FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Avenue South
Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

May 26, 2023

Peter Leon, Project Manager
Leon Environmental
8047 Burke Ave N
Seattle, WA 98103

Dear Mr Leon:

Included are the additional results from the testing of material submitted on March 24, 2023 from the Port of Friday Harbor Jensen's Marina, F&BI 303388 project. There is 1 page included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Peter Leon, Grant Hainsworth
NAA0526R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on March 24, 2023 by Friedman & Bruya, Inc. from the Crete Consulting Port of Friday Harbor Jensen's Marina, F&BI 303388 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
303388 -01	SED-07C:0-1
303388 -02	SED-07C:1-3
303388 -03	SED-08C:0-1
303388 -04	SED-08C:1-3
303388 -05	SED-08C:3-5
303388 -06	SED-08C:5-7
303388 -07	SED-09C:0-1
303388 -08	SED-09C:1-3
303388 -09	SED-09C:3-5
303388 -10	SED-09C:5-7
303388 -11	SED-12C:0-1
303388 -12	SED-12C:1-3
303388 -13	SED-26C:0-1
303388 -14	SED-26C:1-3
303388 -15	SED-26C:3-5
303388 -16	SED-26C:5-7
303388 -17	SED-25C:0-1
303388 -18	SED-25C:1-3
303388 -19	SED-25C:3-5
303388 -20	SED-25C:5-7
303388 -21	SED-27C:0-1
303388 -22	SED-27C:1-3
303388 -23	SED-27C:3-5
303388 -24	SED-27C:5-7
303388 -25	SED-DUP2C
303388 -26	SED-10C:0-1
303388 -27	SED-10C:1-3
303388 -28	SED-10C:3-5
303388 -29	SED-10C:5-6
303388 -30	SED-11C:0-1
303388 -31	SED-11C:1-3
303388 -32	SED-11C:3-5
303388 -33	SED-27G:0-10
303388 -34	SED-DUP3C

The samples selected for total solids, total organic carbon, ammonia and dioxins and furans were sent to Analytical Resources for analyses. The samples selected for grain size analysis were sent to HWA Geosciences. The reports are enclosed.

303388

SAMPLE CHAIN OF CUSTODY 03/24/23 #3/#4

Page # 1 of 4

Report To Leon Jones / Hainsworth

Company LE / CRETE

Address

City, State, ZIP

Phone 832.330.1359 Email

SAMPLERS (signature): Rusty Jones R. Jones

PROJECT NAME: Port of Friday Harbor Jensen's Marina

PO #

REMARKS

Project specific RLs? - Yes / No

INVOICE TO: L-E

TURNAROUND TIME
- [x] Standard turnaround
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [x] Archive samples
- [ ] Other
- Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED: Dioxins/Furans NWTPH-Dx SGT	NWTPH-Gx/BTEX	Total Sulfides EPA 8021B	Ammonia NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Grain Size	TOC, Total Solids	SMS Metals, Hg	SMS SVOCs, PCBs, SMS Pest.	Notes
SED-07C:0-1	01 A-F	3/22/2023	0729	SOLIDS	7		X						X	X		X	SMS SVOCs only D/F Archive
SED-07C:1-3	02 A-C		0729		3		X						X	X			
SED-08C:0-1	03 A-I		0807		9	X	X						X	X		(X)	per Appendix ME
SED-08C:1-3	04 A-G		0807		7		X						X	X		X	Hold SMS SVOCs, PCBs, SMS Pest. D/F Archive
SED-08C:3-5	05 A-D		0807		4												Archive All D/F Archive
SED-08C:5-7	06 A-D		0807		4												Archive All D/F Archive
SED-09C:0-1	07 A-H		0833		8	X	X						X	X	X	X	
SED-09C:1-3	08 A-J		0833		8	X	X						X	X	X	X	
SED-09C:3-5	09 A-D		0833		4												Archive All D/F Archive
SED-09C:5-7	10 A-D	↓	0833	↓	4												Archive All D/F Archive

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	3/24/23	0808
Received by: [signature]	Nhan Phan	FedEx	3/24/23	0808
Relinquished by:		Samples received at 0 °C		
Received by:				

Friedman & Bruya, Inc.
Ph. (206) 285-8282

303388

SAMPLE CHAIN OF CUSTODY 03/24/23

H3/H4

Page # 2 of 4

Report To Leon Jones | Hainsworth

Company L-E / CRETE

Address

City, State, ZIP

Phone 832-330-1359 Email

SAMPLERS (signature) Rusty Jones R. Jones

PROJECT NAME: Port of Friday Harbor, Jensen's Marina

PO #

REMARKS

Project specific RLs? - Yes / No

INVOICE TO: L-E

TURNAROUND TIME
- [x] Standard turnaround
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [x] Archive samples
- [ ] Other
- Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	Dioxins/Furans 1613B	TBT NWTPH-Dx or	Total Sulfides BTEX EPA 8021B	SMS SVOCs NWTPH-HCID	PCB Aroclors VOCs EPA 8260C	SMS Pesticides EAHs EPA 8270D	PCBs EPA 8082	Grain Size	TOC, Total Solids	SMS Metals, Hg	D/F Archive	Notes
SED-12C:0-1	11 A-H	3/22/2023	0925	SOLIDS	8	X				X			X	X			
SED-12C:1-3	12 A-D		0925		4											X	Archive All
SED-26C:0-1	13 A-H		1038		8	X	X		X	X	X		X	X	X	X	
SED-26C:1-3	14 A-I		1038		10		X		X	X			X	X	X	X	
SED-26C:3-5	15 A-D		1038		4											X	Archive All
SED-26C:5-7	16 A-D		1038		4											X	Archive All
SED-25C:0-1	17 A-H		1119		8	X	X		X	X	X		X	X	X		
SED-25C:1-3	18 A-I		1119		10		X		X	X			X	X	X		D/F Archive
SED-25C:3-5	19 A-D		1119		4											X	Archive All
SED-25C:5-7	20 A-D		1119		4											X	Archive All

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	3/24/23	0805
Received by:	Nhan Phan	FEBI	3/24/23	0808
Relinquished by:		Samples received at 0°C		
Received by:				

Friedman & Bruya, Inc.
Ph. (206) 285-8282

303384

SAMPLE CHAIN OF CUSTODY 03/24/23 #3/#4

Page # 3 of 4

Report To Leon/Jones/Hainsworth

Company L-E/CRETE

Address

City, State, ZIP

Phone 832.330.1359 Email

SAMPLERS (signature) R. Jones Rusty Jones

PROJECT NAME: Port of Friday Harbor, Jensen's Marina

PO #

REMARKS

Project specific RLs? - Yes / No

INVOICE TO: L-E

TURNAROUND TIME
- [x] Standard turnaround
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [x] Archive samples
- [ ] Other
- Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED: Dioxins/Furans 8290A HRMS	Arsenic, Mercury 7471B	Total Sulfides EPA 9034	BTEX EPA 8021B	SVOCs EPA 8270 SIM HRMS	PAHs EPA 8270 SIM HRMS	VOCs EPA 8260	PCBs EPA 8082	Grain Size	TOC, Total Solids	SVOCs, Metals, Hg	D/F Archive	Notes
SED-27C:0-1	21 A-E	3/22/2023	1324	SOLIDS	5													Archive All
SED-27C:1-3	22 A-F		1324		6													Archive All
SED-27C:3-5	23 A-D		1324		4													Archive All
SED-27C:5-7	24 A-D	↓	1324	↓	4													Archive All
~~DS~~ SED-DUP2C	25	3/22/2023	1200	SOLIDS	1									X				
SED-10C:0-1	26 A-H	3/23/23	0817	SOLIDS	(8)	X	X		X		X		X	X	X	X		
SED-10C:1-3	27 A-I		0817		9	X	X		X		X		X	X	X	X		
SED-10C:3-5	28 A-D		0817		4													Archive All D/F Archive
SED-10C:5-6	29 A-D		0817		4													Archive All D/F Archive
SED-11C:0-1	30 A-G	↓	0842	↓	7	X			X		X		X	X	X	X		

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	3/24/23	0808
Received by:	Nham Pham	FEBI	3/24/23	0808
Relinquished by:		Samples received at 0°C		
Received by:				

Friedman & Bruya, Inc.
Ph. (206) 285-8282

SAMPLE CHAIN OF CUSTODY 03/24/23 #3/#4

303388

Report To Leon Jones Hainsworth

Company L-E/CRETE

Address

City, State, ZIP

Phone 832.330.1359 Email

SAMPLERS (*signature*) Rusty Jones R Jones

PROJECT NAME: Port of Friday Harbor

PO #

REMARKS

Project specific RLs? - Yes / No

INVOICE TO: L-E

TURNAROUND TIME
- [x] Standard turnaround
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [x] Archive samples
- [ ] Other
- Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED: Dioxins/Furans NWTPH-DX HP	TBT NWTPH-Gx HP	Total Sulfides BTEX EPA 8021B	Ammonia NWTPH-HCID HP	SMS SVOCs EPA 8270D	SMS Pesticides, PAHs EPA 8270D	PCBs EPA 8082	Grain Size	TOC, Total Solids	SMS Metals Hg	DIF Archive	Notes
SED-11C: 1-3	31 A-I	3/23/2023	0842	SOLIDS	9	X				X	X	X	X	X	X		Hg Metal only
SED-11C: 3-5	32 A-D	↓	0842	↓	4											X	Archive All
SED-27G: 0-10	33 A-H	↓	1017	↓	8			X	X								+1 bioassay bag
SED-DUP3C	34 A-B	↓	1200	↓	2						X		X	X			SMS Pesticides if volume permit

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	3/24/23	0805
Received by:	Nhan Phan	FCBI	3/24/23	0808
Relinquished by:		Samples received at 0°C		
Received by:				

Friedman & Bruya, Inc.
Ph. (206) 285-8282

Analytical Resources, LLC
Analytical Chemists and Consultants
Tukwila, WA

06 May 2023

Michael Erdahl
Friedman & Bruya Inc.
3012 16th Avenue West
Seattle, WA 98119-2029

RE: Port of Friday Harbor (303388)

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
23C0619	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, LLC

Shelly Fishel, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006-012

23C0619

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER
ARI

PROJECT NAME/NO.	PO #
303388	D-229

REMARKS

merdahl@friedmanandbruya.co

TURNAROUND TIME
☒ Standard TAT
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	TBT	TOC	Total Solids	Dioxins/Furans	Ammonia	Sulfides					Notes
SED-07C:0-1		3/22/2023	729	sediment	2	X	X	X								
SED-07C:1-3		3/22/2023	729	sediment	2	X	X	X								
SED-08C:0-1		3/22/2023	807	sediment	3	X	X	X	X							
SED-08C:1-3		3/22/2023	807	sediment	2	X	X	X								
SED-09C:0-1		3/22/2023	833	sediment	3	X	X	X	X							
SED-09C:1-3		3/22/2023	833	sediment	3	X	X	X	X							
SED-12C:0-1		3/22/2023	925	sediment	2		X	X	X							
SED-26C:0-1		3/22/2023	1038	sediment	3	X	X	X	X							
SED-26C:1-3		3/22/2023	1038	sediment	2	X	X	X								
SED-25C:0-1		3/22/2023	1119	sediment	3	X	X	X	X							
SED-25C:1-3		3/22/2023	1119	sediment	2	X	X	X								
SED-10C:0-1		3/23/2023	817	sediment	3	X	X	X	X							
SED-10C:1-3		3/23/2023	817	sediment	3	X	X	X	X							

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Michael Erdahl	Friedman & Bruya	3/24/23	1330
Received by:	Phillip Baker	Phillip Baker	AR	3/24/23	16:25
Relinquished by:					
Received by:					

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

23C0619

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER
ARI

PROJECT NAME/NO.	PO #
303388	D-229

REMARKS

merdahl@friedmanandbruya.co

TURNAROUND TIME
☒ Standard TAT
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED: TBT	TOC	Total Solids	Dioxins/Furans	Ammonia	Sulfides					Notes
SED-11C:0-1		3/23/2023	842	sediment	2		X	X	X							
SED-11C:1-3		3/23/2023	842	sediment	2		X	X	X							
SED-27G:0-10		3/23/2023	1017	sediment	2					X	X					
SED-DUP3C		3/23/2023	1200	sediment	2		X	X								

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Michael Erdahl	Friedman & Bruya	3/24/23	1330
Received by:	Phillip	Phillip Bates	AR	3/24/23	16:25
Relinquished by:					
Received by:					

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SED-07C:0-1	23C0619-01	Solid	22-Mar-2023 07:29	24-Mar-2023 16:25
SED-07C:1-3	23C0619-02	Solid	22-Mar-2023 07:29	24-Mar-2023 16:25
SED-08C:0-1	23C0619-03	Solid	22-Mar-2023 08:07	24-Mar-2023 16:25
SED-08C:1-3	23C0619-04	Solid	22-Mar-2023 08:07	24-Mar-2023 16:25
SED-09C:0-1	23C0619-05	Solid	22-Mar-2023 08:33	24-Mar-2023 16:25
SED-09C:1-3	23C0619-06	Solid	22-Mar-2023 08:33	24-Mar-2023 16:25
SED-12C:0-1	23C0619-07	Solid	22-Mar-2023 09:25	24-Mar-2023 16:25
SED-26C:0-1	23C0619-08	Solid	22-Mar-2023 10:38	24-Mar-2023 16:25
SED-26C:1-3	23C0619-09	Solid	22-Mar-2023 10:38	24-Mar-2023 16:25
SED-25C:0-1	23C0619-10	Solid	22-Mar-2023 11:19	24-Mar-2023 16:25
SED-25C:1-3	23C0619-11	Solid	22-Mar-2023 11:19	24-Mar-2023 16:25
SED-10C:0-1	23C0619-12	Solid	23-Mar-2023 08:17	24-Mar-2023 16:25
SED-10C:1-3	23C0619-13	Solid	23-Mar-2023 08:17	24-Mar-2023 16:25
SED-11C:0-1	23C0619-14	Solid	23-Mar-2023 08:42	24-Mar-2023 16:25
SED-11C:1-3	23C0619-15	Solid	23-Mar-2023 08:42	24-Mar-2023 16:25
SED-27G:0-10	23C0619-16	Solid	23-Mar-2023 10:17	24-Mar-2023 16:25

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

Work Order Case Narrative

Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Project Number: 303388
Work Order: 23C0619

Sample receipt

Samples as listed on the preceding page were received 24-Mar-2023 16:25 under ARI work order 23C0619. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Wet Chemistry

The sample(s) were prepared and analyzed within the recommended holding times.

The TOC instrument PC fried and samples were not frozen to extend hold time. The sample had been submitted to Fremont Analytical but the client opted to cancel TOC from this work order and supply frozen volume. The TOC analysis was logged under work order 23E0152.

Initial and continuing calibrations were within method requirements.

The method blank(s) were clean at the reporting limits.

The blank spike (BS/LCS) percent recoveries were within control limits.

The duplicate (DUP) relative percent difference (RPD) were within advisory control limits.

Dioxin/Furans - EPA Method 1613

The sample(s) were extracted and analyzed within the recommended holding times. Analysis was performed using an application specific column developed by Restek. The RTX-Dioxin2 column has unique isomer separation for the 2378-TCDF, eliminating the need for confirmation analysis.

Initial and continuing calibrations were within method requirements.

Labeled internal standard areas were within limits.

The cleanup surrogate percent recoveries were within control limits.

The method blank(s) were clean at the reporting limits except 1234678-HpCDD and OCDD. All samples which contain analyte have been flagged with a "B" qualifier.

The OPR (Ongoing Precision and Recovery) standard percent recoveries were within control limits.

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

The reference material (SRM) percent recoveries were within control limits.

Butyl Tin(s) - EPA Method SW8270E-SIM

The sample(s) were extracted and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

Internal standard areas were within limits.

The surrogate percent recoveries were within control limits.

The method blank(s) were clean at the reporting limits.

The blank spike (BS/LCS) percent recoveries were within control limits.

The duplicate (DUP) relative percent difference (RPD) were within advisory control limits except Tributyltin which has been flagged. The matrix spike/matrix spike duplicate (MS/MSD) percent recoveries and relative percent difference (RPD) were within advisory control limits.

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Friedman & Bruya

Project Name: 303388

COC No(s): NA

Delivered by: Fed-Ex UPS Courier Hand Delivered Other:

Assigned ARI Job No: 23C0619

Tracking No: NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler? YES NO

Were custody papers included with the cooler? YES NO

Were custody papers properly filled out (ink, signed, etc.) YES NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 8.3

Time 16:25

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID#: 30097708

Cooler Accepted by: PIB Date: 3/24/23 Time: 16:25

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES NO

What kind of packing material was used? Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other:

Was sufficient ice used (if appropriate)? NA YES NO

How were bottles sealed in plastic bags? Individually Grouped Not

Did all bottles arrive in good condition (unbroken)? YES NO

Were all bottle labels complete and legible? YES NO

Did the number of containers listed on COC match with the number of containers received? YES NO

Did all bottle labels and tags agree with custody papers? YES NO

Were all bottles used correct for the requested analyses? YES NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs) NA YES NO

Were all VOC vials free of air bubbles? NA YES NO

Was sufficient amount of sample sent in each bottle? YES NO

Date VOC Trip Blank was made at ARI NA

Were the sample(s) split by ARI? NA YES Date/Time: Equipment: Split by:

Samples Logged by: IJ Date: 03/25/23 Time: 0945 Labels checked by: IJ

*** Notify Project Manager of discrepancies or concerns ***

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Temperature Compliance Form

ARI Work Order: 23C0619

Cooler#: _____ **Temperature(°C):** 8.3

Sample ID	Bottle Count	Bottle Type
Samples received above 6°C		

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Completed by: JAB Date: 5/24/23 Time: 16:25

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-07C:0-1
23C0619-01 (Solid)

Butyl Tins

Method: EPA 8270E-SIM — Sampled: 03/22/2023 07:29
Instrument: NT12 Analyst: JZ — Analyzed: 04/06/2023 21:51

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 23C0619-01 A 01
	Preparation Batch: BLC0727	Sample Size: 5.98 g (wet)	Dry Weight:5.03 g
	Prepared: 03/28/2023	Final Volume: 0.5 mL	% Solids: 84.09
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-01 A 01
	Cleanup Batch: CLD0022	Initial Volume: 0.5 uL	
	Cleaned: 04-Apr-2023	Final Volume: 0.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.447	3.84	3.61	ug/kg	J
Dibutyltin Ion	14488-53-0	1	1.72	5.75	ND	ug/kg	U
Butyltin Ion	78763-54-9	1	1.88	4.06	ND	ug/kg	U
Tetrabutyltin	1461-25-2	1	4.97	4.97	ND	ug/kg	U
Surrogate: Tripentyltin				*30-160 %*	*80.1*	*%*	
Surrogate: Tripropyltin				*30-160 %*	*77.0*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-07C:1-3

23C0619-02 (Solid)

Butyl Tins

Method: EPA 8270E-SIM — Sampled: 03/22/2023 07:29
Instrument: NT12 Analyst: JZ — Analyzed: 04/06/2023 22:56

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 23C0619-02 A 01
	Preparation Batch: BLC0727	Sample Size: 6.59 g (wet)	Dry Weight:5.02 g
	Prepared: 03/28/2023	Final Volume: 0.5 mL	% Solids: 76.13
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-02 A 01
	Cleanup Batch: CLD0022	Initial Volume: 0.5 uL	
	Cleaned: 04-Apr-2023	Final Volume: 0.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.448	3.85	1.22	ug/kg	J
Dibutyltin Ion	14488-53-0	1	1.72	5.76	ND	ug/kg	U
Butyltin Ion	78763-54-9	1	1.88	4.07	ND	ug/kg	U
Tetrabutyltin	1461-25-2	1	4.98	4.98	ND	ug/kg	U
Surrogate: Tripentyltin				*30-160 %*	*81.4*	*%*	
Surrogate: Tripropyltin				*30-160 %*	*83.4*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-08C:0-1

23C0619-03 (Solid)

Butyl Tins

Method: EPA 8270E-SIM — Sampled: 03/22/2023 08:07

Instrument: NT12 Analyst: JZ — Analyzed: 04/06/2023 23:13

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 23C0619-03 A 01
	Preparation Batch: BLC0727	Sample Size: 7.17 g (wet)	Dry Weight:5.03 g
	Prepared: 03/28/2023	Final Volume: 0.5 mL	% Solids: 70.22
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-03 A 01
	Cleanup Batch: CLD0022	Initial Volume: 0.5 uL	
	Cleaned: 04-Apr-2023	Final Volume: 0.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.447	3.83	58.3	ug/kg	
Dibutyltin Ion	14488-53-0	1	1.72	5.74	36.4	ug/kg	
Butyltin Ion	78763-54-9	1	1.88	4.05	10.4	ug/kg	
Tetrabutyltin	1461-25-2	1	4.97	4.97	ND	ug/kg	U
Surrogate: Tripentyltin				*30-160 %*	*81.8*	*%*	
Surrogate: Tripropyltin				*30-160 %*	*80.0*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-08C:0-1

23C0619-03 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 08:07

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/24/2023 20:08

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 1613		Extract ID: 23C0619-03 C 01
	Preparation Batch: BLD0089	Sample Size: 15.12 g (wet)	Dry Weight:10.01 g
	Prepared: 04/06/2023	Final Volume: 20 uL	% Solids: 66.22
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-03 C 01
	Cleanup Batch: CLD0068	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:23C0619-03 C 01
	Cleanup Batch: CLD0067	Initial Volume: 20 uL	
	Cleaned: 10-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Florisil		Extract ID:23C0619-03 C 01
	Cleanup Batch: CLD0069	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF		0.820	0.655-0.886	0.367	0.999	**2.85**	ng/kg	X
2,3,7,8-TCDD		0.508	0.655-0.886	0.147	0.999	**0.323**	ng/kg	EMPC, J
1,2,3,7,8-PeCDF		1.810	1.318-1.783	0.466	0.999	**3.06**	ng/kg	EMPC
2,3,4,7,8-PeCDF		1.781	1.318-1.783	0.418	0.999	**2.83**	ng/kg	
1,2,3,7,8-PeCDD		1.528	1.318-1.783	0.245	0.999	**3.29**	ng/kg	
1,2,3,4,7,8-HxCDF		1.442	1.054-1.426	0.166	0.999	**3.98**	ng/kg	EMPC
1,2,3,6,7,8-HxCDF		1.544	1.054-1.426	0.177	0.999	**2.70**	ng/kg	EMPC
2,3,4,6,7,8-HxCDF		1.386	1.054-1.426	0.183	0.999	**4.17**	ng/kg	
1,2,3,7,8,9-HxCDF		1.036	1.054-1.426	0.238	0.999	**1.61**	ng/kg	EMPC
1,2,3,4,7,8-HxCDD		1.244	1.054-1.426	0.446	0.999	**5.04**	ng/kg	
1,2,3,6,7,8-HxCDD		1.260	1.054-1.426	0.453	0.999	**21.5**	ng/kg	
1,2,3,7,8,9-HxCDD		1.116	1.054-1.426	0.495	0.999	**8.83**	ng/kg	
1,2,3,4,6,7,8-HpCDF		1.026	0.893-1.208	0.228	0.999	**60.4**	ng/kg	
1,2,3,4,7,8,9-HpCDF		0.850	0.893-1.208	0.350	0.999	**3.22**	ng/kg	EMPC
1,2,3,4,6,7,8-HpCDD		1.022	0.893-1.208	1.24	2.50	**1080**	ng/kg	B
OCDF		0.827	0.757-1.024	0.426	2.50	**147**	ng/kg	
OCDD		0.856	0.757-1.024	0.886	9.99	**7300**	ng/kg	E, B
Homologue groups								
Total TCDF					0.999	**27.6**	ng/kg	
Total TCDD					0.999	**4.73**	ng/kg	
Total PeCDF					0.999	**36.3**	ng/kg	
Total PeCDD					0.999	**20.4**	ng/kg	
Total HxCDF					0.999	**95.5**	ng/kg	
Total HxCDD					0.999	**447**	ng/kg	
Total HpCDF					0.999	**180**	ng/kg	
Total HpCDD					0.999	**4540**	ng/kg	B

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-08C:0-1

23C0619-03 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 08:07

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/24/2023 20:08

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):					23.29		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):					23.29		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, EMPC = ND):					22.65		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, EMPC = ND):					22.02		

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-08C:0-1

23C0619-03 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 08:07

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/24/2023 20:08

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Labeled compounds							
13C12-2,3,7,8-TCDF		*0.761*	*0.655-0.886*	*24-169 %*	*52.0*	*%*	
13C12-2,3,7,8-TCDD		*0.802*	*0.655-0.886*	*25-164 %*	*61.8*	*%*	
13C12-1,2,3,7,8-PeCDF		*1.524*	*1.318-1.783*	*24-185 %*	*82.7*	*%*	
13C12-2,3,4,7,8-PeCDF		*1.540*	*1.318-1.783*	*21-178 %*	*88.5*	*%*	
13C12-1,2,3,7,8-PeCDD		*1.753*	*1.318-1.783*	*25-181 %*	*69.9*	*%*	
13C12-1,2,3,4,7,8-HxCDF		*0.513*	*0.434-0.587*	*26-152 %*	*78.0*	*%*	
13C12-1,2,3,6,7,8-HxCDF		*0.511*	*0.434-0.587*	*26-123 %*	*71.2*	*%*	
13C12-2,3,4,6,7,8-HxCDF		*0.516*	*0.434-0.587*	*28-136 %*	*81.4*	*%*	
13C12-1,2,3,7,8,9-HxCDF		*0.514*	*0.434-0.587*	*29-147 %*	*40.2*	*%*	
13C12-1,2,3,4,7,8-HxCDD		*1.262*	*1.054-1.426*	*32-141 %*	*84.2*	*%*	
13C12-1,2,3,6,7,8-HxCDD		*1.230*	*1.054-1.426*	*28-130 %*	*73.9*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF		*0.462*	*0.374-0.506*	*28-143 %*	*93.9*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF		*0.445*	*0.374-0.506*	*26-138 %*	*86.1*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD		*1.120*	*0.893-1.208*	*23-140 %*	*78.4*	*%*	
13C12-OCDD		*0.897*	*0.757-1.024*	*17-157 %*	*76.1*	*%*	
37Cl4-2,3,7,8-TCDD				*35-197 %*	*58.3*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-08C:0-1

23C0619-03 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 08:07

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/24/2023 20:08

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes

SED-08C:0-1

23C0619-03 (Solid)

Extractions

Method: ASTM D2216 — Sampled: 03/22/2023 08:07

Instrument: N/A Analyst: NL — Analyzed: 04/01/2023 08:31

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep-Organics — Extract ID: 23C0619-03

Preparation Batch: BLC0566 — Sample Size: 1 g (wet) — Dry Weight:0.67 g

Prepared: 03/22/2023 — Final Volume: 1 g — % Solids: 67.08

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	66.22	%	

Labeled compounds

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-08C:1-3

23C0619-04 (Solid)

Butyl Tins

Method: EPA 8270E-SIM — Sampled: 03/22/2023 08:07
Instrument: NT12 Analyst: JZ — Analyzed: 04/06/2023 23:29

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 23C0619-04 A 01
	Preparation Batch: BLC0727	Sample Size: 6.76 g (wet)	Dry Weight:5.02 g
	Prepared: 03/28/2023	Final Volume: 0.5 mL	% Solids: 74.20
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-04 A 01
	Cleanup Batch: CLD0022	Initial Volume: 0.5 uL	
	Cleaned: 04-Apr-2023	Final Volume: 0.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.449	3.85	19.7	ug/kg	
Dibutyltin Ion	14488-53-0	1	1.72	5.76	3.28	ug/kg	J
Butyltin Ion	78763-54-9	1	1.88	4.07	ND	ug/kg	U
Tetrabutyltin	1461-25-2	1	4.98	4.98	ND	ug/kg	U
Surrogate: Tripentyltin				*30-160 %*	*88.3*	*%*	
Surrogate: Tripropyltin				*30-160 %*	*90.6*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-09C:0-1

23C0619-05 (Solid)

Butyl Tins

Method: EPA 8270E-SIM — Sampled: 03/22/2023 08:33
Instrument: NT12 Analyst: JZ — Analyzed: 04/06/2023 23:46

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 23C0619-05 A 01
	Preparation Batch: BLC0727	Sample Size: 7.08 g (wet)	Dry Weight:5.00 g
	Prepared: 03/28/2023	Final Volume: 0.5 mL	% Solids: 70.63
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-05 A 01
	Cleanup Batch: CLD0022	Initial Volume: 0.5 uL	
	Cleaned: 04-Apr-2023	Final Volume: 0.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.450	3.86	52.6	ug/kg	
Dibutyltin Ion	14488-53-0	1	1.73	5.78	37.1	ug/kg	
Butyltin Ion	78763-54-9	1	1.89	4.08	7.19	ug/kg	
Tetrabutyltin	1461-25-2	1	5.00	5.00	ND	ug/kg	U
Surrogate: Tripentyltin				*30-160 %*	*72.5*	*%*	
Surrogate: Tripropyltin				*30-160 %*	*69.7*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-09C:0-1

23C0619-05 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 08:33

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/24/2023 20:57

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 1613		Extract ID: 23C0619-05 C 01
	Preparation Batch: BLD0089	Sample Size: 13.97 g (wet)	Dry Weight:10.01 g
	Prepared: 04/06/2023	Final Volume: 20 uL	% Solids: 71.65
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-05 C 01
	Cleanup Batch: CLD0068	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:23C0619-05 C 01
	Cleanup Batch: CLD0067	Initial Volume: 20 uL	
	Cleaned: 10-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Florisil		Extract ID:23C0619-05 C 01
	Cleanup Batch: CLD0069	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF		0.794	0.655-0.886	0.164	0.999	**0.933**	ng/kg	X, J
2,3,7,8-TCDD		0.494	0.655-0.886	0.096	0.999	**0.239**	ng/kg	EMPC, J
1,2,3,7,8-PeCDF		1.539	1.318-1.783	0.217	0.999	**2.10**	ng/kg	
2,3,4,7,8-PeCDF		1.963	1.318-1.783	0.195	0.999	**1.58**	ng/kg	EMPC
1,2,3,7,8-PeCDD		1.538	1.318-1.783	0.275	0.999	**1.30**	ng/kg	
1,2,3,4,7,8-HxCDF		1.248	1.054-1.426	0.134	0.999	**2.70**	ng/kg	
1,2,3,6,7,8-HxCDF		1.331	1.054-1.426	0.141	0.999	**1.59**	ng/kg	
2,3,4,6,7,8-HxCDF		1.139	1.054-1.426	0.148	0.999	**1.94**	ng/kg	
1,2,3,7,8,9-HxCDF		1.185	1.054-1.426	0.171	0.999	**1.78**	ng/kg	
1,2,3,4,7,8-HxCDD		1.323	1.054-1.426	0.310	0.999	**1.73**	ng/kg	
1,2,3,6,7,8-HxCDD		1.308	1.054-1.426	0.317	0.999	**13.4**	ng/kg	
1,2,3,7,8,9-HxCDD		1.257	1.054-1.426	0.345	0.999	**4.88**	ng/kg	
1,2,3,4,6,7,8-HpCDF		1.059	0.893-1.208	0.235	0.999	**36.2**	ng/kg	
1,2,3,4,7,8,9-HpCDF		1.125	0.893-1.208	0.407	0.999	**1.73**	ng/kg	
1,2,3,4,6,7,8-HpCDD		1.025	0.893-1.208	0.878	2.50	**556**	ng/kg	B
OCDF		0.943	0.757-1.024	0.475	2.50	**61.1**	ng/kg	
OCDD		0.862	0.757-1.024	0.692	9.99	**3810**	ng/kg	B
Homologue groups								
Total TCDF					0.999	**3.66**	ng/kg	
Total TCDD					0.999	**0.377**	ng/kg	J
Total PeCDF					0.999	**23.5**	ng/kg	
Total PeCDD					0.999	**4.89**	ng/kg	
Total HxCDF					0.999	**90.7**	ng/kg	
Total HxCDD					0.999	**180**	ng/kg	
Total HpCDF					0.999	**124**	ng/kg	
Total HpCDD					0.999	**3210**	ng/kg	B

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-09C:0-1

23C0619-05 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 08:33

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/24/2023 20:57

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):					12.07		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):					12.07		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, EMPC = ND):					11.72		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, EMPC = ND):					11.36		

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-09C:0-1

23C0619-05 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 08:33

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/24/2023 20:57

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Labeled compounds							
13C12-2,3,7,8-TCDF		*0.734*	*0.655-0.886*	*24-169 %*	*86.4*	*%*	
13C12-2,3,7,8-TCDD		*0.797*	*0.655-0.886*	*25-164 %*	*89.0*	*%*	
13C12-1,2,3,7,8-PeCDF		*1.587*	*1.318-1.783*	*24-185 %*	*93.5*	*%*	
13C12-2,3,4,7,8-PeCDF		*1.511*	*1.318-1.783*	*21-178 %*	*94.2*	*%*	
13C12-1,2,3,7,8-PeCDD		*1.726*	*1.318-1.783*	*25-181 %*	*74.1*	*%*	
13C12-1,2,3,4,7,8-HxCDF		*0.511*	*0.434-0.587*	*26-152 %*	*84.5*	*%*	
13C12-1,2,3,6,7,8-HxCDF		*0.510*	*0.434-0.587*	*26-123 %*	*74.7*	*%*	
13C12-2,3,4,6,7,8-HxCDF		*0.513*	*0.434-0.587*	*28-136 %*	*82.4*	*%*	
13C12-1,2,3,7,8,9-HxCDF		*0.521*	*0.434-0.587*	*29-147 %*	*79.1*	*%*	
13C12-1,2,3,4,7,8-HxCDD		*1.286*	*1.054-1.426*	*32-141 %*	*88.2*	*%*	
13C12-1,2,3,6,7,8-HxCDD		*1.246*	*1.054-1.426*	*28-130 %*	*74.4*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF		*0.444*	*0.374-0.506*	*28-143 %*	*94.7*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF		*0.445*	*0.374-0.506*	*26-138 %*	*83.0*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD		*1.098*	*0.893-1.208*	*23-140 %*	*77.6*	*%*	
13C12-OCDD		*0.888*	*0.757-1.024*	*17-157 %*	*79.0*	*%*	
37Cl4-2,3,7,8-TCDD				*35-197 %*	*85.2*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-09C:0-1

23C0619-05 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 08:33

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/24/2023 20:57

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes

SED-09C:0-1

23C0619-05 (Solid)

Extractions

Method: ASTM D2216 — Sampled: 03/22/2023 08:33

Instrument: N/A Analyst: NL — Analyzed: 04/01/2023 08:31

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep-Organics — Extract ID: 23C0619-05

Preparation Batch: BLC0566 — Sample Size: 1 g (wet) — Dry Weight:0.71 g

Prepared: 03/22/2023 — Final Volume: 1 g — % Solids: 70.59

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	71.65	%	

Labeled compounds

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-09C:1-3

23C0619-06 (Solid)

Butyl Tins

Method: EPA 8270E-SIM — Sampled: 03/22/2023 08:33
Instrument: NT12 Analyst: JZ — Analyzed: 04/07/2023 00:02

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 23C0619-06 A 01
	Preparation Batch: BLC0727	Sample Size: 6.49 g (wet)	Dry Weight:5.02 g
	Prepared: 03/28/2023	Final Volume: 0.5 mL	% Solids: 77.40
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-06 A 01
	Cleanup Batch: CLD0022	Initial Volume: 0.5 uL	
	Cleaned: 04-Apr-2023	Final Volume: 0.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.448	3.84	ND	ug/kg	U
Dibutyltin Ion	14488-53-0	1	1.72	5.75	ND	ug/kg	U
Butyltin Ion	78763-54-9	1	1.88	4.06	ND	ug/kg	U
Tetrabutyltin	1461-25-2	1	4.98	4.98	ND	ug/kg	U
Surrogate: Tripentyltin				*30-160 %*	*75.1*	*%*	
Surrogate: Tripropyltin				*30-160 %*	*79.7*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-09C:1-3

23C0619-06 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 08:33

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/24/2023 21:46

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 1613		Extract ID: 23C0619-06 C 01
	Preparation Batch: BLD0089	Sample Size: 12.82 g (wet)	Dry Weight:10.00 g
	Prepared: 04/06/2023	Final Volume: 20 uL	% Solids: 78.03
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-06 C 01
	Cleanup Batch: CLD0068	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:23C0619-06 C 01
	Cleanup Batch: CLD0067	Initial Volume: 20 uL	
	Cleaned: 10-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Florisil		Extract ID:23C0619-06 C 01
	Cleanup Batch: CLD0069	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF			0.655-0.886	0.183	1.00	ND	ng/kg	U
2,3,7,8-TCDD			0.655-0.886	0.110	1.00	ND	ng/kg	U
1,2,3,7,8-PeCDF			1.318-1.783	0.208	1.00	ND	ng/kg	U
2,3,4,7,8-PeCDF			1.318-1.783	0.192	1.00	ND	ng/kg	U
1,2,3,7,8-PeCDD			1.318-1.783	0.152	1.00	ND	ng/kg	U
1,2,3,4,7,8-HxCDF			1.054-1.426	0.089	1.00	ND	ng/kg	U
1,2,3,6,7,8-HxCDF			1.054-1.426	0.091	1.00	ND	ng/kg	U
2,3,4,6,7,8-HxCDF			1.054-1.426	0.092	1.00	ND	ng/kg	U
1,2,3,7,8,9-HxCDF			1.054-1.426	0.123	1.00	ND	ng/kg	U
1,2,3,4,7,8-HxCDD			1.054-1.426	0.120	1.00	ND	ng/kg	U
1,2,3,6,7,8-HxCDD			1.054-1.426	0.120	1.00	ND	ng/kg	U
1,2,3,7,8,9-HxCDD			1.054-1.426	0.132	1.00	ND	ng/kg	U
1,2,3,4,6,7,8-HpCDF		1.422	0.893-1.208	0.106	1.00	**0.178**	ng/kg	EMPC, J
1,2,3,4,7,8,9-HpCDF			0.893-1.208	0.193	1.00	ND	ng/kg	U
1,2,3,4,6,7,8-HpCDD		0.836	0.893-1.208	0.185	2.50	**2.31**	ng/kg	EMPC, J, B
OCDF		1.013	0.757-1.024	0.302	2.50	0.145	ng/kg	J
OCDD		0.821	0.757-1.024	0.327	10.0	**15.0**	ng/kg	B
Homologue groups								
Total TCDF					1.00	ND	ng/kg	U
Total TCDD					1.00	ND	ng/kg	U
Total PeCDF					1.00	**ND**	ng/kg	U
Total PeCDD					1.00	ND	ng/kg	U
Total HxCDF					1.00	ND	ng/kg	U
Total HxCDD					1.00	ND	ng/kg	U
Total HpCDF					1.00	ND	ng/kg	U
Total HpCDD					1.00	**5.60**	ng/kg	B

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-09C:1-3

23C0619-06 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 08:33

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/24/2023 21:46

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):					0.24		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):					0.03		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, EMPC = ND):					0.23		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, EMPC = ND):					0.00		

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-09C:1-3

23C0619-06 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 08:33

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/24/2023 21:46

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Labeled compounds							
13C12-2,3,7,8-TCDF		*0.755*	*0.655-0.886*	*24-169 %*	*68.3*	*%*	
13C12-2,3,7,8-TCDD		*0.769*	*0.655-0.886*	*25-164 %*	*77.5*	*%*	
13C12-1,2,3,7,8-PeCDF		*1.579*	*1.318-1.783*	*24-185 %*	*94.4*	*%*	
13C12-2,3,4,7,8-PeCDF		*1.536*	*1.318-1.783*	*21-178 %*	*94.6*	*%*	
13C12-1,2,3,7,8-PeCDD		*1.724*	*1.318-1.783*	*25-181 %*	*73.7*	*%*	
13C12-1,2,3,4,7,8-HxCDF		*0.530*	*0.434-0.587*	*26-152 %*	*83.3*	*%*	
13C12-1,2,3,6,7,8-HxCDF		*0.510*	*0.434-0.587*	*26-123 %*	*77.4*	*%*	
13C12-2,3,4,6,7,8-HxCDF		*0.510*	*0.434-0.587*	*28-136 %*	*84.7*	*%*	
13C12-1,2,3,7,8,9-HxCDF		*0.514*	*0.434-0.587*	*29-147 %*	*78.8*	*%*	
13C12-1,2,3,4,7,8-HxCDD		*1.238*	*1.054-1.426*	*32-141 %*	*87.6*	*%*	
13C12-1,2,3,6,7,8-HxCDD		*1.307*	*1.054-1.426*	*28-130 %*	*77.7*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF		*0.427*	*0.374-0.506*	*28-143 %*	*102*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF		*0.444*	*0.374-0.506*	*26-138 %*	*83.7*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD		*1.114*	*0.893-1.208*	*23-140 %*	*81.6*	*%*	
13C12-OCDD		*0.907*	*0.757-1.024*	*17-157 %*	*81.9*	*%*	
37Cl4-2,3,7,8-TCDD				*35-197 %*	*72.2*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-09C:1-3

23C0619-06 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 08:33

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/24/2023 21:46

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes

SED-09C:1-3

23C0619-06 (Solid)

Extractions

Method: ASTM D2216 — Sampled: 03/22/2023 08:33

Instrument: N/A Analyst: NL — Analyzed: 04/01/2023 08:31

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep-Organics — Extract ID: 23C0619-06

Preparation Batch: BLC0566 — Sample Size: 1 g (wet) — Dry Weight:0.76 g

Prepared: 03/22/2023 — Final Volume: 1 g — % Solids: 75.82

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	78.03	%	

Labeled compounds

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-12C:0-1

23C0619-07 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 09:25

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/24/2023 22:35

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 1613		Extract ID: 23C0619-07 A 01
	Preparation Batch: BLD0089	Sample Size: 12.47 g (wet)	Dry Weight:10.01 g
	Prepared: 04/06/2023	Final Volume: 20 uL	% Solids: 80.27
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-07 A 01
	Cleanup Batch: CLD0068	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:23C0619-07 A 01
	Cleanup Batch: CLD0067	Initial Volume: 20 uL	
	Cleaned: 10-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Florisil		Extract ID:23C0619-07 A 01
	Cleanup Batch: CLD0069	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF			0.655-0.886	0.186	0.999	ND	ng/kg	U
2,3,7,8-TCDD			0.655-0.886	0.097	0.999	ND	ng/kg	U
1,2,3,7,8-PeCDF			1.318-1.783	0.191	0.999	ND	ng/kg	U
2,3,4,7,8-PeCDF			1.318-1.783	0.181	0.999	ND	ng/kg	U
1,2,3,7,8-PeCDD			1.318-1.783	0.189	0.999	ND	ng/kg	U
1,2,3,4,7,8-HxCDF			1.054-1.426	0.097	0.999	ND	ng/kg	U
1,2,3,6,7,8-HxCDF			1.054-1.426	0.103	0.999	ND	ng/kg	U
2,3,4,6,7,8-HxCDF			1.054-1.426	0.106	0.999	ND	ng/kg	U
1,2,3,7,8,9-HxCDF			1.054-1.426	0.132	0.999	ND	ng/kg	U
1,2,3,4,7,8-HxCDD			1.054-1.426	0.158	0.999	ND	ng/kg	U
1,2,3,6,7,8-HxCDD		1.169	1.054-1.426	0.156	0.999	**0.325**	ng/kg	J
1,2,3,7,8,9-HxCDD		1.656	1.054-1.426	0.173	0.999	0.107	ng/kg	EMPC, J
1,2,3,4,6,7,8-HpCDF		0.967	0.893-1.208	0.100	0.999	**1.28**	ng/kg	
1,2,3,4,7,8,9-HpCDF			0.893-1.208	0.169	0.999	ND	ng/kg	U
1,2,3,4,6,7,8-HpCDD		1.017	0.893-1.208	0.259	2.50	**8.94**	ng/kg	B
OCDF		0.948	0.757-1.024	0.353	2.50	**2.92**	ng/kg	
OCDD		0.818	0.757-1.024	0.362	9.99	**59.3**	ng/kg	B
Homologue groups								
Total TCDF					0.999	ND	ng/kg	U
Total TCDD					0.999	ND	ng/kg	U
Total PeCDF					0.999	**0.510**	ng/kg	J
Total PeCDD					0.999	ND	ng/kg	U
Total HxCDF					0.999	**1.52**	ng/kg	
Total HxCDD					0.999	**2.09**	ng/kg	
Total HpCDF					0.999	**3.63**	ng/kg	
Total HpCDD					0.999	**28.3**	ng/kg	B

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-12C:0-1

23C0619-07 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 09:25

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/24/2023 22:35

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):					0.37		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):					0.15		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, EMPC = ND):					0.37		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, EMPC = ND):					0.15		

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-12C:0-1

23C0619-07 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 09:25

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/24/2023 22:35

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Labeled compounds							
13C12-2,3,7,8-TCDF		*0.756*	*0.655-0.886*	*24-169 %*	*77.2*	*%*	
13C12-2,3,7,8-TCDD		*0.785*	*0.655-0.886*	*25-164 %*	*84.9*	*%*	
13C12-1,2,3,7,8-PeCDF		*1.586*	*1.318-1.783*	*24-185 %*	*90.1*	*%*	
13C12-2,3,4,7,8-PeCDF		*1.524*	*1.318-1.783*	*21-178 %*	*88.3*	*%*	
13C12-1,2,3,7,8-PeCDD		*1.611*	*1.318-1.783*	*25-181 %*	*70.5*	*%*	
13C12-1,2,3,4,7,8-HxCDF		*0.513*	*0.434-0.587*	*26-152 %*	*80.2*	*%*	
13C12-1,2,3,6,7,8-HxCDF		*0.517*	*0.434-0.587*	*26-123 %*	*73.4*	*%*	
13C12-2,3,4,6,7,8-HxCDF		*0.517*	*0.434-0.587*	*28-136 %*	*83.0*	*%*	
13C12-1,2,3,7,8,9-HxCDF		*0.500*	*0.434-0.587*	*29-147 %*	*76.3*	*%*	
13C12-1,2,3,4,7,8-HxCDD		*1.257*	*1.054-1.426*	*32-141 %*	*85.6*	*%*	
13C12-1,2,3,6,7,8-HxCDD		*1.208*	*1.054-1.426*	*28-130 %*	*76.9*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF		*0.435*	*0.374-0.506*	*28-143 %*	*91.0*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF		*0.423*	*0.374-0.506*	*26-138 %*	*79.0*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD		*1.086*	*0.893-1.208*	*23-140 %*	*77.5*	*%*	
13C12-OCDD		*0.895*	*0.757-1.024*	*17-157 %*	*79.0*	*%*	
37Cl4-2,3,7,8-TCDD				*35-197 %*	*80.6*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-12C:0-1

23C0619-07 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 09:25
Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/24/2023 22:35

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes

SED-12C:0-1

23C0619-07 (Solid)

Extractions

Method: ASTM D2216 — Sampled: 03/22/2023 09:25
Instrument: N/A Analyst: NL — Analyzed: 04/01/2023 08:31

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep-Organics — Extract ID: 23C0619-07
Preparation Batch: BLC0566 — Sample Size: 1 g (wet) — Dry Weight:0.79 g
Prepared: 03/22/2023 — Final Volume: 1 g — % Solids: 79.04

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	80.27	%	

Labeled compounds

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-26C:0-1

23C0619-08 (Solid)

Butyl Tins

Method: EPA 8270E-SIM — Sampled: 03/22/2023 10:38

Instrument: NT12 Analyst: JZ — Analyzed: 04/07/2023 00:18

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 23C0619-08 A 01
	Preparation Batch: BLC0727	Sample Size: 7.97 g (wet)	Dry Weight:5.01 g
	Prepared: 03/28/2023	Final Volume: 0.5 mL	% Solids: 62.82
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-08 A 01
	Cleanup Batch: CLD0022	Initial Volume: 0.5 uL	
	Cleaned: 04-Apr-2023	Final Volume: 0.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.449	3.85	214	ug/kg	
Dibutyltin Ion	14488-53-0	1	1.73	5.77	216	ug/kg	
Butyltin Ion	78763-54-9	1	1.89	4.07	40.6	ug/kg	
Tetrabutyltin	1461-25-2	1	4.99	4.99	ND	ug/kg	U
Surrogate: Tripentyltin				*30-160 %*	*79.8*	*%*	
Surrogate: Tripropyltin				*30-160 %*	*84.3*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-26C:0-1

23C0619-08 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 10:38

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 01:09

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 1613		Extract ID: 23C0619-08 C 01
	Preparation Batch: BLD0089	Sample Size: 16.46 g (wet)	Dry Weight:10.03 g
	Prepared: 04/06/2023	Final Volume: 20 uL	% Solids: 60.92
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-08 C 01
	Cleanup Batch: CLD0068	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:23C0619-08 C 01
	Cleanup Batch: CLD0067	Initial Volume: 20 uL	
	Cleaned: 10-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Florisil		Extract ID:23C0619-08 C 01
	Cleanup Batch: CLD0069	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF		0.792	0.655-0.886	0.202	0.997	**3.10**	ng/kg	X
2,3,7,8-TCDD		0.868	0.655-0.886	0.085	0.997	**0.512**	ng/kg	J
1,2,3,7,8-PeCDF		1.537	1.318-1.783	0.166	0.997	**2.65**	ng/kg	
2,3,4,7,8-PeCDF		1.502	1.318-1.783	0.155	0.997	**2.33**	ng/kg	
1,2,3,7,8-PeCDD		1.525	1.318-1.783	0.401	0.997	**4.31**	ng/kg	
1,2,3,4,7,8-HxCDF		1.233	1.054-1.426	0.139	0.997	**4.68**	ng/kg	
1,2,3,6,7,8-HxCDF		1.316	1.054-1.426	0.145	0.997	**3.45**	ng/kg	
2,3,4,6,7,8-HxCDF		1.184	1.054-1.426	0.163	0.997	**5.03**	ng/kg	
1,2,3,7,8,9-HxCDF		1.455	1.054-1.426	0.177	0.997	**1.57**	ng/kg	EMPC
1,2,3,4,7,8-HxCDD		1.219	1.054-1.426	0.330	0.997	**4.08**	ng/kg	
1,2,3,6,7,8-HxCDD		1.220	1.054-1.426	0.330	0.997	**26.1**	ng/kg	
1,2,3,7,8,9-HxCDD		1.216	1.054-1.426	0.364	0.997	**11.0**	ng/kg	
1,2,3,4,6,7,8-HpCDF		1.047	0.893-1.208	0.342	0.997	**116**	ng/kg	
1,2,3,4,7,8,9-HpCDF		0.941	0.893-1.208	0.535	0.997	**5.85**	ng/kg	
1,2,3,4,6,7,8-HpCDD		1.027	0.893-1.208	1.02	2.49	**976**	ng/kg	B
OCDF		0.889	0.757-1.024	0.946	2.49	**554**	ng/kg	
OCDD		0.858	0.757-1.024	1.51	9.97	**8660**	ng/kg	E, B
Homologue groups								
Total TCDF					0.997	**30.7**	ng/kg	
Total TCDD					0.997	**8.75**	ng/kg	
Total PeCDF					0.997	**55.9**	ng/kg	
Total PeCDD					0.997	**19.7**	ng/kg	
Total HxCDF					0.997	**144**	ng/kg	
Total HxCDD					0.997	**233**	ng/kg	
Total HpCDF					0.997	**486**	ng/kg	
Total HpCDD					0.997	**2320**	ng/kg	B

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-26C:0-1

23C0619-08 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 10:38

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 01:09

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):					25.24		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):					25.24		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, EMPC = ND):					25.17		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, EMPC = ND):					25.09		

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-26C:0-1

23C0619-08 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 10:38

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 01:09

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Labeled compounds							
13C12-2,3,7,8-TCDF		*0.752*	*0.655-0.886*	*24-169 %*	*81.9*	*%*	
13C12-2,3,7,8-TCDD		*0.798*	*0.655-0.886*	*25-164 %*	*88.1*	*%*	
13C12-1,2,3,7,8-PeCDF		*1.481*	*1.318-1.783*	*24-185 %*	*92.1*	*%*	
13C12-2,3,4,7,8-PeCDF		*1.545*	*1.318-1.783*	*21-178 %*	*95.4*	*%*	
13C12-1,2,3,7,8-PeCDD		*1.612*	*1.318-1.783*	*25-181 %*	*75.2*	*%*	
13C12-1,2,3,4,7,8-HxCDF		*0.514*	*0.434-0.587*	*26-152 %*	*83.2*	*%*	
13C12-1,2,3,6,7,8-HxCDF		*0.512*	*0.434-0.587*	*26-123 %*	*73.9*	*%*	
13C12-2,3,4,6,7,8-HxCDF		*0.511*	*0.434-0.587*	*28-136 %*	*78.8*	*%*	
13C12-1,2,3,7,8,9-HxCDF		*0.511*	*0.434-0.587*	*29-147 %*	*73.3*	*%*	
13C12-1,2,3,4,7,8-HxCDD		*1.242*	*1.054-1.426*	*32-141 %*	*84.5*	*%*	
13C12-1,2,3,6,7,8-HxCDD		*1.263*	*1.054-1.426*	*28-130 %*	*78.4*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF		*0.462*	*0.374-0.506*	*28-143 %*	*88.8*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF		*0.431*	*0.374-0.506*	*26-138 %*	*80.2*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD		*1.022*	*0.893-1.208*	*23-140 %*	*76.6*	*%*	
13C12-OCDD		*0.887*	*0.757-1.024*	*17-157 %*	*69.1*	*%*	
37Cl4-2,3,7,8-TCDD				*35-197 %*	*87.7*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-26C:0-1

23C0619-08 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 10:38

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 01:09

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes

SED-26C:0-1

23C0619-08 (Solid)

Extractions

Method: ASTM D2216 — Sampled: 03/22/2023 10:38

Instrument: N/A Analyst: NL — Analyzed: 04/01/2023 08:31

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep-Organics — Extract ID: 23C0619-08

Preparation Batch: BLC0566 — Sample Size: 1 g (wet) — Dry Weight:0.60 g

Prepared: 03/22/2023 — Final Volume: 1 g — % Solids: 60.20

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	60.92	%	

Labeled compounds

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-26C:1-3

23C0619-09 (Solid)

Butyl Tins

Method: EPA 8270E-SIM — Sampled: 03/22/2023 10:38
Instrument: NT12 Analyst: JZ — Analyzed: 04/07/2023 00:35

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 23C0619-09 A 01
	Preparation Batch: BLC0727	Sample Size: 6.43 g (wet)	Dry Weight:5.01 g
	Prepared: 03/28/2023	Final Volume: 0.5 mL	% Solids: 77.86
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-09 A 01
	Cleanup Batch: CLD0022	Initial Volume: 0.5 uL	
	Cleaned: 04-Apr-2023	Final Volume: 0.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.449	3.86	98.7	ug/kg	
Dibutyltin Ion	14488-53-0	1	1.73	5.77	20.3	ug/kg	
Butyltin Ion	78763-54-9	1	1.89	4.07	4.81	ug/kg	
Tetrabutyltin	1461-25-2	1	4.99	4.99	ND	ug/kg	U
Surrogate: Tripentyltin				*30-160 %*	*80.9*	*%*	
Surrogate: Tripropyltin				*30-160 %*	*84.4*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-25C:0-1

23C0619-10 (Solid)

Butyl Tins

Method: EPA 8270E-SIM — Sampled: 03/22/2023 11:19

Instrument: NT12 Analyst: JZ — Analyzed: 04/07/2023 00:51

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 23C0619-10 A 01
	Preparation Batch: BLC0727	Sample Size: 6.49 g (wet)	Dry Weight:5.00 g
	Prepared: 03/28/2023	Final Volume: 0.5 mL	% Solids: 77.08
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-10 A 01
	Cleanup Batch: CLD0022	Initial Volume: 0.5 uL	
	Cleaned: 04-Apr-2023	Final Volume: 0.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.450	3.86	12.6	ug/kg	
Dibutyltin Ion	14488-53-0	1	1.73	5.78	8.47	ug/kg	
Butyltin Ion	78763-54-9	1	1.89	4.08	2.13	ug/kg	J
Tetrabutyltin	1461-25-2	1	5.00	5.00	ND	ug/kg	U
Surrogate: Tripentyltin				*30-160 %*	*70.4*	*%*	
Surrogate: Tripropyltin				*30-160 %*	*75.4*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-25C:0-1

23C0619-10 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 11:19

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 01:58

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 1613		Extract ID: 23C0619-10 C 01
	Preparation Batch: BLD0089	Sample Size: 13.24 g (wet)	Dry Weight:10.00 g
	Prepared: 04/06/2023	Final Volume: 20 uL	% Solids: 75.54
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-10 C 01
	Cleanup Batch: CLD0068	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:23C0619-10 C 01
	Cleanup Batch: CLD0067	Initial Volume: 20 uL	
	Cleaned: 10-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Florisil		Extract ID:23C0619-10 C 01
	Cleanup Batch: CLD0069	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF		0.850	0.655-0.886	0.254	1.00	**0.373**	ng/kg	X, J
2,3,7,8-TCDD		0.384	0.655-0.886	0.098	1.00	**0.206**	ng/kg	EMPC, J
1,2,3,7,8-PeCDF		1.483	1.318-1.783	0.202	1.00	**0.329**	ng/kg	J
2,3,4,7,8-PeCDF		1.114	1.318-1.783	0.192	1.00	0.154	ng/kg	EMPC, J
1,2,3,7,8-PeCDD		2.241	1.318-1.783	0.263	1.00	**0.720**	ng/kg	EMPC, J
1,2,3,4,7,8-HxCDF		1.377	1.054-1.426	0.102	1.00	**0.589**	ng/kg	J
1,2,3,6,7,8-HxCDF		0.939	1.054-1.426	0.110	1.00	**0.376**	ng/kg	EMPC, J
2,3,4,6,7,8-HxCDF		1.309	1.054-1.426	0.109	1.00	**0.623**	ng/kg	J
1,2,3,7,8,9-HxCDF		1.780	1.054-1.426	0.132	1.00	**0.193**	ng/kg	EMPC, J
1,2,3,4,7,8-HxCDD		0.926	1.054-1.426	0.218	1.00	**0.619**	ng/kg	EMPC, J
1,2,3,6,7,8-HxCDD		1.181	1.054-1.426	0.224	1.00	**2.73**	ng/kg	
1,2,3,7,8,9-HxCDD		1.286	1.054-1.426	0.243	1.00	**1.44**	ng/kg	
1,2,3,4,6,7,8-HpCDF		1.069	0.893-1.208	0.152	1.00	**10.0**	ng/kg	
1,2,3,4,7,8,9-HpCDF		1.499	0.893-1.208	0.244	1.00	**0.575**	ng/kg	EMPC, J
1,2,3,4,6,7,8-HpCDD		1.022	0.893-1.208	0.469	2.50	**89.0**	ng/kg	B
OCDF		0.882	0.757-1.024	0.417	2.50	**23.2**	ng/kg	
OCDD		0.860	0.757-1.024	0.926	10.0	**611**	ng/kg	B
Homologue groups								
Total TCDF					1.00	**1.71**	ng/kg	
Total TCDD					1.00	**0.331**	ng/kg	J
Total PeCDF					1.00	**3.81**	ng/kg	
Total PeCDD					1.00	**0.244**	ng/kg	J
Total HxCDF					1.00	**14.4**	ng/kg	
Total HxCDD					1.00	**29.0**	ng/kg	
Total HpCDF					1.00	**31.3**	ng/kg	
Total HpCDD					1.00	**273**	ng/kg	B

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-25C:0-1

23C0619-10 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 11:19

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 01:58

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):					2.84		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):					2.82		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, EMPC = ND):					2.29		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, EMPC = ND):					1.77		

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-25C:0-1

23C0619-10 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 11:19

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 01:58

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Labeled compounds							
13C12-2,3,7,8-TCDF		*0.746*	*0.655-0.886*	*24-169 %*	*81.8*	*%*	
13C12-2,3,7,8-TCDD		*0.781*	*0.655-0.886*	*25-164 %*	*88.9*	*%*	
13C12-1,2,3,7,8-PeCDF		*1.520*	*1.318-1.783*	*24-185 %*	*96.8*	*%*	
13C12-2,3,4,7,8-PeCDF		*1.530*	*1.318-1.783*	*21-178 %*	*96.2*	*%*	
13C12-1,2,3,7,8-PeCDD		*1.655*	*1.318-1.783*	*25-181 %*	*74.9*	*%*	
13C12-1,2,3,4,7,8-HxCDF		*0.503*	*0.434-0.587*	*26-152 %*	*82.4*	*%*	
13C12-1,2,3,6,7,8-HxCDF		*0.524*	*0.434-0.587*	*26-123 %*	*74.8*	*%*	
13C12-2,3,4,6,7,8-HxCDF		*0.498*	*0.434-0.587*	*28-136 %*	*87.0*	*%*	
13C12-1,2,3,7,8,9-HxCDF		*0.510*	*0.434-0.587*	*29-147 %*	*86.5*	*%*	
13C12-1,2,3,4,7,8-HxCDD		*1.245*	*1.054-1.426*	*32-141 %*	*90.6*	*%*	
13C12-1,2,3,6,7,8-HxCDD		*1.283*	*1.054-1.426*	*28-130 %*	*79.5*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF		*0.463*	*0.374-0.506*	*28-143 %*	*96.5*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF		*0.450*	*0.374-0.506*	*26-138 %*	*84.3*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD		*1.048*	*0.893-1.208*	*23-140 %*	*78.1*	*%*	
13C12-OCDD		*0.916*	*0.757-1.024*	*17-157 %*	*78.3*	*%*	
37Cl4-2,3,7,8-TCDD				*35-197 %*	*81.5*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-25C:0-1

23C0619-10 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/22/2023 11:19

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 01:58

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes

SED-25C:0-1

23C0619-10 (Solid)

Extractions

Method: ASTM D2216 — Sampled: 03/22/2023 11:19

Instrument: N/A Analyst: NL — Analyzed: 04/01/2023 08:31

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep-Organics — Extract ID: 23C0619-10

Preparation Batch: BLC0566 — Sample Size: 1 g (wet) — Dry Weight:0.73 g

Prepared: 03/22/2023 — Final Volume: 1 g — % Solids: 72.77

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	75.54	%	

Labeled compounds

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-25C:1-3

23C0619-11 (Solid)

Butyl Tins

Method: EPA 8270E-SIM — Sampled: 03/22/2023 11:19
Instrument: NT12 Analyst: JZ — Analyzed: 04/07/2023 01:08

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 23C0619-11 A 01
	Preparation Batch: BLC0727	Sample Size: 6.23 g (wet)	Dry Weight:5.01 g
	Prepared: 03/28/2023	Final Volume: 0.5 mL	% Solids: 80.38
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-11 A 01
	Cleanup Batch: CLD0022	Initial Volume: 0.5 uL	
	Cleaned: 04-Apr-2023	Final Volume: 0.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.449	3.85	0.952	ug/kg	J
Dibutyltin Ion	14488-53-0	1	1.73	5.77	ND	ug/kg	U
Butyltin Ion	78763-54-9	1	1.89	4.07	ND	ug/kg	U
Tetrabutyltin	1461-25-2	1	4.99	4.99	ND	ug/kg	U
Surrogate: Tripentyltin				*30-160 %*	*81.1*	*%*	
Surrogate: Tripropyltin				*30-160 %*	*85.8*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-10C:0-1

23C0619-12 (Solid)

Butyl Tins

Method: EPA 8270E-SIM — Sampled: 03/23/2023 08:17
Instrument: NT12 Analyst: JZ — Analyzed: 04/07/2023 01:24

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 23C0619-12 A 01
	Preparation Batch: BLC0727	Sample Size: 6.38 g (wet)	Dry Weight:5.08 g
	Prepared: 03/28/2023	Final Volume: 0.5 mL	% Solids: 79.68
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-12 A 01
	Cleanup Batch: CLD0022	Initial Volume: 0.5 uL	
	Cleaned: 04-Apr-2023	Final Volume: 0.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.443	3.80	63.8	ug/kg	
Dibutyltin Ion	14488-53-0	1	1.70	5.68	56.1	ug/kg	
Butyltin Ion	78763-54-9	1	1.86	4.01	9.46	ug/kg	
Tetrabutyltin	1461-25-2	1	4.92	4.92	ND	ug/kg	U
Surrogate: Tripentyltin				*30-160 %*	*76.0*	*%*	
Surrogate: Tripropyltin				*30-160 %*	*82.9*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-10C:0-1

23C0619-12 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/23/2023 08:17

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 02:47

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 1613		Extract ID: 23C0619-12 C 01
	Preparation Batch: BLD0089	Sample Size: 12.76 g (wet)	Dry Weight:10.00 g
	Prepared: 04/06/2023	Final Volume: 20 uL	% Solids: 78.35
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-12 C 01
	Cleanup Batch: CLD0068	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:23C0619-12 C 01
	Cleanup Batch: CLD0067	Initial Volume: 20 uL	
	Cleaned: 10-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Florisil		Extract ID:23C0619-12 C 01
	Cleanup Batch: CLD0069	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF		0.725	0.655-0.886	0.217	1.00	**0.659**	ng/kg	X, J
2,3,7,8-TCDD		0.365	0.655-0.886	0.087	1.00	**0.228**	ng/kg	EMPC, J
1,2,3,7,8-PeCDF		2.165	1.318-1.783	0.279	1.00	**0.478**	ng/kg	EMPC, J
2,3,4,7,8-PeCDF		1.342	1.318-1.783	0.256	1.00	**0.601**	ng/kg	J
1,2,3,7,8-PeCDD		1.281	1.318-1.783	0.178	1.00	**1.44**	ng/kg	EMPC
1,2,3,4,7,8-HxCDF		1.280	1.054-1.426	0.110	1.00	**1.65**	ng/kg	
1,2,3,6,7,8-HxCDF		1.397	1.054-1.426	0.116	1.00	**1.07**	ng/kg	
2,3,4,6,7,8-HxCDF		1.045	1.054-1.426	0.119	1.00	**1.59**	ng/kg	EMPC
1,2,3,7,8,9-HxCDF		1.237	1.054-1.426	0.139	1.00	**0.354**	ng/kg	J
1,2,3,4,7,8-HxCDD		1.216	1.054-1.426	0.208	1.00	**1.39**	ng/kg	
1,2,3,6,7,8-HxCDD		1.313	1.054-1.426	0.204	1.00	**7.10**	ng/kg	
1,2,3,7,8,9-HxCDD		1.001	1.054-1.426	0.227	1.00	**3.27**	ng/kg	EMPC
1,2,3,4,6,7,8-HpCDF		1.054	0.893-1.208	0.263	1.00	**56.8**	ng/kg	
1,2,3,4,7,8,9-HpCDF		1.077	0.893-1.208	0.445	1.00	**2.98**	ng/kg	
1,2,3,4,6,7,8-HpCDD		1.013	0.893-1.208	0.637	2.50	**294**	ng/kg	B
OCDF		0.881	0.757-1.024	0.586	2.50	**297**	ng/kg	
OCDD		0.856	0.757-1.024	0.530	10.0	**2470**	ng/kg	B
Homologue groups								
Total TCDF					1.00	**9.10**	ng/kg	
Total TCDD					1.00	**7.99**	ng/kg	
Total PeCDF					1.00	**9.17**	ng/kg	
Total PeCDD					1.00	**4.53**	ng/kg	
Total HxCDF					1.00	**49.0**	ng/kg	
Total HxCDD					1.00	**60.5**	ng/kg	
Total HpCDF					1.00	**228**	ng/kg	
Total HpCDD					1.00	**638**	ng/kg	B

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-10C:0-1

23C0619-12 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01 Analyst: pk

Sampled: 03/23/2023 08:17
Analyzed: 04/25/2023 02:47

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):					7.94		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):					7.94		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, EMPC = ND):					6.85		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, EMPC = ND):					5.77		

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-10C:0-1

23C0619-12 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/23/2023 08:17

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 02:47

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Labeled compounds							
13C12-2,3,7,8-TCDF		*0.747*	*0.655-0.886*	*24-169 %*	*87.1*	*%*	
13C12-2,3,7,8-TCDD		*0.787*	*0.655-0.886*	*25-164 %*	*95.9*	*%*	
13C12-1,2,3,7,8-PeCDF		*1.615*	*1.318-1.783*	*24-185 %*	*104*	*%*	
13C12-2,3,4,7,8-PeCDF		*1.514*	*1.318-1.783*	*21-178 %*	*104*	*%*	
13C12-1,2,3,7,8-PeCDD		*1.716*	*1.318-1.783*	*25-181 %*	*78.6*	*%*	
13C12-1,2,3,4,7,8-HxCDF		*0.507*	*0.434-0.587*	*26-152 %*	*90.5*	*%*	
13C12-1,2,3,6,7,8-HxCDF		*0.530*	*0.434-0.587*	*26-123 %*	*82.1*	*%*	
13C12-2,3,4,6,7,8-HxCDF		*0.516*	*0.434-0.587*	*28-136 %*	*89.4*	*%*	
13C12-1,2,3,7,8,9-HxCDF		*0.514*	*0.434-0.587*	*29-147 %*	*90.2*	*%*	
13C12-1,2,3,4,7,8-HxCDD		*1.241*	*1.054-1.426*	*32-141 %*	*96.4*	*%*	
13C12-1,2,3,6,7,8-HxCDD		*1.242*	*1.054-1.426*	*28-130 %*	*85.2*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF		*0.449*	*0.374-0.506*	*28-143 %*	*104*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF		*0.437*	*0.374-0.506*	*26-138 %*	*90.8*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD		*1.087*	*0.893-1.208*	*23-140 %*	*83.4*	*%*	
13C12-OCDD		*0.908*	*0.757-1.024*	*17-157 %*	*89.9*	*%*	
37Cl4-2,3,7,8-TCDD				*35-197 %*	*87.9*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-10C:0-1

23C0619-12 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/23/2023 08:17

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 02:47

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes

SED-10C:0-1

23C0619-12 (Solid)

Extractions

Method: ASTM D2216 — Sampled: 03/23/2023 08:17

Instrument: N/A Analyst: NL — Analyzed: 04/01/2023 08:31

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep-Organics — Extract ID: 23C0619-12

Preparation Batch: BLC0566 — Sample Size: 1 g (wet) — Dry Weight:0.69 g

Prepared: 03/22/2023 — Final Volume: 1 g — % Solids: 68.92

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	78.35	%	

Labeled compounds

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-10C:1-3

23C0619-13 (Solid)

Butyl Tins

Method: EPA 8270E-SIM — Sampled: 03/23/2023 08:17
Instrument: NT12 Analyst: JZ — Analyzed: 04/07/2023 01:41

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 23C0619-13 A 01
	Preparation Batch: BLC0727	Sample Size: 6.18 g (wet)	Dry Weight:5.01 g
	Prepared: 03/28/2023	Final Volume: 0.5 mL	% Solids: 81.01
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-13 A 01
	Cleanup Batch: CLD0022	Initial Volume: 0.5 uL	
	Cleaned: 04-Apr-2023	Final Volume: 0.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.449	3.86	12.8	ug/kg	
Dibutyltin Ion	14488-53-0	1	1.73	5.77	8.36	ug/kg	
Butyltin Ion	78763-54-9	1	1.89	4.07	4.65	ug/kg	
Tetrabutyltin	1461-25-2	1	4.99	4.99	ND	ug/kg	U
Surrogate: Tripentyltin				*30-160 %*	*80.0*	*%*	
Surrogate: Tripropyltin				*30-160 %*	*85.2*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-10C:1-3

23C0619-13 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/23/2023 08:17

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 03:36

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 1613		Extract ID: 23C0619-13 C 01
	Preparation Batch: BLD0089	Sample Size: 13.42 g (wet)	Dry Weight:10.01 g
	Prepared: 04/06/2023	Final Volume: 20 uL	% Solids: 74.60
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-13 C 01
	Cleanup Batch: CLD0068	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:23C0619-13 C 01
	Cleanup Batch: CLD0067	Initial Volume: 20 uL	
	Cleaned: 10-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Florisil		Extract ID:23C0619-13 C 01
	Cleanup Batch: CLD0069	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF		0.628	0.655-0.886	0.184	0.999	**0.199**	ng/kg	EMPC, J
2,3,7,8-TCDD			0.655-0.886	0.082	0.999	ND	ng/kg	U
1,2,3,7,8-PeCDF			1.318-1.783	0.214	0.999	ND	ng/kg	U
2,3,4,7,8-PeCDF			1.318-1.783	0.194	0.999	ND	ng/kg	U
1,2,3,7,8-PeCDD			1.318-1.783	0.198	0.999	ND	ng/kg	U
1,2,3,4,7,8-HxCDF		1.250	1.054-1.426	0.103	0.999	**0.457**	ng/kg	J
1,2,3,6,7,8-HxCDF		0.783	1.054-1.426	0.100	0.999	**0.309**	ng/kg	EMPC, J
2,3,4,6,7,8-HxCDF		1.245	1.054-1.426	0.110	0.999	**0.559**	ng/kg	J
1,2,3,7,8,9-HxCDF			1.054-1.426	0.143	0.999	ND	ng/kg	U
1,2,3,4,7,8-HxCDD		0.863	1.054-1.426	0.153	0.999	**0.259**	ng/kg	EMPC, J
1,2,3,6,7,8-HxCDD		1.041	1.054-1.426	0.156	0.999	**1.83**	ng/kg	EMPC
1,2,3,7,8,9-HxCDD		1.030	1.054-1.426	0.170	0.999	**0.772**	ng/kg	EMPC, J
1,2,3,4,6,7,8-HpCDF		1.048	0.893-1.208	0.181	0.999	**14.9**	ng/kg	
1,2,3,4,7,8,9-HpCDF		0.727	0.893-1.208	0.296	0.999	**0.870**	ng/kg	EMPC, J
1,2,3,4,6,7,8-HpCDD		0.986	0.893-1.208	0.406	2.50	**60.3**	ng/kg	B
OCDF		0.876	0.757-1.024	0.488	2.50	**62.3**	ng/kg	
OCDD		0.845	0.757-1.024	0.874	9.99	**447**	ng/kg	B
Homologue groups								
Total TCDF					0.999	**1.80**	ng/kg	
Total TCDD					0.999	**0.143**	ng/kg	J
Total PeCDF					0.999	**2.49**	ng/kg	
Total PeCDD					0.999	ND	ng/kg	U
Total HxCDF					0.999	**14.3**	ng/kg	
Total HxCDD					0.999	**8.24**	ng/kg	
Total HpCDF					0.999	**54.0**	ng/kg	
Total HpCDD					0.999	**125**	ng/kg	B

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-10C:1-3

23C0619-13 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01 Analyst: pk

Sampled: 03/23/2023 08:17
Analyzed: 04/25/2023 03:36

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):					1.53		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):					1.35		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, EMPC = ND):					1.36		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, EMPC = ND):					1.01		

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-10C:1-3

23C0619-13 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/23/2023 08:17

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 03:36

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Labeled compounds							
13C12-2,3,7,8-TCDF		*0.767*	*0.655-0.886*	*24-169 %*	*106*	*%*	
13C12-2,3,7,8-TCDD		*0.787*	*0.655-0.886*	*25-164 %*	*115*	*%*	
13C12-1,2,3,7,8-PeCDF		*1.636*	*1.318-1.783*	*24-185 %*	*120*	*%*	
13C12-2,3,4,7,8-PeCDF		*1.506*	*1.318-1.783*	*21-178 %*	*119*	*%*	
13C12-1,2,3,7,8-PeCDD		*1.694*	*1.318-1.783*	*25-181 %*	*96.9*	*%*	
13C12-1,2,3,4,7,8-HxCDF		*0.498*	*0.434-0.587*	*26-152 %*	*112*	*%*	
13C12-1,2,3,6,7,8-HxCDF		*0.511*	*0.434-0.587*	*26-123 %*	*104*	*%*	
13C12-2,3,4,6,7,8-HxCDF		*0.513*	*0.434-0.587*	*28-136 %*	*111*	*%*	
13C12-1,2,3,7,8,9-HxCDF		*0.508*	*0.434-0.587*	*29-147 %*	*102*	*%*	
13C12-1,2,3,4,7,8-HxCDD		*1.260*	*1.054-1.426*	*32-141 %*	*122*	*%*	
13C12-1,2,3,6,7,8-HxCDD		*1.240*	*1.054-1.426*	*28-130 %*	*105*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF		*0.439*	*0.374-0.506*	*28-143 %*	*124*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF		*0.456*	*0.374-0.506*	*26-138 %*	*110*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD		*1.055*	*0.893-1.208*	*23-140 %*	*104*	*%*	
13C12-OCDD		*0.929*	*0.757-1.024*	*17-157 %*	*99.2*	*%*	
37Cl4-2,3,7,8-TCDD				*35-197 %*	*109*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-10C:1-3
23C0619-13 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/23/2023 08:17
Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 03:36

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes

SED-10C:1-3
23C0619-13 (Solid)

Extractions

Method: ASTM D2216 — Sampled: 03/23/2023 08:17
Instrument: N/A Analyst: NL — Analyzed: 04/01/2023 08:31

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep-Organics — Extract ID: 23C0619-13
Preparation Batch: BLC0566 — Sample Size: 1 g (wet) — Dry Weight:0.73 g
Prepared: 03/22/2023 — Final Volume: 1 g — % Solids: 72.72

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	74.60	%	

Labeled compounds

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-11C:0-1

23C0619-14 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/23/2023 08:42

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 04:24

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 1613		Extract ID: 23C0619-14 A 01
	Preparation Batch: BLD0089	Sample Size: 14.31 g (wet)	Dry Weight:10.01 g
	Prepared: 04/06/2023	Final Volume: 20 uL	% Solids: 69.96
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-14 A 01
	Cleanup Batch: CLD0068	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:23C0619-14 A 01
	Cleanup Batch: CLD0067	Initial Volume: 20 uL	
	Cleaned: 10-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Florisil		Extract ID:23C0619-14 A 01
	Cleanup Batch: CLD0069	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF		0.665	0.655-0.886	0.168	0.999	**1.42**	ng/kg	
2,3,7,8-TCDD		0.354	0.655-0.886	0.097	0.999	**0.265**	ng/kg	EMPC, J
1,2,3,7,8-PeCDF		1.704	1.318-1.783	0.216	0.999	**1.08**	ng/kg	
2,3,4,7,8-PeCDF		1.663	1.318-1.783	0.200	0.999	**0.842**	ng/kg	J
1,2,3,7,8-PeCDD		1.527	1.318-1.783	0.348	0.999	**1.91**	ng/kg	
1,2,3,4,7,8-HxCDF		1.389	1.054-1.426	0.092	0.999	**1.73**	ng/kg	
1,2,3,6,7,8-HxCDF		1.191	1.054-1.426	0.100	0.999	**1.36**	ng/kg	
2,3,4,6,7,8-HxCDF		1.184	1.054-1.426	0.105	0.999	**1.84**	ng/kg	
1,2,3,7,8,9-HxCDF		1.013	1.054-1.426	0.121	0.999	**0.461**	ng/kg	EMPC, J
1,2,3,4,7,8-HxCDD		1.085	1.054-1.426	0.224	0.999	**1.59**	ng/kg	
1,2,3,6,7,8-HxCDD		1.333	1.054-1.426	0.218	0.999	**6.87**	ng/kg	
1,2,3,7,8,9-HxCDD		1.166	1.054-1.426	0.243	0.999	**4.09**	ng/kg	
1,2,3,4,6,7,8-HpCDF		1.048	0.893-1.208	0.172	0.999	**32.6**	ng/kg	
1,2,3,4,7,8,9-HpCDF		1.036	0.893-1.208	0.279	0.999	**1.96**	ng/kg	
1,2,3,4,6,7,8-HpCDD		1.051	0.893-1.208	0.607	2.50	**206**	ng/kg	B
OCDF		0.811	0.757-1.024	0.302	2.50	**95.3**	ng/kg	
OCDD		0.854	0.757-1.024	0.880	9.99	**1470**	ng/kg	B
Homologue groups								
Total TCDF					0.999	**17.5**	ng/kg	
Total TCDD					0.999	**2.48**	ng/kg	
Total PeCDF					0.999	**18.0**	ng/kg	
Total PeCDD					0.999	**6.03**	ng/kg	
Total HxCDF					0.999	**42.1**	ng/kg	
Total HxCDD					0.999	**82.7**	ng/kg	
Total HpCDF					0.999	**104**	ng/kg	
Total HpCDD					0.999	**638**	ng/kg	B

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-11C:0-1

23C0619-14 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01 Analyst: pk

Sampled: 03/23/2023 08:42
Analyzed: 04/25/2023 04:24

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):					7.27		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):					7.27		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, EMPC = ND):					7.12		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, EMPC = ND):					6.96		

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-11C:0-1

23C0619-14 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/23/2023 08:42

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 04:24

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Labeled compounds							
13C12-2,3,7,8-TCDF		*0.748*	*0.655-0.886*	*24-169 %*	*95.0*	*%*	
13C12-2,3,7,8-TCDD		*0.792*	*0.655-0.886*	*25-164 %*	*102*	*%*	
13C12-1,2,3,7,8-PeCDF		*1.538*	*1.318-1.783*	*24-185 %*	*113*	*%*	
13C12-2,3,4,7,8-PeCDF		*1.528*	*1.318-1.783*	*21-178 %*	*112*	*%*	
13C12-1,2,3,7,8-PeCDD		*1.695*	*1.318-1.783*	*25-181 %*	*85.3*	*%*	
13C12-1,2,3,4,7,8-HxCDF		*0.510*	*0.434-0.587*	*26-152 %*	*97.1*	*%*	
13C12-1,2,3,6,7,8-HxCDF		*0.529*	*0.434-0.587*	*26-123 %*	*86.8*	*%*	
13C12-2,3,4,6,7,8-HxCDF		*0.518*	*0.434-0.587*	*28-136 %*	*97.4*	*%*	
13C12-1,2,3,7,8,9-HxCDF		*0.517*	*0.434-0.587*	*29-147 %*	*92.4*	*%*	
13C12-1,2,3,4,7,8-HxCDD		*1.297*	*1.054-1.426*	*32-141 %*	*101*	*%*	
13C12-1,2,3,6,7,8-HxCDD		*1.213*	*1.054-1.426*	*28-130 %*	*90.2*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF		*0.458*	*0.374-0.506*	*28-143 %*	*107*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF		*0.448*	*0.374-0.506*	*26-138 %*	*92.5*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD		*1.056*	*0.893-1.208*	*23-140 %*	*88.6*	*%*	
13C12-OCDD		*0.900*	*0.757-1.024*	*17-157 %*	*86.5*	*%*	
37Cl4-2,3,7,8-TCDD				*35-197 %*	*91.8*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-11C:0-1

23C0619-14 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/23/2023 08:42

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 04:24

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes

SED-11C:0-1

23C0619-14 (Solid)

Extractions

Method: ASTM D2216 — Sampled: 03/23/2023 08:42

Instrument: N/A Analyst: NL — Analyzed: 04/01/2023 08:31

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep-Organics — Extract ID: 23C0619-14

Preparation Batch: BLC0566 — Sample Size: 1 g (wet) — Dry Weight:0.65 g

Prepared: 03/22/2023 — Final Volume: 1 g — % Solids: 64.70

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	69.96	%	

Labeled compounds

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-11C:1-3

23C0619-15 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/23/2023 08:42

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 05:14

Analysis by: Analytical Resources, LLC

Sample Preparation:	Preparation Method: EPA 1613		Extract ID: 23C0619-15 A 01
	Preparation Batch: BLD0089	Sample Size: 13.23 g (wet)	Dry Weight:10.00 g
	Prepared: 04/06/2023	Final Volume: 20 uL	% Solids: 75.57
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 23C0619-15 A 01
	Cleanup Batch: CLD0068	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:23C0619-15 A 01
	Cleanup Batch: CLD0067	Initial Volume: 20 uL	
	Cleaned: 10-Apr-2023	Final Volume: 20 uL	
Sample Cleanup:	Cleanup Method: Florisil		Extract ID:23C0619-15 A 01
	Cleanup Batch: CLD0069	Initial Volume: 20 uL	
	Cleaned: 11-Apr-2023	Final Volume: 20 uL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF		0.850	0.655-0.886	0.168	1.00	**0.237**	ng/kg	J
2,3,7,8-TCDD			0.655-0.886	0.117	1.00	ND	ng/kg	U
1,2,3,7,8-PeCDF			1.318-1.783	0.189	1.00	ND	ng/kg	U
2,3,4,7,8-PeCDF			1.318-1.783	0.186	1.00	ND	ng/kg	U
1,2,3,7,8-PeCDD		1.059	1.318-1.783	0.178	1.00	**0.346**	ng/kg	EMPC, J
1,2,3,4,7,8-HxCDF		1.705	1.054-1.426	0.083	1.00	**0.480**	ng/kg	EMPC, J
1,2,3,6,7,8-HxCDF		1.351	1.054-1.426	0.086	1.00	**0.315**	ng/kg	J
2,3,4,6,7,8-HxCDF		0.812	1.054-1.426	0.088	1.00	**0.467**	ng/kg	EMPC, J
1,2,3,7,8,9-HxCDF			1.054-1.426	0.100	1.00	ND	ng/kg	U
1,2,3,4,7,8-HxCDD		1.479	1.054-1.426	0.138	1.00	**0.305**	ng/kg	EMPC, J
1,2,3,6,7,8-HxCDD		1.051	1.054-1.426	0.133	1.00	**1.42**	ng/kg	EMPC
1,2,3,7,8,9-HxCDD		1.023	1.054-1.426	0.149	1.00	**0.759**	ng/kg	EMPC, J
1,2,3,4,6,7,8-HpCDF		0.930	0.893-1.208	0.141	1.00	**11.5**	ng/kg	
1,2,3,4,7,8,9-HpCDF		0.783	0.893-1.208	0.218	1.00	**0.999**	ng/kg	EMPC, J
1,2,3,4,6,7,8-HpCDD		1.003	0.893-1.208	0.316	2.50	**44.4**	ng/kg	B
OCDF		0.877	0.757-1.024	0.482	2.50	**40.6**	ng/kg	
OCDD		0.861	0.757-1.024	0.752	10.0	**318**	ng/kg	B
Homologue groups								
Total TCDF					1.00	**1.03**	ng/kg	
Total TCDD					1.00	**1.01**	ng/kg	
Total PeCDF					1.00	**2.97**	ng/kg	
Total PeCDD					1.00	**0.700**	ng/kg	J
Total HxCDF					1.00	**8.81**	ng/kg	
Total HxCDD					1.00	**8.65**	ng/kg	
Total HpCDF					1.00	**39.2**	ng/kg	
Total HpCDD					1.00	**101**	ng/kg	B

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-11C:1-3

23C0619-15 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/23/2023 08:42

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 05:14

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):					1.52		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):					1.42		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, EMPC = ND):					1.17		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, EMPC = ND):					0.72		

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-11C:1-3

23C0619-15 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/23/2023 08:42

Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 05:14

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	Reporting Limit	Result	Units	Notes
Labeled compounds							
13C12-2,3,7,8-TCDF		*0.756*	*0.655-0.886*	*24-169 %*	*83.4*	*%*	
13C12-2,3,7,8-TCDD		*0.787*	*0.655-0.886*	*25-164 %*	*91.2*	*%*	
13C12-1,2,3,7,8-PeCDF		*1.490*	*1.318-1.783*	*24-185 %*	*98.5*	*%*	
13C12-2,3,4,7,8-PeCDF		*1.516*	*1.318-1.783*	*21-178 %*	*97.1*	*%*	
13C12-1,2,3,7,8-PeCDD		*1.681*	*1.318-1.783*	*25-181 %*	*77.4*	*%*	
13C12-1,2,3,4,7,8-HxCDF		*0.510*	*0.434-0.587*	*26-152 %*	*90.3*	*%*	
13C12-1,2,3,6,7,8-HxCDF		*0.520*	*0.434-0.587*	*26-123 %*	*81.0*	*%*	
13C12-2,3,4,6,7,8-HxCDF		*0.512*	*0.434-0.587*	*28-136 %*	*89.9*	*%*	
13C12-1,2,3,7,8,9-HxCDF		*0.520*	*0.434-0.587*	*29-147 %*	*93.8*	*%*	
13C12-1,2,3,4,7,8-HxCDD		*1.246*	*1.054-1.426*	*32-141 %*	*95.6*	*%*	
13C12-1,2,3,6,7,8-HxCDD		*1.212*	*1.054-1.426*	*28-130 %*	*84.1*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF		*0.465*	*0.374-0.506*	*28-143 %*	*99.7*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF		*0.446*	*0.374-0.506*	*26-138 %*	*91.9*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD		*1.057*	*0.893-1.208*	*23-140 %*	*83.0*	*%*	
13C12-OCDD		*0.914*	*0.757-1.024*	*17-157 %*	*83.1*	*%*	
37Cl4-2,3,7,8-TCDD				*35-197 %*	*83.4*	*%*	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-11C:1-3
23C0619-15 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 03/23/2023 08:42
Instrument: AUTOSPEC01 Analyst: pk — Analyzed: 04/25/2023 05:14

Analysis by: Analytical Resources, LLC

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes

SED-11C:1-3
23C0619-15 (Solid)

Extractions

Method: ASTM D2216 — Sampled: 03/23/2023 08:42
Instrument: N/A Analyst: NL — Analyzed: 04/01/2023 08:31

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep-Organics — Extract ID: 23C0619-15
Preparation Batch: BLC0566 — Sample Size: 1 g (wet) — Dry Weight:0.73 g
Prepared: 03/22/2023 — Final Volume: 1 g — % Solids: 72.93

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	75.57	%	

Labeled compounds

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-27G:0-10

23C0619-16 (Solid)

Wet Chemistry

Method: EPA 9034 — Sampled: 03/23/2023 10:17

Instrument: S2 Buret Analyst: CDE — Analyzed: 04/04/2023 15:00

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23C0619-16 B

Preparation Batch: BLC0751 — Sample Size: 5.129 g (wet) — Dry Weight:3.24 g

Prepared: 03/28/2023 — Final Volume: 100 g — % Solids: 63.22

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	1	30.8	30.8	86.4	mg/kg	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-27G:0-10

23C0619-16 (Solid)

Wet Chemistry

Method: PSEP 1986 — Sampled: 03/23/2023 10:17

Instrument: BAL2 Analyst: UW — Analyzed: 03/29/2023 09:55

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23C0619-16

Preparation Batch: BLC0769 — Sample Size: 5 g (wet) — Dry Weight:3.22 g

Prepared: 03/29/2023 — Final Volume: 5 g — % Solids: 64.47

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids, Sulfide		1	0.04	0.04	63.22	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-27G:0-10

23C0619-16 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 03/23/2023 10:17

Instrument: BAL2 Analyst: UW — Analyzed: 03/29/2023 09:55

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23C0619-16

Preparation Batch: BLC0766 — Sample Size: 5 g (wet) — Dry Weight:3.22 g

Prepared: 03/29/2023 — Final Volume: 5 g — % Solids: 64.47

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	64.47	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

SED-27G:0-10

23C0619-16 (Solid)

Wet Chemistry

Method: SM 4500-NH3 H-97 — Sampled: 03/23/2023 10:17

Instrument: LACHAT1 Analyst: RMS — Analyzed: 03/28/2023 13:29

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23C0619-16 A

Preparation Batch: BLC0709 — Sample Size: 4.23 g (wet) — Dry Weight:2.73 g

Prepared: 03/27/2023 — Final Volume: 40 g — % Solids: 64.47

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	1	0.59	0.59	5.63	mg/kg NH3-N	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

Analysis by: Analytical Resources, LLC

Butyl Tins - Quality Control

Batch BLC0727 - EPA 8270E-SIM

Instrument: NT12 Analyst: JZ

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BLC0727-BLK1)					Prepared: 28-Mar-2023 Analyzed: 06-Apr-2023 18:16						
Tributyltin Ion	ND	0.450	3.86	ug/kg							U
Dibutyltin Ion	ND	1.73	5.78	ug/kg							U
Butyltin Ion	ND	1.89	4.08	ug/kg							U
Tetrabutyltin	ND	5.00	5.00	ug/kg							U
Surrogate: Tripentyltin	45.3			ug/kg	*45.2*		*100*	*30-160*			
Surrogate: Tripropyltin	39.2			ug/kg	*43.7*		*89.6*	*30-160*			
LCS (BLC0727-BS1)					Prepared: 28-Mar-2023 Analyzed: 06-Apr-2023 18:33						
Tributyltin Ion	44.7	0.450	3.86	ug/kg	44.6		100	30-160			
Dibutyltin Ion	29.9	1.73	5.78	ug/kg	38.4		78.1	30-160			
Butyltin Ion	21.7	1.89	4.08	ug/kg	31.2		69.6	30-160			
Surrogate: Tripentyltin	44.0			ug/kg	*45.2*		*97.3*	*30-160*			
Surrogate: Tripropyltin	37.2			ug/kg	*43.7*		*85.1*	*30-160*			
LCS Dup (BLC0727-BSD1)					Prepared: 28-Mar-2023 Analyzed: 06-Apr-2023 18:49						
Tributyltin Ion	49.1	0.450	3.86	ug/kg	44.6		110	30-160	9.37	30	
Dibutyltin Ion	31.9	1.73	5.78	ug/kg	38.4		83.3	30-160	6.44	30	
Butyltin Ion	23.4	1.89	4.08	ug/kg	31.2		75.1	30-160	7.67	30	
Surrogate: Tripentyltin	43.1			ug/kg	*45.2*		*95.3*	*30-160*			
Surrogate: Tripropyltin	38.2			ug/kg	*43.7*		*87.4*	*30-160*			
Duplicate (BLC0727-DUP1)		**Source: 23C0619-01**			Prepared: 28-Mar-2023 Analyzed: 06-Apr-2023 22:07						
Tributyltin Ion	1.74	0.450	3.86	ug/kg		3.61			69.70	30	*, J
Dibutyltin Ion	ND	1.73	5.78	ug/kg		ND					U
Butyltin Ion	ND	1.89	4.08	ug/kg		ND					U
Tetrabutyltin	ND	5.00	5.00	ug/kg		ND					U
Surrogate: Tripentyltin	40.7			ug/kg	*45.1*	*36.0*	*90.2*	*30-160*			
Surrogate: Tripropyltin	36.0			ug/kg	*43.7*	*33.5*	*82.5*	*30-160*			
Matrix Spike (BLC0727-MS1)		**Source: 23C0619-01**			Prepared: 28-Mar-2023 Analyzed: 06-Apr-2023 22:23						
Tributyltin Ion	48.5	0.450	3.86	ug/kg	44.5	3.61	101	30-160			
Dibutyltin Ion	32.1	1.73	5.78	ug/kg	38.3	ND	83.8	30-160			
Butyltin Ion	14.9	1.89	4.08	ug/kg	31.1	ND	48.0	30-160			
Surrogate: Tripentyltin	41.8			ug/kg	*45.1*	*36.0*	*92.5*	*30-160*			

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

Analysis by: Analytical Resources, LLC

Butyl Tins - Quality Control

Batch BLC0727 - EPA 8270E-SIM

Instrument: NT12 Analyst: JZ

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike (BLC0727-MS1)	**Source: 23C0619-01**			Prepared: 28-Mar-2023 Analyzed: 06-Apr-2023 22:23							
Surrogate: Tripropyltin	36.6			ug/kg	*43.7*	*33.5*	*83.7*	*30-160*			
Recovery limits for target analytes in MS/MSD QC samples are advisory only.											
Matrix Spike Dup (BLC0727-MSD1)	**Source: 23C0619-01**			Prepared: 28-Mar-2023 Analyzed: 06-Apr-2023 22:40							
Tributyltin Ion	46.3	0.450	3.86	ug/kg	44.5	3.61	96.0	30-160	4.49	30	
Dibutyltin Ion	30.0	1.73	5.78	ug/kg	38.3	ND	78.2	30-160	6.87	30	
Butyltin Ion	17.8	1.89	4.08	ug/kg	31.1	ND	57.3	30-160	17.60	30	
Surrogate: Tripentyltin	39.0			ug/kg	*45.1*	*36.0*	*86.4*	*30-160*			
Surrogate: Tripropyltin	36.5			ug/kg	*43.7*	*33.5*	*83.4*	*30-160*			
Recovery limits for target analytes in MS/MSD QC samples are advisory only.											

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

Analysis by: Analytical Resources, LLC

Dioxins/Furans - Quality Control

Batch BLD0089 - EPA 1613B

Instrument: AUTOSPEC01 Analyst: pl

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BLD0089-BLK2)				Prepared: 06-Apr-2023 Analyzed: 20-Apr-2023 18:18							
2,3,7,8-TCDF		0.655-0.886	0.224	1.00	ND	ng/kg					U
2,3,7,8-TCDD		0.655-0.886	0.156	1.00	ND	ng/kg					U
1,2,3,7,8-PeCDF		1.318-1.783	0.225	1.00	ND	ng/kg					U
2,3,4,7,8-PeCDF		1.318-1.783	0.212	1.00	ND	ng/kg					U
1,2,3,7,8-PeCDD		1.318-1.783	0.191	1.00	ND	ng/kg					U
1,2,3,4,7,8-HxCDF		1.054-1.426	0.130	1.00	ND	ng/kg					U
1,2,3,6,7,8-HxCDF		1.054-1.426	0.127	1.00	ND	ng/kg					U
2,3,4,6,7,8-HxCDF		1.054-1.426	0.136	1.00	ND	ng/kg					U
1,2,3,7,8,9-HxCDF		1.054-1.426	0.208	1.00	ND	ng/kg					U
1,2,3,4,7,8-HxCDD		1.054-1.426	0.157	1.00	ND	ng/kg					U
1,2,3,6,7,8-HxCDD		1.054-1.426	0.149	1.00	ND	ng/kg					U
1,2,3,7,8,9-HxCDD		1.054-1.426	0.168	1.00	ND	ng/kg					U
1,2,3,4,6,7,8-HpCDF		0.893-1.208	0.171	1.00	ND	ng/kg					U
1,2,3,4,7,8,9-HpCDF		0.893-1.208	0.254	1.00	ND	ng/kg					U
1,2,3,4,6,7,8-HpCDD	1.201	0.893-1.208		2.50	0.508	ng/kg					J
OCDF		0.757-1.024	0.448	2.50	ND	ng/kg					U
OCDD	0.775	0.757-1.024		10.0	2.35	ng/kg					J
Homologue group											
Total TCDF				1.00	ND	ng/kg					U
Total TCDD				1.00	ND	ng/kg					U
Total PeCDF				1.00	ND	ng/kg					U
Total PeCDD				1.00	ND	ng/kg					U
Total HxCDF				1.00	ND	ng/kg					U
Total HxCDD				1.00	ND	ng/kg					U
Total HpCDF				1.00	ND	ng/kg					U
Total HpCDD				1.00	0.508	ng/kg					J

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):	0.14
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):	0.01
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, EMPC=ND):	0.14
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0 EDL, EMPC=ND):	0.01

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

Analysis by: Analytical Resources, LLC

Dioxins/Furans - Quality Control

Batch BLD0089 - EPA 1613B

Instrument: AUTOSPEC01 Analyst: pl

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BLD0089-BLK2)				Prepared: 06-Apr-2023 Analyzed: 20-Apr-2023 18:18							
Labeled compounds											
13C12-2,3,7,8-TCDF	*0.745*	*0.655-0.886*			*85.6*			*24-169 %*			
13C12-2,3,7,8-TCDD	*0.780*	*0.655-0.886*			*89.4*			*25-164 %*			
13C12-1,2,3,7,8-PeCDF	*1.413*	*1.318-1.783*			*116*			*24-185 %*			
13C12-2,3,4,7,8-PeCDF	*1.536*	*1.318-1.783*			*118*			*21-178 %*			
13C12-1,2,3,7,8-PeCDD	*1.615*	*1.318-1.783*			*104*			*25-181 %*			
13C12-1,2,3,4,7,8-HxCDF	*0.520*	*0.434-0.587*			*102*			*26-152 %*			
13C12-1,2,3,6,7,8-HxCDF	*0.506*	*0.434-0.587*			*104*			*26-123 %*			
13C12-2,3,4,6,7,8-HxCDF	*0.499*	*0.434-0.587*			*112*			*28-136 %*			
13C12-1,2,3,7,8,9-HxCDF	*0.512*	*0.434-0.587*			*89.2*			*29-147 %*			
13C12-1,2,3,4,7,8-HxCDD	*1.254*	*1.054-1.426*			*117*			*32-141 %*			
13C12-1,2,3,6,7,8-HxCDD	*1.279*	*1.054-1.426*			*118*			*28-130 %*			
13C12-1,2,3,4,6,7,8-HpCDF	*0.448*	*0.374-0.506*			*109*			*28-143 %*			
13C12-1,2,3,4,7,8,9-HpCDF	*0.445*	*0.374-0.506*			*100*			*26-138 %*			
13C12-1,2,3,4,6,7,8-HpCDD	*1.064*	*0.893-1.208*			*79.7*			*23-140 %*			
13C12-OCDD	*0.939*	*0.757-1.024*			*96.8*			*17-157 %*			
37Cl4-2,3,7,8-TCDD					*82.5*			*35-197 %*			
LCS (BLD0089-BS2)				Prepared: 06-Apr-2023 Analyzed: 20-Apr-2023 19:07							
2,3,7,8-TCDF	0.840	0.655-0.886		1.00	24.2	ng/kg	121	75-158 %			
2,3,7,8-TCDD	0.815	0.655-0.886		1.00	21.7	ng/kg	109	67-158 %			
1,2,3,7,8-PeCDF	1.563	1.318-1.783		1.00	118	ng/kg	118	80-134 %			
2,3,4,7,8-PeCDF	1.583	1.318-1.783		1.00	120	ng/kg	120	68-160 %			
1,2,3,7,8-PeCDD	1.513	1.318-1.783		1.00	115	ng/kg	115	70-142 %			
1,2,3,4,7,8-HxCDF	1.240	1.054-1.426		1.00	104	ng/kg	104	72-134 %			
1,2,3,6,7,8-HxCDF	1.298	1.054-1.426		1.00	114	ng/kg	114	84-130 %			
2,3,4,6,7,8-HxCDF	1.256	1.054-1.426		1.00	104	ng/kg	104	70-156 %			
1,2,3,7,8,9-HxCDF	1.304	1.054-1.426		1.00	103	ng/kg	103	78-130 %			
1,2,3,4,7,8-HxCDD	1.190	1.054-1.426		1.00	98.1	ng/kg	98.1	70-164 %			
1,2,3,6,7,8-HxCDD	1.211	1.054-1.426		1.00	104	ng/kg	104	76-134 %			
1,2,3,7,8,9-HxCDD	1.201	1.054-1.426		1.00	98.1	ng/kg	98.1	64-162 %			
1,2,3,4,6,7,8-HpCDF	1.013	0.893-1.208		1.00	107	ng/kg	107	82-122 %			
1,2,3,4,7,8,9-HpCDF	1.054	0.893-1.208		1.00	112	ng/kg	112	78-138 %			
1,2,3,4,6,7,8-HpCDD	1.201	0.893-1.208		2.50	117	ng/kg	117	70-140 %			B
OCDF	0.939	0.757-1.024		2.50	239	ng/kg	119	63-170 %			
OCDD	0.821	0.757-1.024		10.0	229	ng/kg	114	78-144 %			B

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

Analysis by: Analytical Resources, LLC

Dioxins/Furans - Quality Control

Batch BLD0089 - EPA 1613B

Instrument: AUTOSPEC01 Analyst: pl

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BLD0089-BS2)				Prepared: 06-Apr-2023 Analyzed: 20-Apr-2023 19:07							
Labeled compounds											
13C12-2,3,7,8-TCDF	*0.764*	*0.655-0.886*			*91.9*			*24-169 %*			
13C12-2,3,7,8-TCDD	*0.774*	*0.655-0.886*			*89.8*			*25-164 %*			
13C12-1,2,3,7,8-PeCDF	*1.432*	*1.318-1.783*			*98.8*			*24-185 %*			
13C12-2,3,4,7,8-PeCDF	*1.528*	*1.318-1.783*			*104*			*21-178 %*			
13C12-1,2,3,7,8-PeCDD	*1.625*	*1.318-1.783*			*91.4*			*25-181 %*			
13C12-1,2,3,4,7,8-HxCDF	*0.512*	*0.434-0.587*			*77.1*			*26-152 %*			
13C12-1,2,3,6,7,8-HxCDF	*0.503*	*0.434-0.587*			*75.0*			*26-123 %*			
13C12-2,3,4,6,7,8-HxCDF	*0.489*	*0.434-0.587*			*86.3*			*28-136 %*			
13C12-1,2,3,7,8,9-HxCDF	*0.560*	*0.434-0.587*			*87.6*			*29-147 %*			
13C12-1,2,3,4,7,8-HxCDD	*1.259*	*1.054-1.426*			*95.0*			*32-141 %*			
13C12-1,2,3,6,7,8-HxCDD	*1.235*	*1.054-1.426*			*95.1*			*28-130 %*			
13C12-1,2,3,4,6,7,8-HpCDF	*0.458*	*0.374-0.506*			*112*			*28-143 %*			
13C12-1,2,3,4,7,8,9-HpCDF	*0.456*	*0.374-0.506*			*106*			*26-138 %*			
13C12-1,2,3,4,6,7,8-HpCDD	*1.069*	*0.893-1.208*			*85.8*			*23-140 %*			
13C12-OCDD	*0.883*	*0.757-1.024*			*92.9*			*17-157 %*			
37Cl4-2,3,7,8-TCDD					*85.0*			*35-197 %*			
Reference (BLD0089-SRM1)				Prepared: 06-Apr-2023 Analyzed: 24-Apr-2023 18:30							
2,3,7,8-TCDF	0.859	0.655-0.886		0.999	1.02	ng/kg	91.7	50-150 %			
2,3,7,8-TCDD	0.698	0.655-0.886		0.999	1.01	ng/kg	96.2	50-150 %			
1,2,3,7,8-PeCDF	1.085	1.318-1.783		0.999	1.35	ng/kg	110	50-150 %			EMPC
2,3,4,7,8-PeCDF	1.732	1.318-1.783		0.999	1.22	ng/kg	114	50-150 %			
1,2,3,7,8-PeCDD	1.091	1.318-1.783		0.999	1.43	ng/kg	132	50-150 %			EMPC
1,2,3,4,7,8-HxCDF	1.167	1.054-1.426		0.999	2.44	ng/kg	80.8	50-150 %			
1,2,3,6,7,8-HxCDF	1.288	1.054-1.426		0.999	0.863	ng/kg	79.1	50-150 %			J
2,3,4,6,7,8-HxCDF	1.185	1.054-1.426		0.999	1.93	ng/kg	105	50-150 %			
1,2,3,7,8,9-HxCDF	1.272	1.054-1.426		0.999	0.682	ng/kg	133	50-150 %			J
1,2,3,4,7,8-HxCDD	1.062	1.054-1.426		0.999	1.51	ng/kg	95.1	50-150 %			
1,2,3,6,7,8-HxCDD	1.112	1.054-1.426		0.999	3.45	ng/kg	88.8	50-150 %			
1,2,3,7,8,9-HxCDD	1.215	1.054-1.426		0.999	2.65	ng/kg	87.3	50-150 %			
1,2,3,4,6,7,8-HpCDF	1.131	0.893-1.208		0.999	19.1	ng/kg	102	50-150 %			
1,2,3,4,7,8,9-HpCDF	0.906	0.893-1.208		0.999	1.70	ng/kg	105	50-150 %			
1,2,3,4,6,7,8-HpCDD	1.040	0.893-1.208		2.50	101	ng/kg	112	50-150 %			B
OCDF	0.964	0.757-1.024		2.50	65.2	ng/kg	112	50-150 %			
OCDD	0.872	0.757-1.024		9.99	802	ng/kg	98.9	50-150 %			B

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

Analysis by: Analytical Resources, LLC

Dioxins/Furans - Quality Control

Batch BLD0089 - EPA 1613B

Instrument: AUTOSPEC01 Analyst: pl

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
Reference (BLD0089-SRM1)				Prepared: 06-Apr-2023	Analyzed: 24-Apr-2023 18:30						
Labeled compounds											
13C12-2,3,7,8-TCDF	*0.750*	*0.655-0.886*			*91.6*			*24-169 %*			
13C12-2,3,7,8-TCDD	*0.795*	*0.655-0.886*			*93.8*			*25-164 %*			
13C12-1,2,3,7,8-PeCDF	*1.542*	*1.318-1.783*			*104*			*24-185 %*			
13C12-2,3,4,7,8-PeCDF	*1.560*	*1.318-1.783*			*107*			*21-178 %*			
13C12-1,2,3,7,8-PeCDD	*1.692*	*1.318-1.783*			*83.5*			*25-181 %*			
13C12-1,2,3,4,7,8-HxCDF	*0.518*	*0.434-0.587*			*87.5*			*26-152 %*			
13C12-1,2,3,6,7,8-HxCDF	*0.528*	*0.434-0.587*			*79.0*			*26-123 %*			
13C12-2,3,4,6,7,8-HxCDF	*0.521*	*0.434-0.587*			*87.2*			*28-136 %*			
13C12-1,2,3,7,8,9-HxCDF	*0.521*	*0.434-0.587*			*79.1*			*29-147 %*			
13C12-1,2,3,4,7,8-HxCDD	*1.242*	*1.054-1.426*			*95.7*			*32-141 %*			
13C12-1,2,3,6,7,8-HxCDD	*1.223*	*1.054-1.426*			*84.3*			*28-130 %*			
13C12-1,2,3,4,6,7,8-HpCDF	*0.439*	*0.374-0.506*			*99.1*			*28-143 %*			
13C12-1,2,3,4,7,8,9-HpCDF	*0.440*	*0.374-0.506*			*96.4*			*26-138 %*			
13C12-1,2,3,4,6,7,8-HpCDD	*1.099*	*0.893-1.208*			*85.3*			*23-140 %*			
13C12-OCDD	*0.880*	*0.757-1.024*			*77.1*			*17-157 %*			
37Cl4-2,3,7,8-TCDD					*86.8*			*35-197 %*			

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

Analysis by: Analytical Resources, LLC

Wet Chemistry - Quality Control

Batch BLC0709 - SM 4500-NH3 H-97

Instrument: LACHAT1 Analyst: RMS

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BLC0709-BLK1)				Prepared: 27-Mar-2023 Analyzed: 28-Mar-2023 13:08							
Ammonia-N	ND	0.40	0.40	mg/kg NH3-N							U
LCS (BLC0709-BS1)				Prepared: 27-Mar-2023 Analyzed: 28-Mar-2023 13:09							
Ammonia-N	97.2	8.00	8.00	mg/kg NH3-N	100		97.2	90-110			D

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

Analysis by: Analytical Resources, LLC

Wet Chemistry - Quality Control

Batch BLC0751 - EPA 9034

Instrument: S2 Buret Analyst: CDE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BLC0751-BLK1)				Prepared: 28-Mar-2023 Analyzed: 04-Apr-2023 15:00							
Sulfide	ND	20.0	20.0	mg/kg							U
LCS (BLC0751-BS1)				Prepared: 28-Mar-2023 Analyzed: 04-Apr-2023 15:00							
Sulfide	168	20.0	20.0	mg/kg	211		79.6	75-125			

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

Analysis by: Analytical Resources, LLC

Wet Chemistry - Quality Control

Batch BLC0766 - SM 2540 G-97

Instrument: BAL2 Analyst: UW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BLC0766-BLK1)				Prepared: 29-Mar-2023 Analyzed: 29-Mar-2023 09:55							
Total Solids	ND	0.04	0.04	%							U
Duplicate (BLC0766-DUP1)		**Source: 23C0619-02**		Prepared: 29-Mar-2023 Analyzed: 29-Mar-2023 09:55							
Total Solids	75.78	0.04	0.04	%		71.88			5.28	20	
Duplicate (BLC0766-DUP2)		**Source: 23C0619-02**		Prepared: 29-Mar-2023 Analyzed: 29-Mar-2023 09:55							
Total Solids	74.66	0.04	0.04	%		71.88			3.80	20	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

Analysis by: Analytical Resources, LLC

Wet Chemistry - Quality Control

Batch BLC0769 - PSEP 1986

Instrument: BAL2 Analyst: UW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BLC0769-BLK1)				Prepared: 29-Mar-2023 Analyzed: 29-Mar-2023 09:55							
Total Solids, Sulfide	ND	0.04	0.04	%							U

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

Certified Analyses included in this Report

Analyte	Certifications
EPA 1613B in Solid	
2,3,7,8-TCDF	DoD-ELAP,NELAP,WADOE
2,3,7,8-TCDD	DoD-ELAP,NELAP,WADOE
1,2,3,7,8-PeCDF	DoD-ELAP,NELAP,WADOE
2,3,4,7,8-PeCDF	DoD-ELAP,NELAP,WADOE
1,2,3,7,8-PeCDD	DoD-ELAP,NELAP,WADOE
1,2,3,4,7,8-HxCDF	DoD-ELAP,NELAP,WADOE
1,2,3,6,7,8-HxCDF	DoD-ELAP,NELAP,WADOE
2,3,4,6,7,8-HxCDF	DoD-ELAP,NELAP,WADOE
1,2,3,7,8,9-HxCDF	DoD-ELAP,NELAP,WADOE
1,2,3,4,7,8-HxCDD	DoD-ELAP,NELAP,WADOE
1,2,3,6,7,8-HxCDD	DoD-ELAP,NELAP,WADOE
1,2,3,7,8,9-HxCDD	DoD-ELAP,NELAP,WADOE
1,2,3,4,6,7,8-HpCDF	DoD-ELAP,NELAP,WADOE
1,2,3,4,7,8,9-HpCDF	DoD-ELAP,NELAP,WADOE
1,2,3,4,6,7,8-HpCDD	DoD-ELAP,NELAP,WADOE
OCDF	DoD-ELAP,NELAP,WADOE
OCDD	DoD-ELAP,NELAP,WADOE
Total TCDF	DoD-ELAP,NELAP,WADOE
Total TCDD	DoD-ELAP,NELAP,WADOE
Total PeCDF	DoD-ELAP,NELAP,WADOE
Total PeCDD	DoD-ELAP,NELAP,WADOE
Total HxCDF	DoD-ELAP,NELAP,WADOE
Total HxCDD	DoD-ELAP,NELAP,WADOE
Total HpCDF	DoD-ELAP,NELAP,WADOE
Total HpCDD	DoD-ELAP,NELAP,WADOE
13C12-2,3,7,8-TCDF	DoD-ELAP
13C12-2,3,7,8-TCDD	DoD-ELAP
13C12-1,2,3,7,8-PeCDF	DoD-ELAP
13C12-2,3,4,7,8-PeCDF	DoD-ELAP
13C12-1,2,3,7,8-PeCDD	DoD-ELAP

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

13C12-1,2,3,4,7,8-HxCDF	DoD-ELAP
13C12-1,2,3,6,7,8-HxCDF	DoD-ELAP
13C12-2,3,4,6,7,8-HxCDF	DoD-ELAP
13C12-1,2,3,7,8,9-HxCDF	DoD-ELAP
13C12-1,2,3,4,7,8-HxCDD	DoD-ELAP
13C12-1,2,3,6,7,8-HxCDD	DoD-ELAP
13C12-1,2,3,4,6,7,8-HpCDF	DoD-ELAP
13C12-1,2,3,4,7,8,9-HpCDF	DoD-ELAP
13C12-1,2,3,4,6,7,8-HpCDD	DoD-ELAP
13C12-OCDD	DoD-ELAP
37Cl4-2,3,7,8-TCDD	DoD-ELAP
EPA 8270E-SIM in Solid	
Tributyltin Ion	WADOE,DoD-ELAP,NELAP
Dibutyltin Ion	WADOE,DoD-ELAP,NELAP
Butyltin Ion	WADOE,NELAP
Tetrabutyltin	NELAP
EPA 9034 in Solid	
Sulfide	NELAP
SM 4500-NH3 H-97 in Solid	
Ammonia-N	WADOE,NELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	03/28/2025
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program, PJLA Testing	66169	02/28/2025
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006-012	05/12/2023
WADOE	WA Dept of Ecology	C558	06/30/2023
WA-DW	Ecology - Drinking Water	C558	06/30/2023

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303388	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	06-May-2023 11:35

Notes and Definitions

*	Flagged value is not within established control limits.
B	This analyte was detected in the method blank.
D	The reported value is from a dilution
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL)
EMPC	Estimated Maximum Possible Concentration qualifier for HRGCMS Dioxin
H	Hold time violation - Hold time was exceeded.
J	Estimated concentration value detected below the reporting limit.
L	Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to +/- RL instead of 20% RPD
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
X	Indicates possible CDPE interference.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER ARI	
PROJECT NAME/NO. 303388	PO # D-229
REMARKS merdahl@friedmanandbruya.co	

TURNAROUND TIME
☒ Standard TAT
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED: TBT	TOC	Total Solids	Dioxins/Furans	Ammonia	Sulfides					Notes
SED-07C:0-1		3/22/2023	729	sediment		X	X	X								
SED-07C:1-3		3/22/2023	729	sediment		X	X	X								
SED-08C:0-1		3/22/2023	807	sediment		X	X	X	X							
SED-08C:1-3		3/22/2023	807	sediment		X	X	X								
SED-09C:0-1		3/22/2023	833	sediment		X	X	X	X							
SED-09C:1-3		3/22/2023	833	sediment		X	X	X	X							
SED-12C:0-1		3/22/2023	925	sediment			X	X	X							
SED-26C:0-1		3/22/2023	1038	sediment		X	X	X	X							
SED-26C:1-3		3/22/2023	1038	sediment		X	X	X								
SED-25C:0-1		3/22/2023	1119	sediment		X	X	X	X							
SED-25C:1-3		3/22/2023	1119	sediment		X	X	X								
SED-10C:0-1		3/23/2023	817	sediment		X	X	X	X							
SED-10C:1-3		3/23/2023	817	sediment		X	X	X	X							

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Michael Erdahl	Friedman & Bruya		
Received by:					
Relinquished by:					
Received by:					

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER ARI	
PROJECT NAME/NO. 303388	PO # D-229
REMARKS merdahl@friedmanandbruya.co	

TURNAROUND TIME
☒ Standard TAT
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED: TBT	TOC	Total Solids	Dioxins/Furans	Ammonia	Sulfides					Notes
SED-11C:0-1		3/23/2023	842	sediment			X	X	X							
SED-11C:1-3		3/23/2023	842	sediment			X	X	X							
SED-27G:0-10		3/23/2023	1017	sediment						X	X					
SED-DUP3C		3/23/2023	1200	sediment			X	X								

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Michael Erdahl	Friedman & Bruya		
Received by:				
Relinquished by:				
Received by:				

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER ARI	
PROJECT NAME/NO. 303333	PO # D-221
REMARKS EIM EDD	

TURNAROUND TIME

☒ Standard TAT

RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

Dispose after 30 days

Return samples

Will call with instructions

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Total Sulfides	Ammonia	Total Organic Carbon	Total Solids							Notes
SED-07G:0-10		3/20/2023	810	solids	2	x	x									
SED-11G:0-10		3/20/2023	924	solids	2	x	x									
SED-14G:0-10		3/20/2023	1011	solids	2	x	x									
SED-15G:0-10		3/20/2023	1042	solids	2	x	x									
SED-24G:0-10		3/20/2023	1106	solids	1		x	x	x							hold ammonia
SED-23G:0-10		3/20/2023	1142	solids	1		x	x	x							↓
SED-22G:0-10		3/20/2023	1158	solids	1		x	x	x							↓
SED-21G:0-10		3/20/2023	1216	solids	1		x	x	x							↓
SED-03G:0-10		3/20/2023	1315	solids	2	x	x									
SED-20G:0-10		3/20/2023	1338	solids	1		x	x	x							hold ammonia
SED-18G:0-10		3/20/2023	1408	solids	1		x	x	x							↓
SED-19G:0-10		3/20/2023	1427	solids	1		x	x	x							↓
SED-01G:0-10		3/20/2023	1445	solids	2	x	x									

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Michael Erdahl	Friedman & Bruya	03/22/23	08:20
Received by:					
Relinquished by:					
Received by:					

HWA GeoSciences Inc.
DBE/MWBE

May 25, 2023
HWA Project No. 2023-070

Friedman & Bruya, Inc.
5500 4th Ave S
Seattle, Washington 98108

Attention: Mr. Michael Erdahl

Subject: **Materials Laboratory Report**
Letter Report 2
Port of Friday Harbor - Jensen's Marina

Dear Mr. Erdahl,

In accordance with your request, HWA GeoSciences Inc. (HWA) performed laboratory testing for the above referenced project. Herein we present the results of our laboratory analyses, which are summarized on the attached Figures. The laboratory testing program was performed in general accordance with your instructions and appropriate ASTM Standards as outlined below.

SAMPLE DESCRIPTION: The subject samples were delivered to our laboratory on March 27, 2023 by Friedman & Bruya personnel. The samples were delivered in coolers containing re-sealable plastic jars designated with exploration/sample IDs. The sample descriptions may be found on the attached Summary of Material Properties, Figures 1 and 2.

PARTICLE SIZE ANALYSIS OF SOILS: The particle size distribution of each specified sample was determined in general accordance with ASTM D6913 and D7928. The results are plotted on the attached Particle Size Analysis of Soils Report, Figures 3 through 10, which also indicate the moisture content of the soil samples at the time of testing.

CLOSURE: Experience has shown that test values on soil and other natural materials vary with each representative sample. As such, HWA has no knowledge as to the extent and quantity of material the tested samples may represent. HWA also makes no warranty as to how representative either the samples tested or the test results obtained are to actual field conditions. It is a well-established fact that sampling methods present varying degrees of disturbance that affect sample representativeness.

No copy should be made of this report except in its entirety.

We appreciate the opportunity to provide laboratory testing services on this project. Should you have any questions or comments, or if we may be of further service, please call.

Sincerely,

HWA GEOSCIENCES INC.

Alex Hodges
Materials Laboratory Supervisor

Steven E. Greene, L.G., L.E.G.
Principal Engineering Geologist
Vice President

Attachments:

Figures 1-2	Summary of Material Properties
Figures 3-10	Particle Size Analysis of Soils Report

EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVITY	ATTERBERG LIMITS (%)			% GRAVEL	% SAND	% FINES	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION
						LL	PL	PI					
SED-01C,0-1	0.0	1.0	60.3						0.1	26.9	73.0	ML	Very dark gray, SILT with sand
SED-03C,0-1	0.0	1.0	100.3						0.2	15.8	83.9	ML	Very dark gray, SILT with sand
SED-05C,0-1	0.0	1.0	65.8						0.2	17.0	82.8	ML	Very dark gray, SILT with sand and trace organics
SED-07C,0-1	0.0	1.0	34.5						28.3	40.4	31.2	SM	Greenish-black, silty SAND with gravel and trace shells
SED-07C,1-3	1.0	3.0	30.9						14.8	50.2	35.0	SM	Very dark gray, silty SAND with trace shells
SED-08C,0-1	0.0	1.0	48.9						0.9	46.8	52.3	ML	Very dark gray, sandy SILT with trace shells
SED-08C,1-3	1.0	3.0	34.9						2.2	67.2	30.6	SM	Very dark gray, silty SAND with organics and trace shells
SED-09C,0-1	0.0	1.0	41.4						4.8	66.6	28.6	SM	Very dark gray, silty SAND with organics and shells
SED-09C,1-3	1.0	3.0	30.6						1.9	76.3	21.8	SM	Very dark gray, silty SAND with organics and shells
SED-10C,0-1	0.0	1.0	27.5						13.9	66.4	19.7	SM	Very dark gray, silty SAND with trace organics
SED-10C,1-3	1.0	3.0	28.2						29.1	55.3	15.5	SM	Very dark gray, silty SAND with gravel and trace organics
SED-11C,0-1	0.0	1.0	39.6						12.0	50.9	37.1	SM	Very dark gray, silty SAND with trace organics
SED-11C,1-3	1.0	3.0	32.5						4.5	67.4	28.2	SM	Very dark gray, silty SAND with shells
SED-12C,0-1	0.0	1.0	26.6						18.2	65.1	16.7	SM	Very dark gray, silty SAND with gravel with organics and shells
SED-14C,0-1	0.0	1.0	48.5						0.4	46.1	53.5	ML	Very dark gray, sandy SILT with shells and trace organics
SED-18G,0-10	0.0	10.0	72.3						0.3	16.5	83.2	ML	Very dark gray, SILT with sand
SED-19G,0-10	0.0	10.0	50.0							27.8	72.2	ML	Very dark gray, SILT with sand
SED-25C,0-1	0.0	1.0	36.4						4.3	67.7	28.0	SM	Greenish-black, silty SAND with organics and shells
SED-25C,1-3	1.0	3.0	29.3						3.2	74.1	22.7	SM	Very dark gray, silty SAND with shells
SED-26C,0-1	0.0	1.0	55.4						2.9	65.3	31.8	SM	Greenish-black, silty SAND with organics and shells

Notes: 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report test, other graphs and tables, and the exploration logs.
2. The soil classifications in this table are based on ASTM D2487 and D2488 as applicable.

GeoSciences Inc.

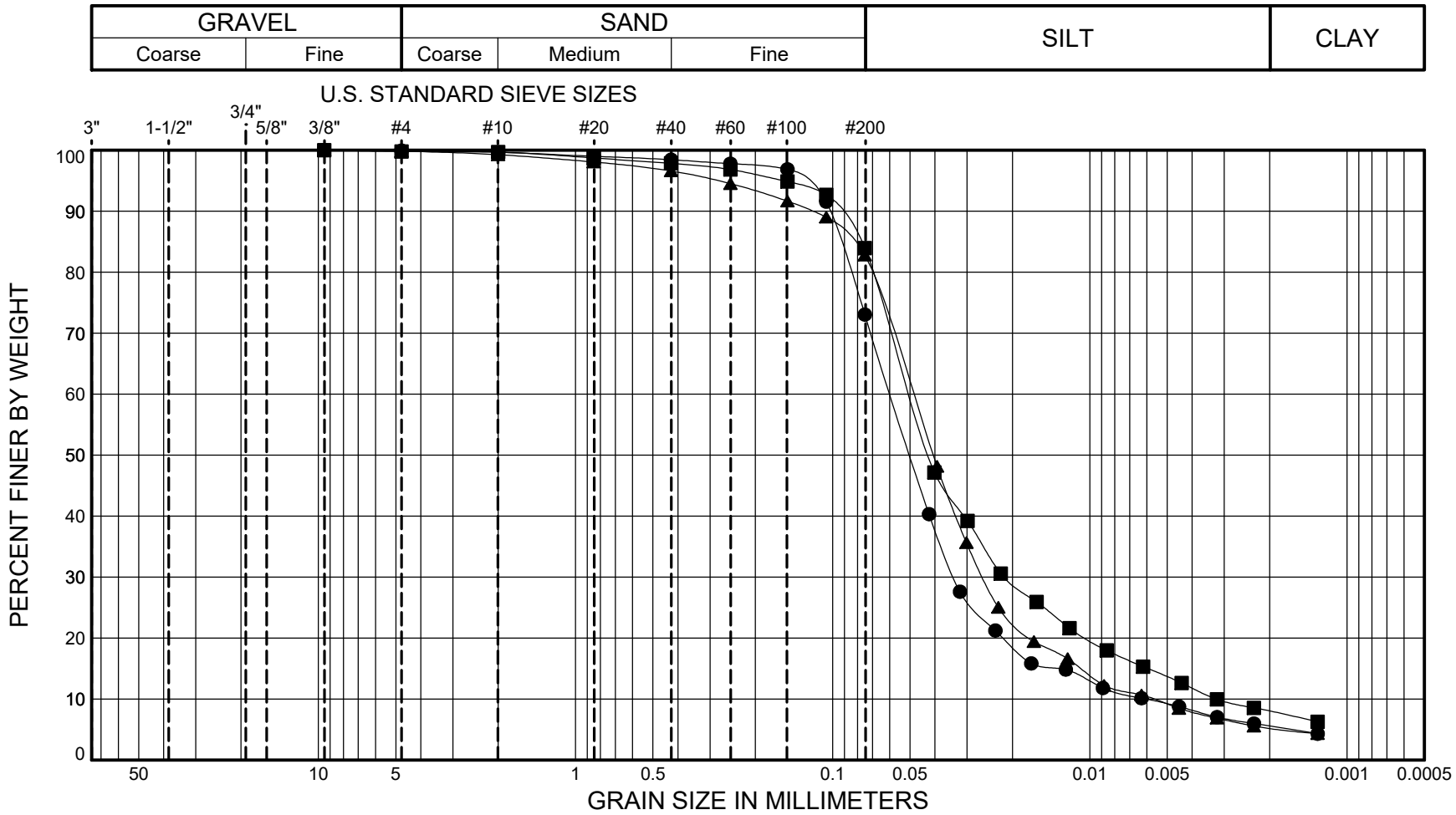
Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

SUMMARY OF MATERIAL PROPERTIES

PROJECT NO.: 2023-070 FIGURE: 1

EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVITY	ATTERBERG LIMITS (%)			% GRAVEL	% SAND	% FINES	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION
						LL	PL	PI					
SED-26C,1-3	1.0	3.0	37.3						7.3	64.6	28.1	SM	Very dark gray, silty SAND with shells
SED-DUP2C,	0.0	0.0	22.0						40.7	41.8	17.4	SM	Very dark gray, silty SAND with gravel
SED-DUP3C,	0.0	0.0	26.9						5.7	67.6	26.8	SM	Very dark gray, silty SAND with shells

Notes: 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report test, other graphs and tables, and the exploration logs.
2. The soil classifications in this table are based on ASTM D2487 and D2488 as applicable.



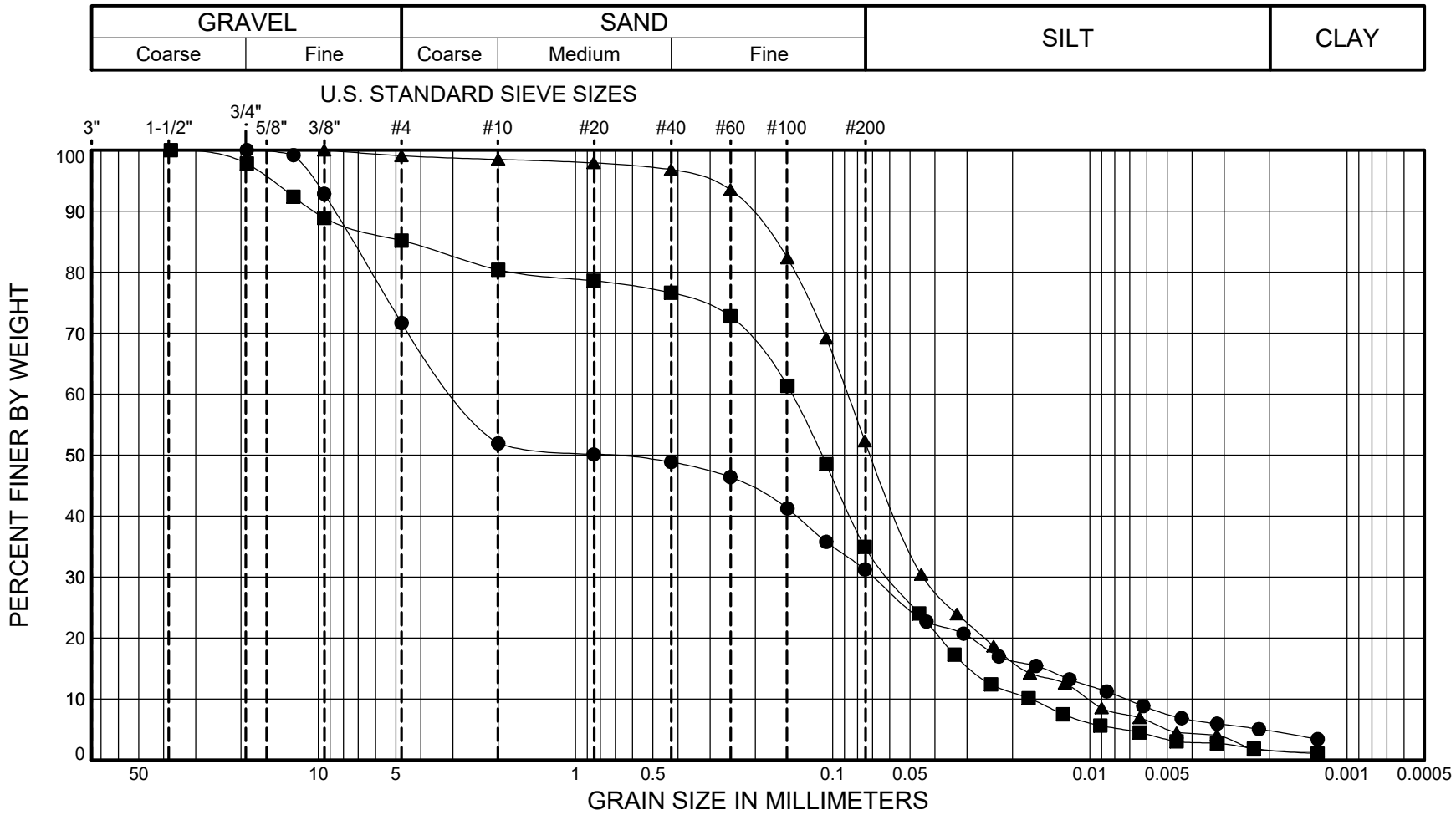
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-01C	0-1	0.0 - 1.0	(ML) Very dark gray, SILT with sand	60				0.1	26.9	67.5	5.6	
■	SED-03C	0-1	0.0 - 1.0	(ML) Very dark gray, SILT with sand	100				0.2	15.8	76.0	8.0	
▲	SED-05C	0-1	0.0 - 1.0	(ML) Very dark gray, SILT with sand and trace organics	66				0.2	17.0	77.5	5.3	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 3



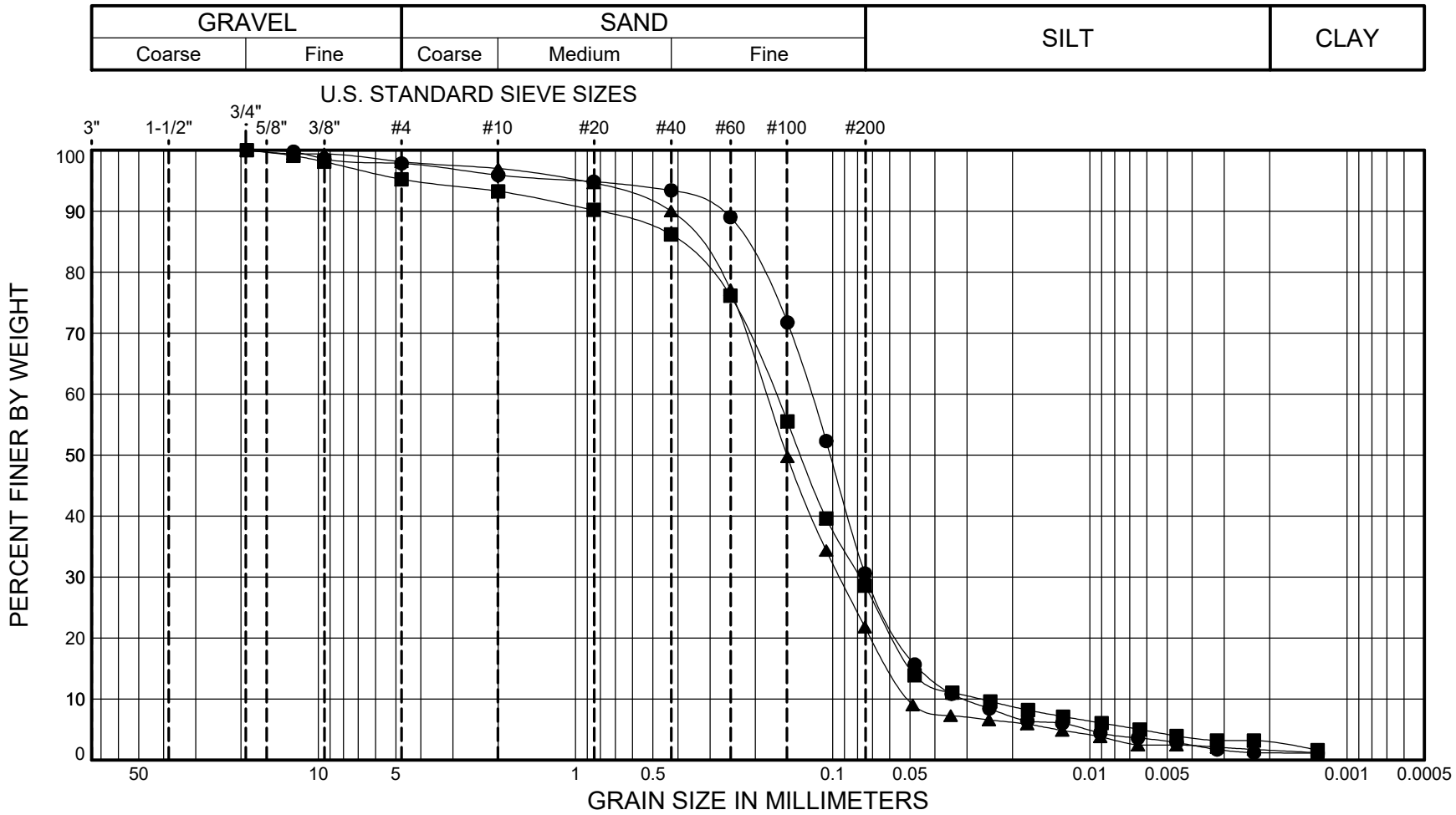
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-07C	0-1	0.0 - 1.0	(SM) Greenish-black, silty SAND with gravel and trace shells	34				28.3	40.4	26.5	4.8	
■	SED-07C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with trace shells	31				14.8	50.2	33.3	1.7	
▲	SED-08C	0-1	0.0 - 1.0	(ML) Very dark gray, sandy SILT with trace shells	49				0.9	46.8	50.7	1.6	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 4



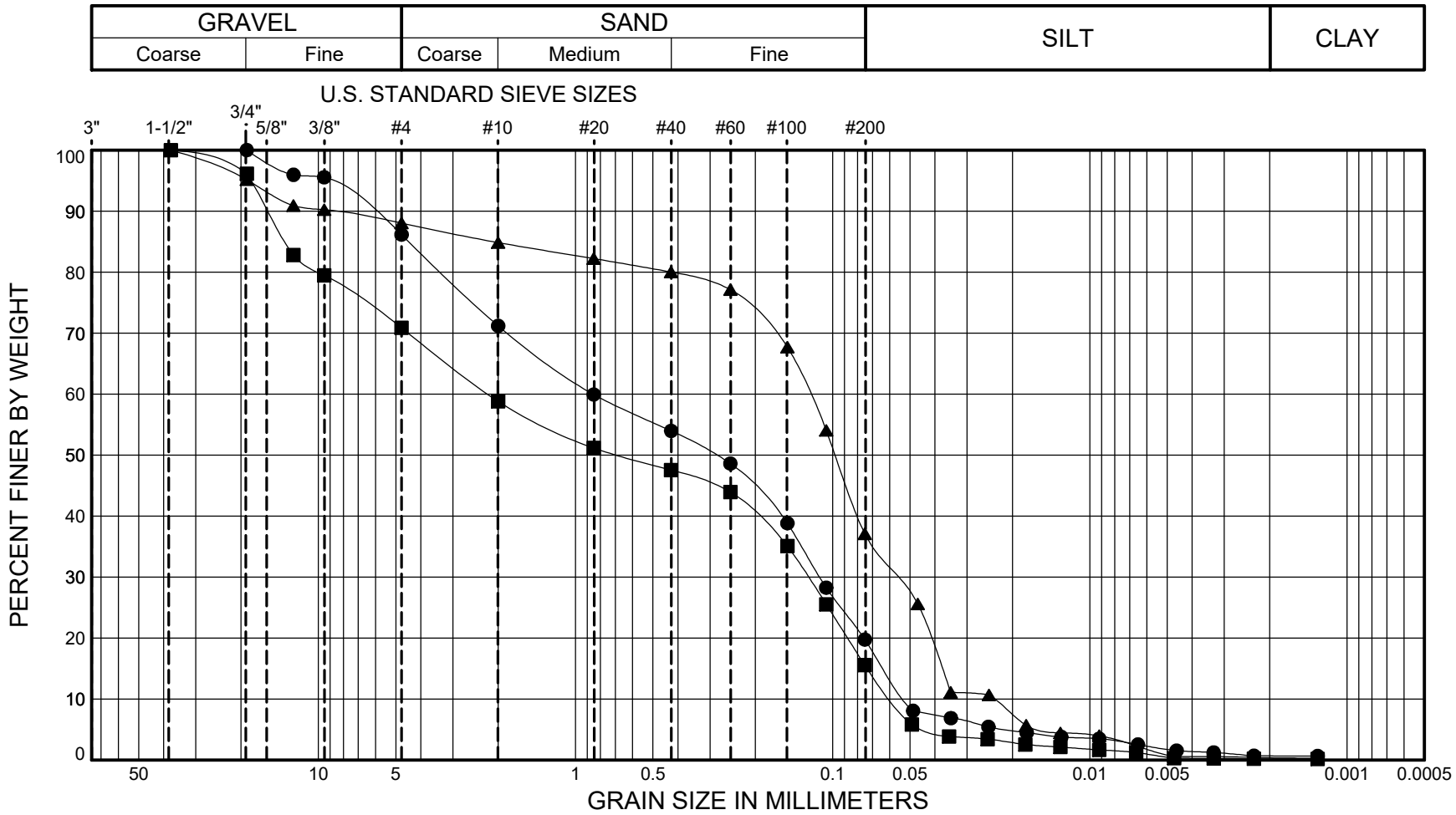
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-08C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with organics and trace shells	35				2.2	67.2	29.4	1.2	
■	SED-09C	0-1	0.0 - 1.0	(SM) Very dark gray, silty SAND with organics and shells	41				4.8	66.6	25.8	2.8	
▲	SED-09C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with organics and shells	31				1.9	76.3	20.2	1.6	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 5



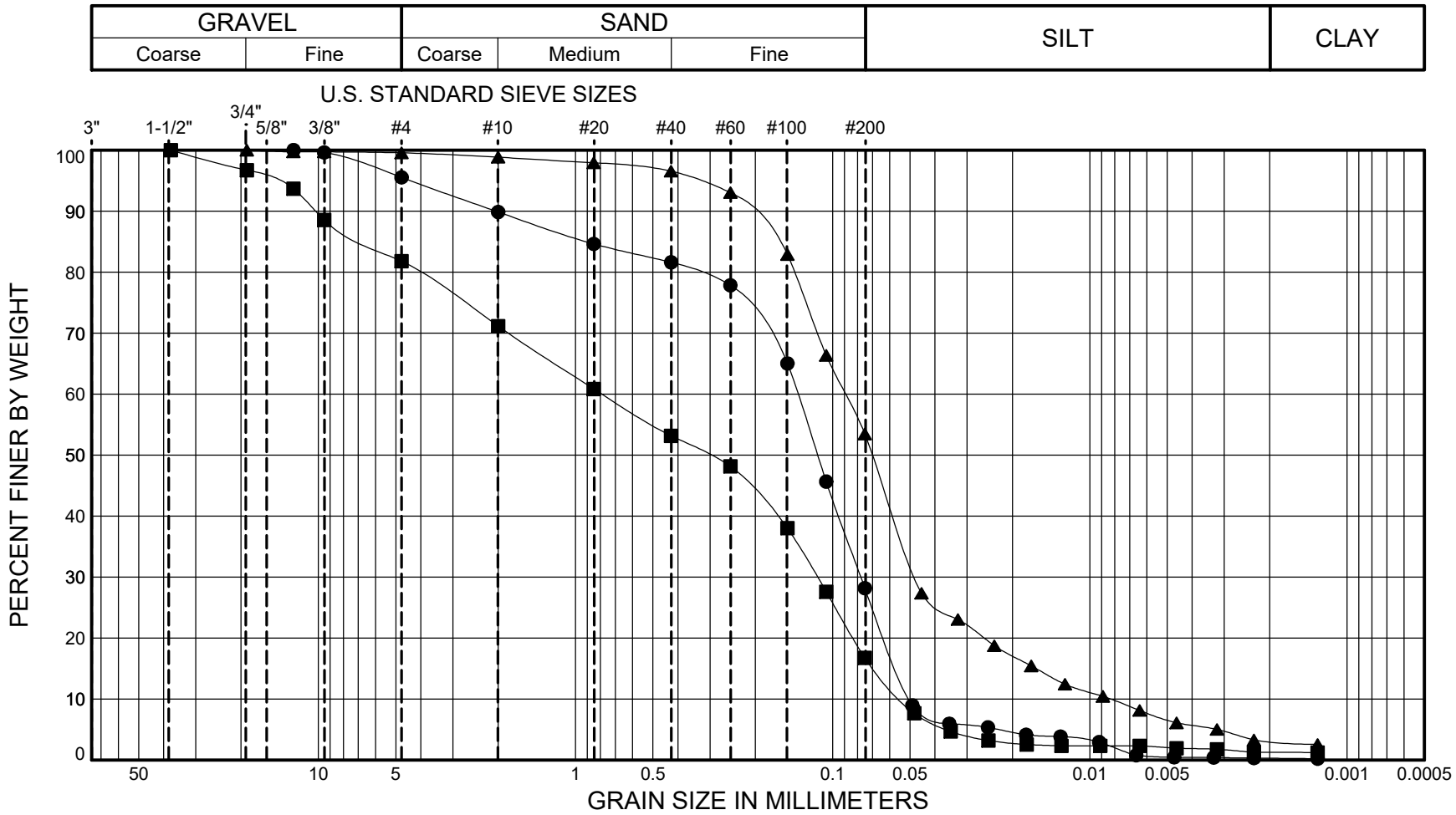
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-10C	0-1	0.0 - 1.0	(SM) Very dark gray, silty SAND with trace organics	28				13.9	66.4	19.1	0.7	
■	SED-10C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with gravel and trace organics	28				29.1	55.3	15.4	0.2	
▲	SED-11C	0-1	0.0 - 1.0	(SM) Very dark gray, silty SAND with trace organics	40				12.0	50.9	36.7	0.4	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 6



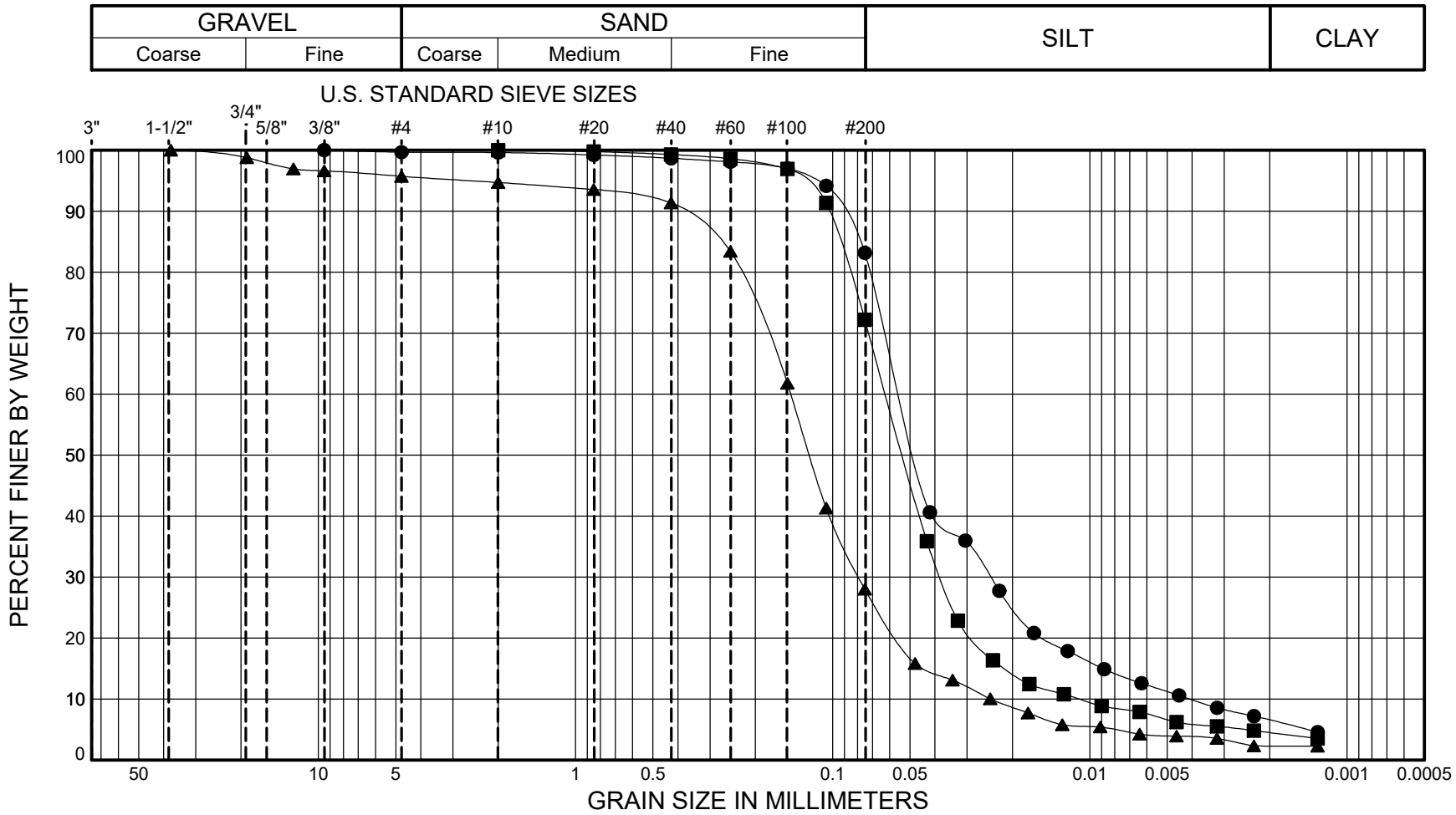
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-11C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with shells	33				4.5	67.4	27.9	0.3	
■	SED-12C	0-1	0.0 - 1.0	(SM) Very dark gray, silty SAND with gravel with organics and shells	27				18.2	65.1	15.5	1.3	
▲	SED-14C	0-1	0.0 - 1.0	(ML) Very dark gray, sandy SILT with shells and trace organics	48				0.4	46.1	50.4	3.1	

GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 7



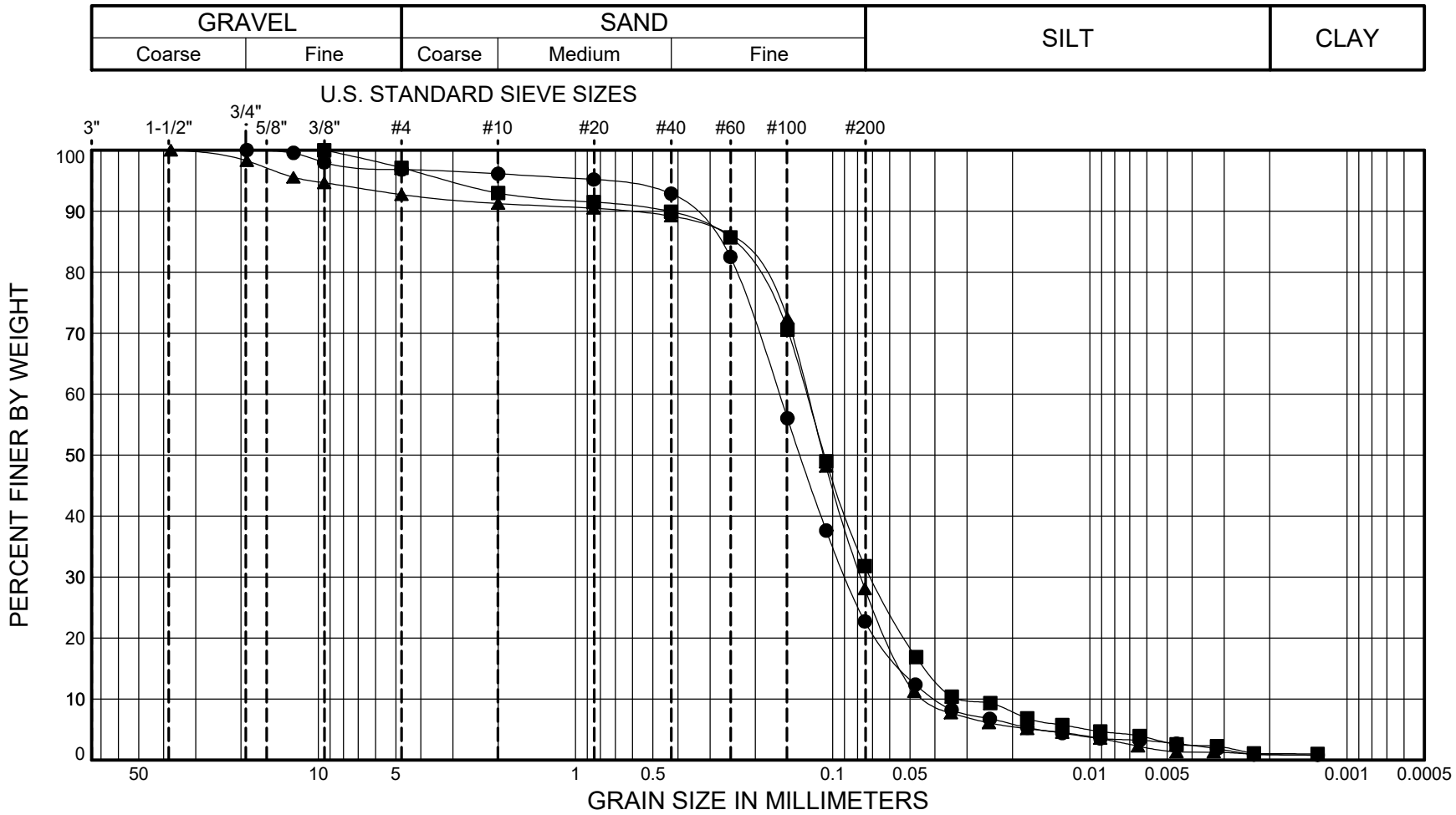
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-18G	0-10	0.0 - 10.0	(ML) Very dark gray, SILT with sand	72				0.3	16.5	76.6	6.5	
■	SED-19G	0-10	0.0 - 10.0	(ML) Very dark gray, SILT with sand	50					27.8	67.7	4.5	
▲	SED-25C	0-1	0.0 - 1.0	(SM) Greenish-black, silty SAND with organics and shells	36				4.3	67.7	25.7	2.3	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 8



SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-25C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with shells	29				3.2	74.1	21.8	0.9	
■	SED-26C	0-1	0.0 - 1.0	(SM) Greenish-black, silty SAND with organics and shells	55				2.9	65.3	30.7	1.1	
▲	SED-26C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with shells	37				7.3	64.6	27.1	0.9	

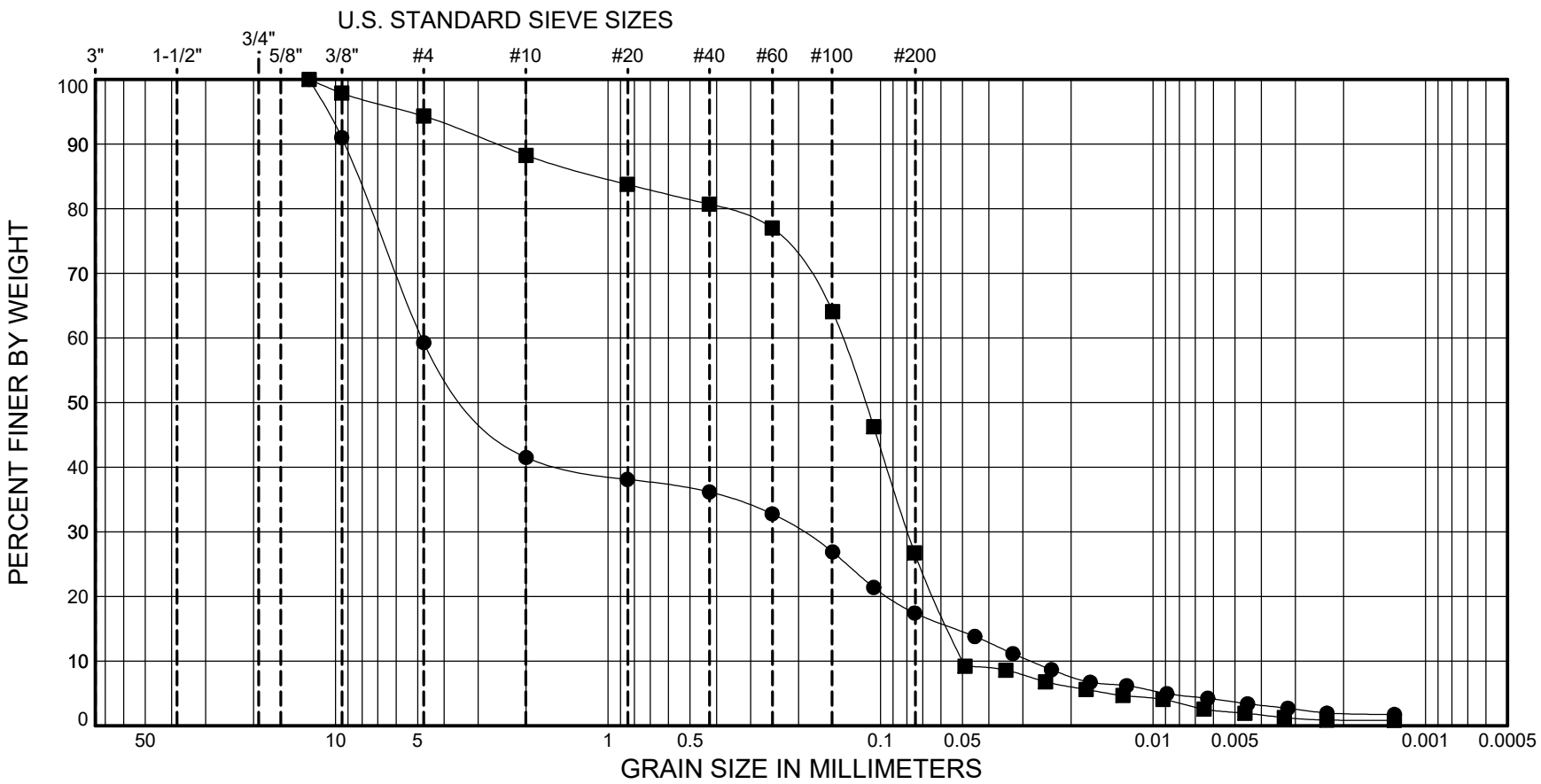
HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 9

GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		



SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-DUP2C		0.0 - 0.0	(SM) Very dark gray, silty SAND with gravel	22				40.7	41.8	15.5	1.9	
■	SED-DUP3C		0.0 - 0.0	(SM) Very dark gray, silty SAND with shells	27				5.7	67.6	25.9	0.9	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 10

HWA GeoSciences Inc.
DBE/MWBE

May 12, 2023
HWA Project No. 2023-070

Friedman & Bruya, Inc.
5500 4th Ave S
Seattle, Washington 98108

Attention: Mr. Michael Erdahl

Subject: **Materials Laboratory Report**
Letter Report 1 – Priority Samples
Port of Friday Harbor - Jensen's Marina

Dear Mr. Erdahl,

In accordance with your request, HWA GeoSciences Inc. (HWA) performed laboratory testing for the above referenced project. Herein we present the results of our laboratory analyses, which are summarized on the attached Figures. The laboratory testing program was performed in general accordance with your instructions and appropriate ASTM Standards as outlined below.

SAMPLE DESCRIPTION: The subject samples were delivered to our laboratory on March 27, 2023 by Friedman & Bruya personnel. The samples were delivered in coolers containing re-sealable plastic jars designated with exploration/sample IDs. The sample descriptions may be found on the attached Summary of Material Properties, Figure 1.

PARTICLE SIZE ANALYSIS OF SOILS: The particle size distribution of each specified sample was determined in general accordance with ASTM D6913 and D7928. The results are plotted on the attached Particle Size Analysis of Soils Report, Figures 2 through 5, which also indicate the moisture content of the soil samples at the time of testing.

CLOSURE: Experience has shown that test values on soil and other natural materials vary with each representative sample. As such, HWA has no knowledge as to the extent and quantity of material the tested samples may represent. HWA also makes no warranty as to how representative either the samples tested or the test results obtained are to actual field conditions. It is a well-established fact that sampling methods present varying degrees of disturbance that affect sample representativeness.

No copy should be made of this report except in its entirety.

We appreciate the opportunity to provide laboratory testing services on this project. Should you have any questions or comments, or if we may be of further service, please call.

Sincerely,

HWA GEOSCIENCES INC.

Alex Hodges
Materials Laboratory Supervisor

Steven E. Greene, L.G., L.E.G.
Principal Engineering Geologist
Vice President

Attachments:

Figures 1	Summary of Material Properties
Figures 2-5	Particle Size Analysis of Soils Report

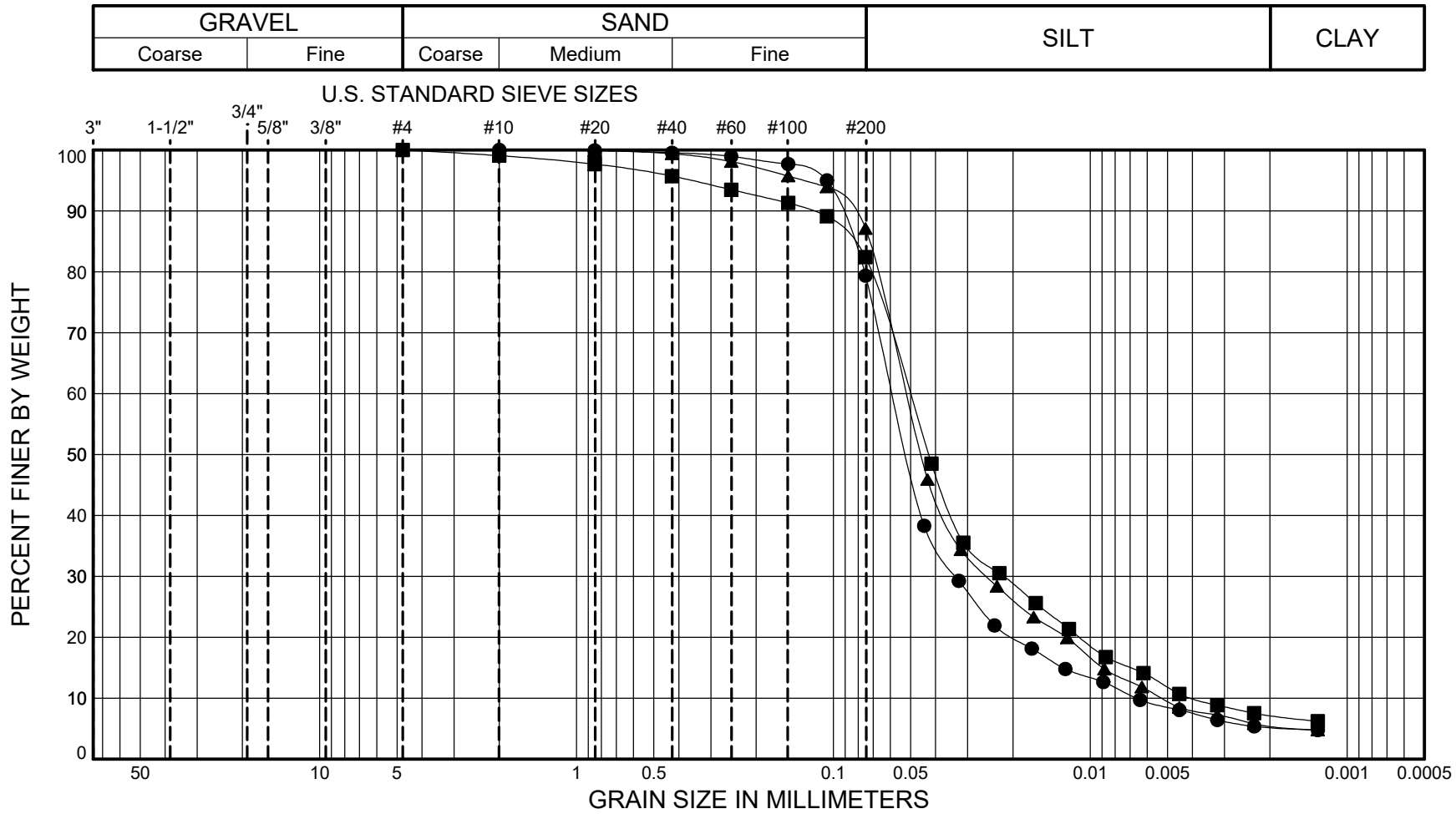
EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVITY	ATTERBERG LIMITS (%)			% GRAVEL	% SAND	% FINES	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION
						LL	PL	PI					
SED-01G,0-10	0.0	10.0	65.5							20.6	79.4	ML	Greenish-black, SILT with sand
SED-03G,0-10	0.0	10.0	78.7							17.6	82.4	ML	Greenish-black, SILT with sand and trace shells
SED-05G,0-10	0.0	10.0	90.3							12.9	87.1	ML	Greenish-black, SILT
SED-07G,0-10	0.0	10.0	32.8						55.8	21.8	22.4	GM	Greenish-black, silty GRAVEL with sand and trace shells
SED-11G,0-10	0.0	10.0	42.6						5.8	48.6	45.6	SM	Greenish-black, silty SAND with trace organics and trace shells
SED-14G,0-10	0.0	10.0	80.5							22.0	78.0	ML	Greenish-black, SILT with sand
SED-15G,0-10	0.0	10.0	65.8							36.2	63.8	ML	Greenish-black, sandy SILT
SED-20G,0-10	0.0	10.0	50.5							17.9	82.1	ML	Greenish-black, SILT with sand and trace shells
SED-21G,0-10	0.0	10.0	102.4						0.1	7.3	92.6	ML	Greenish-black, SILT with trace organics and trace shells
SED-22G,0-10	0.0	10.0	94.0							7.1	92.9	ML	Greenish-black, SILT
SED-23G,0-10	0.0	10.0	127.6							5.1	94.9	ML	Greenish-black, SILT
SED-24G,0-10	0.0	10.0	107.0							6.7	93.3	ML	Greenish-black, SILT

Notes: 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report test, other graphs and tables, and the exploration logs.
2. The soil classifications in this table are based on ASTM D2487 and D2488 as applicable.

GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

SUMMARY OF
MATERIAL PROPERTIES



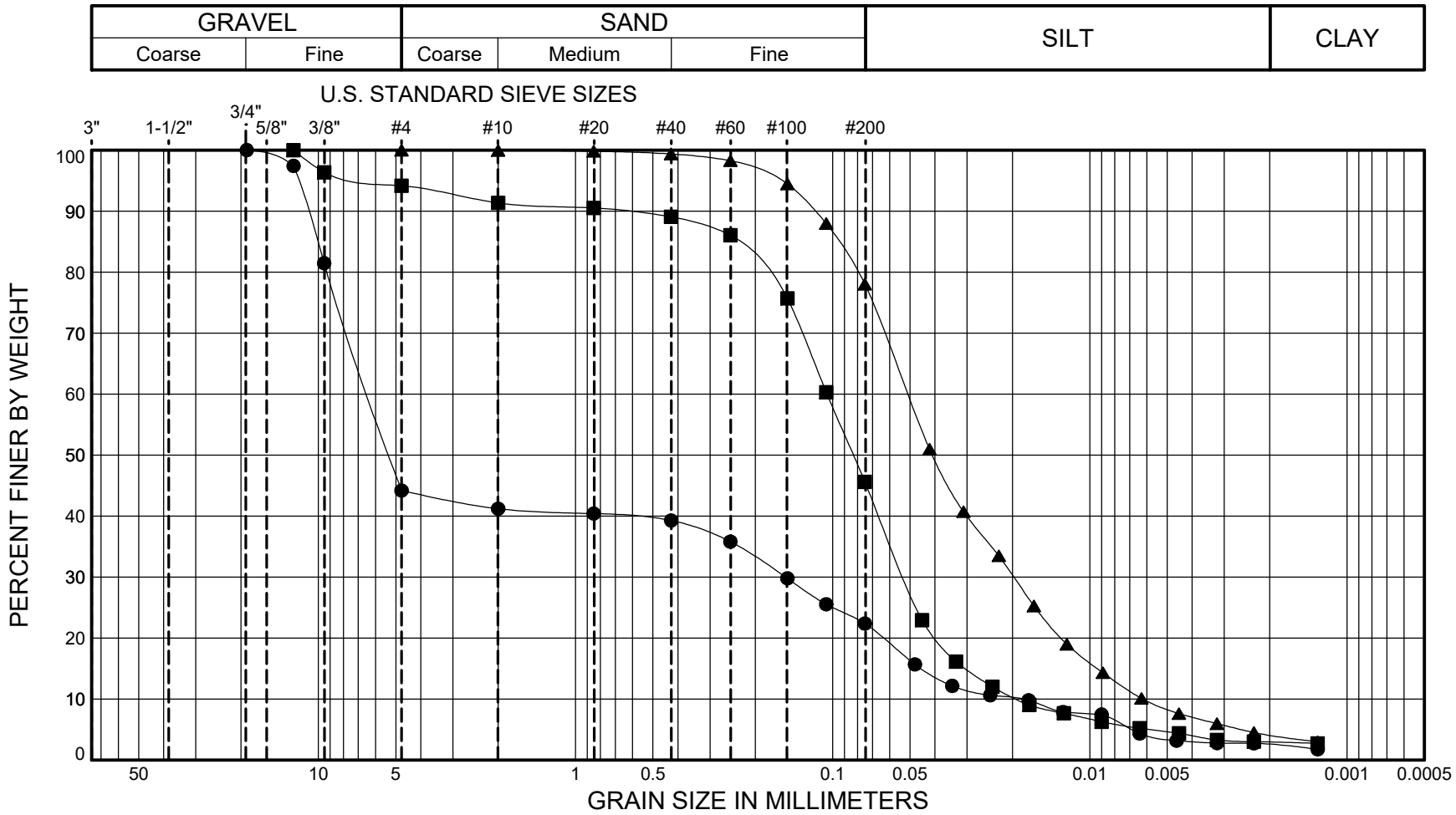
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-01G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT with sand	65					20.6	74.1	5.2	
■	SED-03G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT with sand and trace shells	79					17.6	75.2	7.2	
▲	SED-05G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT	90					12.9	81.5	5.5	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 2



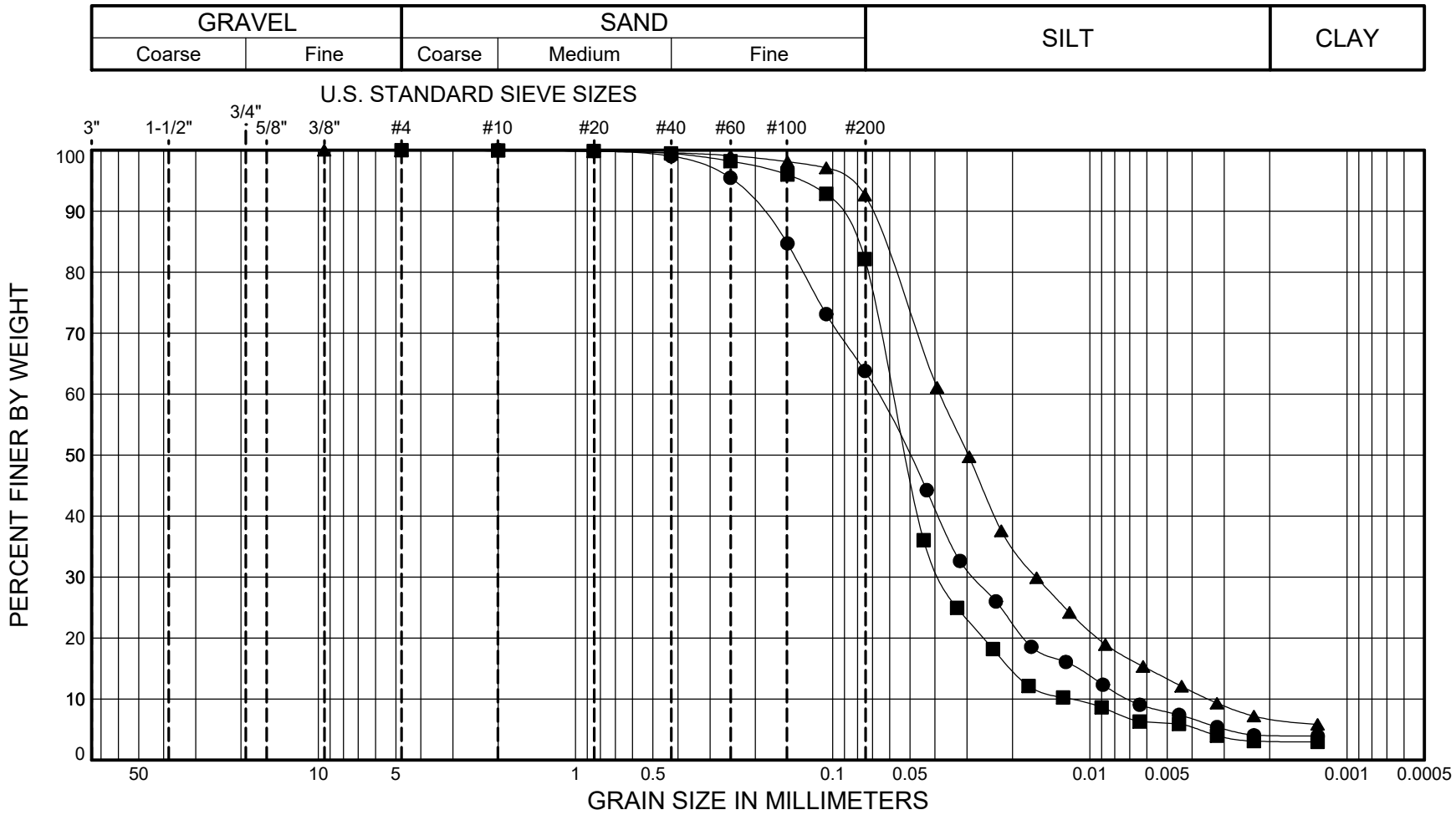
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-07G	0-10	0.0 - 10.0	(GM) Greenish-black, silty GRAVEL with sand and trace shells	33				55.8	21.8	19.9	2.5	
■	SED-11G	0-10	0.0 - 10.0	(SM) Greenish-black, silty SAND with trace organics and trace shells	43				5.8	48.6	42.7	2.9	
▲	SED-14G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT with sand	81					22.0	73.9	4.1	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 3



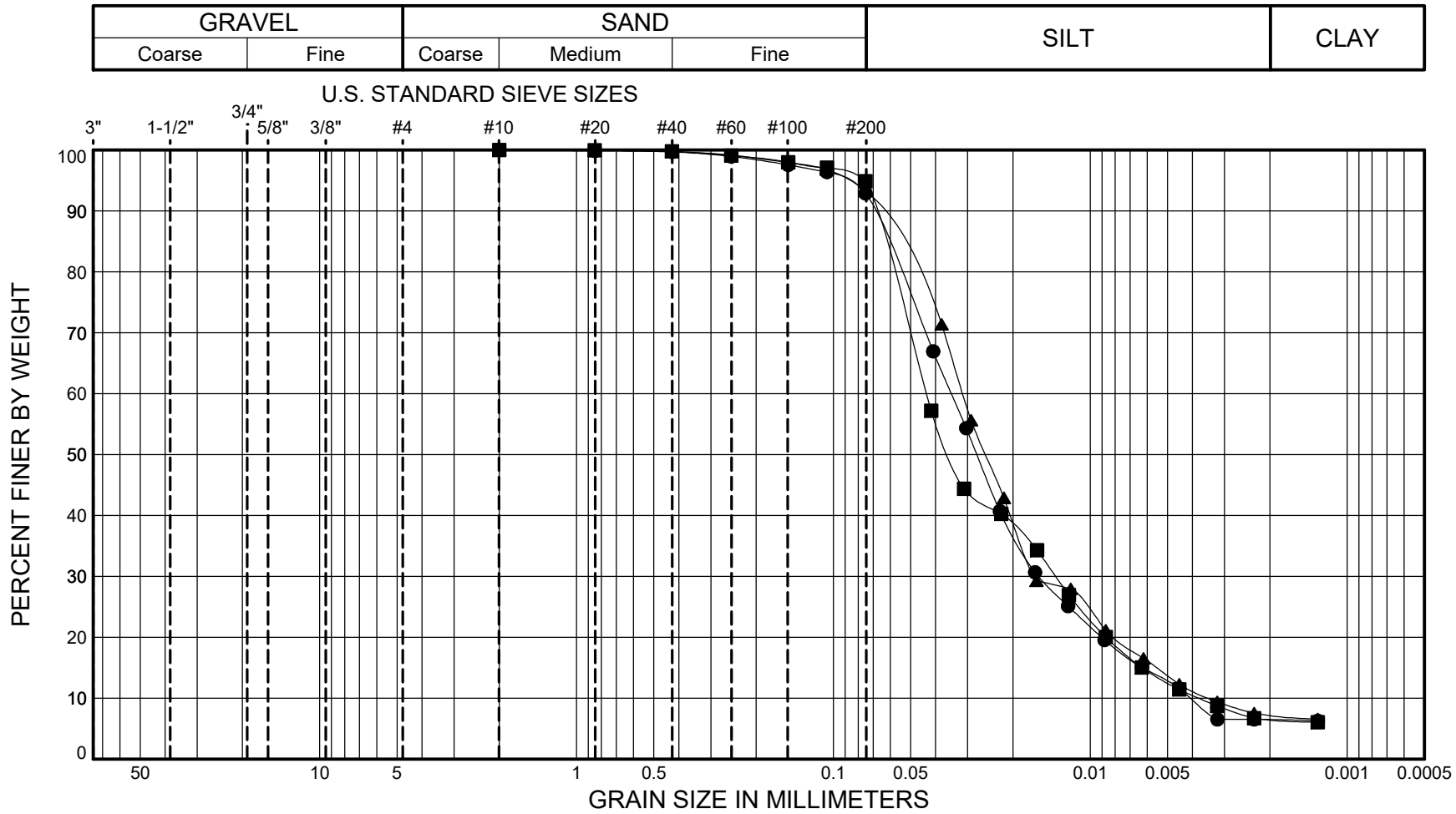
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-15G	0-10	0.0 - 10.0	(ML) Greenish-black, sandy SILT	66					36.2	59.8	4.0	
■	SED-20G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT with sand and trace shells	51					17.9	79.1	3.1	
▲	SED-21G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT with trace organics and trace shells	102				0.1	7.3	85.8	6.9	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 4



SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-22G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT	94					7.1	86.4	6.5	
■	SED-23G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT	128					5.1	88.3	6.5	
▲	SED-24G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT	107					6.7	86.0	7.3	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Avenue South
Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

June 30, 2023

Peter Leon, Project Manager
Leon Environmental
8047 Burke Ave N
Seattle, WA 98103

Dear Mr Leon:

Included are the results from the testing of material submitted on May 25, 2023 from the Port of Friday Harbor, F&BI 305424 project. There is 1 page included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
NAA0630R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on May 25, 2023 by Friedman & Bruya, Inc. from the Leon Environmental Port of Friday Harbor, F&BI 305424 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Leon Environmental
305424 -01	CARR18-23-REF
305424 -02	CARR18-23-REF
305424 -03	CARR40-23-REF
305424 -04	CARR40-23-REF
305424 -05	CARR62-23-REF
305424 -06	CARR62-23-REF

The samples were sent to Analytical Resources for total organic carbon and total solids analyses. In addition, the samples were sent to HWA for grain size analyis. The reports are enclosed.

CHAIN OF CUSTODY

305424

EcoAnalysts, Inc
4770 NE View Dr., Port Gamble, WA. 9836
Tel: (360) 297-604

05/25/23

Destination: Friedman & Bruya, Inc.	Sample Originator (Organization): EcoAnalysts	Report Results To: Lean Environmental	Phone:
Destination Contact: Michael Erdahl	PERSON WHO COLLECTED SAMPLE: EcoA, Marisa Seibert	Contact Name: Peter Leon	Fax:
Date: 5/24/23	Address:	Address:	Email:
Turn-Around-Time:			
Project Name: Port of Friday Harbor	Phone:	Analyses:	Invoicing To:
	Fax:		Comments or Special Instructions:
Contract/PO:	E-mail		

No.	Sample ID	Matrix	Volume & Type of Container	Date & Time	Grain Size	TOC, Total Solids					Preservation	Sample Temp Upon Receipt	LAB ID
1	CARR18-23-REF	Sed.	4oz jar	5/19/23 1125		x					Ice		01
2	CARR18-23-REF	↓	16oz jar	↓	x						↓		02
3	CARR40-23-REF		4oz jar			x							03
4	CARR40-23-REF		16oz jar		x								04
5	CARR62-23-REF		4oz jar			x							05
6	CARR62-23-REF		16oz jar		x								06
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													

Samples received at 4 °C

Relinquished by:	Received by:	Relinquished by:	Received by:	Matrix Codes
Print Name: Julia Leverygood	Print Name: DeeDee Weldon	Print Name:	Print Name:	FW = Fresh Water
Signature:	Signature:	Signature:	Signature:	SB = Salt & Brackish Water
Affiliation: EcoAnalysts	Affiliation: F+BI	Affiliation:	Affiliation:	SS = Soil & Sediment
Date/Time: 5/24/23 1100	Date/Time: 5/25 12:00	Date/Time:	Date/Time:	

Analytical Resources, LLC
Analytical Chemists and Consultants
Tukwila, WA

28 June 2023

Michael Erdahl
Friedman & Bruya Inc.
3012 16th Avenue West
Seattle, WA 98119-2029

RE: Port of Friday Harbor (305424)

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
23E0570	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, LLC

Shelly Fishel, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006-012

23E0570

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER ARI

PROJECT NAME/NO. 305424

PO # D-313

REMARKS

TURNAROUND TIME

☒ Standard TAT

RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

Dispose after 30 days

Return samples

Will call with instructions

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Grain Size	TOC	Total Solids	Sulfate	CO2	dissolved methane					Notes
CARR18-23-REF		5/19/2023	1125	sediment	1		X	X								
CARR40-23-REF		5/19/2023	1125	sediment	1		X	X								
CARR62-23-REF		5/19/2023	1125	sediment	1		X	X								

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Michael Erdahl	Friedman & Bruya	5/25/23	1230
Received by:		Matthew Nutel	ARI LLC	05/25/23	1357
Relinquished by:					
Received by:					

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 305424	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	28-Jun-2023 15:53

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
CARR18-23-REF	23E0570-01	Solid	19-May-2023 11:25	25-May-2023 13:57
CARR40-23-REF	23E0570-02	Solid	19-May-2023 11:25	25-May-2023 13:57
CARR62-23-REF	23E0570-03	Solid	19-May-2023 11:25	25-May-2023 13:57

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 305424	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	28-Jun-2023 15:53

Work Order Case Narrative

Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Project Number: 305424
Work Order: 23E0570

Sample receipt

Samples as listed on the preceding page were received 25-May-2023 13:57 under ARI work order 23E0570. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Wet Chemistry

The samples were prepared and analyzed for Total Solids within the recommended holding times . For Total Organic Carbon the samples were analyzed outside of the recommended holding time. ARI had instrumentation issues and heavy workload delaying analysis. The project was built to have the samples frozen but due to newer staff the analysis code was not applied to the samples. Due to the heavy workload and limited conventional chemistry staff when the instrument went down the work list was not reviewed for ability to freeze. The data has been flagged with "H" qualifiers.

Initial and continuing calibrations were within method requirements.

The method blank(s) were clean at the reporting limits.

The blank spike (BS/LCS) percent recoveries were within control limits.

The reference material (SRM) percent recoveries were within control limits.

The matrix spike (MS) percent recoveries and the duplicate (DUP) relative percent difference (RPD) were within advisory control limits.

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Friedman Bruya Project Name: 305424

COC No(s): NA Delivered by: Fed-Ex UPS Courier Hand Delivered Other:

Assigned ARI Job No: 23E0570 Tracking No: NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler?	YES	NO
Were custody papers included with the cooler?	YES	NO
Were custody papers properly filled out (ink, signed, etc.)	YES	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 8.6 °C

Time 1357

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID#: 90470078

Cooler Accepted by: MP Date: 05/25/23 Time: 1357

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	NO
What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other:			
Was sufficient ice used (if appropriate)?	NA	YES	NO
How were bottles sealed in plastic bags?	Individually	Grouped	Not MP 05/25/23
Did all bottles arrive in good condition (unbroken)?		YES	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		YES	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs) ...	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA		

Were the sample(s) split by ARI? NA YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: _____ Date: 5/25/23 Time: 1655 Labels checked by: _____

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Temperature Compliance Form

ARI Work Order: 23E0570

Cooler#: 1 **Temperature(°C):**

Sample ID	Bottle Count	Bottle Type
Samples received above 6.0°C		

Cooler#: **Temperature(°C):**

Sample ID	Bottle Count	Bottle Type

Cooler#: **Temperature(°C):**

Sample ID	Bottle Count	Bottle Type

Cooler#: **Temperature(°C):**

Sample ID	Bottle Count	Bottle Type

Completed by: MD Date: 05/25/23 Time: 1357

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 305424	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	28-Jun-2023 15:53

CARR18-23-REF

23E0570-01 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 05/19/2023 11:25

Instrument: TOC Cube Analyst: CDE — Analyzed: 06/15/2023 01:55

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0570-01 A

Preparation Batch: BLF0414 — Sample Size: 0.6103 g (wet) — Dry Weight:0.46 g

Prepared: 06/14/2023 — Final Volume: 0.6103 g — % Solids: 74.77

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	0.20	%	H

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 305424	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	28-Jun-2023 15:53

CARR18-23-REF

23E0570-01 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 05/19/2023 11:25
Instrument: BAL2 Analyst: UW — Analyzed: 05/30/2023 14:40

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0570-01
Preparation Batch: BLE0827 — Sample Size: 5 g (wet) — Dry Weight:3.74 g
Prepared: 05/30/2023 — Final Volume: 5 g — % Solids: 74.77

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	74.77	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 305424	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	28-Jun-2023 15:53

CARR40-23-REF

23E0570-02 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 05/19/2023 11:25

Instrument: TOC Cube Analyst: CDE — Analyzed: 06/15/2023 21:33

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0570-02 A

Preparation Batch: BLF0414 — Sample Size: 0.4323 g (wet) — Dry Weight:0.31 g

Prepared: 06/14/2023 — Final Volume: 0.4323 g — % Solids: 72.25

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	0.60	%	H

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 305424	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	28-Jun-2023 15:53

CARR40-23-REF

23E0570-02 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 05/19/2023 11:25

Instrument: BAL2 Analyst: UW — Analyzed: 05/30/2023 14:40

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0570-02

Preparation Batch: BLE0827 — Sample Size: 5 g (wet) — Dry Weight:3.61 g

Prepared: 05/30/2023 — Final Volume: 5 g — % Solids: 72.25

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	72.25	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 305424	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	28-Jun-2023 15:53

CARR62-23-REF

23E0570-03 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 05/19/2023 11:25

Instrument: TOC Cube Analyst: CDE — Analyzed: 06/15/2023 22:04

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0570-03 A

Preparation Batch: BLF0414 — Sample Size: 0.6211 g (wet) — Dry Weight:0.39 g

Prepared: 06/14/2023 — Final Volume: 0.6211 g — % Solids: 62.15

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	0.60	%	H

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 305424	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	28-Jun-2023 15:53

CARR62-23-REF

23E0570-03 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 05/19/2023 11:25

Instrument: BAL2 Analyst: UW — Analyzed: 05/30/2023 14:40

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0570-03

Preparation Batch: BLE0827 — Sample Size: 5 g (wet) — Dry Weight:3.11 g

Prepared: 05/30/2023 — Final Volume: 5 g — % Solids: 62.15

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	62.15	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 305424	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	28-Jun-2023 15:53

Analysis by: Analytical Resources, LLC

Wet Chemistry - Quality Control

Batch BLE0827 - SM 2540 G-97

Instrument: BAL2 Analyst: UW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BLE0827-BLK1)				Prepared: 30-May-2023 Analyzed: 30-May-2023 14:40							
Total Solids	ND	0.04	0.04	%							U

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 305424	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	28-Jun-2023 15:53

Analysis by: Analytical Resources, LLC

Wet Chemistry - Quality Control

Batch BLF0414 - EPA 9060A m

Instrument: TOC Cube Analyst: CDE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BLF0414-BLK1)					Prepared: 14-Jun-2023 Analyzed: 14-Jun-2023 20:25						
Total Organic Carbon	ND	0.02	0.02	%							U
LCS (BLF0414-BS1)					Prepared: 14-Jun-2023 Analyzed: 14-Jun-2023 21:55						
Total Organic Carbon	45.6	0.02	0.02	%	44.4		103	80-120			
Duplicate (BLF0414-DUP1)		**Source: 23E0570-01**			Prepared: 14-Jun-2023 Analyzed: 15-Jun-2023 02:25						
Total Organic Carbon	0.20	0.02	0.02	%		0.20			3.37	20	H
Duplicate (BLF0414-DUP2)		**Source: 23E0570-01**			Prepared: 14-Jun-2023 Analyzed: 15-Jun-2023 02:56						
Total Organic Carbon	0.21	0.02	0.02	%		0.20			4.53	20	H
Matrix Spike (BLF0414-MS1)		**Source: 23E0570-01**			Prepared: 14-Jun-2023 Analyzed: 15-Jun-2023 03:26						
Total Organic Carbon	1.01	0.02	0.02	%	0.764	0.20	106	75-125			H
Recovery limits for target analytes in MS/MSD QC samples are advisory only.											
Matrix Spike Dup (BLF0414-MSD1)		**Source: 23E0570-01**			Prepared: 14-Jun-2023 Analyzed: 15-Jun-2023 03:56						
Total Organic Carbon	0.85	0.02	0.02	%	0.624	0.20	105	75-125	17.00	20	H
Recovery limits for target analytes in MS/MSD QC samples are advisory only.											
Reference (BLF0414-SRM2)					Prepared: 14-Jun-2023 Analyzed: 24-Jun-2023 16:01						
Total Organic Carbon	3.19	0.02	0.02	%	2.99		107	80-120			

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 305424	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	28-Jun-2023 15:53

Certified Analyses included in this Report

Analyte	Certifications
EPA 9060A m in Solid	
Total Organic Carbon	WADOE

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	03/28/2025
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program, PJLA Testing	66169	02/28/2025
WADOE	WA Dept of Ecology	C558	06/30/2023
WA-DW	Ecology - Drinking Water	C558	06/30/2023

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 305424	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	28-Jun-2023 15:53

Notes and Definitions

H	Hold time violation - Hold time was exceeded.
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

HWA GeoSciences Inc.
DBE/MWBE

June 7, 2023
HWA Project No. 2023-070

Friedman & Bruya, Inc.
5500 4th Ave S
Seattle, Washington 98108

Attention: Mr. Michael Erdahl

Subject: **Materials Laboratory Report**
Letter Report 3 – Carr Inlet Reference Samples
Port of Friday Harbor - Jensen's Marina

Dear Mr. Erdahl,

In accordance with your request, HWA GeoSciences Inc. (HWA) performed laboratory testing for the above referenced project. Herein we present the results of our laboratory analyses, which are summarized on the attached Figures. The laboratory testing program was performed in general accordance with your instructions and appropriate ASTM Standards as outlined below.

SAMPLE DESCRIPTION: Three additional samples were delivered to our laboratory on May 25, 2023 by courier. The samples were delivered in re-sealable plastic jars designated with exploration/sample IDs. The sample descriptions may be found on the attached Summary of Material Properties, Figure 1.

PARTICLE SIZE ANALYSIS OF SOILS: The particle size distribution of each specified sample was determined in general accordance with ASTM D6913 and D7928. The results are plotted on the attached Particle Size Analysis of Soils Report, Figure 2, which also indicates the moisture content of the soil samples at the time of testing.

CLOSURE: Experience has shown that test values on soil and other natural materials vary with each representative sample. As such, HWA has no knowledge as to the extent and quantity of material the tested samples may represent. HWA also makes no warranty as to how representative either the samples tested or the test results obtained are to actual field conditions. It is a well-established fact that sampling methods present varying degrees of disturbance that affect sample representativeness.

No copy should be made of this report except in its entirety.

We appreciate the opportunity to provide laboratory testing services on this project. Should you have any questions or comments, or if we may be of further service, please call.

Sincerely,

HWA GEOSCIENCES INC.

Kristin Nolan
Laboratory Data Manager

Steven E. Greene, L.G., L.E.G.
Principal Engineering Geologist
Vice President

Attachments:

Figure 1	Summary of Material Properties
Figure 2	Particle Size Analysis of Soils Report

EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVITY	ATTERBERG LIMITS (%)			% GRAVEL	% SAND	% FINES	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION
						LL	PL	PI					
CARR18-23-REF,	0.0	0.0	40.7							85.1	14.9	SM	Dark olive-gray, silty SAND
CARR40-23-REF,	0.0	0.0	48.1							55.3	44.7	SM	Dark olive-gray, silty SAND with trace shells
CARR62-23-REF,	0.0	0.0	63.5							26.5	73.5	ML	Dark olive-gray, SILT with sand

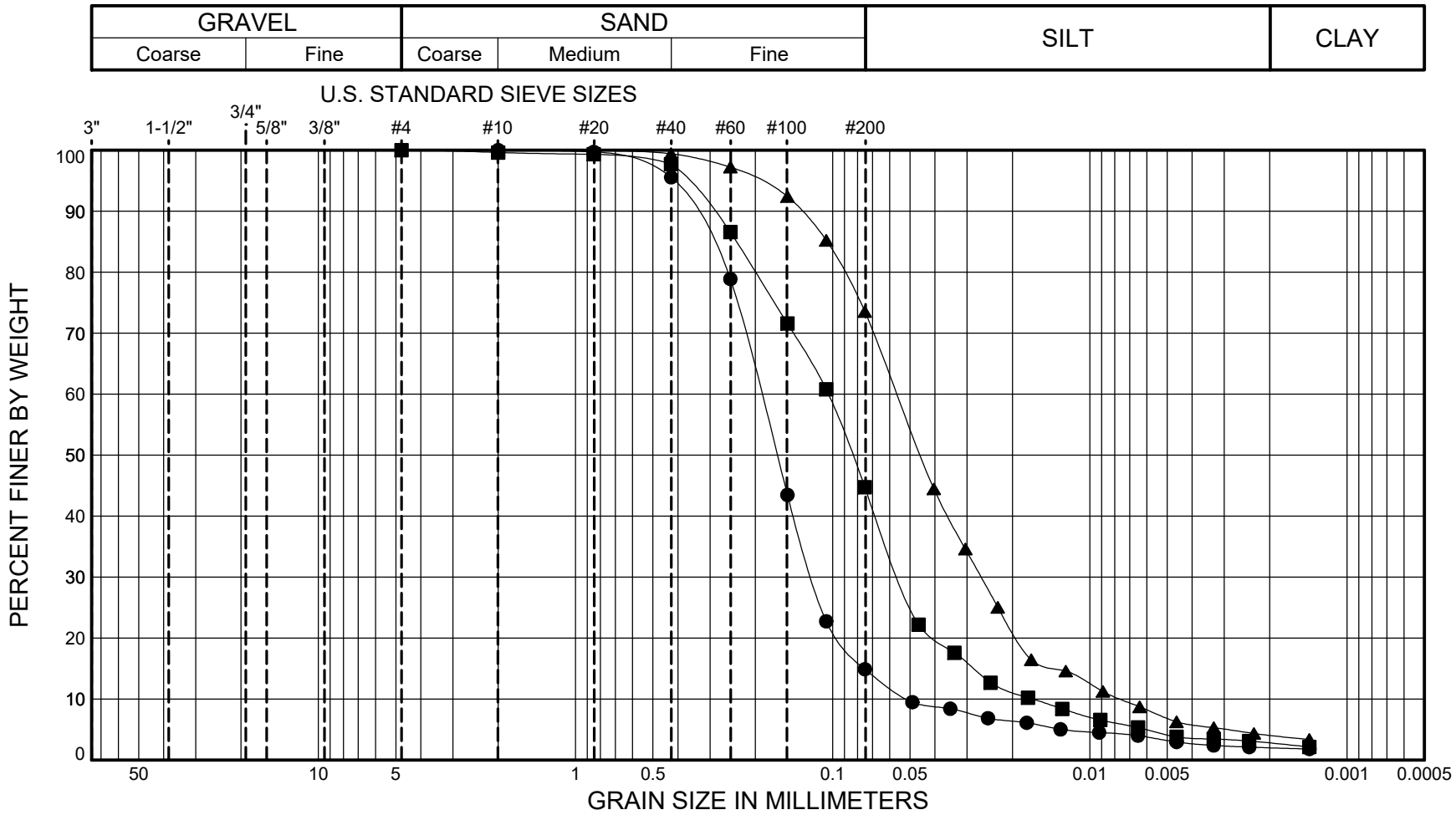
Notes: 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report test, other graphs and tables, and the exploration logs.
2. The soil classifications in this table are based on ASTM D2487 and D2488 as applicable.

GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

SUMMARY OF
MATERIAL PROPERTIES

PROJECT NO.: 2023-070 FIGURE: 1



SYMBOL	SAMPLE	DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	CARR18-23-REF	0.0 - 0.0	(SM) Dark olive-gray, silty SAND	41					85.1	12.9	2.0	
■	CARR40-23-REF	0.0 - 0.0	(SM) Dark olive-gray, silty SAND with trace shells	48					55.3	41.9	2.8	
▲	CARR62-23-REF	0.0 - 0.0	(ML) Dark olive-gray, SILT with sand	63					26.5	69.4	4.1	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Avenue South
Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

May 26, 2023

Peter Leon, Project Manager
Leon Environmental
8047 Burke Ave N
Seattle, WA 98103

Dear Mr Leon:

Included are the results from the testing of material submitted on March 23, 2023 from the Port of Friday Harbor (PoFH) Jensen's Marina, F&BI 303373 project. There is 1 page included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Grant Hainworth (Crete), Rusty Jones (Crete)
NAA0526R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on March 23, 2023 by Friedman & Bruya, Inc. from the Leon Environmental Port of Friday Harbor (PoFH) Jensen's Marina, F&BI 303373 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Leon Environmental
303373 -01	SED-07G:0-10
303373 -02	SED-11G:0-10
303373 -03	SED-14G:0-10
303373 -04	SED-15G:0-10
303373 -05	SED-24G:0-10
303373 -06	SED-23G:0-10
303373 -07	SED-22G:0-10
303373 -08	SED-21G:0-10
303373 -09	SED-03G:0-10
303373 -10	SED-20G:0-10
303373 -11	SED-18G:0-10
303373 -12	SED-19G:0-10
303373 -13	SED-01G:0-10
303373 -14	SED-01C:0-1
303373 -15	SED-01C:1-3
303373 -16	SED-01C:3-5
303373 -17	SED-01C:5-7
303373 -18	SED-05C:0-1
303373 -19	SED-05C:1-3
303373 -20	SED-05C:3-5
303373 -21	SED-05C:5-7
303373 -22	SED-05G:0-10
303373 -23	SED-03C:0-1
303373 -24	SED-03C:1-3
303373 -25	SED-03C:3-5
303373 -26	SED-03C:5-7
303373 -27	SED-14C:0-1
303373 -28	SED-14C:1-3
303373 -29	SED-14C:3-5
303373 -30	SED-14C:5-7
303373 -31	SED-DUPC
303373 -32	SED-07C:0-1
303373 -33	SED-07C:1-3
303373 -34	SED-07C:3-5
303373 -35	SED-07C:5-7

The samples selected for total solids, total organic carbon, ammonia and dioxins and furans were sent to Analytical Resources for analyses. The samples selected for grain size analysis were sent to HWA Geosciences. The reports are enclosed.

303373

SAMPLE CHAIN OF CUSTODY 03/23/23 H5

Page # 1 of 4

Report To P. Leon / R. Jones / G. Hainsworth

Company Leon Environmental / CRETE

Address

City, State, ZIP

Phone 832.330.1359 Email

SAMPLERS (*signature*): Rusty Jones R. Jones

PROJECT NAME: Port of Friday Harbor (Potts) Jensen's Marina

PO #

REMARKS: Archive for DIF; Archive for SMS Pesticides (699); Project specific RLs? - Yes / No

INVOICE TO: Leon Environmental (L-E)

TURNAROUND TIME
- [x] Standard turnaround
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [x] Archive samples
- [ ] Other
- Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	Ammonia NWTPH-Dx RS	Total Sulfides NWTPH-Gx RS	TBT	BTEX EPA 8021 RS	Dioxins/Furans NWTPH-HCID RS	VOCs EPA 8260	PAHs EPA 8270	TBT PCBs EPA 8082	Grain Size	TOC, Total Solids	SMS Metals, Hg	SMS SVOCs SMS PCBs + Pest.	* logged in under SDG 303333 NE Notes ⊗ added per Agency MG 3/24/23
SED-07G:0-10	01 A-F	3/20/23	1002	SOLIDS	8 (6)								⊗	⊗	⊗		⊗	SVOCs only +1 bioassay bag
SED-11G:0-10	02		0924		8 (6)									⊗	⊗	⊗	⊗	All SVOC, Pest, PCB +1 bioassay bag
SED-14G:0-10	03 A-I		1011		8 (6)								⊗	⊗	⊗	⊗	⊗	All SVOC, Pest, PCB +1 bioassay bag
SED-15G:0-10	04 A-C		1042		3								⊗	⊗	⊗			+1 bioassay bag
SED-24G:0-10	05		1106		3 (4)									X	*		X	SMS PCBs +Pest. only
SED-23G:0-10	06		1147		3 (4)									X	*		X	SMS PCBs +Pest only
SED-22G:0-10	07		1158		3 (4)									X	*		X	No SMS SVOCs, PCBs
SED-21G:0-10	08		1210		3 (4)									X	*		X	No SMS, SVOCs, PCBs
SED-03G:0-10	09 A-D		1315		4 (5)									⊗	⊗		⊗	SVOCs+Pest +1 bioassay bag
SED-20G:0-10	10 A-C	↓	1338	↓	4 (5)										*		X	No SMS SVOCs, PCBs

Samples received at 2 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	3/22/23	2100
Received by:	Preston Martin	NewFields	3/23/23	0500
Relinquished by:	Preston Martin	NewFields	3/23/23	1200
Received by: DeeDee Webber	DeeDee Webber	F+BI	3/23/23	1200

Friedman & Bruya, Inc.
Ph. (206) 285-8282

Samples received at 2 °C

303373

SAMPLE CHAIN OF CUSTODY 03/23/23

H5

Report To Leon Jones Hainsworth

Company L-E CRETE

Address

City, State, ZIP

Phone 832.330.1359 Email

SAMPLERS (signature) Rusty Jones R. Jones

PROJECT NAME: Port Jensen's Marina

PO #

REMARKS: Archive for DF, SMS Pest. (1699), others

Project specific RLs? - Yes / No

INVOICE TO: L-E

TURNAROUND TIME
- [x] Standard turnaround
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [x] Archive samples
- [ ] Other
- Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	Ammonia	Total Sulfides	NWTPH-Dx	BTEX EPA 8021	DIOXINS/FURANS NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Grain Size	TOC, Total Solids	SMS Metals Hg	SMS SVOCs, PCBs + Pests	Notes
SED-18G:0-10	11 A-C	3/20/23	1408	SOLIDS	3 (4)									X	X		X	No SVOCs ORDCBs
SED-19G:0-10	12 A-D		1427		5 (4)									X	X		X	No SVOCs ORDCBs
SED-01G:0-10	13 A-F		1445		8 (6)	X	X							(X)	(X)		(X)	Pest only +1 biomassay bag
SED-01C:0-1	14	3/21/23	1151	SOLIDS	6									X	X		X	SMS Pest. only
SED-01C:1-3	15 A-B		1151		2													ARCHIVE ALL
SED-01C:3-5	16		1151		2													
SED-01C:5-7	17		1151		2													
SED-05C:0-1	18 A-F		1244		6									X	X		X	No PCBs
SED-05C:1-3	19 A-B		1244		2													ARCHIVE ALL
SED-05C:3-5	20		1244		2													

Samples received at 2oC

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	3/22/23	2100
Received by:	Preston Martin	NewFields	3/23/23	0500
Relinquished by:	Preston Martin	NewFields	3/23/23	1200
Received by: DeeDee Webster	DeeDee Webster	F+BI	3/23/23	1200

Friedman & Bruya, Inc.
Ph. (206) 285-8282

303373

SAMPLE CHAIN OF CUSTODY 03/23/23

H5

Page # 3 of 4

Report To Leon/Jones/Hainsworth

Company L-E/CRETE

Address

City, State, ZIP

Phone 952.330.1359 Email

SAMPLERS (signature) Rusty Jones R. Jones

PROJECT NAME: PoFH Jensen's Marina

PO #

REMARKS: Archive for DF SMS Pest/UBM, others

Project specific RLs? - Yes / No

INVOICE TO: L-E

TURNAROUND TIME
- [x] Standard turnaround
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [x] Archive samples
- [ ] Other
- Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	SMS Suites NWTPH Dx/Gx	SMS PCBs NWTPH Dx/Gx	SMS Pesticides BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	Ammonia+Sulfides PAHs EPA 8270	SMS Metals, Hg PCBs EPA 8082	Grain Size	TOC Total Solids	Dioxins/Furans	TBT	Notes
SED-05C:5-7	21 A-B	3/21/23	1244	SOLIDS	2												ARCHIVE ALL
SED-05G:0-10	22 A-H		1310		8	X		X			X		X	X			+1 bioassay bag
SED-03C:0-1	23 A-F		1442		6	X		X					X	X			
SED-03C:1-3	24 A-B		1442		2												ARCHIVE ALL
SED-03C:3-5	25		1442		2												↓ ↓
SED-03C:5-7	26 ↓		1442		2												↓ ↓
SED-14C:0-1	27 A-I		1553		10	X	X	X				X	X	X	X	X	No D/F (Archive)
SED-14C:1-3	28 A B		1553		2	X	X	X					X	X	X	X	No D/F (Archive)
SED-14C:3-5	29		1553		2												ARCHIVE ALL
SED-14C:5-7	30 A B	↓	1533	↓	2												↓ ↓

Samples received at 2 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	3/21/23	2100
Received by:	Preston Martin	NewFields	3/23/23	0500
Relinquished by:	Preston Martin	NewFields	3/23/23	12.00
Received by: DeeDee Webber	DeeDee Webber	F&BI	3/23/23	1200

Friedman & Bruya, Inc.
Ph. (206) 285-8282

303373

SAMPLE CHAIN OF CUSTODY

03/23/23 ~~HS~~ HS

Page # 4 of 4

Report To Leon | Jones | Hainsworth

Company LE | CRETE

Address

City, State, ZIP

Phone 832.330.1359 Email

SAMPLERS (signature) Rusty Jones RJones

PROJECT NAME: Poff Jensen's Marina

PO #

REMARKS: Archive for D/F, SMS Pest (1668), other

Project specific RLs? - Yes / No

INVOICE TO: LE

TURNAROUND TIME
- [x] Standard turnaround
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [x] Archive samples
- [ ] Other
- Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	SMS SVOCs ~~NWTPH-Dx~~	SMS PCBs ~~NWTPH-Gx~~	SMS Pesticides BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	SMS Metals Hg ~~PCBs EPA 8082~~	Grain Size	TOC, Total Solids	Dioxins/Furans	TBT	Notes
SED-DUPC	~~35~~ 31 A-I	3.21.2023	1200	SOLIDS	8	X	X	X				X	X	X		X	Archive others
SED-07C:0-1	32 A-B	3.22.2023	0729		2												Archive
SED-07C:1-3	33	↓	0729		2												Archive
SED-07C:3-5	34 A-D		0729		4												Archive all
SED-07C:5-7	35 A-D	↓	0729	↓	4												Archive all
~~SED-DUP2C+0-1F1~~	~~36~~	~~3/22/23~~	1200										X				~~Added at lab.~~ (NP) 3/23/23 moved to
																	SDG 303808MG
																	Samples received at 2 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: RJones	Rusty Jones	CRETE	3/22/23	2100
Received by: Preston Martin	Preston Martin	NewFields	3/23/23	0500
Relinquished by: Preston Martin	Preston Martin	NewFields	3/23/23	1200
Received by: DeeDee Wohler	DeeDee Wohler	F+BT	3/23/23	1200

Friedman & Bruya, Inc.
Ph. (206) 285-8282

Analytical Resources, LLC
Analytical Chemists and Consultants
Tukwila, WA

11 May 2023

Michael Erdahl
Friedman & Bruya Inc.
3012 16th Avenue West
Seattle, WA 98119-2029

RE: Port of Friday Harbor (303373)

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
23E0148	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, LLC

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Shelly Fishel, Project Manager

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006-012

23E0148

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER
ARI

PROJECT NAME/NO.	PO #
303373	D-221

REMARKS

Replacement volume for TOC.
Frozen prior to subcontract

TURNAROUND TIME
Standard TAT
☒ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Total Organic Carbon										Notes
SED-07G:0-10		3/20/2023	1002	sediment	1	x										
SED-11G:0-10		3/20/2023	924	sediment	1	x										
SED-14G:0-10		3/20/2023	1011	sediment	1	x										
SED-15G:0-10		3/20/2023	1242	sediment	1	x										
SED-03G:0-10		3/20/2023	1315	sediment	1	x										
SED-01G:0-10		3/20/2023	1445	sediment	1	x										
SED-01C:0-1		3/20/2023	1151	sediment	1	x										
SED-05C:0-1		3/21/2023	1244	sediment	1	x										
SED-05G:0-10		3/21/2023	1310	sediment	1	x										
SED-03C:0-1		3/21/2023	1442	sediment	1	x										
SED-14C:0-1		3/21/2023	1553	sediment	1	x										
SED-14C:1-3		3/21/2023	1553	sediment	1	x										
SED-DUPC		3/21/2023	1200	sediment	1	x										

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Michael Erdahl	Friedman & Bruya	5/5/23	
Received by:		Matthew Daniels	ARCLC	5/5/23	1420
Relinquished by:					
Received by:					

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SED-07G:0-10	23E0148-01	Solid	20-Mar-2023 10:02	05-May-2023 14:20
SED-11G:0-10	23E0148-02	Solid	20-Mar-2023 09:24	05-May-2023 14:20
SED-14G:0-10	23E0148-03	Solid	20-Mar-2023 10:11	05-May-2023 14:20
SED-15G:0-10	23E0148-04	Solid	20-Mar-2023 12:42	05-May-2023 14:20
SED-03G:0-10	23E0148-05	Solid	20-Mar-2023 13:15	05-May-2023 14:20
SED-01G:0-10	23E0148-06	Solid	20-Mar-2023 14:45	05-May-2023 14:20
SED-01C:0-1	23E0148-07	Solid	20-Mar-2023 11:51	05-May-2023 14:20
SED-05C:0-1	23E0148-08	Solid	21-Mar-2023 12:44	05-May-2023 14:20
SED-05G:0-10	23E0148-09	Solid	21-Mar-2023 13:10	05-May-2023 14:20
SED-03C:0-1	23E0148-10	Solid	21-Mar-2023 14:42	05-May-2023 14:20
SED-14C:0-1	23E0148-11	Solid	21-Mar-2023 15:53	05-May-2023 14:20
SED-14C:1-3	23E0148-12	Solid	21-Mar-2023 15:53	05-May-2023 14:20
SED-DUPC	23E0148-13	Solid	21-Mar-2023 12:00	05-May-2023 14:20

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

Work Order Case Narrative

Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Work Order: 23E0148

Sample receipt

Samples as listed on the preceding page(s) were pulled from frozen archive at Friedman & Bruya and logged under ARI work order 23E0148. For details regarding sample receipt, please refer to the original Cooler Receipt Forms.

Wet Chemistry

The sample(s) were prepared and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blank(s) were clean at the reporting limits.

The blank spike (BS/LCS) percent recoveries were within control limits.

The reference material (SRM) percent recoveries were within control limits.

One sample run in triplicate reported as the original sample, DUP1 and DUP2. The relative percent difference (RPD) were outside advisory control limits. The matrix spike (MS) percent recovery was out of control low. The matrix spike duplicate (MSD) percent recovery was within advisory control limits. The MS/MSD RPD was outside advisory limits. All atributed to non-homogeneous sample. The deviations have been flagged.

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Friedman and Bruya Project Name: 303373

COC No(s): _____ (NA) Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: 23E0148 Tracking No: _____ (NA)

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler?	YES	(NO)
Were custody papers included with the cooler?	(YES)	NO
Were custody papers properly filled out (ink, signed, etc.)	(YES)	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time 1420 3.6 °C

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID#: 30049208

Cooler Accepted by: MP Date: 05/05/23 Time: 1420

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	(NO)
What kind of packing material was used? ...	Bubble Wrap (Wet Ice) Gel Packs Baggies Foam Block Paper Other: _____		
Was sufficient ice used (if appropriate)?	NA	(YES)	NO
How were bottles sealed in plastic bags?	Individually	Grouped	(Not)
Did all bottles arrive in good condition (unbroken)?		(YES)	NO
Were all bottle labels complete and legible?		(YES)	NO
Did the number of containers listed on COC match with the number of containers received?		(YES)	NO
Did all bottle labels and tags agree with custody papers?		(YES)	NO
Were all bottles used correct for the requested analyses?		(YES)	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs) ...	(NA)	YES	NO
Were all VOC vials free of air bubbles?	(NA)	YES	NO
Was sufficient amount of sample sent in each bottle?		(YES)	NO
Date VOC Trip Blank was made at ARI	(NA)		

Were the sample(s) split by ARI? (NA) YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: PIB Date: 5/5/23 Time: 14:49 Labels checked by: PIB

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-07G:0-10
23E0148-01 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 03/20/2023 10:02
Instrument: TOC Cube Analyst: CDE — Analyzed: 05/06/2023 21:19

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-01 A
Preparation Batch: BLE0200 — Sample Size: 0.2853 g (wet) — Dry Weight:0.21 g
Prepared: 05/06/2023 — Final Volume: 0.2853 g — % Solids: 73.61

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	1.37	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-07G:0-10

23E0148-01 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 03/20/2023 10:02

Instrument: BAL2 Analyst: UW — Analyzed: 05/08/2023 13:08

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-01

Preparation Batch: BLE0230 — Sample Size: 5 g (wet) — Dry Weight:3.68 g

Prepared: 05/08/2023 — Final Volume: 5 g — % Solids: 73.61

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	73.61	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-11G:0-10

23E0148-02 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 03/20/2023 09:24

Instrument: TOC Cube Analyst: CDE — Analyzed: 05/07/2023 03:23

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-02 A

Preparation Batch: BLE0200 — Sample Size: 0.5952 g (wet) — Dry Weight:0.43 g

Prepared: 05/06/2023 — Final Volume: 0.5952 g — % Solids: 72.27

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	1.26	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-11G:0-10

23E0148-02 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 03/20/2023 09:24

Instrument: BAL2 Analyst: UW — Analyzed: 05/08/2023 13:08

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-02

Preparation Batch: BLE0230 — Sample Size: 5 g (wet) — Dry Weight:3.61 g

Prepared: 05/08/2023 — Final Volume: 5 g — % Solids: 72.27

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	72.27	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-14G:0-10

23E0148-03 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 03/20/2023 10:11

Instrument: TOC Cube Analyst: CDE — Analyzed: 05/07/2023 03:54

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-03 A

Preparation Batch: BLE0200 — Sample Size: 0.608 g (wet) — Dry Weight:0.33 g

Prepared: 05/06/2023 — Final Volume: 0.608 g — % Solids: 54.58

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	1.20	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-14G:0-10

23E0148-03 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 03/20/2023 10:11

Instrument: BAL2 Analyst: UW — Analyzed: 05/08/2023 13:08

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-03

Preparation Batch: BLE0230 — Sample Size: 5 g (wet) — Dry Weight:2.73 g

Prepared: 05/08/2023 — Final Volume: 5 g — % Solids: 54.58

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	54.58	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-15G:0-10

23E0148-04 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 03/20/2023 12:42

Instrument: TOC Cube Analyst: CDE — Analyzed: 05/07/2023 05:25

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-04 A

Preparation Batch: BLE0200 — Sample Size: 0.5388 g (wet) — Dry Weight:0.33 g

Prepared: 05/06/2023 — Final Volume: 0.5388 g — % Solids: 61.15

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	1.12	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-15G:0-10

23E0148-04 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 03/20/2023 12:42

Instrument: BAL2 Analyst: UW — Analyzed: 05/08/2023 13:08

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-04

Preparation Batch: BLE0230 — Sample Size: 5 g (wet) — Dry Weight:3.06 g

Prepared: 05/08/2023 — Final Volume: 5 g — % Solids: 61.15

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	61.15	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-03G:0-10

23E0148-05 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 03/20/2023 13:15

Instrument: TOC Cube Analyst: CDE — Analyzed: 05/07/2023 05:56

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-05 A

Preparation Batch: BLE0200 — Sample Size: 0.6576 g (wet) — Dry Weight:0.30 g

Prepared: 05/06/2023 — Final Volume: 0.6576 g — % Solids: 45.94

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	1.39	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-03G:0-10

23E0148-05 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 03/20/2023 13:15

Instrument: BAL2 Analyst: UW — Analyzed: 05/08/2023 13:08

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-05

Preparation Batch: BLE0230 — Sample Size: 5 g (wet) — Dry Weight:2.30 g

Prepared: 05/08/2023 — Final Volume: 5 g — % Solids: 45.94

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	45.94	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-01G:0-10

23E0148-06 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 03/20/2023 14:45

Instrument: TOC Cube Analyst: CDE — Analyzed: 05/07/2023 06:26

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-06 A

Preparation Batch: BLE0200 — Sample Size: 0.6862 g (wet) — Dry Weight:0.37 g

Prepared: 05/06/2023 — Final Volume: 0.6862 g — % Solids: 53.25

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	0.85	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-01G:0-10

23E0148-06 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 03/20/2023 14:45

Instrument: BAL2 Analyst: UW — Analyzed: 05/08/2023 13:08

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-06

Preparation Batch: BLE0230 — Sample Size: 5 g (wet) — Dry Weight:2.66 g

Prepared: 05/08/2023 — Final Volume: 5 g — % Solids: 53.25

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	53.25	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-01C:0-1

23E0148-07 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 03/20/2023 11:51

Instrument: TOC Cube Analyst: CDE — Analyzed: 05/07/2023 06:56

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-07 A

Preparation Batch: BLE0200 — Sample Size: 0.6237 g (wet) — Dry Weight:0.34 g

Prepared: 05/06/2023 — Final Volume: 0.6237 g — % Solids: 55.22

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	0.72	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-01C:0-1

23E0148-07 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 03/20/2023 11:51
Instrument: BAL2 Analyst: UW — Analyzed: 05/08/2023 13:08

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-07
Preparation Batch: BLE0230 — Sample Size: 5 g (wet) — Dry Weight:2.76 g
Prepared: 05/08/2023 — Final Volume: 5 g — % Solids: 55.22

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	55.22	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-05C:0-1

23E0148-08 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 03/21/2023 12:44

Instrument: TOC Cube Analyst: CDE — Analyzed: 05/07/2023 07:27

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-08 A

Preparation Batch: BLE0200 — Sample Size: 0.516 g (wet) — Dry Weight:0.28 g

Prepared: 05/06/2023 — Final Volume: 0.516 g — % Solids: 54.83

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	1.00	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-05C:0-1

23E0148-08 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 03/21/2023 12:44

Instrument: BAL2 Analyst: UW — Analyzed: 05/08/2023 13:08

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-08

Preparation Batch: BLE0230 — Sample Size: 5 g (wet) — Dry Weight:2.74 g

Prepared: 05/08/2023 — Final Volume: 5 g — % Solids: 54.83

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	54.83	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-05G:0-10

23E0148-09 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 03/21/2023 13:10

Instrument: TOC Cube Analyst: CDE — Analyzed: 05/07/2023 07:57

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-09 A

Preparation Batch: BLE0200 — Sample Size: 0.5311 g (wet) — Dry Weight:0.28 g

Prepared: 05/06/2023 — Final Volume: 0.5311 g — % Solids: 51.94

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	1.12	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-05G:0-10

23E0148-09 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 03/21/2023 13:10

Instrument: BAL2 Analyst: UW — Analyzed: 05/08/2023 13:08

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-09

Preparation Batch: BLE0230 — Sample Size: 5 g (wet) — Dry Weight:2.60 g

Prepared: 05/08/2023 — Final Volume: 5 g — % Solids: 51.94

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	51.94	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-03C:0-1

23E0148-10 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 03/21/2023 14:42

Instrument: TOC Cube Analyst: CDE — Analyzed: 05/07/2023 08:28

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-10 A

Preparation Batch: BLE0200 — Sample Size: 0.533 g (wet) — Dry Weight:0.30 g

Prepared: 05/06/2023 — Final Volume: 0.533 g — % Solids: 55.48

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	1.52	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-03C:0-1

23E0148-10 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 03/21/2023 14:42

Instrument: BAL2 Analyst: UW — Analyzed: 05/08/2023 13:08

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-10

Preparation Batch: BLE0230 — Sample Size: 5 g (wet) — Dry Weight:2.77 g

Prepared: 05/08/2023 — Final Volume: 5 g — % Solids: 55.48

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	55.48	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-14C:0-1

23E0148-11 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 03/21/2023 15:53

Instrument: TOC Cube Analyst: CDE — Analyzed: 05/07/2023 08:58

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-11 A

Preparation Batch: BLE0200 — Sample Size: 0.544 g (wet) — Dry Weight:0.37 g

Prepared: 05/06/2023 — Final Volume: 0.544 g — % Solids: 68.13

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	0.74	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-14C:0-1

23E0148-11 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 03/21/2023 15:53

Instrument: BAL2 Analyst: UW — Analyzed: 05/08/2023 13:08

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-11

Preparation Batch: BLE0230 — Sample Size: 5 g (wet) — Dry Weight:3.41 g

Prepared: 05/08/2023 — Final Volume: 5 g — % Solids: 68.13

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	68.13	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-14C:1-3

23E0148-12 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 03/21/2023 15:53

Instrument: TOC Cube Analyst: CDE — Analyzed: 05/07/2023 09:28

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-12 A

Preparation Batch: BLE0200 — Sample Size: 0.5084 g (wet) — Dry Weight:0.35 g

Prepared: 05/06/2023 — Final Volume: 0.5084 g — % Solids: 67.96

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	0.66	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-14C:1-3

23E0148-12 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 03/21/2023 15:53

Instrument: BAL2 Analyst: UW — Analyzed: 05/08/2023 13:08

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-12

Preparation Batch: BLE0230 — Sample Size: 5 g (wet) — Dry Weight:3.40 g

Prepared: 05/08/2023 — Final Volume: 5 g — % Solids: 67.96

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	67.96	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-DUPC

23E0148-13 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 03/21/2023 12:00
Instrument: TOC Cube Analyst: CDE — Analyzed: 05/07/2023 09:59

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-13 A
Preparation Batch: BLE0200 — Sample Size: 0.5245 g (wet) — Dry Weight:0.34 g
Prepared: 05/06/2023 — Final Volume: 0.5245 g — % Solids: 65.16

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	0.65	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

SED-DUPC

23E0148-13 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 03/21/2023 12:00
Instrument: BAL2 Analyst: UW — Analyzed: 05/08/2023 13:08

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 23E0148-13
Preparation Batch: BLE0230 — Sample Size: 5 g (wet) — Dry Weight:3.26 g
Prepared: 05/08/2023 — Final Volume: 5 g — % Solids: 65.16

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	65.16	%	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

Analysis by: Analytical Resources, LLC

Wet Chemistry - Quality Control

Batch BLE0200 - EPA 9060A m

Instrument: TOC Cube Analyst: CDE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BLE0200-BLK1)					Prepared: 06-May-2023 Analyzed: 06-May-2023 18:17						
Total Organic Carbon	ND	0.02	0.02	%							U
LCS (BLE0200-BS1)					Prepared: 06-May-2023 Analyzed: 06-May-2023 19:17						
Total Organic Carbon	44.3	0.02	0.02	%	44.4		99.6	80-120			
Duplicate (BLE0200-DUP1)		**Source: 23E0148-01**			Prepared: 06-May-2023 Analyzed: 06-May-2023 21:49						
Total Organic Carbon	1.07	0.02	0.02	%		1.37			24.60	20	*
Duplicate (BLE0200-DUP2)		**Source: 23E0148-01**			Prepared: 06-May-2023 Analyzed: 06-May-2023 23:20						
Total Organic Carbon	1.06	0.02	0.02	%		1.37			25.00	20	*
Matrix Spike (BLE0200-MS1)		**Source: 23E0148-01**			Prepared: 06-May-2023 Analyzed: 06-May-2023 23:51						
Total Organic Carbon	3.25	0.02	0.02	%	2.53	1.37	74.6	75-125			*
Recovery limits for target analytes in MS/MSD QC samples are advisory only.											
Matrix Spike Dup (BLE0200-MSD1)		**Source: 23E0148-01**			Prepared: 06-May-2023 Analyzed: 07-May-2023 00:21						
Total Organic Carbon	2.65	0.02	0.02	%	1.54	1.37	83.2	75-125	20.60	20	*
Recovery limits for target analytes in MS/MSD QC samples are advisory only.											
Reference (BLE0200-SRM1)					Prepared: 06-May-2023 Analyzed: 06-May-2023 20:18						
Total Organic Carbon	2.99	0.02	0.02	%	2.99		100	80-120			

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

Analysis by: Analytical Resources, LLC

Wet Chemistry - Quality Control

Batch BLE0230 - SM 2540 G-97

Instrument: BAL2 Analyst: UW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BLE0230-BLK1)				Prepared: 08-May-2023 Analyzed: 08-May-2023 13:08							
Total Solids	ND	0.04	0.04	%							U
Duplicate (BLE0230-DUP1)		**Source: 23E0148-01**		Prepared: 08-May-2023 Analyzed: 08-May-2023 13:08							
Total Solids	75.10	0.04	0.04	%		73.61			2.01	20	
Duplicate (BLE0230-DUP2)		**Source: 23E0148-01**		Prepared: 08-May-2023 Analyzed: 08-May-2023 13:08							
Total Solids	76.03	0.04	0.04	%		73.61			3.23	20	

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

Certified Analyses included in this Report

Analyte	Certifications
EPA 9060A m in Solid	
Total Organic Carbon	WADOE

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	03/28/2025
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program, PJLA Testing	66169	02/28/2025
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006-012	05/12/2023
WADOE	WA Dept of Ecology	C558	06/30/2023
WA-DW	Ecology - Drinking Water	C558	06/30/2023

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
3012 16th Avenue West	Project Number: 303373	**Reported:**
Seattle WA, 98119-2029	Project Manager: Michael Erdahl	11-May-2023 18:07

Notes and Definitions

*	Flagged value is not within established control limits.
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

HWA GeoSciences Inc.
DBE/MWBE

May 25, 2023
HWA Project No. 2023-070

Friedman & Bruya, Inc.
5500 4th Ave S
Seattle, Washington 98108

Attention: Mr. Michael Erdahl

Subject: **Materials Laboratory Report**
Letter Report 2
Port of Friday Harbor - Jensen's Marina

Dear Mr. Erdahl,

In accordance with your request, HWA GeoSciences Inc. (HWA) performed laboratory testing for the above referenced project. Herein we present the results of our laboratory analyses, which are summarized on the attached Figures. The laboratory testing program was performed in general accordance with your instructions and appropriate ASTM Standards as outlined below.

SAMPLE DESCRIPTION: The subject samples were delivered to our laboratory on March 27, 2023 by Friedman & Bruya personnel. The samples were delivered in coolers containing re-sealable plastic jars designated with exploration/sample IDs. The sample descriptions may be found on the attached Summary of Material Properties, Figures 1 and 2.

PARTICLE SIZE ANALYSIS OF SOILS: The particle size distribution of each specified sample was determined in general accordance with ASTM D6913 and D7928. The results are plotted on the attached Particle Size Analysis of Soils Report, Figures 3 through 10, which also indicate the moisture content of the soil samples at the time of testing.

CLOSURE: Experience has shown that test values on soil and other natural materials vary with each representative sample. As such, HWA has no knowledge as to the extent and quantity of material the tested samples may represent. HWA also makes no warranty as to how representative either the samples tested or the test results obtained are to actual field conditions. It is a well-established fact that sampling methods present varying degrees of disturbance that affect sample representativeness.

No copy should be made of this report except in its entirety.

We appreciate the opportunity to provide laboratory testing services on this project. Should you have any questions or comments, or if we may be of further service, please call.

Sincerely,

HWA GEOSCIENCES INC.

Alex Hodges
Materials Laboratory Supervisor

Steven E. Greene, L.G., L.E.G.
Principal Engineering Geologist
Vice President

Attachments:

Figures 1-2	Summary of Material Properties
Figures 3-10	Particle Size Analysis of Soils Report

EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVITY	ATTERBERG LIMITS (%)			% GRAVEL	% SAND	% FINES	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION
						LL	PL	PI					
SED-01C,0-1	0.0	1.0	60.3						0.1	26.9	73.0	ML	Very dark gray, SILT with sand
SED-03C,0-1	0.0	1.0	100.3						0.2	15.8	83.9	ML	Very dark gray, SILT with sand
SED-05C,0-1	0.0	1.0	65.8						0.2	17.0	82.8	ML	Very dark gray, SILT with sand and trace organics
SED-07C,0-1	0.0	1.0	34.5						28.3	40.4	31.2	SM	Greenish-black, silty SAND with gravel and trace shells
SED-07C,1-3	1.0	3.0	30.9						14.8	50.2	35.0	SM	Very dark gray, silty SAND with trace shells
SED-08C,0-1	0.0	1.0	48.9						0.9	46.8	52.3	ML	Very dark gray, sandy SILT with trace shells
SED-08C,1-3	1.0	3.0	34.9						2.2	67.2	30.6	SM	Very dark gray, silty SAND with organics and trace shells
SED-09C,0-1	0.0	1.0	41.4						4.8	66.6	28.6	SM	Very dark gray, silty SAND with organics and shells
SED-09C,1-3	1.0	3.0	30.6						1.9	76.3	21.8	SM	Very dark gray, silty SAND with organics and shells
SED-10C,0-1	0.0	1.0	27.5						13.9	66.4	19.7	SM	Very dark gray, silty SAND with trace organics
SED-10C,1-3	1.0	3.0	28.2						29.1	55.3	15.5	SM	Very dark gray, silty SAND with gravel and trace organics
SED-11C,0-1	0.0	1.0	39.6						12.0	50.9	37.1	SM	Very dark gray, silty SAND with trace organics
SED-11C,1-3	1.0	3.0	32.5						4.5	67.4	28.2	SM	Very dark gray, silty SAND with shells
SED-12C,0-1	0.0	1.0	26.6						18.2	65.1	16.7	SM	Very dark gray, silty SAND with gravel with organics and shells
SED-14C,0-1	0.0	1.0	48.5						0.4	46.1	53.5	ML	Very dark gray, sandy SILT with shells and trace organics
SED-18G,0-10	0.0	10.0	72.3						0.3	16.5	83.2	ML	Very dark gray, SILT with sand
SED-19G,0-10	0.0	10.0	50.0							27.8	72.2	ML	Very dark gray, SILT with sand
SED-25C,0-1	0.0	1.0	36.4						4.3	67.7	28.0	SM	Greenish-black, silty SAND with organics and shells
SED-25C,1-3	1.0	3.0	29.3						3.2	74.1	22.7	SM	Very dark gray, silty SAND with shells
SED-26C,0-1	0.0	1.0	55.4						2.9	65.3	31.8	SM	Greenish-black, silty SAND with organics and shells

Notes: 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report test, other graphs and tables, and the exploration logs.
2. The soil classifications in this table are based on ASTM D2487 and D2488 as applicable.

GeoSciences Inc.

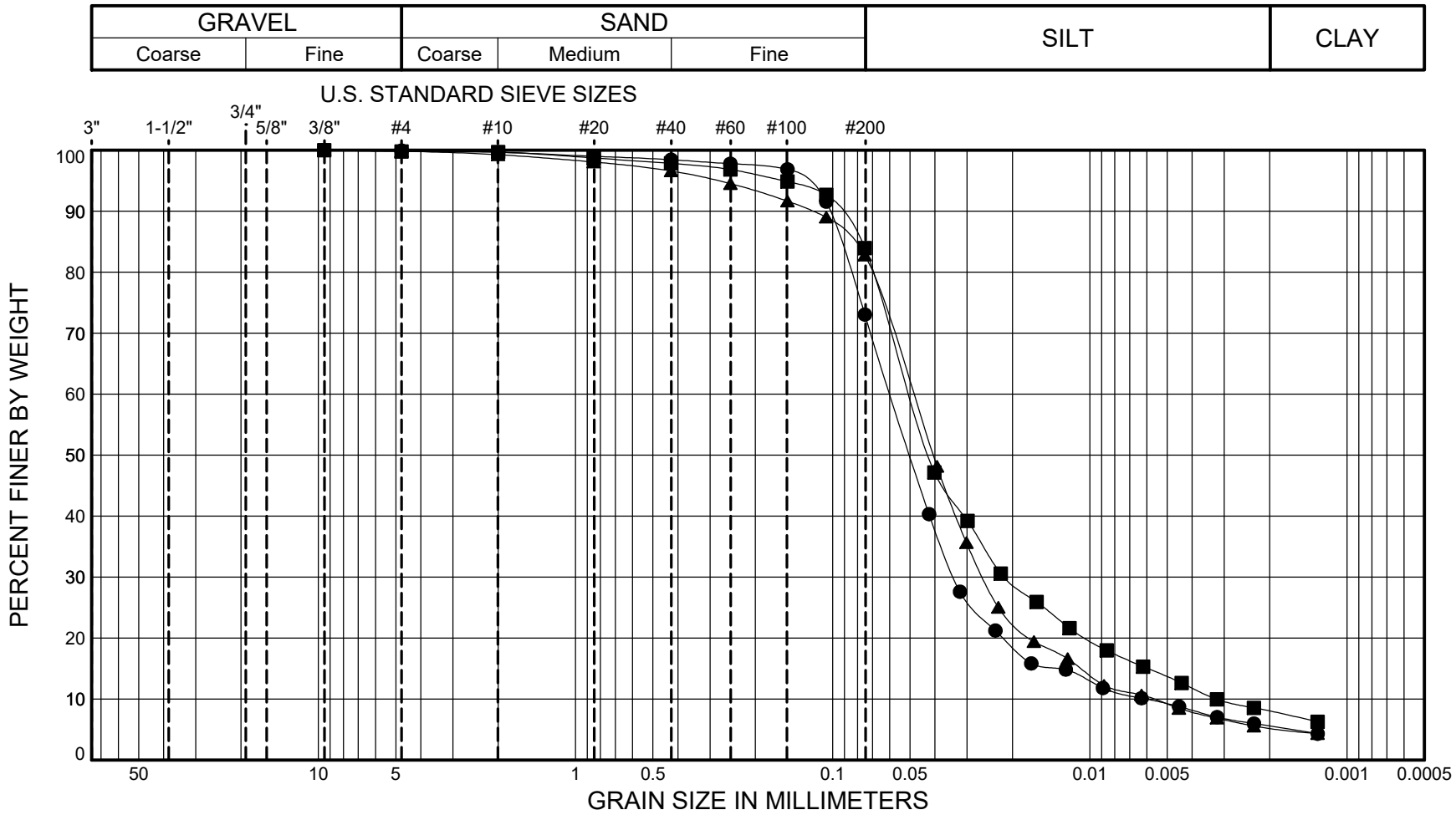
Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

SUMMARY OF MATERIAL PROPERTIES

PROJECT NO.: 2023-070 FIGURE: 1

EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVITY	ATTERBERG LIMITS (%)			% GRAVEL	% SAND	% FINES	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION
						LL	PL	PI					
SED-26C,1-3	1.0	3.0	37.3						7.3	64.6	28.1	SM	Very dark gray, silty SAND with shells
SED-DUP2C,	0.0	0.0	22.0						40.7	41.8	17.4	SM	Very dark gray, silty SAND with gravel
SED-DUP3C,	0.0	0.0	26.9						5.7	67.6	26.8	SM	Very dark gray, silty SAND with shells

Notes: 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report test, other graphs and tables, and the exploration logs.
2. The soil classifications in this table are based on ASTM D2487 and D2488 as applicable.



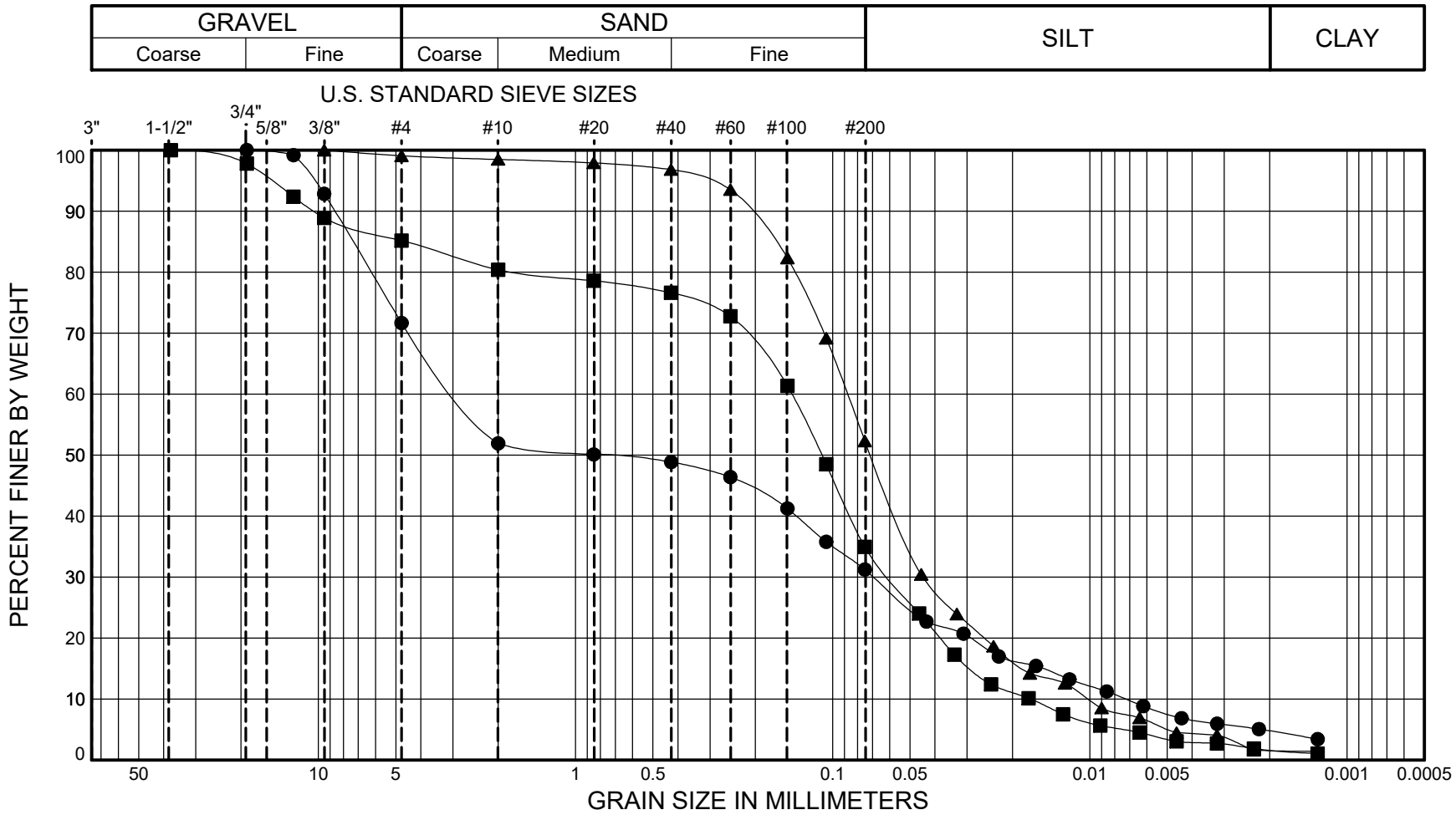
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-01C	0-1	0.0 - 1.0	(ML) Very dark gray, SILT with sand	60				0.1	26.9	67.5	5.6	
■	SED-03C	0-1	0.0 - 1.0	(ML) Very dark gray, SILT with sand	100				0.2	15.8	76.0	8.0	
▲	SED-05C	0-1	0.0 - 1.0	(ML) Very dark gray, SILT with sand and trace organics	66				0.2	17.0	77.5	5.3	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 3



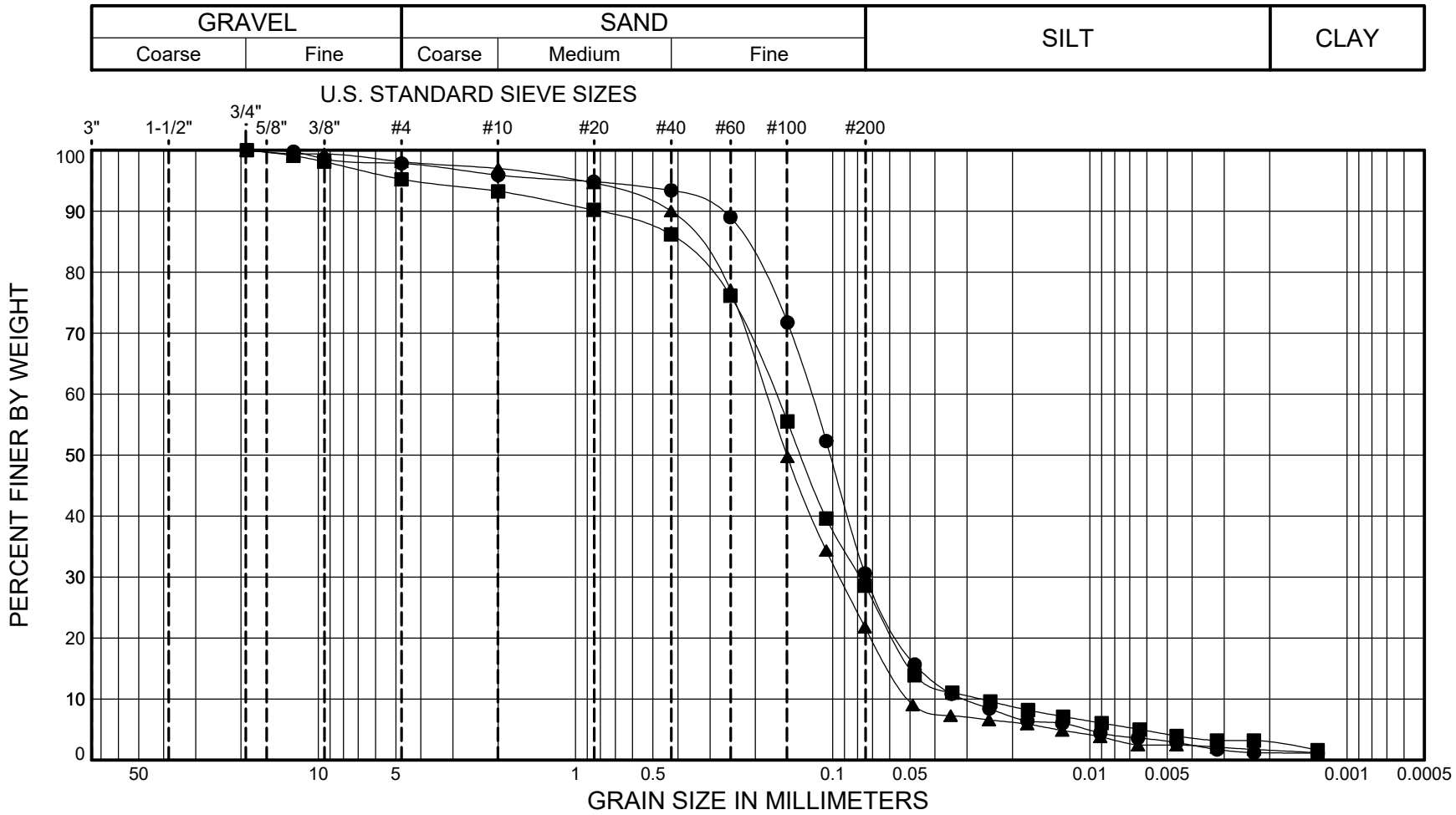
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-07C	0-1	0.0 - 1.0	(SM) Greenish-black, silty SAND with gravel and trace shells	34				28.3	40.4	26.5	4.8	
■	SED-07C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with trace shells	31				14.8	50.2	33.3	1.7	
▲	SED-08C	0-1	0.0 - 1.0	(ML) Very dark gray, sandy SILT with trace shells	49				0.9	46.8	50.7	1.6	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 4



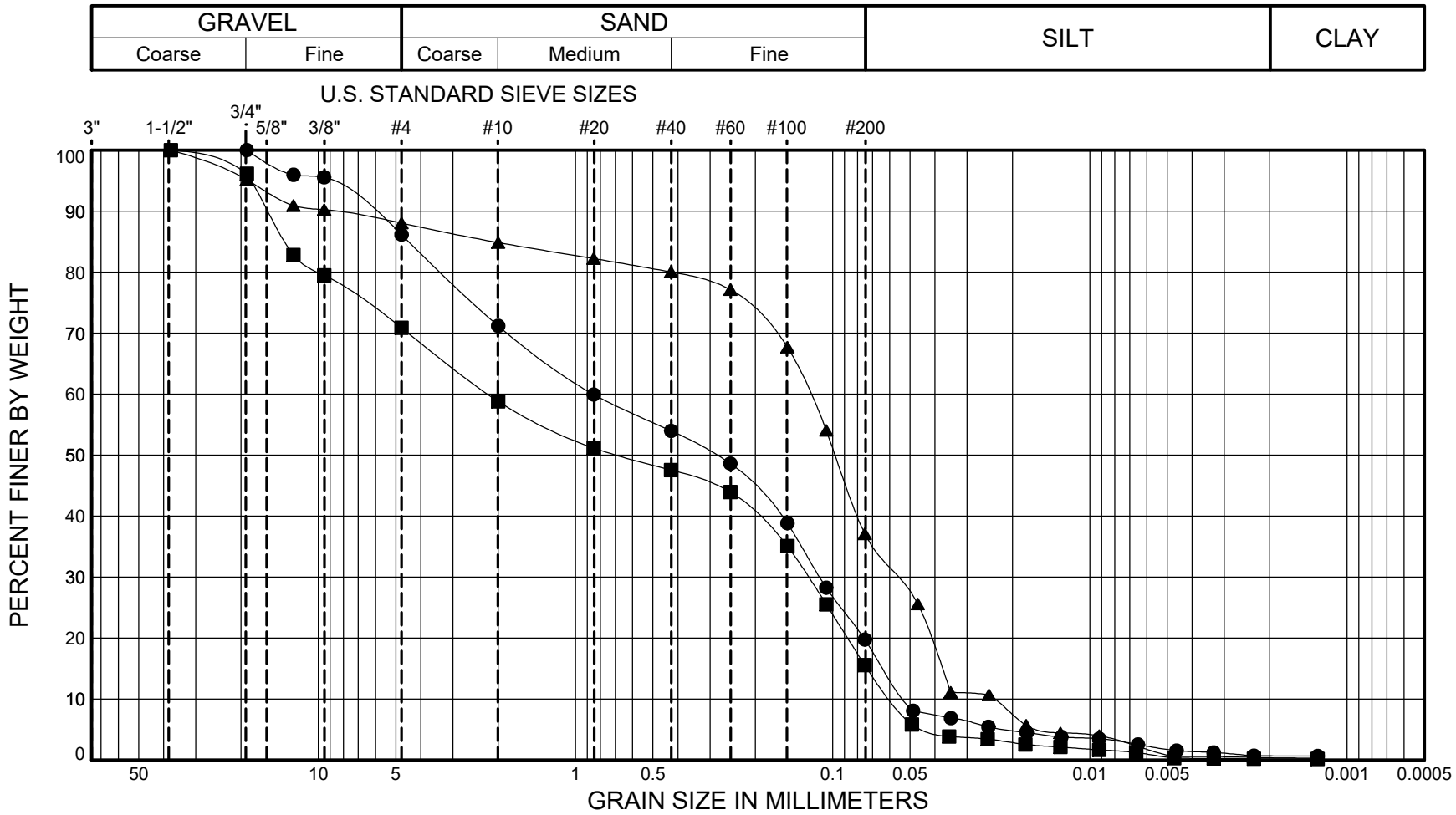
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-08C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with organics and trace shells	35				2.2	67.2	29.4	1.2	
■	SED-09C	0-1	0.0 - 1.0	(SM) Very dark gray, silty SAND with organics and shells	41				4.8	66.6	25.8	2.8	
▲	SED-09C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with organics and shells	31				1.9	76.3	20.2	1.6	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 5



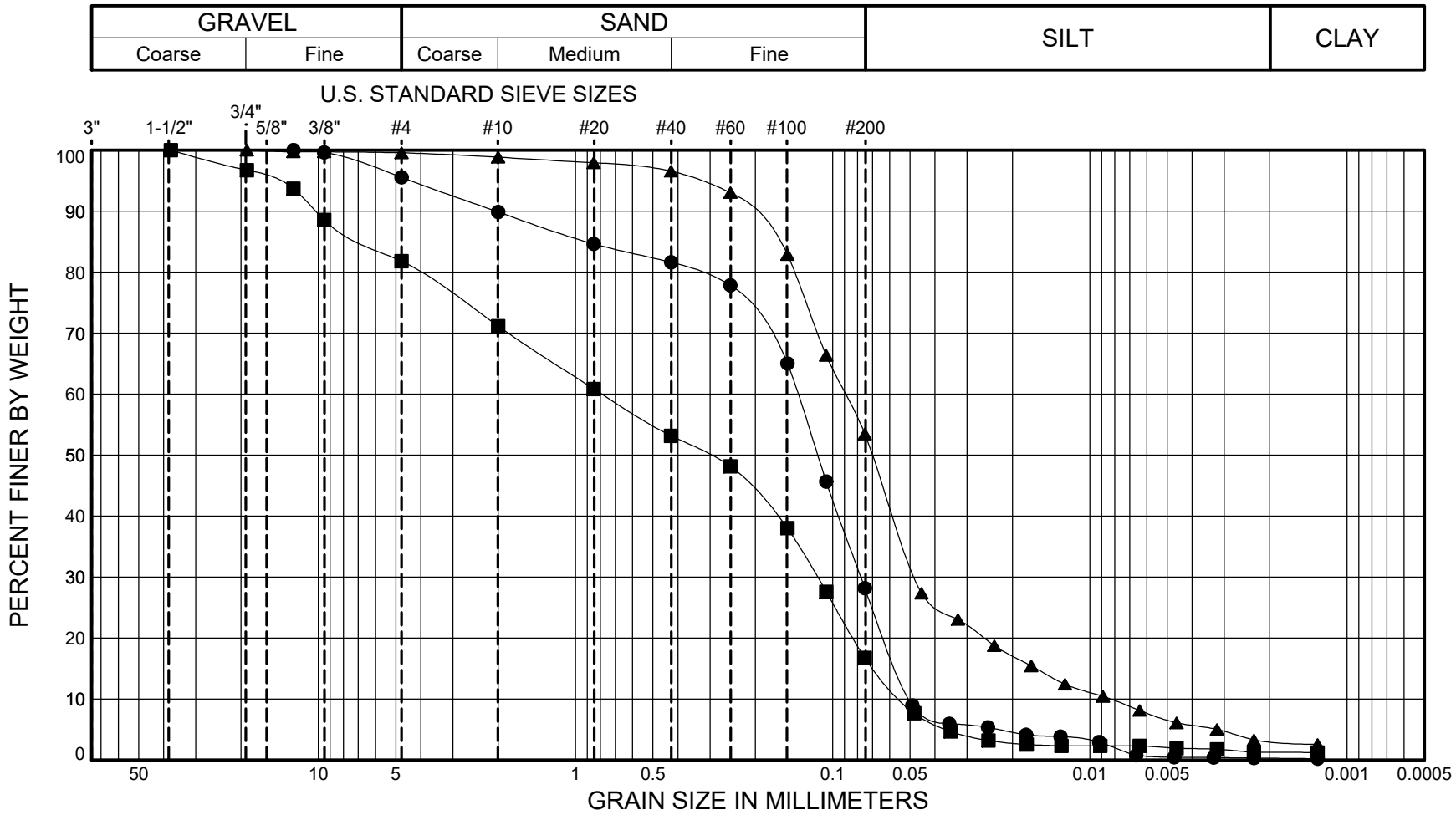
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-10C	0-1	0.0 - 1.0	(SM) Very dark gray, silty SAND with trace organics	28				13.9	66.4	19.1	0.7	
■	SED-10C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with gravel and trace organics	28				29.1	55.3	15.4	0.2	
▲	SED-11C	0-1	0.0 - 1.0	(SM) Very dark gray, silty SAND with trace organics	40				12.0	50.9	36.7	0.4	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 6



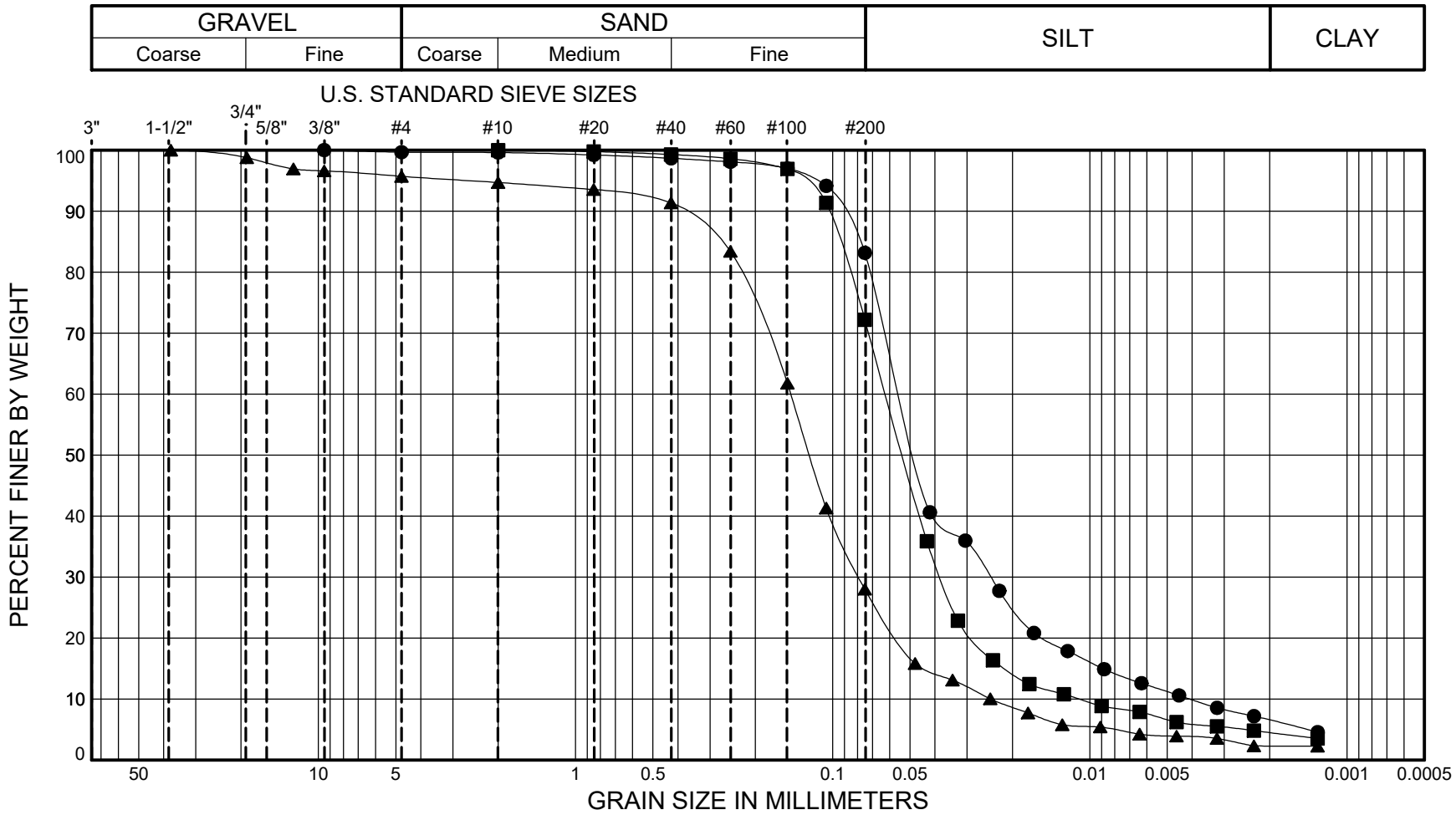
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-11C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with shells	33				4.5	67.4	27.9	0.3	
■	SED-12C	0-1	0.0 - 1.0	(SM) Very dark gray, silty SAND with gravel with organics and shells	27				18.2	65.1	15.5	1.3	
▲	SED-14C	0-1	0.0 - 1.0	(ML) Very dark gray, sandy SILT with shells and trace organics	48				0.4	46.1	50.4	3.1	

GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 7



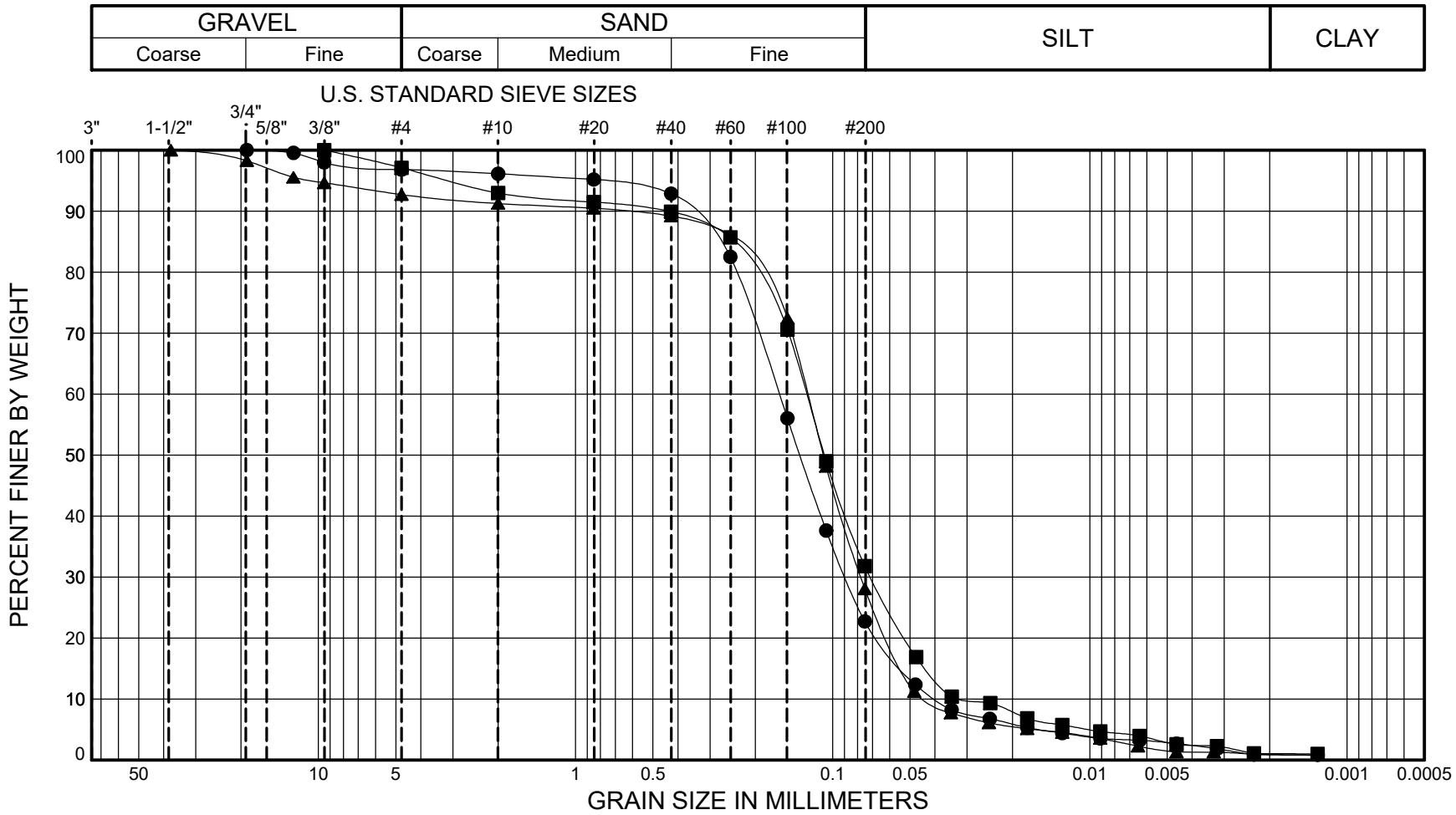
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-18G	0-10	0.0 - 10.0	(ML) Very dark gray, SILT with sand	72				0.3	16.5	76.6	6.5	
■	SED-19G	0-10	0.0 - 10.0	(ML) Very dark gray, SILT with sand	50					27.8	67.7	4.5	
▲	SED-25C	0-1	0.0 - 1.0	(SM) Greenish-black, silty SAND with organics and shells	36				4.3	67.7	25.7	2.3	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 8



SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-25C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with shells	29				3.2	74.1	21.8	0.9	
■	SED-26C	0-1	0.0 - 1.0	(SM) Greenish-black, silty SAND with organics and shells	55				2.9	65.3	30.7	1.1	
▲	SED-26C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with shells	37				7.3	64.6	27.1	0.9	

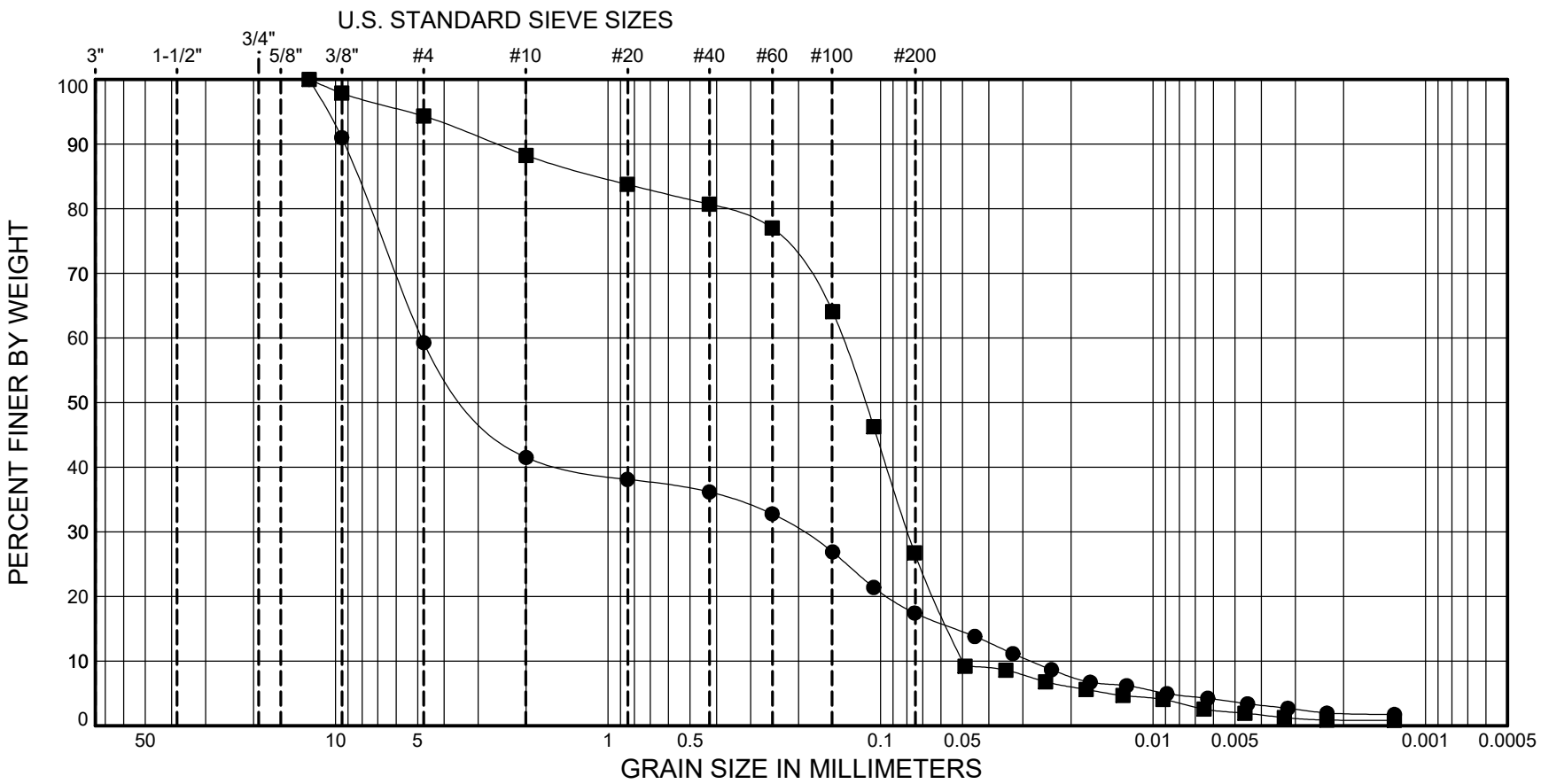
HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 9

GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		



SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-DUP2C		0.0 - 0.0	(SM) Very dark gray, silty SAND with gravel	22				40.7	41.8	15.5	1.9	
■	SED-DUP3C		0.0 - 0.0	(SM) Very dark gray, silty SAND with shells	27				5.7	67.6	25.9	0.9	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 10

HWA GeoSciences Inc.
DBE/MWBE

May 12, 2023
HWA Project No. 2023-070

Friedman & Bruya, Inc.
5500 4th Ave S
Seattle, Washington 98108

Attention: Mr. Michael Erdahl

Subject: **Materials Laboratory Report**
Letter Report 1 – Priority Samples
Port of Friday Harbor - Jensen's Marina

Dear Mr. Erdahl,

In accordance with your request, HWA GeoSciences Inc. (HWA) performed laboratory testing for the above referenced project. Herein we present the results of our laboratory analyses, which are summarized on the attached Figures. The laboratory testing program was performed in general accordance with your instructions and appropriate ASTM Standards as outlined below.

SAMPLE DESCRIPTION: The subject samples were delivered to our laboratory on March 27, 2023 by Friedman & Bruya personnel. The samples were delivered in coolers containing re-sealable plastic jars designated with exploration/sample IDs. The sample descriptions may be found on the attached Summary of Material Properties, Figure 1.

PARTICLE SIZE ANALYSIS OF SOILS: The particle size distribution of each specified sample was determined in general accordance with ASTM D6913 and D7928. The results are plotted on the attached Particle Size Analysis of Soils Report, Figures 2 through 5, which also indicate the moisture content of the soil samples at the time of testing.

CLOSURE: Experience has shown that test values on soil and other natural materials vary with each representative sample. As such, HWA has no knowledge as to the extent and quantity of material the tested samples may represent. HWA also makes no warranty as to how representative either the samples tested or the test results obtained are to actual field conditions. It is a well-established fact that sampling methods present varying degrees of disturbance that affect sample representativeness.

No copy should be made of this report except in its entirety.

We appreciate the opportunity to provide laboratory testing services on this project. Should you have any questions or comments, or if we may be of further service, please call.

Sincerely,

HWA GEOSCIENCES INC.

Alex Hodges
Materials Laboratory Supervisor

Steven E. Greene, L.G., L.E.G.
Principal Engineering Geologist
Vice President

Attachments:

Figures 1	Summary of Material Properties
Figures 2-5	Particle Size Analysis of Soils Report

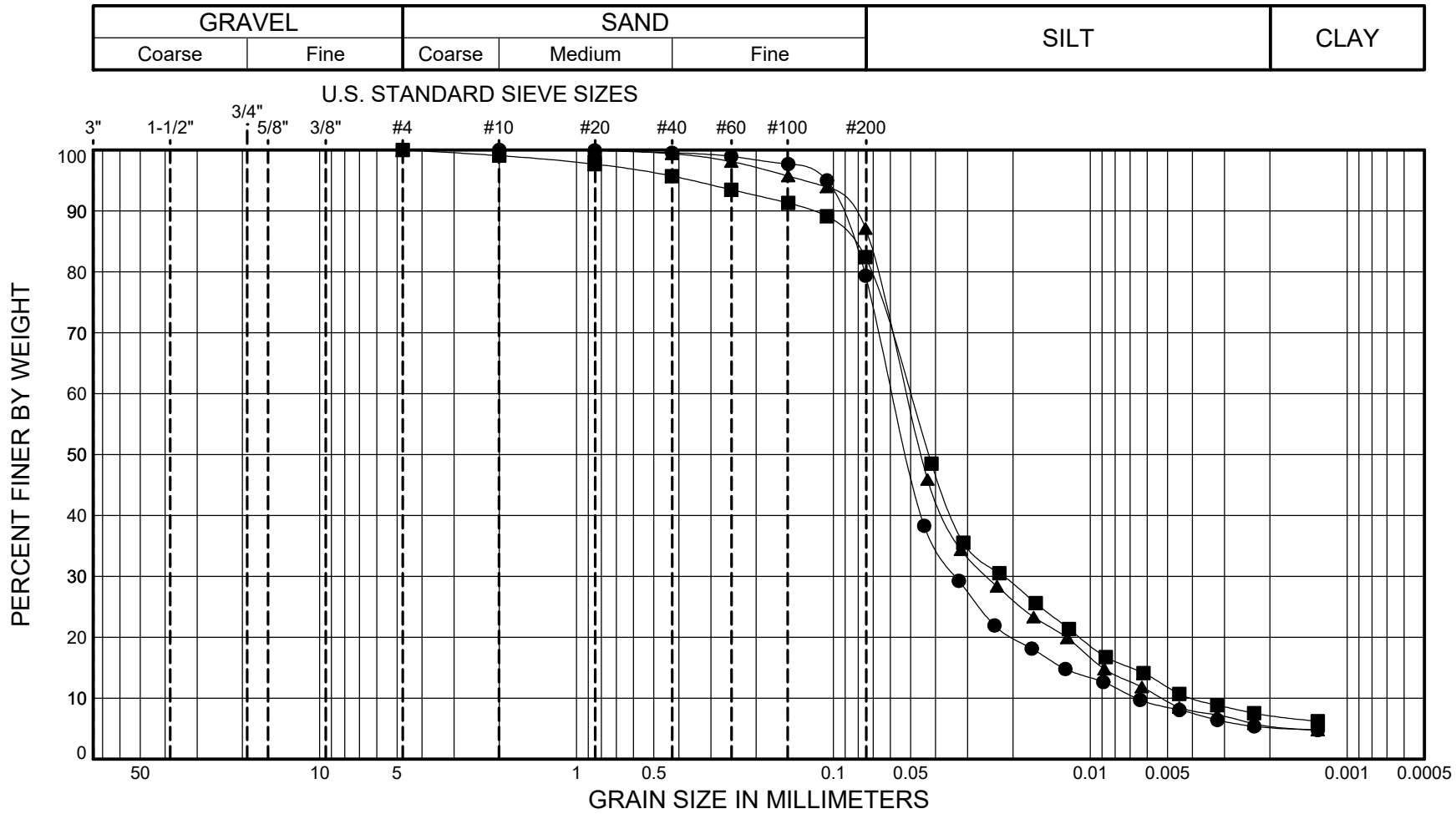
EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVITY	ATTERBERG LIMITS (%)			% GRAVEL	% SAND	% FINES	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION
						LL	PL	PI					
SED-01G,0-10	0.0	10.0	65.5							20.6	79.4	ML	Greenish-black, SILT with sand
SED-03G,0-10	0.0	10.0	78.7							17.6	82.4	ML	Greenish-black, SILT with sand and trace shells
SED-05G,0-10	0.0	10.0	90.3							12.9	87.1	ML	Greenish-black, SILT
SED-07G,0-10	0.0	10.0	32.8						55.8	21.8	22.4	GM	Greenish-black, silty GRAVEL with sand and trace shells
SED-11G,0-10	0.0	10.0	42.6						5.8	48.6	45.6	SM	Greenish-black, silty SAND with trace organics and trace shells
SED-14G,0-10	0.0	10.0	80.5							22.0	78.0	ML	Greenish-black, SILT with sand
SED-15G,0-10	0.0	10.0	65.8							36.2	63.8	ML	Greenish-black, sandy SILT
SED-20G,0-10	0.0	10.0	50.5							17.9	82.1	ML	Greenish-black, SILT with sand and trace shells
SED-21G,0-10	0.0	10.0	102.4						0.1	7.3	92.6	ML	Greenish-black, SILT with trace organics and trace shells
SED-22G,0-10	0.0	10.0	94.0							7.1	92.9	ML	Greenish-black, SILT
SED-23G,0-10	0.0	10.0	127.6							5.1	94.9	ML	Greenish-black, SILT
SED-24G,0-10	0.0	10.0	107.0							6.7	93.3	ML	Greenish-black, SILT

Notes: 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report test, other graphs and tables, and the exploration logs.
2. The soil classifications in this table are based on ASTM D2487 and D2488 as applicable.

GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

SUMMARY OF
MATERIAL PROPERTIES



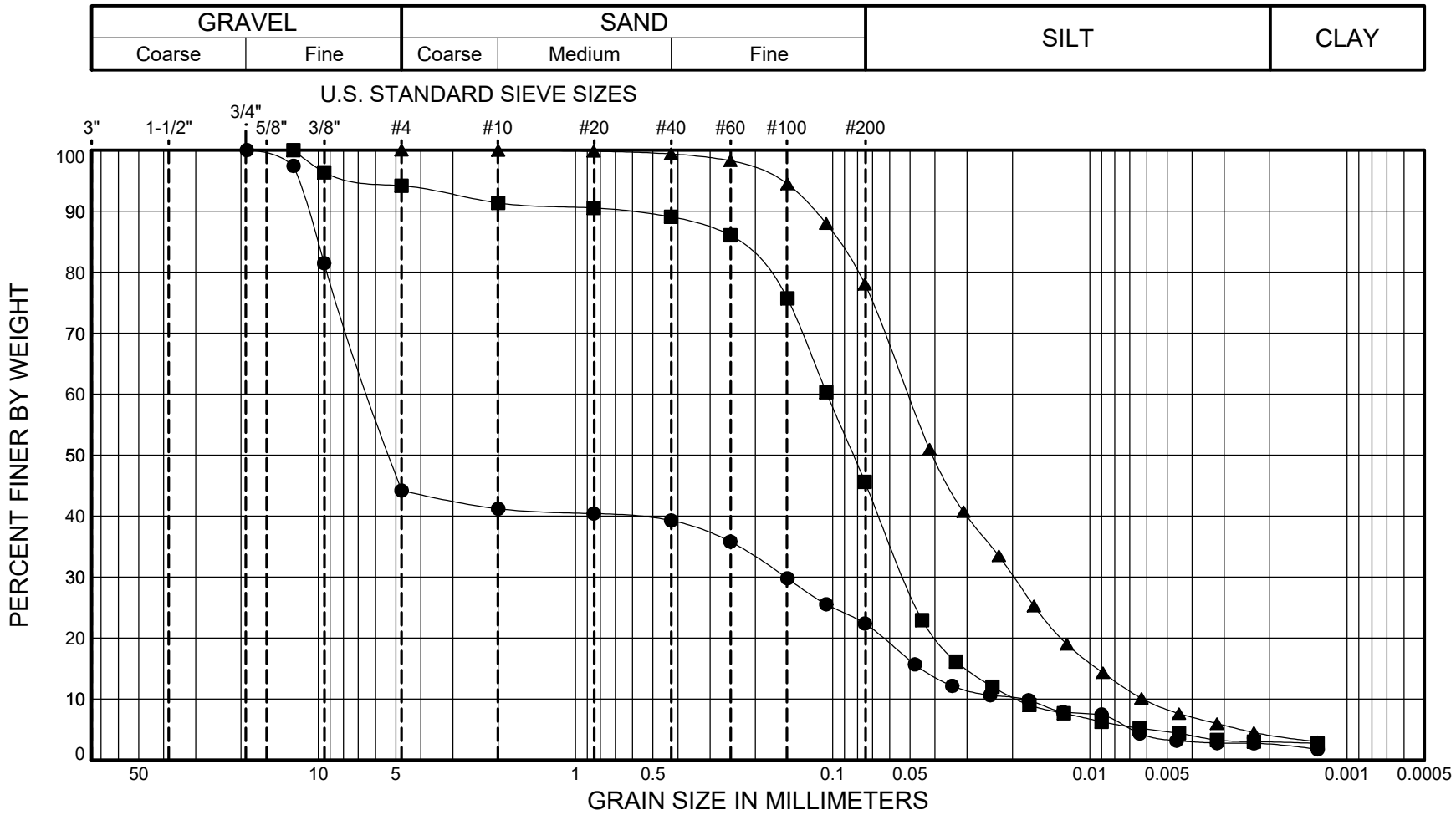
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-01G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT with sand	65					20.6	74.1	5.2	
■	SED-03G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT with sand and trace shells	79					17.6	75.2	7.2	
▲	SED-05G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT	90					12.9	81.5	5.5	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 2



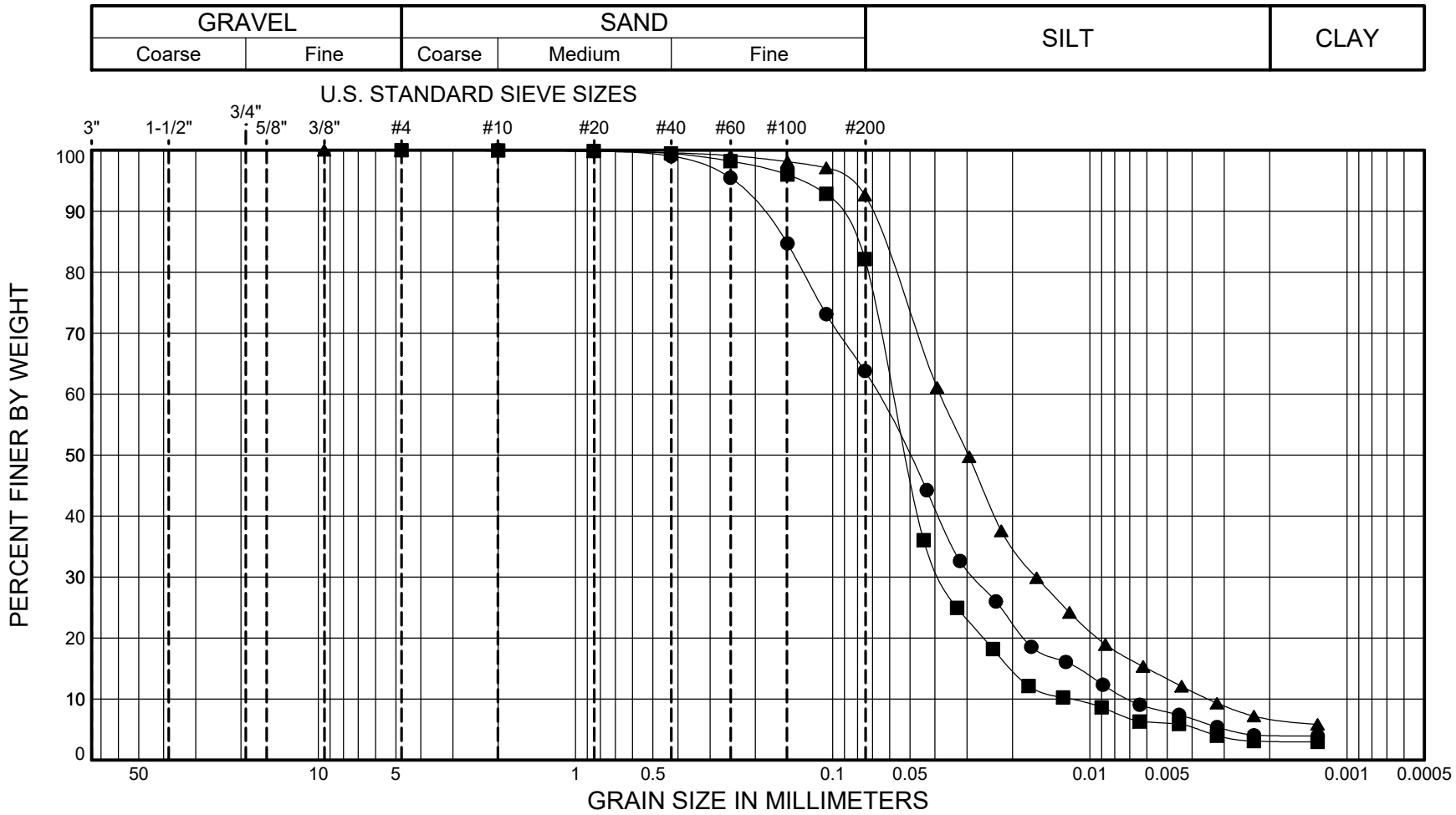
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-07G	0-10	0.0 - 10.0	(GM) Greenish-black, silty GRAVEL with sand and trace shells	33				55.8	21.8	19.9	2.5	
■	SED-11G	0-10	0.0 - 10.0	(SM) Greenish-black, silty SAND with trace organics and trace shells	43				5.8	48.6	42.7	2.9	
▲	SED-14G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT with sand	81					22.0	73.9	4.1	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 3



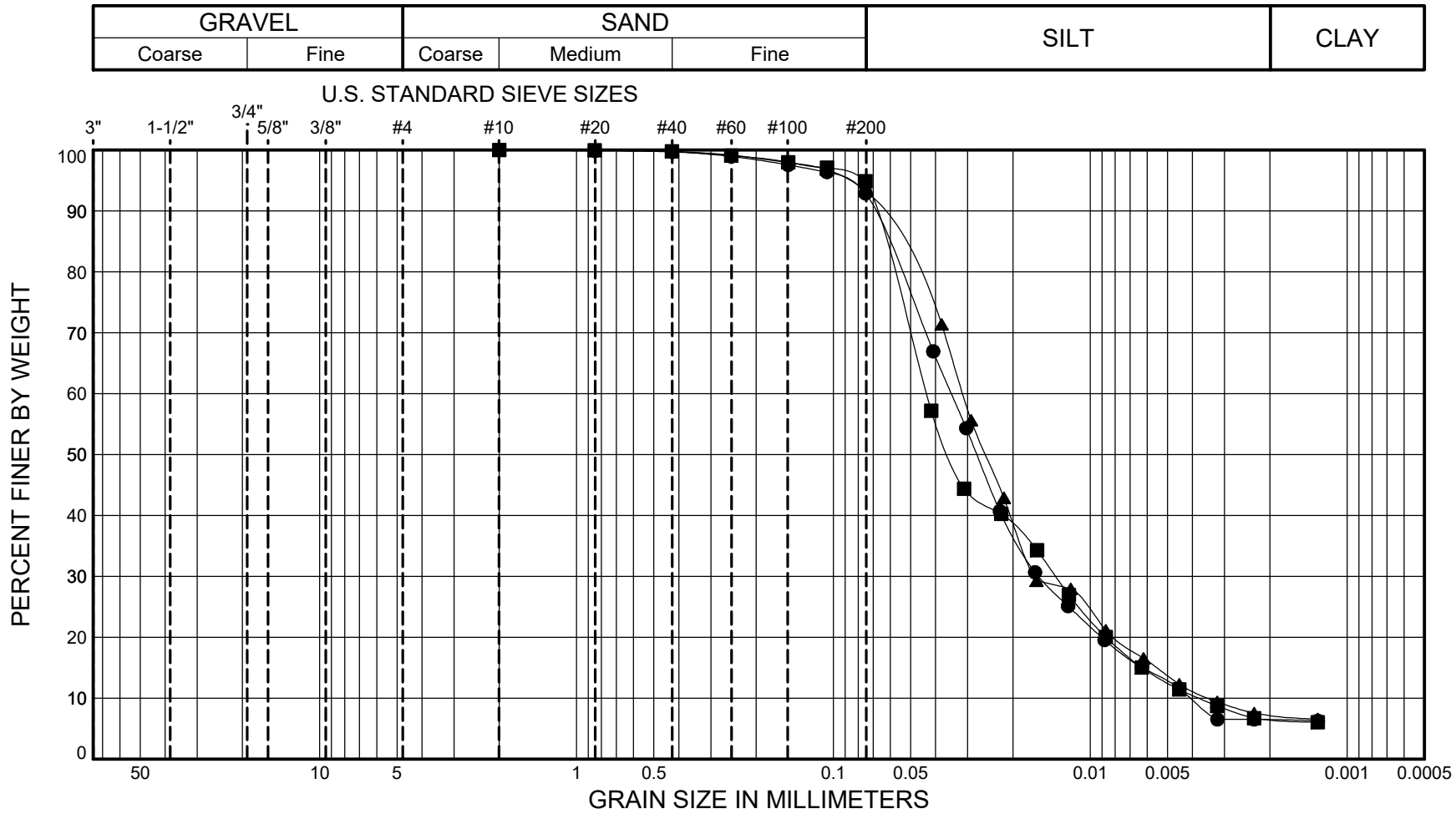
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-15G	0-10	0.0 - 10.0	(ML) Greenish-black, sandy SILT	66					36.2	59.8	4.0	
■	SED-20G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT with sand and trace shells	51					17.9	79.1	3.1	
▲	SED-21G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT with trace organics and trace shells	102				0.1	7.3	85.8	6.9	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 4



SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-22G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT	94					7.1	86.4	6.5	
■	SED-23G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT	128					5.1	88.3	6.5	
▲	SED-24G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT	107					6.7	86.0	7.3	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 5

HWA GeoSciences Inc.
DBE/MWBE

May 12, 2023
HWA Project No. 2023-070

Friedman & Bruya, Inc.
5500 4th Ave S
Seattle, Washington 98108

Attention: Mr. Michael Erdahl

Subject: **Materials Laboratory Report**
Letter Report 1 – Priority Samples
Port of Friday Harbor - Jensen's Marina

Dear Mr. Erdahl,

In accordance with your request, HWA GeoSciences Inc. (HWA) performed laboratory testing for the above referenced project. Herein we present the results of our laboratory analyses, which are summarized on the attached Figures. The laboratory testing program was performed in general accordance with your instructions and appropriate ASTM Standards as outlined below.

SAMPLE DESCRIPTION: The subject samples were delivered to our laboratory on March 27, 2023 by Friedman & Bruya personnel. The samples were delivered in coolers containing re-sealable plastic jars designated with exploration/sample IDs. The sample descriptions may be found on the attached Summary of Material Properties, Figure 1.

PARTICLE SIZE ANALYSIS OF SOILS: The particle size distribution of each specified sample was determined in general accordance with ASTM D6913 and D7928. The results are plotted on the attached Particle Size Analysis of Soils Report, Figures 2 through 5, which also indicate the moisture content of the soil samples at the time of testing.

CLOSURE: Experience has shown that test values on soil and other natural materials vary with each representative sample. As such, HWA has no knowledge as to the extent and quantity of material the tested samples may represent. HWA also makes no warranty as to how representative either the samples tested or the test results obtained are to actual field conditions. It is a well-established fact that sampling methods present varying degrees of disturbance that affect sample representativeness.

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Sincerely,

HWA GEOSCIENCES INC.

Alex Hodges
Materials Laboratory Supervisor

Steven E. Greene, L.G., L.E.G.
Principal Engineering Geologist
Vice President

Attachments:

Figures 1	Summary of Material Properties
Figures 2-5	Particle Size Analysis of Soils Report

EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVITY	ATTERBERG LIMITS (%)			% GRAVEL	% SAND	% FINES	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION
						LL	PL	PI					
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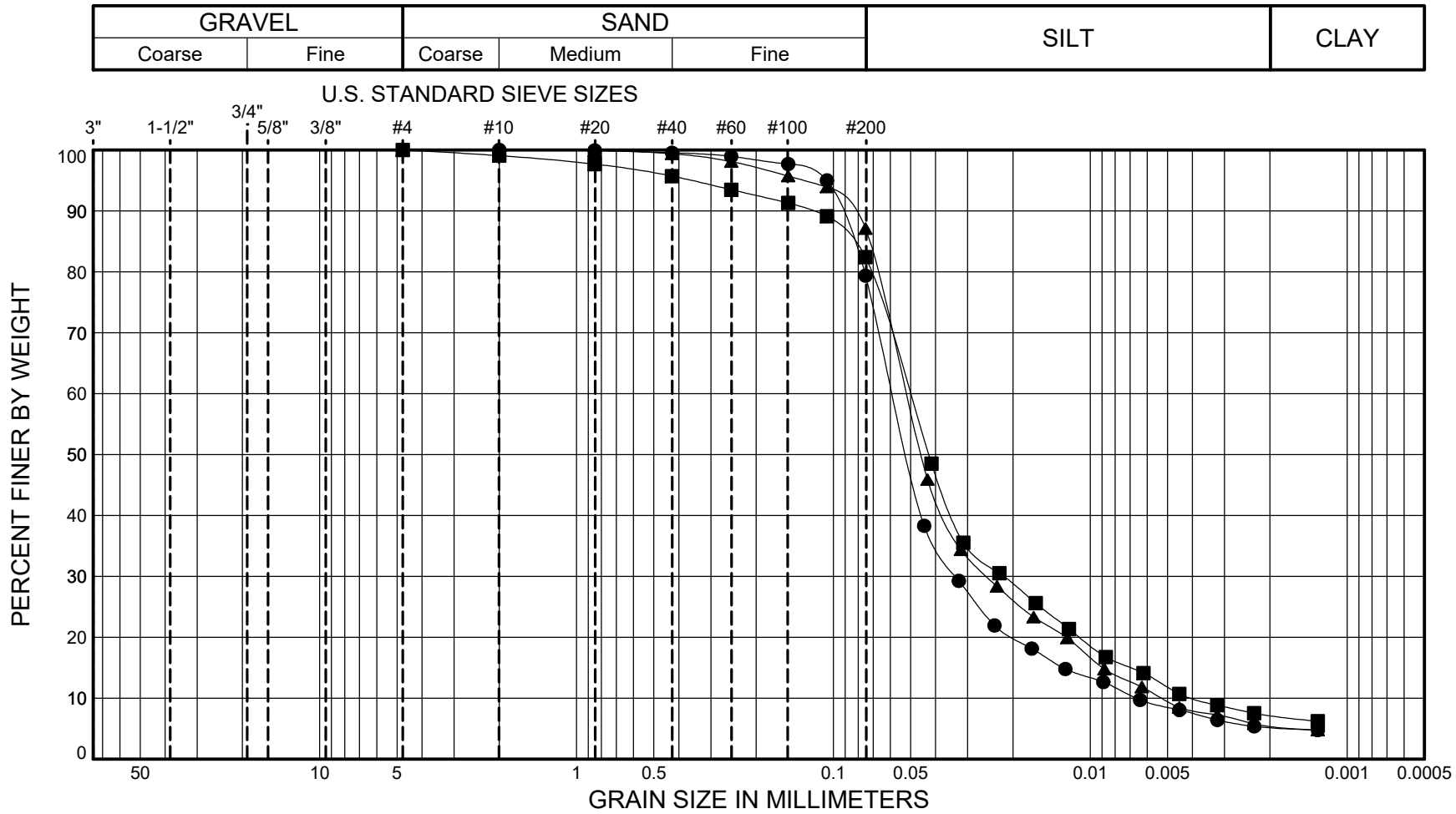
SED-03G,0-10	0.0	10.0	78.7							17.6	82.4	ML	Greenish-black, SILT with sand and trace shells
SED-05G,0-10	0.0	10.0	90.3							12.9	87.1	ML	Greenish-black, SILT
SED-07G,0-10	0.0	10.0	32.8						55.8	21.8	22.4	GM	Greenish-black, silty GRAVEL with sand and trace shells
SED-11G,0-10	0.0	10.0	42.6						5.8	48.6	45.6	SM	Greenish-black, silty SAND with trace organics and trace shells
SED-14G,0-10	0.0	10.0	80.5							22.0	78.0	ML	Greenish-black, SILT with sand
SED-15G,0-10	0.0	10.0	65.8							36.2	63.8	ML	Greenish-black, sandy SILT
SED-20G,0-10	0.0	10.0	50.5							17.9	82.1	ML	Greenish-black, SILT with sand and trace shells
SED-21G,0-10	0.0	10.0	102.4						0.1	7.3	92.6	ML	Greenish-black, SILT with trace organics and trace shells
SED-22G,0-10	0.0	10.0	94.0							7.1	92.9	ML	Greenish-black, SILT
SED-23G,0-10	0.0	10.0	127.6							5.1	94.9	ML	Greenish-black, SILT
SED-24G,0-10	0.0	10.0	107.0							6.7	93.3	ML	Greenish-black, SILT

Notes: 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report test, other graphs and tables, and the exploration logs.
2. The soil classifications in this table are based on ASTM D2487 and D2488 as applicable.

GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

SUMMARY OF
MATERIAL PROPERTIES



SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
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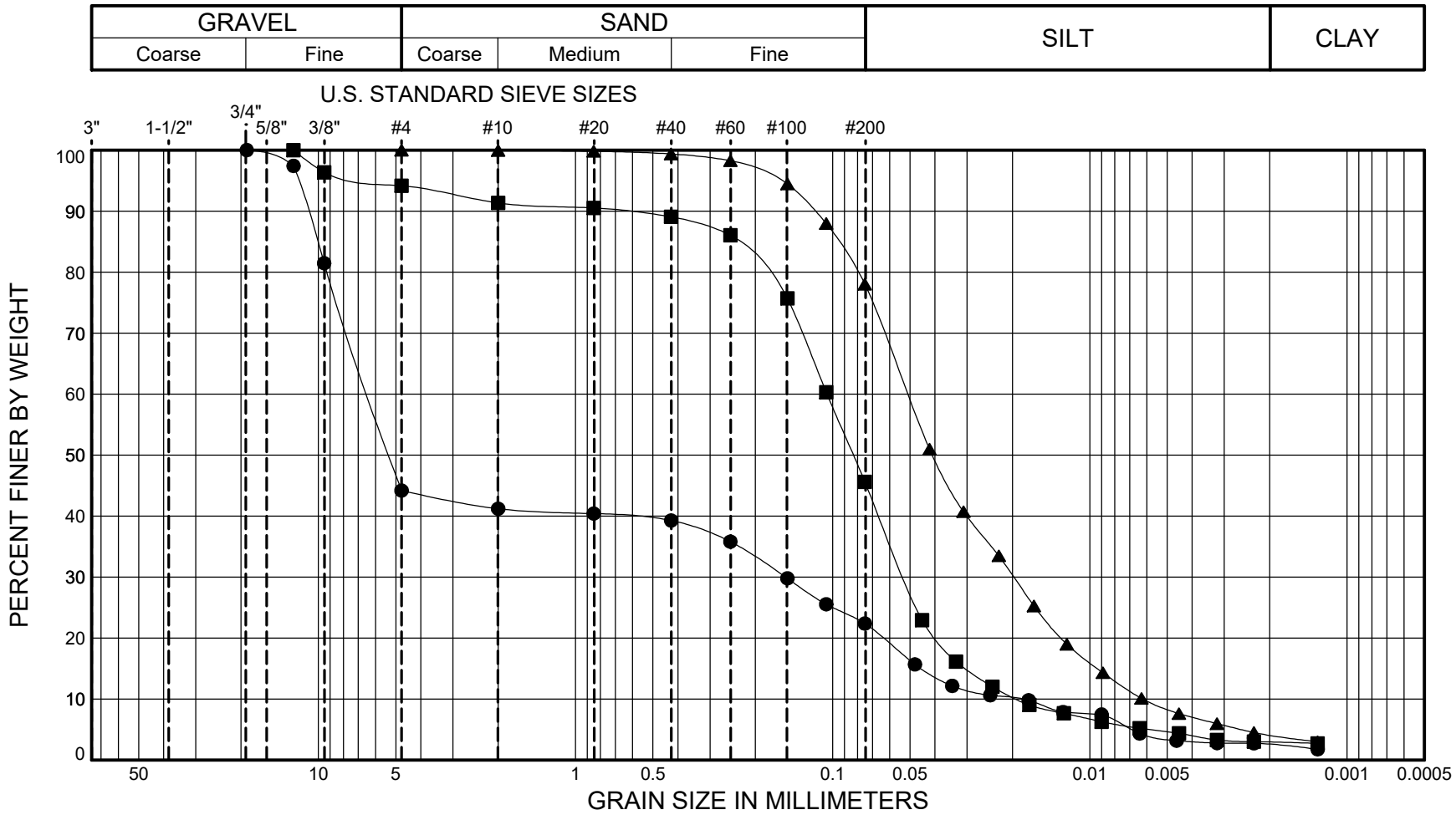
▲	SED-05G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT	90					12.9	81.5	5.5	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 2



SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
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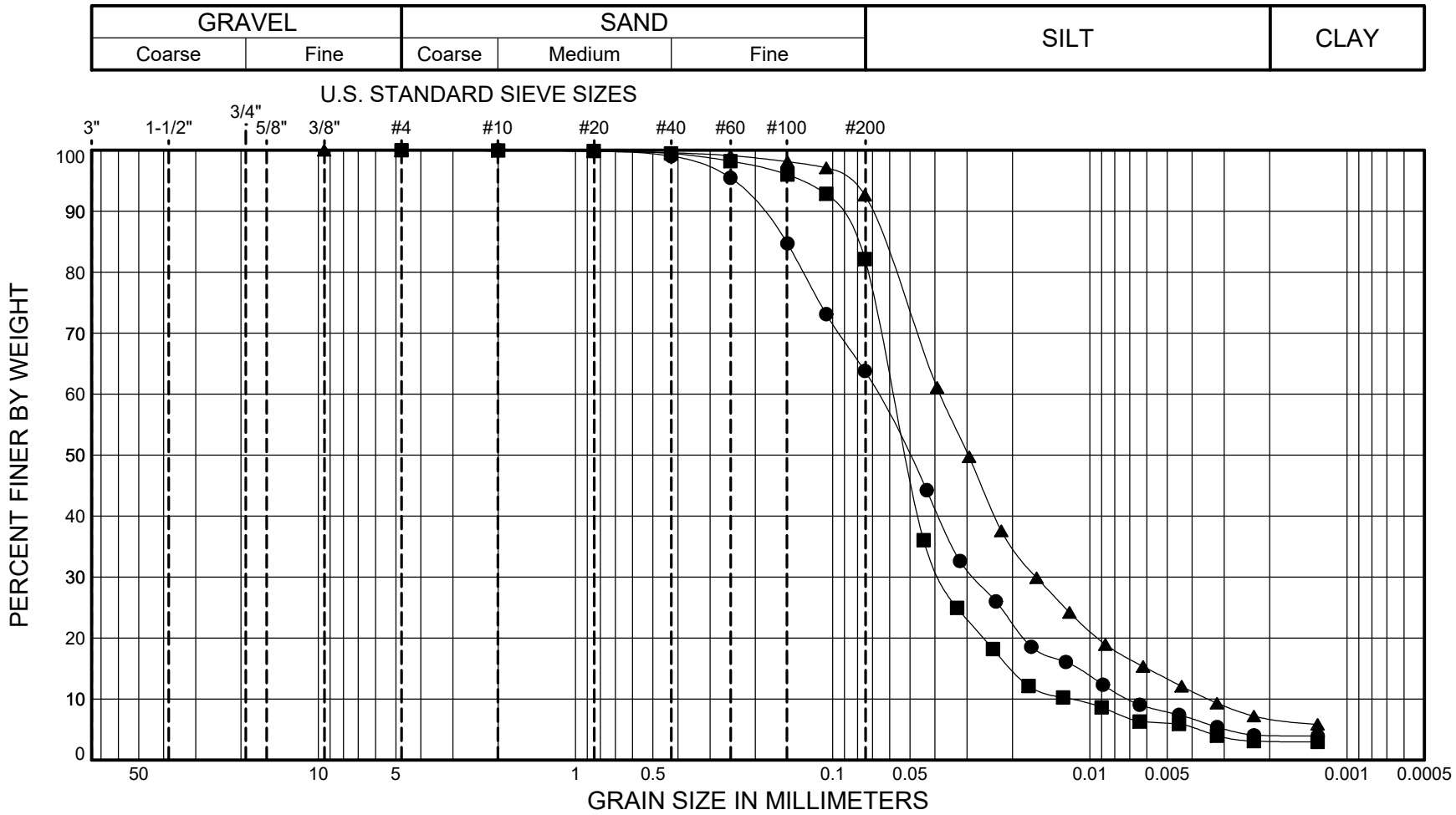
■	SED-11G	0-10	0.0 - 10.0	(SM) Greenish-black, silty SAND with trace organics and trace shells	43				5.8	48.6	42.7	2.9	
▲	SED-14G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT with sand	81					22.0	73.9	4.1	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 3



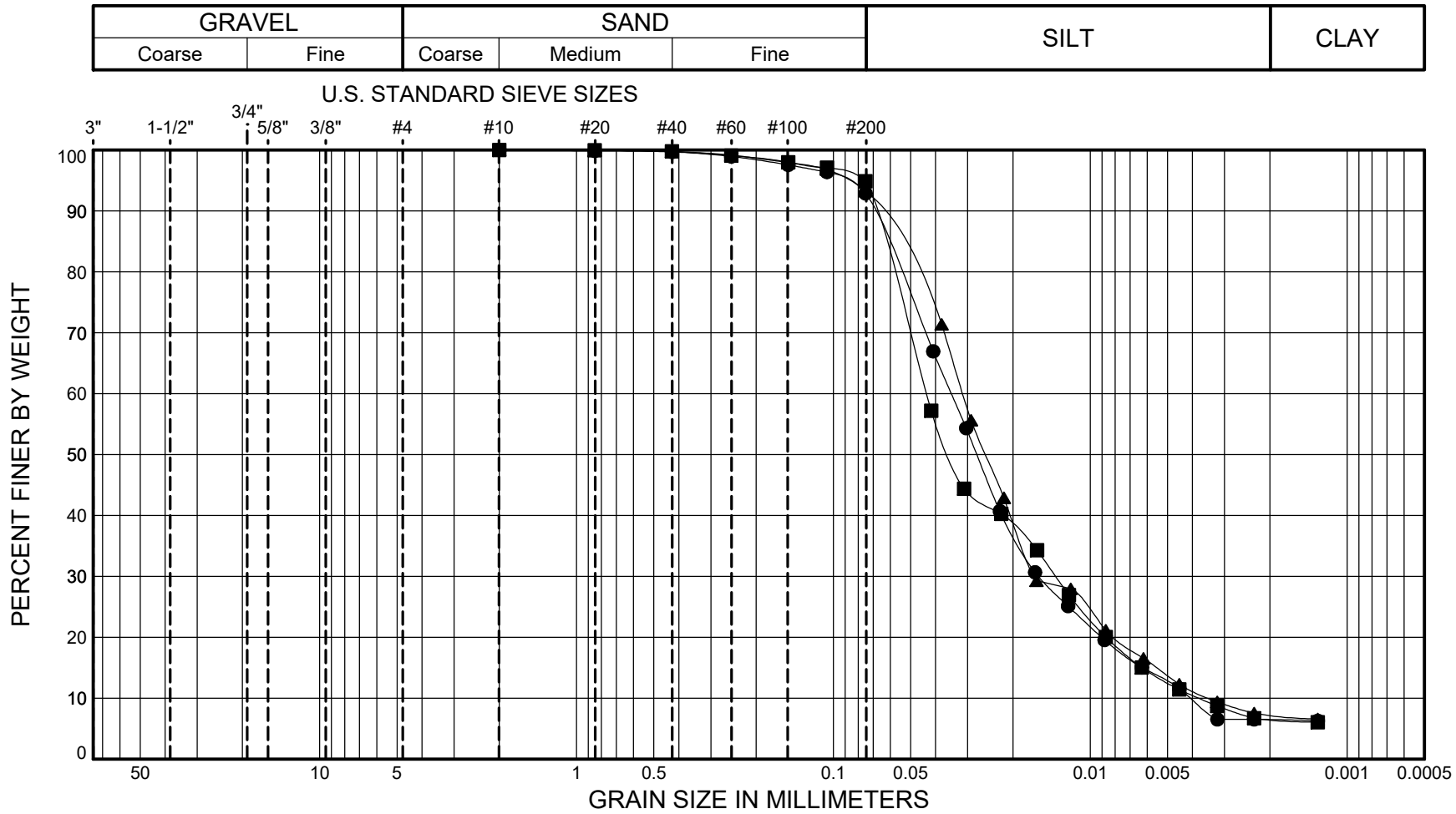
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-15G	0-10	0.0 - 10.0	(ML) Greenish-black, sandy SILT	66					36.2	59.8	4.0	
■	SED-20G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT with sand and trace shells	51					17.9	79.1	3.1	
▲	SED-21G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT with trace organics and trace shells	102				0.1	7.3	85.8	6.9	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 4



SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
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▲	SED-24G	0-10	0.0 - 10.0	(ML) Greenish-black, SILT	107					6.7	86.0	7.3	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 5

HWA GeoSciences Inc.
DBE/MWBE

May 25, 2023
HWA Project No. 2023-070

Friedman & Bruya, Inc.
5500 4th Ave S
Seattle, Washington 98108

Attention: Mr. Michael Erdahl

Subject: **Materials Laboratory Report**
Letter Report 2
Port of Friday Harbor - Jensen's Marina

Dear Mr. Erdahl,

In accordance with your request, HWA GeoSciences Inc. (HWA) performed laboratory testing for the above referenced project. Herein we present the results of our laboratory analyses, which are summarized on the attached Figures. The laboratory testing program was performed in general accordance with your instructions and appropriate ASTM Standards as outlined below.

SAMPLE DESCRIPTION: The subject samples were delivered to our laboratory on March 27, 2023 by Friedman & Bruya personnel. The samples were delivered in coolers containing re-sealable plastic jars designated with exploration/sample IDs. The sample descriptions may be found on the attached Summary of Material Properties, Figures 1 and 2.

PARTICLE SIZE ANALYSIS OF SOILS: The particle size distribution of each specified sample was determined in general accordance with ASTM D6913 and D7928. The results are plotted on the attached Particle Size Analysis of Soils Report, Figures 3 through 10, which also indicate the moisture content of the soil samples at the time of testing.

CLOSURE: Experience has shown that test values on soil and other natural materials vary with each representative sample. As such, HWA has no knowledge as to the extent and quantity of material the tested samples may represent. HWA also makes no warranty as to how representative either the samples tested or the test results obtained are to actual field conditions. It is a well-established fact that sampling methods present varying degrees of disturbance that affect sample representativeness.

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Sincerely,

HWA GEOSCIENCES INC.

Alex Hodges
Materials Laboratory Supervisor

Steven E. Greene, L.G., L.E.G.
Principal Engineering Geologist
Vice President

Attachments:

Figures 1-2	Summary of Material Properties
Figures 3-10	Particle Size Analysis of Soils Report

EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVITY	ATTERBERG LIMITS (%)			% GRAVEL	% SAND	% FINES	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION
						LL	PL	PI					
SED-01C,0-1	0.0	1.0	60.3						0.1	26.9	73.0	ML	Very dark gray, SILT with sand
SED-03C,0-1	0.0	1.0	100.3						0.2	15.8	83.9	ML	Very dark gray, SILT with sand
SED-05C,0-1	0.0	1.0	65.8						0.2	17.0	82.8	ML	Very dark gray, SILT with sand and trace organics
SED-07C,0-1	0.0	1.0	34.5						28.3	40.4	31.2	SM	Greenish-black, silty SAND with gravel and trace shells
SED-07C,1-3	1.0	3.0	30.9						14.8	50.2	35.0	SM	Very dark gray, silty SAND with trace shells
SED-08C,0-1	0.0	1.0	48.9						0.9	46.8	52.3	ML	Very dark gray, sandy SILT with trace shells
SED-08C,1-3	1.0	3.0	34.9						2.2	67.2	30.6	SM	Very dark gray, silty SAND with organics and trace shells
SED-09C,0-1	0.0	1.0	41.4						4.8	66.6	28.6	SM	Very dark gray, silty SAND with organics and shells
SED-09C,1-3	1.0	3.0	30.6						1.9	76.3	21.8	SM	Very dark gray, silty SAND with organics and shells
SED-10C,0-1	0.0	1.0	27.5						13.9	66.4	19.7	SM	Very dark gray, silty SAND with trace organics
SED-10C,1-3	1.0	3.0	28.2						29.1	55.3	15.5	SM	Very dark gray, silty SAND with gravel and trace organics
SED-11C,0-1	0.0	1.0	39.6						12.0	50.9	37.1	SM	Very dark gray, silty SAND with trace organics
SED-11C,1-3	1.0	3.0	32.5						4.5	67.4	28.2	SM	Very dark gray, silty SAND with shells
SED-12C,0-1	0.0	1.0	26.6						18.2	65.1	16.7	SM	Very dark gray, silty SAND with gravel with organics and shells
SED-14C,0-1	0.0	1.0	48.5						0.4	46.1	53.5	ML	Very dark gray, sandy SILT with shells and trace organics
SED-18G,0-10	0.0	10.0	72.3						0.3	16.5	83.2	ML	Very dark gray, SILT with sand
SED-19G,0-10	0.0	10.0	50.0							27.8	72.2	ML	Very dark gray, SILT with sand
SED-25C,0-1	0.0	1.0	36.4						4.3	67.7	28.0	SM	Greenish-black, silty SAND with organics and shells
SED-25C,1-3	1.0	3.0	29.3						3.2	74.1	22.7	SM	Very dark gray, silty SAND with shells
SED-26C,0-1	0.0	1.0	55.4						2.9	65.3	31.8	SM	Greenish-black, silty SAND with organics and shells

Notes: 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report test, other graphs and tables, and the exploration logs.
2. The soil classifications in this table are based on ASTM D2487 and D2488 as applicable.

GeoSciences Inc.

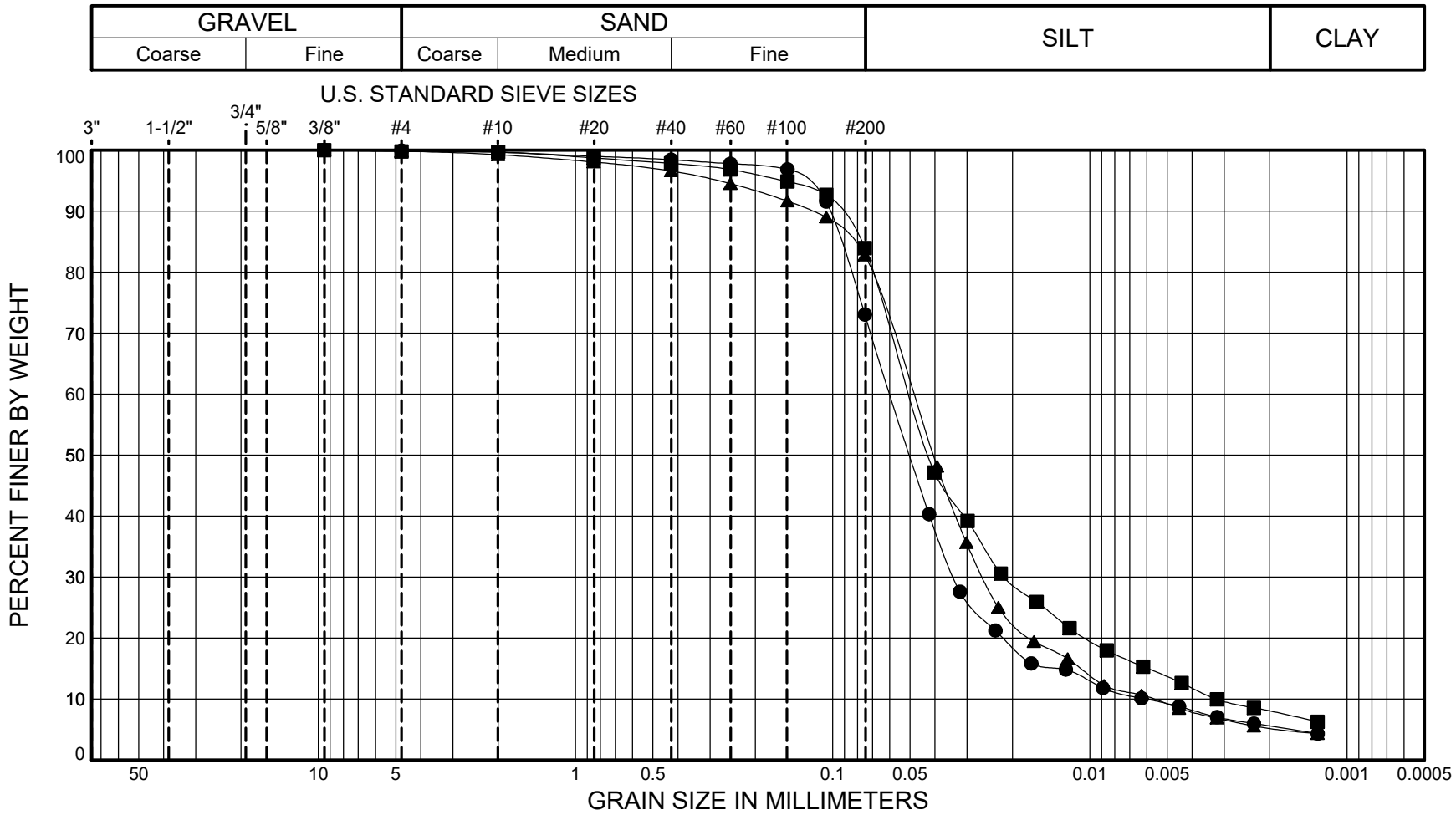
Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

SUMMARY OF MATERIAL PROPERTIES

PROJECT NO.: 2023-070 FIGURE: 1

EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVITY	ATTERBERG LIMITS (%)			% GRAVEL	% SAND	% FINES	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION
						LL	PL	PI					
SED-26C,1-3	1.0	3.0	37.3						7.3	64.6	28.1	SM	Very dark gray, silty SAND with shells
SED-DUP2C,	0.0	0.0	22.0						40.7	41.8	17.4	SM	Very dark gray, silty SAND with gravel
SED-DUP3C,	0.0	0.0	26.9						5.7	67.6	26.8	SM	Very dark gray, silty SAND with shells

Notes: 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report test, other graphs and tables, and the exploration logs.
2. The soil classifications in this table are based on ASTM D2487 and D2488 as applicable.



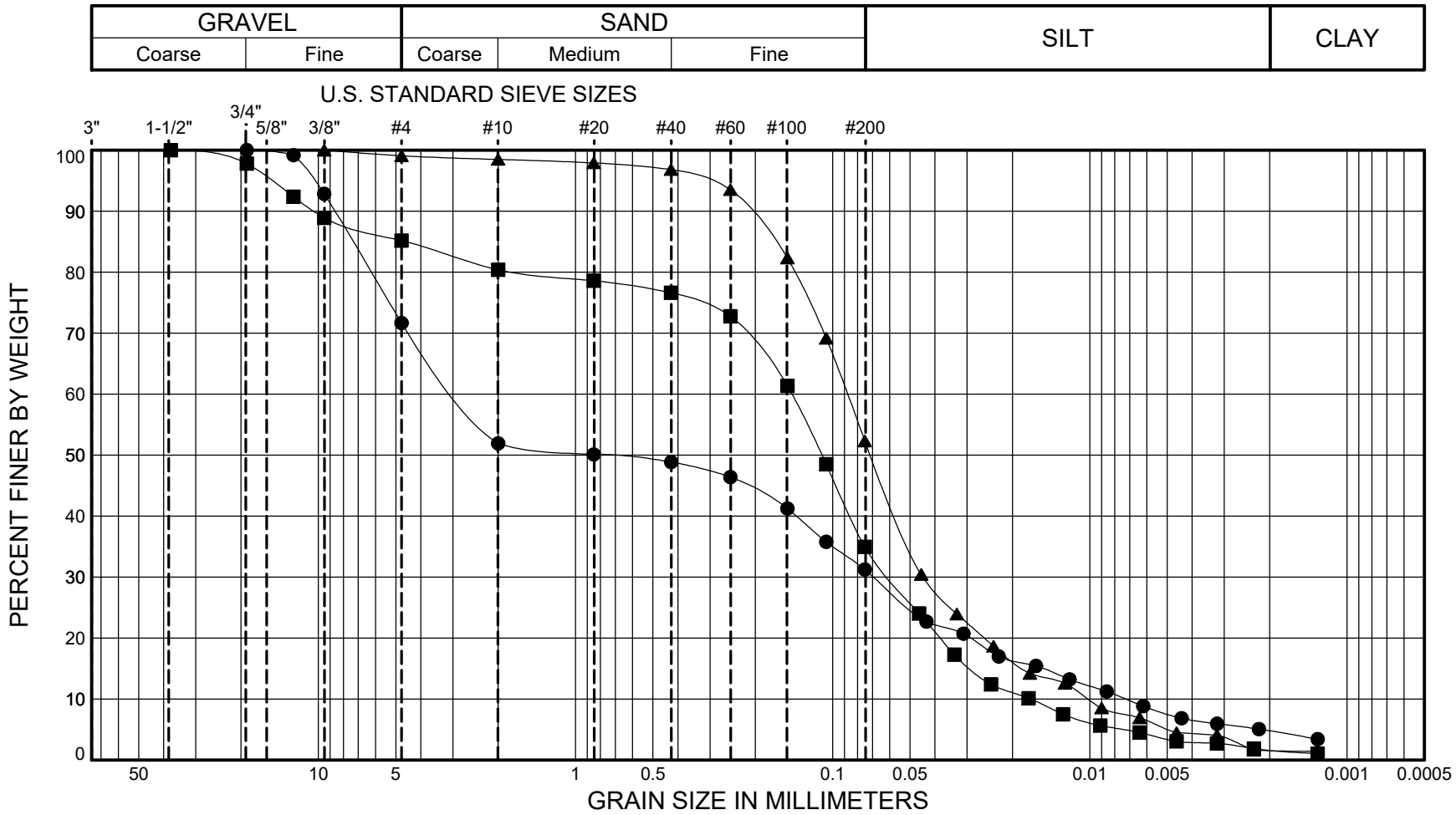
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-01C	0-1	0.0 - 1.0	(ML) Very dark gray, SILT with sand	60				0.1	26.9	67.5	5.6	
■	SED-03C	0-1	0.0 - 1.0	(ML) Very dark gray, SILT with sand	100				0.2	15.8	76.0	8.0	
▲	SED-05C	0-1	0.0 - 1.0	(ML) Very dark gray, SILT with sand and trace organics	66				0.2	17.0	77.5	5.3	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 3



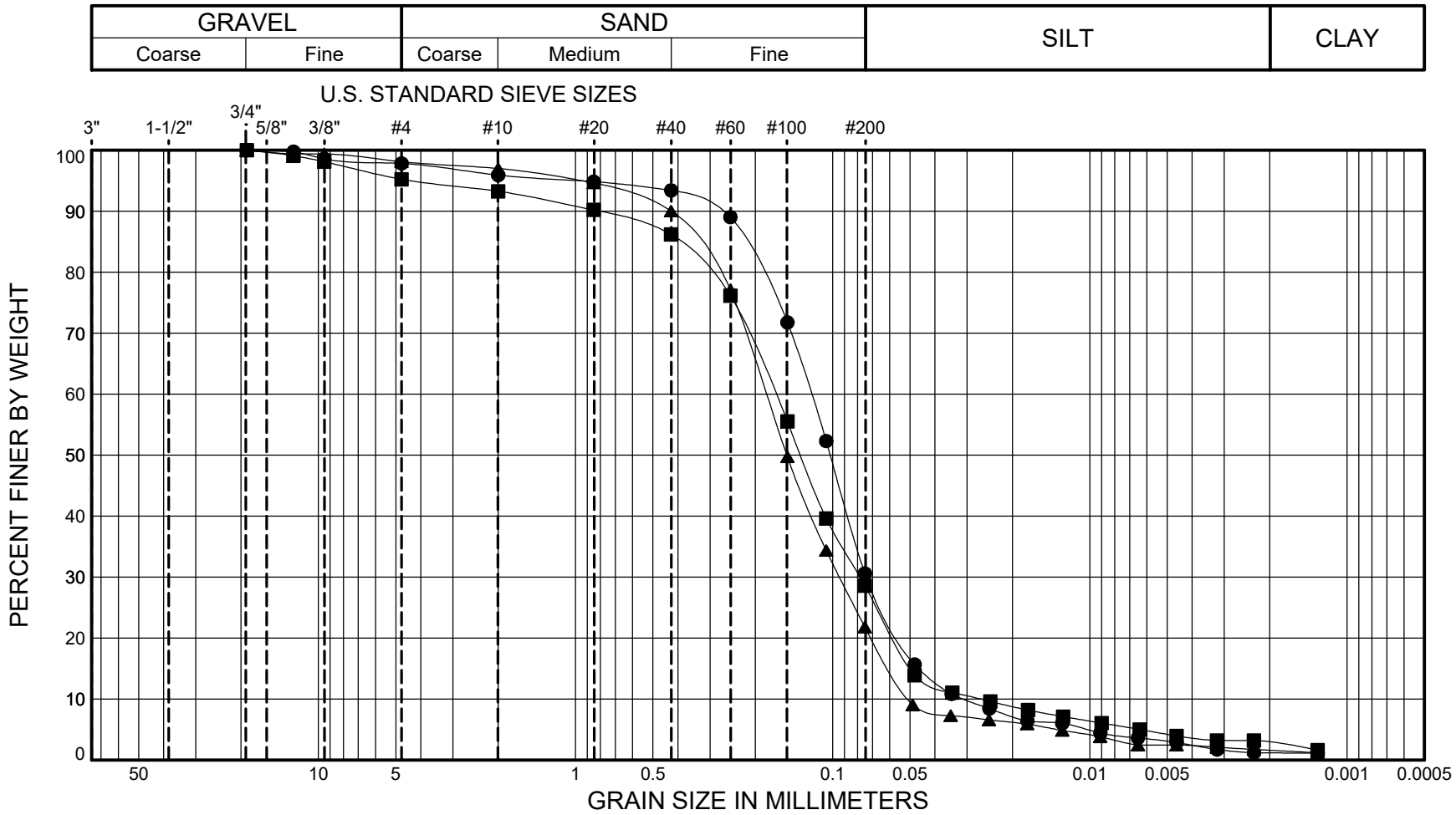
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-07C	0-1	0.0 - 1.0	(SM) Greenish-black, silty SAND with gravel and trace shells	34				28.3	40.4	26.5	4.8	
■	SED-07C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with trace shells	31				14.8	50.2	33.3	1.7	
▲	SED-08C	0-1	0.0 - 1.0	(ML) Very dark gray, sandy SILT with trace shells	49				0.9	46.8	50.7	1.6	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 4



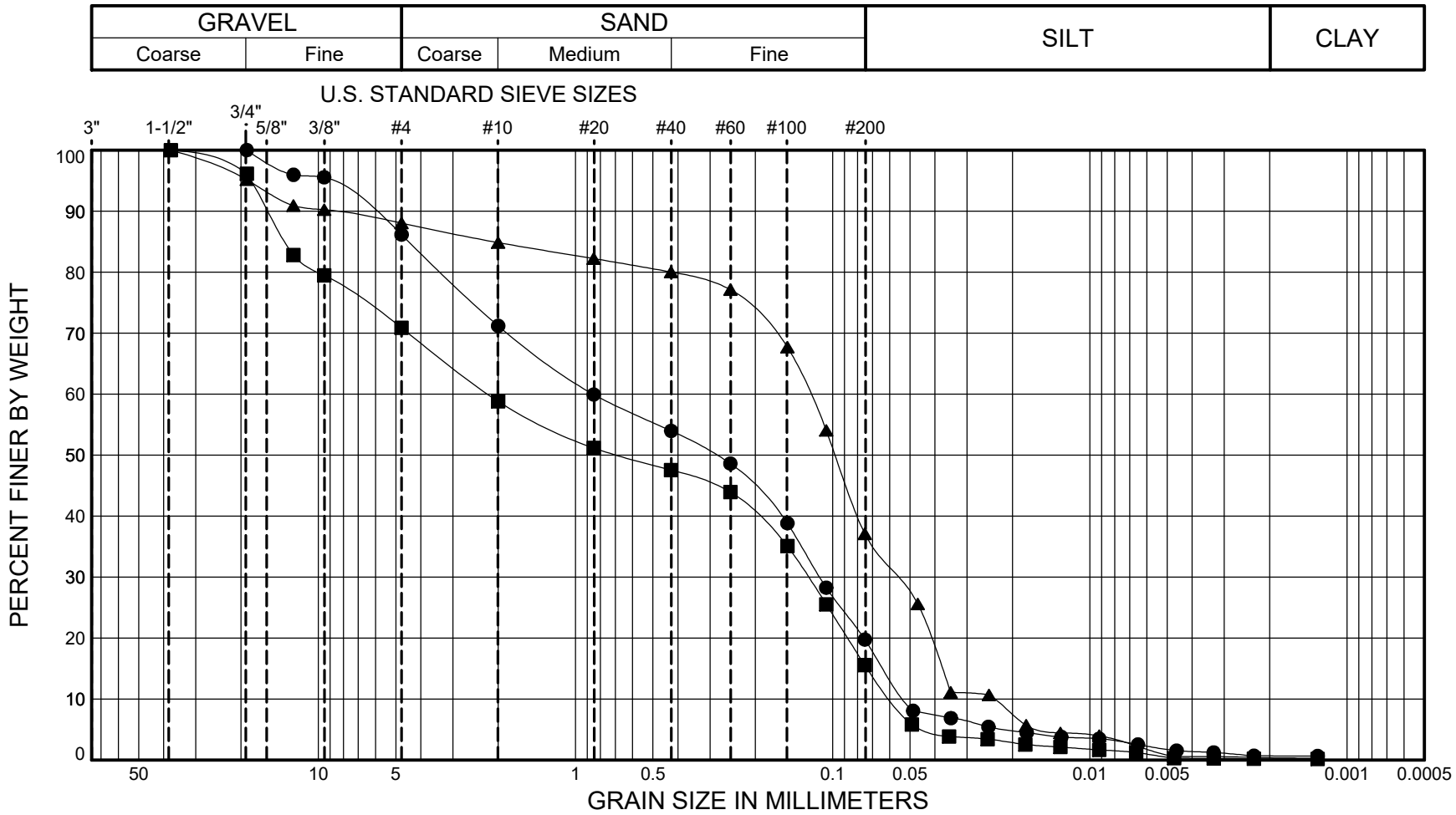
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-08C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with organics and trace shells	35				2.2	67.2	29.4	1.2	
■	SED-09C	0-1	0.0 - 1.0	(SM) Very dark gray, silty SAND with organics and shells	41				4.8	66.6	25.8	2.8	
▲	SED-09C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with organics and shells	31				1.9	76.3	20.2	1.6	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 5



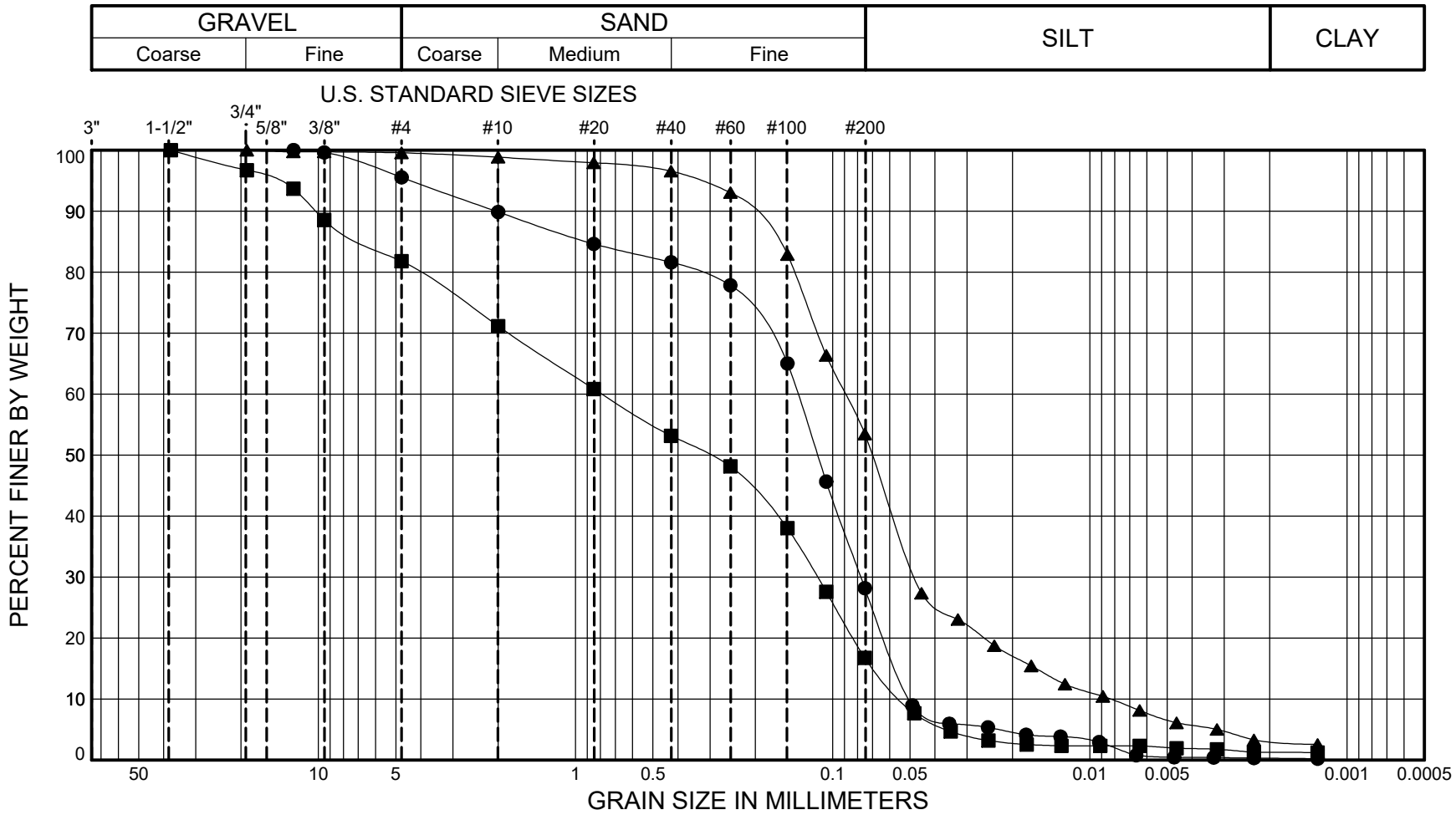
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-10C	0-1	0.0 - 1.0	(SM) Very dark gray, silty SAND with trace organics	28				13.9	66.4	19.1	0.7	
■	SED-10C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with gravel and trace organics	28				29.1	55.3	15.4	0.2	
▲	SED-11C	0-1	0.0 - 1.0	(SM) Very dark gray, silty SAND with trace organics	40				12.0	50.9	36.7	0.4	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 6



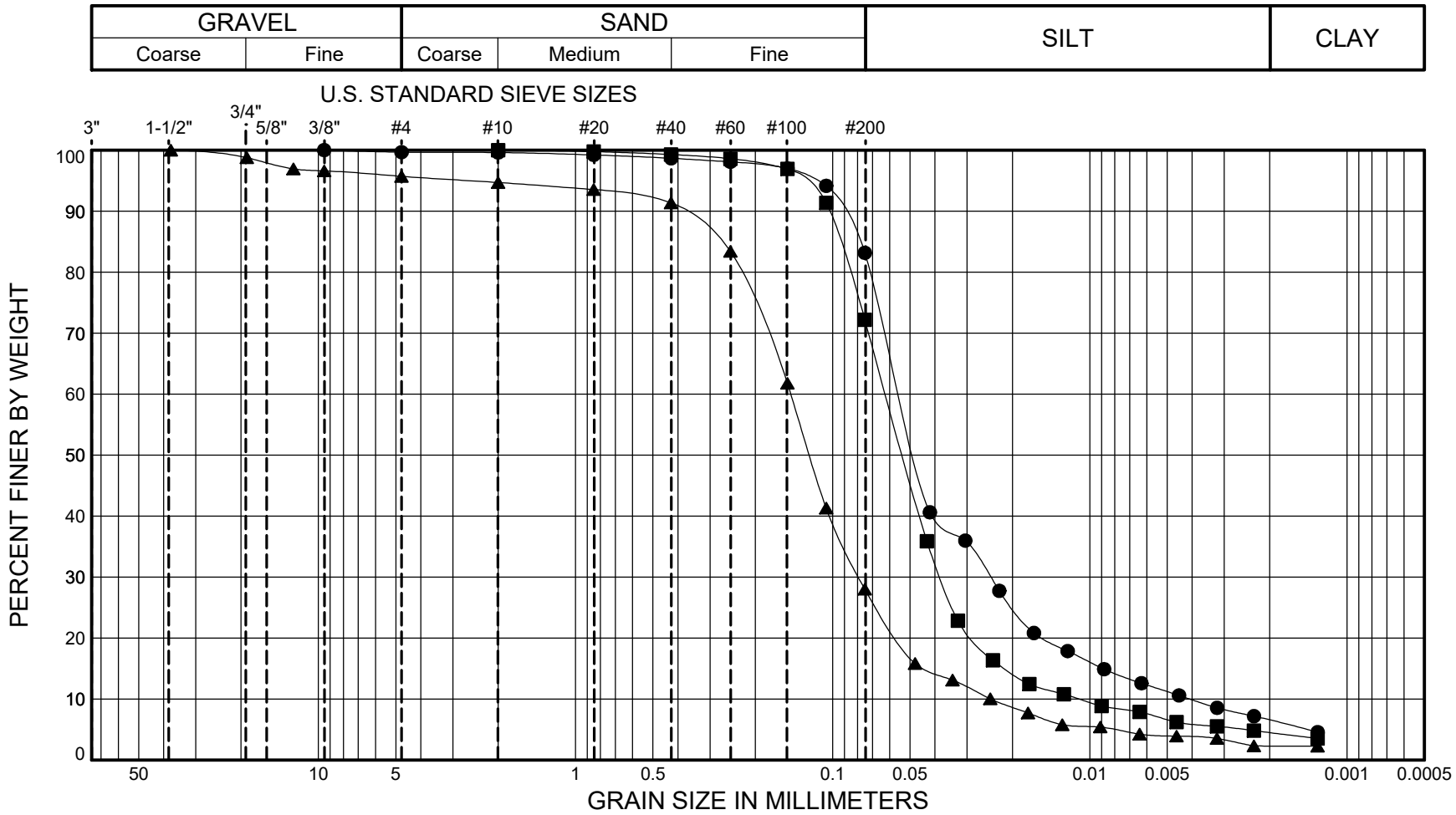
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-11C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with shells	33				4.5	67.4	27.9	0.3	
■	SED-12C	0-1	0.0 - 1.0	(SM) Very dark gray, silty SAND with gravel with organics and shells	27				18.2	65.1	15.5	1.3	
▲	SED-14C	0-1	0.0 - 1.0	(ML) Very dark gray, sandy SILT with shells and trace organics	48				0.4	46.1	50.4	3.1	

GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 7



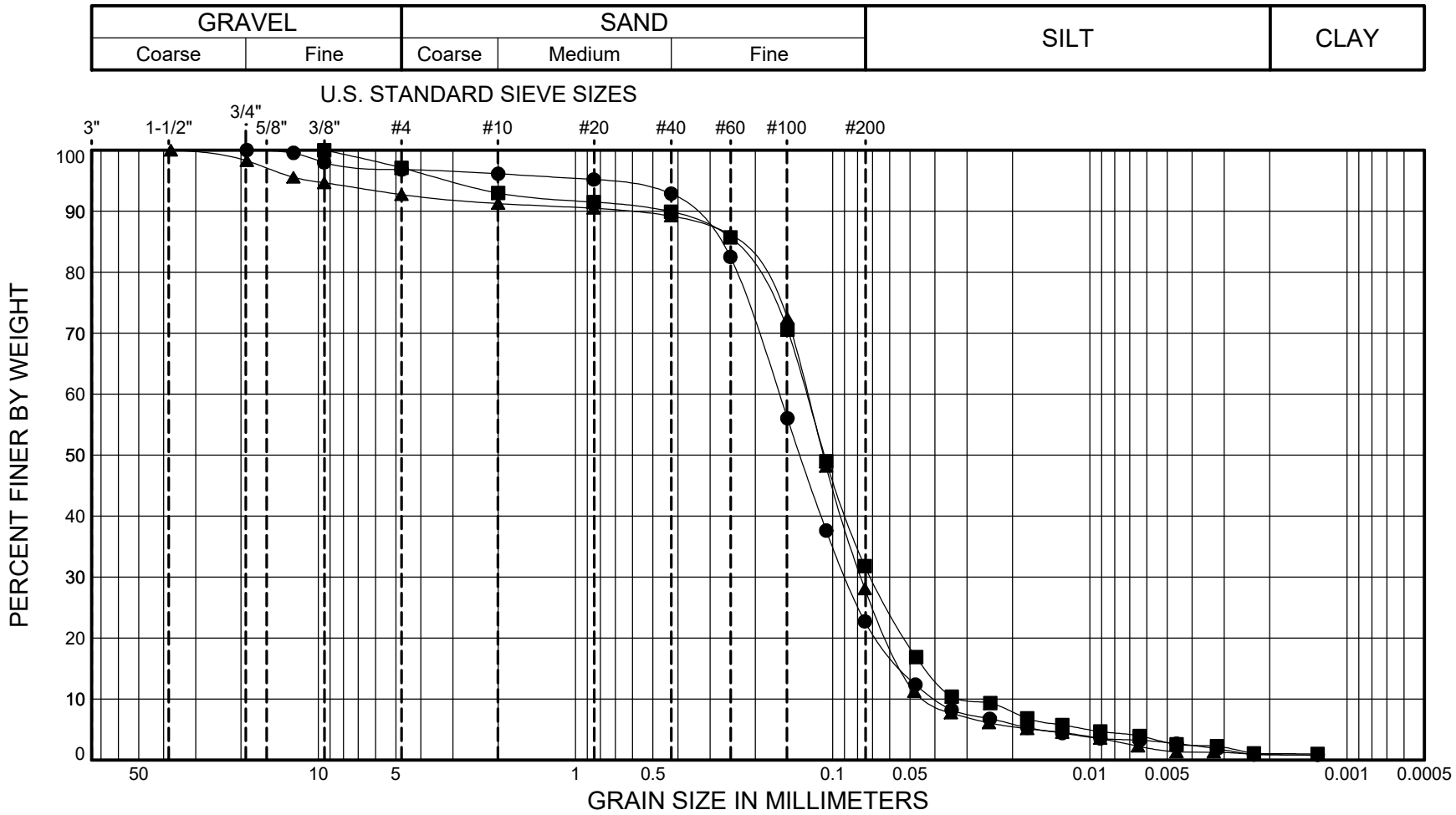
SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-18G	0-10	0.0 - 10.0	(ML) Very dark gray, SILT with sand	72				0.3	16.5	76.6	6.5	
■	SED-19G	0-10	0.0 - 10.0	(ML) Very dark gray, SILT with sand	50					27.8	67.7	4.5	
▲	SED-25C	0-1	0.0 - 1.0	(SM) Greenish-black, silty SAND with organics and shells	36				4.3	67.7	25.7	2.3	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 8



SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-25C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with shells	29				3.2	74.1	21.8	0.9	
■	SED-26C	0-1	0.0 - 1.0	(SM) Greenish-black, silty SAND with organics and shells	55				2.9	65.3	30.7	1.1	
▲	SED-26C	1-3	1.0 - 3.0	(SM) Very dark gray, silty SAND with shells	37				7.3	64.6	27.1	0.9	

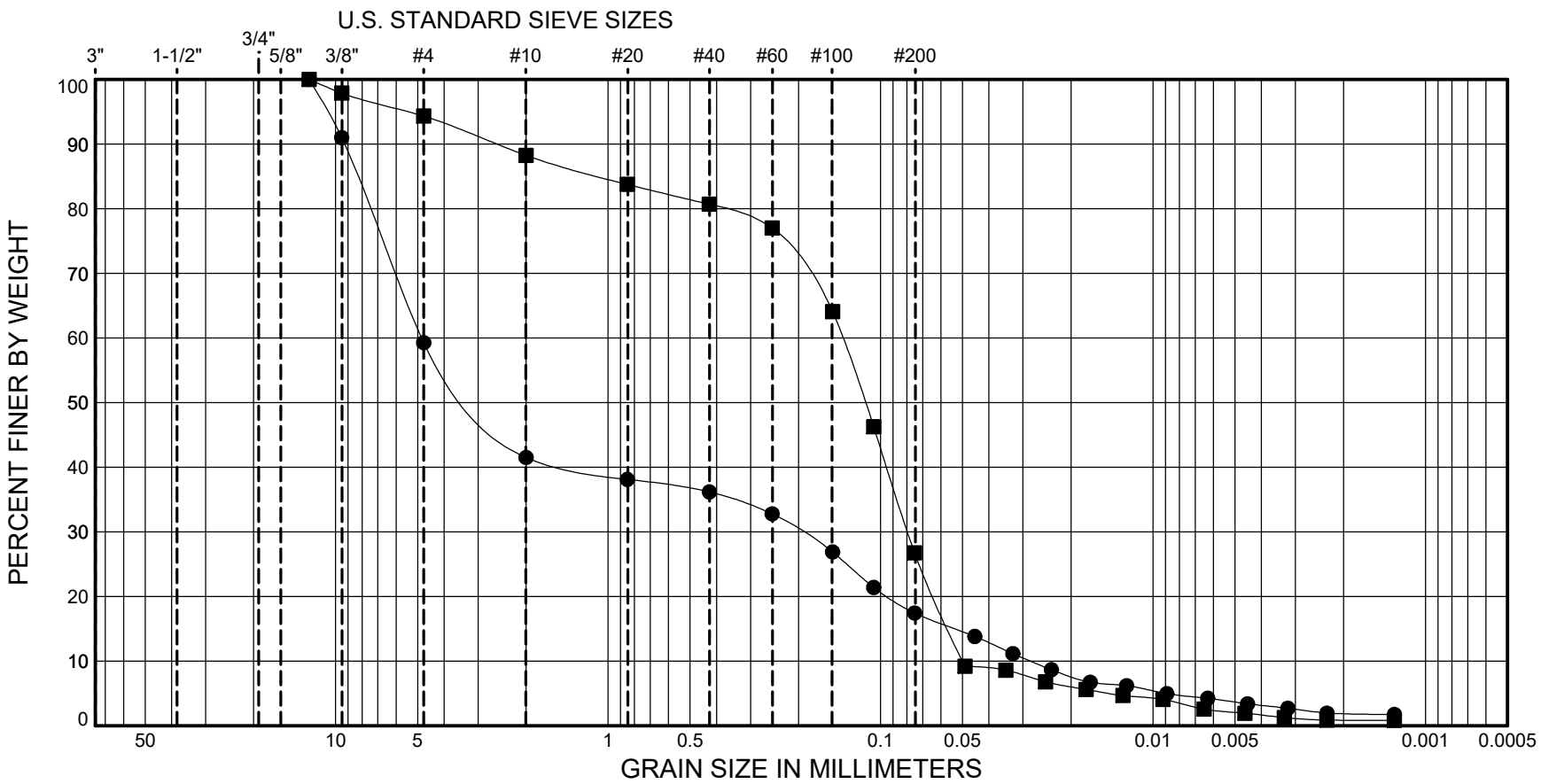
HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 9

GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		



SYMBOL	SAMPLE		DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	SED-DUP2C		0.0 - 0.0	(SM) Very dark gray, silty SAND with gravel	22				40.7	41.8	15.5	1.9	
■	SED-DUP3C		0.0 - 0.0	(SM) Very dark gray, silty SAND with shells	27				5.7	67.6	25.9	0.9	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 10

HWA GeoSciences Inc.
DBE/MWBE

June 7, 2023
HWA Project No. 2023-070

Friedman & Bruya, Inc.
5500 4th Ave S
Seattle, Washington 98108

Attention: Mr. Michael Erdahl

Subject: **Materials Laboratory Report**
Letter Report 3 – Carr Inlet Reference Samples
Port of Friday Harbor - Jensen's Marina

Dear Mr. Erdahl,

In accordance with your request, HWA GeoSciences Inc. (HWA) performed laboratory testing for the above referenced project. Herein we present the results of our laboratory analyses, which are summarized on the attached Figures. The laboratory testing program was performed in general accordance with your instructions and appropriate ASTM Standards as outlined below.

SAMPLE DESCRIPTION: Three additional samples were delivered to our laboratory on May 25, 2023 by courier. The samples were delivered in re-sealable plastic jars designated with exploration/sample IDs. The sample descriptions may be found on the attached Summary of Material Properties, Figure 1.

PARTICLE SIZE ANALYSIS OF SOILS: The particle size distribution of each specified sample was determined in general accordance with ASTM D6913 and D7928. The results are plotted on the attached Particle Size Analysis of Soils Report, Figure 2, which also indicates the moisture content of the soil samples at the time of testing.

CLOSURE: Experience has shown that test values on soil and other natural materials vary with each representative sample. As such, HWA has no knowledge as to the extent and quantity of material the tested samples may represent. HWA also makes no warranty as to how representative either the samples tested or the test results obtained are to actual field conditions. It is a well-established fact that sampling methods present varying degrees of disturbance that affect sample representativeness.

No copy should be made of this report except in its entirety.

We appreciate the opportunity to provide laboratory testing services on this project. Should you have any questions or comments, or if we may be of further service, please call.

Sincerely,

HWA GEOSCIENCES INC.

Kristin Nolan
Laboratory Data Manager

Steven E. Greene, L.G., L.E.G.
Principal Engineering Geologist
Vice President

Attachments:

Figure 1	Summary of Material Properties
Figure 2	Particle Size Analysis of Soils Report

EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVITY	ATTERBERG LIMITS (%)			% GRAVEL	% SAND	% FINES	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION
						LL	PL	PI					
CARR18-23-REF,	0.0	0.0	40.7							85.1	14.9	SM	Dark olive-gray, silty SAND
CARR40-23-REF,	0.0	0.0	48.1							55.3	44.7	SM	Dark olive-gray, silty SAND with trace shells
CARR62-23-REF,	0.0	0.0	63.5							26.5	73.5	ML	Dark olive-gray, SILT with sand

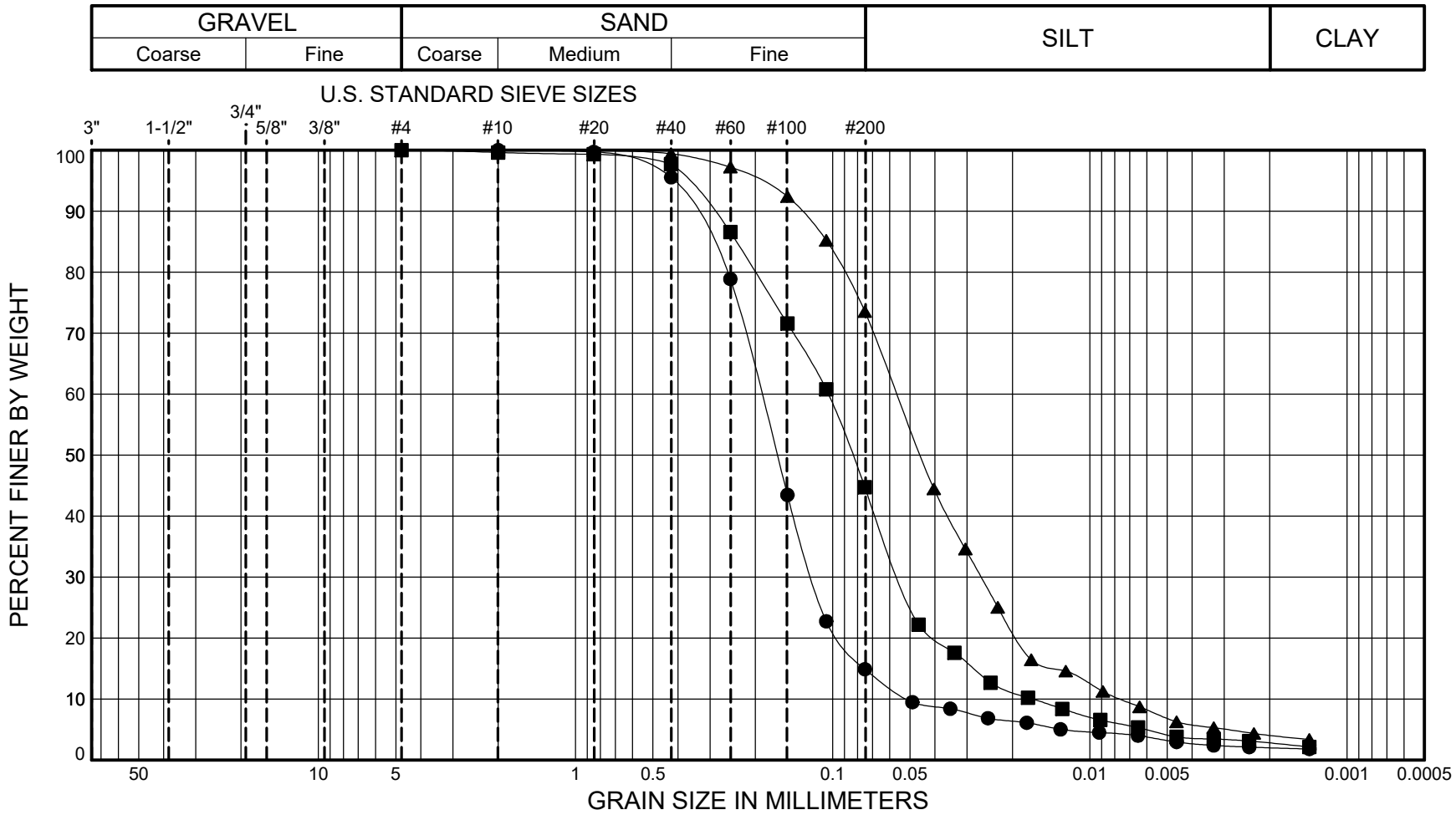
Notes: 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report test, other graphs and tables, and the exploration logs.
2. The soil classifications in this table are based on ASTM D2487 and D2488 as applicable.

GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

SUMMARY OF
MATERIAL PROPERTIES

PROJECT NO.: 2023-070 FIGURE: 1



SYMBOL	SAMPLE	DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	CARR18-23-REF	0.0 - 0.0	(SM) Dark olive-gray, silty SAND	41					85.1	12.9	2.0	
■	CARR40-23-REF	0.0 - 0.0	(SM) Dark olive-gray, silty SAND with trace shells	48					55.3	41.9	2.8	
▲	CARR62-23-REF	0.0 - 0.0	(ML) Dark olive-gray, SILT with sand	63					26.5	69.4	4.1	

HWA GeoSciences Inc.

Laboratory Testing for Friedman & Bruya, Inc.
Port of Friday Harbor - Jensen's Marina

PARTICLE-SIZE ANALYSIS
OF SOILS
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-070 FIGURE: 2

Analytical Resources, LLC
Analytical Chemists and Consultants

18 July 2024

Michael Erdahl
Friedman & Bruya Inc.
5500 4th Ave S
Seattle, WA 98108

RE: Port of Friday Harbor (303333)

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
23C0538	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclosed Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, LLC

Susan Dunnihoo For Shelly Fishel, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Cert# 100006-012

23C0538

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER ARI	
PROJECT NAME/NO. 303333	PO # D-221
REMARKS EIM EDD	

TURNAROUND TIME
☒ Standard TAT
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Total Sulfides	Ammonia	Total Organic Carbon	Total Solids							Notes
SED-07G:0-10		3/20/2023	810	solids	2	x	x									
SED-11G:0-10		3/20/2023	924	solids	2	x	x									
SED-14G:0-10		3/20/2023	1011	solids	2	x	x									
SED-15G:0-10		3/20/2023	1042	solids	2	x	x									
SED-24G:0-10		3/20/2023	1106	solids	1		x	x	x							hold ammonia MS 3/22/23
SED-23G:0-10		3/20/2023	1142	solids	1		x	x	x							↓
SED-22G:0-10		3/20/2023	1158	solids	1		x	x	x							↓
SED-21G:0-10		3/20/2023	1216	solids	1		x	x	x							↓
SED-03G:0-10		3/20/2023	1315	solids	2	x	x									
SED-20G:0-10		3/20/2023	1338	solids	1		x	x	x							Hold ammonia MS 3/22/23
SED-18G:0-10		3/20/2023	1408	solids	1		x	x	x							↓
SED-19G:0-10		3/20/2023	1427	solids	1		x	x	x							↓
SED-01G:0-10		3/20/2023	1445	solids	2	x	x									

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Michael Erdahl	Friedman & Bruya	03/22/23	08:20
Received by:	Phillip Bates	Phillip Bates	AR	3/22/23	16:08
Relinquished by:					
Received by:					

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Friedman & Bruya
Project Name: 303333
COC No(s): NA
Delivered by: Fed-Ex UPS Courier Hand Delivered Other:
Assigned ARI Job No: 23C0538
Tracking No: NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler?	YES	NO
Were custody papers included with the cooler?	YES	NO
Were custody papers properly filled out (ink, signed, etc.)	YES	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 5.1
Time 16:08
If cooler temperature is out of compliance fill out form 00070F
Temp Gun ID#: 30097408

Cooler Accepted by: PIB Date: 3/22/23 Time: 16:08

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	NO
What kind of packing material was used? ...	Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other:		
Was sufficient ice used (if appropriate)?	NA	YES	NO
How were bottles sealed in plastic bags?	Individually	Grouped	Not
Did all bottles arrive in good condition (unbroken)?		YES	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		YES	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs) ...	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA		

Were the sample(s) split by ARI? NA YES Date/Time: Equipment: Split by:

Samples Logged by: PIB Date: 3/23/23 Time: 9:34 Labels checked by: PIB

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
5500 4th Ave S	Project Number: 303333	**Reported:**
Seattle, WA 98108	Project Manager: Michael Erdahl	07/18/2024 15:11

ANALYTICAL REPORT FOR SAMPLES

Laboratory ID	Sample ID	Matrix	Date Sampled	Date Received
23C0538-01	SED-07G:0-10	Solid	03/20/23 08:10	03/22/23 16:08
23C0538-02	SED-11G:0-10	Solid	03/20/23 09:24	03/22/23 16:08
23C0538-03	SED-14G:0-10	Solid	03/20/23 10:11	03/22/23 16:08
23C0538-04	SED-15G:0-10	Solid	03/20/23 10:42	03/22/23 16:08
23C0538-05	SED-23G:0-10	Solid	03/20/23 11:42	03/22/23 16:08
23C0538-06	SED-22G:0-10	Solid	03/20/23 11:58	03/22/23 16:08
23C0538-07	SED-21G:0-10	Solid	03/20/23 12:16	03/22/23 16:08
23C0538-08	SED-03G:0-10	Solid	03/20/23 13:15	03/22/23 16:08
23C0538-09	SED-20G:0-10	Solid	03/20/23 13:38	03/22/23 16:08
23C0538-10	SED-18G:0-10	Solid	03/20/23 14:08	03/22/23 16:08
23C0538-11	SED-19G:0-10	Solid	03/20/23 14:27	03/22/23 16:08
23C0538-12	SED-01G:0-10	Solid	03/20/23 14:45	03/22/23 16:08
23C0538-13	SED-24G:0-10	Solid	03/20/23 11:06	03/22/23 16:08

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
5500 4th Ave S	Project Number: 303333	**Reported:**
Seattle WA, 98108	Project Manager: Michael Erdahl	18-Jul-2024 15:11

Case Narrative

Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Project Number: 303333
Work Order: 23C0538

Sample receipt

Samples as listed on the preceding page were received 22-Mar-2023 16:08 under ARI work order 23C0538. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Total organic carbon analyses were cancelled in this work order and analyzed from frozen volumes under work order 23E0156.

Wet Chemistry

The sample(s) were prepared and analyzed within the recommended holding times for ammonia.

The sulfide method requested was not a routine method at this laboratory, and samples expired before the method was confirmed as acceptable. As there is no option for preserving samples beyond seven days, analyses were completed, and results "H"-flagged to note the deviation.

Initial and continuing calibrations were within method requirements.

The method blank(s) were clean at the reporting limits.

The blank spike (BS/LCS) percent recoveries were within control limits.

The ammonia duplicate (DUP) relative percent difference (RPD) was outside advisory control limits and flagged on the summary sheet.

The sulfide duplicate (DUP) relative percent difference (RPD) was outside advisory control limits and confirmed by reanalysis, also reported and flagged on the summary sheet.

The sulfide matrix spike (MS) spike recovery was within advisory control limits.

The ammonia matrix spike/matrix spike duplicate (MS/MSD) percent recoveries and relative percent difference (RPD) were within advisory control limits.

QUALIFIERS AND NOTES

Qualifier	Definition
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
L	Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to +/- RL instead of 20% RPD
H	Hold time violation - Hold time was exceeded.
D	The reported value is from a dilution
*	Flagged value is not within established control limits.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 9034

SED-07G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-01 B	SDG:	23C0538
Sampled:	03/20/23 08:10	Prepared:	03/28/23 16:36	File ID:	
% Solids:	73.11	Preparation:	No Prep Wet Chem	Analyzed:	04/04/23 15:00
Batch:	BLC0751	Sequence:	SLD0180	Initial/Final:	5.183 g Wet / 100 g
Instrument:	S2 Buret			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration (mg/kg dry)	Dilution Factor	MDL	MRL	Q
18496-25-8	Sulfide	100	1	26.4	26.4	H

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 9034

SED-07G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-01RE1 B	SDG:	23C0538
Sampled:	03/20/23 08:10	Prepared:	03/28/23 16:36	File ID:	
% Solids:	73.11	Preparation:	No Prep Wet Chem	Analyzed:	04/04/23 15:00
Batch:	BLC0751	Sequence:	SLD0180	Initial/Final:	5.183 g Wet / 100 g
Instrument:	S2 Buret			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration (mg/kg dry)	Dilution Factor	MDL	MRL	Q
18496-25-8	Sulfide	89.7	1	26.4	26.4	H

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 9034

SED-11G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-02 B	SDG:	23C0538
Sampled:	03/20/23 09:24	Prepared:	03/28/23 16:36	File ID:	
% Solids:	63.76	Preparation:	No Prep Wet Chem	Analyzed:	04/04/23 15:00
Batch:	BLC0751	Sequence:	SLD0180	Initial/Final:	5.149 g Wet / 100 g
Instrument:	S2 Buret			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration (mg/kg dry)	Dilution Factor	MDL	MRL	Q
18496-25-8	Sulfide	204	1	30.5	30.5	H

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 9034

SED-14G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-03 B	SDG:	23C0538
Sampled:	03/20/23 10:11	Prepared:	03/28/23 16:36	File ID:	
% Solids:	50.52	Preparation:	No Prep Wet Chem	Analyzed:	04/04/23 15:00
Batch:	BLC0751	Sequence:	SLD0180	Initial/Final:	5.114 g Wet / 100 g
Instrument:	S2 Buret			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration (mg/kg dry)	Dilution Factor	MDL	MRL	Q
18496-25-8	Sulfide	170	1	38.7	38.7	H

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 9034

SED-15G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-04 B	SDG:	23C0538
Sampled:	03/20/23 10:42	Prepared:	03/28/23 16:36	File ID:	
% Solids:	57.52	Preparation:	No Prep Wet Chem	Analyzed:	04/04/23 15:00
Batch:	BLC0751	Sequence:	SLD0180	Initial/Final:	5.015 g Wet / 100 g
Instrument:	S2 Buret			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration (mg/kg dry)	Dilution Factor	MDL	MRL	Q
18496-25-8	Sulfide	146	1	34.7	34.7	H

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 9034

SED-03G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-08 B	SDG:	23C0538
Sampled:	03/20/23 13:15	Prepared:	03/28/23 16:36	File ID:	
% Solids:	51.96	Preparation:	No Prep Wet Chem	Analyzed:	04/04/23 15:00
Batch:	BLC0751	Sequence:	SLD0180	Initial/Final:	5.054 g Wet / 100 g
Instrument:	S2 Buret			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration (mg/kg dry)	Dilution Factor	MDL	MRL	Q
18496-25-8	Sulfide	259	1	38.1	38.1	H

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 9034

SED-01G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-12 B	SDG:	23C0538
Sampled:	03/20/23 14:45	Prepared:	03/28/23 16:36	File ID:	
% Solids:	54.68	Preparation:	No Prep Wet Chem	Analyzed:	04/04/23 15:00
Batch:	BLC0751	Sequence:	SLD0180	Initial/Final:	5.541 g Wet / 100 g
Instrument:	S2 Buret			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration (mg/kg dry)	Dilution Factor	MDL	MRL	Q
18496-25-8	Sulfide	304	1	33.0	33.0	H

PREPARATION BATCH SUMMARY

EPA 9034

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Batch: BLC0751 Batch Matrix: Solid
Preparation: No Prep Wet Chem

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SED-07G:0-10	23C0538-01		03/28/23 16:36	
SED-07G:0-10	23C0538-01RE1		03/28/23 16:36	Added 4/13/2023 by CDE
SED-11G:0-10	23C0538-02		03/28/23 16:36	
SED-14G:0-10	23C0538-03		03/28/23 16:36	
SED-15G:0-10	23C0538-04		03/28/23 16:36	
SED-03G:0-10	23C0538-08		03/28/23 16:36	
SED-01G:0-10	23C0538-12		03/28/23 16:36	
Blank	BLC0751-BLK1		03/28/23 16:36	
LCS	BLC0751-BS1		03/28/23 16:36	
SED-07G:0-10	BLC0751-DUP1		03/28/23 16:36	
SED-07G:0-10	BLC0751-DUP2		03/28/23 16:36	Added 4/13/2023 by CDE
SED-07G:0-10	BLC0751-MS1		03/28/23 16:36	

Analytical Resources, LLC
Analytical Chemists and Consultants

Method: ***Sulfide, EPA 9034 Titration, Solid (PSEP)*** Analyst: CDE

Batch ID: BLC0751 Prep Date, Time: 3/28/2023 16:36

Revision Date & # : ***0*** ***7/1/2015***

Sample Preparation Log

Reagents, Equipment

HCl+Al:	***K010977***
pH Indicator:	J011724
0.2N ZnOAC:	K008611
Balance:	BAL9
Sulfide Stock:	L002834

Step By Step

5 grams sample
Fill traps to line with 0.2N ZnOAc
LCS and MS get 1mL S2 Stock
100mL dispersing water
~5mL HCl+Al to pH < 3 by
Bromophenol Blue Indicator
60 minutes at 90C
Decant to 100 mL with ZnOAc

Revision: ***0*** ***7/1/2015***

Lab Number	FALSE		Sample Amount (g/mL)	Final Volume (mL)	Spike ID	Spike Volume (µL)
23C0538-01			5.183	100		
23C0538-02			5.149	100		
23C0538-03			5.114	100		
23C0538-04			5.015	100		
23C0538-08			5.054	100		
23C0538-12			5.541	100		
23C0618-09			5.130	100		
23C0619-16			5.129	100		
BLC0751-BLK1			5.000	100		
BLC0751-BS1			5.000	100	L002834	1000
23C0538-01-DUP1			5.132	100		
23C0538-01-MS1			5.062	100	L002834	1000

Form I

METHOD BLANK DATA SHEET

EPA 9034

TotalAnalytes

Blank

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Batch: BLC0751
Laboratory ID: BLC0751-BLK1
Prepared: 03/28/23 16:36
Matrix: Solid
Preparation: No Prep Wet Chem
Analyzed: 04/04/23 15:00
Sequence: SLD0180
Calibration: N/A
Instrument: S2 Buret

CAS NO.	Analyte	Concentration (mg/kg wet)	Dilution Factor	MDL	MRL	Q
18496-25-8	Sulfide	ND	1	20.0	20.0	U

LCS / LCS DUPLICATE RECOVERY

EPA 9034

Laboratory:	Analytical Resources, LLC	SDG:	23C0538
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Matrix:	Solid	Analyzed:	04/04/23 15:00
Batch:	BLC0751	Laboratory ID:	BLC0751-BS1
Preparation:	No Prep Wet Chem	Sequence Name:	LCS
Initial/Final:	5 g / 100 g		

COMPOUND	SPIKE ADDED (mg/kg wet)	LCS CONCENTRATION (mg/kg wet)	Q	LCS % REC. #	QC LIMITS REC.
Sulfide	211	168		79.6	75 - 125

* Indicates values outside of QC limits

SED-07G:0-10

DUPLICATES

EPA 9034

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Laboratory ID: BLC0751-DUP1
Batch: BLC0751
Lab Source ID: 23C0538-01
Preparation: No Prep Wet Chem
Initial/Final: 5.132 g / 100 g
Source Sample Name: SED-07G:0-10
% Solids: 73.11

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION	DUPLICATE CONCENTRATION	RPD %	Q
Sulfide	20	100	42.6	80.7	*

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

SED-07G:0-10

DUPLICATES

EPA 9034

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Laboratory ID: BLC0751-DUP2
Batch: BLC0751
Lab Source ID: 23C0538-01RE1
Preparation: No Prep Wet Chem
Initial/Final: 5.132 g / 100 g
Source Sample Name: SED-07G:0-10
% Solids: 73.11

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION	DUPLICATE CONCENTRATION	RPD %	Q
Sulfide	20	89.7	34.6	88.6	*

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

MS / MS DUPLICATE RECOVERY
EPA 9034

Laboratory:	Analytical Resources, LLC	SDG:	23C0538
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Matrix:	Solid	Analyzed:	04/04/23 15:00
Batch:	BLC0751	Laboratory ID:	BLC0751-MS1
Preparation:	No Prep Wet Chem	Sequence Name:	Matrix Spike
Initial/Final:	5.062 g / 100 g	Source Sample:	SED-07G:0-10

COMPOUND	SPIKE ADDED (mg/kg dry)	SAMPLE CONCENTRATION (mg/kg dry)	Q	MS CONCENTRATION (mg/kg dry)	Q	MS % REC. #	QC LIMITS REC.
Sulfide	285	100	H	316	H	75.7	75 - 125

* Values outside of QC limits

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 9034

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Sequence: SLD0180
Instrument: S2 Buret
Calibration: UNASSIGNED

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
Initial Cal Blank	SLD0180-ICB1		NA	04/04/23 15:00
Initial Cal Check	SLD0180-ICV1		NA	04/04/23 15:00
Low Cal Check	SLD0180-LCV1		NA	04/04/23 15:00
Blank	BLC0751-BLK1		Solid	04/04/23 15:00
LCS	BLC0751-BS1		Solid	04/04/23 15:00
SED-07G:0-10	23C0538-01		Solid	04/04/23 15:00
SED-07G:0-10	BLC0751-DUP1		Solid	04/04/23 15:00
SED-07G:0-10	BLC0751-MS1		Solid	04/04/23 15:00
SED-11G:0-10	23C0538-02		Solid	04/04/23 15:00
SED-14G:0-10	23C0538-03		Solid	04/04/23 15:00
SED-15G:0-10	23C0538-04		Solid	04/04/23 15:00
SED-03G:0-10	23C0538-08		Solid	04/04/23 15:00
Calibration Blank	SLD0180-CCB1		NA	04/04/23 15:00
Calibration Check	SLD0180-CCV1		NA	04/04/23 15:00
SED-01G:0-10	23C0538-12		Solid	04/04/23 15:00
SED-07G:0-10	23C0538-01RE1		Solid	04/04/23 15:00
SED-07G:0-10	BLC0751-DUP2		Solid	04/04/23 15:00
Calibration Blank	SLD0180-CCB2		NA	04/04/23 15:00
Calibration Check	SLD0180-CCV2		NA	04/04/23 15:00

SULFIDE BENCHSHEET (TITRATION) **SLD0180**

			Date	Analyst
EPA 376.1		*Distillation*	3/28/23 16:38	CDE
If distilled, specify Procedure:	**PSEP**	*Finish*	4/4/23 15:00	CDE
Buret used for titrations:	S2			

CalibrationData *ZnOAc:* K008611

1. Standardization of sodium thiosulfate titrant

Thiosulfate ID: **L002861**

Bi-iodate ID: **L003502**

Stock bi-iodate = **0.8134** *grams to* 1000 *mL*

Normality = **0.025**

	Titration of bi-iodate with thiosulfate			
mL bi-iodate =	3.00	3.00	3.00	
mL thiosulfate =	3.07	3.08	3.06	*nthio*
*Normality thiosulfate = (mL bi-iodate*normbio) / mL thiosulfate =*	0.024	0.024	0.025	**0.024**

2. Normality of Iodine Soln

Iodine ID: **L002862**

	Titration of Iodine with thiosulfate			
mL iodine =	3.00	3.00	3.00	
mL thiosulfate =	3.12	3.10	3.11	*ni*
*Normality iodine = (mL thiosulfate*nthio) / mL iodine=*	0.025	0.025	0.025	**0.025**

3. Standardization (Sulfide Stock Solution)

Stock ID = **L002834**

Approx conc in 60ml

g Na2S = 0.4745 *mg /mL =* 1.056

	Titration of standard with thiosulfate			
mL Standard =	1.00	1.00	1.00	
mL iodine =	3.00	3.00	3.00	
mL thiosulfate =	0.98	0.99	0.99	*stkconc (mg/mL)*
*Sulfide (mg/mL) = {[(mL iodine*ni)-(mL thio *nthio)]*16} / mL standard =*	0.834	0.830	0.830	**0.831**

4. Verification Standard: L003965

Add 1.0 *mL Stock to* 50 *mL DI water* ***CV =*** **16.6** ***mg/L sulfide***

5. LCV Standard: L003964

Add 0.1 *mL Stock to* 50 *mL DI water* ***DQL =*** **1.0** ***mg/L sulfide*** confirm 1.0

6. Distillation Standard: L002834, Titrated standard: L003966

Add 1.0 *mL Stock to* 100 *mL DI water* ***Dist Chk =*** **8.3** ***mg/L sulfide***

SAMPLE DATA

Calculation: mg/L = [((mL I X N I) - (mL thio X N thio)) X 16,000] / mL sample

	DISTILL DATA		TITRATION DATA						
SAMPLE ID	Sample Volume (mL)	Trap Volume (mL)	Sample Volume (mL)	IODINE ADDED (mL)	Thiosulfate TITRANT (mL)	CONC (mg S/L)	Concentration If distilled (mg S/L wet)		
SLD0180-ICB1			50.0	3.0	3.08	0.2			
SLD0180-ICV1			50.0	3.0	1.02	16.4			*98.43%*
SLD0180-LCV1			50.0	3.0	2.95	1.3			*125.24%*
BLC0751-BLK1	100.0	100	50.0	3.0	3.12	-0.1	-0.1		
BLC0751-BS1	100.0	100	50.0	3.0	2.04	8.4	8.4	101%	*100.78%*
23C0538-01	5.183	100	50.0	3.0	2.63	3.8	72.5		
BLC0751-DUP1	5.132	100	50.0	3.0	2.90	1.6	32.0	*RPD =*	*78.3%*
BLC0751-MS1	5.062	100	50.0	3.0	1.62	11.7	230.4	*%Rec =*	*96.1%*
Spike = 1.0	*mL stk to*	100.00	*mL sample =*			8.2	*mg/L*		
23C0538-02	5.149	100.0	50.0	3.0	2.25	6.7	130.7		
23C0538-03	5.114	100.0	50.0	3.0	2.55	4.4	85.7		
23C0538-04	5.015	100.0	50.0	3.0	2.57	4.2	84.3		
23C0538-08	5.054	100.0	50.0	3.0	2.24	6.8	134.7		
23C0618-09	5.130	100.0	50.0	3.0	2.22	7.0	135.8		
SLD0180-CCB1			50.0	3.0	3.07	0.3		ND	
SLD0180-CCV1			50.0	3.0	1.00	16.5			*99.37%*
23C0538-12	5.541	100.0	50.0	3.0	1.93	9.2	166.7		
23C0619-16	5.129	100.0	50.0	3.0	2.75	2.8	54.9		
23C0538-01RE	5.183	100	50.0	3.0	2.68	3.4	64.9		
BLC0751-DUP1	5.132	100	50.0	3.0	2.95	1.3	24.4	*RPD =*	*91.5%*
SLD0180-CCB2			50.0	3.0	3.08	0.2			
SLD0180-CCV2			50.0	3.0	1.00	16.5			*99.37%*

INSTRUMENT BLANKS
EPA 9034

Laboratory: Analytical Resources, LLC
Client: Friedman & Bruya Inc.
Instrument ID: S2 Buret
Sequence: SLD0180

SDG: 23C0538
Project: Port of Friday Harbor
Calibration: UNASSIGNED
Date Analyzed: 04/04/23 15:00

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SLD0180-CCB1	Sulfide	0.300	1	1.00	mg/L	
SLD0180-CCB2	Sulfide	0.200	1	1.00	mg/L	
SLD0180-ICB1	Sulfide	0.200	1	1.00	mg/L	

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 9034

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Instrument ID: S2 Buret
Calibration: UNASSIGNED
Control Limt: +/- 10.00%
Sequence: SLD0180

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SLD0180-CCV1	Sulfide	16.620	16.5	99.3	mg/L	EPA 9034
SLD0180-CCV2	Sulfide	16.620	16.5	99.3	mg/L	EPA 9034
SLD0180-ICV1	Sulfide	16.620	16.4	98.7	mg/L	EPA 9034

* Values outside of QC limits

LOW-CONCENTRATION CALIBRATION VERIFICATION

EPA 9034

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Calibration: UNASSIGNED
Laboratory ID: SLD0180-LCV1
Sequence: SLD0180
Standard ID: L003964

ANALYTE	EXPECTED (mg/L)	FOUND (mg/L)	% DRIFT	QC LIMIT
Sulfide	1.6620	1.30	-21.8	

* Values outside of QC limits

HOLDING TIME SUMMARY

Analysis: EPA 9034

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SED-07G:0-10 23C0538-01	03/20/23 08:10	03/22/23 16:08	03/28/23 16:36	8	7	04/04/23 15:00			*
SED-07G:0-10 23C0538-01RE1	03/20/23 08:10	03/22/23 16:08	03/28/23 16:36	8	7	04/04/23 15:00			*
SED-11G:0-10 23C0538-02	03/20/23 09:24	03/22/23 16:08	03/28/23 16:36	8	7	04/04/23 15:00			*
SED-14G:0-10 23C0538-03	03/20/23 10:11	03/22/23 16:08	03/28/23 16:36	8	7	04/04/23 15:00			*
SED-15G:0-10 23C0538-04	03/20/23 10:42	03/22/23 16:08	03/28/23 16:36	8	7	04/04/23 15:00			*
SED-03G:0-10 23C0538-08	03/20/23 13:15	03/22/23 16:08	03/28/23 16:36	8	7	04/04/23 15:00			*
SED-01G:0-10 23C0538-12	03/20/23 14:45	03/22/23 16:08	03/28/23 16:36	8	7	04/04/23 15:00			*
Duplicate BLC0751-DUP1	03/20/23 08:10	03/22/23 16:08	03/28/23 16:36	8	7	04/04/23 15:00			*
Duplicate BLC0751-DUP2	03/20/23 08:10	03/22/23 16:08	03/28/23 16:36	8	7	04/04/23 15:00			*
Matrix Spike BLC0751-MS1	03/20/23 08:10	03/22/23 16:08	03/28/23 16:36	8	7	04/04/23 15:00			*

* Indicates hold time exceedance.

METHOD DETECTION AND REPORTING LIMITS

EPA 9034

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Instrument: S2 Buret

Analyte	MDL	RL	Units
Sulfide	20.0	20.0	mg/kg

Analytical Resources, LLC
Analytical Chemists and Consultants

Analytical Standard Record

Standard ID: E007844

Printed: 1/12/2023 12:49:51PM

Description:	Sodium sulfide nonahydrate (98+%)	Expires:	31-Dec-2079
Standard Type:	Reagent	Prepared:	22-Dec-2016
Solvent:	NA	Prepared By:	Casey English
Final Volume (mls):	500	Department:	Conventionals
Vials:	1	Last Edit:	20-Sep-2017 17:17 by CDE
Vendor:	ACROS Organics	Lot #:	B0142157
Vendor Catalog #:	152580		

Comments

Analyte	CAS Number	Concentration	Units
Sulfide	18496-25-8	133500	mg/Kg
Soluble Sulfide	18496-25-8	133500	mg/Kg
Sodium sulfide nonahydrate	1313-84-4	1000000	mg/Kg

Form I
INORGANIC ANALYSIS DATA SHEET
PSEP 1986

SED-07G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-01 B	SDG:	23C0538
Sampled:	03/20/23 08:10	Prepared:	03/24/23 15:46	File ID:	
% Solids:	61.59	Preparation:	No Prep Wet Chem	Analyzed:	03/24/23 15:47
Batch:	BLC0674	Sequence:		Initial/Final:	5 g Wet / 5 g
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids, Sulfide	73.11	1	0.04	0.04	

Form I
INORGANIC ANALYSIS DATA SHEET
PSEP 1986

SED-11G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-02 B	SDG:	23C0538
Sampled:	03/20/23 09:24	Prepared:	03/24/23 15:46	File ID:	
% Solids:	63.80	Preparation:	No Prep Wet Chem	Analyzed:	03/24/23 15:47
Batch:	BLC0674	Sequence:		Initial/Final:	5 g Wet / 5 g
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids, Sulfide	63.76	1	0.04	0.04	

Form I
INORGANIC ANALYSIS DATA SHEET
PSEP 1986

SED-14G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-03 B	SDG:	23C0538
Sampled:	03/20/23 10:11	Prepared:	03/24/23 15:46	File ID:	
% Solids:	55.62	Preparation:	No Prep Wet Chem	Analyzed:	03/24/23 15:47
Batch:	BLC0674	Sequence:		Initial/Final:	5 g Wet / 5 g
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids, Sulfide	50.52	1	0.04	0.04	

Form I
INORGANIC ANALYSIS DATA SHEET
PSEP 1986

SED-15G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-04 B	SDG:	23C0538
Sampled:	03/20/23 10:42	Prepared:	03/24/23 15:46	File ID:	
% Solids:	59.75	Preparation:	No Prep Wet Chem	Analyzed:	03/24/23 15:47
Batch:	BLC0674	Sequence:		Initial/Final:	5 g Wet / 5 g
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids, Sulfide	57.52	1	0.04	0.04	

Form I
INORGANIC ANALYSIS DATA SHEET
PSEP 1986

SED-03G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-08 B	SDG:	23C0538
Sampled:	03/20/23 13:15	Prepared:	03/24/23 15:46	File ID:	
% Solids:	52.75	Preparation:	No Prep Wet Chem	Analyzed:	03/24/23 15:47
Batch:	BLC0674	Sequence:		Initial/Final:	5 g Wet / 5 g
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids, Sulfide	51.96	1	0.04	0.04	

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
PSEP 1986

SED-01G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-12 B	SDG:	23C0538
Sampled:	03/20/23 14:45	Prepared:	03/24/23 15:46	File ID:	
% Solids:	55.11	Preparation:	No Prep Wet Chem	Analyzed:	03/24/23 15:47
Batch:	BLC0674	Sequence:		Initial/Final:	5 g Wet / 5 g
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids, Sulfide	54.68	1	0.04	0.04	

PREPARATION BATCH SUMMARY

PSEP 1986

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Batch: BLC0674 Batch Matrix: Solid
Preparation: No Prep Wet Chem

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SED-07G:0-10	23C0538-01		03/24/23 15:46	
SED-11G:0-10	23C0538-02		03/24/23 15:46	
SED-14G:0-10	23C0538-03		03/24/23 15:46	
SED-15G:0-10	23C0538-04		03/24/23 15:46	
SED-03G:0-10	23C0538-08		03/24/23 15:46	
SED-01G:0-10	23C0538-12		03/24/23 15:46	
Blank	BLC0674-BLK1		03/24/23 15:46	
SED-07G:0-10	BLC0674-DUP1		03/24/23 15:46	

TOTAL SOLIDS/VOLATILE SOLIDS (TS / TVS) BENCHSHEET for Solid samples

Method: PSEP 1986, SM2540, EPA 160.1

(dry at 104 (12-24 hr) then combust at 550 (30 min))

TSPR

Batch:	BLC0674
Date:	3/24/2023 15:47
Analyst:	UW

Instrumentation

Drying Ovens:	12	**Analytical Balance:**	BAL2
Muffle Furnace:	2		

Batch drying time

record times as mm/dd/yy hh:mm

date/time in oven:	3/24/2023 16:40	
date/time out:	3/27/2023 10:05	
elapsed hrs =	65.4	> 24 hr

TS (%) calculated as:
Final dry wt (g) = (Dry Wt - Tare Wt)
TS = (Final Dry Wt)/ (grams Sample-Tare)

Oven Temps, °C	
Start Temp	105
Dry Cycle 1	104
Dry Cycle 2	
Dry Cycle 3	

TVS (mg/kg dry wt) calculated as:
Final ash wt (g) = (min ash wt - tare wt)
TVS (mg/kg) = [(Dry wt-Ash wt)/ (dry weight)] *1,000,000
if ash wt > dry wt, "Chk for Err"
if dry wt-ash wt < 0.001 g, "< (1/dry wt)*1,000,000

Balance Calibration Check

Record weights to 4 places

Cal Weight ID:	CV-02	CV-02	CV-02	CV-02	CV-02		CV-02	CV-02	CV-02
Date & Time:	3/24/23 15:57	3/24/23 16:25	3/27/23 10:50						
Cal Wt (g): 10.0000	10.0000	10.0000	10.0000						
	Cal OK!	Cal OK!	Cal OK!						

Sample ID	Dish #	Tare Wt. (g)	Dish & Sample (g)	Dry Wt 104C (grams) 1	2	3	dry Wt (g)	TS (%)	Notes	ASH WT 550C (grams) 1	2	3	Ash Wt (g)	TVS (mg/kg)	(%)	Notes
BLC0674-BLK1	20	0.7744	0.0000	0.7743			-0.0001	0.01%								
23C0538-01	21	0.7952	7.6057	5.7744			4.9792	73.11%								
BLC0674-DUP1	22	0.8008	8.2482	6.1071			5.3063	71.25%	RPD=2.6							
23C0538-02	23	0.7979	6.4315	4.3901			3.5922	63.76%								
23C0538-03	24	0.8201	6.3463	3.6120			2.7919	50.52%								
23C0538-04	25	0.8195	7.5398	4.6853			3.8658	57.52%								
23C0538-08	26	0.8037	9.3657	5.2524			4.4487	51.96%								
23C0538-12	27	0.8016	7.0473	4.2165			3.4149	54.68%								

Form I

METHOD BLANK DATA SHEET

PSEP 1986

TotalAnalytes

Blank

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Batch: BLC0674
Laboratory ID: BLC0674-BLK1
Prepared: 03/24/23 15:46
Matrix: Solid
Preparation: No Prep Wet Chem
Analyzed: 03/24/23 15:47
Sequence:
Calibration:
Instrument: BAL2

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids, Sulfide	ND	1	0.04	0.04	U

SED-07G:0-10

DUPLICATES

PSEP 1986

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Laboratory ID: BLC0674-DUP1
Batch: BLC0674
Lab Source ID: 23C0538-01
Preparation: No Prep Wet Chem
Initial/Final: 5 g / 5 g
Source Sample Name: SED-07G:0-10
% Solids: 61.59

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION	DUPLICATE CONCENTRATION	RPD %	Q
Total Solids, Sulfide	20	73.11	71.25	2.58	

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

HOLDING TIME SUMMARY

Analysis: PSEP 1986

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SED-07G:0-10 23C0538-01	03/20/23 08:10	03/22/23 16:08	03/24/23 15:46	4	28	03/24/23 15:47	4	28	
SED-11G:0-10 23C0538-02	03/20/23 09:24	03/22/23 16:08	03/24/23 15:46	4	28	03/24/23 15:47	4	28	
SED-14G:0-10 23C0538-03	03/20/23 10:11	03/22/23 16:08	03/24/23 15:46	4	28	03/24/23 15:47	4	28	
SED-15G:0-10 23C0538-04	03/20/23 10:42	03/22/23 16:08	03/24/23 15:46	4	28	03/24/23 15:47	4	28	
SED-03G:0-10 23C0538-08	03/20/23 13:15	03/22/23 16:08	03/24/23 15:46	4	28	03/24/23 15:47	4	28	
SED-01G:0-10 23C0538-12	03/20/23 14:45	03/22/23 16:08	03/24/23 15:46	4	28	03/24/23 15:47	4	28	
Duplicate BLC0674-DUP1	03/20/23 08:10	03/22/23 16:08	03/24/23 15:46	4	28	03/24/23 15:47	4	28	

* Indicates hold time exceedance.

METHOD DETECTION AND REPORTING LIMITS

PSEP 1986

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Instrument:

Analyte	MDL	RL	Units
Total Solids, Sulfide	0.04	0.04	%

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2540 G-11

SED-07G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-01 A	SDG:	23C0538
Sampled:	03/20/23 08:10	Prepared:	03/24/23 15:44	File ID:	
% Solids:	61.59	Preparation:	No Prep Wet Chem	Analyzed:	03/24/23 15:47
Batch:	BLC0673	Sequence:		Initial/Final:	5 g Wet / 5 g
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids	61.59	1	0.04	0.04	

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2540 G-11

SED-11G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-02 A	SDG:	23C0538
Sampled:	03/20/23 09:24	Prepared:	03/24/23 15:44	File ID:	
% Solids:	63.80	Preparation:	No Prep Wet Chem	Analyzed:	03/24/23 15:47
Batch:	BLC0673	Sequence:		Initial/Final:	5 g Wet / 5 g
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids	63.80	1	0.04	0.04	

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2540 G-11

SED-14G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-03 A	SDG:	23C0538
Sampled:	03/20/23 10:11	Prepared:	03/24/23 15:44	File ID:	
% Solids:	55.62	Preparation:	No Prep Wet Chem	Analyzed:	03/24/23 15:47
Batch:	BLC0673	Sequence:		Initial/Final:	5 g Wet / 5 g
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids	55.62	1	0.04	0.04	

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2540 G-11

SED-15G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-04 A	SDG:	23C0538
Sampled:	03/20/23 10:42	Prepared:	03/24/23 15:44	File ID:	
% Solids:	59.75	Preparation:	No Prep Wet Chem	Analyzed:	03/24/23 15:47
Batch:	BLC0673	Sequence:		Initial/Final:	5 g Wet / 5 g
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids	59.75	1	0.04	0.04	

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2540 G-11

SED-03G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-08 A	SDG:	23C0538
Sampled:	03/20/23 13:15	Prepared:	03/24/23 15:44	File ID:	
% Solids:	52.75	Preparation:	No Prep Wet Chem	Analyzed:	03/24/23 15:47
Batch:	BLC0673	Sequence:		Initial/Final:	5 g Wet / 5 g
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids	52.75	1	0.04	0.04	

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2540 G-11

SED-01G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-12 A	SDG:	23C0538
Sampled:	03/20/23 14:45	Prepared:	03/24/23 15:44	File ID:	
% Solids:	55.11	Preparation:	No Prep Wet Chem	Analyzed:	03/24/23 15:47
Batch:	BLC0673	Sequence:		Initial/Final:	5 g Wet / 5 g
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids	55.11	1	0.04	0.04	

PREPARATION BATCH SUMMARY

SM 2540 G-11

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Batch: BLC0673 Batch Matrix: Solid
Preparation: No Prep Wet Chem

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SED-07G:0-10	23C0538-01		03/24/23 15:44	
SED-11G:0-10	23C0538-02		03/24/23 15:44	
SED-14G:0-10	23C0538-03		03/24/23 15:44	
SED-15G:0-10	23C0538-04		03/24/23 15:44	
SED-03G:0-10	23C0538-08		03/24/23 15:44	
SED-01G:0-10	23C0538-12		03/24/23 15:44	
Blank	BLC0673-BLK1		03/24/23 15:44	
SED-07G:0-10	BLC0673-DUP1		03/24/23 15:44	
SED-07G:0-10	BLC0673-DUP2		03/24/23 15:44	

TOTAL SOLIDS/VOLATILE SOLIDS (TS / TVS) BENCHSHEET for Solid samples

Method: PSEP 1986, SM2540, EPA 160.1

(dry at 104 (12-24 hr) then combust at 550 (30 min))

Batch:	BLC0673
Date:	3/24/2023 15:47
Analyst:	UW

Instrumentation

Drying Ovens:	12	**Analytical Balance:**	BAL2
Muffle Furnace:	2		

Batch drying time

record times as mm/dd/yy hh:mm

date/time in oven:	3/24/2023 16:40	
date/time out:	3/27/2023 10:05	
elapsed hrs =	65.4	> 24 hr

TS (%) calculated as:
Final dry wt (g) = (Dry Wt - Tare Wt)
TS = (Final Dry Wt)/ (grams Sample-Tare)

Oven Temps, °C	
Start Temp	105
Dry Cycle 1	104
Dry Cycle 2	
Dry Cycle 3	

TVS (mg/kg dry wt) calculated as:
Final ash wt (g) = (min ash wt - tare wt)
TVS (mg/kg) = [(Dry wt-Ash wt)/ (dry weight)] *1,000,000
if ash wt > dry wt, "Chk for Err"
if dry wt-ash wt < 0.001 g, "< (1/dry wt)*1,000,000

Balance Calibration Check

Record weights to 4 places

Cal Weight ID:	CV-02	CV-02	CV-02	CV-02	CV-02		CV-02	CV-02	CV-02	
Date & Time:	3/24/23 15:50	3/24/23 16:00	3/27/23 10:40							
Cal Wt (g): 10.0000	10.0000	10.0000	10.0000							
	Cal OK!	Cal OK!	Cal OK!							

Sample ID	Dish #	Tare Wt. (g)	Dish & Sample (g)	Dry Wt 104C (grams) 1	2	3	dry Wt (g)	TS (%)	Notes	ASH WT 550C (grams) 1	2	3	Ash Wt (g)	TVS (mg/kg)	(%)	Notes
BLC0673-BLK1	1	0.8266	0.0000	0.8266			0.0000	0.00%								
23C0538-01	2	0.8216	6.7694	4.4848			3.6632	61.59%								
BLC0673-DUP1	3	0.7958	6.8489	4.5589			3.7631	62.17%	RPD=0.9							
BLC0673-DUP2	4	0.8068	6.7764	4.8957			4.0889	68.50%	RSD=6							
23C0538-02	5	0.8025	7.8126	5.2746			4.4721	63.80%								
23C0538-03	6	0.7930	7.5194	4.5345			3.7415	55.62%								
23C0538-04	7	0.7775	7.6002	4.8540			4.0765	59.75%								
23C0538-05	8	0.7956	6.7455	3.4722			2.6766	44.99%								
23C0538-06	9	0.8136	7.9471	4.4128			3.5992	50.45%								
23C0538-07	10	0.8020	8.1966	4.3834			3.5814	48.43%								
23C0538-08	11	0.7995	7.1920	4.1718			3.3723	52.75%								
23C0538-09	12	0.8351	9.0522	5.8833			5.0482	61.44%								
23C0538-10	13	0.8169	8.2446	4.6416			3.8247	51.49%								
23C0538-11	14	0.8235	6.8283	4.4016			3.5781	59.59%								
23C0538-12	15	0.8334	7.7196	4.6284			3.7950	55.11%								
23C0538-13	16	0.7878	6.8425	3.7157			2.9279	48.36%								
23C0553-01	17	0.8098	8.0830	6.6743			5.8645	80.63%								
23C0553-02	18	0.8039	8.2560	7.0498			6.2459	83.81%								
23C0553-03	19	0.7962	8.5522	8.0377			7.2415	93.37%								

Form I

METHOD BLANK DATA SHEET

SM 2540 G-11

TotalAnalytes

Blank

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Batch: BLC0673
Laboratory ID: BLC0673-BLK1
Prepared: 03/24/23 15:44
Matrix: Solid
Preparation: No Prep Wet Chem
Analyzed: 03/24/23 15:47
Sequence:
Calibration:
Instrument: BAL2

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids	ND	1	0.04	0.04	U

SED-07G:0-10

DUPLICATES

SM 2540 G-11

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Laboratory ID: BLC0673-DUP1
Batch: BLC0673
Lab Source ID: 23C0538-01
Preparation: No Prep Wet Chem
Initial/Final: 5 g / 5 g
Source Sample Name: SED-07G:0-10
% Solids: 61.59

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION	DUPLICATE CONCENTRATION	RPD %	Q
Total Solids	20	61.59	62.17	0.936	

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

SED-07G:0-10

DUPLICATES

SM 2540 G-11

Laboratory: Analytical Resources, LLC
Client: Friedman & Bruya Inc.
Matrix: Solid
Batch: BLC0673
Preparation: No Prep Wet Chem
Source Sample Name: SED-07G:0-10

SDG: 23C0538
Project: Port of Friday Harbor
Laboratory ID: BLC0673-DUP2
Lab Source ID: 23C0538-01
Initial/Final: 5 g / 5 g
% Solids: 61.59

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION	DUPLICATE CONCENTRATION	RPD %	Q
Total Solids	20	61.59	68.50	10.6	

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

HOLDING TIME SUMMARY

Analysis: SM 2540 G-11

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SED-07G:0-10 23C0538-01	03/20/23 08:10	03/22/23 16:08	03/24/23 15:44	4	28	03/24/23 15:47	4	28	
SED-11G:0-10 23C0538-02	03/20/23 09:24	03/22/23 16:08	03/24/23 15:44	4	28	03/24/23 15:47	4	28	
SED-14G:0-10 23C0538-03	03/20/23 10:11	03/22/23 16:08	03/24/23 15:44	4	28	03/24/23 15:47	4	28	
SED-15G:0-10 23C0538-04	03/20/23 10:42	03/22/23 16:08	03/24/23 15:44	4	28	03/24/23 15:47	4	28	
SED-03G:0-10 23C0538-08	03/20/23 13:15	03/22/23 16:08	03/24/23 15:44	4	28	03/24/23 15:47	4	28	
SED-01G:0-10 23C0538-12	03/20/23 14:45	03/22/23 16:08	03/24/23 15:44	4	28	03/24/23 15:47	4	28	
Duplicate BLC0673-DUP1	03/20/23 08:10	03/22/23 16:08	03/24/23 15:44	4	28	03/24/23 15:47	4	28	
Duplicate BLC0673-DUP2	03/20/23 08:10	03/22/23 16:08	03/24/23 15:44	4	28	03/24/23 15:47	4	28	

* Indicates hold time exceedance.

METHOD DETECTION AND REPORTING LIMITS

SM 2540 G-11

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Instrument:

Analyte	MDL	RL	Units
Total Solids	0.04	0.04	%

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
SM 4500-NH3 H-11

SED-07G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-01 A	SDG:	23C0538
Sampled:	03/20/23 08:10	Prepared:	03/27/23 15:05	File ID:	032823 NH3A-013
% Solids:	61.59	Preparation:	No Prep Wet Chem	Analyzed:	03/28/23 13:11
Batch:	BLC0709	Sequence:	SLD0023	Initial/Final:	4.23 g Wet / 40 g
Instrument:	LACHAT1			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration ng/kg NH3-N dry	Dilution Factor	MDL	MRL	Q
7664-41-7	Ammonia-N	10.4	1	0.61	0.61	

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
SM 4500-NH3 H-11

SED-11G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-02 A	SDG:	23C0538
Sampled:	03/20/23 09:24	Prepared:	03/27/23 15:05	File ID:	032823 NH3A-017
% Solids:	63.80	Preparation:	No Prep Wet Chem	Analyzed:	03/28/23 13:15
Batch:	BLC0709	Sequence:	SLD0023	Initial/Final:	4.2 g Wet / 40 g
Instrument:	LACHAT1			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration ng/kg NH3-N dry	Dilution Factor	MDL	MRL	Q
7664-41-7	Ammonia-N	13.5	1	0.60	0.60	

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
SM 4500-NH3 H-11

SED-14G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-03 A	SDG:	23C0538
Sampled:	03/20/23 10:11	Prepared:	03/27/23 15:05	File ID:	032823 NH3A-018
% Solids:	55.62	Preparation:	No Prep Wet Chem	Analyzed:	03/28/23 13:16
Batch:	BLC0709	Sequence:	SLD0023	Initial/Final:	4.41 g Wet / 40 g
Instrument:	LACHAT1			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration ng/kg NH3-N dry	Dilution Factor	MDL	MRL	Q
7664-41-7	Ammonia-N	12.7	1	0.65	0.65	

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
SM 4500-NH3 H-11

SED-15G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-04 A	SDG:	23C0538
Sampled:	03/20/23 10:42	Prepared:	03/27/23 15:05	File ID:	032823 NH3A-019
% Solids:	59.75	Preparation:	No Prep Wet Chem	Analyzed:	03/28/23 13:18
Batch:	BLC0709	Sequence:	SLD0023	Initial/Final:	4.46 g Wet / 40 g
Instrument:	LACHAT1			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration ng/kg NH3-N dry	Dilution Factor	MDL	MRL	Q
7664-41-7	Ammonia-N	4.65	1	0.60	0.60	

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
SM 4500-NH3 H-11

SED-03G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-08 A	SDG:	23C0538
Sampled:	03/20/23 13:15	Prepared:	03/27/23 15:05	File ID:	032823 NH3A-022
% Solids:	52.75	Preparation:	No Prep Wet Chem	Analyzed:	03/28/23 13:26
Batch:	BLC0709	Sequence:	SLD0023	Initial/Final:	4.27 g Wet / 40 g
Instrument:	LACHAT1			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration ng/kg NH3-N dry	Dilution Factor	MDL	MRL	Q
7664-41-7	Ammonia-N	4.51	1	0.71	0.71	

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
SM 4500-NH3 H-11

SED-01G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Solid	Laboratory ID:	23C0538-12 A	SDG:	23C0538
Sampled:	03/20/23 14:45	Prepared:	03/27/23 15:05	File ID:	032823 NH3A-023
% Solids:	55.11	Preparation:	No Prep Wet Chem	Analyzed:	03/28/23 13:27
Batch:	BLC0709	Sequence:	SLD0023	Initial/Final:	4.16 g Wet / 40 g
Instrument:	LACHAT1			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration ng/kg NH3-N dry	Dilution Factor	MDL	MRL	Q
7664-41-7	Ammonia-N	8.74	1	0.70	0.70	

PREPARATION BATCH SUMMARY

SM 4500-NH3 H-11

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Batch: BLC0709 Batch Matrix: Solid
Preparation: No Prep Wet Chem

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SED-07G:0-10	23C0538-01	032823 NH3A-013	03/27/23 15:05	
SED-07G:0-10	23C0538-01RE1		03/27/23 15:05	Added 4/3/2023 by RMS
SED-11G:0-10	23C0538-02	032823 NH3A-017	03/27/23 15:05	
SED-14G:0-10	23C0538-03	032823 NH3A-018	03/27/23 15:05	
SED-15G:0-10	23C0538-04	032823 NH3A-019	03/27/23 15:05	
SED-03G:0-10	23C0538-08	032823 NH3A-022	03/27/23 15:05	
SED-01G:0-10	23C0538-12	032823 NH3A-023	03/27/23 15:05	
Blank	BLC0709-BLK1	032823 NH3A-011	03/27/23 15:05	
LCS	BLC0709-BS1	032823 NH3A-012	03/27/23 15:05	
SED-07G:0-10	BLC0709-DUP1	032823 NH3A-014	03/27/23 15:05	
MRL Check	BLC0709-MRL1	032823 NH3A-010	03/27/23 15:05	
SED-07G:0-10	BLC0709-MS1	032823 NH3A-015	03/27/23 15:05	
SED-07G:0-10	BLC0709-MSD1	032823 NH3A-016	03/27/23 15:05	

Analytical Resources, LLC
Analytical Chemists and Consultants

Method: ***Ammonia-N, SM 4500-NH3 H-97 Solid*** Analyst: RMS

Batch ID: BLC0709 Prep Date, Time: 3/27/2023 15:05

Revision Date & # : ***0*** ***6/29/2016*** Balance ID: BAL5

Sample Preparation Log

Reagents, Equipment

Notes

Revision: ***0*** ***6/29/2016***

Lab Number	Sample Amount (g/mL)	Final Volume (mL)	Spike 1 ID	Spike 1 Volume (µL)	Spike 2 ID	Spike 2 Volume (µL)
23C0538-01	4.23	40				
23C0538-02	4.2	40				
23C0538-03	4.41	40				
23C0538-04	4.46	40				
23C0538-08	4.27	40				
23C0538-12	4.16	40				
23C0618-09	4.2	40				
23C0619-16	4.23	40				
BLC0709-BLK1	4	40				
BLC0709-BS1	4	40	K006560	400		
23C0538-01-DUP1	4.06	40				
BLC0709-MRL1	4	40	L003218	80		
BLC0709-MS1	4.01	40	K010908	400		
23C0538-01-MSD1	4.42	40	K010908	400		

Form I

METHOD BLANK DATA SHEET

SM 4500-NH3 H-11

TotalAnalytes

Blank

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Batch: BLC0709
Laboratory ID: BLC0709-BLK1
Prepared: 03/27/23 15:05
Matrix: Solid
Preparation: No Prep Wet Chem
Analyzed: 03/28/23 13:08
Sequence: SLD0023
Calibration: N/A
Instrument: LACHAT1

CAS NO.	Analyte	Concentration (mg/kg NH3-N wet)	Dilution Factor	MDL	MRL	Q
7664-41-7	Ammonia-N	ND	1	0.40	0.40	U

LCS / LCS DUPLICATE RECOVERY

SM 4500-NH3 H-11

Laboratory:	Analytical Resources, LLC	SDG:	23C0538
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Matrix:	Solid	Analyzed:	03/28/23 13:09
Batch:	BLC0709	Laboratory ID:	BLC0709-BS1
Preparation:	No Prep Wet Chem	Sequence Name:	LCS
Initial/Final:	4 g / 40 g		

COMPOUND	SPIKE ADDED (mg/kg NH3-N	LCS CONCENTRATION (mg/kg NH3-N wet)	Q	LCS % REC. #	QC LIMITS REC.
Ammonia-N	100	97.2	D	97.2	90 - 110

* Indicates values outside of QC limits

SED-07G:0-10

DUPLICATES

SM 4500-NH3 H-11

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Laboratory ID: BLC0709-DUP1
Batch: BLC0709
Lab Source ID: 23C0538-01
Preparation: No Prep Wet Chem
Initial/Final: 4.06 g / 40 g
Source Sample Name: SED-07G:0-10
% Solids: 61.59

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION	DUPLICATE CONCENTRATION	RPD %	Q
Ammonia-N	20	10.4	14.0	29.8	*

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

MS / MS DUPLICATE RECOVERY
SM 4500-NH3 H-11

Laboratory:	Analytical Resources, LLC	SDG:	23C0538
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Matrix:	Solid	Analyzed:	03/28/23 13:13
Batch:	BLC0709	Laboratory ID:	BLC0709-MS1
Preparation:	No Prep Wet Chem	Sequence Name:	Matrix Spike
Initial/Final:	4.01 g / 40 g	Source Sample:	SED-07G:0-10

COMPOUND	SPIKE ADDED (mg/kg	SAMPLE CONCENTRATION (mg/kg NH3-N dry)	Q	MS CONCENTRATION (mg/kg NH3-N dry)	Q	MS % REC. #	QC LIMITS REC.
Ammonia-N	162	10.4		196	D	121	75 - 125

* Values outside of QC limits

MS / MS DUPLICATE RECOVERY
SM 4500-NH3 H-11

Laboratory:	Analytical Resources, LLC	SDG:	23C0538
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Matrix:	Solid	Analyzed:	03/28/23 13:14
Batch:	BLC0709	Laboratory ID:	BLC0709-MSD1
Preparation:	No Prep Wet Chem	Sequence Name:	Matrix Spike Dup
Initial/Final:	4.42 g / 40 g	Source Sample:	SED-07G:0-10

COMPOUND	SPIKE ADDED (mg/kg	MSD CONCENTRATION (mg/kg NH3-N dry)	Q	MSD % REC. #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Ammonia-N	147	167	D	114	15.8	200	75 - 125

* Values outside of QC limits

ANALYSIS BATCH (SEQUENCE) SUMMARY

SM 4500-NH3 H-11

Laboratory:	Analytical Resources, LLC	SDG:	23C0538
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Sequence:	SLD0023	Instrument:	LACHAT1
		Calibration:	UNASSIGNED

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
Cal Standard	SLD0023-CAL1	032823 NH3A-001	NA	03/28/23 12:52
Cal Standard	SLD0023-CAL2	032823 NH3A-002	NA	03/28/23 12:53
Cal Standard	SLD0023-CAL3	032823 NH3A-003	NA	03/28/23 12:54
Cal Standard	SLD0023-CAL4	032823 NH3A-004	NA	03/28/23 12:55
Cal Standard	SLD0023-CAL5	032823 NH3A-005	NA	03/28/23 12:56
Cal Standard	SLD0023-CAL6	032823 NH3A-006	NA	03/28/23 12:58
Cal Standard	SLD0023-CAL7	032823 NH3A-007	NA	03/28/23 12:59
Initial Cal Check	SLD0023-ICV1	032823 NH3A-008	NA	03/28/23 13:00
Initial Cal Blank	SLD0023-ICB1	032823 NH3A-009	NA	03/28/23 13:04
MRL Check	BLC0709-MRL1	032823 NH3A-010	Solid	03/28/23 13:07
Blank	BLC0709-BLK1	032823 NH3A-011	Solid	03/28/23 13:08
LCS	BLC0709-BS1	032823 NH3A-012	Solid	03/28/23 13:09
SED-07G:0-10	23C0538-01	032823 NH3A-013	Solid	03/28/23 13:11
SED-07G:0-10	BLC0709-DUP1	032823 NH3A-014	Solid	03/28/23 13:12
SED-07G:0-10	BLC0709-MS1	032823 NH3A-015	Solid	03/28/23 13:13
SED-07G:0-10	BLC0709-MSD1	032823 NH3A-016	Solid	03/28/23 13:14
SED-11G:0-10	23C0538-02	032823 NH3A-017	Solid	03/28/23 13:15
SED-14G:0-10	23C0538-03	032823 NH3A-018	Solid	03/28/23 13:16
SED-15G:0-10	23C0538-04	032823 NH3A-019	Solid	03/28/23 13:18
Calibration Check	SLD0023-CCV1	032823 NH3A-020	NA	03/28/23 13:19
Calibration Blank	SLD0023-CCB1	032823 NH3A-021	NA	03/28/23 13:22
SED-03G:0-10	23C0538-08	032823 NH3A-022	Solid	03/28/23 13:26
SED-01G:0-10	23C0538-12	032823 NH3A-023	Solid	03/28/23 13:27
Calibration Check	SLD0023-CCV2	032823 NH3A-028	NA	03/28/23 13:35
Calibration Blank	SLD0023-CCB2	032823 NH3A-029	NA	03/28/23 13:39

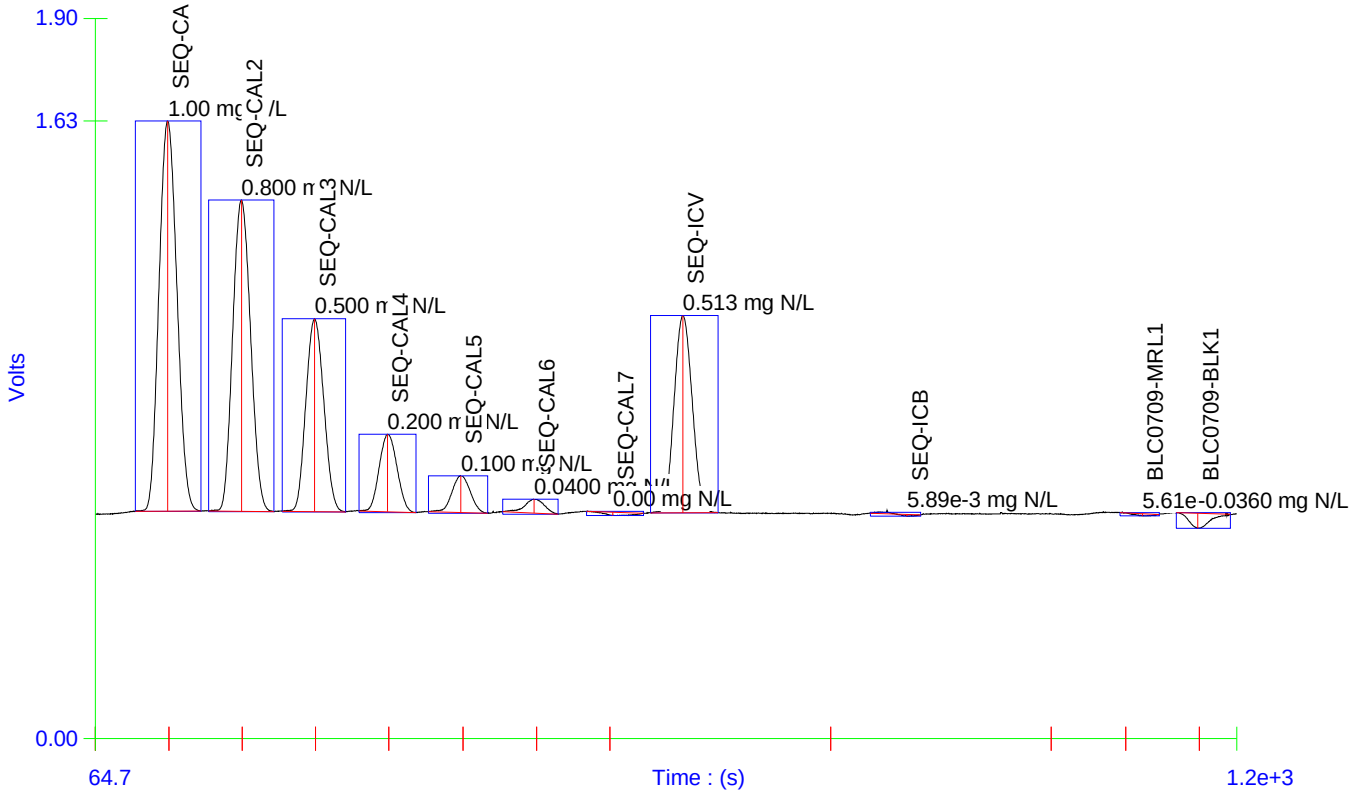
Original Run Filename: OM_3-28-2023_12-51-11PM.OMN Created: 3/28/2023 12:51:11 PM
Original Run Author's Signature: [RMS]
Current Run Filename: 032823 NH3A.omn Last Modified: 3/28/2023 1:49:54 PM
Current Run Author's Signature: [RMS]
Description: Default New Run

Sample	Rep.	Cup No.	Channel 1 NH3			Detection Time	MDF
			Conc. (mg N/L)	Area (V.s)	Height (V)		
SEQ-CAL1	1	S1	1.00	20.3	1.03	3/28/2023@12:52:18 PM	
SEQ-CAL2	1	S2	0.800	16.2	0.820	3/28/2023@12:53:28 PM	
SEQ-CAL3	1	S3	0.500	10.0	0.508	3/28/2023@12:54:38 PM	
SEQ-CAL4	1	S4	0.200	4.01	0.204	3/28/2023@12:55:49 PM	
SEQ-CAL5	1	S5	0.100	1.95	0.0965	3/28/2023@12:56:59 PM	
SEQ-CAL6	1	S6	0.0400	0.789	0.0364	3/28/2023@12:58:10 PM	
SEQ-CAL7	1	S7	0.00	-0.257	-8.79e-3	3/28/2023@12:59:21 PM	
SEQ-ICV	1	8	0.513	10.4	0.520	3/28/2023@1:00:31 PM	
Known Conc:			0.500				
Calibration:			Table/Fig. : 1				
SEQ-ICB	1	9	5.89e-3	-8.39e-3	-4.67e-3	3/28/2023@1:04:02 PM	
Known Conc:			0.00				
BLC0709-MRL1	1	10	5.61e-4	-0.117	-5.82e-3	3/28/2023@1:07:34 PM	
BLC0709-BLK1	1	11	-0.0360	-0.864	-0.0395	3/28/2023@1:08:45 PM	
BLC0709-BS1	1	12	0.486	9.80	0.495	3/28/2023@1:09:55 PM	20.00
23C0538-01	1	13	0.676	13.7	0.695	3/28/2023@1:11:06 PM	
BLC0709-DUP1	1	14	0.876	17.8	0.899	3/28/2023@1:12:16 PM	
BLC0709-MS1	1	15	0.605	12.2	0.618	3/28/2023@1:13:26 PM	20.00
BLC0709-MSD1	1	16	0.569	11.5	0.583	3/28/2023@1:14:38 PM	20.00
23C0538-02	1	17	0.906	18.4	0.931	3/28/2023@1:15:49 PM	
23C0538-03	1	18	0.778	15.8	0.799	3/28/2023@1:16:59 PM	
23C0538-04	1	19	0.310	6.22	0.314	3/28/2023@1:18:10 PM	
SEQ-CCV	1	8	0.514	10.4	0.521	3/28/2023@1:19:21 PM	
Known Conc:			0.500				
SEQ-CCB	1	9	0.0146	0.170	9.71e-3	3/28/2023@1:22:52 PM	
Known Conc:			0.00				
23C0538-08	1	20	0.254	5.06	0.257	3/28/2023@1:26:24 PM	
23C0538-12	1	21	0.501	10.1	0.514	3/28/2023@1:27:35 PM	
23C0618-09	1	22	0.722	14.6	0.741	3/28/2023@1:28:47 PM	
23C0619-16	1	23	0.384	7.72	0.391	3/28/2023@1:29:57 PM	
23C0538-01RE1	1	13	0.683	13.8	0.701	3/28/2023@1:31:08 PM	
BLC0709-DUP2	1	14	0.885	18.0	0.902	3/28/2023@1:32:18 PM	
SEQ-CCV	1	8	0.515	10.4	0.524	3/28/2023@1:35:50 PM	
Known Conc:			0.500				
SEQ-CCB	1	9	-5.73e-3	-0.246	-0.0100	3/28/2023@1:39:21 PM	
Known Conc:			0.00				

Author: RMS

Date : 3/28/2023

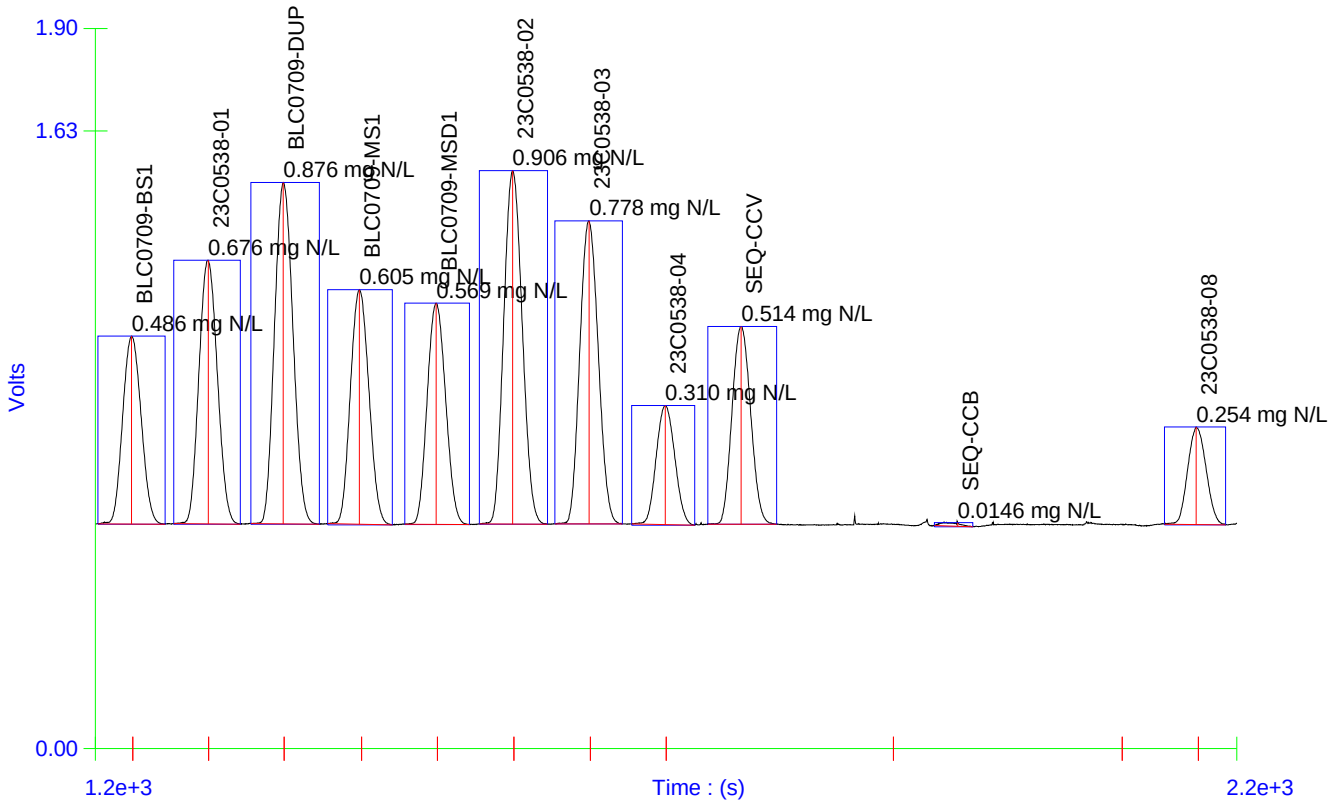
Channel 1 - Set: 1 / 3



Author: RMS

Date : 3/28/2023

Channel 1 - Set: 2 / 3



Author: RMS

Date : 3/28/2023

Channel 1 - Set: 3 / 3

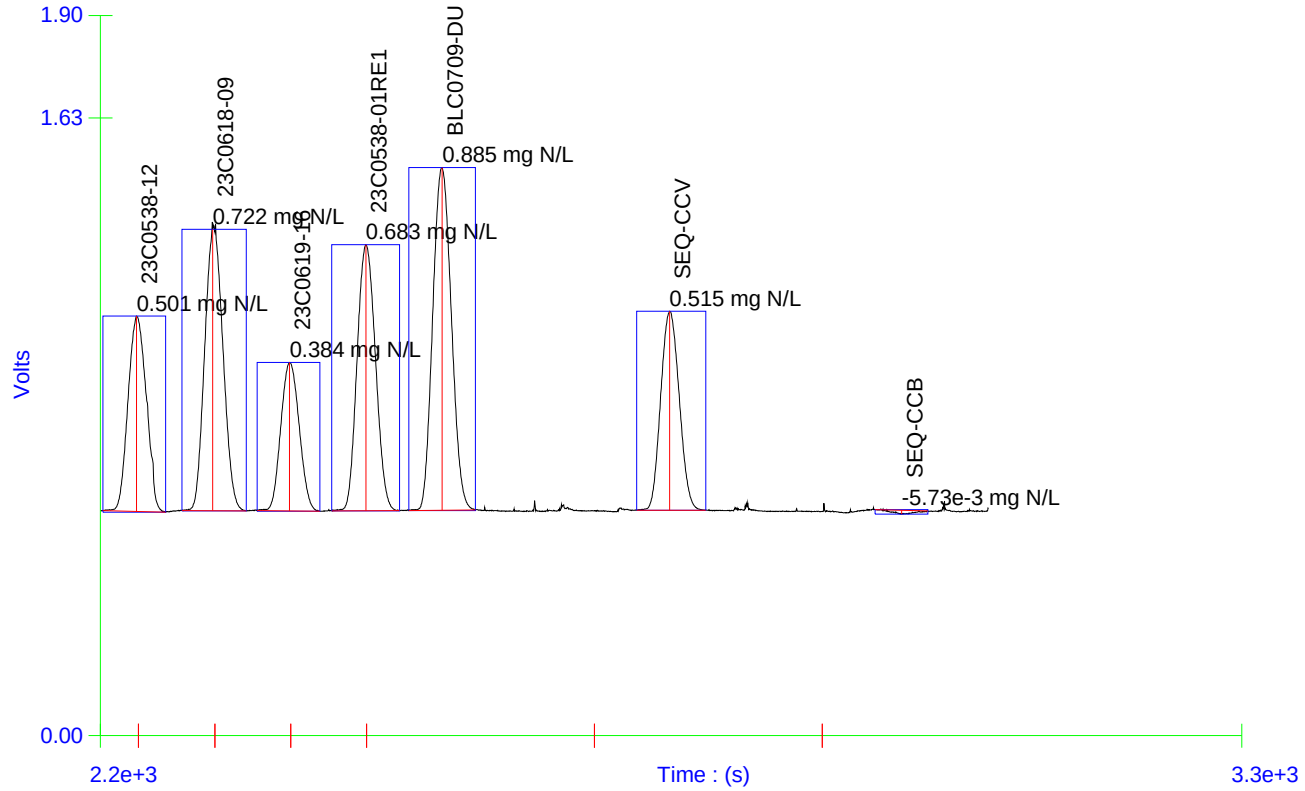
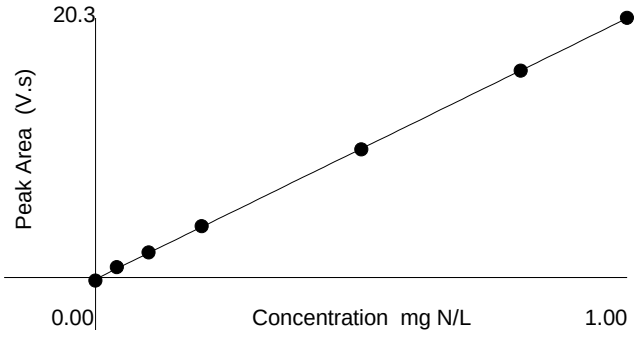


Table : 1 (NH3)

	Known Conc. (mg N/L)	Rep.	Peak Area (V.s)	Peak Height (V)	% RSD	% Residual	Det. Conc (mg N/L)	Detection Date	Detection Time
1	1.00	1	20.3	1.03	0.0	-0.1	1.00	3/28/2023	12:52:18 PM
2	0.800	1	16.2	0.820	0.0	0.1	0.799	3/28/2023	12:53:28 PM
3	0.500	1	10.0	0.508	0.0	0.5	0.497	3/28/2023	12:54:38 PM
4	0.200	1	4.01	0.204	0.0	-1.2	0.202	3/28/2023	12:55:49 PM
5	0.100	1	1.95	0.0965	0.0	-1.6	0.101	3/28/2023	12:56:59 PM
6	0.0400	1	0.789	0.0364	0.0	-14.4	0.0449	3/28/2023	12:58:10 PM
7	0.00	1	-0.257	-8.79e-3			-6.25e-3	3/28/2023	12:59:21 PM

Figure : 1 (NH3)



Area = 20.4 * Conc - 0.128
Conc = 0.0489 * Area + 6.30e-3
Correlation Coefficient (r) = 0.99996

Weighting : None

INSTRUMENT BLANKS
SM 4500-NH3 H-11

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Instrument ID: LACHAT1
Calibration: UNASSIGNED
Sequence: SLD0023
Date Analyzed: 03/28/23 13:04

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SLD0023-ICB1	Ammonia-N	0.006	0.04	0.04	mg/L NH3-N	
SLD0023-CCB1	Ammonia-N	0.01	0.04	0.04	mg/L NH3-N	
SLD0023-CCB2	Ammonia-N	-0.006	0.04	0.04	mg/L NH3-N	

INITIAL AND CONTINUING CALIBRATION CHECK

SM 4500-NH3 H-11

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Instrument ID: LACHAT1
Calibration: UNASSIGNED
Control Limt: +/- 10.00%
Sequence: SLD0023

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SLD0023-ICV1	Ammonia-N	0.50000	0.51	103	mg/L NH3-N	SM 4500-NH3 H-11
SLD0023-CCV1	Ammonia-N	0.50000	0.51	103	mg/L NH3-N	SM 4500-NH3 H-11
SLD0023-CCV2	Ammonia-N	0.50000	0.52	103	mg/L NH3-N	SM 4500-NH3 H-11

* Values outside of QC limits

HOLDING TIME SUMMARY

Analysis: SM 4500-NH3 H-11

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SED-07G:0-10 23C0538-01	03/20/23 08:10	03/22/23 16:08	03/27/23 15:05	7	7	03/28/23 13:11	1	7	
SED-11G:0-10 23C0538-02	03/20/23 09:24	03/22/23 16:08	03/27/23 15:05	7	7	03/28/23 13:15	1	7	
SED-14G:0-10 23C0538-03	03/20/23 10:11	03/22/23 16:08	03/27/23 15:05	7	7	03/28/23 13:16	1	7	
SED-15G:0-10 23C0538-04	03/20/23 10:42	03/22/23 16:08	03/27/23 15:05	7	7	03/28/23 13:18	1	7	
SED-03G:0-10 23C0538-08	03/20/23 13:15	03/22/23 16:08	03/27/23 15:05	7	7	03/28/23 13:26	1	7	
SED-01G:0-10 23C0538-12	03/20/23 14:45	03/22/23 16:08	03/27/23 15:05	7	7	03/28/23 13:27	1	7	
Duplicate BLC0709-DUP1	03/20/23 08:10	03/22/23 16:08	03/27/23 15:05	7	7	03/28/23 13:12	1	7	
Matrix Spike BLC0709-MS1	03/20/23 08:10	03/22/23 16:08	03/27/23 15:05	7	7	03/28/23 13:13	1	7	
Matrix Spike Dup BLC0709-MSD1	03/20/23 08:10	03/22/23 16:08	03/27/23 15:05	7	7	03/28/23 13:14	1	7	

* Indicates hold time exceedance.

METHOD DETECTION AND REPORTING LIMITS

SM 4500-NH3 H-11

Laboratory: Analytical Resources, LLC
SDG: 23C0538
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Instrument: LACHAT1

Analyte	MDL	RL	Units
Ammonia-N	0.40	0.40	mg/kg NH3-N

Fisher Scientific

1 Reagent Lane
Fair Lawn, NJ 07410
201.796.7100 tel
201.796.1329 fax

Certificate of Analysis

Fisher Scientific's Quality System has been found to conform to Quality Management System Standard ISO9001:2008 standard by SAI Global Certificate Number CERT - 0090918

This is to certify that units of the lot number below were tested and found to comply with the specifications of the grade listed. Certain data have been supplied by third parties. Fisher Scientific expressly disclaims all warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose. Certain products (USP/FCC/NF/EP/BP/JP grades) are sold for use in food, drug, or medical device manufacturing. Fisher does not claim regulatory coverage under 21 CFR nor maintain DMF's with the FDA. The following are the actual analytical results obtained:

Catalog Number	**A649**	**Quality Test / Release Date**	**9/20/2017**
Lot Number	**174327**		
Description	**AMMONIUM CHLORIDE, USP/FCC**		
Country of Origin	**United States**	*** Suggested Retest Date**	**Sep-2020**
Chemical Origin	**Inorganic**		
BSE/TSE Comment	No animal products are used as starting raw material ingredients, or used in processing, including lubricants, processing aids, or any other material that might migrate to the finished product.		

USP Grade

Result name	Units	Specifications	Test Value
APPEARANCE		REPORT	White crystalline powder
ASSAY	%	Inclusive Between 99.5 - 100.5	99.7
HEAVY METALS (as Pb)	%	<= 0.001	<0.0010
IDENTIFICATION (ALL LISTED)	PASS/FAIL	= PASS TEST	PASS TEST
IGNITION RESIDUE	%	<= 0.1	<0.01
LIMIT OF THIOCYANATE	PASS/FAIL	= PASS TEST	PASS TEST
LOSS ON DRYING	%	<= 0.5	0.03
PH OF A 5% SOLUTION		Inclusive Between 4.6 - 6.0	4.7
RESIDUAL SOLVENTS	Meets Requirements	= MEETS REQUIREMENTS	MEETS REQUIREMENTS

FCC Grade

Result name	Units	Specifications	Test Value
APPEARANCE		REPORT	White crystalline powder
ASSAY	%	>= 99.0	99.7
IDENTIFICATION (ALL LISTED)	PASS/FAIL	= PASS TEST	PASS TEST
LEAD (Pb)	MG/KG	<= 4	<4.0
LOSS ON DRYING PER FCC	%	<= 0.5	0.03

Residual Solvents	No Class 1, Class 2, or Class 3 solvents are used in the manufacturing, processing, or subsequent handling of this product.

Teresa Bailey-Wyche

Quality Assurance Specialist - Certificate of Analysis Fair Lawn

Note: The data listed is valid for all package sizes of this lot of this product, expressed as a extension of this catalog number listed above. If there are any questions with this certificate, please call Chemical Services at (800) 227-6701.
*Based on suggested storage condition.

ERA A Waters Company J002956

Certified Reference Material

▪ Certificate of Analysis ▪

Product:	1000 mg/L Ammonia as N
Catalog Number:	045-125mL, 985-500mL
Lot No.	091120m
Starting Material:	Ammonium Chloride (NH_4Cl)
Matrix:	18 megohm deionized water
Density:	0.9997 ± 0.0016 g/ml at 19.2 °C and 756 mm Hg
Verification Method:	Ion Selective Electrode (ISE)
Certificate Issue Date:	November 5, 2020
Expiration Date:	November 3, 2022
Revision Number:	Original

CERTIFICATION

Parameter	Certified Value[1]	Uncertainty[2]	NIST Traceability	
	mg/L	%	SRM Number[3]	Recovery %
Ammonia as N (NH_3-N)	1000	1.43	194a	99.5

16341 Table Mountain Pkwy ▪ Golden, CO 80403 ▪ 800.372.0122 ▪ 303.431.8454 ▪ fax 303.421.0159 ▪ www.eraqc.com

ERA
A Waters Company

Certified Reference Material

▪ Certificate of Analysis ▪

Product: 1000 mg/L Ammonia as N
Catalog Number: 045-125mL, 985-500mL
Lot No. 591021m
Starting Material: Ammonium Chloride (NH_4Cl)
Matrix: 18 megohm deionized water
Density: 0.9998 ± 0.0003 g/mL 22.3 °C and 747 mm Hg
Verification Method: Ion Selective Electrode (ISE)
Certificate Issue Date: November 23, 2021
Expiration Date: October 29, 2023
Revision Number: Original

CERTIFICATION

Parameter	Certified Value[1]	Uncertainty[2]	NIST Traceability	
	mg/L	%	SRM Number[3]	Recovery %
Ammonia as N (NH_3-N)	1000	0.827	194a	99.8

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▪ Certificate of Analysis ▪

1. The **Certified Value** is the actual gravimetric/volumetric "made-to" concentration confirmed by ERA analytical verification. The certified value is monitored and the purchasers will be notified of any significant changes resulting in recertification or withdrawal of this certified reference material during the period of validity of this certificate.

2. The **Uncertainty** represents an expanded uncertainty and approximates a 95% confidence interval. The uncertainty is based on the characterization, homogeneity and stability characteristics of the product, multiplied by a coverage factor (k=2). The uncertainty applies to the product as supplied and does not take into account any required or optional dilution and/or preparations the laboratory may perform while using this product. The formula used to calculate the expanded uncertainty is:
$U_{expanded} = k * SQRT((U_{char}^2) + (U_{homogen}^2) + (U_{LTS}^2) + (U_{STS}^2) + (U_{RSS}^2))$

Where:

$U_{expanded}$ = Expanded uncertainty.
k = Coverage factor.
U_{char} = Combined standard uncertainty of the manufacturing and/or analytical verification assessment.
$U_{homogen}$ = Standard uncertainty of the homogeneity assessment.
U_{LTS} = Standard uncertainty associated with long-term stability.
U_{STS} = Standard uncertainty associated with short-term (transport) stability.
U_{RSS} = Standard uncertainty associated with repeated sampling of the product (where permitted by product use instructions).

3. Where NIST Standard Reference Materials (SRMs) are available, each analyte has been analytically traced to the NIST SRM listed. **Analytical Traceability Recovery (%)** = [(% recovery ERA certified reference material)/(% recovery NIST SRM)]*100
The traceability data shown were compiled by analyzing this ERA certified reference material and/or it's associated stock solution(s) against the applicable NIST SRMs.

4. **Metrological Traceability.** This certified reference material is metrologically traceable to NIST mass reference materials through an unbroken chain of comparisons.

5. **Storage:** 20-25°C

6. **Intended Use:** This standard is intended to be used to calibrate your analytical process and/or as a quality control check of the entire process for the analytes/matrix included in the standard.

7. **Minimum Sample Size:** ERA suggests that when subsampling this product prior to analysis, you use a minimum sample size of at least 1 mL. Using a smaller sample size may invalidate the assigned value and/or uncertainty shown.

8. **Repeat Sampling:** Repeated Sampling of this product is permitted, provided minimum sample sizes and storage instructions are adhered to.

9. **Safety:** ERA products may be hazardous and are intended for use by professional laboratory personnel trained in the competent handling of such materials. Responsibility for the safe use of these products rests entirely with the buyer and/or user. Safety Data Sheets (SDS) for all ERA products are available through our website: www.eraqc.com

If you have any questions or need technical assistance, please call ERA technical assistance at 1-800-372-0122 or send an email to info@eraqc.com.

Certifying Officer
Brian Miller

Brian Miller

Quality Officer
Matthew Seebeck

ISO 17034:2016 ACCREDITED Reference Material Producer CERT #1539.03

ISO/IEC 17025:2017 ACCREDITED Chemical Testing Laboratory CERT #1539.01

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Analytical Resources, LLC
Analytical Chemists and Consultants

18 July 2024

Michael Erdahl
Friedman & Bruya Inc.
5500 4th Ave S
Seattle, WA 98108

RE: Port of Friday Harbor (303373)

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
23C0618	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclosed Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, LLC

Susan Dunnihoo For Shelly Fishel, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Cert# 100006-012

23C0618

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER ARI	
PROJECT NAME/NO. 303373	PO # D-221
REMARKS merdahl@friedmanandbruya.co	

TURNAROUND TIME
☒ Standard TAT
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	TBT	TOC	Total Solids	Dioxins/Furans	Ammonia	Total Sulfides					Notes
SED-07G:0-10		3/20/2023	1002	sediment	2	X	X	X								
SED-11G:0-10		3/20/2023	924	sediment	1		X	X								
SED-14G:0-10		3/20/2023	1011	sediment	2	X	X	X								
SED-15G:0-10		3/20/2023	1042	sediment	2	X	X	X								
SED-03G:0-10		3/20/2023	1315	sediment	1		X	X								
SED-01G:0-10		3/20/2023	1445	sediment	1		X	X								
SED-01C:0-1		3/21/2023	1151	sediment	1		X	X								
SED-05C:0-1		3/21/2023	1244	sediment	1		X	X								
SED-05G:0-10		3/21/2023	1310	sediment	3		X	X		X	X					
SED-03C:0-1		3/21/2023	1442	sediment	1		X	X								
SED-14C:0-1		3/21/2023	1553	sediment	2	X	X	X								
SED-14C:1-3		3/21/2023	1553	sediment	2	X	X	X								
SED-DUPC		3/21/2023	1200	sediment	2	X	X	X								

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Michael Erdahl	Friedman & Bruya	3/24/23	13:30
Received by:	Philip	Philip Bates	AR	3/24/23	16:25
Relinquished by:					
Received by:					

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Friedman & Bruya

Project Name: 303373

COC No(s): NA

Delivered by: Fed-Ex UPS Courier Hand Delivered Other:

Assigned ARI Job No: 23C0618

Tracking No: NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler?	YES	NO
Were custody papers included with the cooler?	YES	NO
Were custody papers properly filled out (ink, signed, etc.)	YES	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time 16:25 — 5.4

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 10097098

Cooler Accepted by: PIA Date: 3/24/23 Time: 16:25

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	NO
What kind of packing material was used?	Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other:		
Was sufficient ice used (if appropriate)?	NA	YES	NO
How were bottles sealed in plastic bags?	Individually	Grouped	Not
Did all bottles arrive in good condition (unbroken)?		YES	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		YES	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA		

Were the sample(s) split by ARI? NA YES Date/Time: Equipment: Split by:

Samples Logged by: JAV Date: 03/25/23 Time: 0907 Labels checked by: JG

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
5500 4th Ave S	Project Number: 303373	**Reported:**
Seattle, WA 98108	Project Manager: Michael Erdahl	07/18/2024 15:17

ANALYTICAL REPORT FOR SAMPLES

Laboratory ID	Sample ID	Matrix	Date Sampled	Date Received
23C0618-01	SED-07G:0-10	Solid	03/20/23 10:02	03/24/23 16:25
23C0618-02	SED-11G:0-10	Solid	03/20/23 09:24	03/24/23 16:25
23C0618-03	SED-14G:0-10	Solid	03/20/23 10:11	03/24/23 16:25
23C0618-04	SED-15G:0-10	Solid	03/20/23 10:42	03/24/23 16:25
23C0618-05	SED-03G:0-10	Solid	03/20/23 13:15	03/24/23 16:25
23C0618-06	SED-01G:0-10	Solid	03/20/23 14:45	03/24/23 16:25
23C0618-07	SED-01C:0-1	Solid	03/21/23 11:51	03/24/23 16:25
23C0618-08	SED-05C:0-1	Solid	03/21/23 12:44	03/24/23 16:25
23C0618-09	SED-05G:0-10	Solid	03/21/23 13:10	03/24/23 16:25
23C0618-10	SED-03C:0-1	Solid	03/21/23 14:42	03/24/23 16:25
23C0618-11	SED-14C:0-1	Solid	03/21/23 15:53	03/24/23 16:25
23C0618-12	SED-14C:1-3	Solid	03/21/23 15:53	03/24/23 16:25
23C0618-13	SED-DUPC	Solid	03/21/23 12:00	03/24/23 16:25

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
5500 4th Ave S	Project Number: 303373	**Reported:**
Seattle WA, 98108	Project Manager: Michael Erdahl	18-Jul-2024 15:17

Case Narrative

Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Project Number: 303373
Work Order: 23C0618

Sample receipt

Samples as listed on the preceding page were received 24-Mar-2023 16:25 under ARI work order 23C0618. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Total organic carbon analyses were cancelled in this work order and analyzed from frozen volumes under work order 23E0148.

Wet Chemistry

The sample(s) were prepared and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blank(s) were clean at the reporting limits.

The blank spike (BS/LCS) percent recoveries were within control limits.

The batch BLC0709 ammonia duplicate (DUP) relative percent difference (RPD) was outside advisory control limits and flagged on the summary sheet, reported under work order 23C0548.

The batch BLC0751 sulfide duplicate (DUP) relative percent difference (RPD) was outside advisory control limits and confirmed by reanalysis, also reported and flagged on the summary sheet, reported under work order 23C0548.

The batch BLC0751 sulfide matrix spike (MS) spike recovery was within advisory control limits, reported under work order 23C0548.

The batch BLC0709 ammonia matrix spike/matrix spike duplicate (MS/MSD) percent recoveries and relative percent difference (RPD) were within advisory control limits, reported under work order 23C0538.

Butyl Tin(s) - EPA Method SW8270E-SIM

The sample(s) were extracted and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

Internal standard areas were within limits.

The surrogate percent recoveries were within control limits.

The method blank(s) were clean at the reporting limits.

The blank spike and blank spike duplicate (BS/LCS and BSD/LCSD) spike recoveries and relative percent difference (RPD) were within control limits.

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
5500 4th Ave S	Project Number: 303373	**Reported:**
Seattle WA, 98108	Project Manager: Michael Erdahl	18-Jul-2024 15:17

Case Narrative

QUALIFIERS AND NOTES

Qualifier	Definition
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
L	Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to +/- RL instead of 20% RPD
J	Estimated concentration value detected below the reporting limit.
H	Hold time violation - Hold time was exceeded.
D	The reported value is from a dilution
*	Flagged value is not within established control limits.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

SED-07G:0-10

Form I
ORGANIC ANALYSIS DATA SHEET
EPA 8270E-SIM
Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0618-01 B	SDG:	23C0618
Sampled:	03/20/23 10:02	Prepared:	03/28/23 12:28	File ID:	2023040617.D
% Solids:	68.96	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/06/23 20:12
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	7.28 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	19.8		0.448	3.84
14488-53-0	Dibutyltin Ion	1	15.6		1.72	5.76
78763-54-9	Butyltin Ion	1	6.31		1.88	4.06
1461-25-2	Tetrabutyltin	1	4.98	U	4.98	4.98

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	44.995	38.4	85.4	30 - 160	
Tripropyltin	43.569	32.7	75.0	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040617.D

Date : 06-APR-2023 20:12

Client ID:

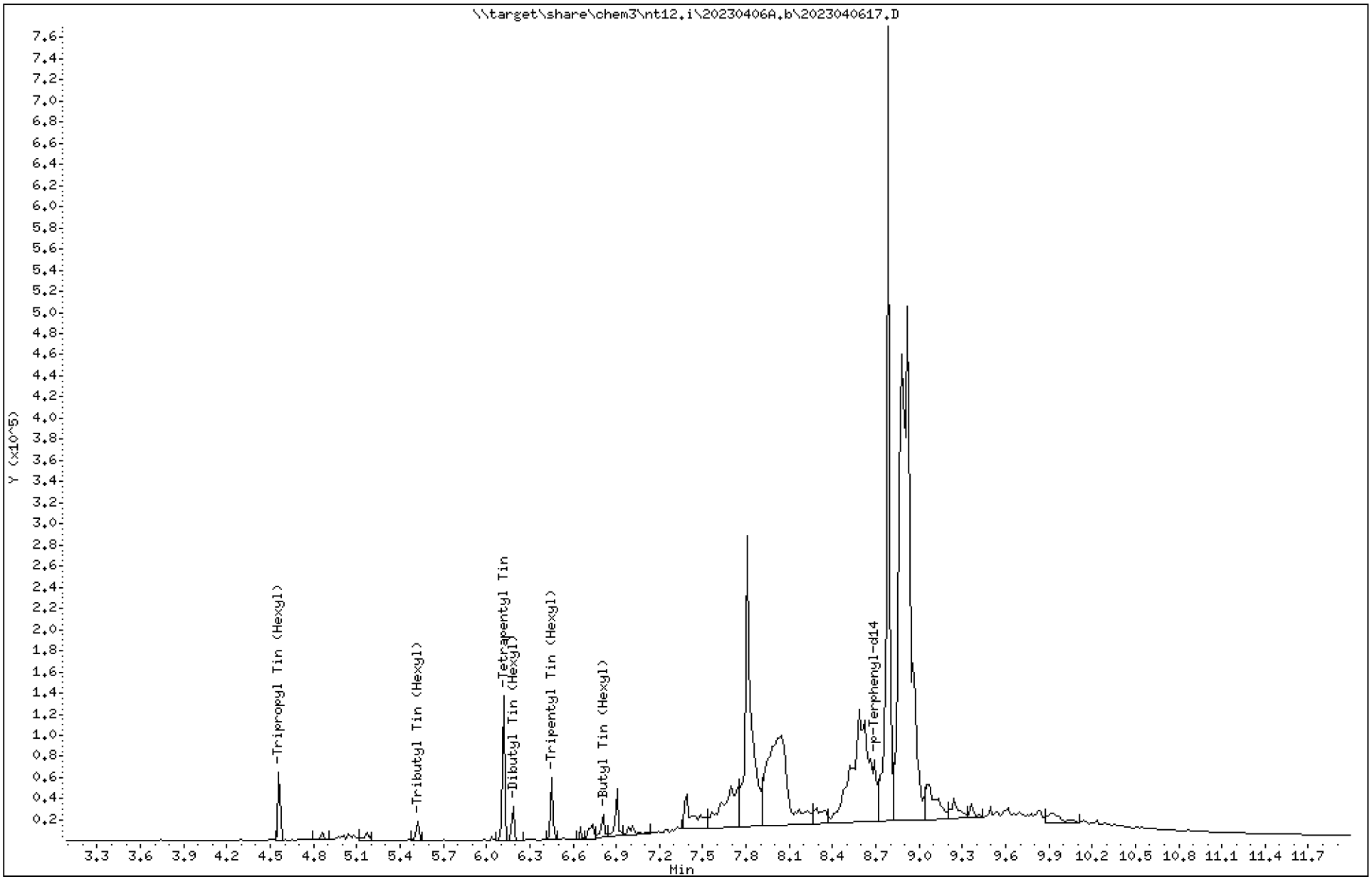
Sample Info: 23C0618-01

Instrument: nt12.i

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040617.D

Date : 06-APR-2023 20:12

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-01

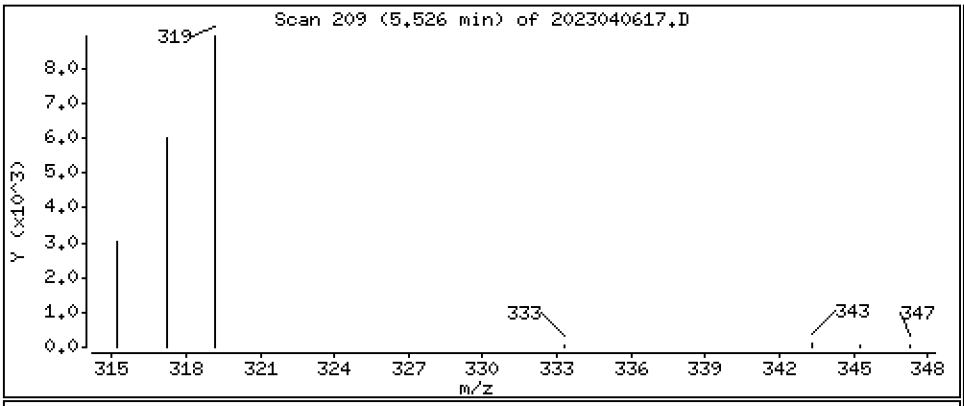
Operator: JZ

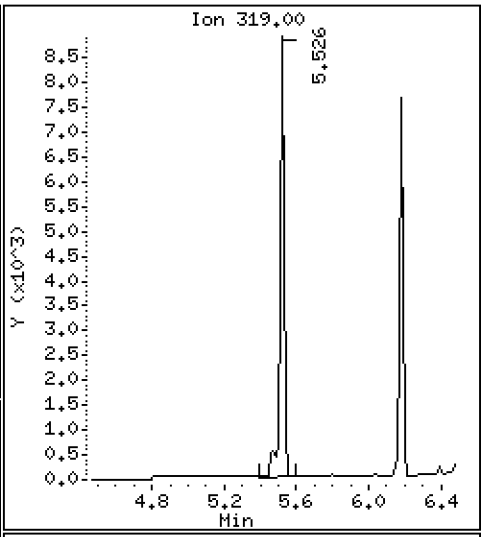
Column phase: ZB-5msi

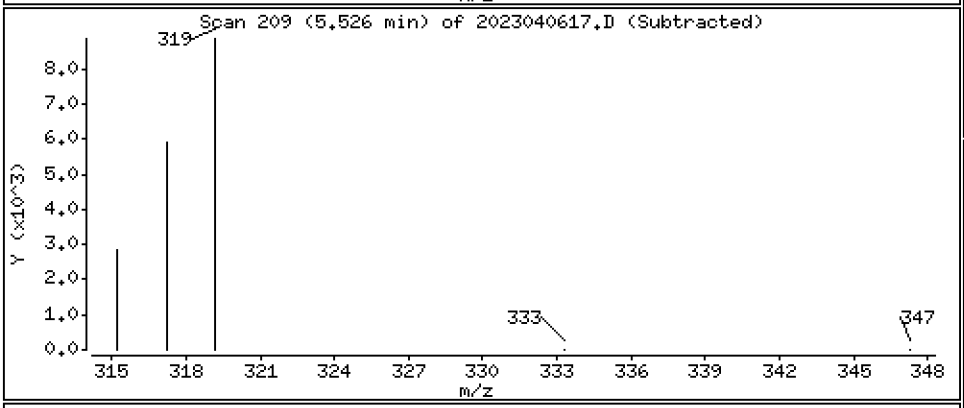
Column diameter: 0.25

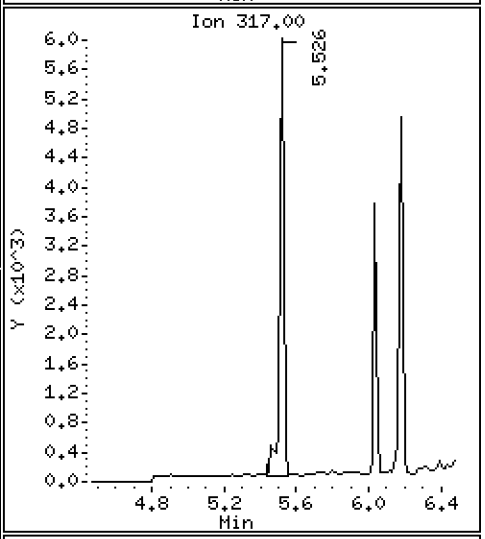
3 Tributyl Tin (Hexyl)

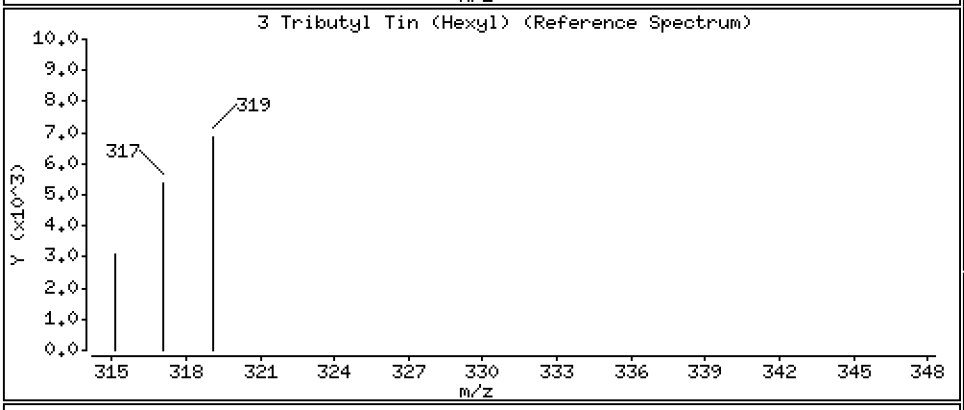
Concentration: 0.2569 ug/mL

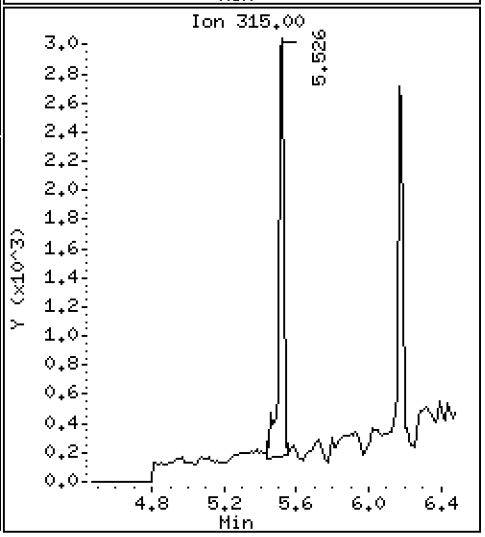


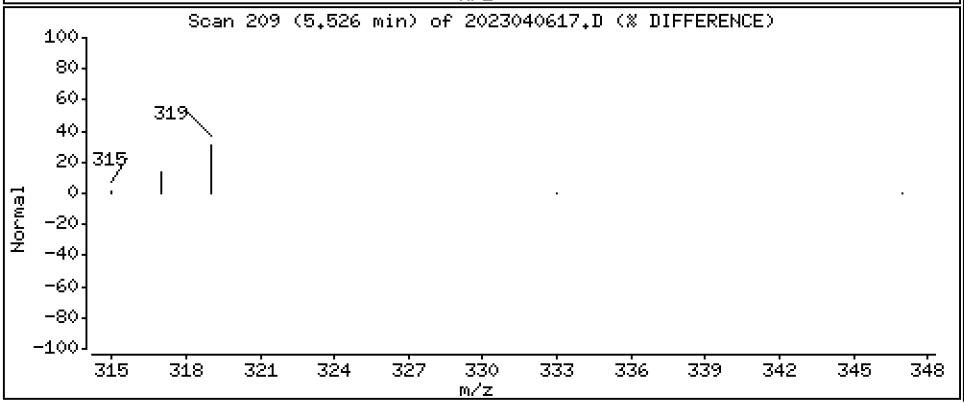












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Date : 06-APR-2023 20:12

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-01

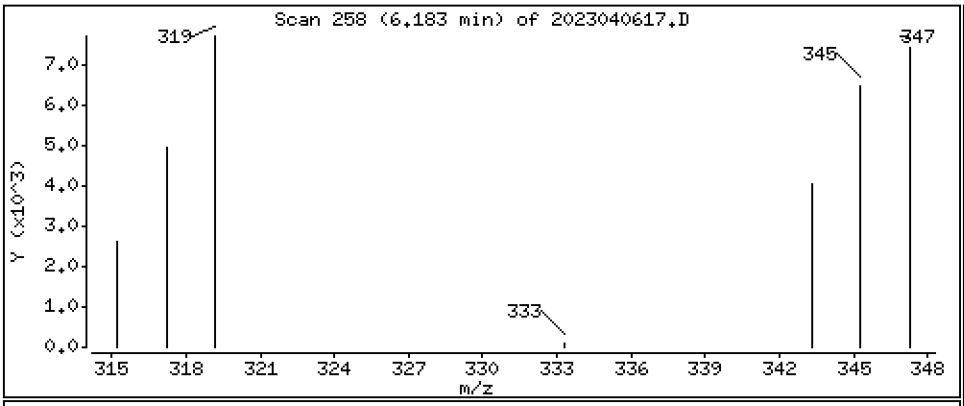
Operator: JZ

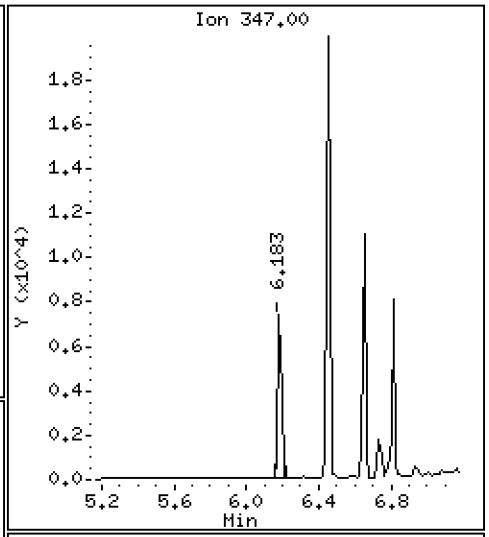
Column phase: ZB-5msi

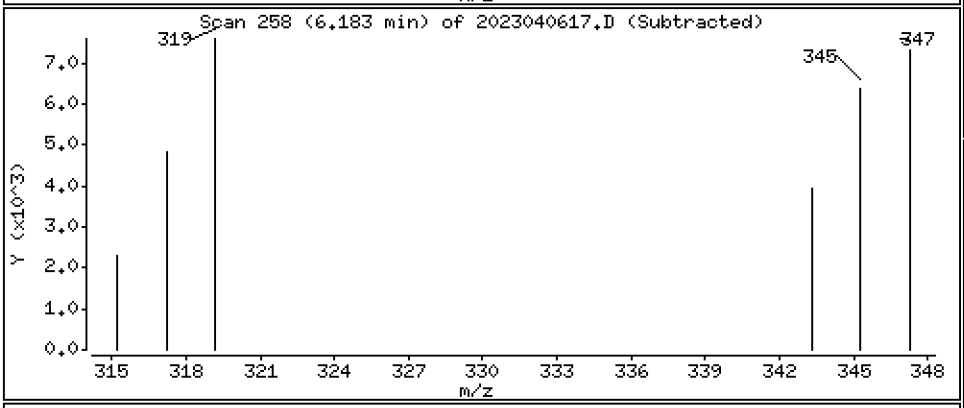
Column diameter: 0.25

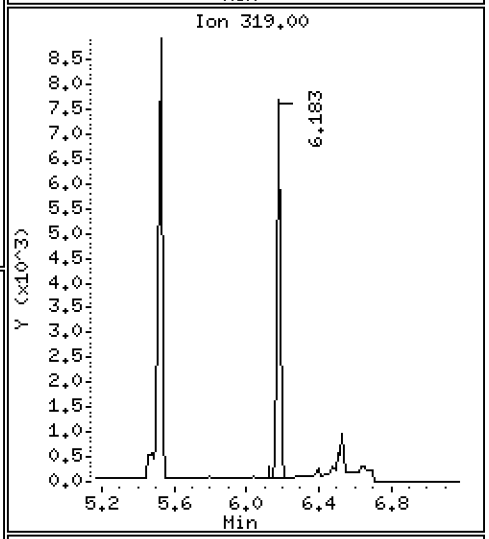
5 Dibutyl Tin (Hexyl)

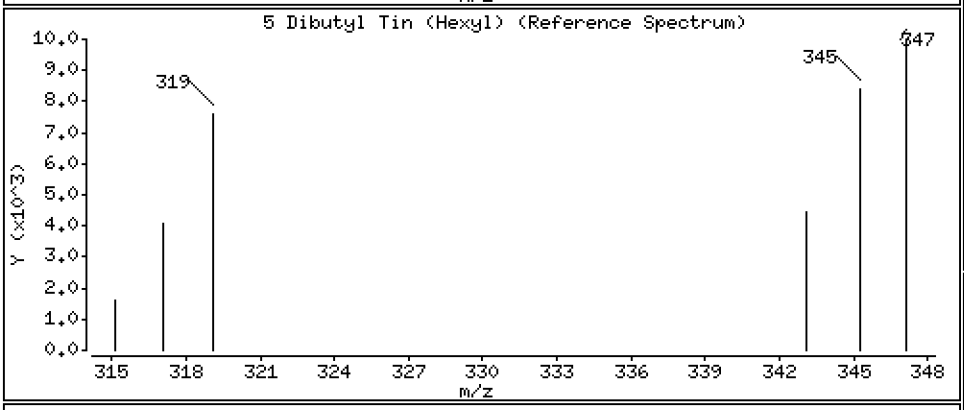
Concentration: 0.2716 ug/mL

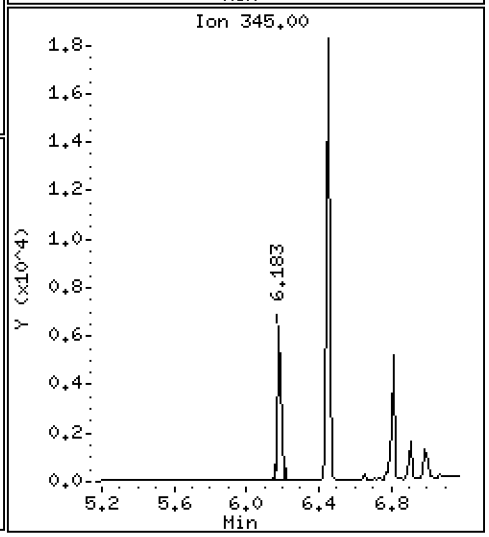


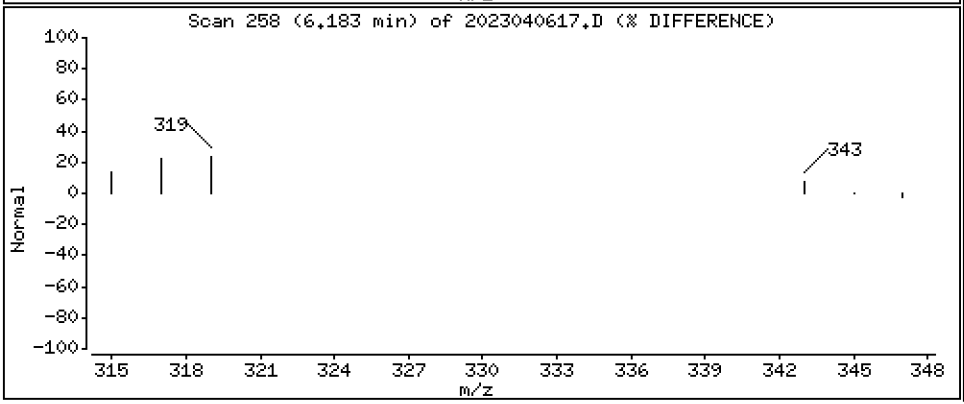












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Date : 06-APR-2023 20:12

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-01

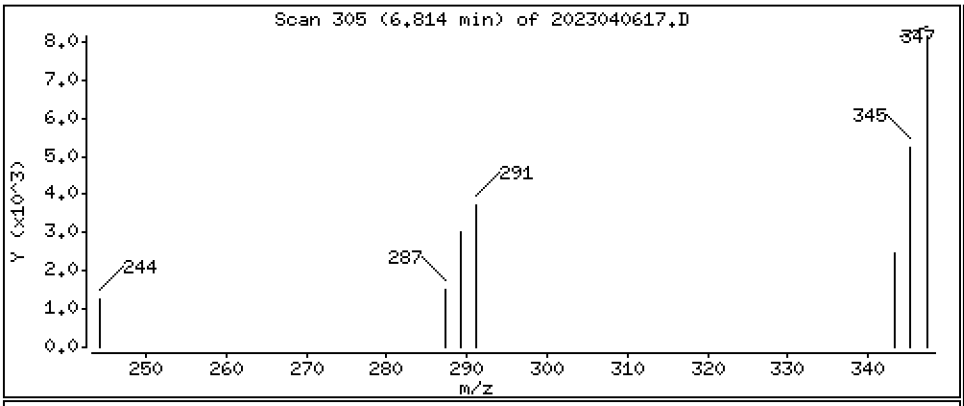
Operator: JZ

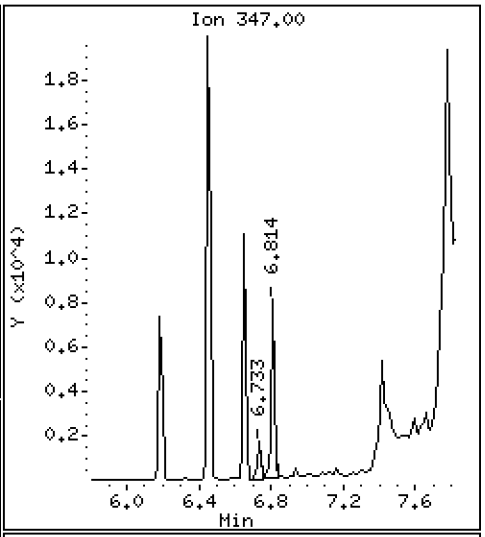
Column phase: ZB-5msi

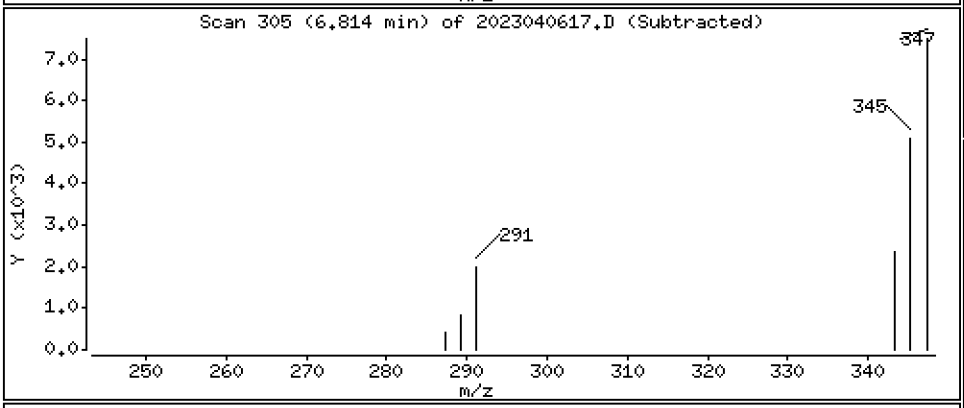
Column diameter: 0.25

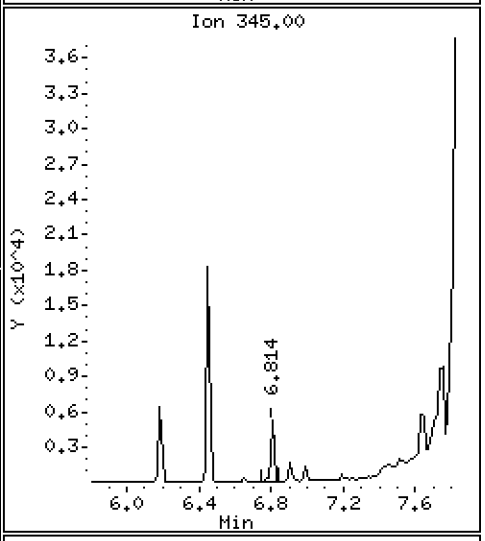
7 Butyl Tin (Hexyl)

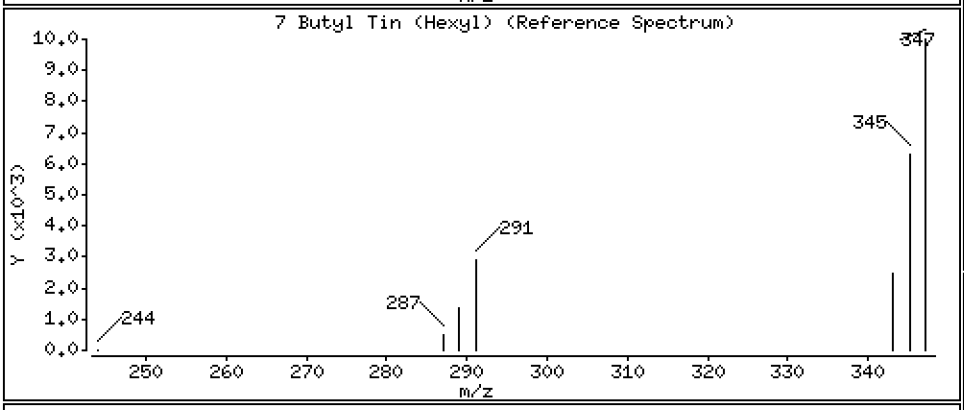
Concentration: 0.1552 ug/mL

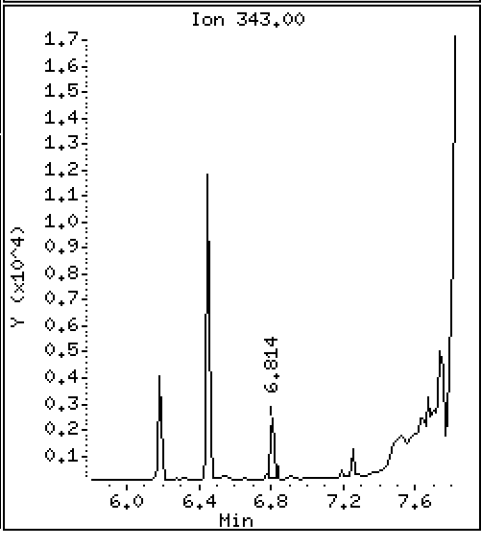


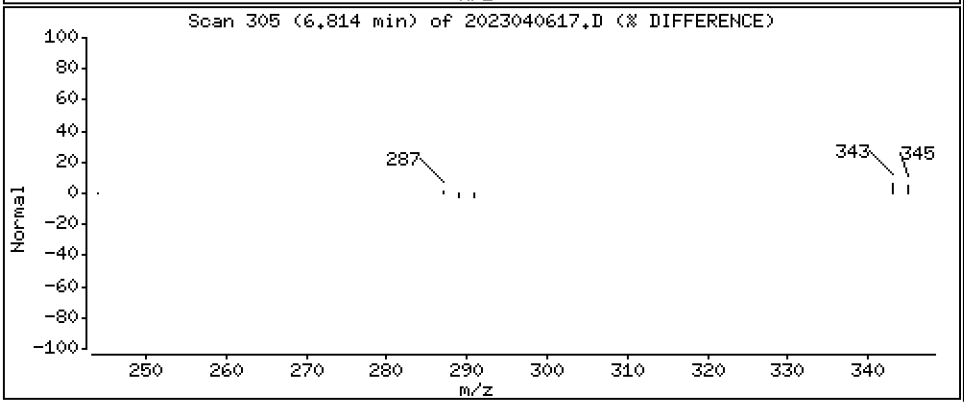












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040617.D
Lab Smp Id: 23C0618-01
Inj Date : 06-APR-2023 20:12
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0618-01
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 17
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.560	4.514	(0.746)	27901	0.44088	0.4409
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.526	5.472	(0.904)	12732	0.25692	0.2569
*	4 Tetrapentyl Tin	333	6.116	6.102	(1.000)	149677	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	9664	0.27161	0.2716
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	25383	0.48491	0.4849
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	8885	0.15518	0.1552
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	21193	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040617.D
Lab Smp Id: 23C0618-01
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

COMPOUND	STANDARD	AREA LIMIT LOWER	AREA LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	149677	-8.83
8 p-Terphenyl-d14	22611	11306	45222	21193	-6.27

COMPOUND	STANDARD	RT LIMIT LOWER	RT LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.12	0.22
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040617.D

Lab ID: 23C0618-01
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 20:12

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.904	0.897	0.0068	Tributyl Tin (Hexyl)
0.746	0.740	0.0059	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Analytical Resources, LLC
Analytical Chemists and Consultants

SED-14G:0-10

Form I
ORGANIC ANALYSIS DATA SHEET
EPA 8270E-SIM
Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0618-03 B	SDG:	23C0618
Sampled:	03/20/23 10:11	Prepared:	03/28/23 12:28	File ID:	2023040618.D
% Solids:	57.60	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/06/23 20:28
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	8.68 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	27.1		0.450	3.86
14488-53-0	Dibutyltin Ion	1	36.7		1.73	5.78
78763-54-9	Butyltin Ion	1	7.58		1.89	4.08
1461-25-2	Tetrabutyltin	1	5.00	U	5.00	5.00

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	45.181	39.6	87.7	30 - 160	
Tripropyltin	43.749	34.0	77.6	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040618.D

Page 1

Date : 06-APR-2023 20:28

Client ID:

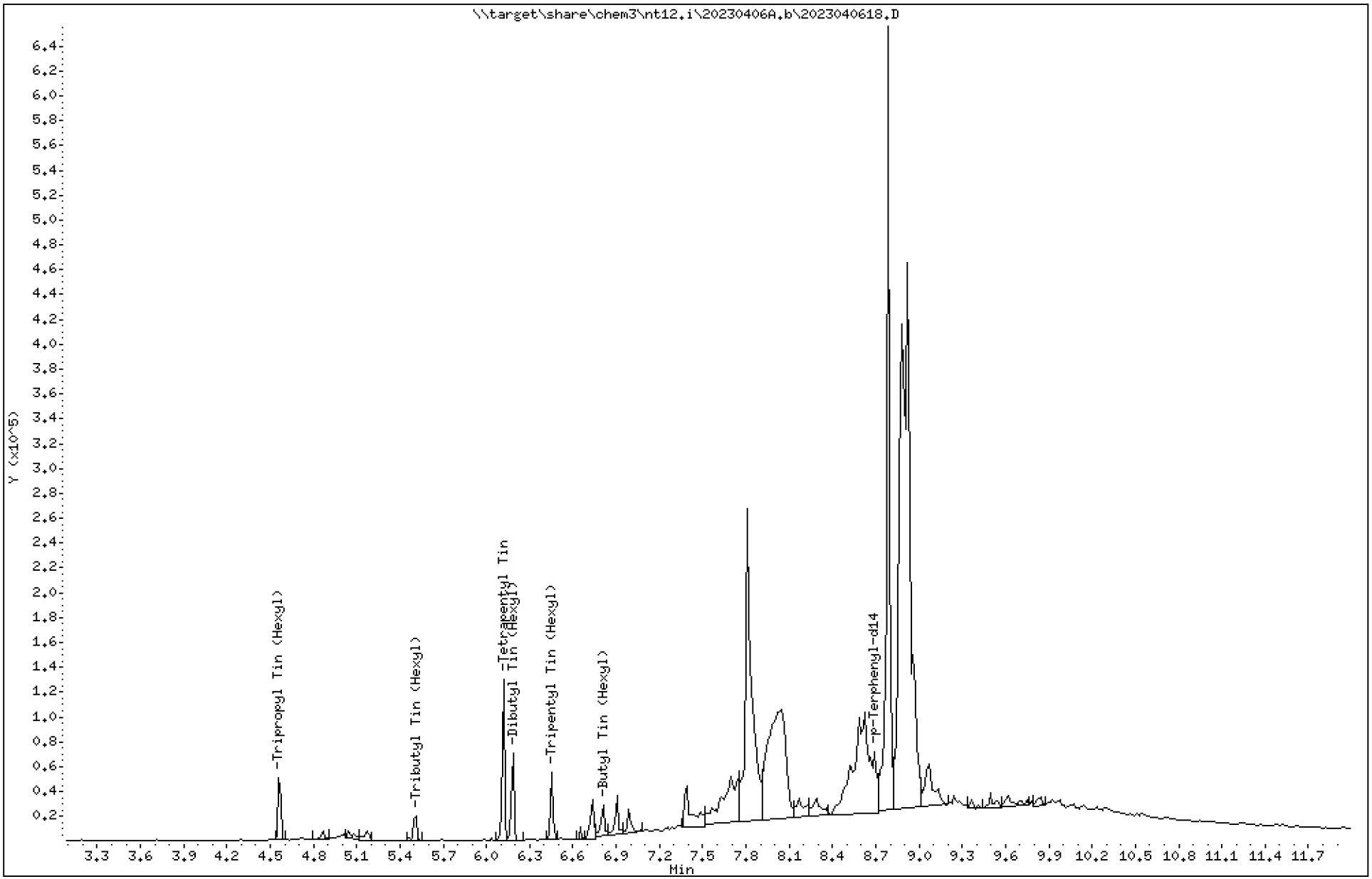
Instrument: nt12.i

Sample Info: 23C0618-03

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0618 CLPLIKE (Rev0) - Page 17 of 269

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040618.D

Date : 06-APR-2023 20:28

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-03

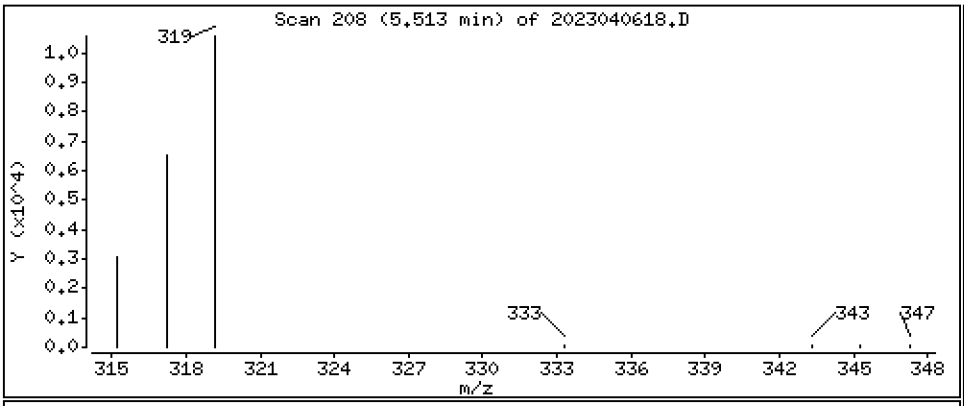
Operator: JZ

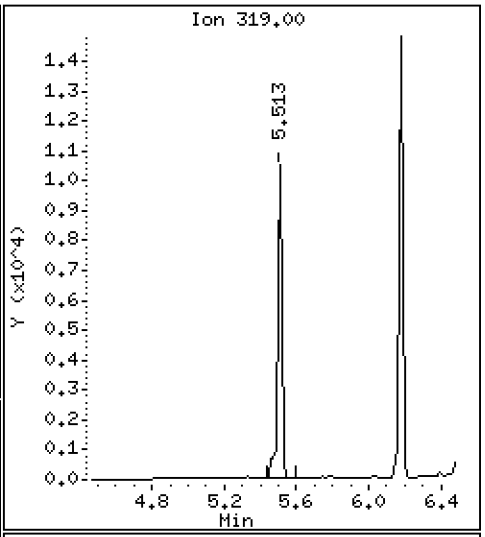
Column phase: ZB-5msi

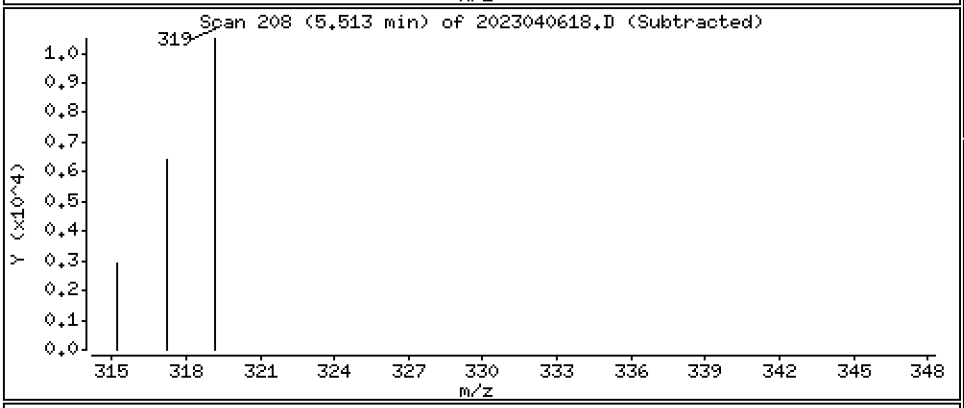
Column diameter: 0.25

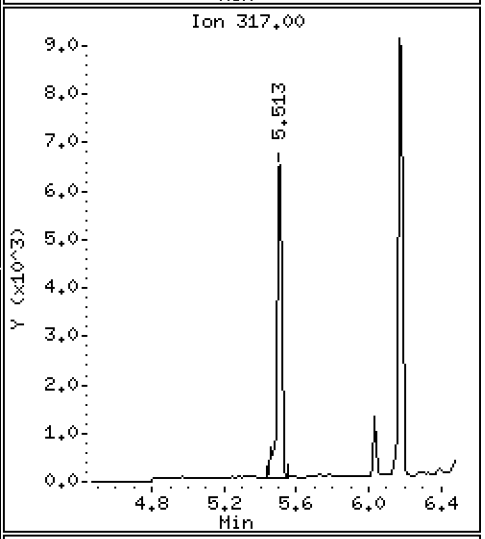
3 Tributyl Tin (Hexyl)

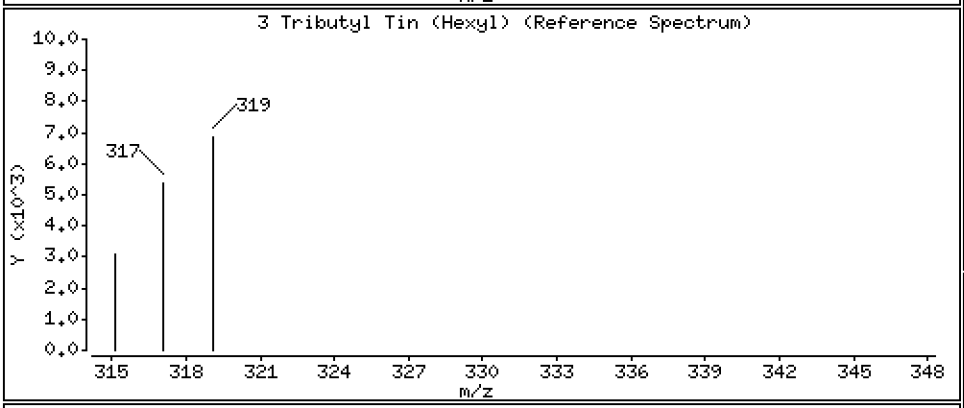
Concentration: 0.3510 ug/mL

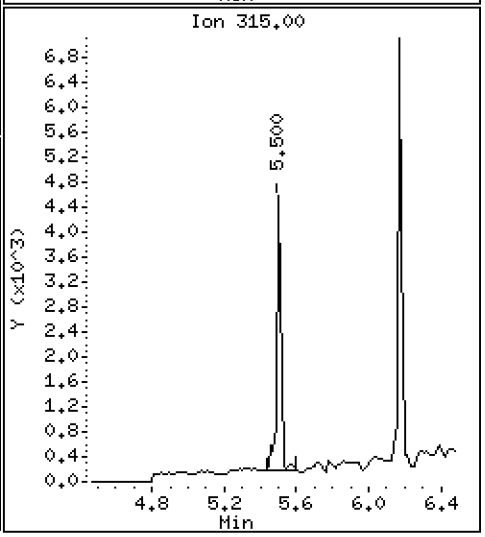


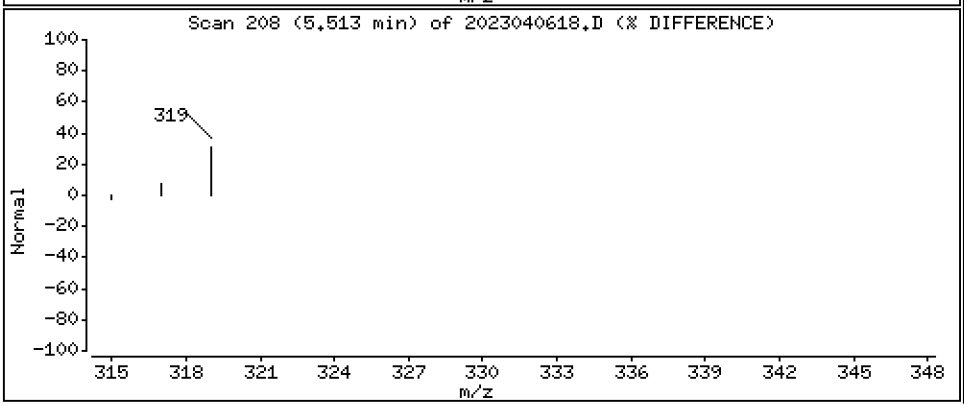












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Date : 06-APR-2023 20:28

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-03

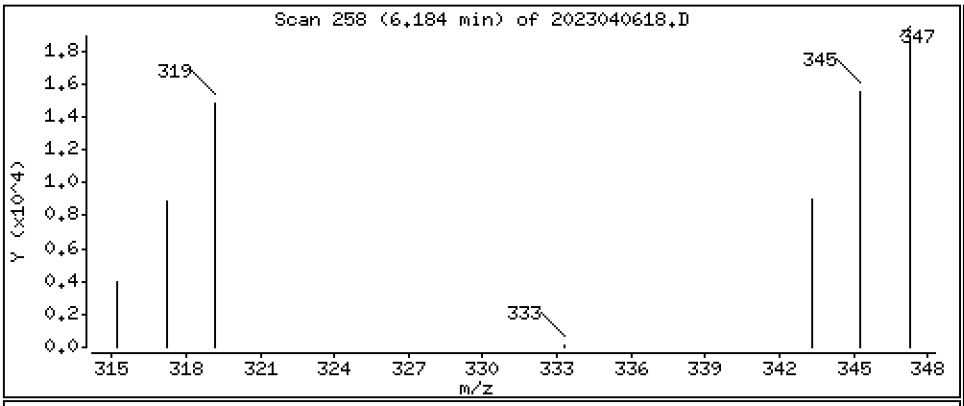
Operator: JZ

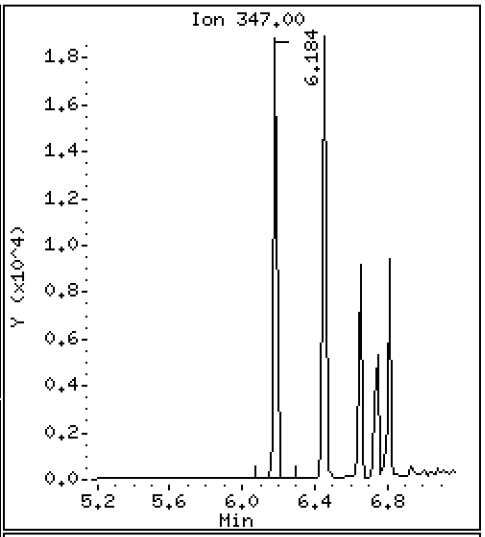
Column phase: ZB-5msi

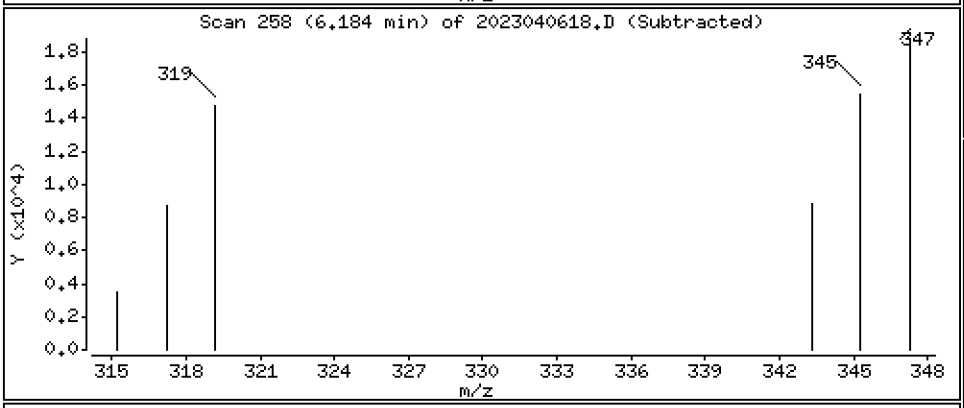
Column diameter: 0.25

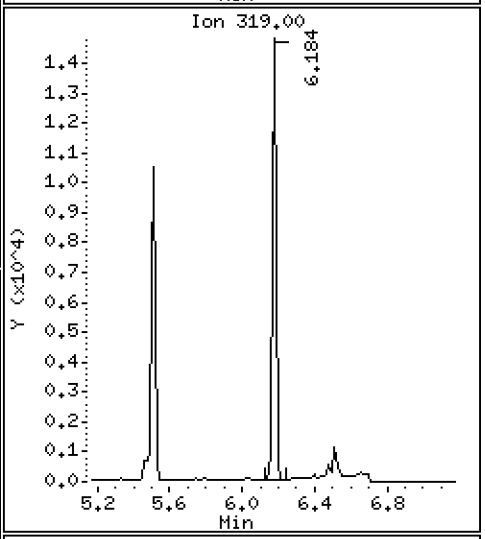
5 Dibutyl Tin (Hexyl)

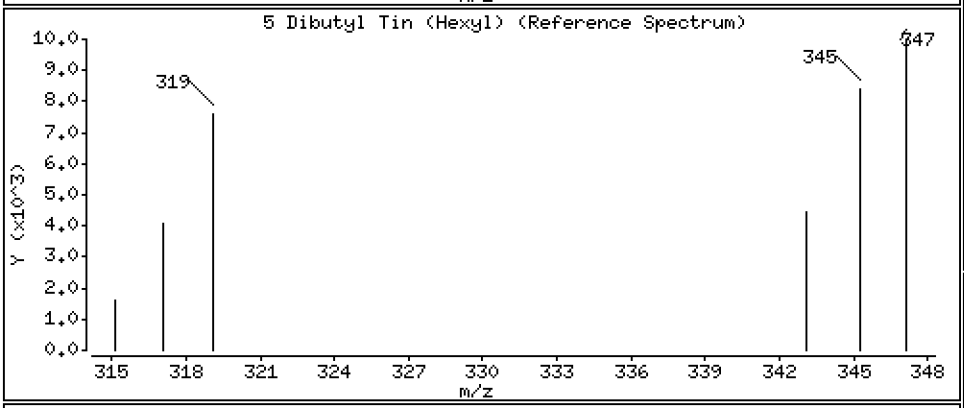
Concentration: 0.6352 ug/mL

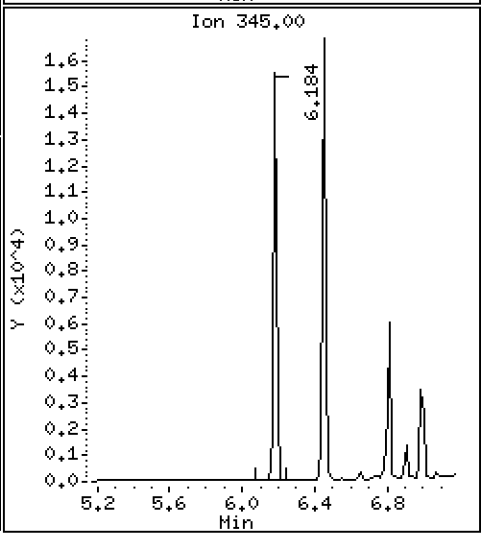


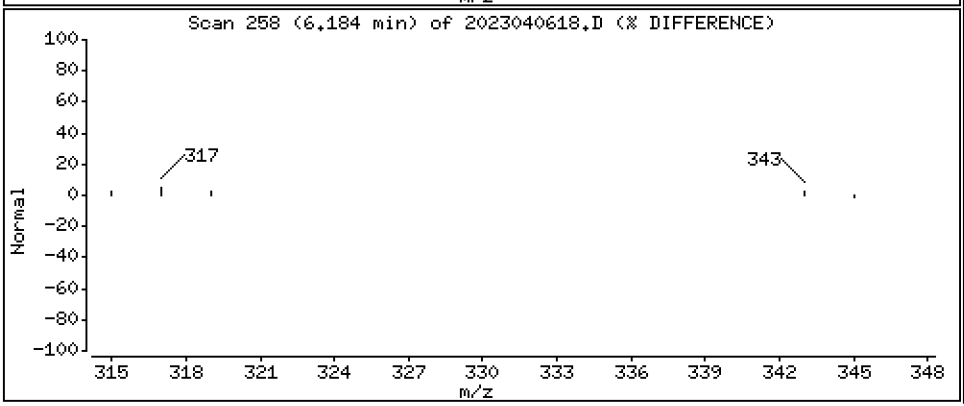












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Date : 06-APR-2023 20:28

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-03

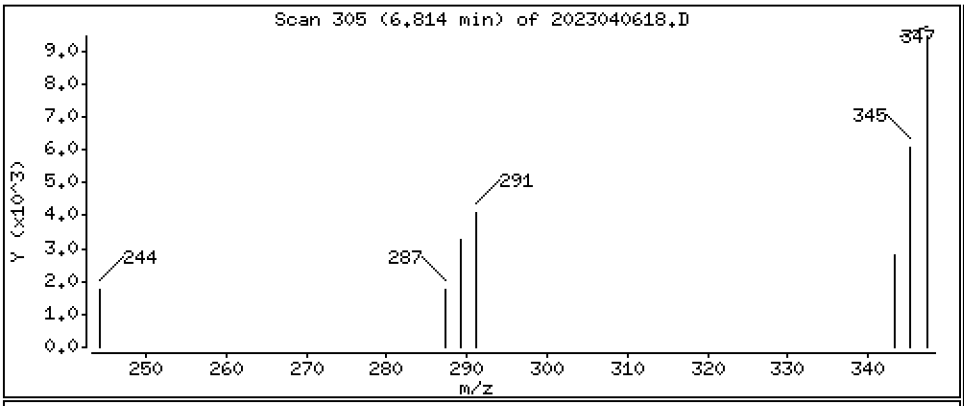
Operator: JZ

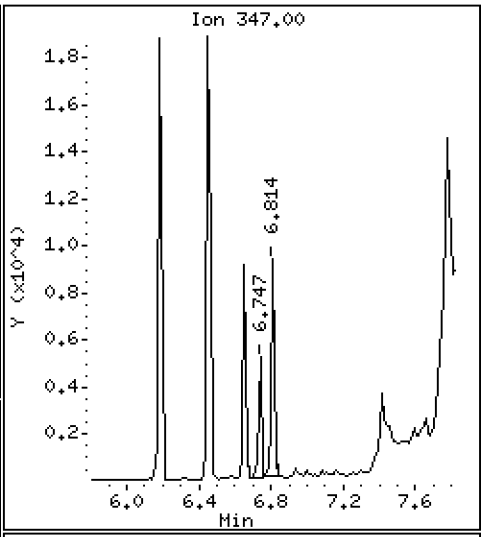
Column phase: ZB-5msi

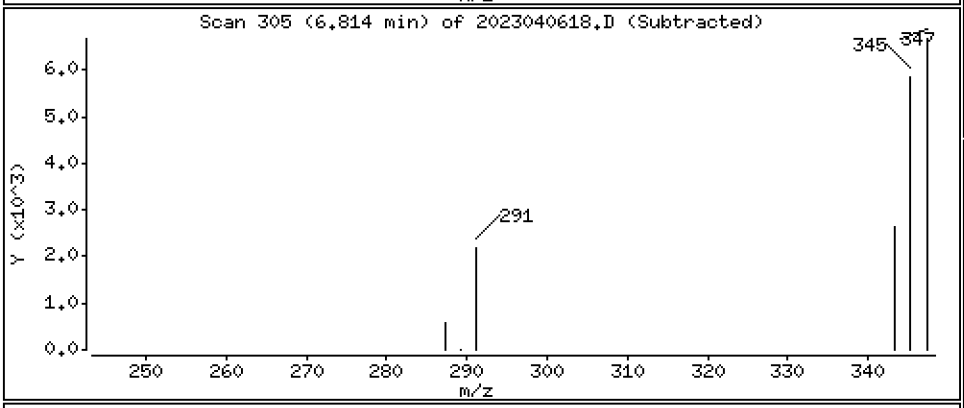
Column diameter: 0.25

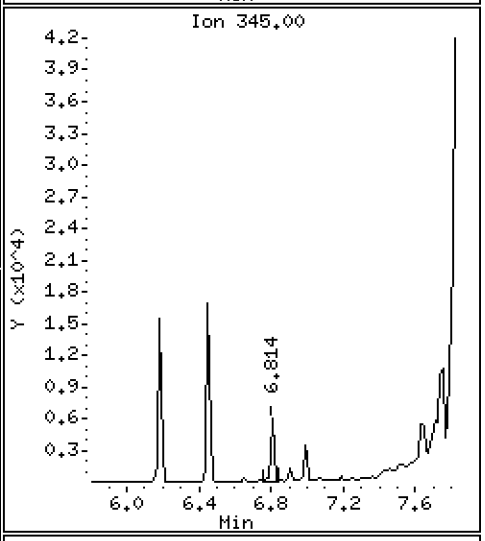
7 Butyl Tin (Hexyl)

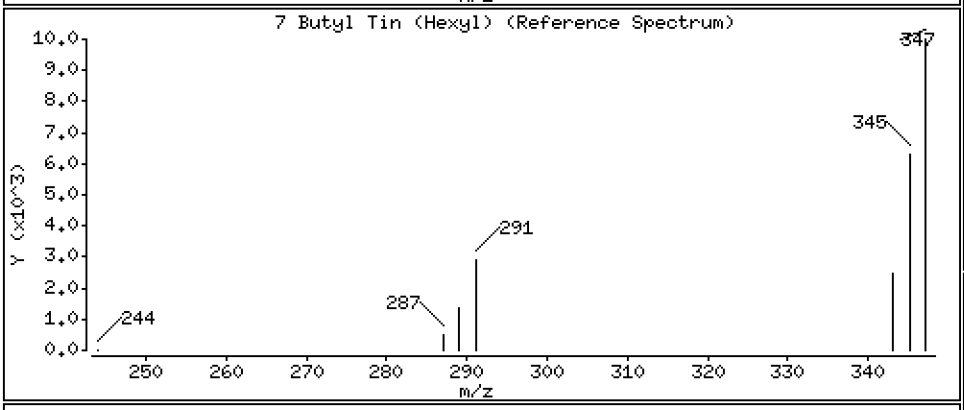
Concentration: 0.1858 ug/mL

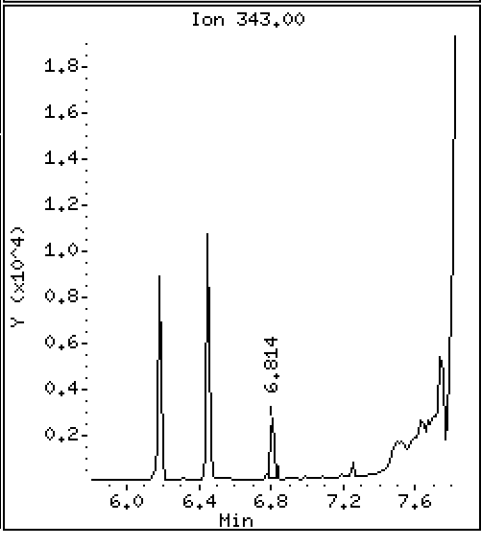


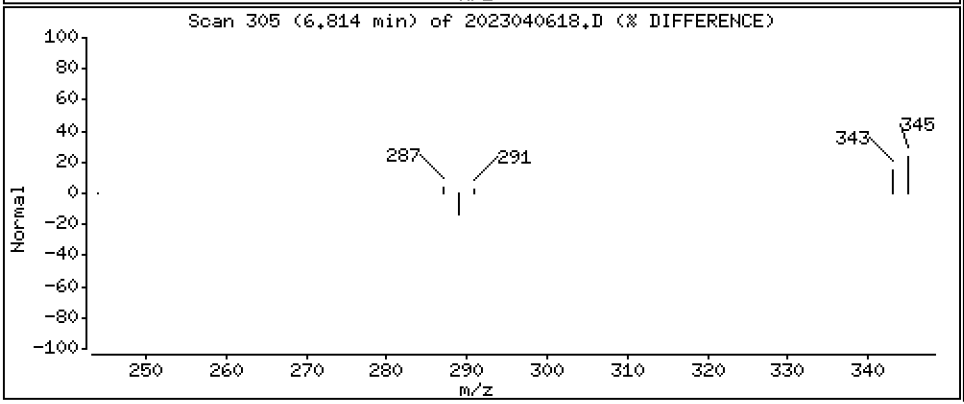












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040618.D
Lab Smp Id: 23C0618-03
Inj Date : 06-APR-2023 20:28
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0618-03
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 18
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	CONCENTRATIONS FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.571	4.514	(0.747)	26927	0.45633	0.4563
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.513	5.472	(0.901)	16217	0.35096	0.3510
*	4 Tetrapentyl Tin	333	6.116	6.102	(1.000)	139560	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	21632	0.63522	0.6352
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	24941	0.49782	0.4978
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	10180	0.18576	0.1858
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	20284	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040618.D
Lab Smp Id: 23C0618-03
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	139560	-14.99
8 p-Terphenyl-d14	22611	11306	45222	20284	-10.29

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.12	0.22
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040618.D

Lab ID: 23C0618-03
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 20:28

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.747	0.740	0.0078	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

SED-15G:0-10

Form I
ORGANIC ANALYSIS DATA SHEET
EPA 8270E-SIM
Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0618-04 B	SDG:	23C0618
Sampled:	03/20/23 10:42	Prepared:	03/28/23 12:28	File ID:	2023040619.D
% Solids:	60.77	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/06/23 20:45
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	8.26 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	101		0.448	3.84
14488-53-0	Dibutyltin Ion	1	36.9		1.72	5.76
78763-54-9	Butyltin Ion	1	6.98		1.88	4.06
1461-25-2	Tetrabutyltin	1	4.98	U	4.98	4.98

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	45.002	41.8	92.8	30 - 160	
Tripropyltin	43.575	35.5	81.5	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040619.D

Page 1

Date : 06-APR-2023 20:45

Client ID:

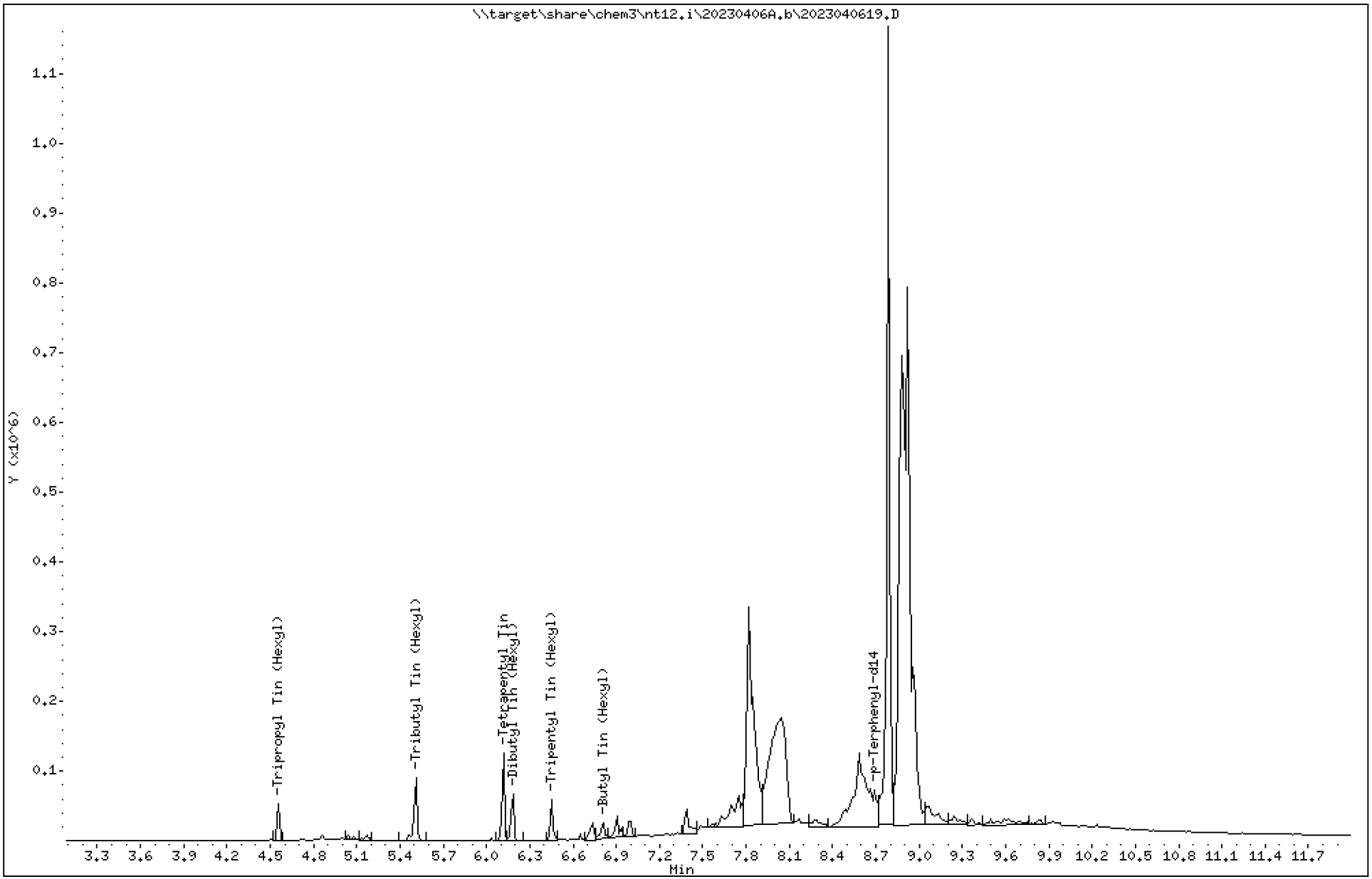
Instrument: nt12.i

Sample Info: 23C0618-04

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040619.D

Date : 06-APR-2023 20:45

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-04

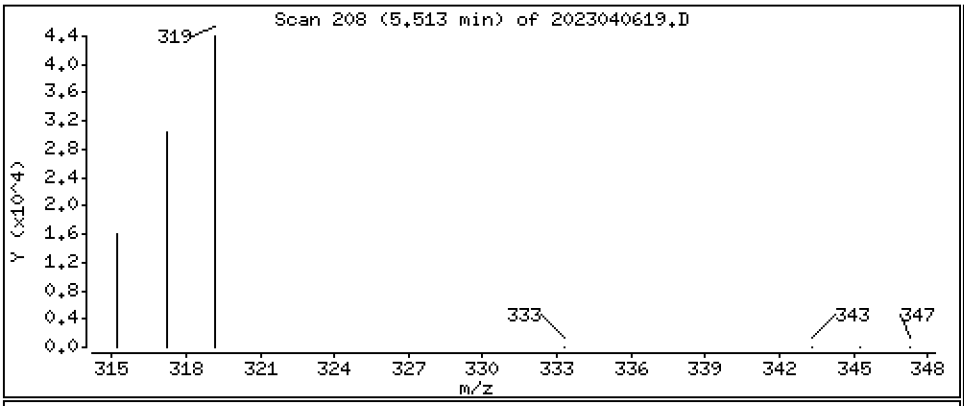
Operator: JZ

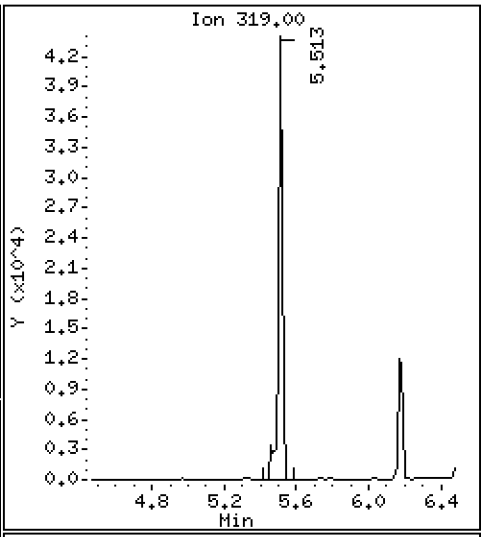
Column phase: ZB-5msi

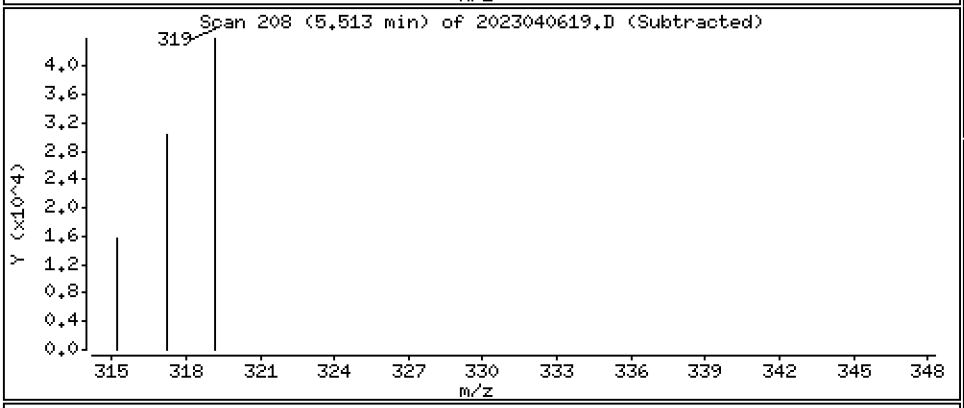
Column diameter: 0.25

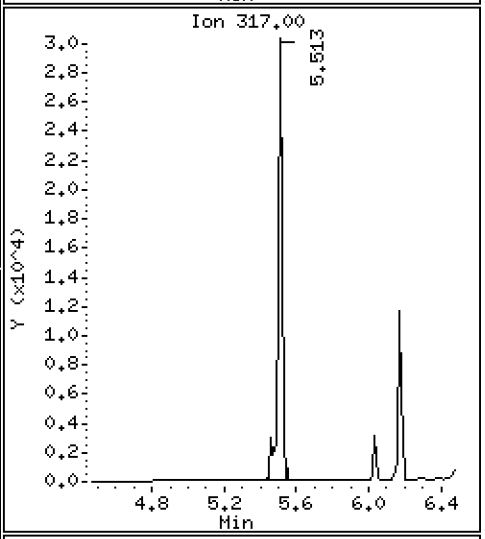
3 Tributyl Tin (Hexyl)

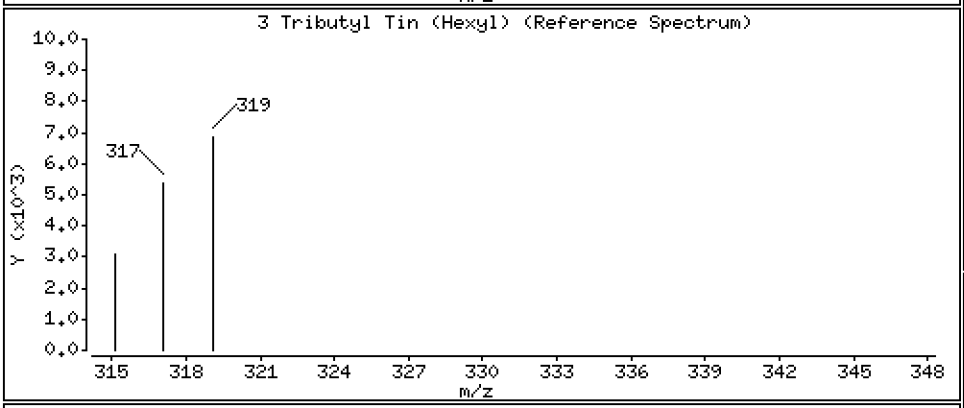
Concentration: 1.310 ug/mL

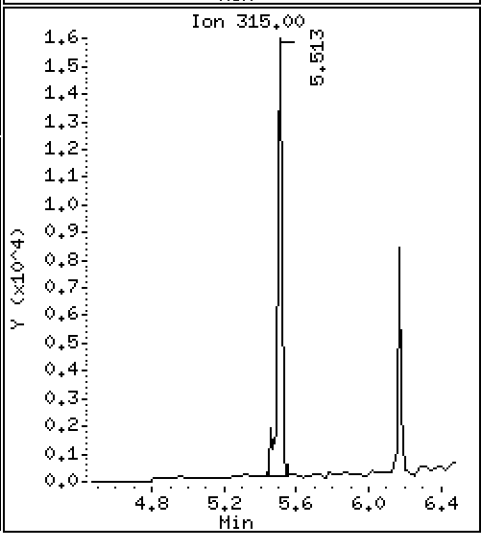


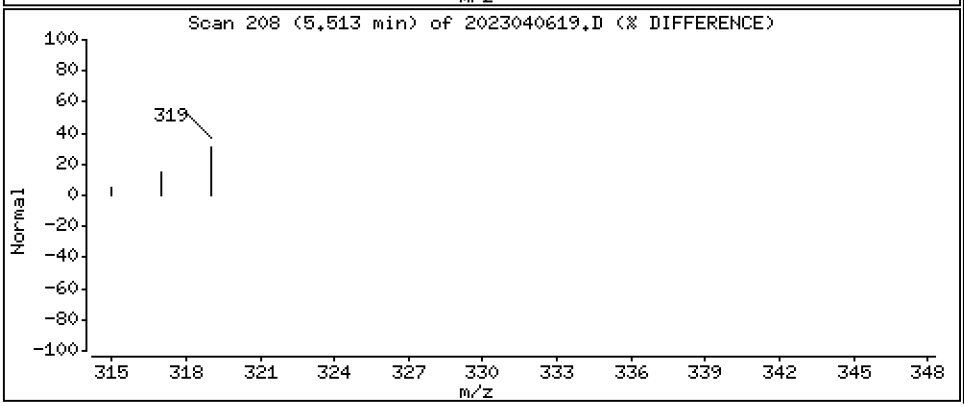












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040619.D

Date : 06-APR-2023 20:45

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-04

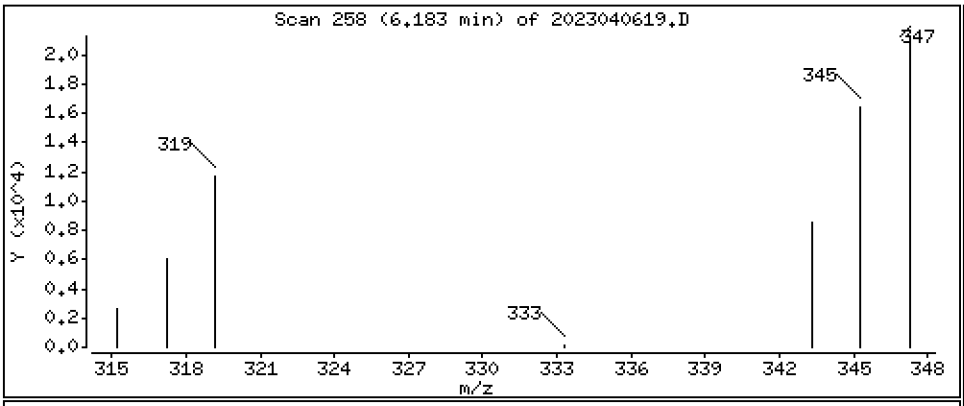
Operator: JZ

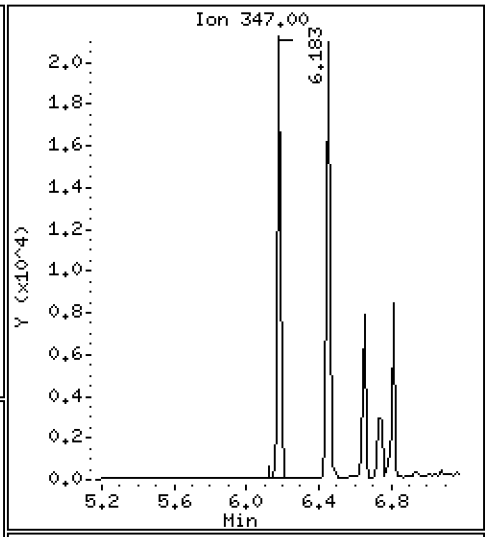
Column phase: ZB-5msi

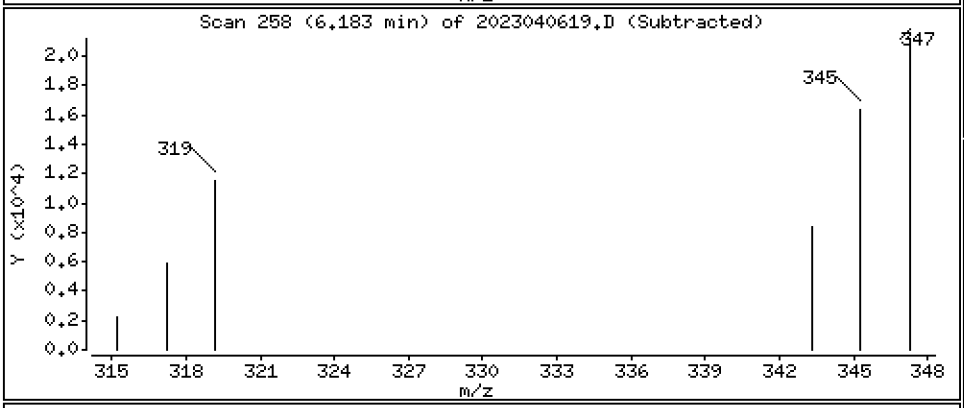
Column diameter: 0.25

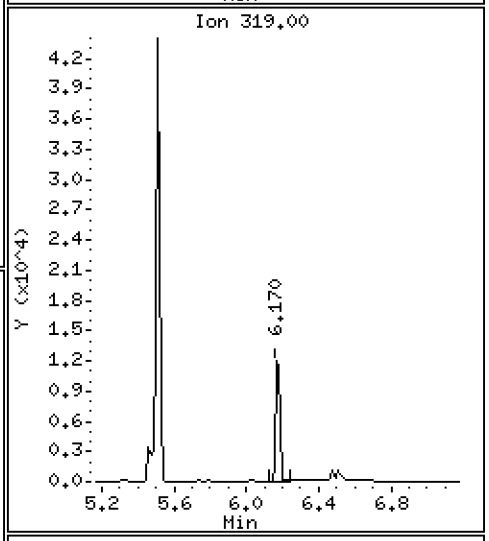
5 Dibutyl Tin (Hexyl)

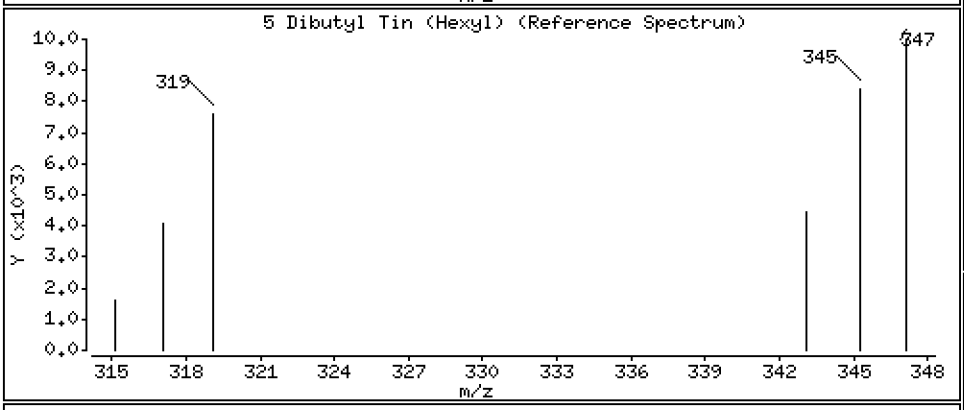
Concentration: 0.6405 ug/mL

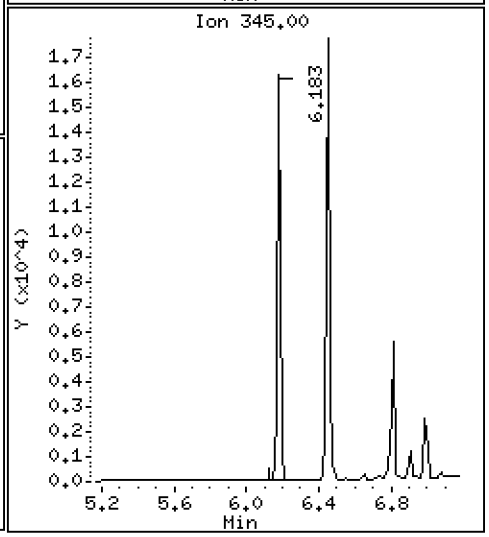


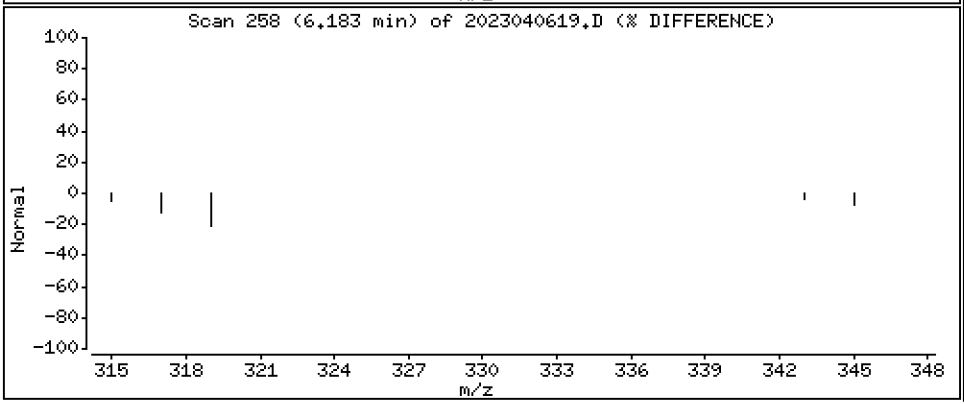












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040619.D

Date : 06-APR-2023 20:45

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-04

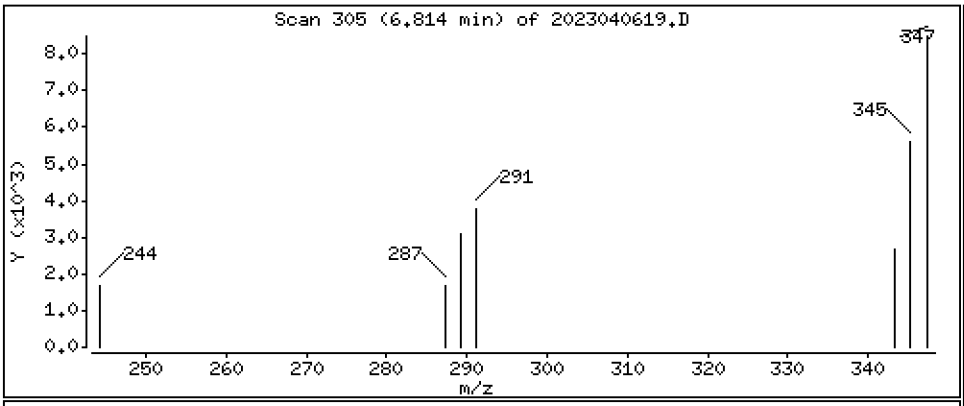
Operator: JZ

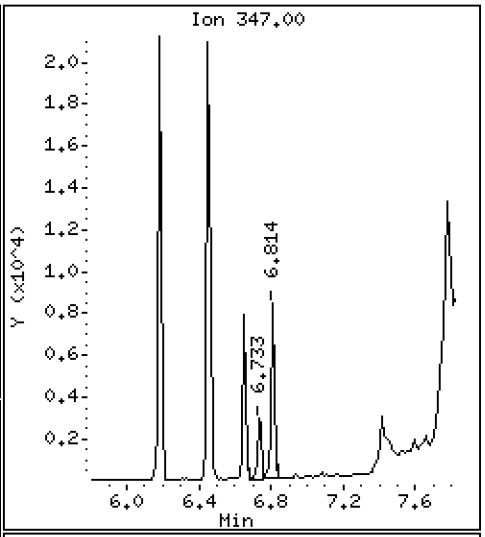
Column phase: ZB-5msi

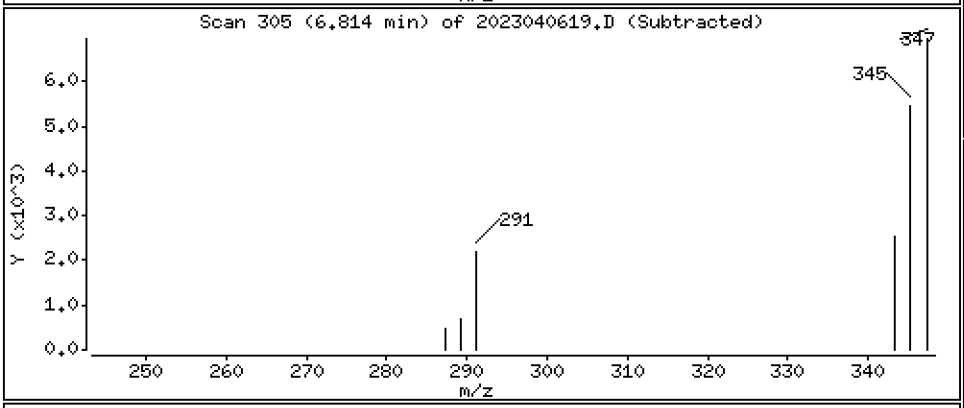
Column diameter: 0.25

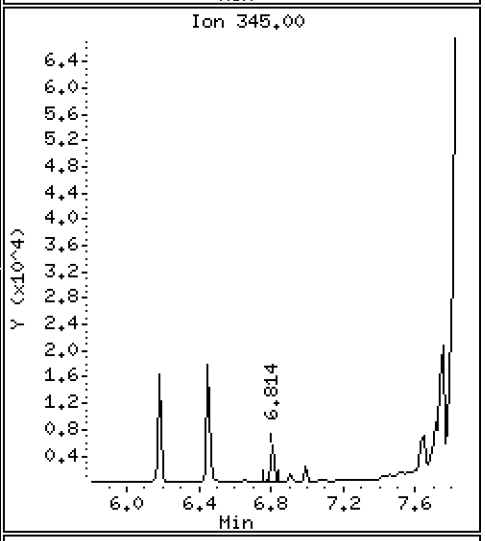
7 Butyl Tin (Hexyl)

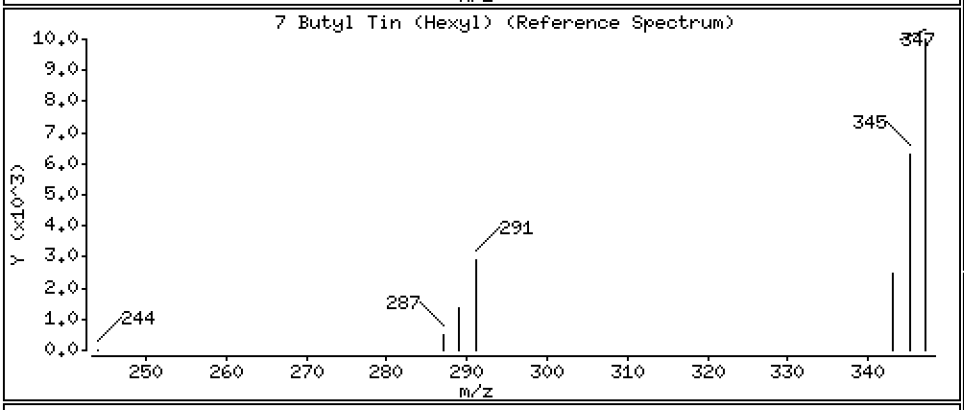
Concentration: 0.1716 ug/mL

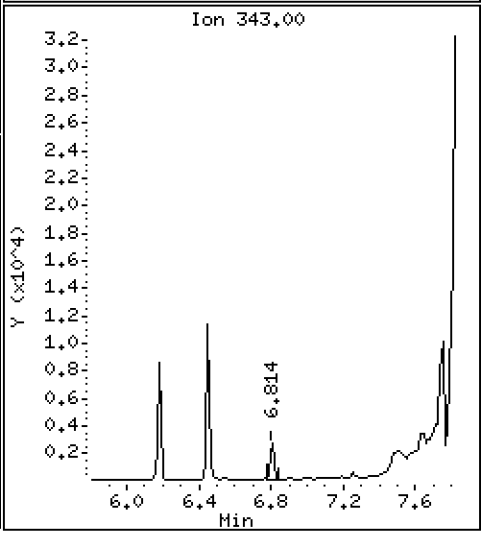


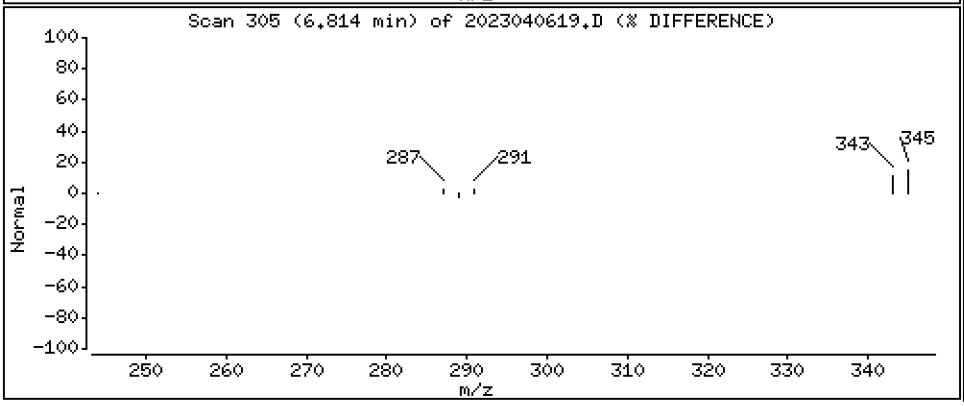












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040619.D
Lab Smp Id: 23C0618-04
Inj Date : 06-APR-2023 20:45
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0618-04
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 19
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.560	4.514	(0.746)	27789	0.47903	0.4790
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.513	5.472	(0.901)	59519	1.31021	1.310
*	4 Tetrapentyl Tin	333	6.116	6.102	(1.000)	137203	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	21965	0.64049	0.6405
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	26570	0.52662	0.5266
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	9472	0.17163	0.1716
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	20427	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040619.D
Lab Smp Id: 23C0618-04
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	137203	-16.43
8 p-Terphenyl-d14	22611	11306	45222	20427	-9.66

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.12	0.22
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040619.D

Lab ID: 23C0618-04
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 20:45

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.746	0.740	0.0059	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Analytical Resources, LLC
Analytical Chemists and Consultants

SED-14C:0-1

Form I
ORGANIC ANALYSIS DATA SHEET
EPA 8270E-SIM
Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0618-11 A	SDG:	23C0618
Sampled:	03/21/23 15:53	Prepared:	03/28/23 12:28	File ID:	2023040620.D
% Solids:	69.54	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/06/23 21:01
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	7.19 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

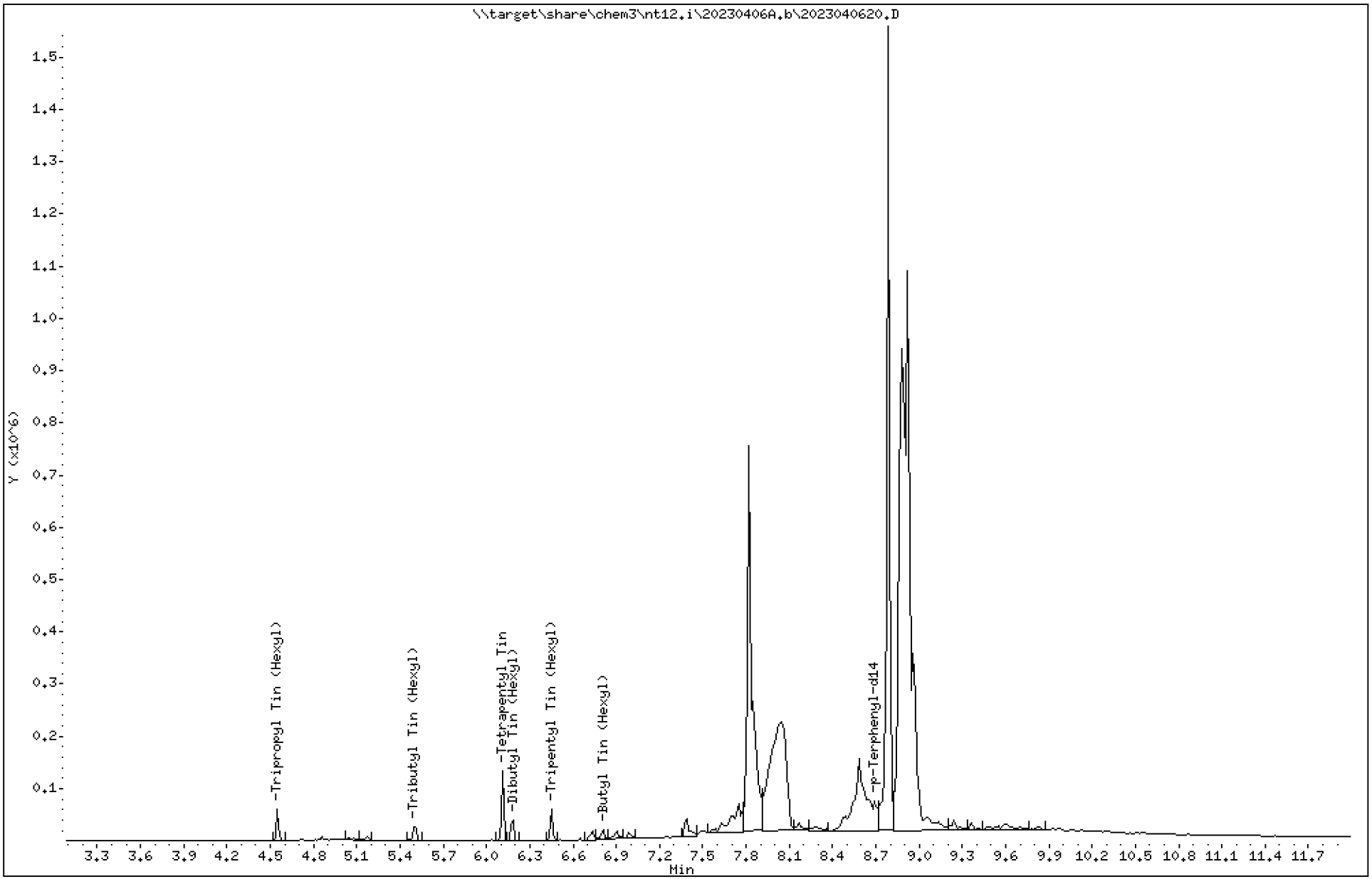
CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	32.7		0.450	3.86
14488-53-0	Dibutyltin Ion	1	22.4		1.73	5.78
78763-54-9	Butyltin Ion	1	5.30		1.89	4.08
1461-25-2	Tetrabutyltin	1	5.00	U	5.00	5.00

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	45.179	38.5	85.1	30 - 160	
Tripropyltin	43.747	35.2	80.4	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040620.D
Date : 06-APR-2023 21:01
Client ID:
Sample Info: 23C0618-11

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



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Date : 06-APR-2023 21:01

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-11

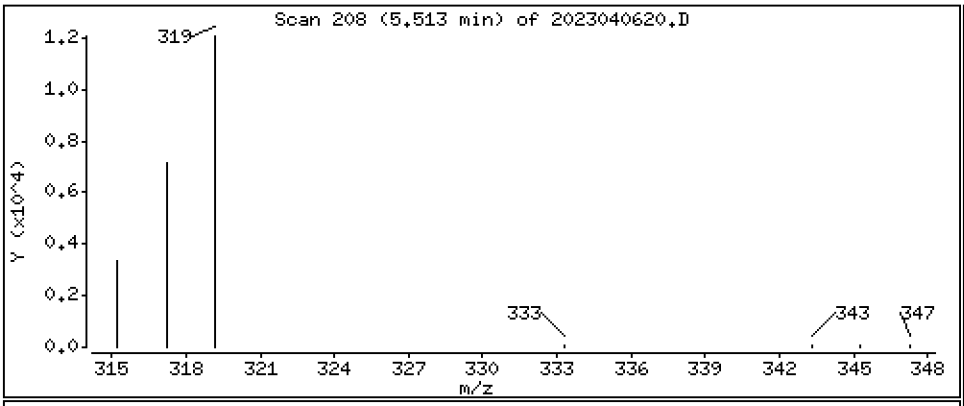
Operator: JZ

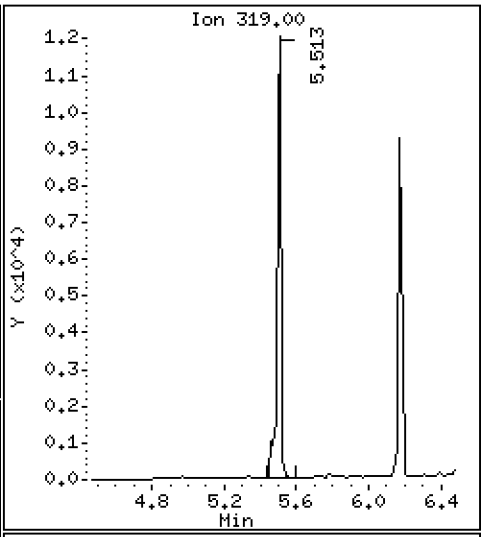
Column phase: ZB-5msi

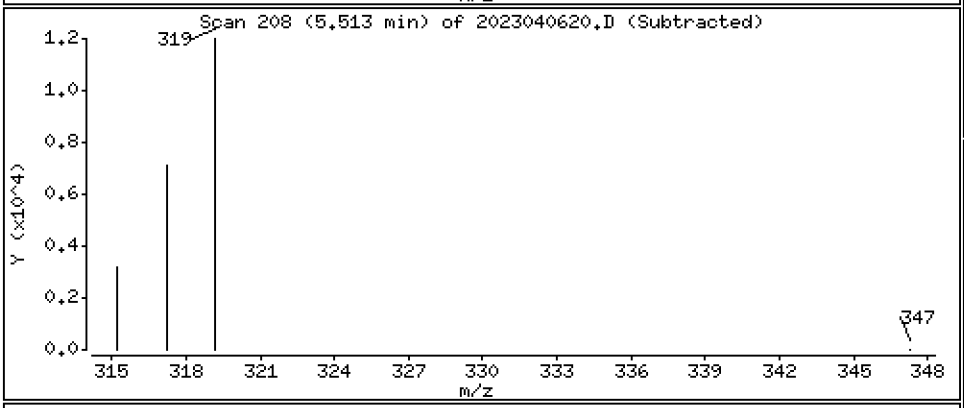
Column diameter: 0.25

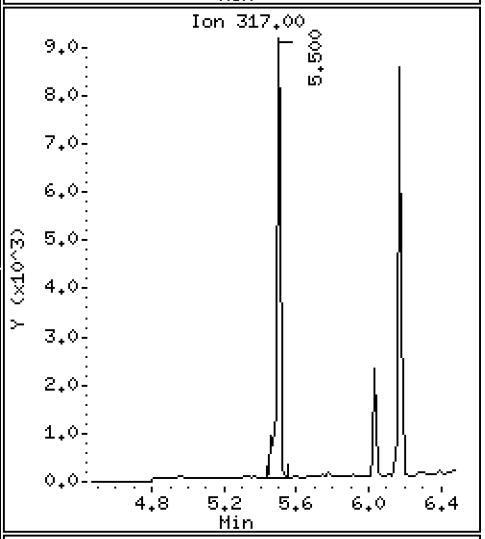
3 Tributyl Tin (Hexyl)

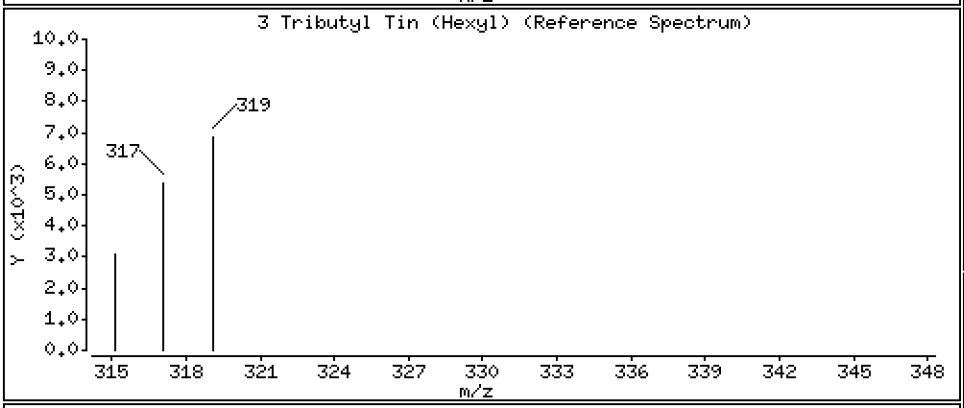
Concentration: 0.4226 ug/mL

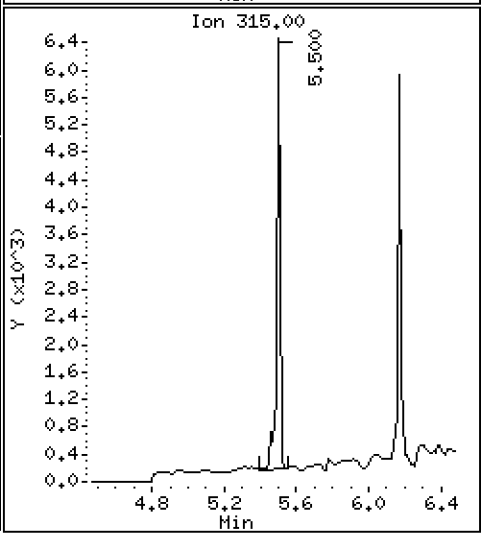


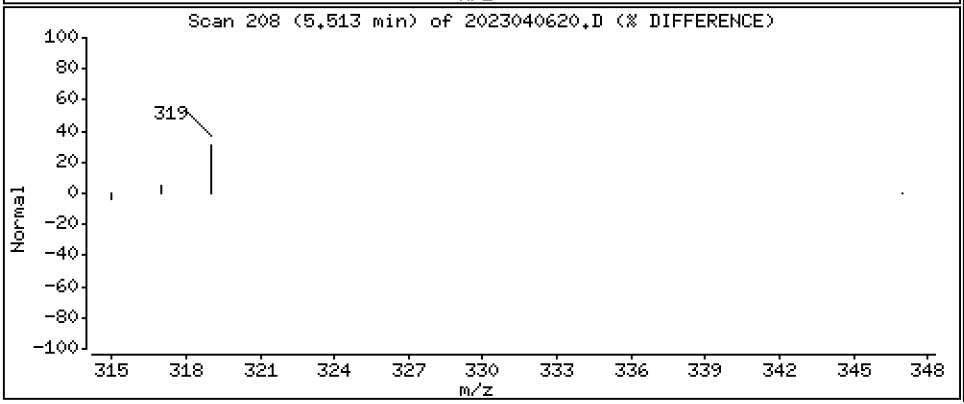












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040620.D

Date : 06-APR-2023 21:01

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-11

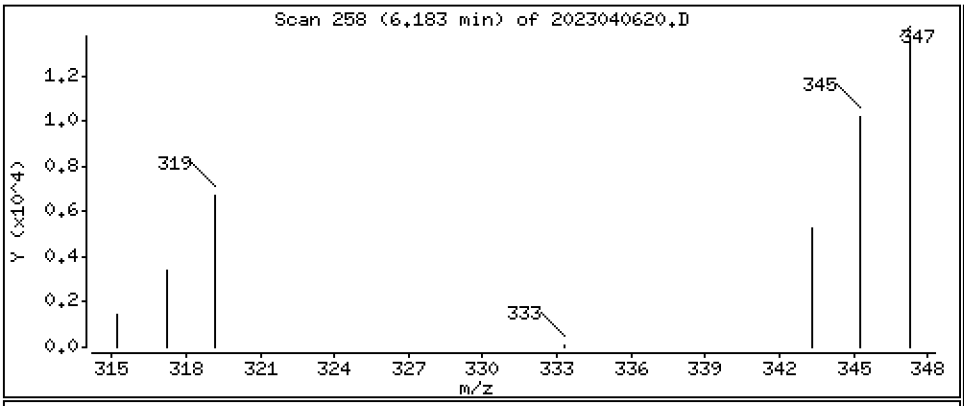
Operator: JZ

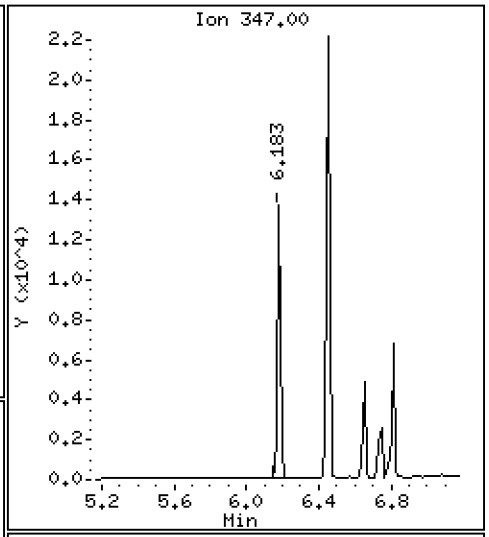
Column phase: ZB-5msi

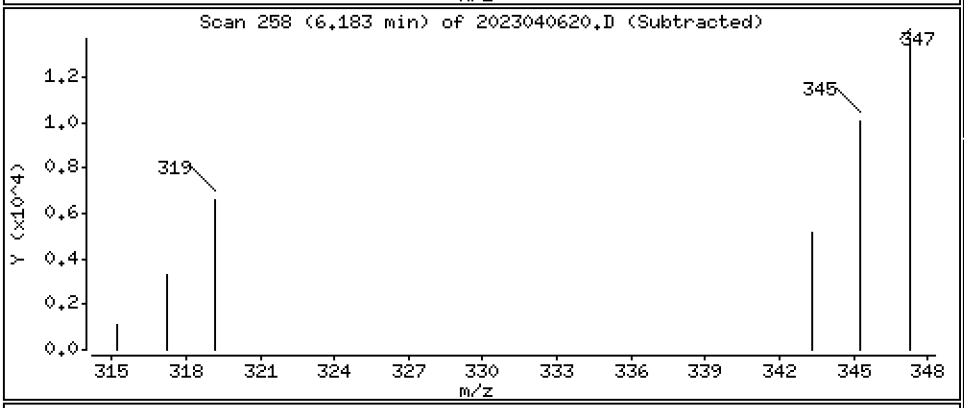
Column diameter: 0.25

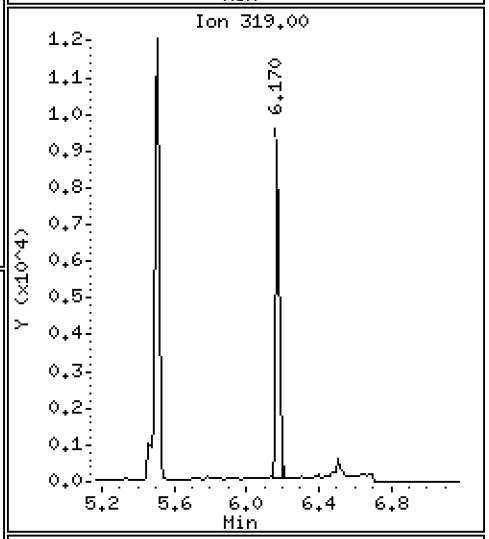
5 Dibutyl Tin (Hexyl)

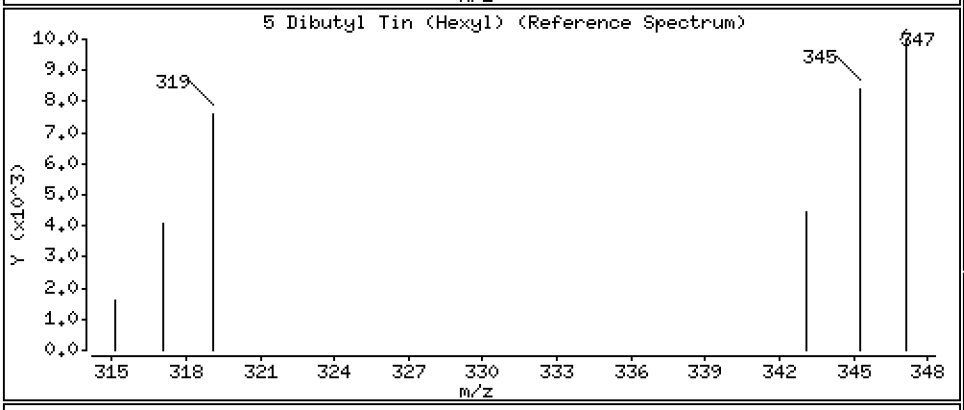
Concentration: 0.3879 ug/mL

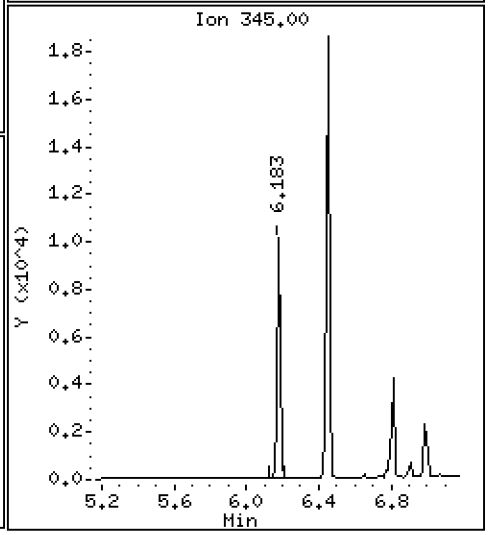


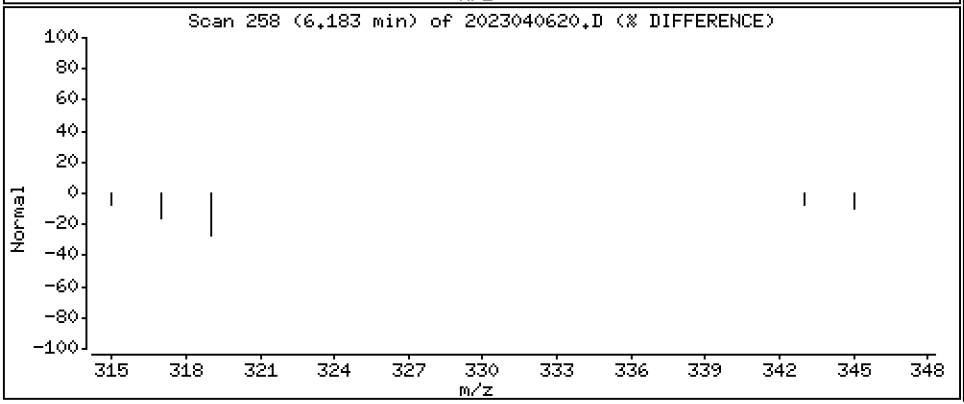












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040620.D

Date : 06-APR-2023 21:01

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-11

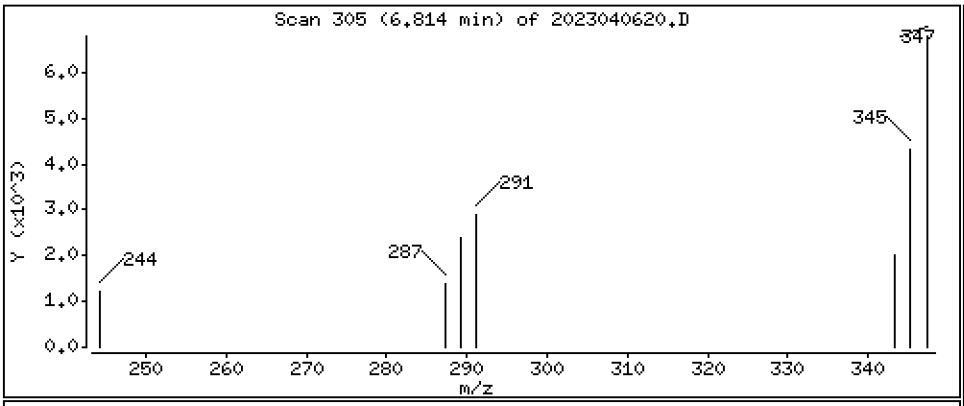
Operator: JZ

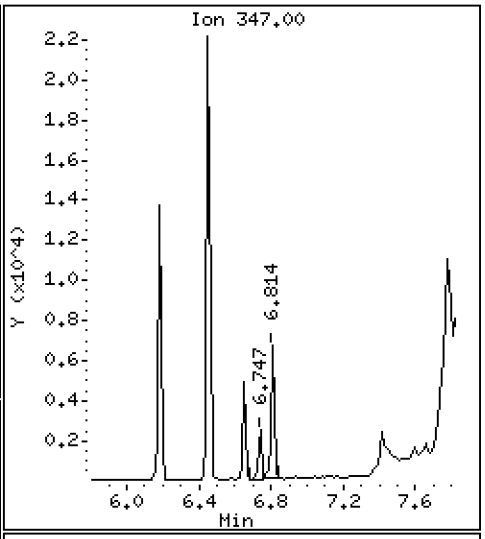
Column phase: ZB-5msi

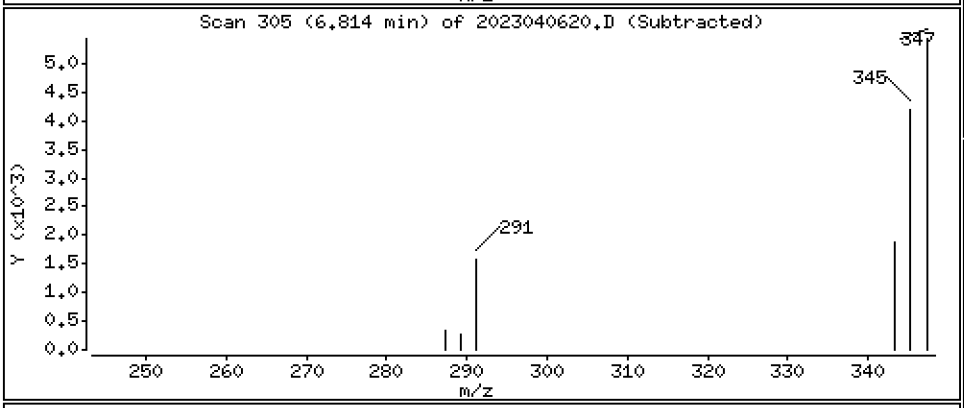
Column diameter: 0.25

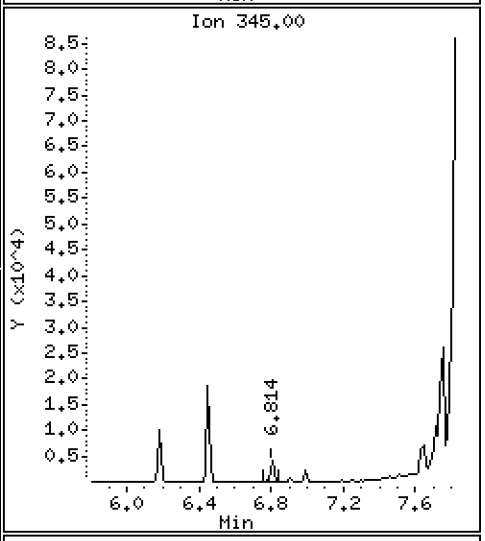
7 Butyl Tin (Hexyl)

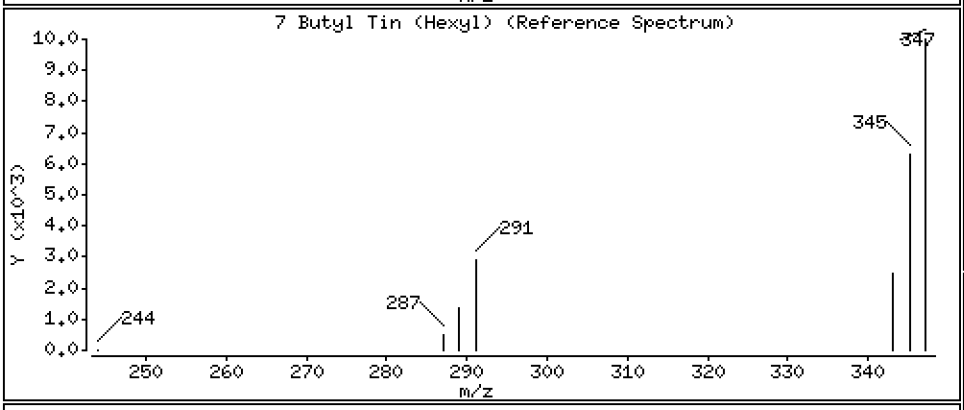
Concentration: 0.1298 ug/mL

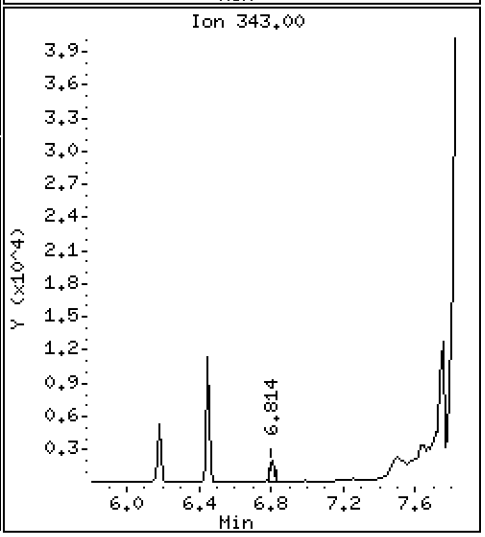


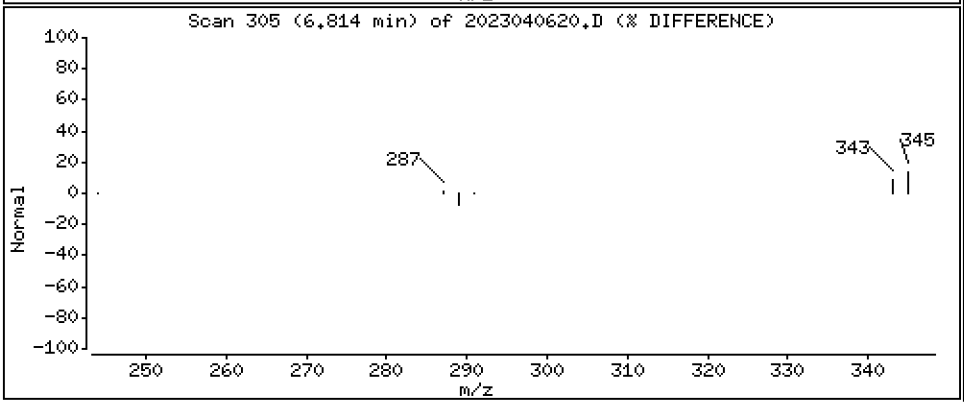












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040620.D
Lab Smp Id: 23C0618-11
Inj Date : 06-APR-2023 21:01
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0618-11
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 20
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.548	4.514	(0.744)	29669	0.47272	0.4727
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.513	5.472	(0.901)	20770	0.42260	0.4226
*	4 Tetrapentyl Tin	333	6.116	6.102	(1.000)	148442	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	14326	0.38789	0.3879
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	26256	0.48321	0.4832
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	7715	0.12981	0.1298
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	21999	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040620.D
Lab Smp Id: 23C0618-11
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	148442	-9.58
8 p-Terphenyl-d14	22611	11306	45222	21999	-2.71

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.12	0.22
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040620.D

Lab ID: 23C0618-11
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 21:01

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606A.D

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

SED-14C:1-3

Form I
ORGANIC ANALYSIS DATA SHEET
EPA 8270E-SIM
Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0618-12 A	SDG:	23C0618
Sampled:	03/21/23 15:53	Prepared:	03/28/23 12:28	File ID:	2023040621.D
% Solids:	60.15	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/06/23 21:18
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	8.33 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

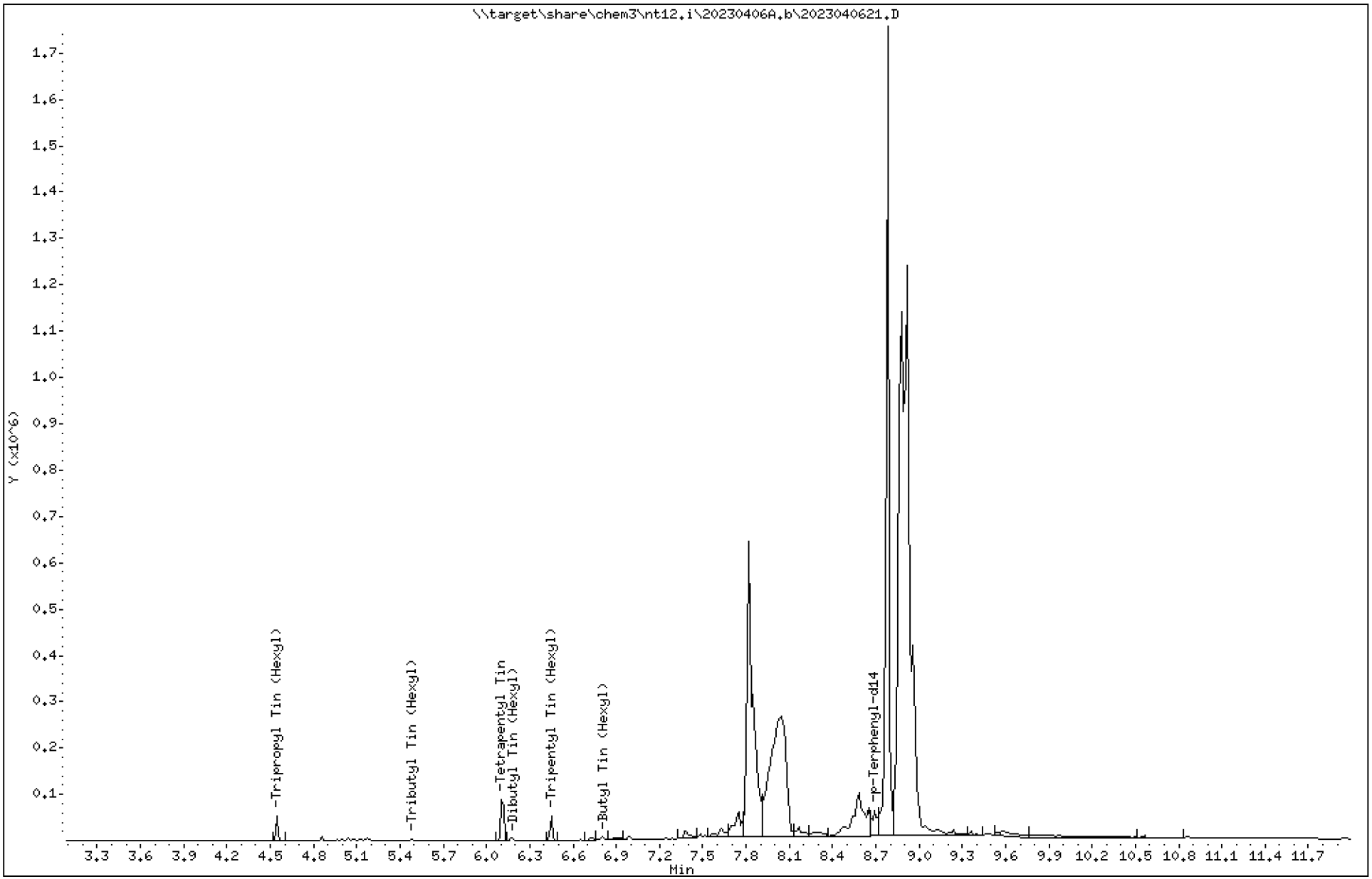
CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	4.41		0.449	3.85
14488-53-0	Dibutyltin Ion	1	2.87	J	1.73	5.77
78763-54-9	Butyltin Ion	1	4.07	U	1.89	4.07
1461-25-2	Tetrabutyltin	1	4.99	U	4.99	4.99

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	45.083	33.3	74.0	30 - 160	
Tripropyltin	43.654	31.9	73.1	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040621.D
Date : 06-APR-2023 21:18
Client ID:
Sample Info: 23C0618-12

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



23C0618 CLPLIKE (Rev0) - Page 41 of 269

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040621.D

Date : 06-APR-2023 21:18

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-12

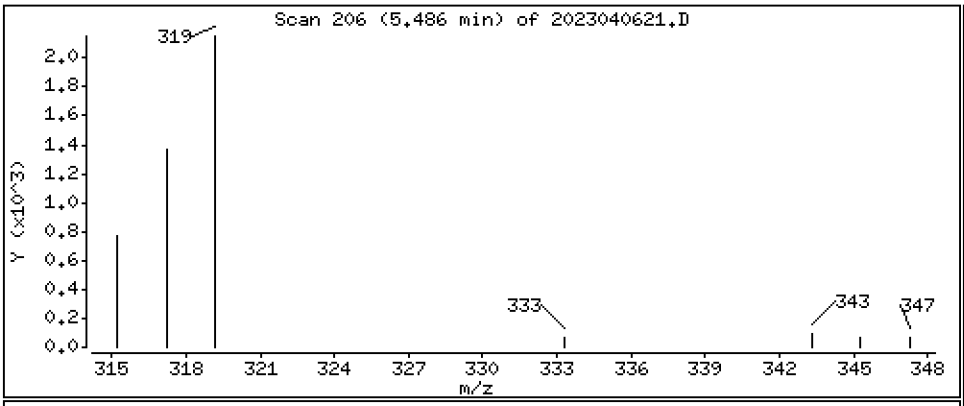
Operator: JZ

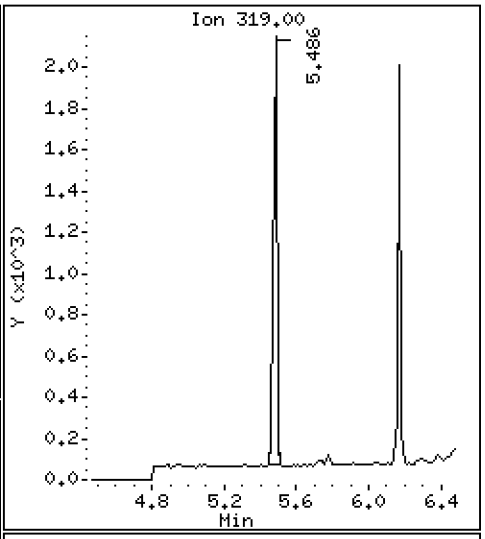
Column phase: ZB-5msi

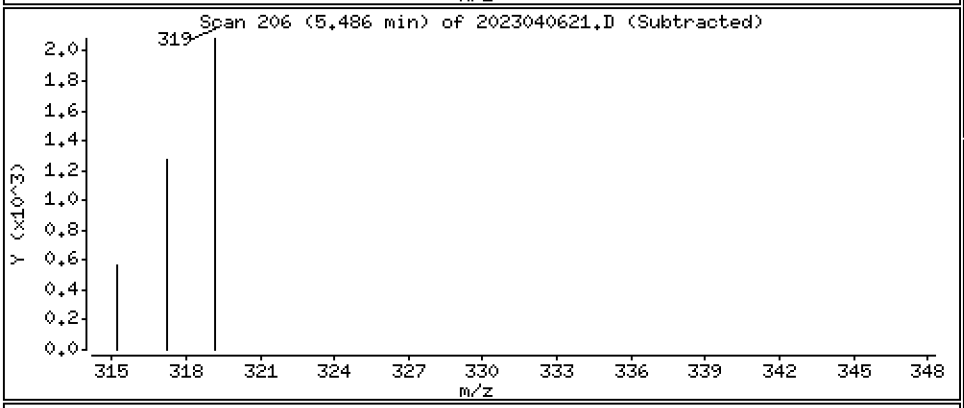
Column diameter: 0.25

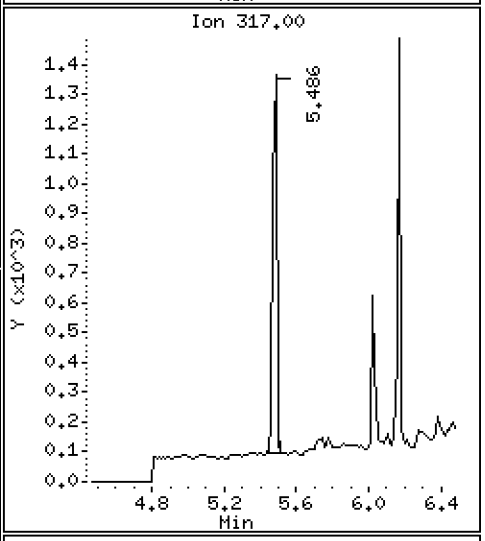
3 Tributyl Tin (Hexyl)

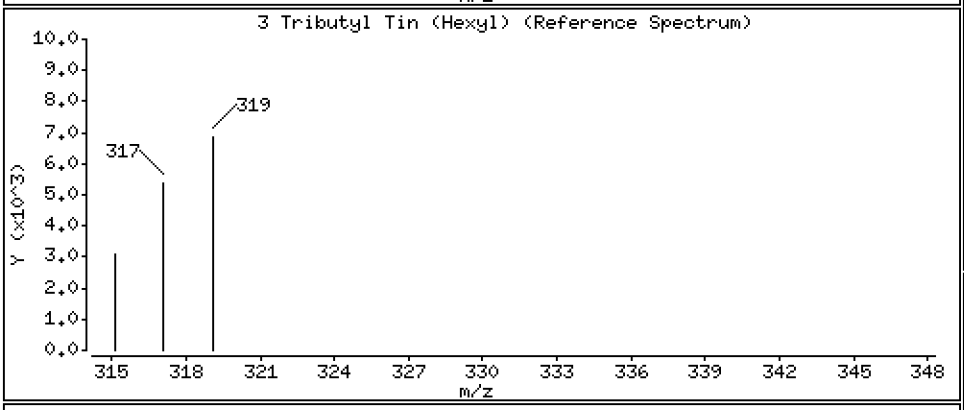
Concentration: 0.05713 ug/mL

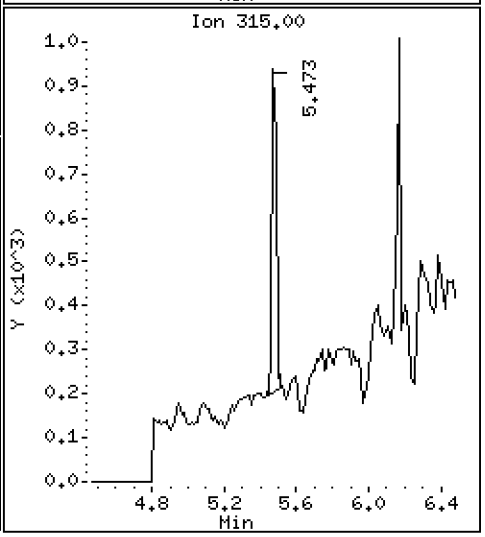


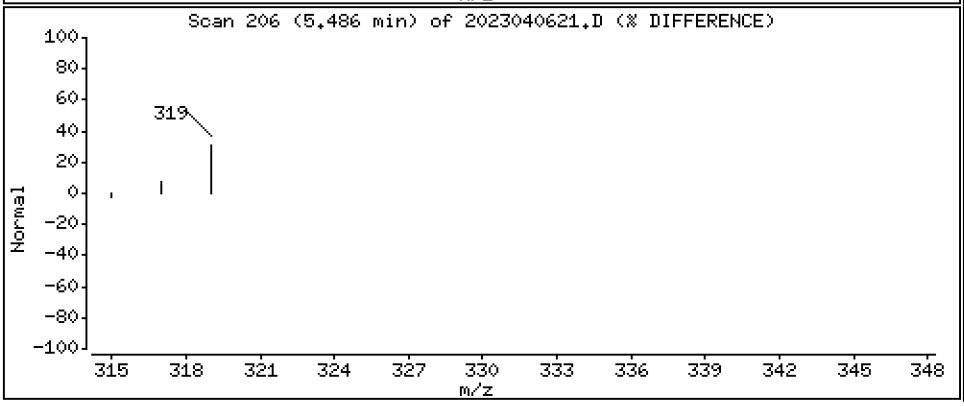












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Date : 06-APR-2023 21:18

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-12

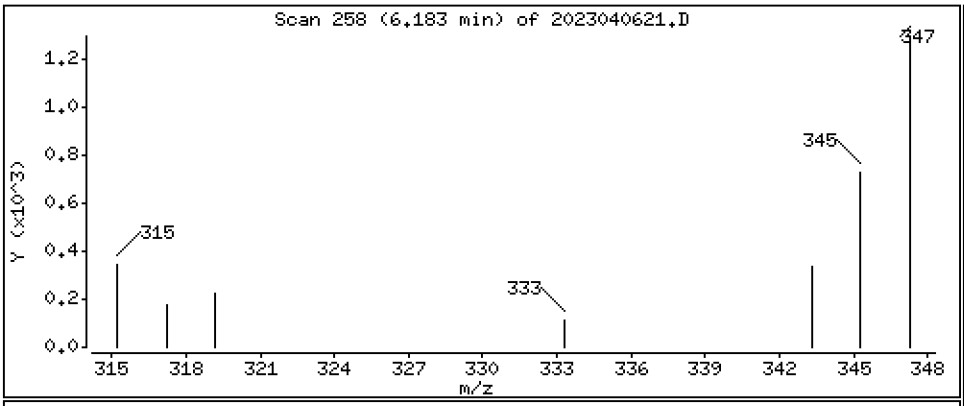
Operator: JZ

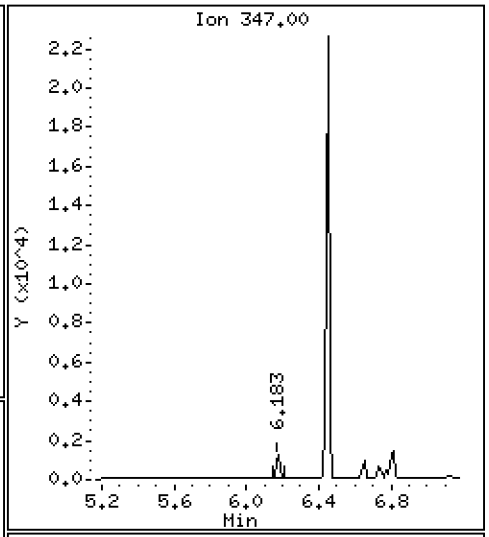
Column phase: ZB-5msi

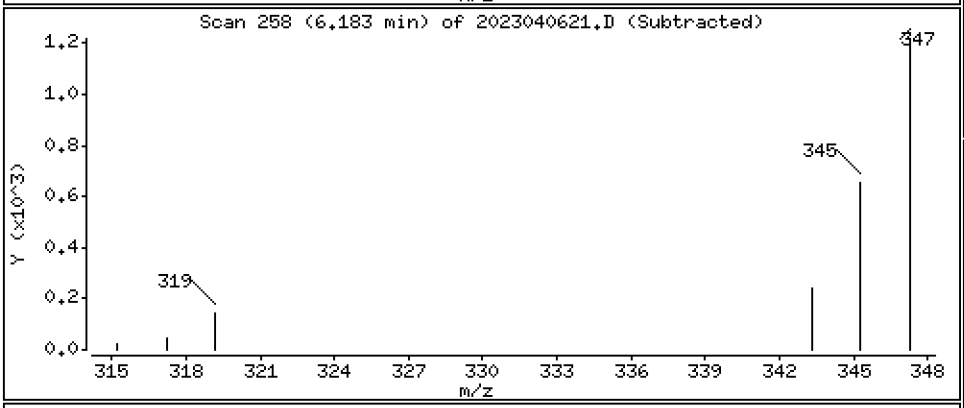
Column diameter: 0.25

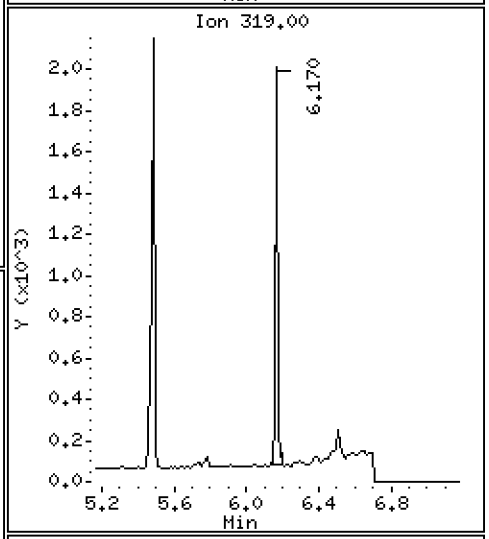
5 Dibutyl Tin (Hexyl)

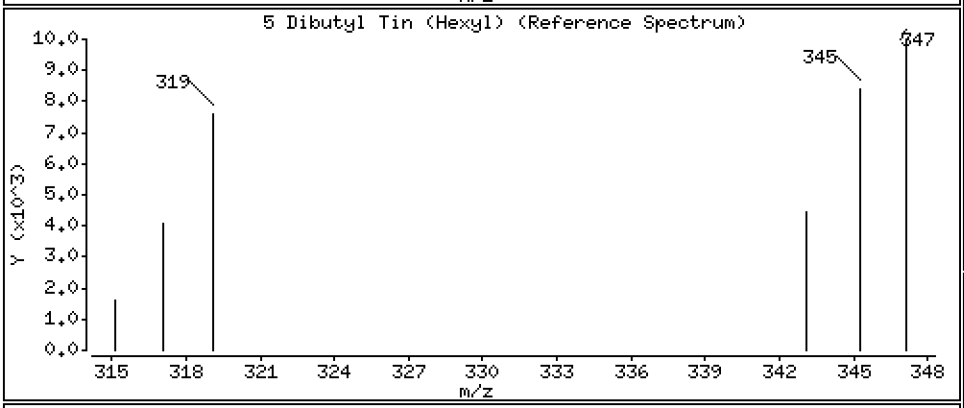
Concentration: 0.04983 ug/mL

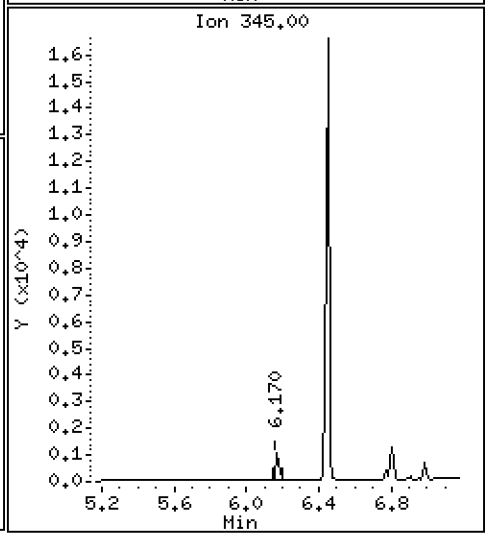


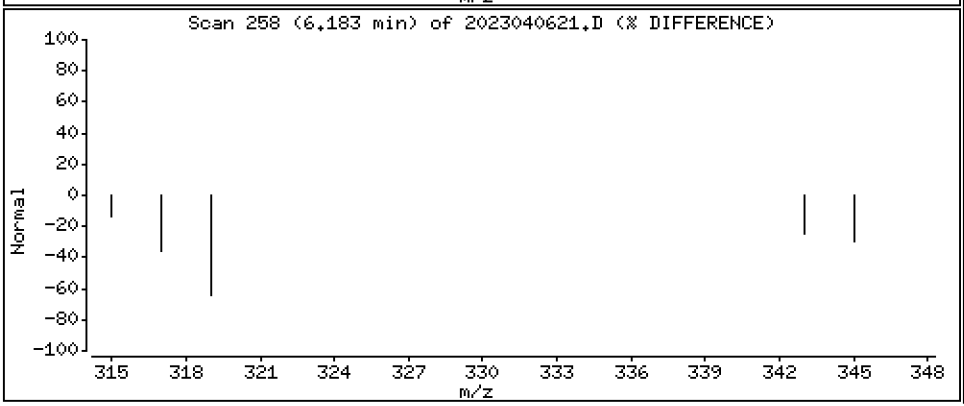












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040621.D

Date : 06-APR-2023 21:18

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-12

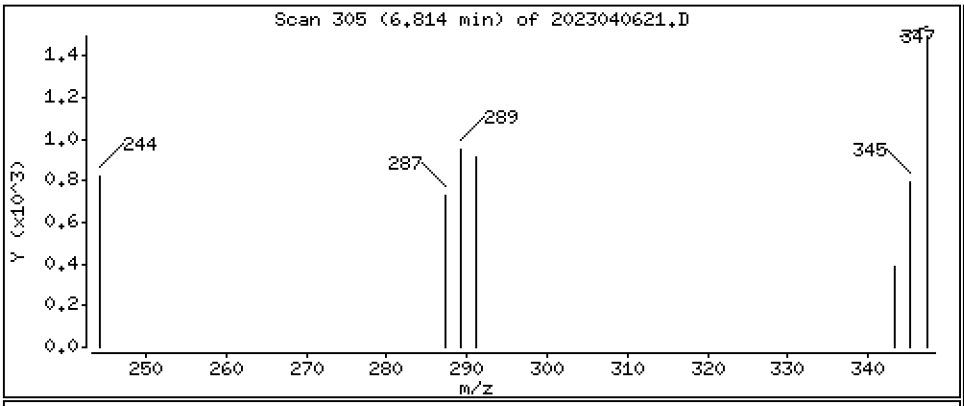
Operator: JZ

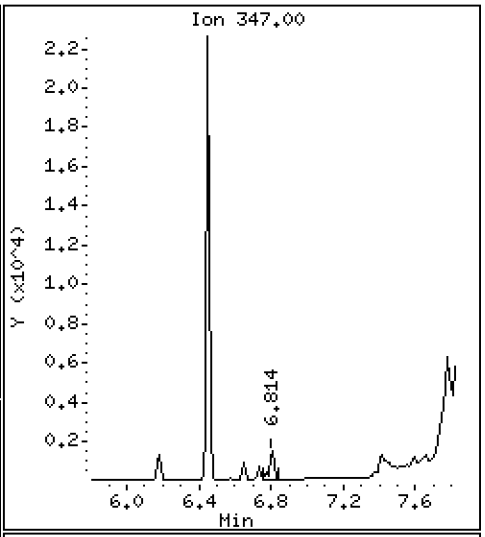
Column phase: ZB-5msi

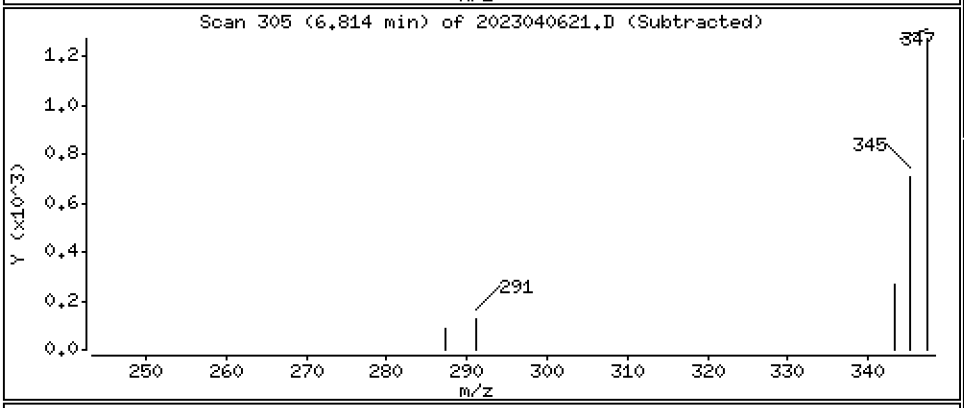
Column diameter: 0.25

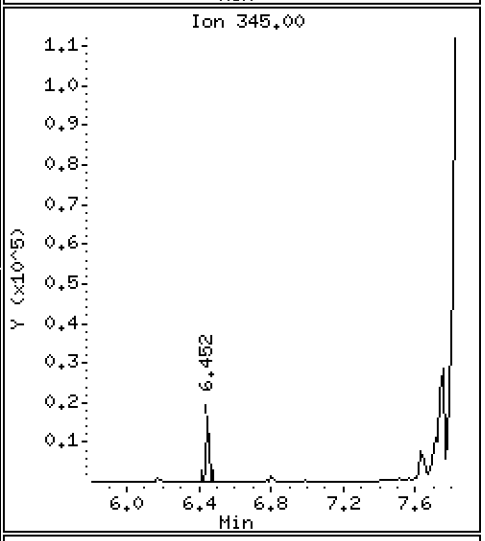
7 Butyl Tin (Hexyl)

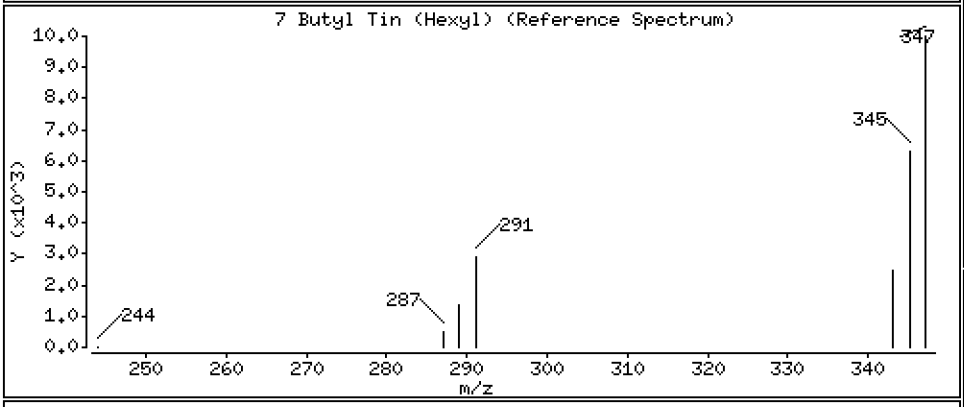
Concentration: 0.04342 ug/mL

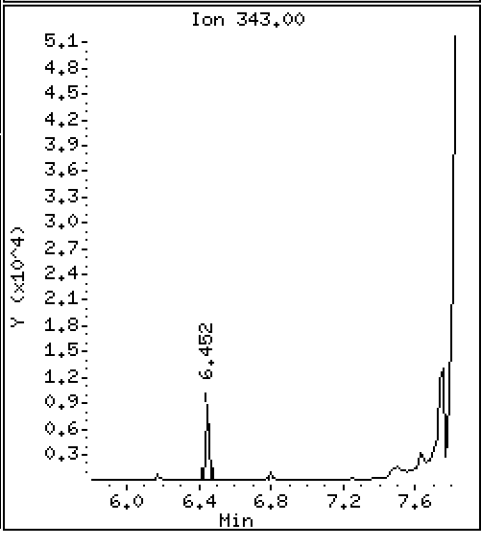


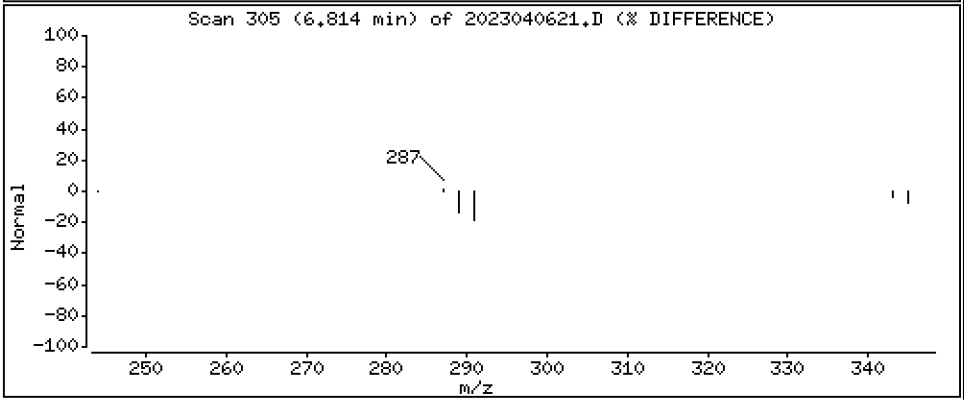












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040621.D
Lab Smp Id: 23C0618-12
Inj Date : 06-APR-2023 21:18
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0618-12
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 21
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.548	4.514	(0.745)	24365	0.42951	0.4295
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.486	5.472	(0.899)	2538	0.05713	0.05713
*	4 Tetrapentyl Tin	333	6.102	6.102	(1.000)	134169	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	1820	0.04983	0.04983
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	22562	0.41987	0.4199
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	2552	0.04342	0.04342
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	21756	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040621.D
Lab Smp Id: 23C0618-12
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	134169	-18.27
8 p-Terphenyl-d14	22611	11306	45222	21756	-3.78

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040621.D

Lab ID: 23C0618-12
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 21:18

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.745	0.740	0.0057	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

SED-DUPC

Form I

ORGANIC ANALYSIS DATA SHEET

EPA 8270E-SIM

Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0618-13 A	SDG:	23C0618
Sampled:	03/21/23 12:00	Prepared:	03/28/23 12:28	File ID:	2023040622.D
% Solids:	68.58	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/06/23 21:34
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	7.3 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

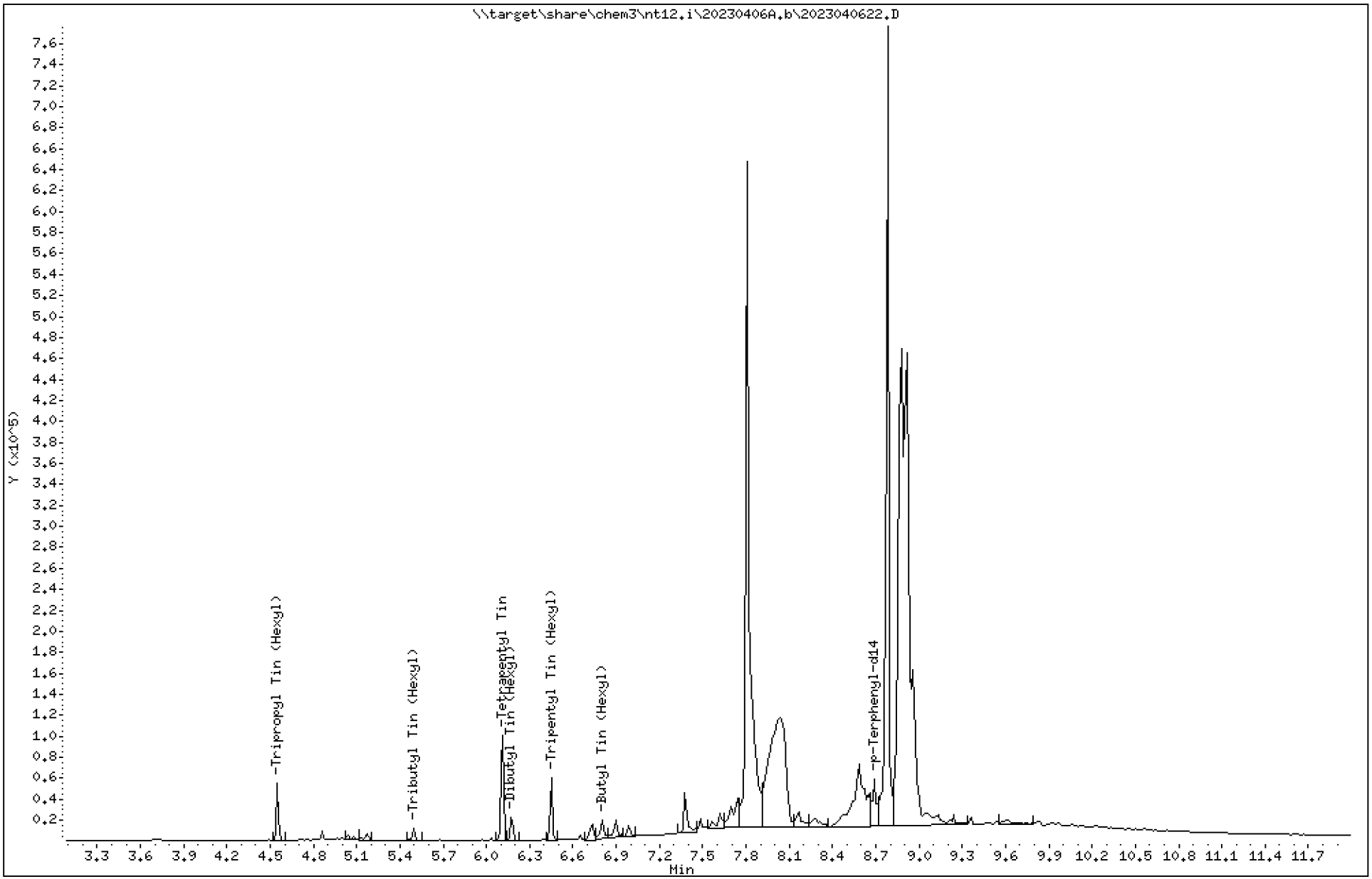
CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	11.3		0.449	3.86
14488-53-0	Dibutyltin Ion	1	10.1		1.73	5.77
78763-54-9	Butyltin Ion	1	4.01	J	1.89	4.07
1461-25-2	Tetrabutyltin	1	4.99	U	4.99	4.99

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	45.121	33.9	75.2	30 - 160	
Tripropyltin	43.691	31.1	71.2	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040622.D
Date : 06-APR-2023 21:34
Client ID:
Sample Info: 23C0618-13

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040622.D

Date : 06-APR-2023 21:34

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-13

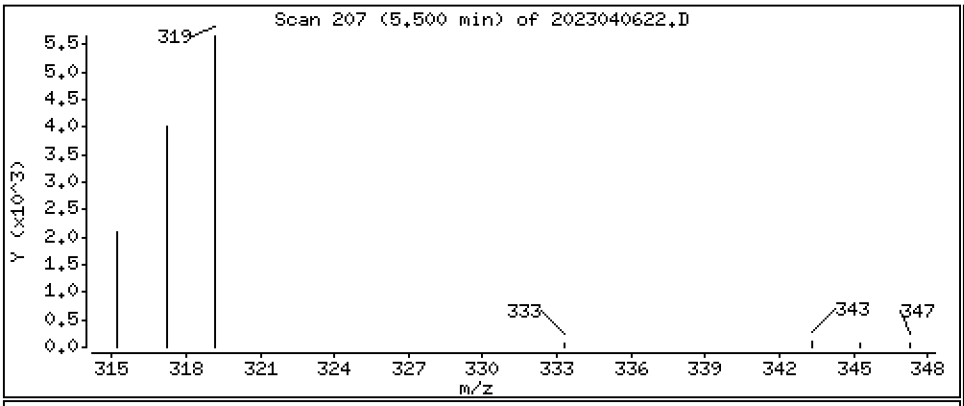
Operator: JZ

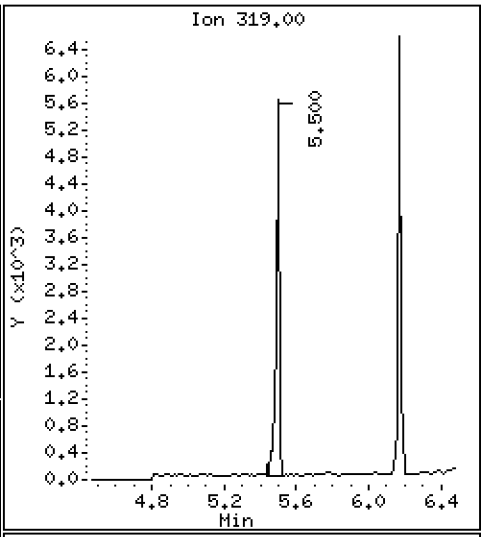
Column phase: ZB-5msi

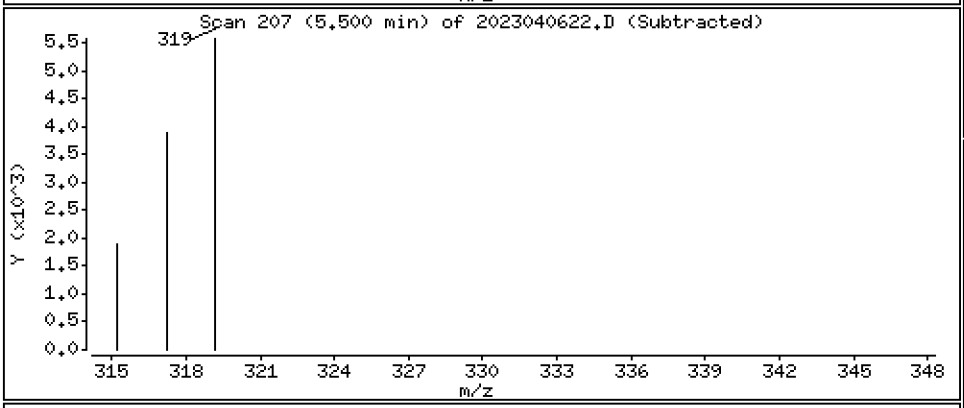
Column diameter: 0.25

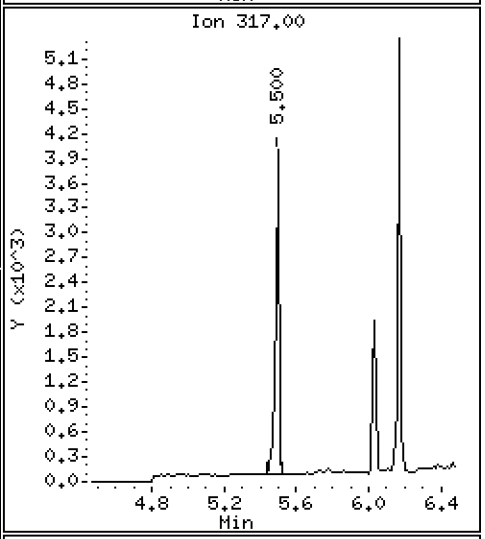
3 Tributyl Tin (Hexyl)

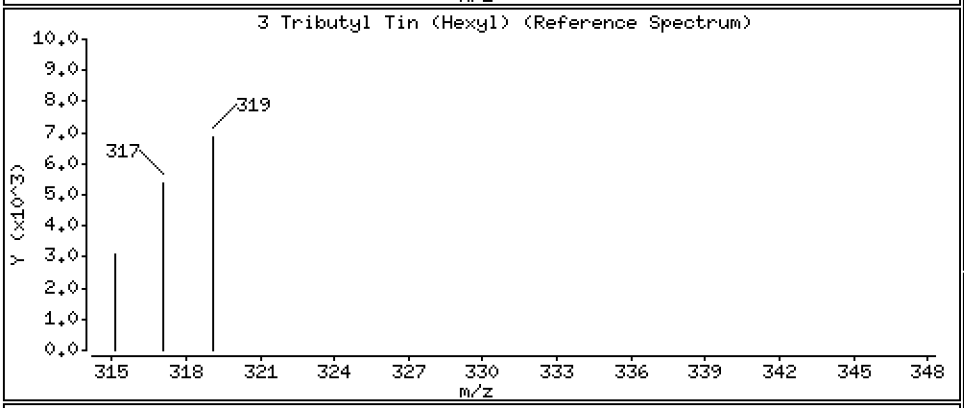
Concentration: 0.1467 ug/mL

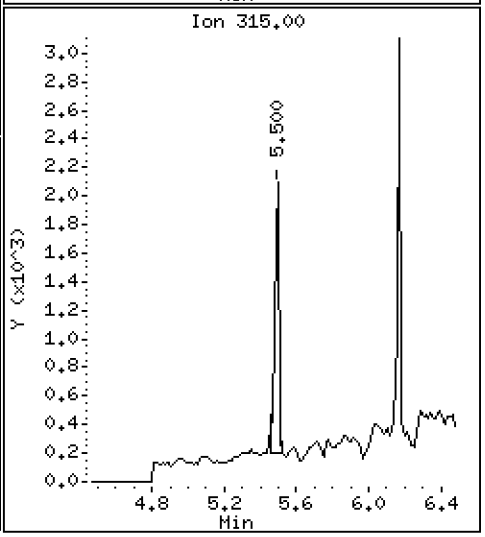


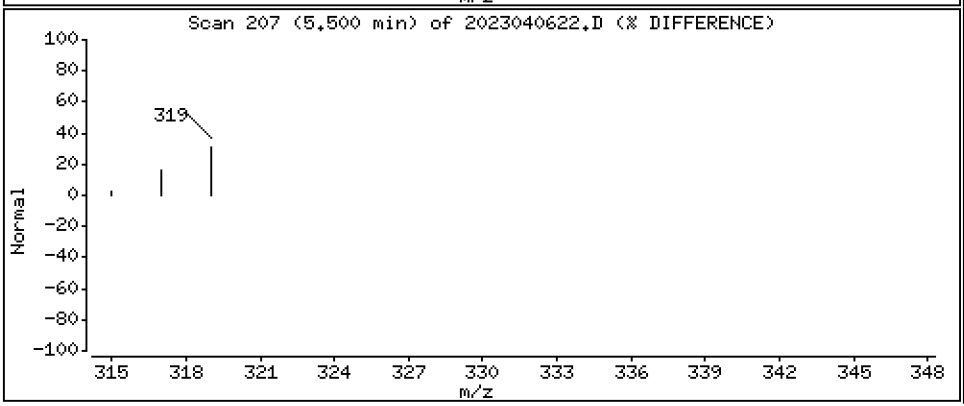












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040622.D

Date : 06-APR-2023 21:34

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-13

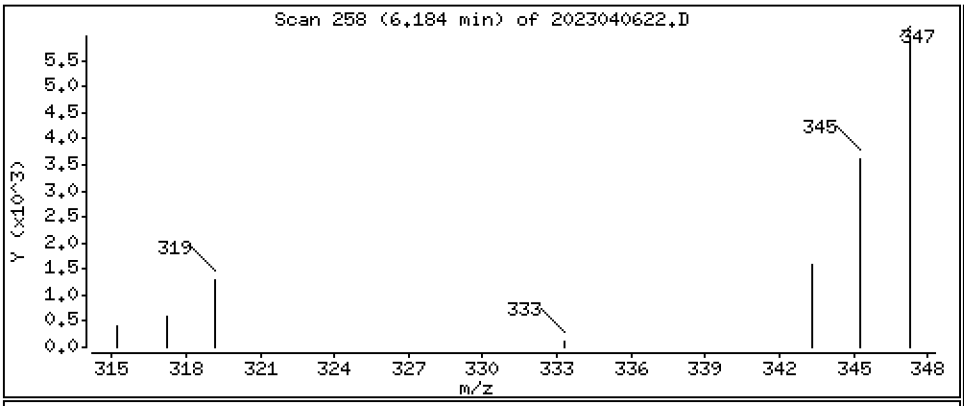
Operator: JZ

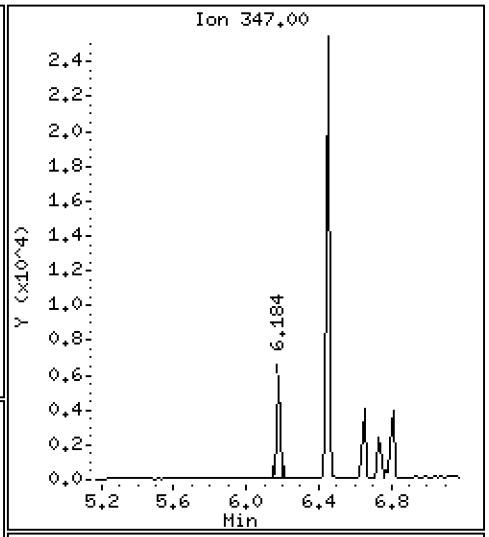
Column phase: ZB-5msi

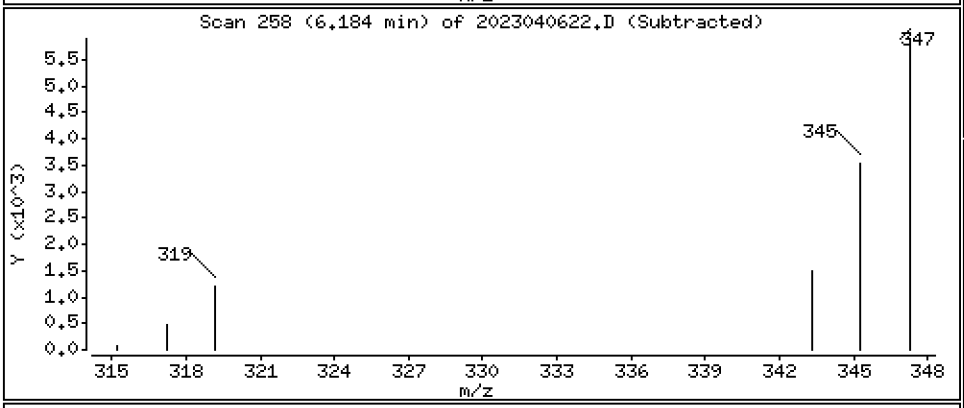
Column diameter: 0.25

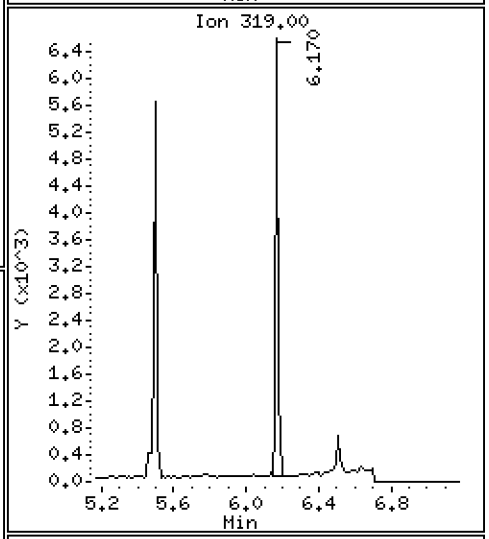
5 Dibutyl Tin (Hexyl)

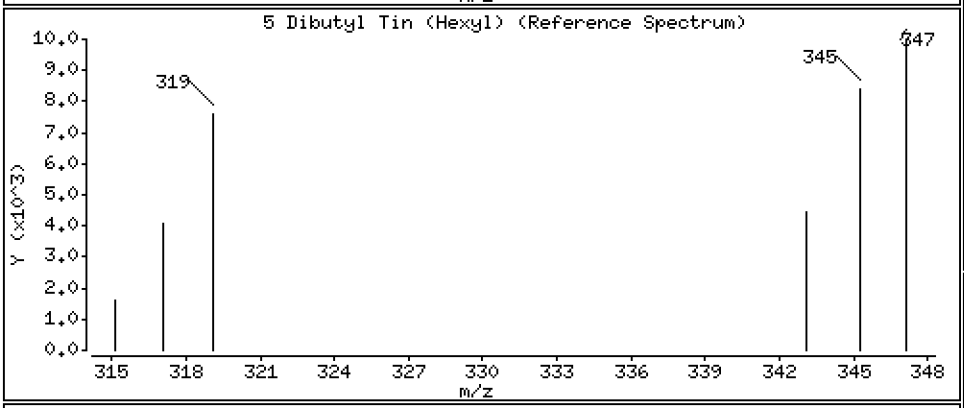
Concentration: 0.1755 ug/mL

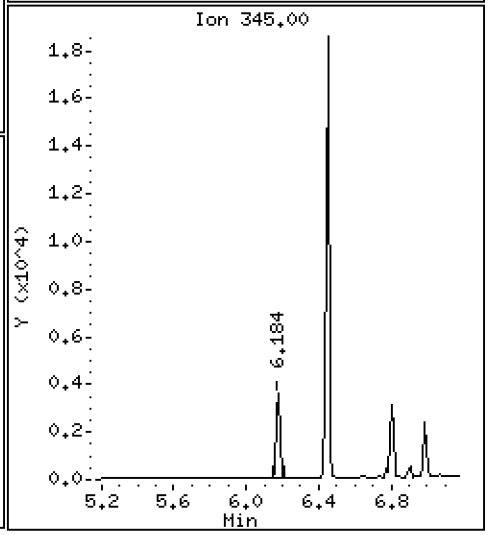


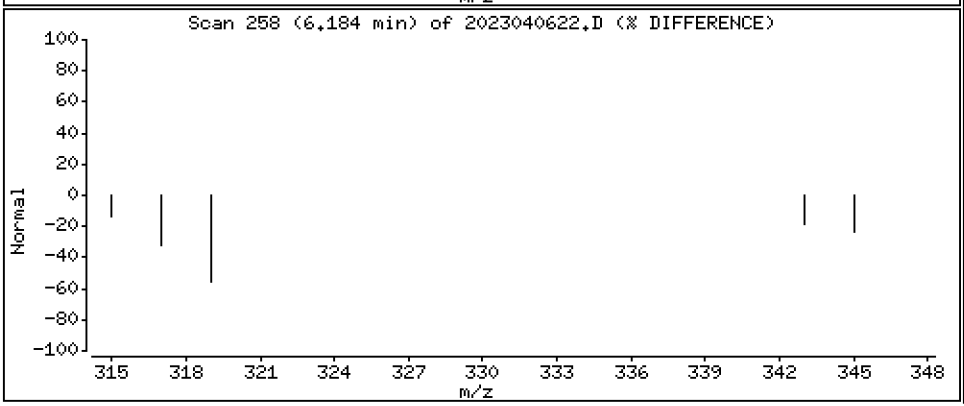












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040622.D

Date : 06-APR-2023 21:34

Client ID:

Instrument: nt12.i

Sample Info: 23C0618-13

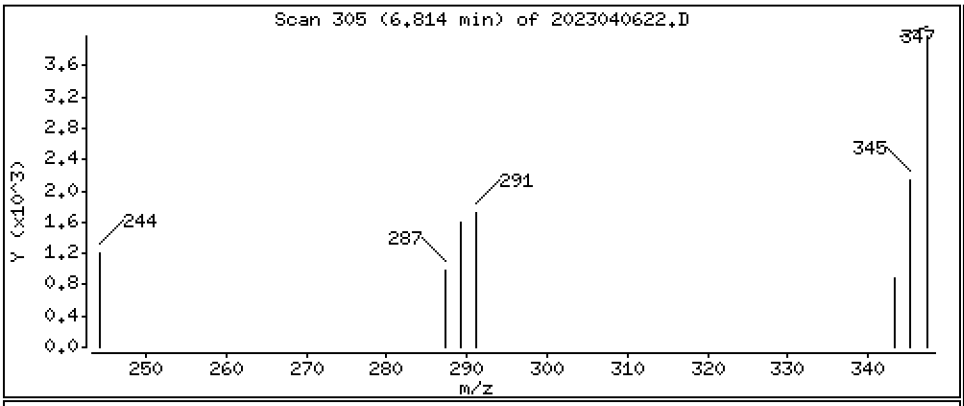
Operator: JZ

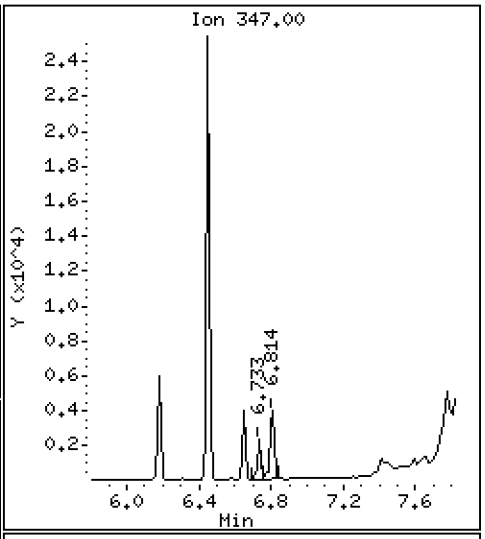
Column phase: ZB-5msi

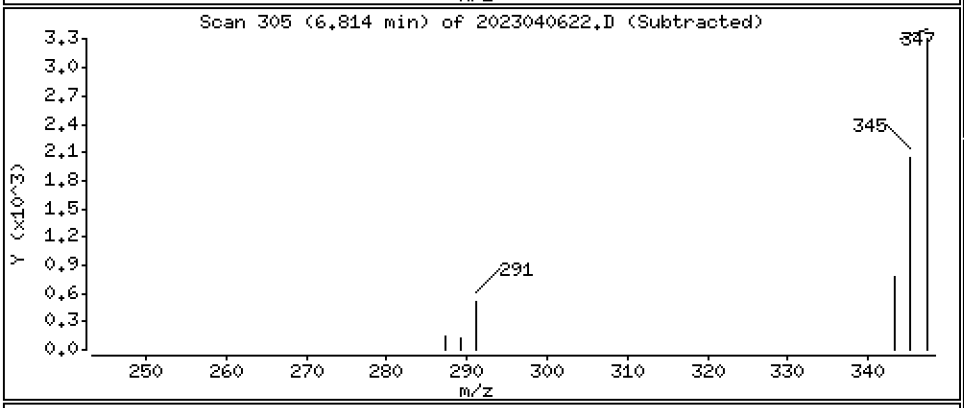
Column diameter: 0.25

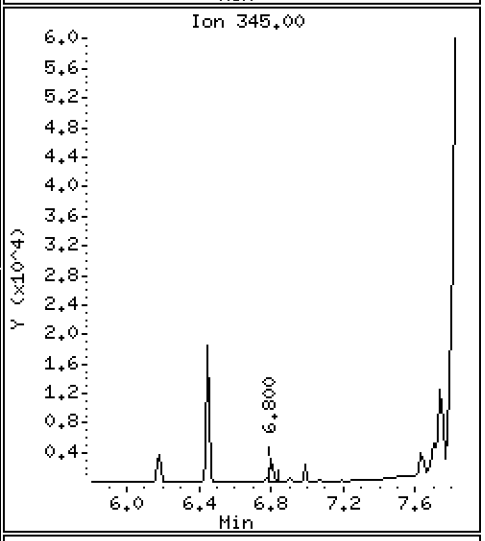
7 Butyl Tin (Hexyl)

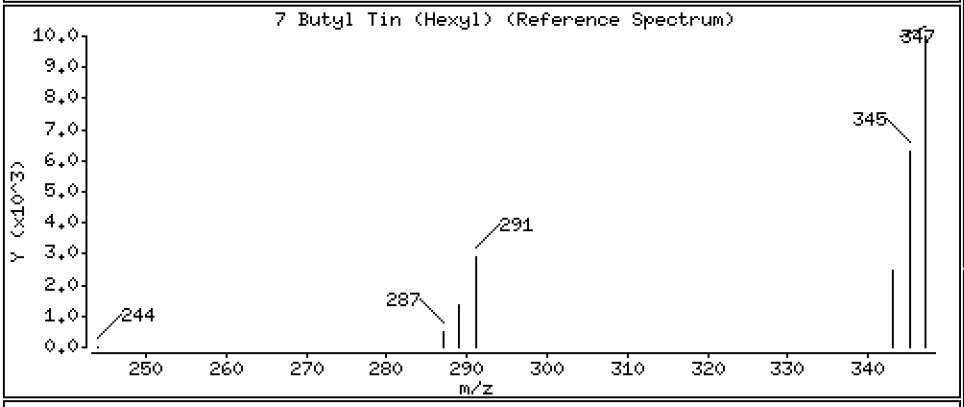
Concentration: 0.09852 ug/mL

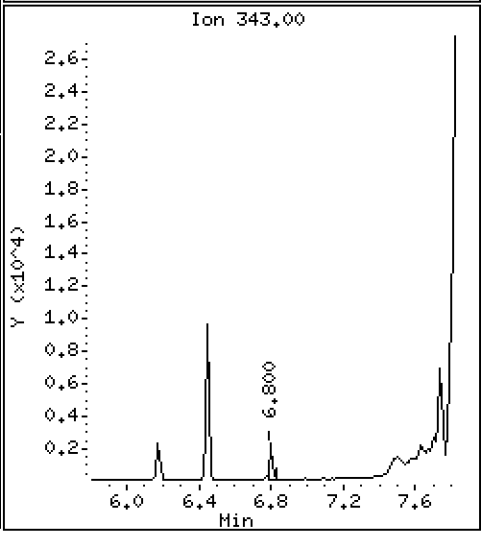


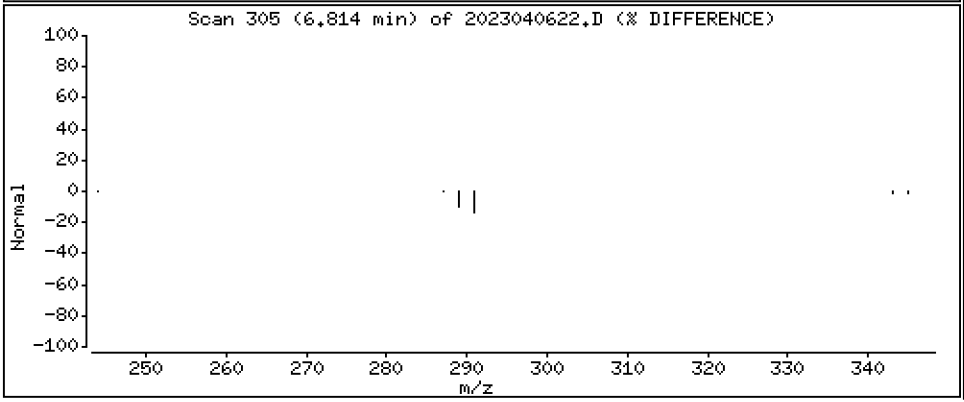












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040622.D
Lab Smp Id: 23C0618-13
Inj Date : 06-APR-2023 21:34
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0618-13
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 22
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	CONCENTRATIONS FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.548	4.514	(0.744)	25781	0.41833	0.4183
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.499	5.472	(0.899)	7078	0.14666	0.1467
*	4 Tetrapentyl Tin	333	6.116	6.102	(1.000)	145759	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	7085	0.17554	0.1755
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	25334	0.42666	0.4267
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	6399	0.09852	0.09852
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	24040	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040622.D
Lab Smp Id: 23C0618-13
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	145759	-11.22
8 p-Terphenyl-d14	22611	11306	45222	24040	6.32

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.12	0.22
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040622.D

Lab ID: 23C0618-13
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 21:34

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606A.D

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

PREPARATION BATCH SUMMARY

EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Batch: BLC0727 Batch Matrix: Solid
Preparation: EPA 3546 (Microwave)

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SED-07G:0-10	23C0618-01	2023040617.D	03/28/23 12:28	
SED-14G:0-10	23C0618-03	2023040618.D	03/28/23 12:28	
SED-15G:0-10	23C0618-04	2023040619.D	03/28/23 12:28	
SED-14C:0-1	23C0618-11	2023040620.D	03/28/23 12:28	
SED-14C:1-3	23C0618-12	2023040621.D	03/28/23 12:28	
SED-DUPC	23C0618-13	2023040622.D	03/28/23 12:28	
Blank	BLC0727-BLK1	2023040610.D	03/28/23 12:28	
LCS	BLC0727-BS1	2023040611.D	03/28/23 12:28	
LCS Dup	BLC0727-BSD1	2023040612.D	03/28/23 12:28	

Analytical Resources, LLC
Analytical Chemists and Consultants

ORGANICS PREPARATION BENCH SHEET

Batch: BLC0727

Prepared using: EPA 3546 (Microwave)

8270E-SIM Butyl Tins in Solid

WO Comments
23C0618: <C> MS/MSD, SRM for TOC, run one sample in triplicate for solids</C>
23C0619: <C> MS/MSD, SRM for TOC, run one sample in triplicate for solids</C>

Analysis: 8270E-SIM Butyl Tins

Lab Number & Container	% Solids	Initial (g) Target Dry: 5 (Wet) Actual	Actual Wet Wt (g)	Final Effective Vol (mL)	Vol (mL) to Lab	Extraction Comments
23C0618-01 B	69.0	(7.25)	7.28	0.5 ____	0.5 ____	
23C0618-03 B	57.6	(8.68)	8.68	0.5 ____	0.5 ____	
23C0618-04 B	60.8	(8.23)	8.26	0.5 ____	0.5 ____	
23C0618-11 A	69.5	(7.19)	7.19	0.5 ____	0.5 ____	
23C0618-12 A	60.2	(8.31)	8.33	0.5 ____	0.5 ____	
23C0618-13 A	68.6	(7.29)	7.30	0.5 ____	0.5 ____	
23C0619-01 A	84.1	(5.95)	5.98	0.5 ____	0.5 ____	
23C0619-02 A	76.1	(6.57)	6.59	0.5 ____	0.5 ____	
23C0619-03 A	70.2	(7.12)	7.17	0.5 ____	0.5 ____	
23C0619-04 A	74.2	(6.74)	6.76	0.5 ____	0.5 ____	
23C0619-05 A	70.6	(7.08)	7.08	0.5 ____	0.5 ____	
23C0619-06 A	77.4	(6.46)	6.49	0.5 ____	0.5 ____	
23C0619-08 A	62.8	(7.96)	7.97	0.5 ____	0.5 ____	
23C0619-09 A	77.9	(6.42)	6.43	0.5 ____	0.5 ____	
23C0619-10 A	77.1	(6.49)	6.49	0.5 ____	0.5 ____	
23C0619-11 A	80.4	(6.22)	6.23	0.5 ____	0.5 ____	
23C0619-12 A	79.7	(6.28)	6.38	0.5 ____	0.5 ____	
23C0619-13 A	81.0	(6.17)	6.18	0.5 ____	0.5 ____	

Batch QC

Lab Number	% Solids	Initial (g) Target Dry: 5 (Wet) Actual	Actual Wet Wt (g)	Final Effective Vol (mL)	Vol (mL) to Lab	Extraction Comments
BLC0727-BLK1	100.0	(5.00)	5.00	0.5 ____	0.5 ____	
BLC0727-BS1	100.0	(5.00)	5.00	0.5 ____	0.5 ____	
BLC0727-BSD1	100.0	(5.00)	5.00	0.5 ____	0.5 ____	
BLC0727-DUP1	84.1	(5.95)	5.95	0.5 ____	0.5 ____	Use 23C0619-01
BLC0727-MS1	84.1	(5.95)	5.95	0.5 ____	0.5 ____	Use 23C0619-01
BLC0727-MSD1	84.1	(5.95)	5.95	0.5 ____	0.5 ____	Use 23C0619-01

03/28/23 3/23/23
Client ID verified By Date

NRB 4/4/23
Preparation Reviewed By Date

03/28/23 12:28
Extraction Date and Time

Printed: 3/28/2023 10:05:02AM

Analytical Resources, LLC
Analytical Chemists and Consultants

ORGANICS PREPARATION BENCH SHEET

Batch: BLC0727

Prepared using: EPA 3546 (Microwave)

8270E-SIM Butyl Tins in Solid

WO Comments

23C0618: <C> MS/MSD, SRM for TOC, run one sample in triplicate for solids</C>

23C0619: <C> MS/MSD, SRM for TOC, run one sample in triplicate for solids</C>

Prep Steps

Microwave
1 2 3
CT 03/28/23
Analyst/Date

TurboVap Hexane Exchange (15 mL)
1 2 3 4 5
SH 3/28/23
Analyst/Date

Derivitization (Vortex + Heating)
SH 3/28/23
Analyst/Date

(REQ) Hydrolisys (~4mL) Vortex
ZH/ 4/4/23
Analyst/Date

(REQ) SPE (1mL)
ZH/ 4/4/23
Analyst/Date

TurboVap Post SPE
1 2 3 4 5
ZH/ 4/4/23
Analyst/Date

Vialing
ZH/ 4/4/23
Analyst/Date

Reagents Used

Station/Reagent	Standard ID
Microwave Analyst: CT/ Date: 03/28/23	
Hexane	L0001957
Neutral Glass Wool	L0004497
0.10% Tropolone in Methylene Chloride	L002243
Anhydrous Sodium Sulfate	L002484
Vialing/HexMgBr Addition Analyst: SH Date: 3/28/23	
(Turbovap exchange): Hexane:	L0001957
HexylMagnesiumBromide	K009032
Hydrolysis/Silica/Final Vialing Analyst: ZH/MWS Date: 4/4/23	
Silica Gel (SPE) Dart (EPH)	SD13211
1:1 HCL/DI H2O	~~K009~~ K009815
Anhydrous Sodium Sulfate	L002114
(Final Vialing):Hexane	L0001957

Surrogates & Spike Standards Used

Type	Vial ID / Standard ID	Vol uL	Analyst	Witness
Surrogate 2.5µg/mL	L L002512 Exp Date: 12/15/2023	100µL	CT	✓
Spike 2.5µg/mL	8 K011887 Exp Date: 12/15/2023	100µL	CT	✓

MANUALLY ENTER EXPIRATION DATES!

(V) indicates a virtual standard combining two or more physical standards. In these cases the Standard ID refers to the virtual standard, not the parent standards.

If a Standard ID is missing, but should be present, check the standard definition in Element LIMS to be sure Standard Info 6 has the correct letter or number designator matching the vial designator inthe Standard ID column. If it is correct, check the batch and bench sheet in Element LIMS to be sure the correct standards are selected for surrogate(s) and spike(s).

Analytical Resources, LLC
Analytical Chemists and Consultants

ORGANICS PREPARATION BENCH SHEET

Batch: BLC0727

Prepared using: EPA 3546 (Microwave)

8270E-SIM Butyl Tins in Solid

Matrix: Solid **Date Prepared:** 3/28/23 **Balance ID:** B14646264 **Set Up By:** CO 3/28/23

WO Comments

23C0618: <C> MS/MSD, SRM for TOC, run one sample in triplicate for solids</C>

23C0619: <C> MS/MSD, SRM for TOC, run one sample in triplicate for solids</C>

The following standards may be missing from this batch!

Designator	Description
QLS 3	QLS Spike

Analytical Resources, LLC
Analytical Chemists and Consultants

ORGANICS PREPARATION BENCH SHEET

Batch: BLC0727

Prepared using: EPA 3546 (Microwave)

8270E-SIM Butyl Tins in Solid

WO Comments

23C0618: <C> MS/MSD, SRM for TOC, run one sample in triplicate for solids</C>

23C0619: <C> MS/MSD, SRM for TOC, run one sample in triplicate for solids</C>

Prep Instructions	
SPECIAL INSTRUCTIONS: NOTE: TBT Extractions must be completed within 48 hours! 1. Blanks = Solvent Only (NO Sulfate). 2. Weigh samples into 100mL beakers-dry with Sodium Sulfate. 3. Pre-Rinse microwave vessel with 0.10% Tropolone in DCM. 4. Transfer soil to microwave vessel. 5. Add 0.10% Tropolone in DCM to vessel until solvent is 1" above soil layer after homogenization). 6. Add surr/spike. 7. Microwave on appropriate power setting determined by # of samples. 8. After microwave-Re-homogenize while hot then let cool 15 min. in cold water bath. Re-homogenize while cool. 9. Decant into 0.10% troplone rinsed turbo tube with small Funnel containing glass wool and 1" sodium sulfate. 10. Add (2) 10mL Hexane rinses to vessel and transfer to turbo tube. VIALING 11. TurboVap to ~2mL and exchange with 15 mL of Hexane - mix well. 12. TurboVap to ~3mL-Transfer with Hexane to 40mL VOA vial. 13. Derivitize with 1 pipet HexMgBr (Mix by hand) then Vortex for 10 seconds then place vials on KD water bath until warm. Repeat vortex and heating 3 times.Then let sit overnite. 14. Hydrolisys: Add 2 pipets of 1:1 HCL. Vortex for 30 sec. Draw off/discard HCL (bottom layer). Add 1 pipet of 1:1 HCL and ~5mL DI H2O. Vortex for 30 sec. Draw off/discard H20 (bottom layer). Add ~5mL DI H2O. Vortex for 30 sec. Draw off/discard H2O (bottom layer). 15. Add sodium sulfate and Let sit 15min. 16. Transfer to culture tube and TurboVap to 1mL. 17. SPE Clean with EPH darts 18. TurboVap 19. Vial in hexane. 20. NOTE: DERIVITIZATIONS MUST BE DONE IN THE HOOD TO PROTECT FROM POTENTIAL CHEMICAL REACTIONS, ODORS AND FUMES. A. Need Total Solids Y (N) B. Archive/Freeze (Y) N	

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Organic Extractions Laboratory Analyst Notes

Extraction Parameter: TBT Extraction Batch: BLC0727

Total Solids Batch: BLC0825 Work Order(s): 23C0618, 619

Screens: Soil/Sediment/Solid/Other:	Analyst/Date
☐ No Anomalies (standard soil/wet sediment/sand/gravel)=	
☑ Standing Water Decanted (Not shared)= 23C0618 Φ3, Φ4, 11, 12. 619 = Φ2, Φ4, Φ6, Φ8, Φ9, 12 13.	✓ Φ3/27/23
☐ Standing Water Homogenized (Shared samples)=	
☐ Clay/Clumps (Difficult to homogenize)=	
☑ Rocks (%+size)? 23C0618 30.0% = Φ1 Φ11 10.1% 619 Φ11 = 12 30.0% Φ11 = 13	✓ Φ3/27/23
☐ Organics (Leaves/sticks/grass)=	
☑ Oily, obvious fuel/sulfur odors= 618 Φ1, Φ3, Φ4, 12, 13, 619 = Φ3, 14.	✓ Φ3/27/23
☐ Received in 32oz jar(s)=Homogenized in Pyrex dish=	
☐ Previously Frozen =	
☑ Other (Details)= 23C0618 = Φ3 had a piece plastic 10.1% chalk pieces 619 = Φ1, Φ2, Φ4, Φ5, Φ6, Φ8, Φ9, 11,	✓ Φ3/27/23
Aqueous:	
☐ No Anomalies	
☐ Turbid/Color=	
☐ Particulates(%)=(Note: >5%=Notify Supervisor/Lead)	
☐ Emulsions (%)=	
☐ Oily, obvious fuel/sulfur odors=	
☐ Other (Details)=	
☐ Received in 1.0L Bottle(s)=No Bottle Rinse=	
☐ Other Notes/Comments= (Note problems, concerns, corrective actions).	
☑ Share Samples Y / N 23C0618 = 12.	✓ Φ3/27/23
☑ Multiple Jars Y / N	✓ Φ3/27/23
☐ Sample Pre-Screens indicate analyte activity=	
☐ Sample weights/volumes reduced based on Pre-Screen=	

Analytical Resources, LLC
Analytical Chemists and Consultants

CLEANUP BATCH SUMMARY

Laboratory:	Analytical Resources, LLC	SDG:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Cleanup Batch:	CLD0022	Cleanup Type:	Silica Gel
Cleanup Method:	EPA 3630C Silica Gel Cleanup - uL	Analysis:	EPA 8270E-SIM

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SED-07G:0-10	23C0618-01	2023040617.D	04/04/2023	
SED-14C:0-1	23C0618-11	2023040620.D	04/04/2023	
SED-14C:1-3	23C0618-12	2023040621.D	04/04/2023	
SED-14G:0-10	23C0618-03	2023040618.D	04/04/2023	
SED-15G:0-10	23C0618-04	2023040619.D	04/04/2023	
SED-DUPC	23C0618-13	2023040622.D	04/04/2023	
Blank	BLC0727-BLK1	2023040610.D	04/04/2023	
LCS	BLC0727-BS1	2023040611.D	04/04/2023	
LCS Dup	BLC0727-BSD1	2023040612.D	04/04/2023	

Analytical Resources, LLC
Analytical Chemists and Consultants

CLEANUP BENCH SHEET

CLD0022

Matrix: Solid **Cleanup using: Organics - EPA 3630C Silica Gel Cleanup - uL** **Printed: 4/4/2023 3:09:11PM**

Lab Number	Sample Container	Sample Name	Extract Container	Initial (uL)	Final (uL)	Analysis	Clean Up Date	Cleaned By	Cleanup Comments
23C0618-01	B	SED-07G:0-10	B 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0618-03	B	SED-14G:0-10	B 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0618-04	B	SED-15G:0-10	B 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0618-11	A	SED-14C:0-1	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0618-12	A	SED-14C:1-3	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0618-13	A	SED-DUPC	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-01	A	SED-07C:0-1	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-02	A	SED-07C:1-3	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-03	A	SED-08C:0-1	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-04	A	SED-08C:1-3	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-05	A	SED-09C:0-1	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-06	A	SED-09C:1-3	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-08	A	SED-26C:0-1	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-09	A	SED-26C:1-3	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-10	A	SED-25C:0-1	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-11	A	SED-25C:1-3	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-12	A	SED-10C:0-1	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-13	A	SED-10C:1-3	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
BLC0727-BLK1	-	Blank	-	0.5	0.5	-	4/4/2023	NRB	
BLC0727-BS1	-	LCS	-	0.5	0.5	-	4/4/2023	NRB	
BLC0727-BSD1	-	LCS Dup	-	0.5	0.5	-	4/4/2023	NRB	
BLC0727-DUP1	-	Duplicate	-	0.5	0.5	-	4/4/2023	NRB	

Analytical Resources, LLC
Analytical Chemists and Consultants

CLEANUP BENCH SHEET

CLD0022

Matrix: Solid **Cleanup using: Organics - EPA 3630C Silica Gel Cleanup - uL** **Printed: 4/4/2023 3:09:11PM**

Lab Number	Sample Container	Sample Name	Extract Container	Initial (uL)	Final (uL)	Analysis	Clean Up Date	Cleaned By	Cleanup Comments
BLC0727-MS1	-	Matrix Spike	-	0.5	0.5	-	4/4/2023	NRB	
BLC0727-MSD1	-	Matrix Spike Dup	-	0.5	0.5	-	4/4/2023	NRB	

Form I

METHOD BLANK DATA SHEET

EPA 8270E-SIM

Blank

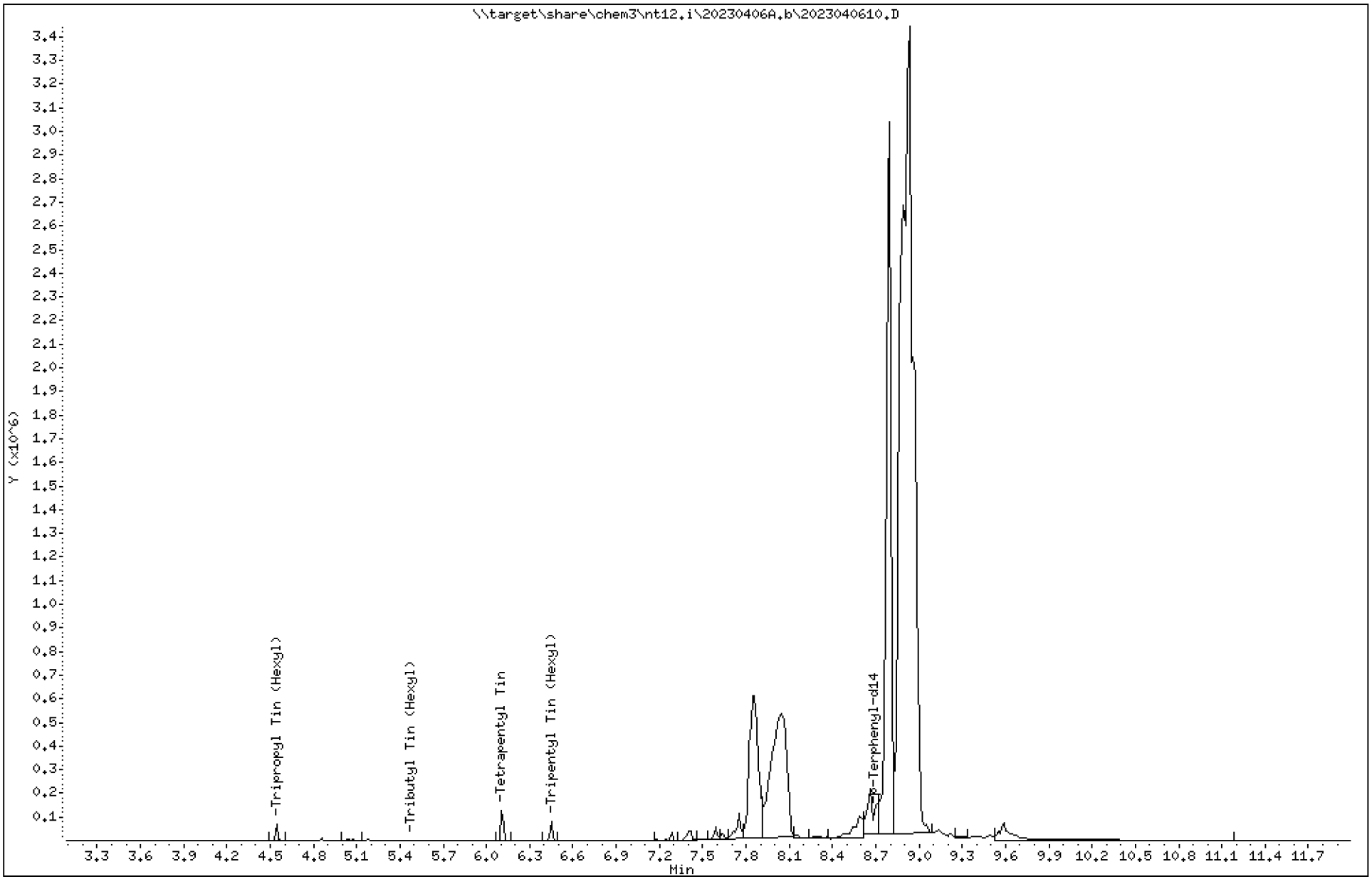
Laboratory:	Analytical Resources, LLC			SDG:	23C0618
Client:	Friedman & Bruya Inc.			Project:	Port of Friday Harbor
Matrix:	Solid	Laboratory ID:	BLC0727-BLK1	File ID:	2023040610.D
Sampled:	N/A	Prepared:	03/28/23 12:28	Analyzed:	04/06/23 18:16
Solids:		Preparation:	EPA 3546 (Microwave)	Initial/Final:	5 g / 0.5 mL
Batch:	BLC0727	Sequence:	SLD0107	Calibration:	GD00019
Instrument:	NT12	Column:	ZB-5MS	Cleanups:	Silica Gel

CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg wet)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	3.86	U	0.450	3.86
14488-53-0	Dibutyltin Ion	1	5.78	U	1.73	5.78
78763-54-9	Butyltin Ion	1	4.08	U	1.89	4.08
1461-25-2	Tetrabutyltin	1	5.00	U	5.00	5.00

SURROGATES	ADDED: (ug/kg wet)	FOUND: (ug/kg wet)	% REC	QC LIMITS	Q
Tripentyltin	45.178	45.3	100	30 - 160	
Tripropyltin	43.746	39.2	89.6	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040610.D
Date : 06-APR-2023 18:16
Client ID:
Sample Info: BLC0727-BLK1,

Instrument: nt12.i
Operator: JZ
Column phase: ZB-5msi
Column diameter: 0.25



Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040610.D

Date : 06-APR-2023 18:16

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-BLK1,

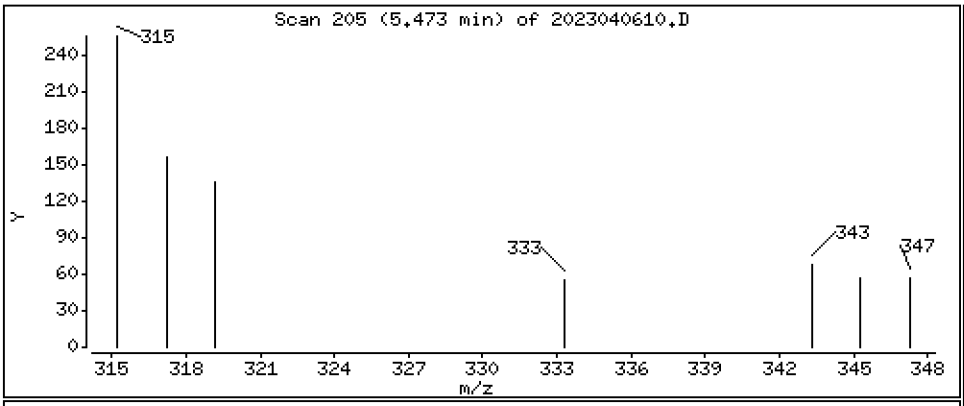
Operator: JZ

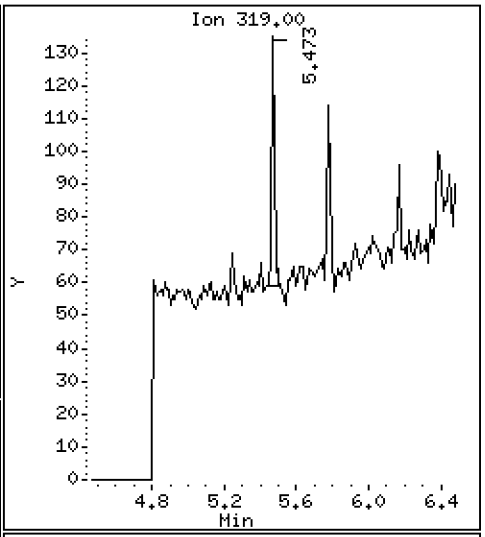
Column phase: ZB-5msi

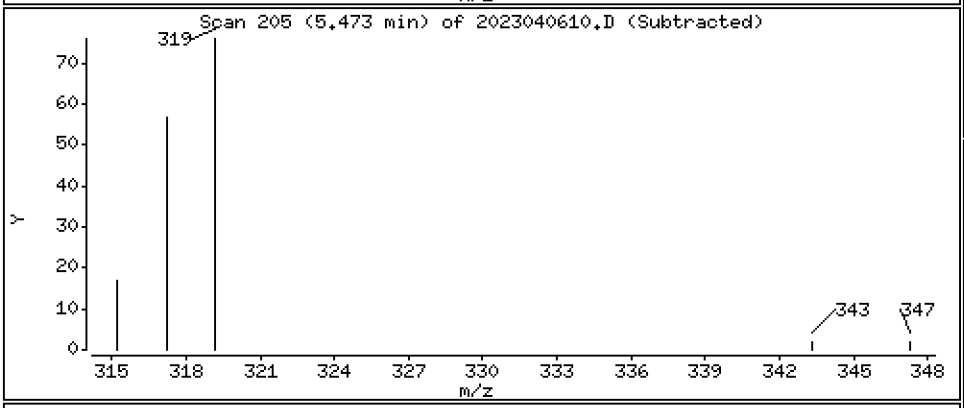
Column diameter: 0.25

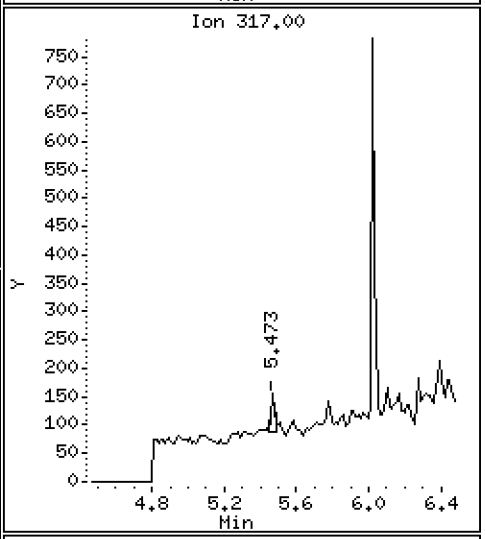
3 Tributyl Tin (Hexyl)

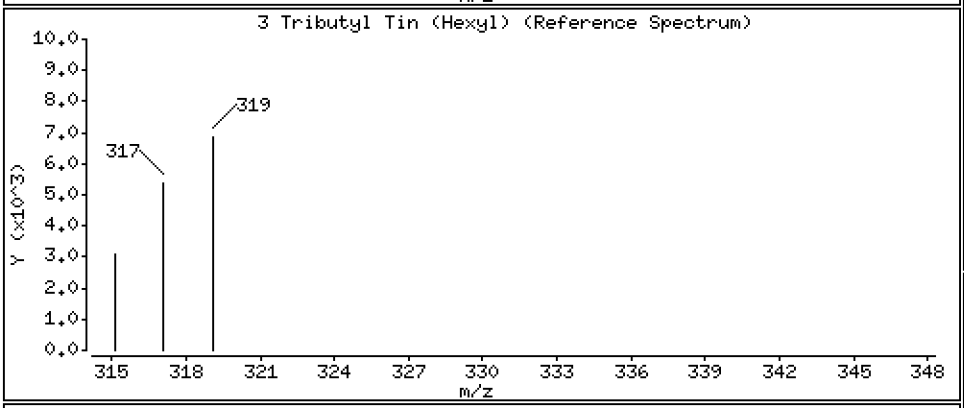
Concentration: 0.001405 ug/mL

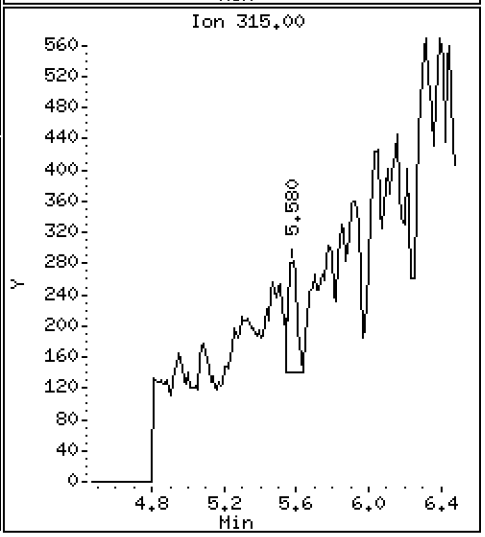


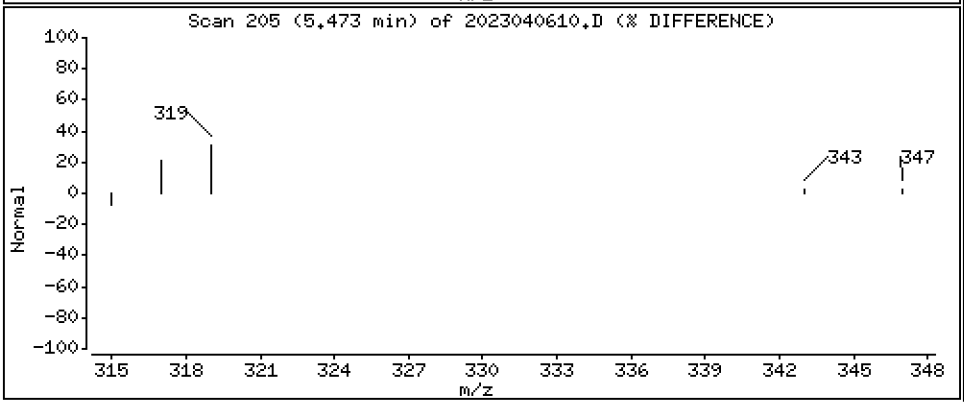












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040610.D
Lab Smp Id: BLC0727-BLK1
Inj Date : 06-APR-2023 18:16
Operator : JZ   Inst ID: nt12.i
Smp Info : BLC0727-BLK1,
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 09:53 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 10
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	CONCENTRATIONS FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.548	4.514	(0.745)	35424	0.52673	0.5267
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	74	0.00141	0.001405
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	159063	2.00000	
	5 Dibutyl Tin (Hexyl)	347	Compound Not Detected.					
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	32740	0.56917	0.5692
	7 Butyl Tin (Hexyl)	347	Compound Not Detected.					
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	23289	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040610.D
Lab Smp Id: BLC0727-BLK1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	159063	-3.11
8 p-Terphenyl-d14	22611	11306	45222	23289	3.00

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040610.D

Lab ID: BLC0727-BLK1
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 18:16

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.745	0.740	0.0057	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

LCS / LCS DUPLICATE RECOVERY

EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Matrix:	Solid	Analyzed:	04/06/23 18:33
Batch:	BLC0727	Laboratory ID:	BLC0727-BS1
Preparation:	EPA 3546 (Microwave)	Sequence Name:	LCS
Initial/Final:	5 g / 0.5 mL		

COMPOUND	SPIKE ADDED (ug/kg wet)	LCS CONCENTRATION (ug/kg wet)	Q	LCS % REC. #	QC LIMITS REC.
Tributyltin Ion	44.6	44.7		100	30 - 160
Dibutyltin Ion	38.4	29.9		78.1	30 - 160
Butyltin Ion	31.2	21.7		69.6	30 - 160

* Indicates values outside of QC limits

LCS / LCS DUPLICATE RECOVERY

EPA 8270E-SIM

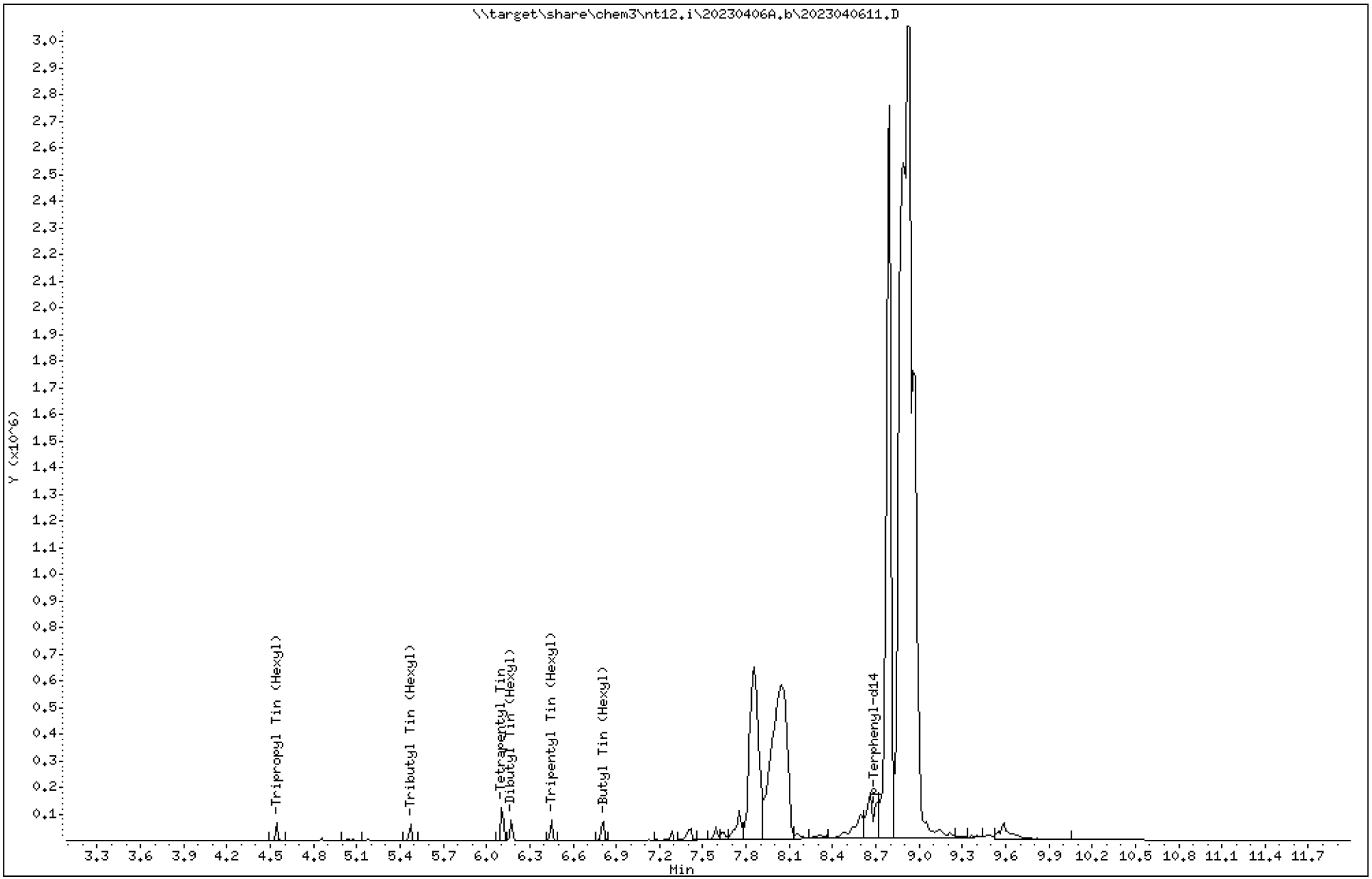
Laboratory:	Analytical Resources, LLC	SDG:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Matrix:	Solid	Analyzed:	04/06/23 18:49
Batch:	BLC0727	Laboratory ID:	BLC0727-BSD1
Preparation:	EPA 3546 (Microwave)	Sequence Name:	LCS Dup
Initial/Final:	5 g / 0.5 mL		

COMPOUND	SPIKE ADDED (ug/kg wet)	LCSD CONCENTRATION (ug/kg wet)	Q	LCSD % REC. #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Tributyltin Ion	44.6	49.1		110	9.37	30	30 - 160
Dibutyltin Ion	38.4	31.9		83.3	6.44	30	30 - 160
Butyltin Ion	31.2	23.4		75.1	7.67	30	30 - 160

* Indicates values outside of QC limits

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040611.D
Date : 06-APR-2023 18:33
Client ID:
Sample Info: BLC0727-BS1,

Instrument: nt12.i
Operator: JZ
Column phase: ZB-5msi
Column diameter: 0.25



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Date : 06-APR-2023 18:33

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-BS1,

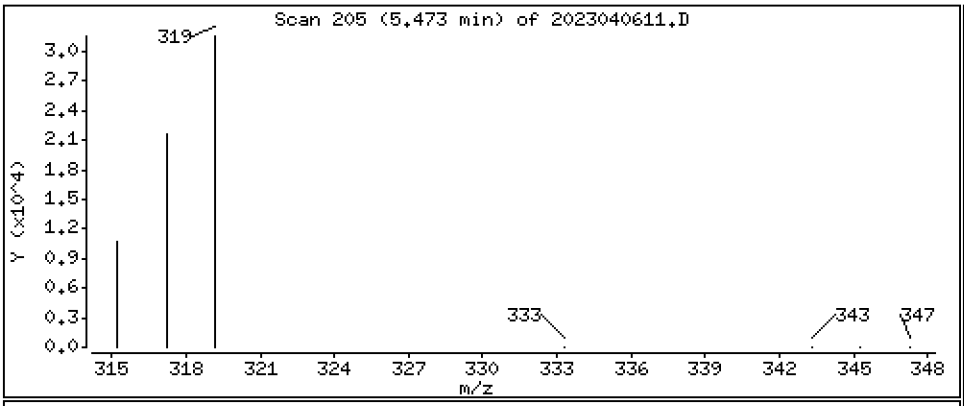
Operator: JZ

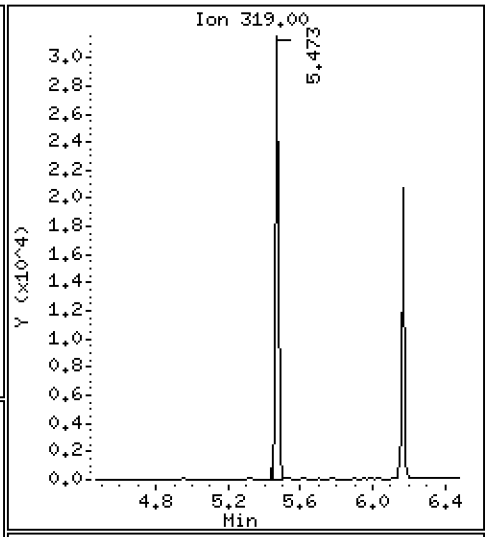
Column phase: ZB-5msi

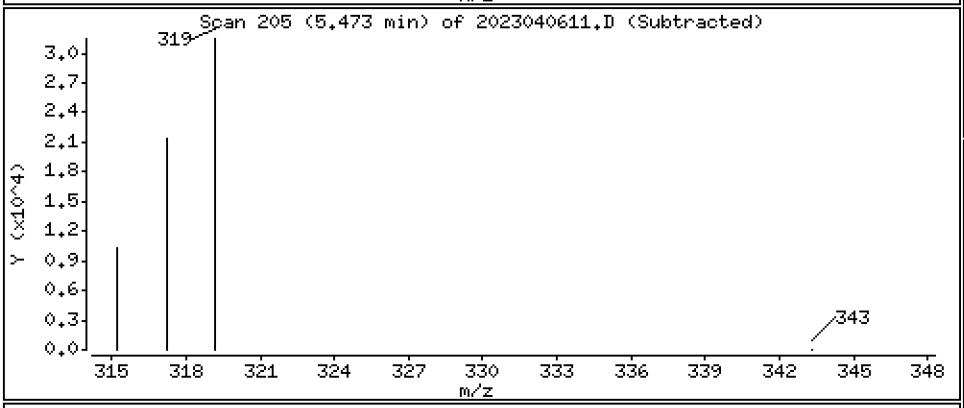
Column diameter: 0.25

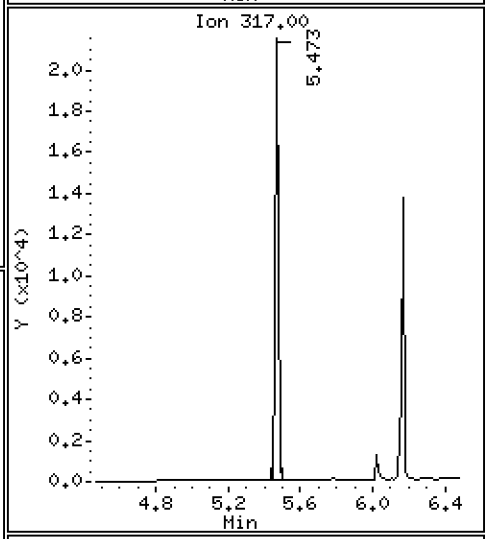
3 Tributyl Tin (Hexyl)

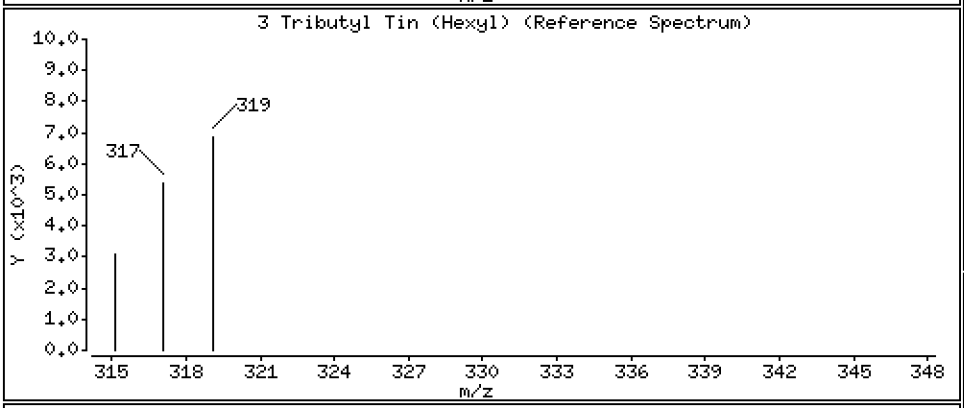
Concentration: 0.5784 ug/mL

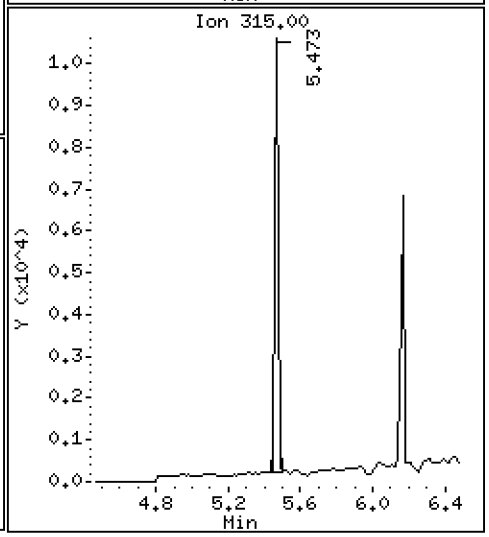


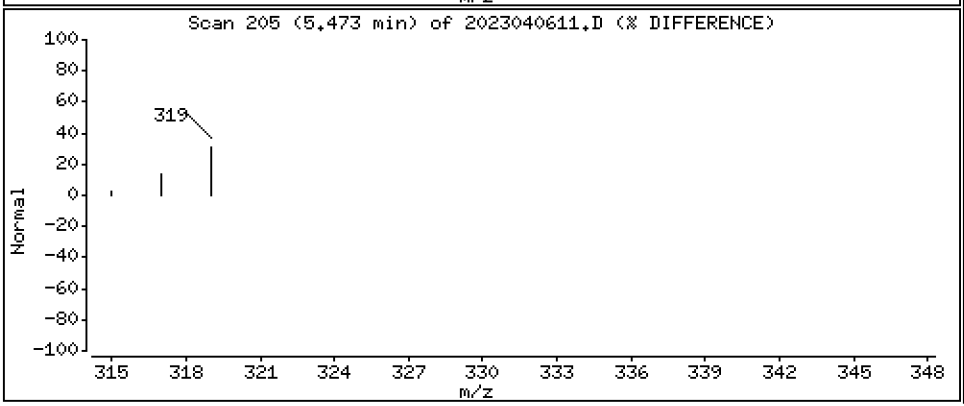












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040611.D

Date : 06-APR-2023 18:33

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-BS1,

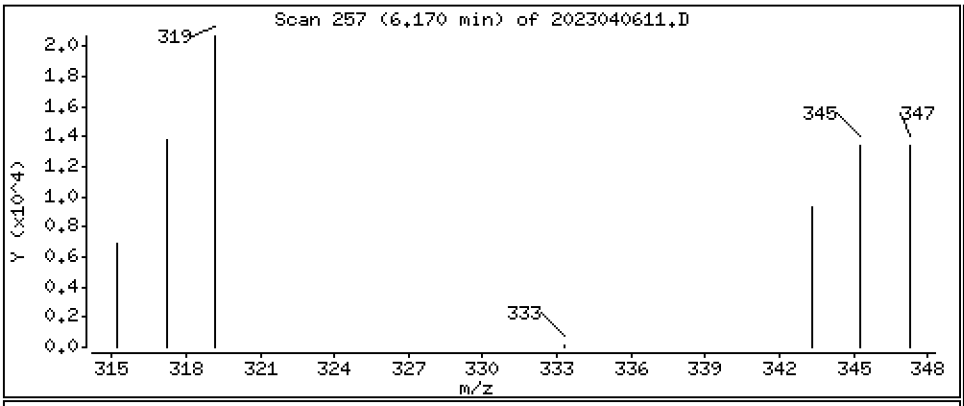
Operator: JZ

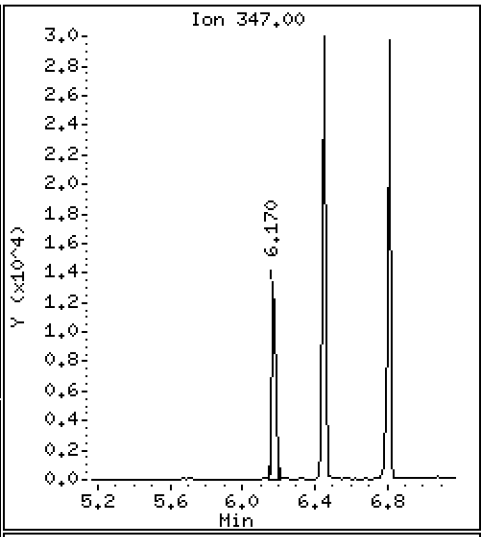
Column phase: ZB-5msi

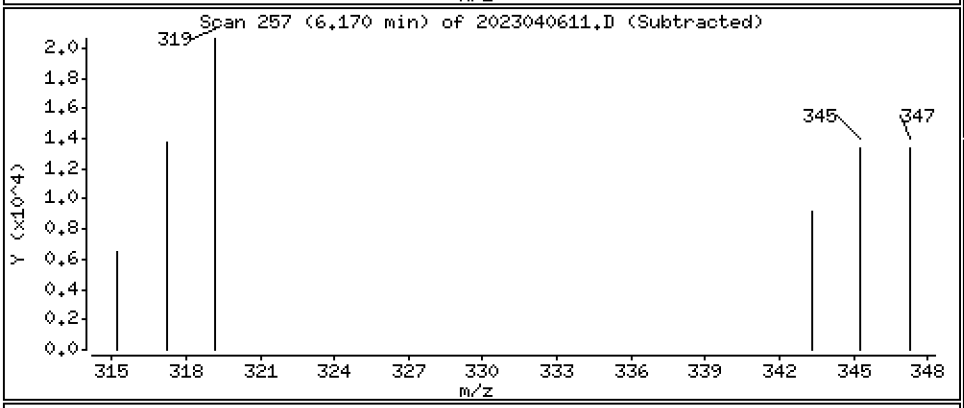
Column diameter: 0.25

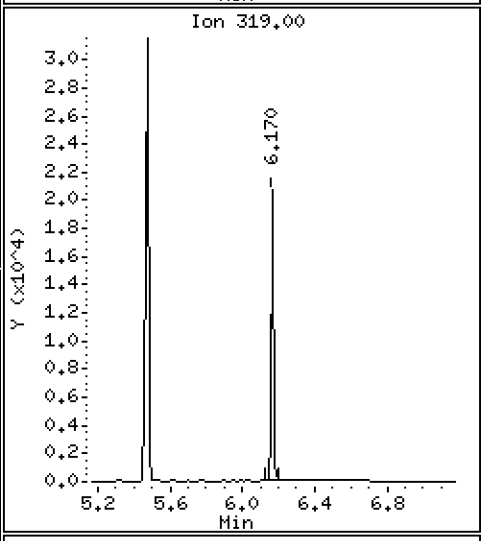
5 Dibutyl Tin (Hexyl)

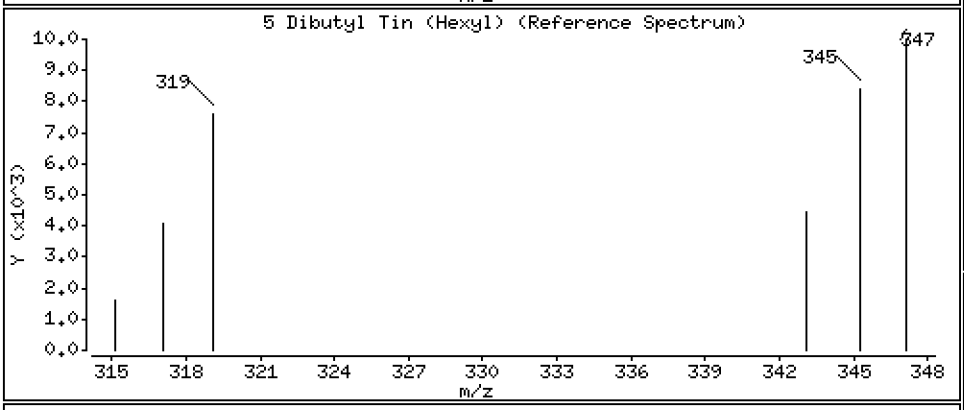
Concentration: 0.5181 ug/mL

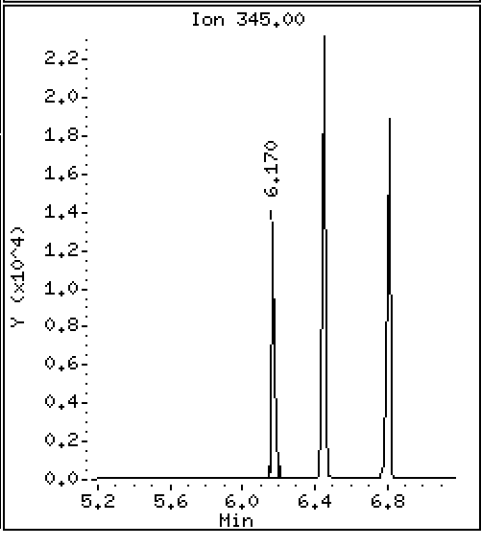


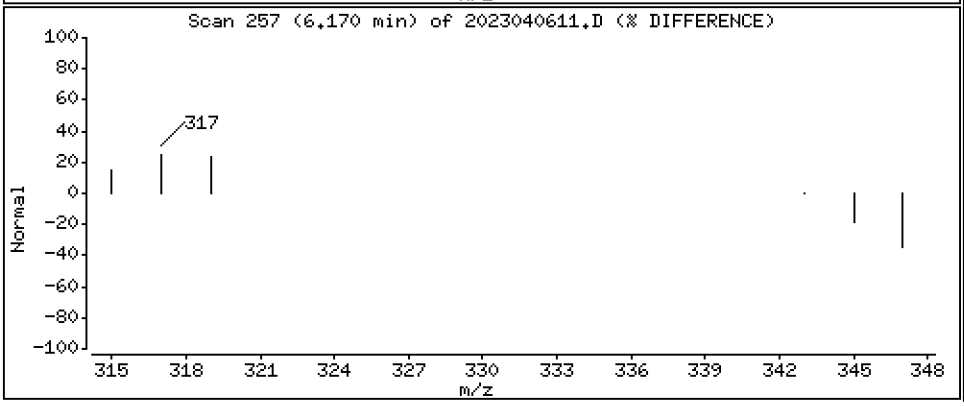












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040611.D

Date : 06-APR-2023 18:33

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-BS1,

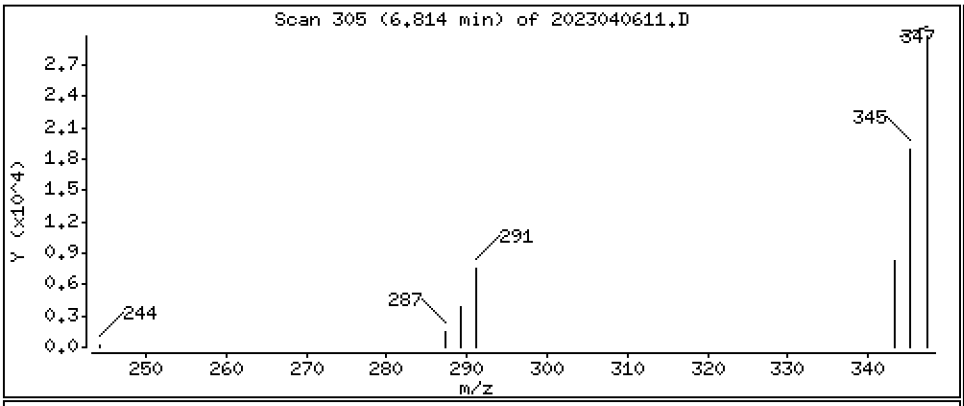
Operator: JZ

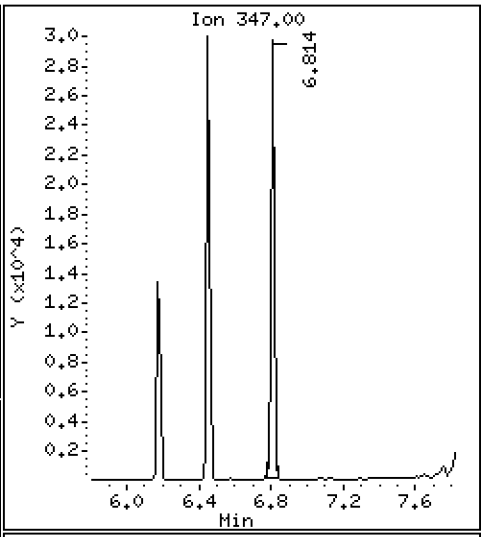
Column phase: ZB-5msi

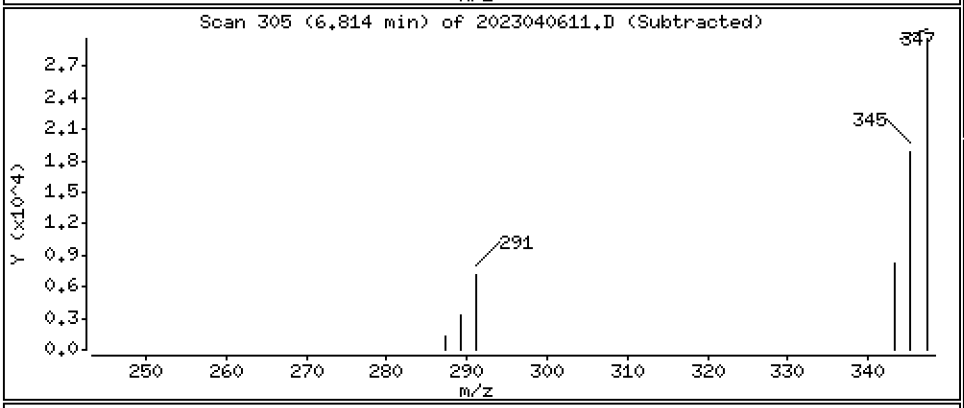
Column diameter: 0.25

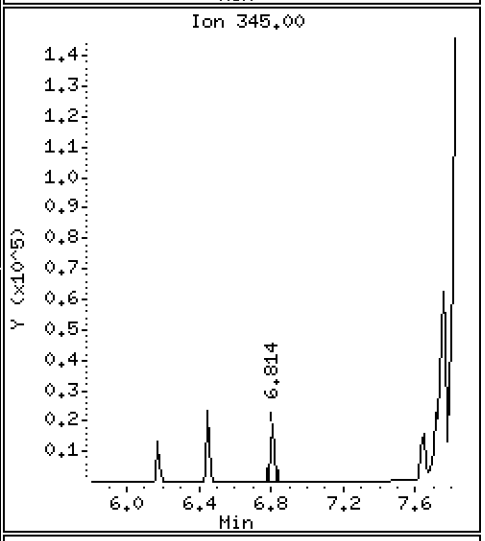
7 Butyl Tin (Hexyl)

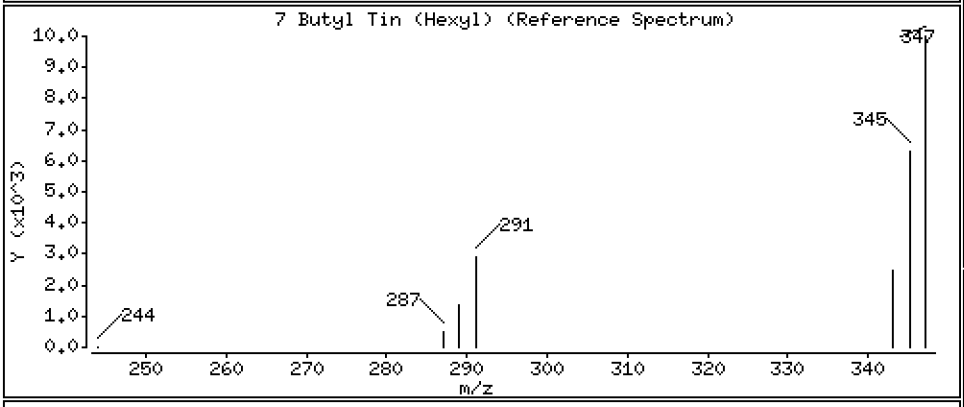
Concentration: 0.5313 ug/mL

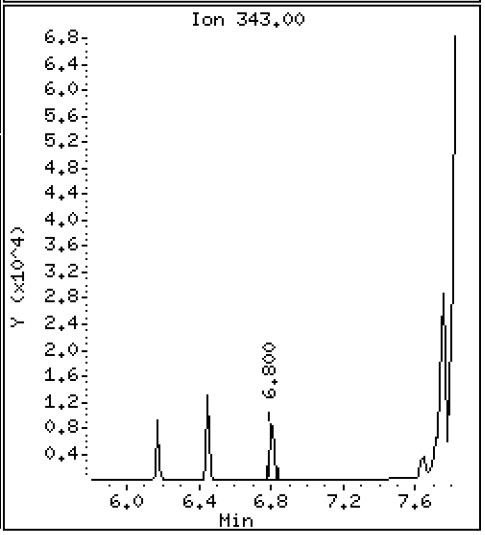


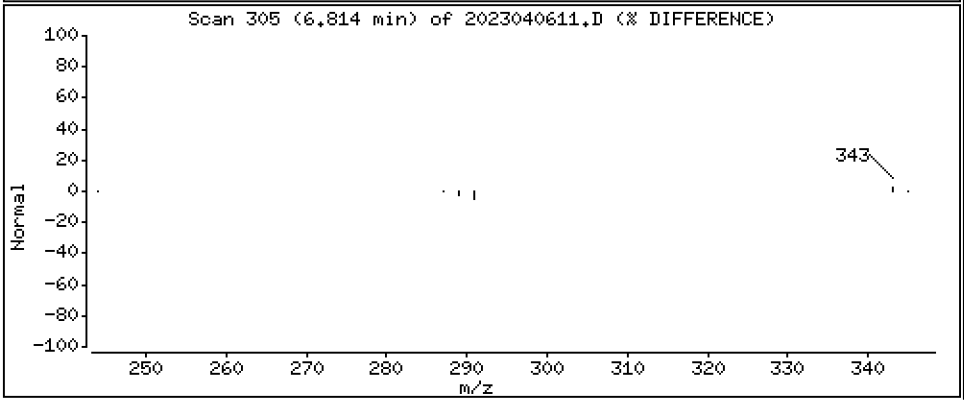












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040611.D
Lab Smp Id: BLC0727-BS1
Inj Date : 06-APR-2023 18:33
Operator : JZ   Inst ID: nt12.i
Smp Info : BLC0727-BS1,
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 09:53 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 11
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.548	4.514	(0.745)	33906	0.50021	0.5002
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	30701	0.57839	0.5784
*	4 Tetrapentyl Tin	333	6.102	6.102	(1.000)	160316	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.170	6.169	(0.710)	20192	0.51810	0.5181
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	31668	0.55231	0.5523
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	33321	0.53129	0.5313
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	23214	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040611.D
Lab Smp Id: BLC0727-BS1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	160316	-2.35
8 p-Terphenyl-d14	22611	11306	45222	23214	2.67

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040611.D

Lab ID: BLC0727-BS1
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 18:33

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.745	0.740	0.0057	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

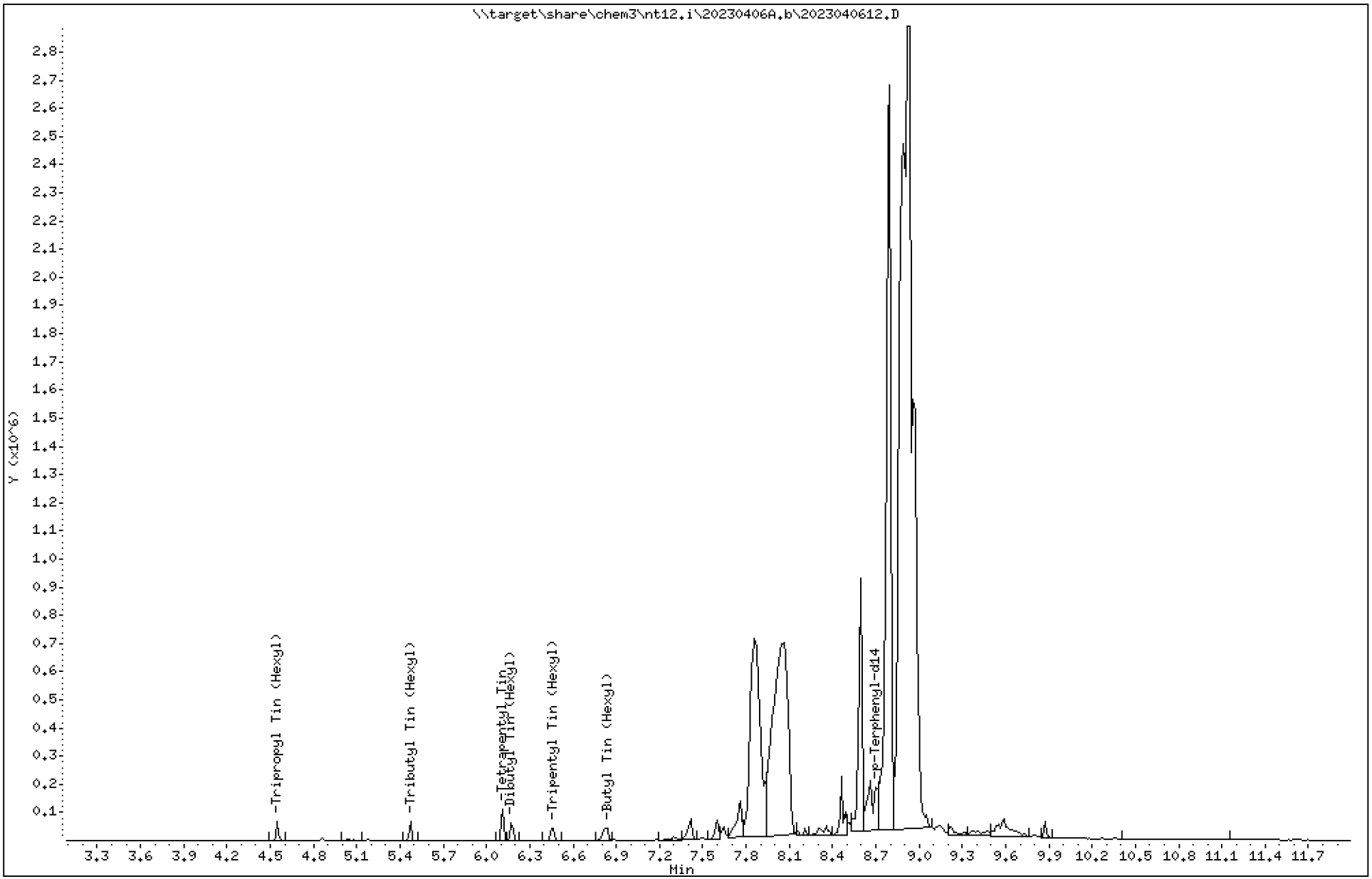
On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040612.D
Date : 06-APR-2023 18:49
Client ID:
Sample Info: BLC0727-BSD1,

Instrument: nt12.i
Operator: JZ
Column phase: ZB-5msi
Column diameter: 0.25



23C0618 CLPLIKE (Rev0) - Page 80 of 269

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040612.D

Date : 06-APR-2023 18:49

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-BSD1,

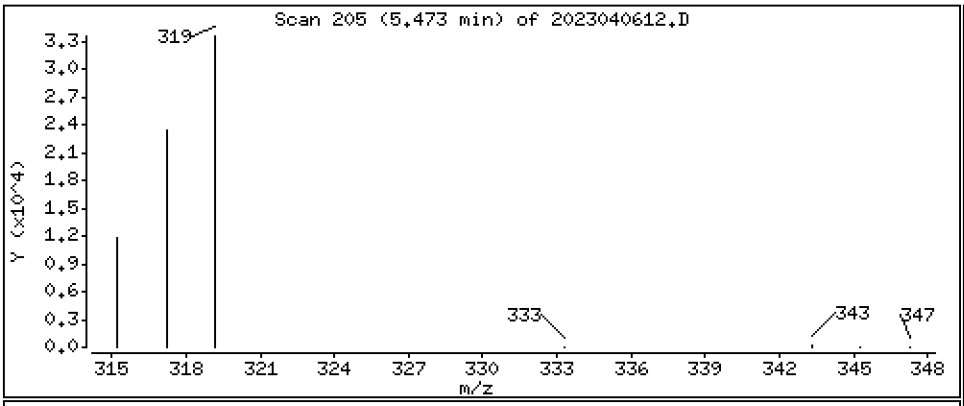
Operator: JZ

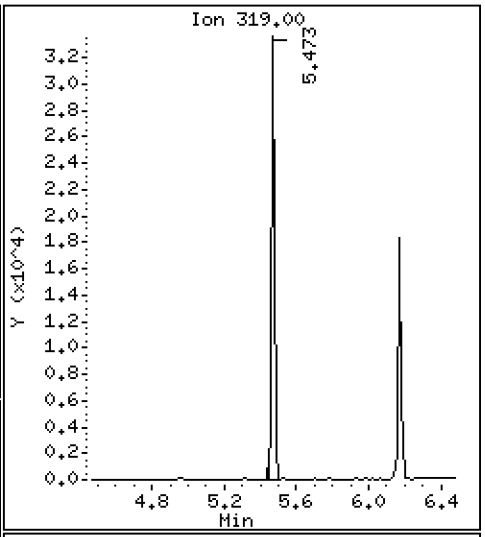
Column phase: ZB-5msi

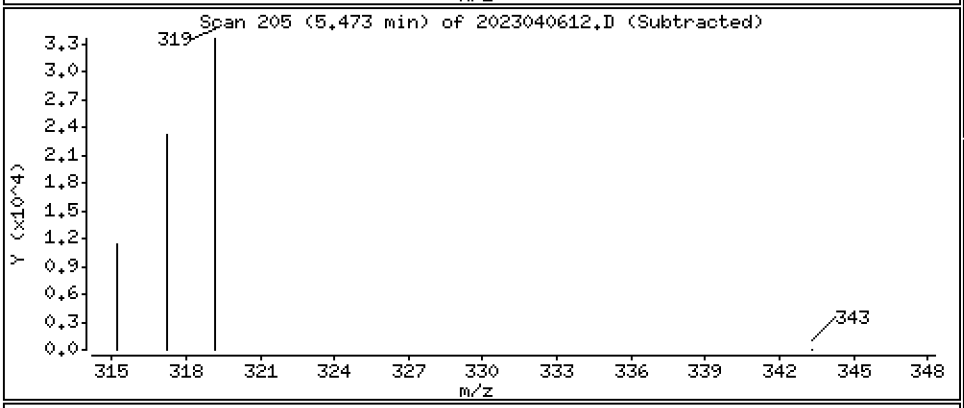
Column diameter: 0.25

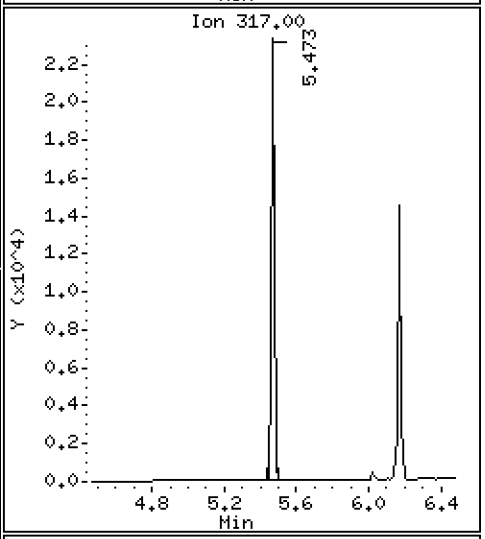
3 Tributyl Tin (Hexyl)

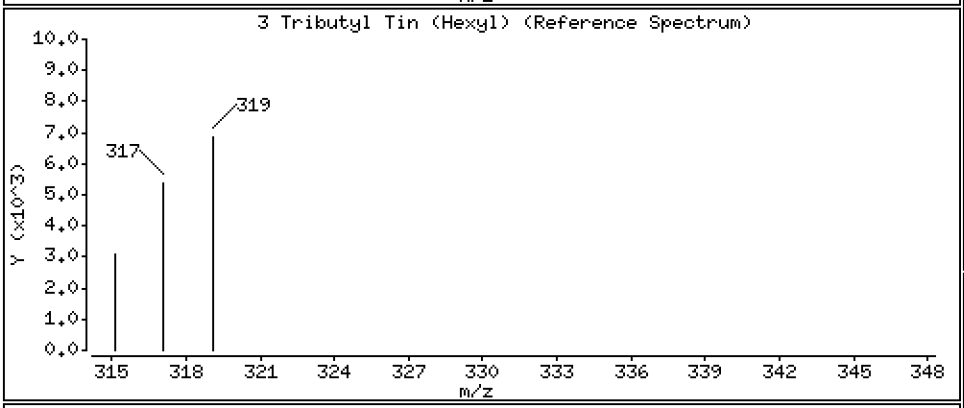
Concentration: 0.6352 ug/mL

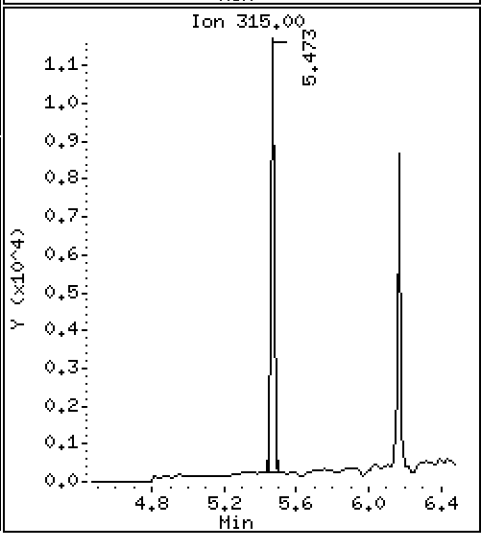


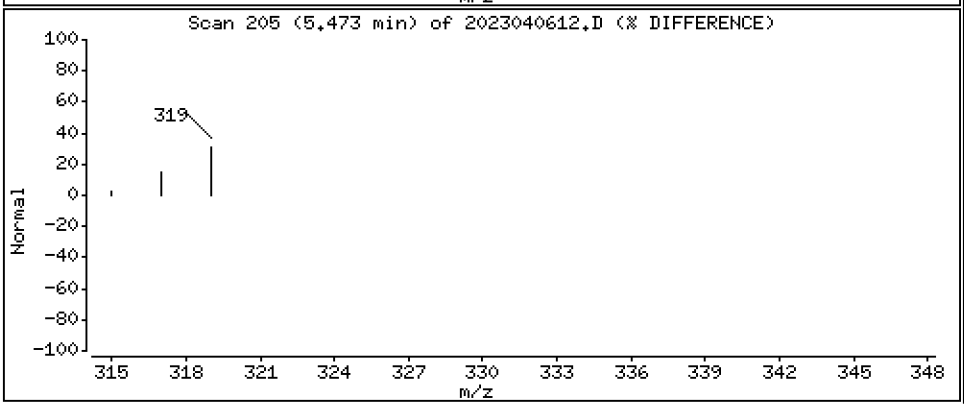












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040612.D

Date : 06-APR-2023 18:49

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-BSD1,

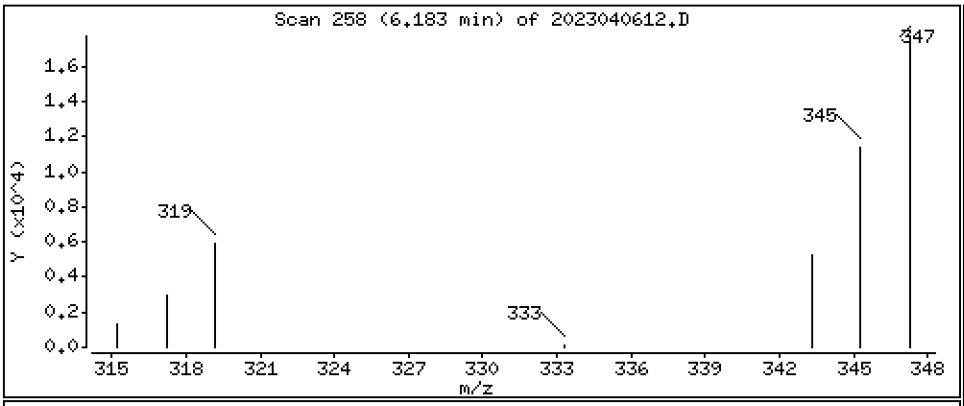
Operator: JZ

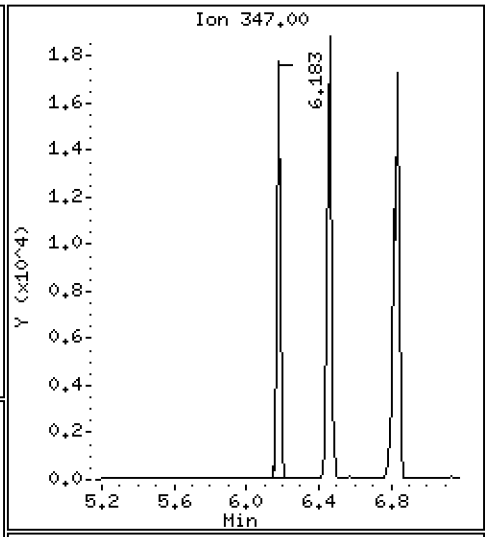
Column phase: ZB-5msi

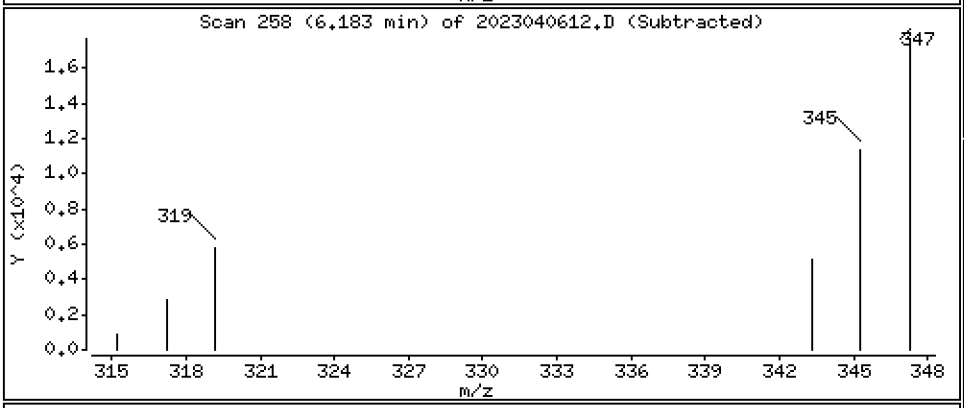
Column diameter: 0.25

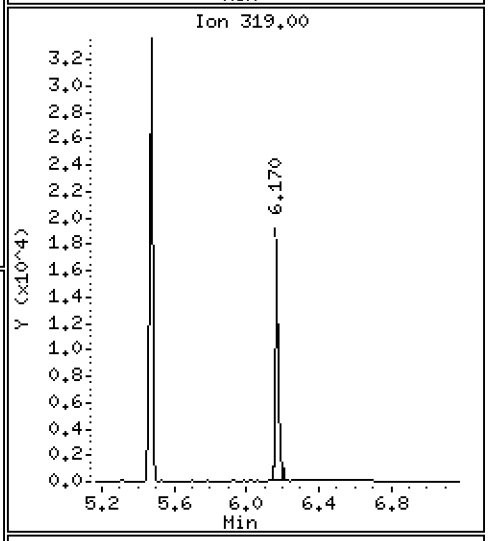
5 Dibutyl Tin (Hexyl)

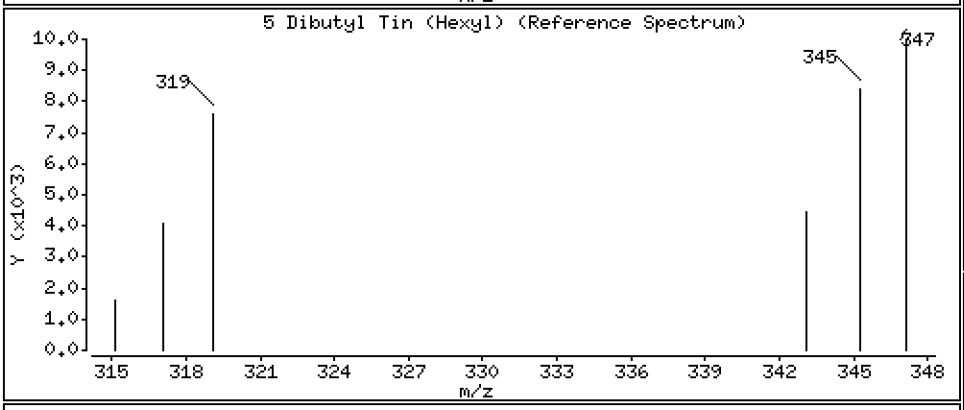
Concentration: 0.5526 ug/mL

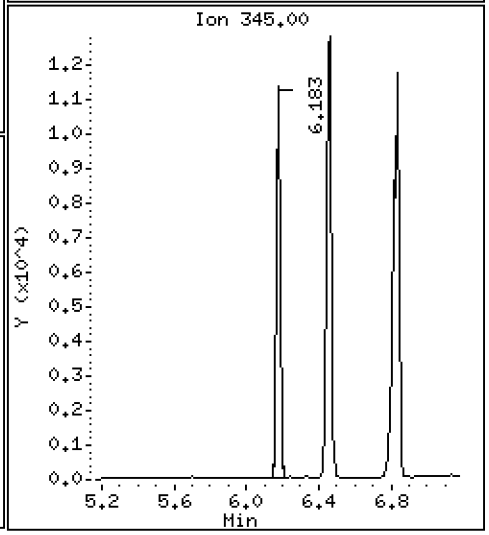


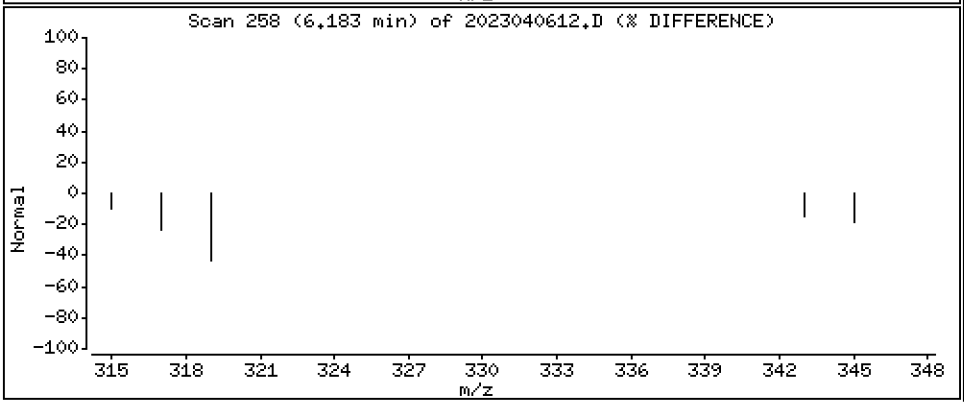












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040612.D

Date : 06-APR-2023 18:49

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-BSD1,

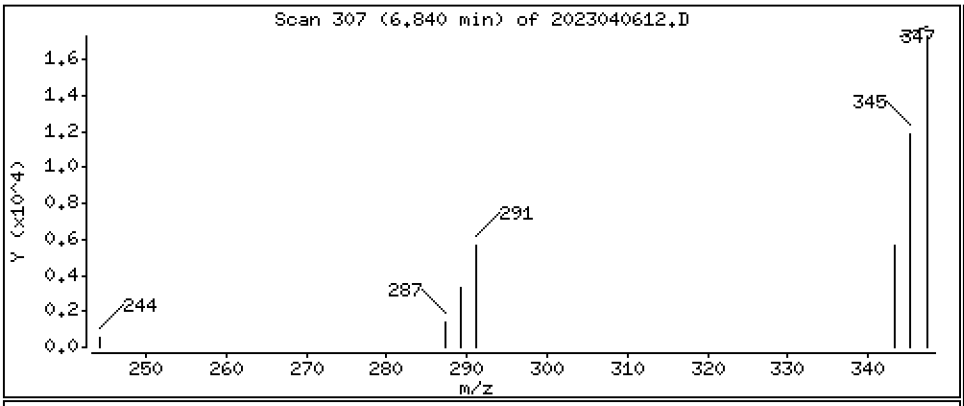
Operator: JZ

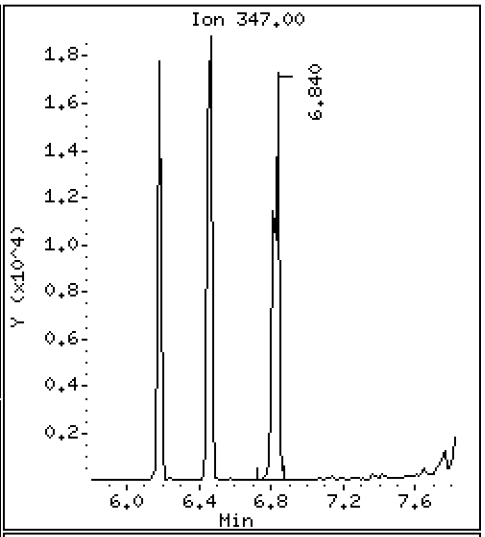
Column phase: ZB-5msi

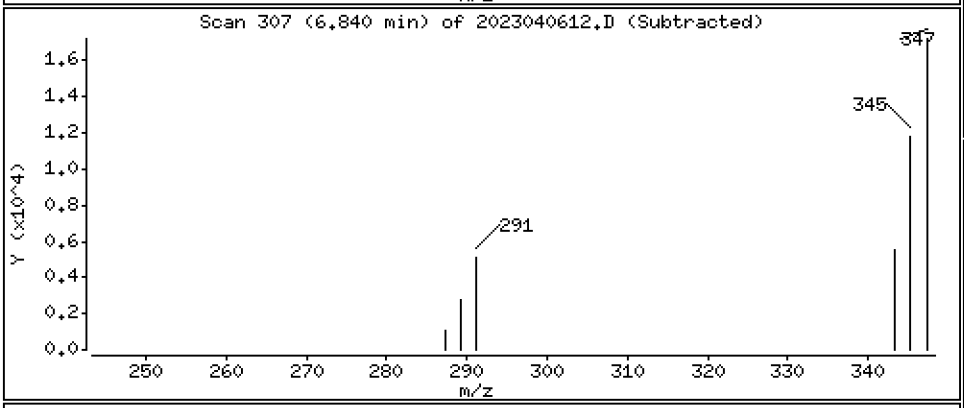
Column diameter: 0.25

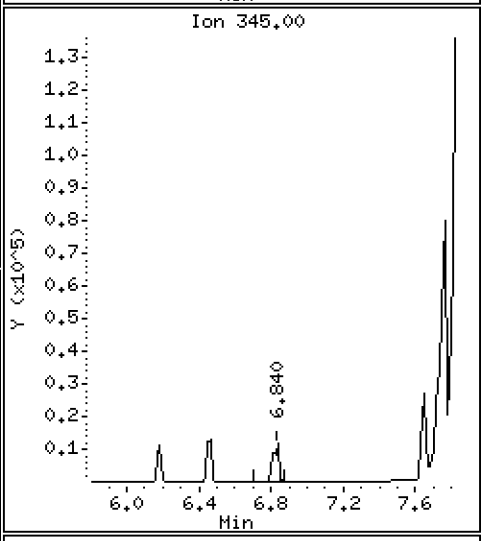
7 Butyl Tin (Hexyl)

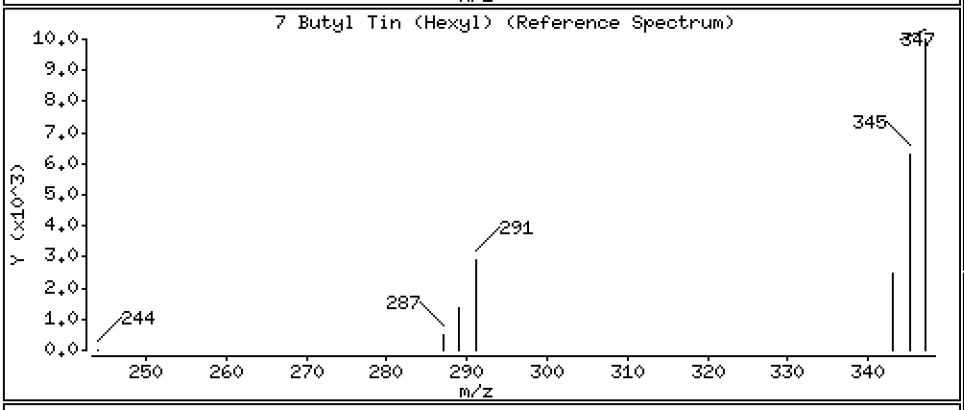
Concentration: 0.5737 ug/mL

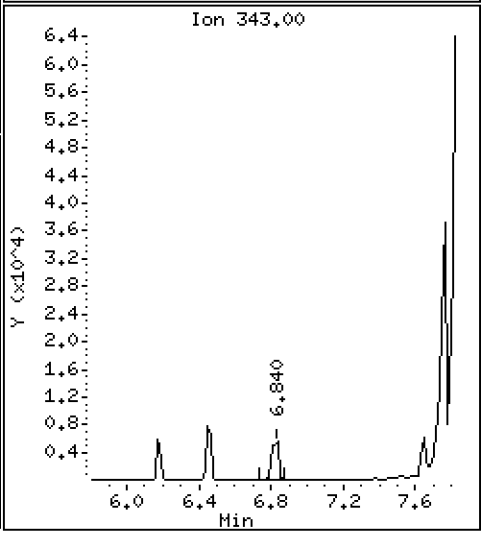


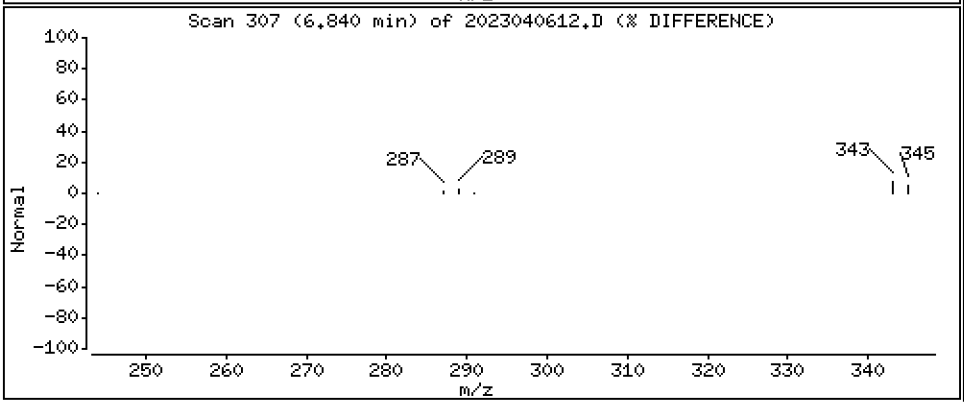












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040612.D
Lab Smp Id: BLC0727-BSD1
Inj Date : 06-APR-2023 18:49
Operator : JZ   Inst ID: nt12.i
Smp Info : BLC0727-BSD1,
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 09:53 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 12
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.548	4.514	(0.744)	33636	0.51366	0.5137
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.895)	32573	0.63522	0.6352
*	4 Tetrapentyl Tin	333	6.116	6.102	(1.000)	154875	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.710)	21384	0.55256	0.5526
$	6 Tripentyl Tin (Hexyl)	347	6.464	6.451	(0.743)	30809	0.54113	0.5411
	7 Butyl Tin (Hexyl)	347	6.840	6.813	(0.786)	35726	0.57367	0.5737
*	8 p-Terphenyl-d14	244	8.704	8.690	(1.000)	23051	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040612.D
Lab Smp Id: BLC0727-BSD1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	154875	-5.66
8 p-Terphenyl-d14	22611	11306	45222	23051	1.95

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.12	0.22
8 p-Terphenyl-d14	8.69	8.19	9.19	8.70	0.15

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040612.D

Lab ID: BLC0727-BSD1
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 18:49

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606A.D

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

MASS SPECTROMETER
INSTRUMENT PERFORMANCE CHECK
EPA 8270E-SIM

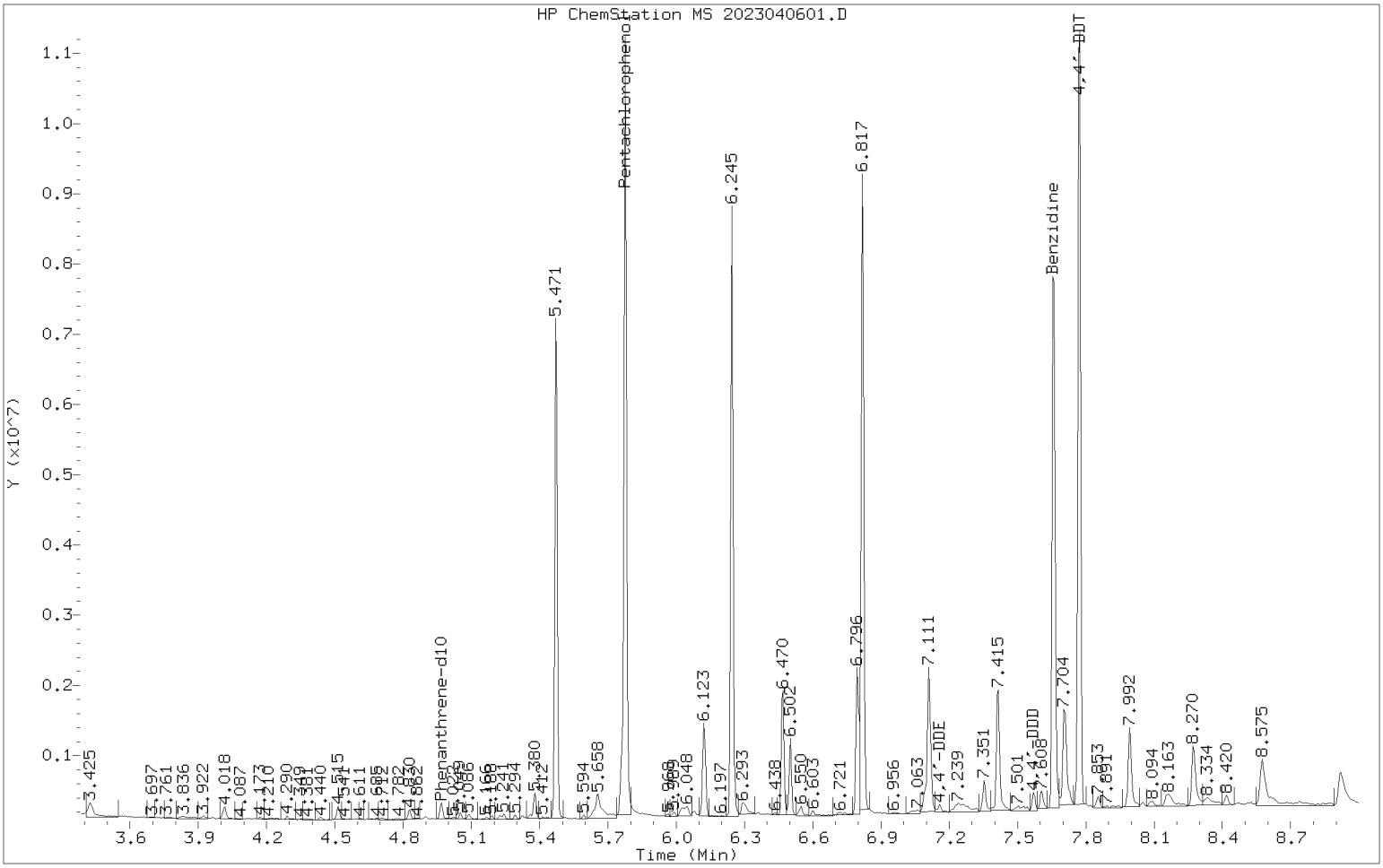
Laboratory:	Analytical Resources, LLC	SDG:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Lab File ID:	2023040601.D	Injection Date:	04/06/23
Instrument ID:	NT12	Injection Time:	15:06
Sequence:	SLD0101	Lab Sample ID:	SLD0101-TUN1

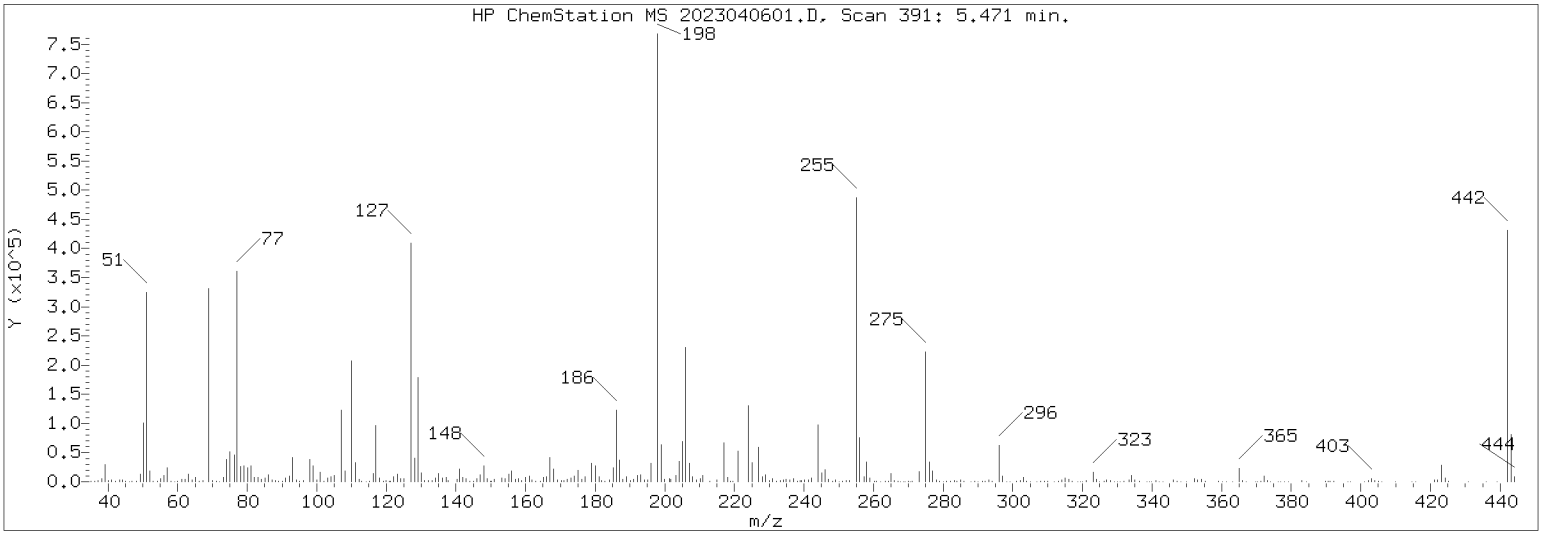
m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
68	Less than 2% of 69	0	PASS
69	Less than 100% of 198	40.7	PASS
70	Less than 2% of 69	0.353	PASS
197	Less than 2% of 198	0	PASS
198	Base peak, 100% relative abundance	100	PASS
199	5 - 9% of 198	7.86	PASS
365	1 - 100% of 198	3.38	PASS
441	Less than 150% of 443	53.8	PASS
442	1 - 200% of 198	68.5	PASS
443	15 - 24% of 442	20.4	PASS
4,4'-DDD	Less than 20% of 4,4'-DDT		
4,4'-DDE	Less than 20% of 4,4'-DDT		
4,4'-DDT	Base peak, 100% relative abundance		

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
MS Tune	SLD0101-TUN1	2023040601.D	04/06/2023	15:06
Initial Cal Blank	SLD0101-ICB1	2023040602.D	04/06/2023	15:22
Cal Standard	SLD0101-CAL1	2023040603.D	04/06/2023	15:39
Cal Standard	SLD0101-CAL2	2023040604.D	04/06/2023	15:55
Cal Standard	SLD0101-CAL3	2023040605.D	04/06/2023	16:12
Cal Standard	SLD0101-CAL4	2023040606.D	04/06/2023	16:28
Cal Standard	SLD0101-CAL5	2023040607.D	04/06/2023	16:45
Cal Standard	SLD0101-CAL6	2023040608.D	04/06/2023	17:01
Secondary Cal Check	SLD0101-SCV1	2023040609.D	04/06/2023	17:18
Secondary Cal Check	SLD0101-SCV2	2023041204.D	04/12/2023	14:30

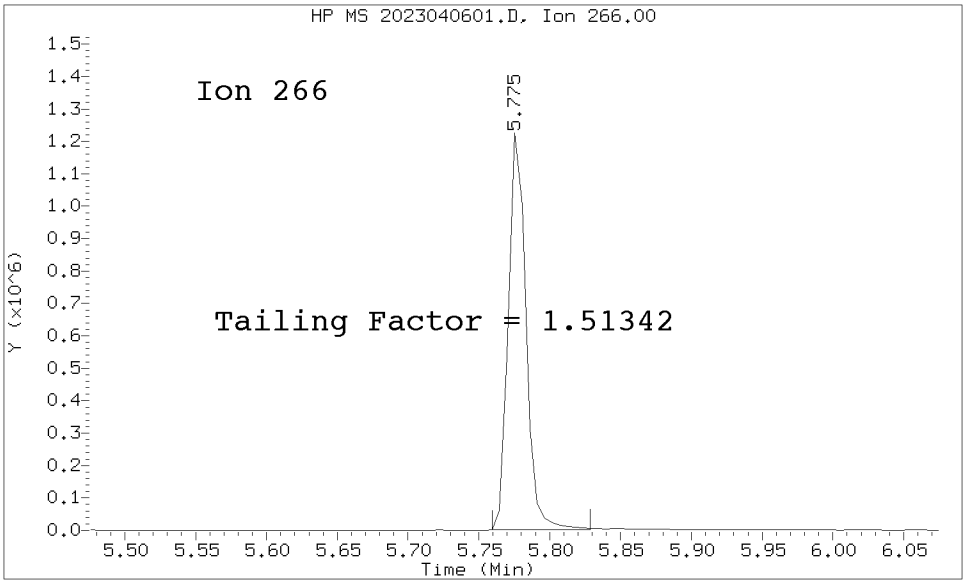
DFTPP TAILING FACTOR AND BREAKDOWN GRAPHIC REPORT

Datafile Analyzed: /20230406.b/tune.b/2023040601.D/2023040601.D
Method Used: \20230406.b\tune.b\DFTPP.m Inst: nt12
Injection Date: 06-APR-2023 15:06 Operator: JZ
Sample Info: SLD0101-TUN1 DFTPP20230406
Report Date: 04/06/2023 20:59



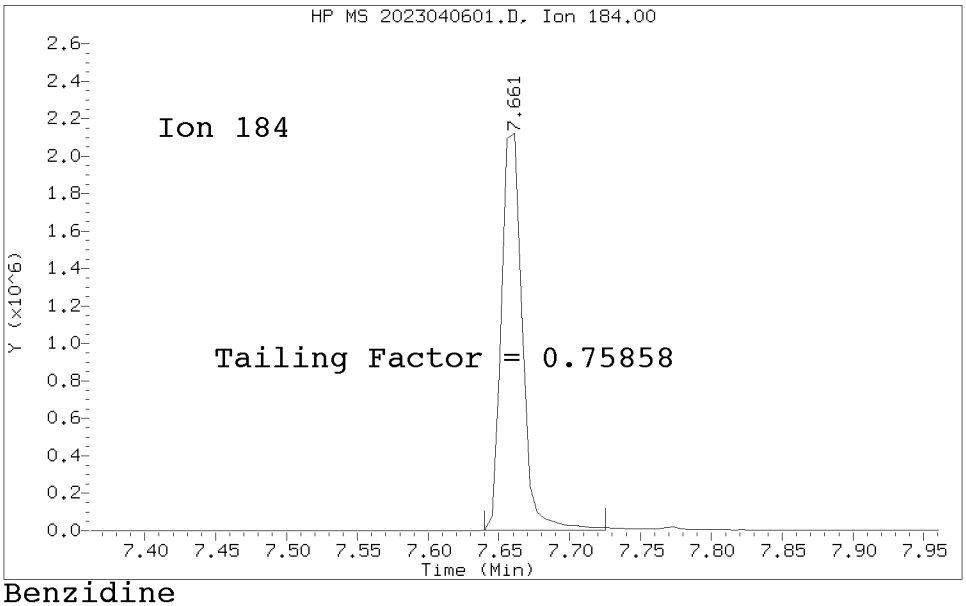


Datafile Analyzed: /20230406.b/tune.b/2023040601.D/2023040601.D
Method Used: \20230406.b\tune.b\DFTPP.m\sw846ddt.m Inst: nt12
Injection Date: 06-APR-2023 15:06 Operator: JZ
Sample Info: DFTPP20230406
Report Date: 04/06/2023 20:59



Pentachlorophenol
==========
Exp. RT = 5.775
Found RT = 5.775

Tail Factor = 1.513 Maximum Allowed = 2.0



Benzidine
==========
Exp. RT = 7.661
Found RT = 7.661

Tail Factor = 0.759 Maximum Allowed = 2.0

8270 TAILING FACTOR/BREAKDOWN SUMMARY RESULTS

TAILING ANALYSIS SUMMARY

Compound	Tail Factor	Max Allowed	Test
Pentachlorophenol	1.5134228	2.000	PASS
Benzidine	0.7585825	2.000	PASS

DDT DEGRADATION BREAKDOWN ANALYSIS SUMMARY

Compound	Response	%Breakdown	Max Allowed	Test
4,4-DDT	1580787			N/A
4,4-DDE	7601	0.5	20.0	PASS
4,4-DDD	39368	2.4	20.0	PASS
4,4-DDD + DDE	46969	2.9	20.0	PASS

Tuning Sample, nt12.i/20230406.b/tune.b/2023040601.D, *** PASSED ***

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
198	Base Peak, 100% relative abundance	100.00
51	10.00 - 80.00% of mass 198	40.61
68	Less than 2.00% of mass 69	0.00 (0.00)
69	Mass 69 relative abundance	40.72
70	Less than 2.00% of mass 69	0.14 (0.35)
127	10.00 - 80.00% of mass 198	51.24
197	Less than 2.00% of mass 198	0.00
199	5.00 - 9.00% of mass 198	7.86
275	10.00 - 60.00% of mass 198	29.70
365	Greater than 1.00% of mass 198	3.38
441	0.01 - 24.00% of mass 442	7.52 (10.98)
442	50.00 - 200.00% of mass 198	68.55
443	15.00 - 24.00% of mass 442	13.97 (20.38)

Data File: 2023040601.D
Spectrum: Avg. Scans 390-392 (5.47), Background Scan 386
Location of Maximum: 198.00
Number of points: 352

m/z	Y	m/z	Y	m/z	Y	m/z	Y
35.00	934	137.00	5291	231.00	3787	328.00	1233
36.00	134	138.00	1407	232.00	1009	329.00	305
37.00	912	139.00	230	233.00	1052	330.00	73
38.00	3820	140.00	2972	234.00	3500	331.00	417
39.00	18080	141.00	15198	235.00	2491	332.00	1240
40.00	243	142.00	4853	236.00	2237	333.00	1048
41.00	482	143.00	3599	237.00	3879	334.00	8817
43.00	276	144.00	991	238.00	953	335.00	2756
45.00	422	145.00	731	239.00	2416	336.00	575
46.00	129	146.00	3724	240.00	1823	338.00	68
49.00	5077	147.00	8084	241.00	2669	339.00	240
50.00	68608	148.00	18304	242.00	4906	340.00	315
51.00	226496	149.00	3492	244.00	71984	341.00	1673
52.00	11730	150.00	963	245.00	10836	342.00	402
53.00	306	151.00	2399	246.00	14890	343.00	192
54.00	268	152.00	733	247.00	3342	344.00	64
55.00	1771	153.00	4659	248.00	851	345.00	99
56.00	6665	154.00	4248	249.00	3014	346.00	2764
57.00	15399	155.00	9624	250.00	543	347.00	793
58.00	606	156.00	13334	251.00	721	348.00	176
60.00	2	157.00	3402	252.00	787	349.00	53
61.00	2775	158.00	3321	253.00	1712	350.00	184
62.00	3701	159.00	2214	255.00	358976	351.00	141
63.00	9745	160.00	5142	256.00	56856	352.00	4460
64.00	1833	161.00	7084	257.00	5369	353.00	2627
65.00	5031	162.00	2303	258.00	24264	354.00	4074
66.00	600	163.00	712	259.00	4673	355.00	1004
69.00	227136	164.00	1147	260.00	577	356.00	208
70.00	801	165.00	5167	261.00	873	359.00	377
71.00	155	166.00	6270	262.00	304	360.00	231
73.00	3742	167.00	31248	263.00	515	361.00	135
74.00	25720	168.00	16351	264.00	360	365.00	18856
75.00	37472	169.00	2256	265.00	9172	366.00	1793
76.00	32416	170.00	1278	266.00	1326	367.00	283
77.00	257600	171.00	1486	267.00	447	370.00	633
78.00	17848	172.00	2907	268.00	239	371.00	378
79.00	17640	173.00	4123	269.00	268	372.00	6826
80.00	15634	174.00	7639	270.00	725	373.00	1925
81.00	19184	175.00	13108	271.00	765	374.00	227
82.00	4772	176.00	2656	272.00	172	376.00	272
83.00	4114	177.00	6112	273.00	13642	378.00	139
85.00	4016	178.00	588	274.00	4783	379.00	79
86.00	5700	179.00	22784	275.00	165632	383.00	1863
87.00	2097	180.00	17880	276.00	24704	384.00	453
88.00	802	181.00	6203	277.00	13899	385.00	55
89.00	936	182.00	1290	278.00	2430	390.00	1364
90.00	32	183.00	748	279.00	475	391.00	724
91.00	4338	184.00	2769	280.00	361	392.00	726
92.00	6926	185.00	13954	282.00	773	395.00	198

93.00	30480	186.00	87216	283.00	1708	396.00	138
94.00	1883	187.00	25688	284.00	1211	397.00	154
95.00	481	188.00	3310	285.00	2147	398.00	91
96.00	1267	189.00	6300	286.00	735	401.00	437
98.00	25544	190.00	1201	287.00	135	402.00	2523
99.00	18560	191.00	2647	288.00	312	403.00	4002
100.00	2272	192.00	7958	289.00	772	404.00	2035
101.00	10814	193.00	8567	290.00	384	405.00	293
102.00	706	194.00	1789	291.00	587	406.00	91
103.00	4258	195.00	1339	292.00	815	409.00	80
104.00	7261	196.00	21568	293.00	2528	410.00	194
105.00	6724	198.00	557760	294.00	1114	415.00	391
107.00	82648	199.00	43824	296.00	46800	416.00	121
108.00	12203	200.00	3097	297.00	6673	419.00	92
110.00	144384	201.00	4066	298.00	401	421.00	3064
111.00	23776	202.00	2002	299.00	458	422.00	3429
112.00	2847	203.00	7186	301.00	590	423.00	24600
113.00	880	204.00	25608	302.00	1001	424.00	6771
114.00	304	205.00	48280	303.00	5044	425.00	897
115.00	118	206.00	167488	304.00	1432	426.00	73
116.00	4357	207.00	20968	305.00	18	429.00	100
117.00	69192	208.00	5879	306.00	100	431.00	119
118.00	5193	209.00	2348	307.00	299	435.00	182
119.00	636	210.00	2340	308.00	669	436.00	54
120.00	1350	211.00	7053	309.00	537	438.00	56
121.00	921	212.00	265	310.00	628	439.00	508
122.00	6271	213.00	680	312.00	283	441.00	41968
123.00	8610	214.00	333	313.00	834	442.00	382336
124.00	3594	215.00	2024	314.00	2613	443.00	77936
125.00	3555	216.00	4064	315.00	4957	444.00	7505
127.00	285824	217.00	47112	316.00	3029	445.00	198
128.00	27544	218.00	5518	317.00	520	451.00	58
129.00	120544	219.00	1133	319.00	362	457.00	56
130.00	10482	221.00	40328	320.00	39	467.00	52
131.00	1933	224.00	96152	321.00	1397	470.00	58
132.00	1163	225.00	24168	323.00	13693	480.00	50
133.00	756	227.00	42032	324.00	2570		
134.00	3587	228.00	6204	325.00	207		
135.00	9210	229.00	7812	326.00	369		
136.00	3691	230.00	1846	327.00	2665		

INITIAL CALIBRATION DATA

EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Calibration:	GD00019	Instrument:	NT12
Calibration Date:	04/06/2023	Column (1):	ZB-5MS

Compound	Level 01		Level 02		Level 03		Level 04		Level 05		Level 06	
	Conc	RRF	Conc	RRF	Conc	RRF	Conc	RRF	Conc	RRF	Conc	RRF
Tributyltin Ion	0.03865	0.7266064	0.1546	0.6086814	0.3865	0.6727639	0.773	0.6396744	1.546	0.6716686	3.092	0.653737
Dibutyltin Ion	0.0578	0.3486452	0.2312	0.3097427	0.578	0.3411116	1.156	0.3304631	2.312	0.3336031	4.624	0.3510799
Butyltin Ion	0.0408	0.50637	0.1632	0.4553246	0.408	0.5551986	0.816	0.5258812	1.632	0.6076835	3.264	0.5915564
Tetrabutyltin	0.05	0.9279184	0.2	0.7772272	0.5	0.8343506	1	0.7892381	2	0.8289532	4	0.7934565
Tripentyltin	0.07959	0.4903103	0.31836	0.4493965	0.7959	0.5177509	1.5918	0.4954624	3.1836	0.5226827	6.3672	0.4883226
Tripropyltin	0.037215	0.9945981	0.14886	0.8153157	0.37215	0.8785713	0.7443	0.7985333	1.4886	0.8140349	2.9772	0.7726542

INITIAL CALIBRATION DATA

EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Calibration:	GD00019	Instrument:	NT12
Calibration Date:	04/06/2023	Column (1):	ZB-5MS

COMPOUND	Mean RRF	RRF RSD	Linear COD	Quad COD	Limit Type & Limit	Q
Tributyltin Ion	0.6621886	6.0			RSD (15)	
Dibutyltin Ion	0.3357743	4.5			RSD (15)	
Butyltin Ion	0.5403357	10.5			RSD (15)	
Tetrabutyltin	0.8251907	6.7			RSD (15)	
Tripentyltin	0.4939876	5.3			RSD (15)	
Tripropyltin	0.8456179	9.6			RSD (15)	

Analytical Resources, LLC
Analytical Chemists and Consultants

ANALYSIS SEQUENCE

SLD0101

Instrument: NT12
Calibration ID: GD00019

Printed: 4/6/2023 9:24:49PM

Lab Number	Analysis	Container	Order	Position	STD ID	ISTD ID	Client	Comments
SLD0101-TUN1	QC		1		K004775			
SLD0101-ICB1	QC		2			L003438		
SLD0101-CAL1	QC		3		L002070	L003438		
SLD0101-CAL2	QC		4		L002071	L003438		
SLD0101-CAL3	QC		5		L002072	L003438		
SLD0101-CAL4	QC		6		L002073	L003438		
SLD0101-CAL5	QC		7		L002074	L003438		
SLD0101-CAL6	QC		8		L002075	L003438		
SLD0101-SCV1	QC		9		L002076	L003438		

Samples Loaded By Date

Data Processed By Date

INTERNAL STANDARD SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406.b

	Time	Filename	LabID	ClientId	DF					
1	1506	2023040601.D	SLD0101-TUN1		1	NO ISTDS FOUND				
2	1522	2023040602.D	SLD0101-ICB1		1	6.12	161159	8.70	23719	
3	1539	2023040603.D	SLD0101-CAL1		1	6.10	157169	8.69	22292	
4	1555	2023040604.D	SLD0101-CAL2		1	6.10	164881	8.69	23279	
5	1612	2023040605.D	SLD0101-CAL3		1	6.10	167613	8.69	23227	
6	1628	2023040606.D	SLD0101-CAL4		1	6.10	164171	8.69	22611	
7	1645	2023040607.D	SLD0101-CAL5		1	6.10	182529	8.69	24468	
8	1701	2023040608.D	SLD0101-CAL6		1	6.10	199113	8.69	25395	
9	1718	2023040609.D	SLD0101-SCV1		1	6.10	178329	8.69	27505	

MANUAL INTEGRATION SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406.b

ARI Job No.: SLD0 Method: TBT20230406.m Instrument: nt12.i Date: 06-APR-2023

Time	Filename	LabID	ClientId	DF	Manually Integrated Compounds
1522	2023040602.D	SLD0101-ICB1		1	NO MANUAL INTEGRATION
1539	2023040603.D	SLD0101-CAL1		1	NO MANUAL INTEGRATION
1555	2023040604.D	SLD0101-CAL2		1	NO MANUAL INTEGRATION
1612	2023040605.D	SLD0101-CAL3		1	NO MANUAL INTEGRATION
1628	2023040606.D	SLD0101-CAL4		1	NO MANUAL INTEGRATION
1645	2023040607.D	SLD0101-CAL5		1	NO MANUAL INTEGRATION
1701	2023040608.D	SLD0101-CAL6		1	NO MANUAL INTEGRATION
1718	2023040609.D	SLD0101-SCV1		1	NO MANUAL INTEGRATION

Security Status Report

Date: 06-Apr-2023 21:28

2023040601.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040602.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040603.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040604.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040605.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040606.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040607.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040608.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040609.D	Data Locked	jianqing, 06-Apr-2023 21:28

ARI Labs, Inc.

INITIAL CALIBRATION DATA

Start Cal Date : 06-APR-2023 15:39
End Cal Date : 06-APR-2023 17:01
Quant Method : ISTD
Origin : Disabled
Target Version : 4.14
Integrator : HP RTE
Method file : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Last Edit : 06-Apr-2023 17:24 nt12.i
Curve Type : Average

Calibration File Names:
Level 1: \\target\share\chem3\nt12.i\20230406.b\2023040603.D
Level 2: \\target\share\chem3\nt12.i\20230406.b\2023040604.D
Level 3: \\target\share\chem3\nt12.i\20230406.b\2023040605.D
Level 4: \\target\share\chem3\nt12.i\20230406.b\2023040606.D
Level 5: \\target\share\chem3\nt12.i\20230406.b\2023040607.D
Level 6: \\target\share\chem3\nt12.i\20230406.b\2023040608.D

Compound	0.05000 Level 1	0.20000 Level 2	0.50000 Level 3	1.000 Level 4	2.000 Level 5	4.000 Level 6	___ RRF	% RSD
2 Tetrabutyl Tin	0.92792	0.77723	0.83435	0.78924	0.82895	0.79346	0.82519	6.693
3 Tributyl Tin (Hexyl)	0.72661	0.60868	0.67276	0.63967	0.67167	0.65374	0.66219	5.962
5 Dibutyl Tin (Hexyl)	0.34865	0.30974	0.34111	0.33046	0.33360	0.35108	0.33577	4.495
7 Butyl Tin (Hexyl)	0.50637	0.45532	0.55520	0.52588	0.60768	0.59156	0.54034	10.459
$ 1 Tripropyl Tin (Hexyl)	0.99460	0.81532	0.87857	0.79853	0.81404	0.77265	0.84562	9.569
$ 6 Tripentyl Tin (Hexyl)	0.49031	0.44940	0.51775	0.49546	0.52268	0.48832	0.49399	5.298

ARI Labs, Inc.
RETENTION TIME SUMMARY REPORT

Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Batch File: \\target\share\chem3\nt12.i\20230406.b
Inst ID: nt12.i

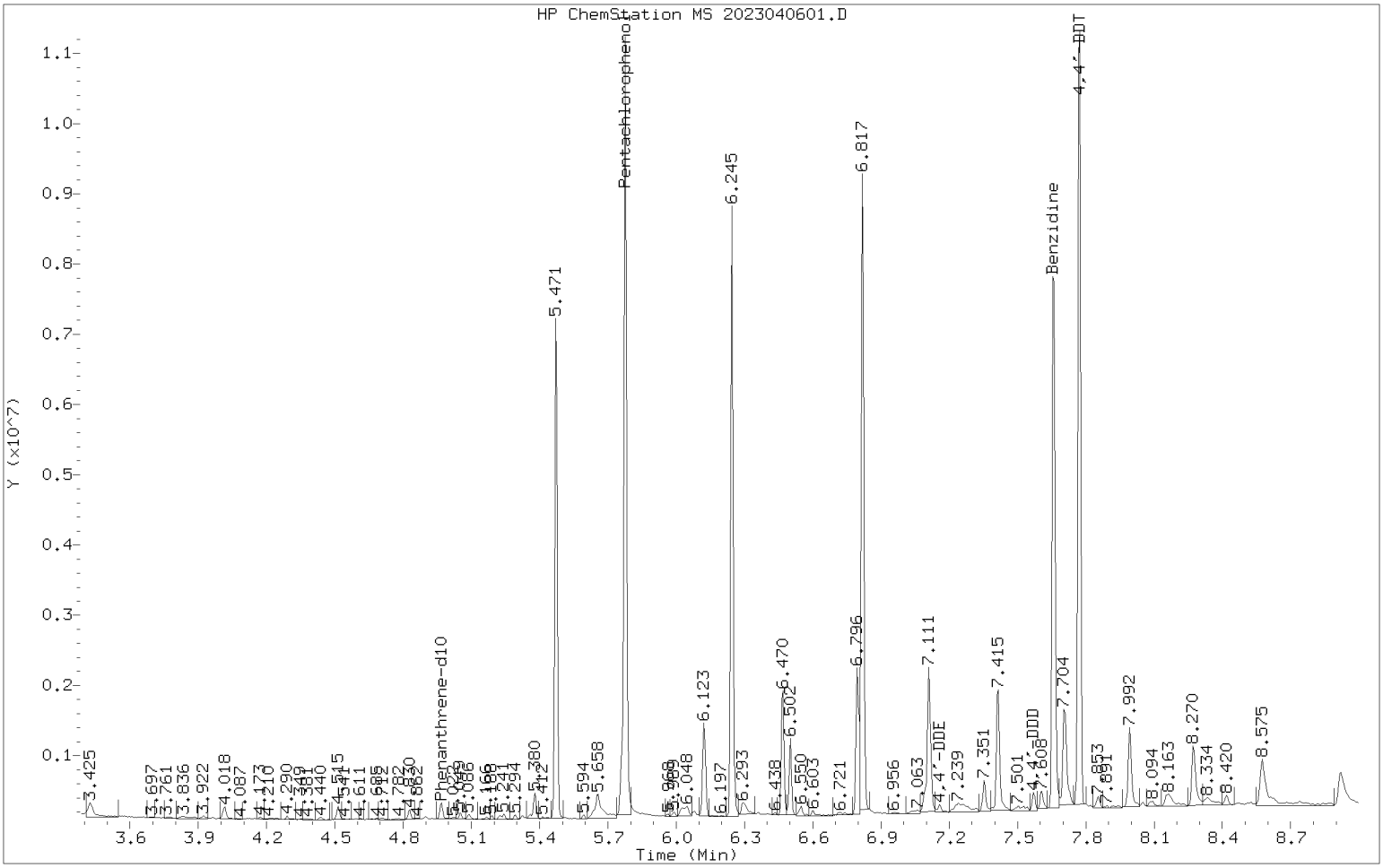
ID:	RT01	RT02	RT03	RT04	RT05	RT06
FILENAME:	2023040603	2023040604	2023040605	2023040606	2023040607	2023040608
INJ.DATE:	06-APR-2023	06-APR-2023	06-APR-2023	06-APR-2023	06-APR-2023	06-APR-2023
INJ.TIME:	15:39	15:55	16:12	16:28	16:45	17:01

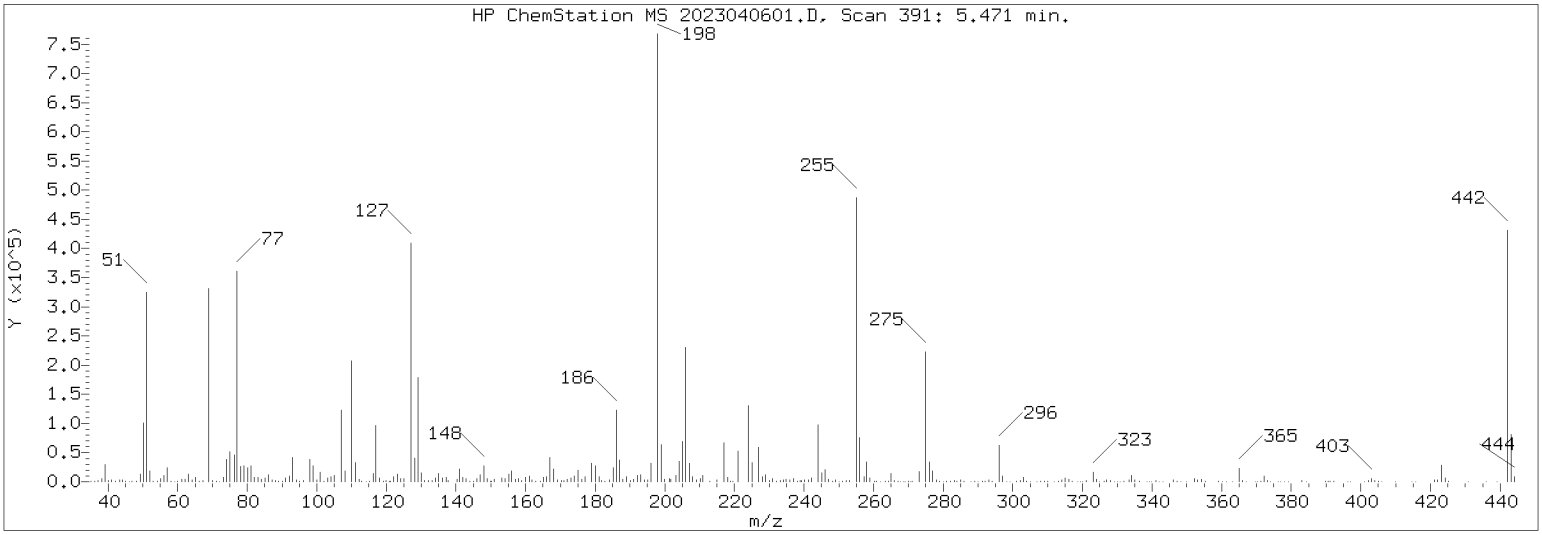
	Compound	RT01	RT02	RT03	RT04	RT05	RT06	EXPEC RT	RT WINDOW	AVG RT	STD DEV
$	1 Tripropyl Tin (Hexyl)	4.514	4.514	4.514	4.514	4.514	4.514	4.514	4.424-4.604	4.514	0.000
	2 Tetrabutyl Tin	4.698	4.698	4.698	4.698	4.698	4.698	4.698	4.604-4.792	4.698	0.000
	3 Tributyl Tin (Hexyl)	5.473	5.473	5.473	5.473	5.473	5.473	5.473	5.363-5.582	5.473	0.000
*	4 Tetrapentyl Tin	6.103	6.103	6.103	6.103	6.103	6.103	6.103	5.981-6.225	6.103	0.000
	5 Dibutyl Tin (Hexyl)	6.170	6.170	6.170	6.170	6.170	6.184	6.170	6.047-6.293	6.172	0.005
$	6 Tripentyl Tin (Hexyl)	6.452	6.452	6.452	6.451	6.452	6.452	6.451	6.322-6.580	6.452	0.000
	7 Butyl Tin (Hexyl)	6.814	6.814	6.814	6.813	6.814	6.814	6.813	6.677-6.950	6.814	0.000
*	8 p-Terphenyl-d14	8.691	8.691	8.691	8.691	8.691	8.691	8.691	8.517-8.865	8.691	0.000

Reviewer 1 _____ Date:_____
Reviewer 2 _____ Date:_____

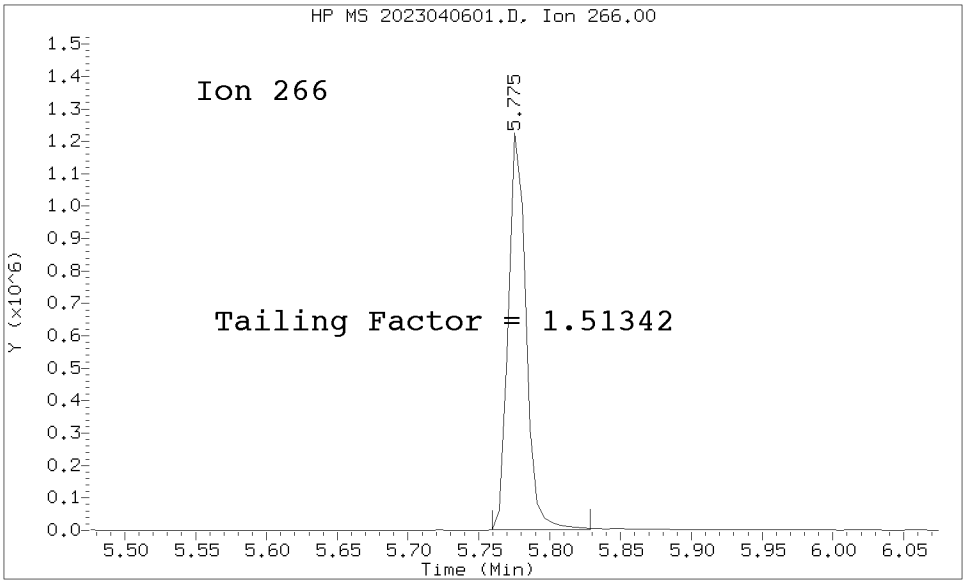
DFTPP TAILING FACTOR AND BREAKDOWN GRAPHIC REPORT

Datafile Analyzed: /20230406.b/tune.b/2023040601.D/2023040601.D
Method Used: \20230406.b\tune.b\DFTPP.m Inst: nt12
Injection Date: 06-APR-2023 15:06 Operator: JZ
Sample Info: SLD0101-TUN1 DFTPP20230406
Report Date: 04/06/2023 20:59



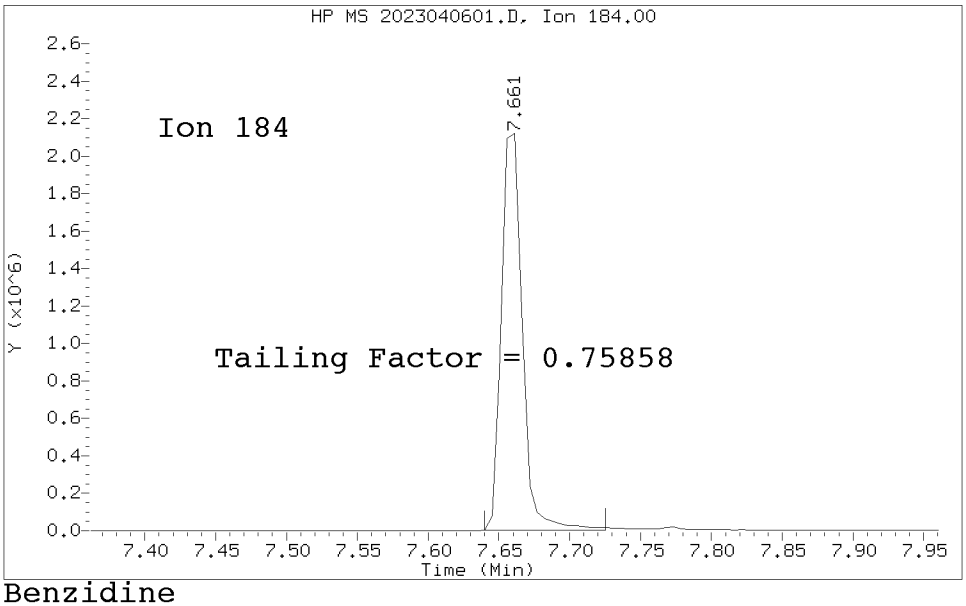


Datafile Analyzed: /20230406.b/tune.b/2023040601.D/2023040601.D
Method Used: \20230406.b\tune.b\DFTPP.m\sw846ddt.m Inst: nt12
Injection Date: 06-APR-2023 15:06 Operator: JZ
Sample Info: DFTPP20230406
Report Date: 04/06/2023 20:59



Pentachlorophenol
==========
 Exp. RT = 5.775
Found RT = 5.775

Tail Factor = 1.513 Maximum Allowed = 2.0



Benzidine
==========
 Exp. RT = 7.661
Found RT = 7.661

Tail Factor = 0.759 Maximum Allowed = 2.0

8270 TAILING FACTOR/BREAKDOWN SUMMARY RESULTS

TAILING ANALYSIS SUMMARY

Compound	Tail Factor	Max Allowed	Test
Pentachlorophenol	1.5134228	2.000	PASS
Benzidine	0.7585825	2.000	PASS

DDT DEGRADATION BREAKDOWN ANALYSIS SUMMARY

Compound	Response	%Breakdown	Max Allowed	Test
4,4-DDT	1580787			N/A
4,4-DDE	7601	0.5	20.0	PASS
4,4-DDD	39368	2.4	20.0	PASS
4,4-DDD + DDE	46969	2.9	20.0	PASS

Tuning Sample, nt12.i/20230406.b/tune.b/2023040601.D, *** PASSED ***

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
198	Base Peak, 100% relative abundance	100.00
51	10.00 - 80.00% of mass 198	40.61
68	Less than 2.00% of mass 69	0.00 (0.00)
69	Mass 69 relative abundance	40.72
70	Less than 2.00% of mass 69	0.14 (0.35)
127	10.00 - 80.00% of mass 198	51.24
197	Less than 2.00% of mass 198	0.00
199	5.00 - 9.00% of mass 198	7.86
275	10.00 - 60.00% of mass 198	29.70
365	Greater than 1.00% of mass 198	3.38
441	0.01 - 24.00% of mass 442	7.52 (10.98)
442	50.00 - 200.00% of mass 198	68.55
443	15.00 - 24.00% of mass 442	13.97 (20.38)

Data File: 2023040601.D
Spectrum: Avg. Scans 390-392 (5.47), Background Scan 386
Location of Maximum: 198.00
Number of points: 352

m/z	Y	m/z	Y	m/z	Y	m/z	Y
35.00	934	137.00	5291	231.00	3787	328.00	1233
36.00	134	138.00	1407	232.00	1009	329.00	305
37.00	912	139.00	230	233.00	1052	330.00	73
38.00	3820	140.00	2972	234.00	3500	331.00	417
39.00	18080	141.00	15198	235.00	2491	332.00	1240
40.00	243	142.00	4853	236.00	2237	333.00	1048
41.00	482	143.00	3599	237.00	3879	334.00	8817
43.00	276	144.00	991	238.00	953	335.00	2756
45.00	422	145.00	731	239.00	2416	336.00	575
46.00	129	146.00	3724	240.00	1823	338.00	68
49.00	5077	147.00	8084	241.00	2669	339.00	240
50.00	68608	148.00	18304	242.00	4906	340.00	315
51.00	226496	149.00	3492	244.00	71984	341.00	1673
52.00	11730	150.00	963	245.00	10836	342.00	402
53.00	306	151.00	2399	246.00	14890	343.00	192
54.00	268	152.00	733	247.00	3342	344.00	64
55.00	1771	153.00	4659	248.00	851	345.00	99
56.00	6665	154.00	4248	249.00	3014	346.00	2764
57.00	15399	155.00	9624	250.00	543	347.00	793
58.00	606	156.00	13334	251.00	721	348.00	176
60.00	2	157.00	3402	252.00	787	349.00	53
61.00	2775	158.00	3321	253.00	1712	350.00	184
62.00	3701	159.00	2214	255.00	358976	351.00	141
63.00	9745	160.00	5142	256.00	56856	352.00	4460
64.00	1833	161.00	7084	257.00	5369	353.00	2627
65.00	5031	162.00	2303	258.00	24264	354.00	4074
66.00	600	163.00	712	259.00	4673	355.00	1004
69.00	227136	164.00	1147	260.00	577	356.00	208
70.00	801	165.00	5167	261.00	873	359.00	377
71.00	155	166.00	6270	262.00	304	360.00	231
73.00	3742	167.00	31248	263.00	515	361.00	135
74.00	25720	168.00	16351	264.00	360	365.00	18856
75.00	37472	169.00	2256	265.00	9172	366.00	1793
76.00	32416	170.00	1278	266.00	1326	367.00	283
77.00	257600	171.00	1486	267.00	447	370.00	633
78.00	17848	172.00	2907	268.00	239	371.00	378
79.00	17640	173.00	4123	269.00	268	372.00	6826
80.00	15634	174.00	7639	270.00	725	373.00	1925
81.00	19184	175.00	13108	271.00	765	374.00	227
82.00	4772	176.00	2656	272.00	172	376.00	272
83.00	4114	177.00	6112	273.00	13642	378.00	139
85.00	4016	178.00	588	274.00	4783	379.00	79
86.00	5700	179.00	22784	275.00	165632	383.00	1863
87.00	2097	180.00	17880	276.00	24704	384.00	453
88.00	802	181.00	6203	277.00	13899	385.00	55
89.00	936	182.00	1290	278.00	2430	390.00	1364
90.00	32	183.00	748	279.00	475	391.00	724
91.00	4338	184.00	2769	280.00	361	392.00	726
92.00	6926	185.00	13954	282.00	773	395.00	198

93.00	30480	186.00	87216	283.00	1708	396.00	138
94.00	1883	187.00	25688	284.00	1211	397.00	154
95.00	481	188.00	3310	285.00	2147	398.00	91
96.00	1267	189.00	6300	286.00	735	401.00	437
98.00	25544	190.00	1201	287.00	135	402.00	2523
99.00	18560	191.00	2647	288.00	312	403.00	4002
100.00	2272	192.00	7958	289.00	772	404.00	2035
101.00	10814	193.00	8567	290.00	384	405.00	293
102.00	706	194.00	1789	291.00	587	406.00	91
103.00	4258	195.00	1339	292.00	815	409.00	80
104.00	7261	196.00	21568	293.00	2528	410.00	194
105.00	6724	198.00	557760	294.00	1114	415.00	391
107.00	82648	199.00	43824	296.00	46800	416.00	121
108.00	12203	200.00	3097	297.00	6673	419.00	92
110.00	144384	201.00	4066	298.00	401	421.00	3064
111.00	23776	202.00	2002	299.00	458	422.00	3429
112.00	2847	203.00	7186	301.00	590	423.00	24600
113.00	880	204.00	25608	302.00	1001	424.00	6771
114.00	304	205.00	48280	303.00	5044	425.00	897
115.00	118	206.00	167488	304.00	1432	426.00	73
116.00	4357	207.00	20968	305.00	18	429.00	100
117.00	69192	208.00	5879	306.00	100	431.00	119
118.00	5193	209.00	2348	307.00	299	435.00	182
119.00	636	210.00	2340	308.00	669	436.00	54
120.00	1350	211.00	7053	309.00	537	438.00	56
121.00	921	212.00	265	310.00	628	439.00	508
122.00	6271	213.00	680	312.00	283	441.00	41968
123.00	8610	214.00	333	313.00	834	442.00	382336
124.00	3594	215.00	2024	314.00	2613	443.00	77936
125.00	3555	216.00	4064	315.00	4957	444.00	7505
127.00	285824	217.00	47112	316.00	3029	445.00	198
128.00	27544	218.00	5518	317.00	520	451.00	58
129.00	120544	219.00	1133	319.00	362	457.00	56
130.00	10482	221.00	40328	320.00	39	467.00	52
131.00	1933	224.00	96152	321.00	1397	470.00	58
132.00	1163	225.00	24168	323.00	13693	480.00	50
133.00	756	227.00	42032	324.00	2570		
134.00	3587	228.00	6204	325.00	207		
135.00	9210	229.00	7812	326.00	369		
136.00	3691	230.00	1846	327.00	2665		

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040602.D

Date : 06-APR-2023 15:22

Client ID:

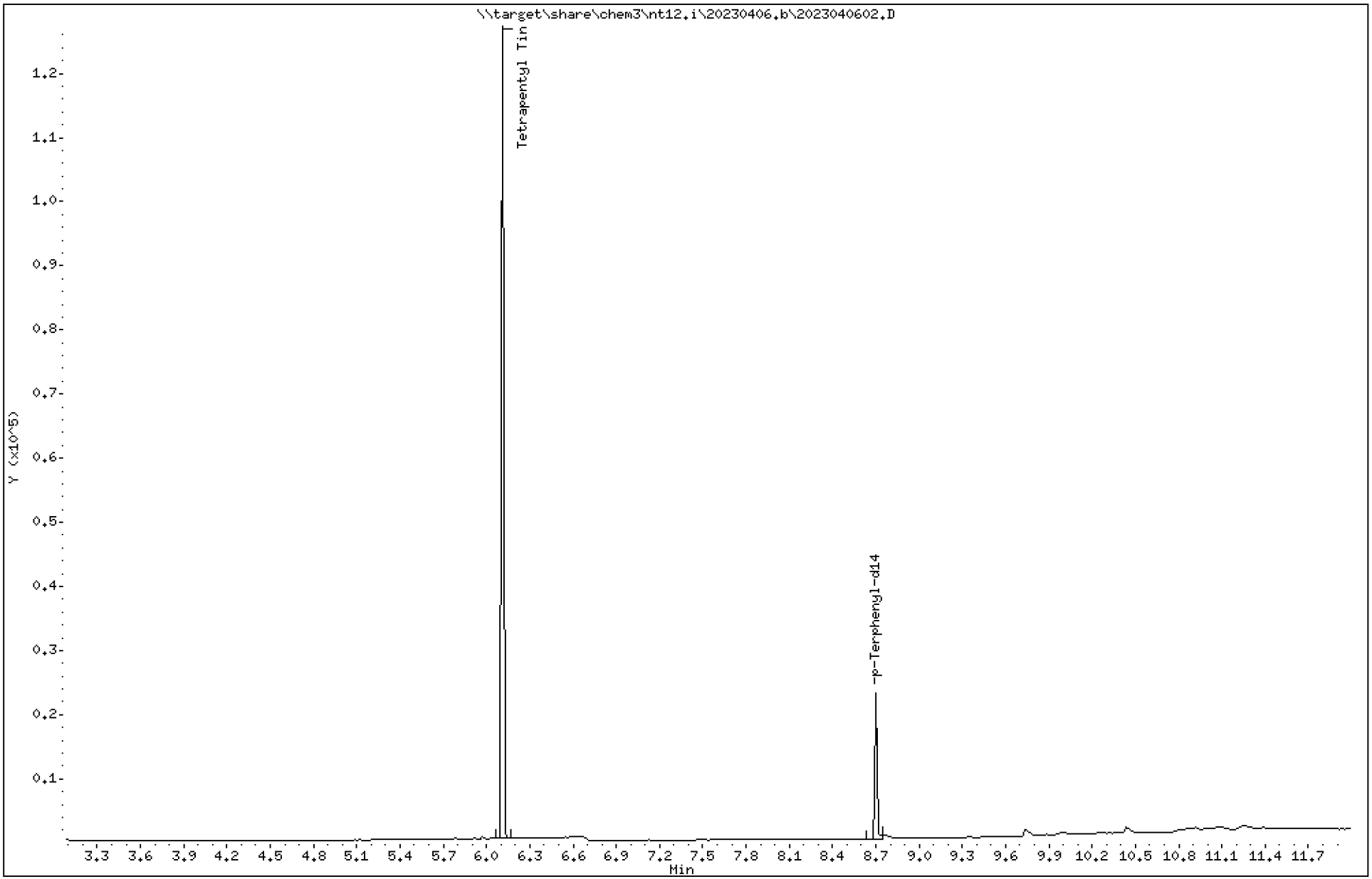
Instrument: nt12.i

Sample Info: ICB230406

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0618 CLPLIKE (Rev0) - Page 108 of 269

ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040602.D
Lab Smp Id: SLD0101-ICB1
Inj Date : 06-APR-2023 15:22
Operator : JZ Inst ID: nt12.i
Smp Info : ICB230406
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 21:02 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 2
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	CONCENTRATIONS FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	Compound Not Detected.					
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	Compound Not Detected.					
*	4 Tetrapentyl Tin	333	6.116	6.102	(1.000)	161159	2.00000	
	5 Dibutyl Tin (Hexyl)	347	Compound Not Detected.					
$	6 Tripentyl Tin (Hexyl)	347	Compound Not Detected.					
	7 Butyl Tin (Hexyl)	347	Compound Not Detected.					
*	8 p-Terphenyl-d14	244	8.704	8.690	(1.000)	23719	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040602.D
Lab Smp Id: SLD0101-ICB1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	161159	-1.83
8 p-Terphenyl-d14	22611	11306	45222	23719	4.90

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.12	0.22
8 p-Terphenyl-d14	8.69	8.19	9.19	8.70	0.16

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040602.D

Lab ID: SLD0101-ICB1
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 15:22

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

** FIRST SURROGATE NOT FOUND. ICAL Check not performed **

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

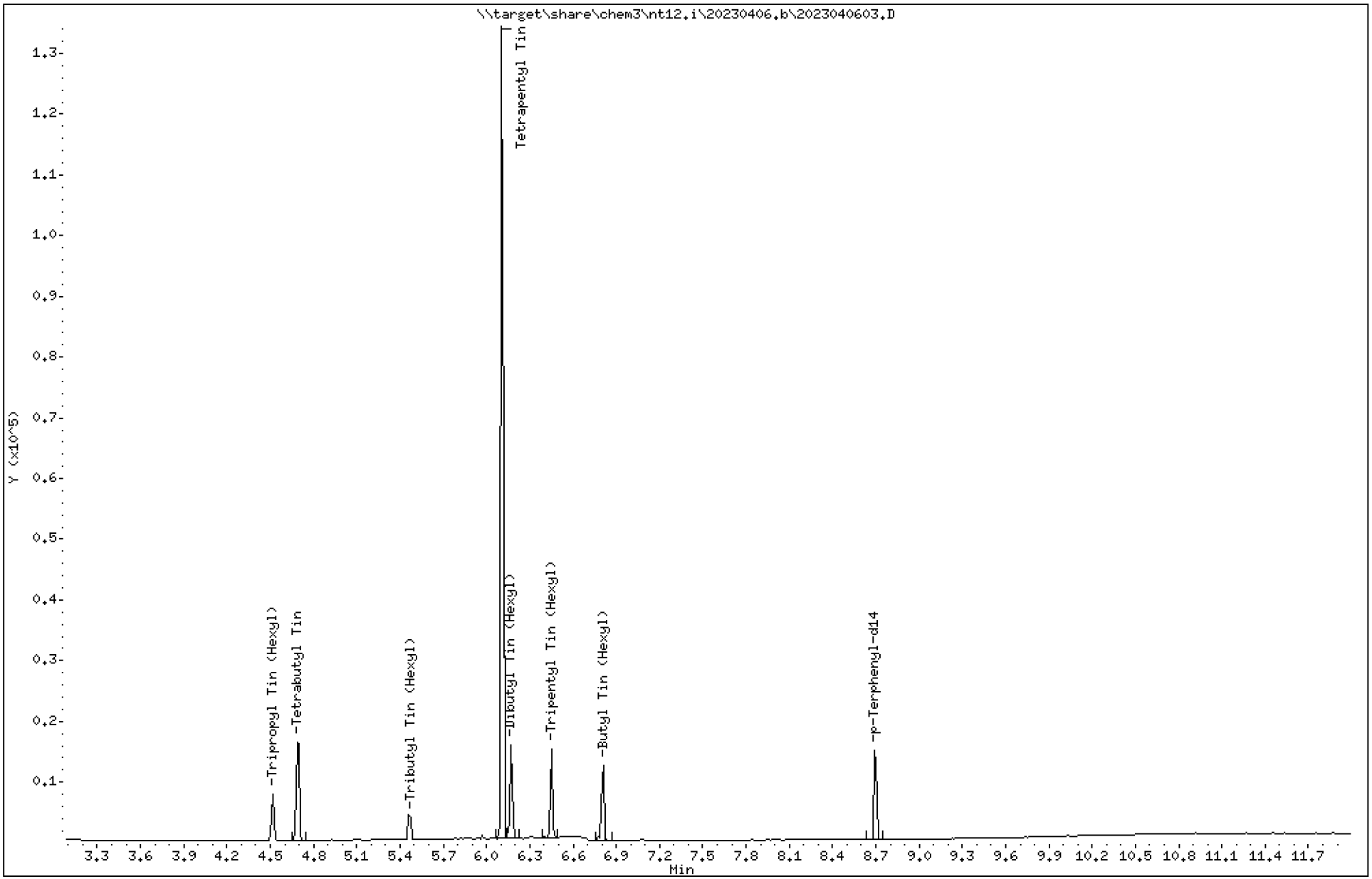
Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040603.D
Date : 06-APR-2023 15:39
Client ID:
Sample Info: IC005230406,

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040603.D
Lab Smp Id: SLD0101-CAL1
Inj Date : 06-APR-2023 15:39
Operator : JZ Inst ID: nt12.i
Smp Info : IC005230406,
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:57 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 3 Calibration Sample, Level: 1
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/mL)	ON-COL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.514	4.514	(0.740)	3908	0.05000	0.05881
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	3646	0.05000	0.05622
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	2855	0.05000	0.05486
*	4 Tetrapentyl Tin	333	6.102	6.102	(1.000)	157169	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.170	6.169	(0.710)	3886	0.10000	0.1038
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	5465	0.10000	0.09926
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	5644	0.10000	0.09371
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	22292	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040603.D
Lab Smp Id: SLD0101-CAL1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Initial Calibration Level 4.

COMPOUND	STANDARD	AREA LIMIT LOWER	AREA LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	157169	-4.27
8 p-Terphenyl-d14	22611	11306	45222	22292	-1.41

COMPOUND	STANDARD	RT LIMIT LOWER	RT LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040603.D

Lab ID: SLD0101-CAL1
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 15:39

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

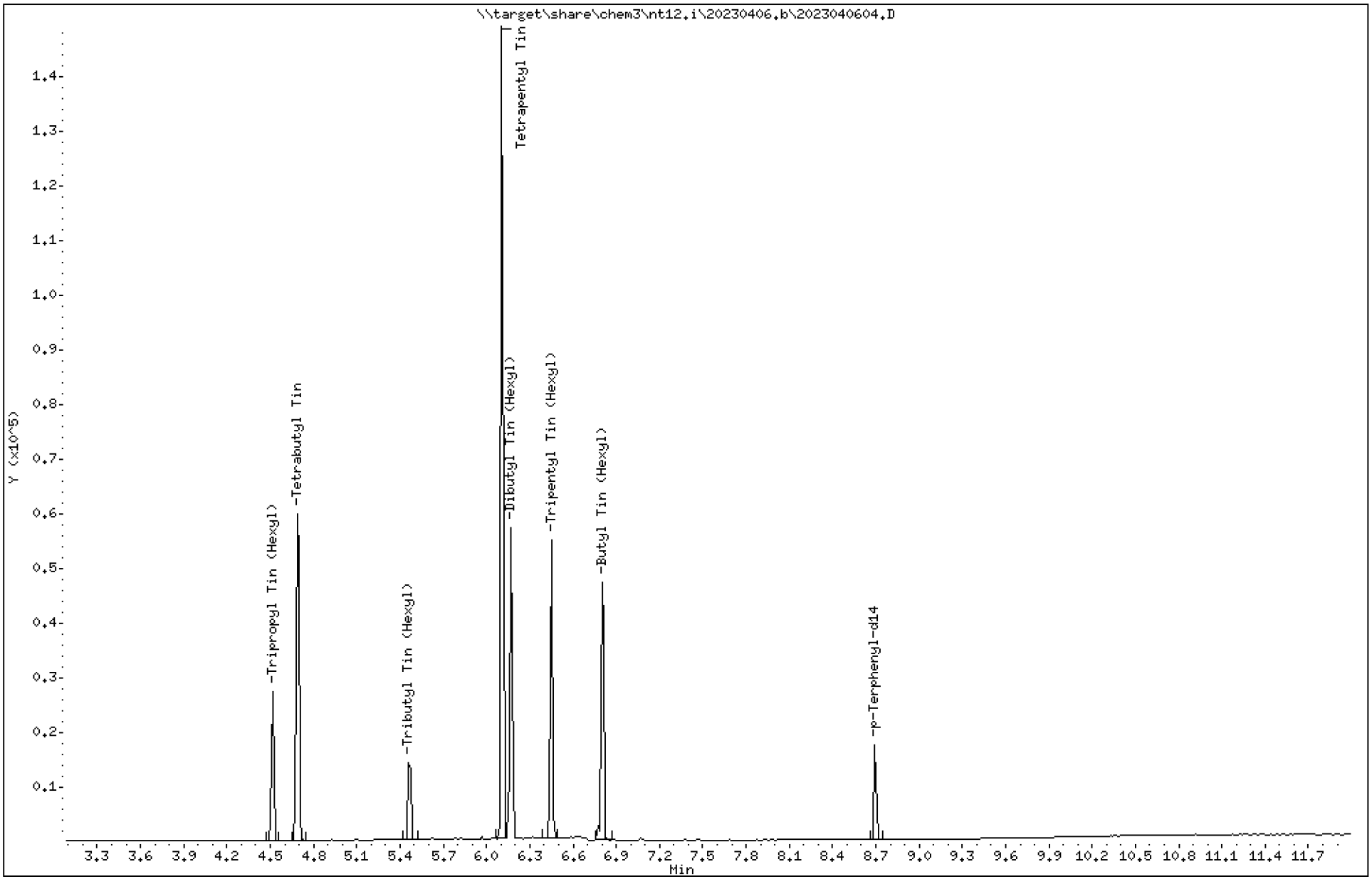
Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040604.D
Date : 06-APR-2023 15:55
Client ID:
Sample Info: IC02230406,

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



23C0618 CLPLIKE (Rev0) - Page 116 of 269

ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040604.D
Lab Smp Id: SLD0101-CAL2
Inj Date : 06-APR-2023 15:55
Operator : JZ Inst ID: nt12.i
Smp Info : IC02230406,
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:57 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 4 Calibration Sample, Level: 2
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/mL)	ON-COL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.514	4.514	(0.740)	13443	0.20000	0.1928
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	12815	0.20000	0.1884
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	10036	0.20000	0.1838
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	164881	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.170	6.169	(0.710)	14421	0.40000	0.3690
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	20923	0.40000	0.3639
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	21199	0.40000	0.3371
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	23279	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040604.D
Lab Smp Id: SLD0101-CAL2
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Initial Calibration Level 4.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	164881	0.43
8 p-Terphenyl-d14	22611	11306	45222	23279	2.95

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040604.D

Lab ID: SLD0101-CAL2
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 15:55

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040605.D

Date : 06-APR-2023 16:12

Client ID:

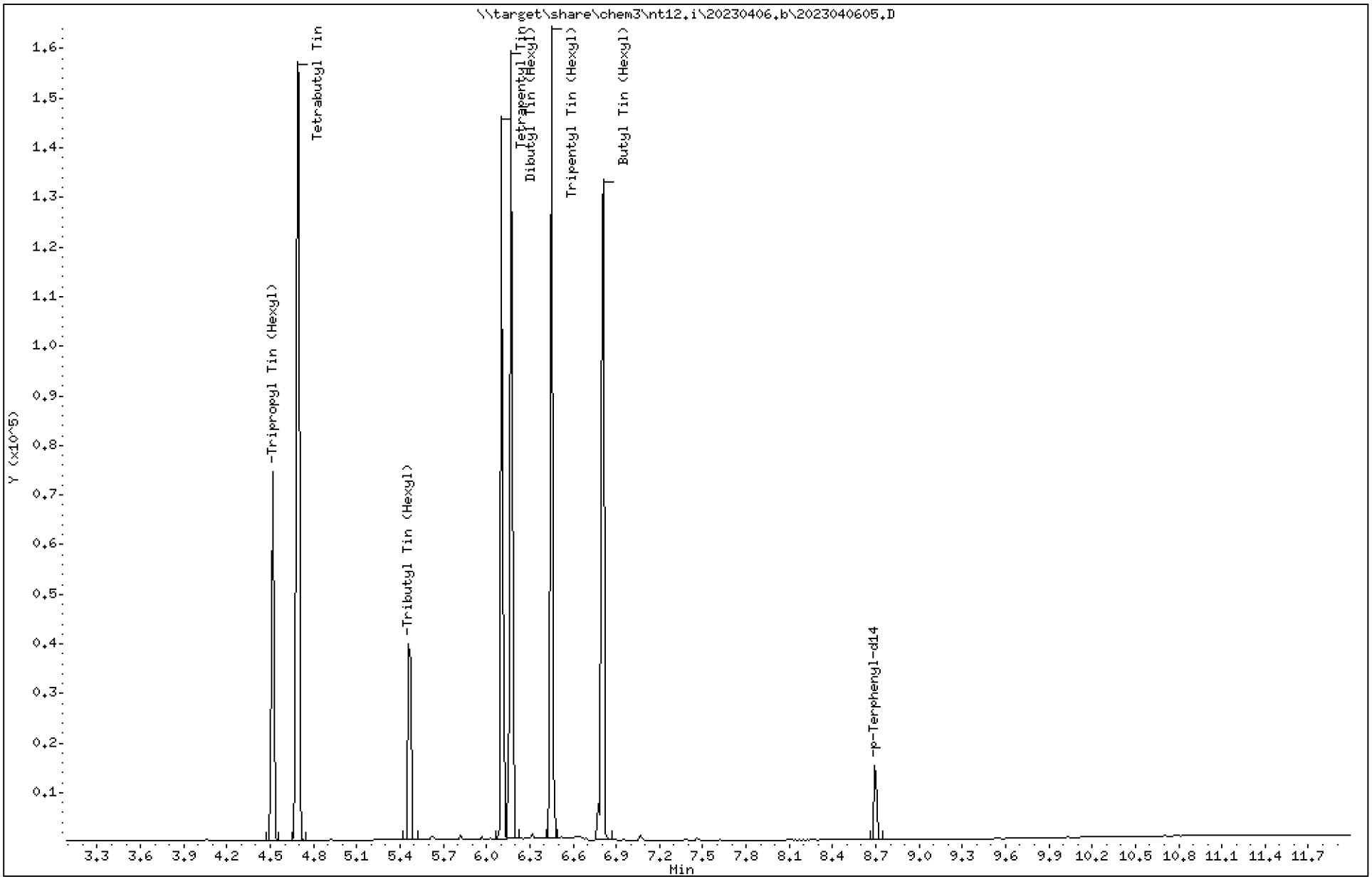
Instrument: nt12.i

Sample Info: IC05230406,

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040605.D
Lab Smp Id: SLD0101-CAL3
Inj Date : 06-APR-2023 16:12
Operator : JZ Inst ID: nt12.i
Smp Info : IC05230406,
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:57 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 5 Calibration Sample, Level: 3
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/mL)	ON-COL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.514	4.514	(0.740)	36815	0.50000	0.5195
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	34962	0.50000	0.5056
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	28191	0.50000	0.5080
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	167613	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.170	6.169	(0.710)	39615	1.00000	1.016
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	60129	1.00000	1.048
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	64478	1.00000	1.028
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	23227	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040605.D
Lab Smp Id: SLD0101-CAL3
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Initial Calibration Level 4.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	167613	2.10
8 p-Terphenyl-d14	22611	11306	45222	23227	2.72

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040605.D

Lab ID: SLD0101-CAL3
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 16:12

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040606.D

Page 1

Date : 06-APR-2023 16:28

Client ID:

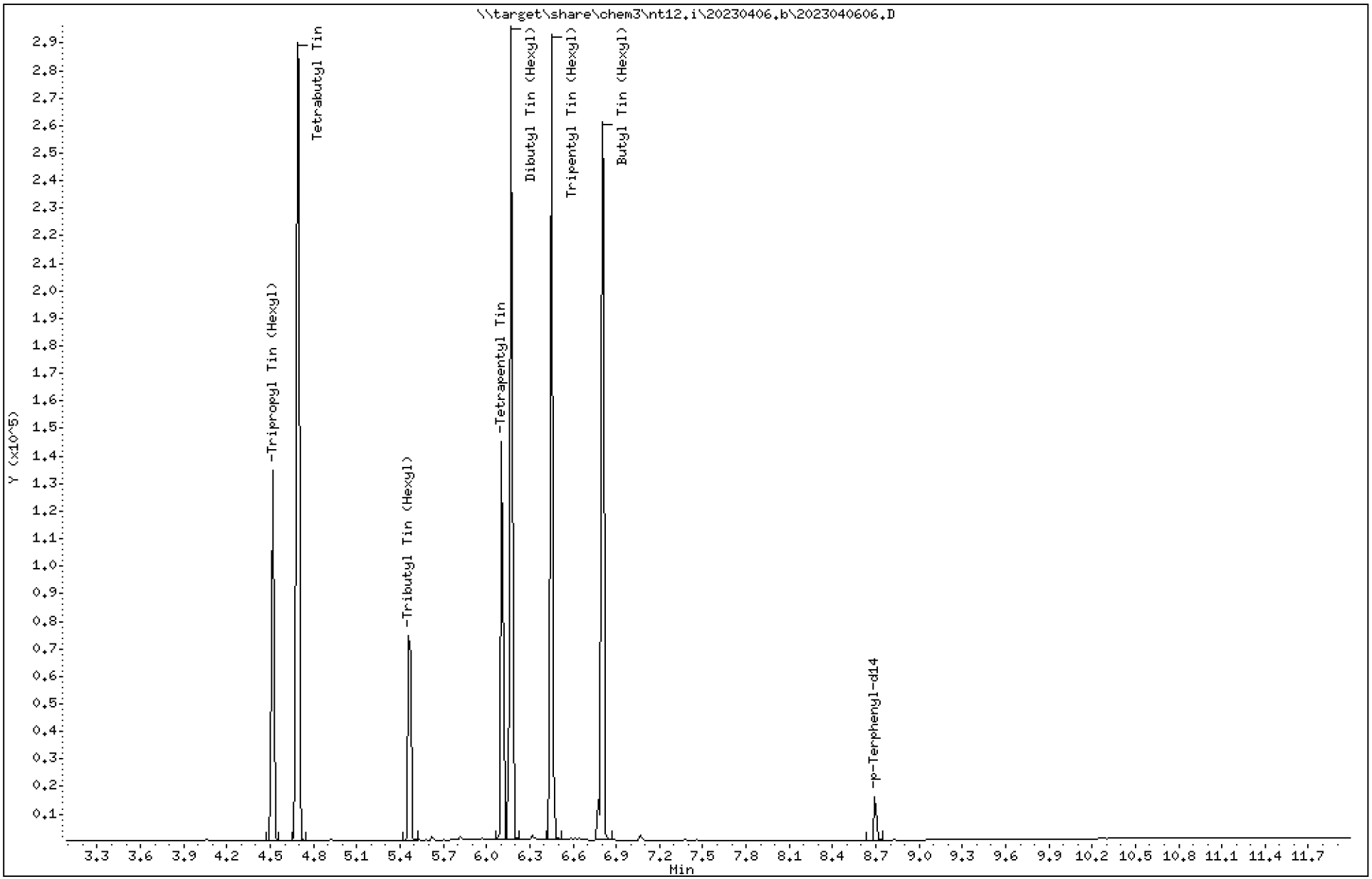
Instrument: nt12.i

Sample Info: IC1230406,

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0618 CLPLIKE (Rev0) - Page 124 of 269

ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040606.D
Lab Smp Id: SLD0101-CAL4
Inj Date : 06-APR-2023 16:28
Operator : JZ Inst ID: nt12.i
Smp Info : IC1230406,
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:57 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 6 Calibration Sample, Level: 4
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/mL)	ON-COL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.514	4.514	(0.740)	65548	1.00000	0.9443
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	64785	1.00000	0.9564
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	52508	1.00000	0.9660
*	4 Tetrapentyl Tin	333	6.102	6.102	(1.000)	164171	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.169	6.169	(0.710)	74721	2.00000	1.968
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	112029	2.00000	2.006
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	118907	2.00000	1.946
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	22611	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040606.D
Lab Smp Id: SLD0101-CAL4
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Initial Calibration Level 4.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	164171	0.00
8 p-Terphenyl-d14	22611	11306	45222	22611	0.00

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040606.D

Lab ID: SLD0101-CAL4
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 16:28

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Q-FLAG SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406.b

Instrument: nt12.i Date: 06-APR-2023 Method: 20230406.b\TBT20230406.m

INITIAL CAL: 06-APR-2023

Compound	%RSD or R^2
NO Q-FLAGS	

ICV CAL: 2023040606.D 06-APR-2023 16:28

Compound	%D
NO Q-FLAGS	

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040607.D

Date : 06-APR-2023 16:45

Client ID:

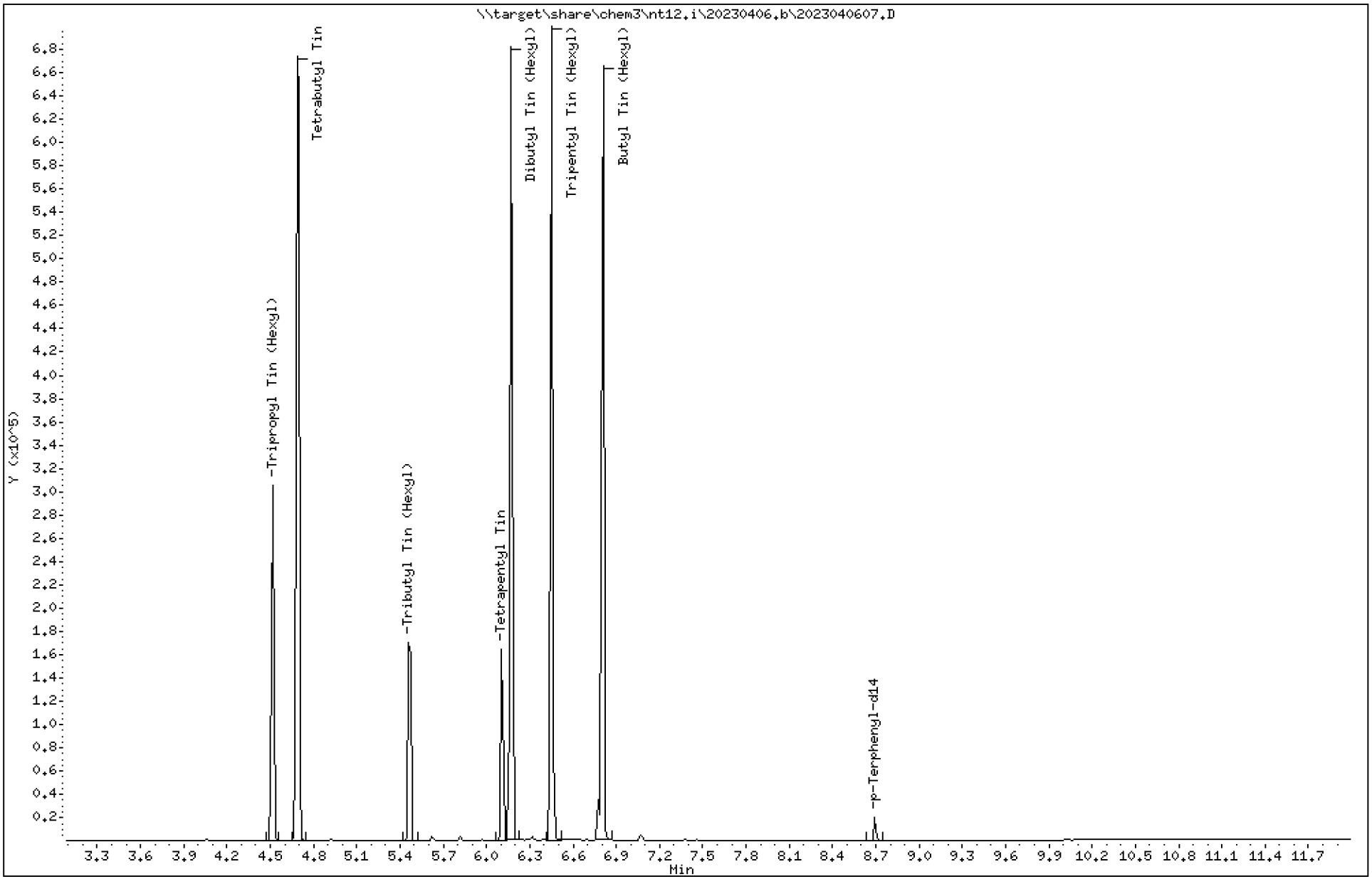
Instrument: nt12.i

Sample Info: IC2230406,

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0618 CLPLIKE (Rev0) - Page 129 of 269

ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040607.D
Lab Smp Id: SLD0101-CAL5
Inj Date : 06-APR-2023 16:45
Operator : JZ Inst ID: nt12.i
Smp Info : IC2230406,
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:57 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 7 Calibration Sample, Level: 5
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/mL)	ON-COL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.514	4.514	(0.740)	148585	2.00000	1.925
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	151308	2.00000	2.009
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	122599	2.00000	2.029
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	182529	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.170	6.169	(0.710)	163252	4.00000	3.974
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	255780	4.00000	4.232
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	297376	4.00000	4.499
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	24468	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040607.D
Lab Smp Id: SLD0101-CAL5
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Initial Calibration Level 4.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	182529	11.18
8 p-Terphenyl-d14	22611	11306	45222	24468	8.21

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040607.D

Lab ID: SLD0101-CAL5
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 16:45

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040608.D

Date : 06-APR-2023 17:01

Client ID:

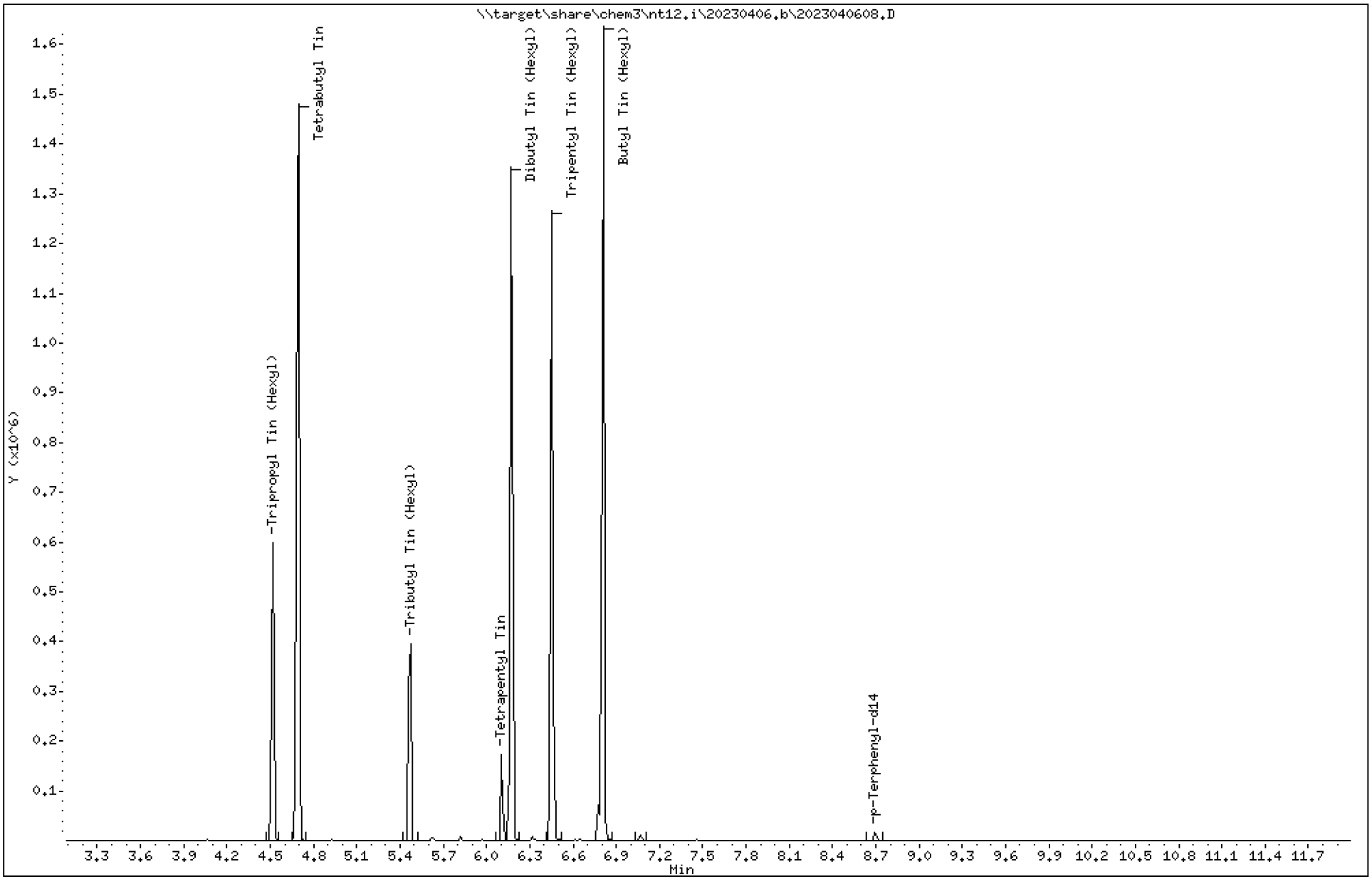
Instrument: nt12.i

Sample Info: IC5230406,

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0618 CLPLIKE (Rev0) - Page 133 of 269

ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040608.D
Lab Smp Id: SLD0101-CAL6
Inj Date : 06-APR-2023 17:01
Operator : JZ Inst ID: nt12.i
Smp Info : IC5230406,
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:57 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 8 Calibration Sample, Level: 6
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/mL)	ON-COL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.514	4.514	(0.740)	307691	4.00000	3.655
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	315975	4.00000	3.846
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	260335	4.00000	3.949
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	199113	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	356627	8.00000	8.365
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	496038	8.00000	7.908
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	600903	8.00000	8.758
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	25395	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040608.D
Lab Smp Id: SLD0101-CAL6
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Initial Calibration Level 4.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	199113	21.28
8 p-Terphenyl-d14	22611	11306	45222	25395	12.31

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040608.D

Lab ID: SLD0101-CAL6
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 17:01

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

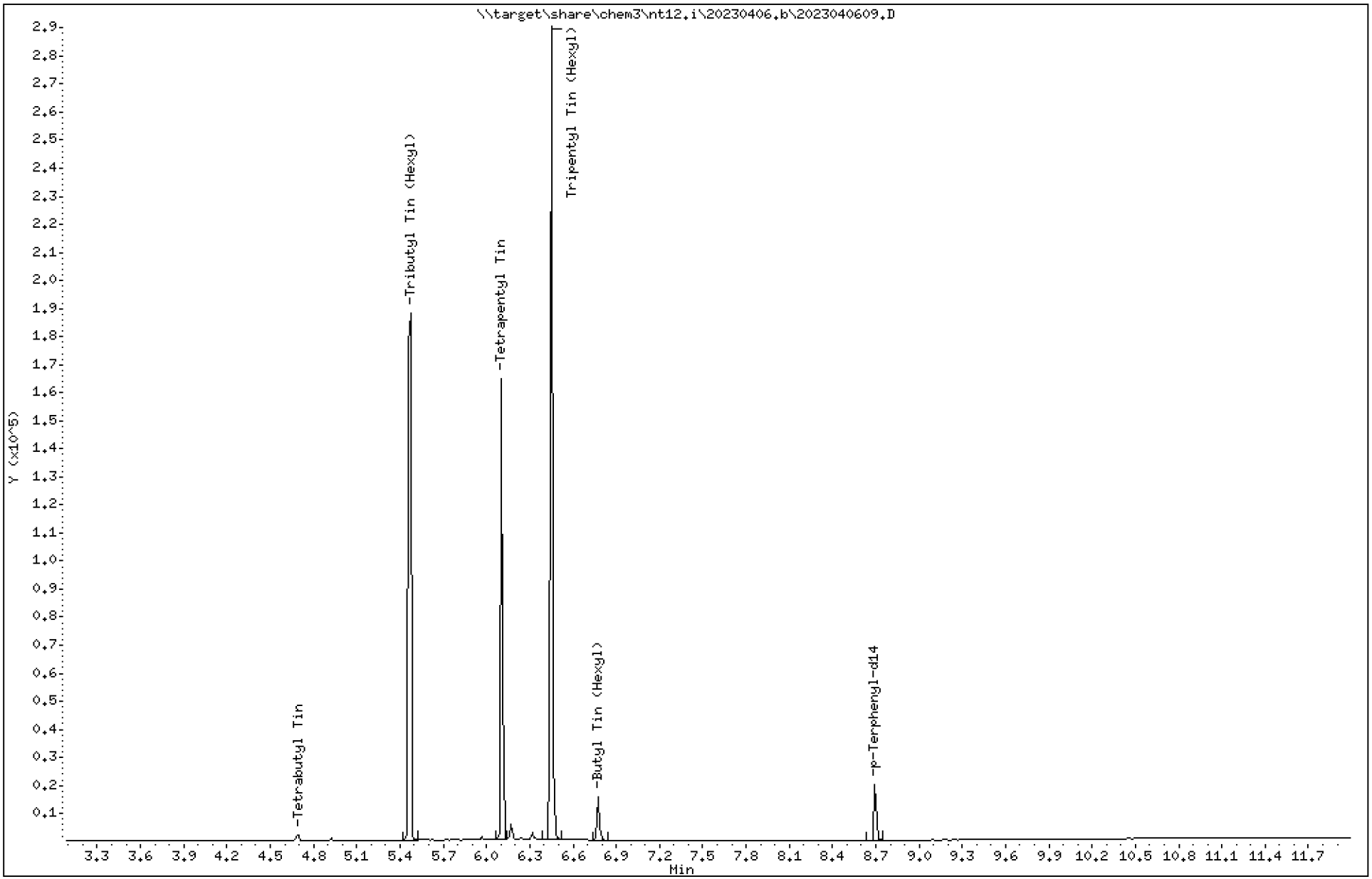
Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D
Date : 06-APR-2023 17:18
Client ID:
Sample Info: SCV230406

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



23C0618 CLPLIKE (Rev0) - Page 137 of 269

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

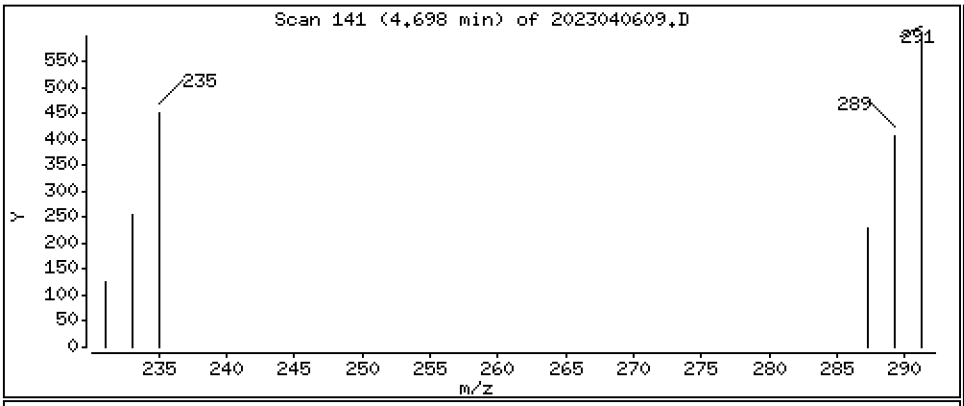
Operator: JZ

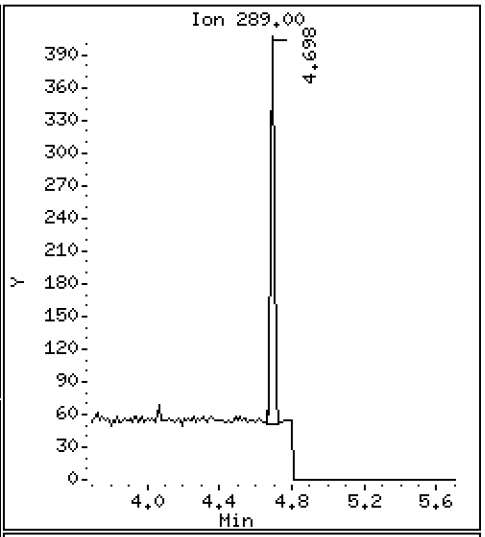
Column phase: ZB-5msi

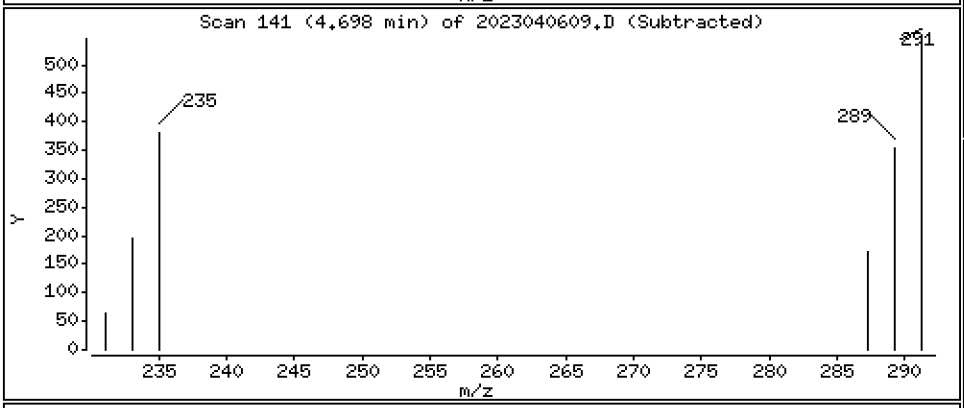
Column diameter: 0.25

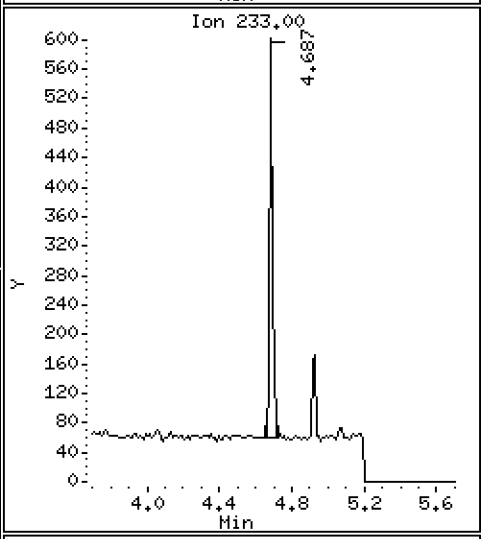
2 Tetrabutyl Tin

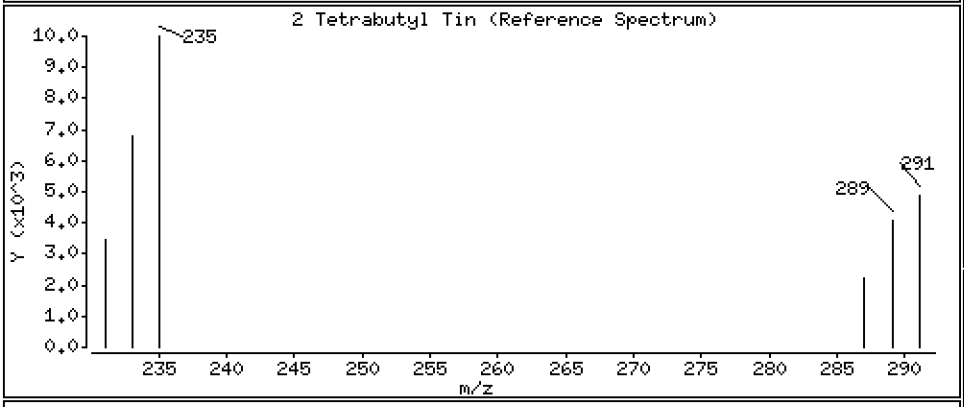
Concentration: 0.005817 ug/mL

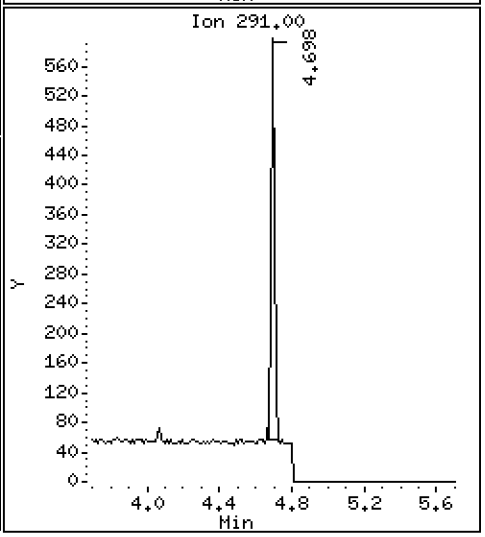


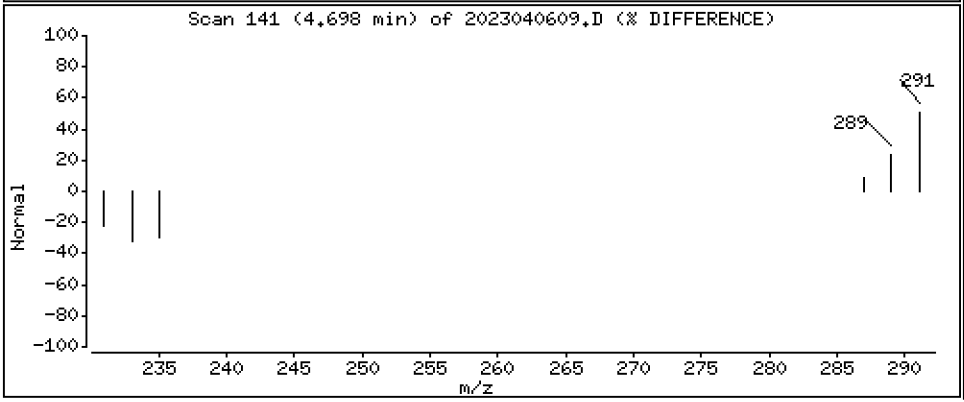












Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

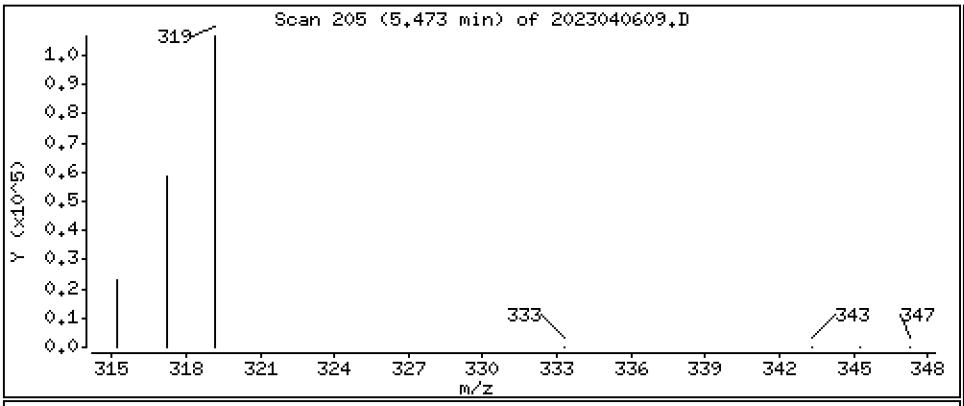
Operator: JZ

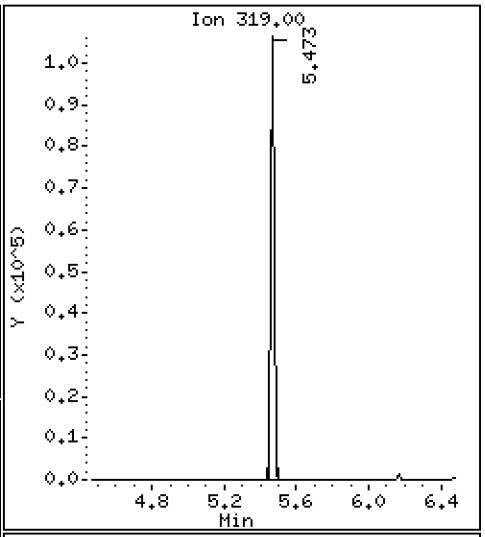
Column phase: ZB-5msi

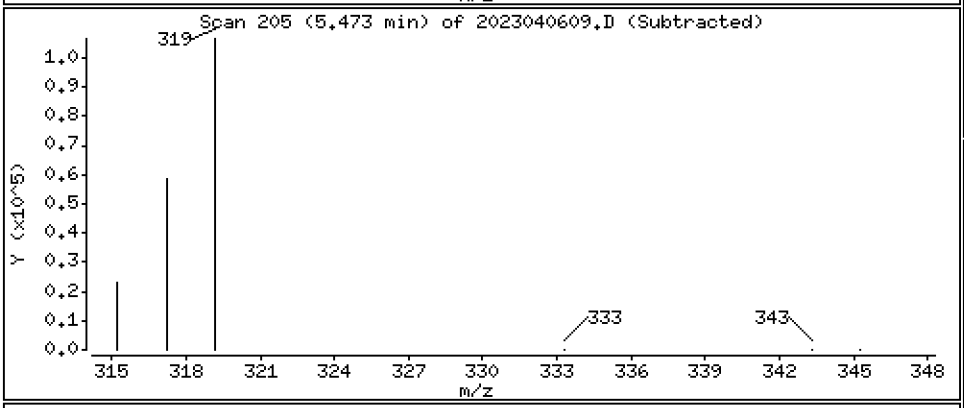
Column diameter: 0.25

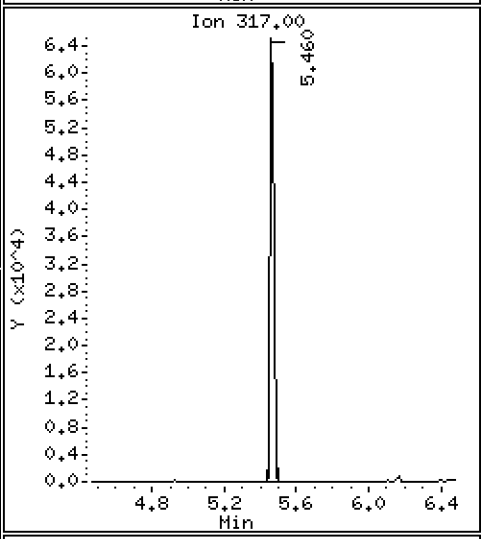
3 Tributyl Tin (Hexyl)

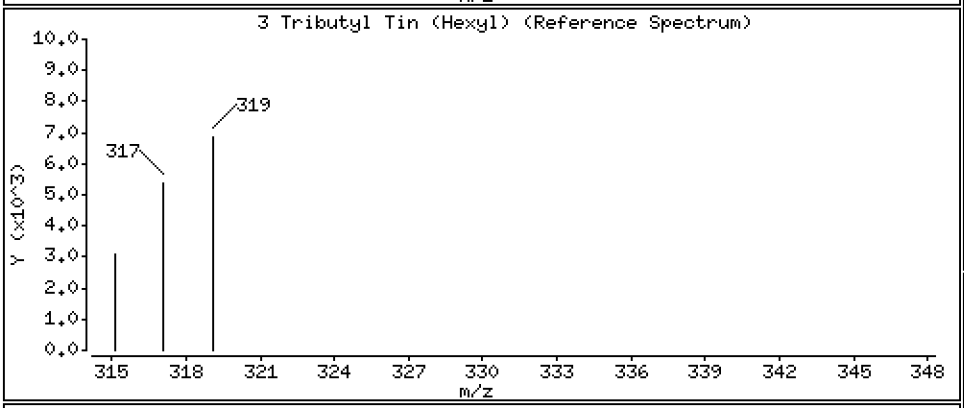
Concentration: 2.309 ug/mL

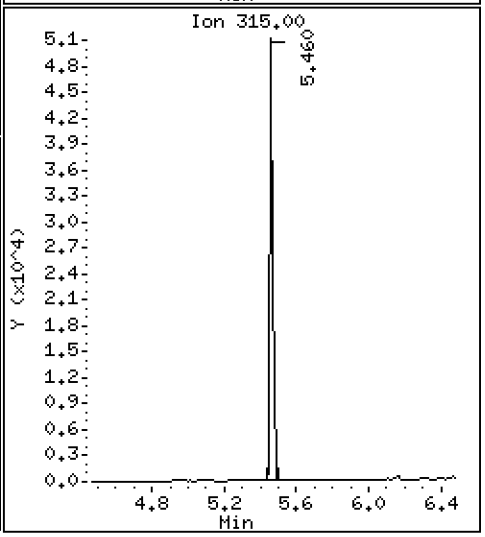


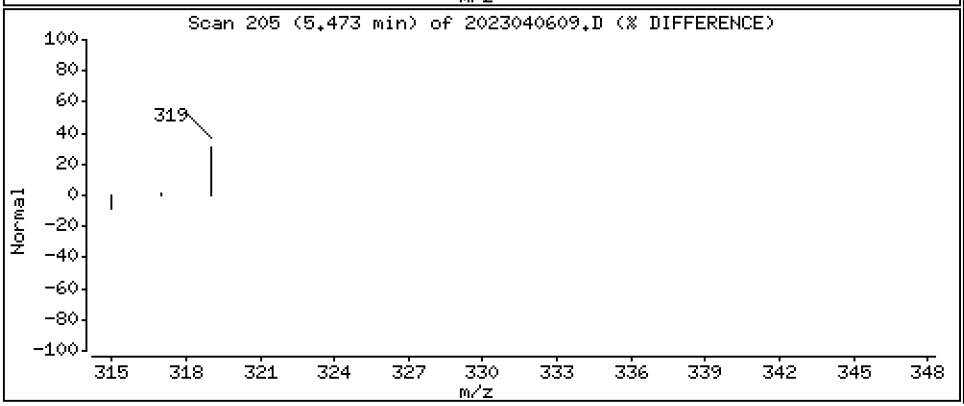












Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

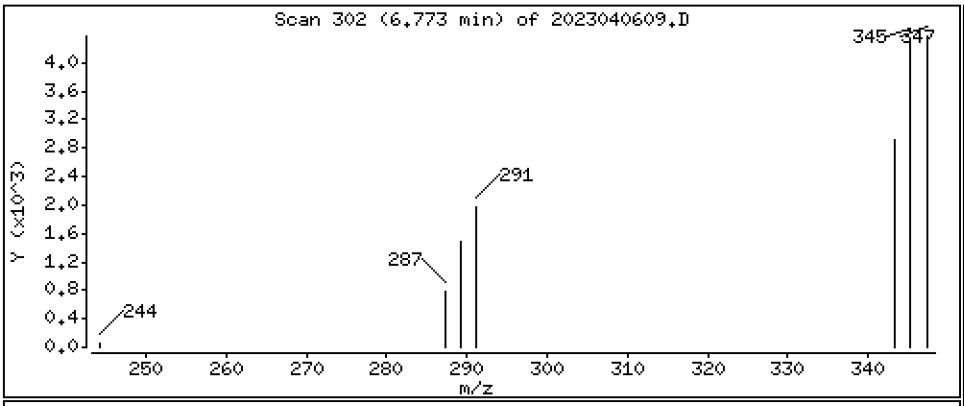
Operator: JZ

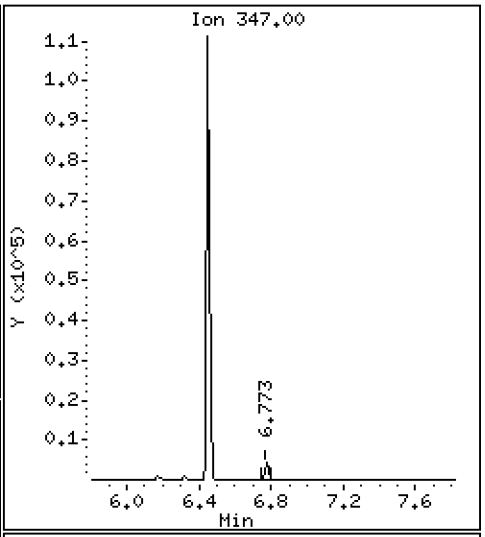
Column phase: ZB-5msi

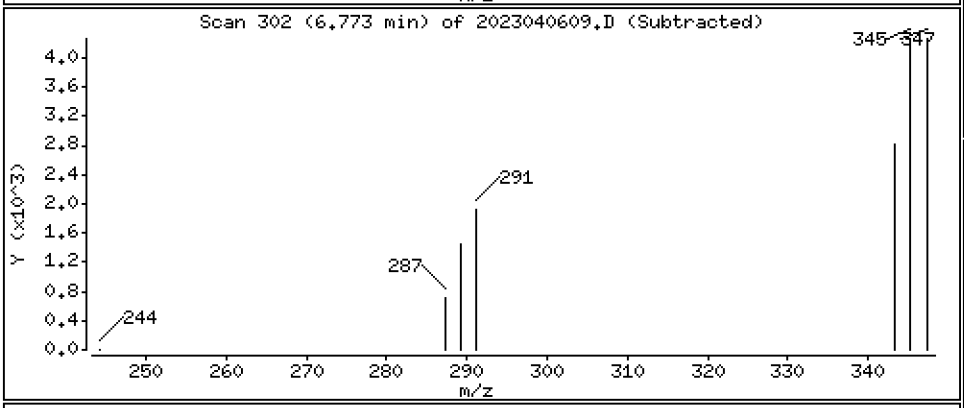
Column diameter: 0.25

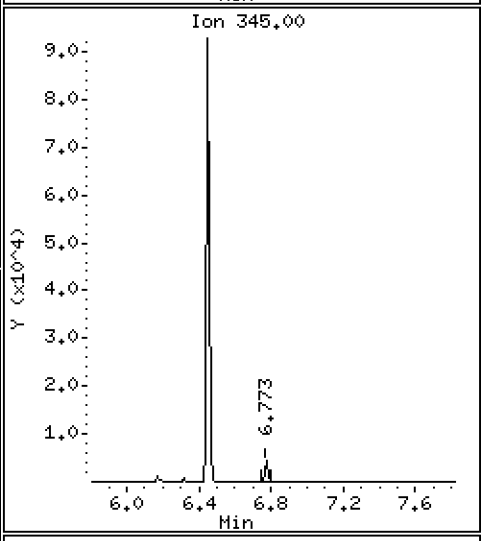
7 Butyl Tin (Hexyl)

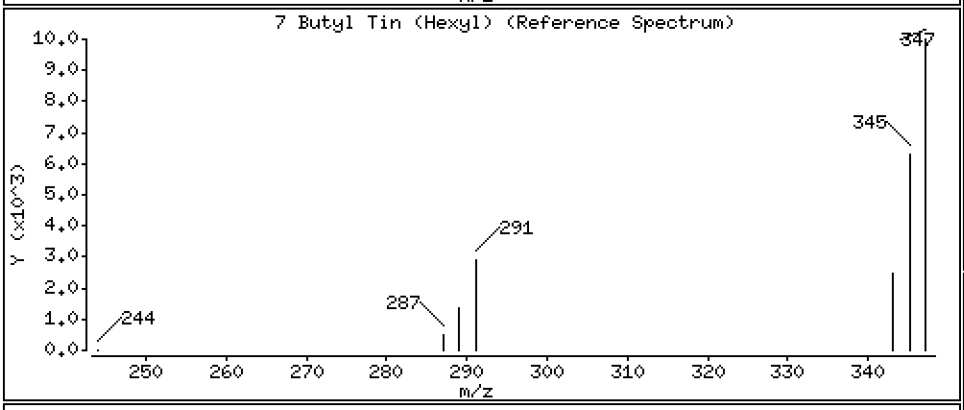
Concentration: 0.07833 ug/mL

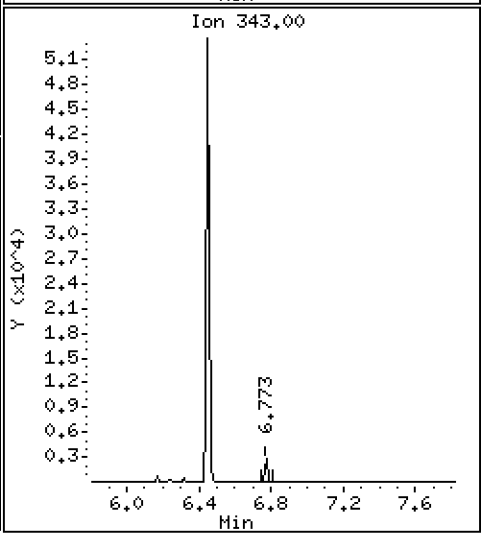


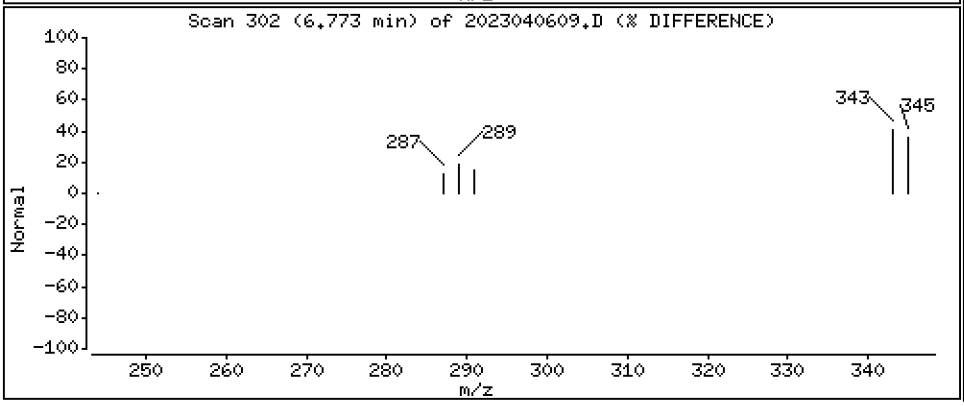












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040609.D
Lab Smp Id: SLD0101-SCV1
Inj Date : 06-APR-2023 17:18
Operator : JZ Inst ID: nt12.i
Smp Info : SCV230406
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:55 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 9
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	CONCENTRATIONS FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	Compound Not Detected.					
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	428	0.00582	0.005817
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	136359	2.30946	2.309
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	178329	2.00000	
	5 Dibutyl Tin (Hexyl)	347	Compound Not Detected.					
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	107876	1.58791	1.588
	7 Butyl Tin (Hexyl)	347	6.773	6.813	(0.779)	5821	0.07833	0.07833
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	27505	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040609.D
Lab Smp Id: SLD0101-SCV1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

COMPOUND	STANDARD	AREA LIMIT LOWER	AREA LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	178329	8.62
8 p-Terphenyl-d14	22611	11306	45222	27505	21.64

COMPOUND	STANDARD	RT LIMIT LOWER	RT LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040609.D

Lab ID: SLD0101-SCV1
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 17:18

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

** FIRST SURROGATE NOT FOUND. ICAL Check not performed **

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

SECOND-SOURCE CALIBRATION VERIFICATION

EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Calibration: GD00019
Laboratory ID: SLD0101-SCV1
Sequence: SLD0101
Sequence Name: Secondary Cal Check
Standard ID: L002076

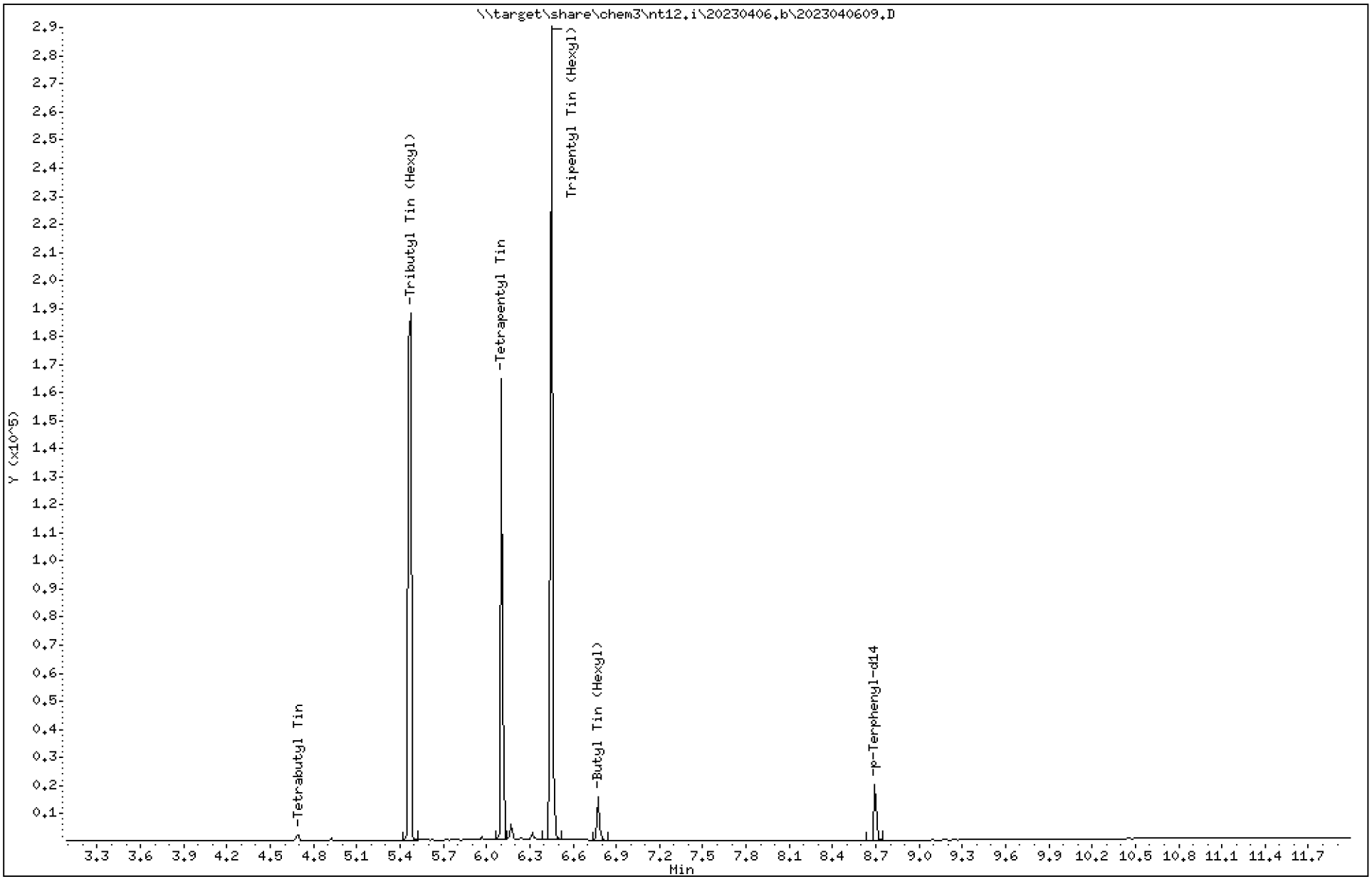
ANALYTE	EXPECTED (ug/mL)	FOUND (ug/mL)	% DRIFT	QC LIMIT
Tributyltin Ion	1.5460	1.79	15.5	20.00
Tripentyltin	1.5918	1.26	-20.6 *	20.00

* Indicates values outside of QC limits

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D
Date : 06-APR-2023 17:18
Client ID:
Sample Info: SCV230406

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



23C0618 CLPLIKE (Rev0) - Page 145 of 269

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

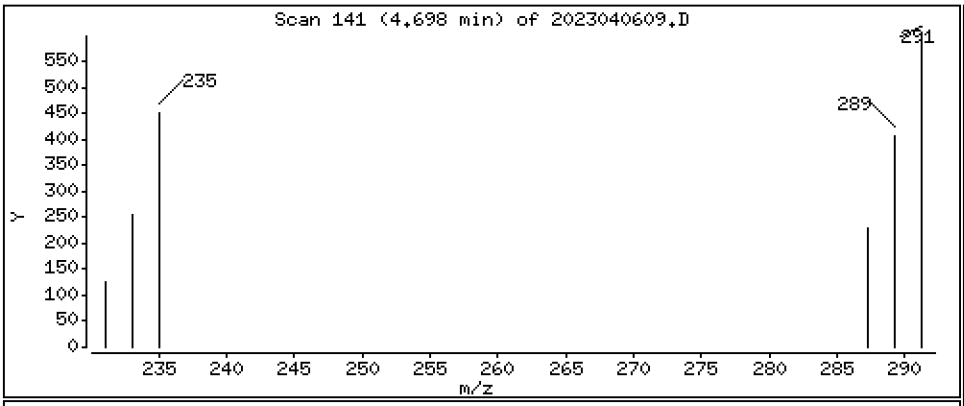
Operator: JZ

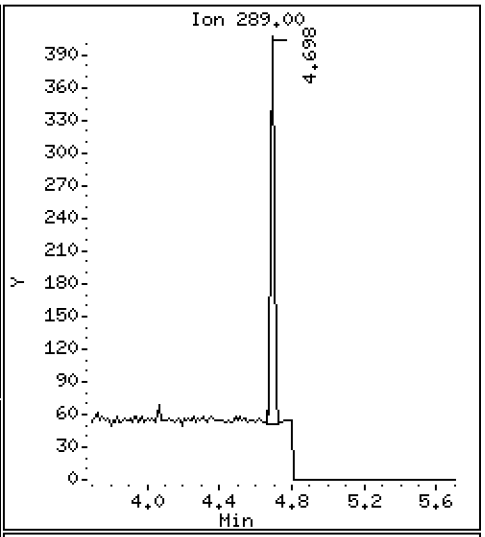
Column phase: ZB-5msi

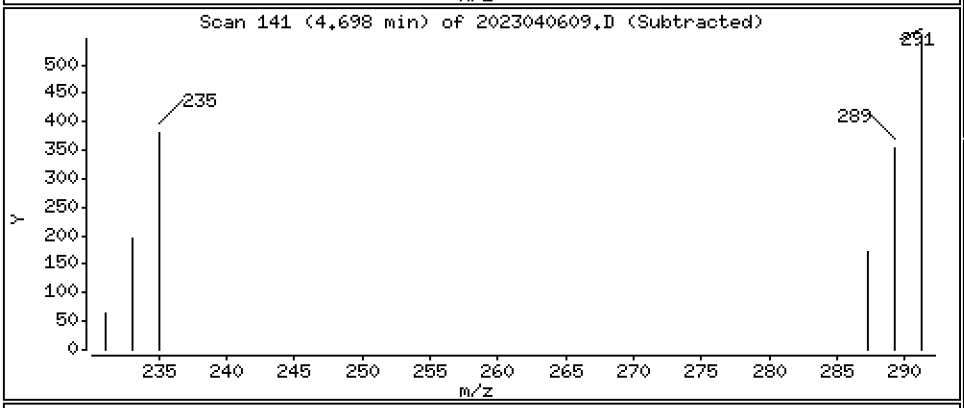
Column diameter: 0.25

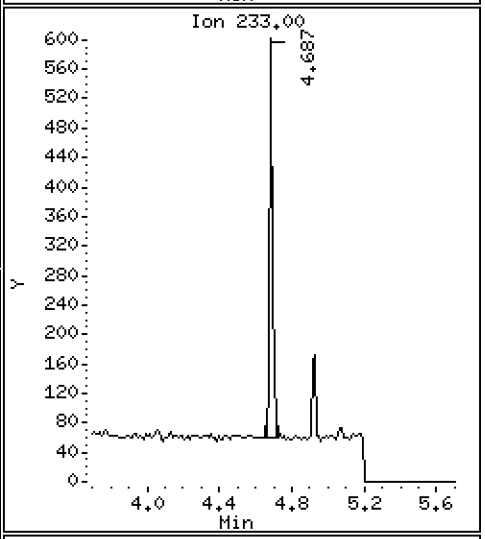
2 Tetrabutyl Tin

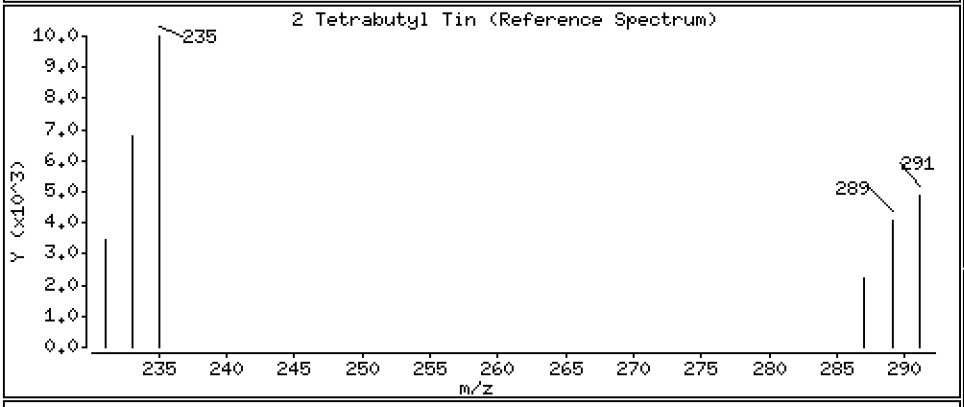
Concentration: 0.005817 ug/mL

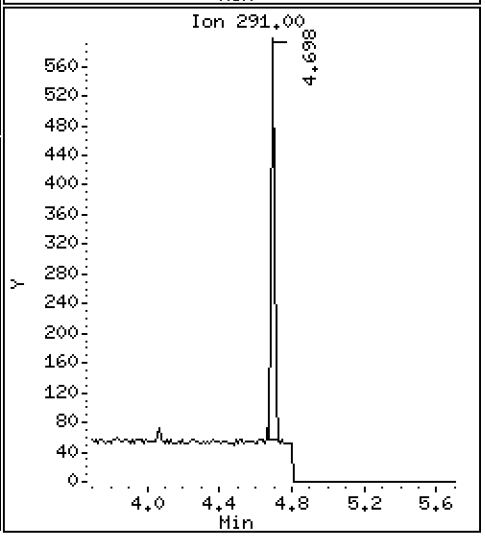


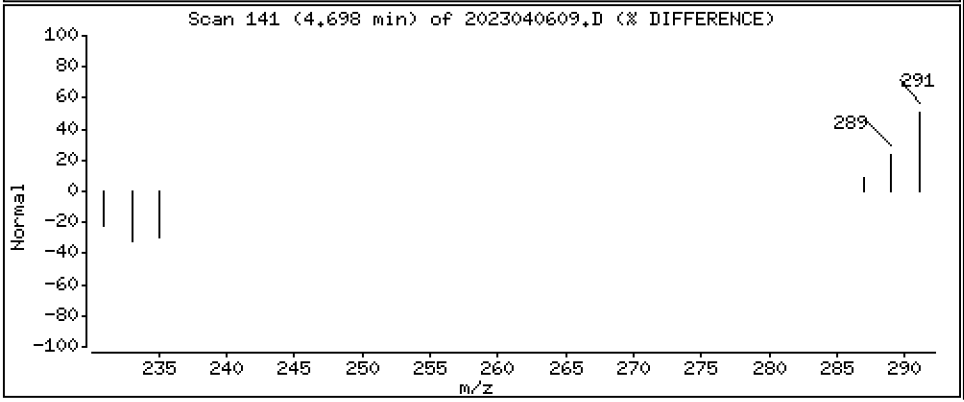












Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

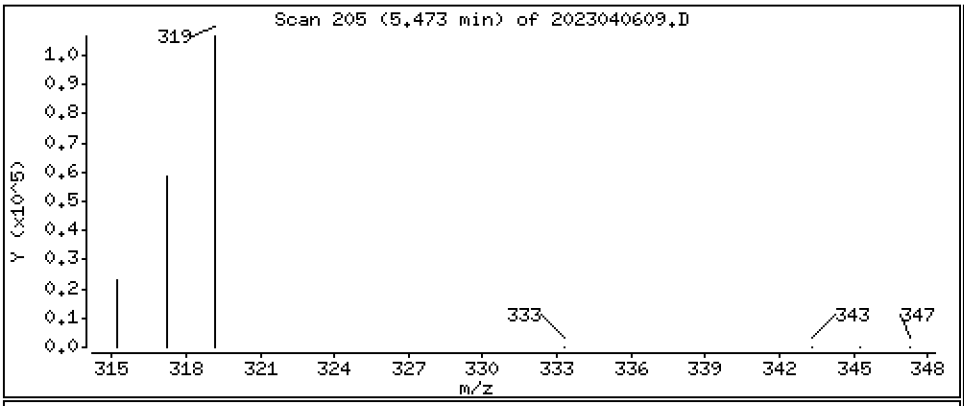
Operator: JZ

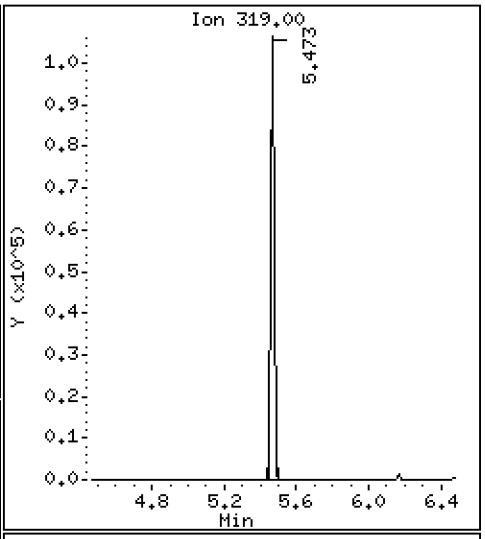
Column phase: ZB-5msi

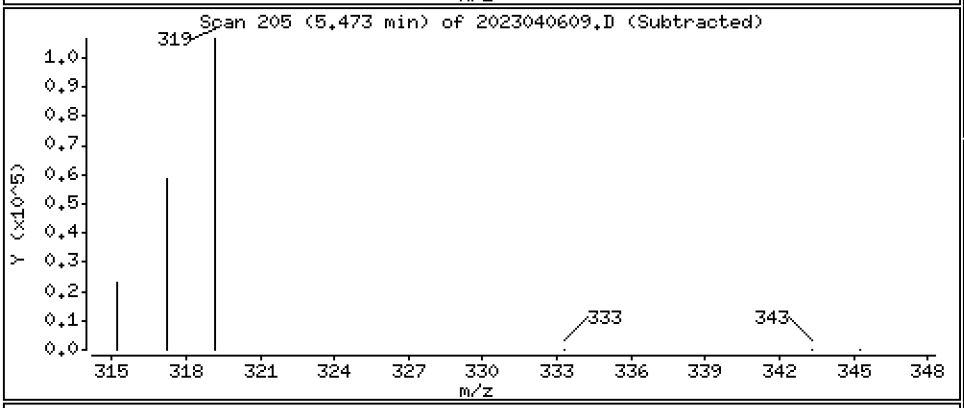
Column diameter: 0.25

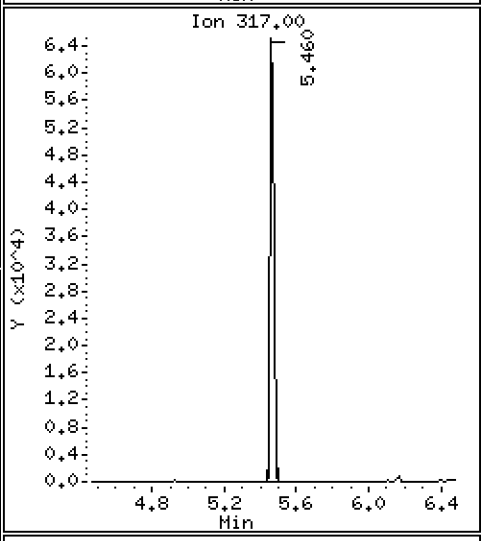
3 Tributyl Tin (Hexyl)

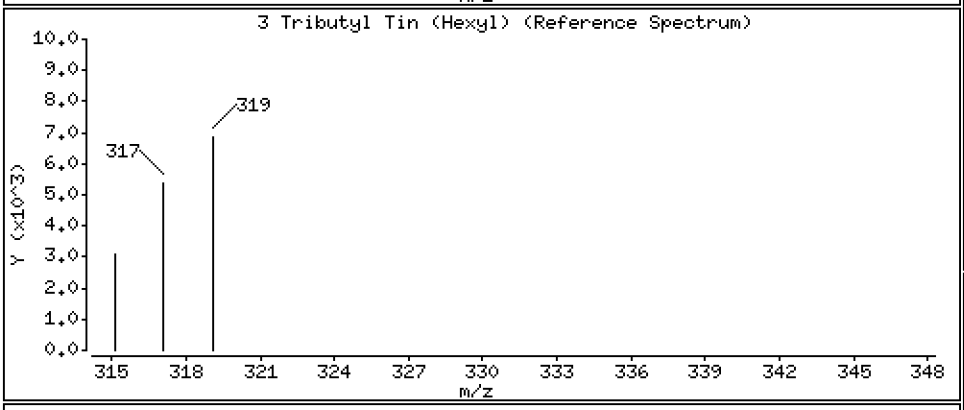
Concentration: 2.309 ug/mL

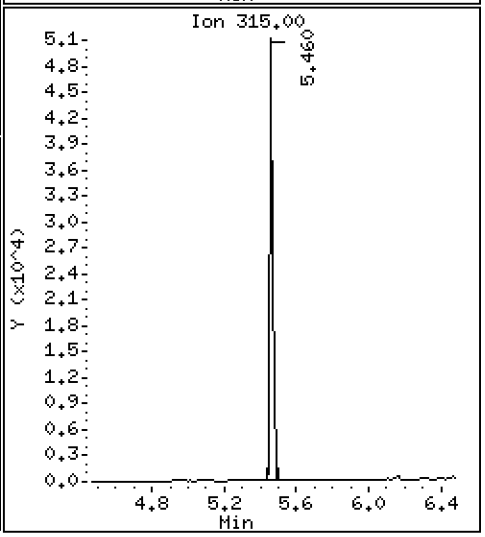


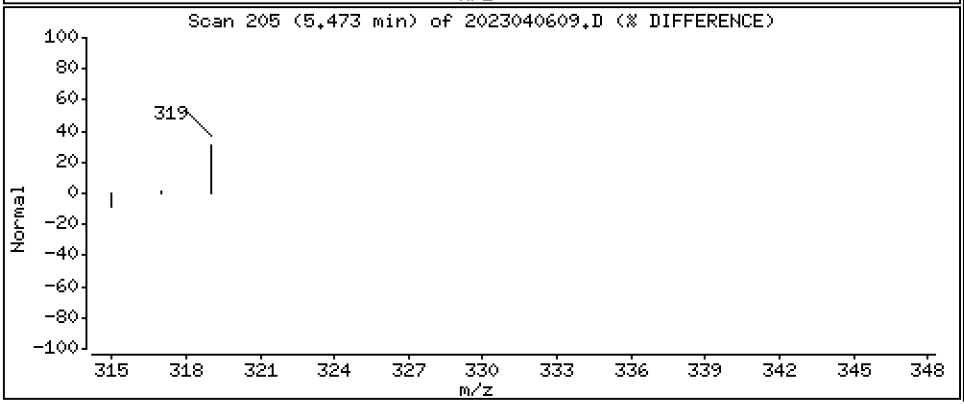












Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

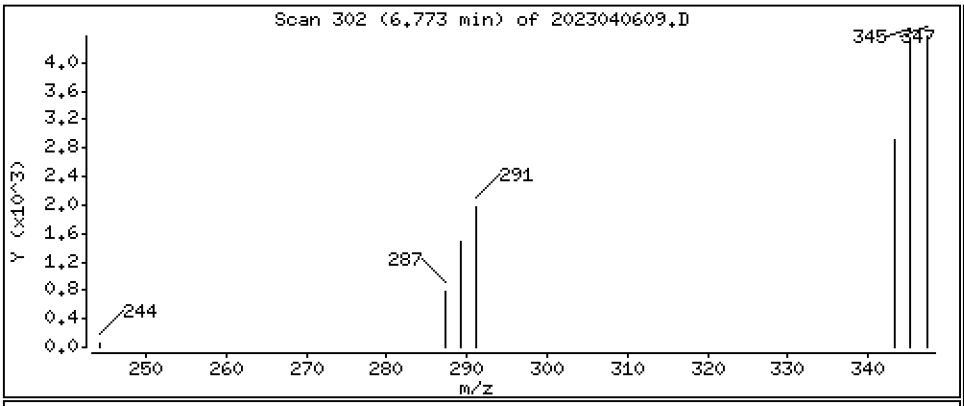
Operator: JZ

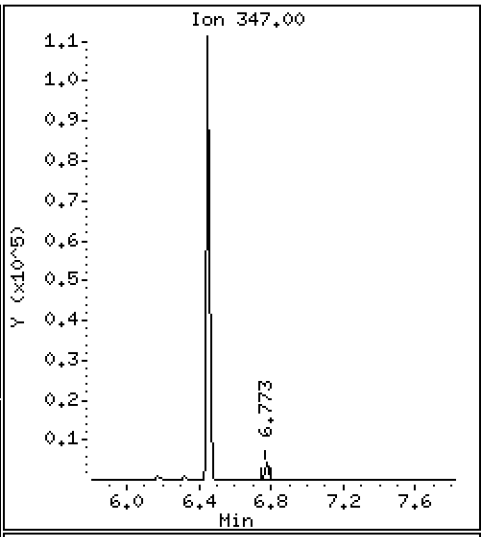
Column phase: ZB-5msi

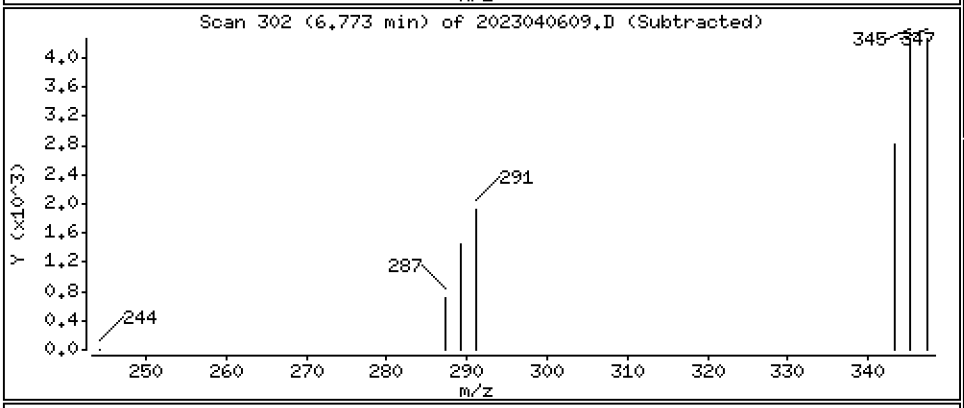
Column diameter: 0.25

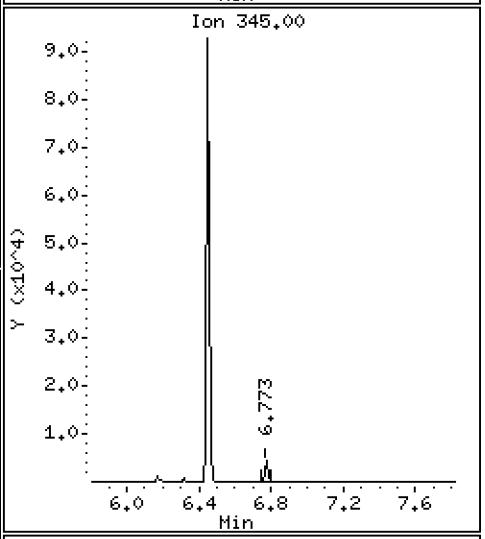
7 Butyl Tin (Hexyl)

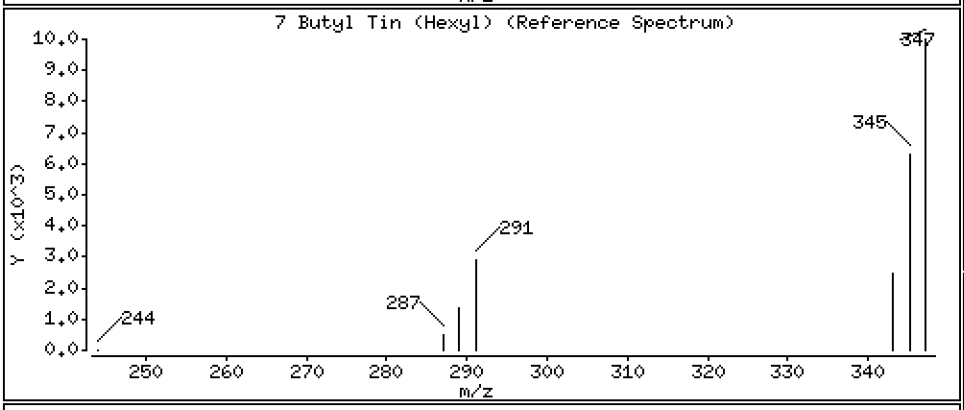
Concentration: 0.07833 ug/mL

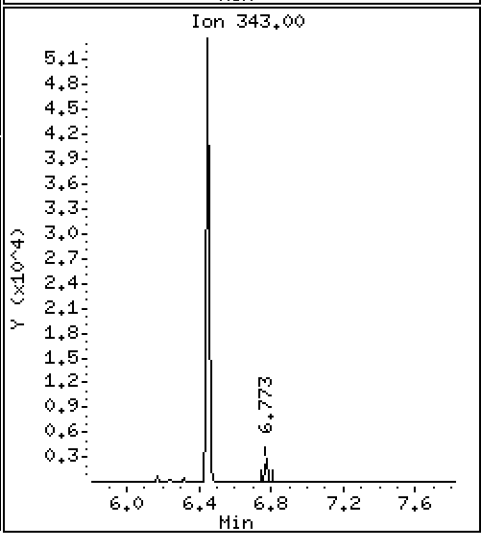


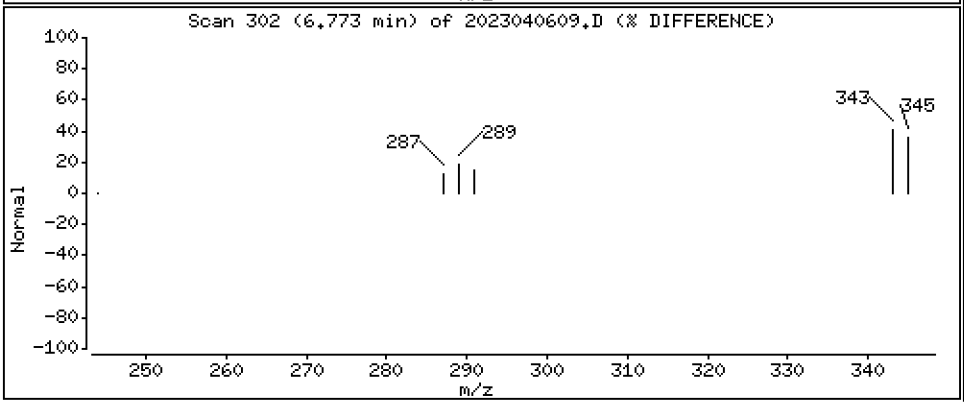












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040609.D
Lab Smp Id: SLD0101-SCV1
Inj Date : 06-APR-2023 17:18
Operator : JZ Inst ID: nt12.i
Smp Info : SCV230406
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:55 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 9
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	CONCENTRATIONS FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	Compound Not Detected.					
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	428	0.00582	0.005817
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	136359	2.30946	2.309
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	178329	2.00000	
	5 Dibutyl Tin (Hexyl)	347	Compound Not Detected.					
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	107876	1.58791	1.588
	7 Butyl Tin (Hexyl)	347	6.773	6.813	(0.779)	5821	0.07833	0.07833
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	27505	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040609.D
Lab Smp Id: SLD0101-SCV1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

COMPOUND	STANDARD	AREA LIMIT LOWER	AREA LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	178329	8.62
8 p-Terphenyl-d14	22611	11306	45222	27505	21.64

COMPOUND	STANDARD	RT LIMIT LOWER	RT LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040609.D

Lab ID: SLD0101-SCV1
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 17:18

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

** FIRST SURROGATE NOT FOUND. ICAL Check not performed **

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

SECOND-SOURCE CALIBRATION VERIFICATION

EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Calibration: GD00019
Laboratory ID: SLD0101-SCV2
Sequence: SLD0101
Sequence Name: Secondary Cal Check
Standard ID: L003829

ANALYTE	EXPECTED (ug/mL)	FOUND (ug/mL)	% DRIFT	QC LIMIT
Tributyltin Ion	1.5460	1.75	13.2	20.00
Tripentyltin	1.5918	1.37	-14.0	20.00

* Indicates values outside of QC limits

SECOND-SOURCE CALIBRATION VERIFICATION

EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Calibration: GD00019
Laboratory ID: SLD0101-SCV1
Sequence: SLD0101
Standard ID: L002076

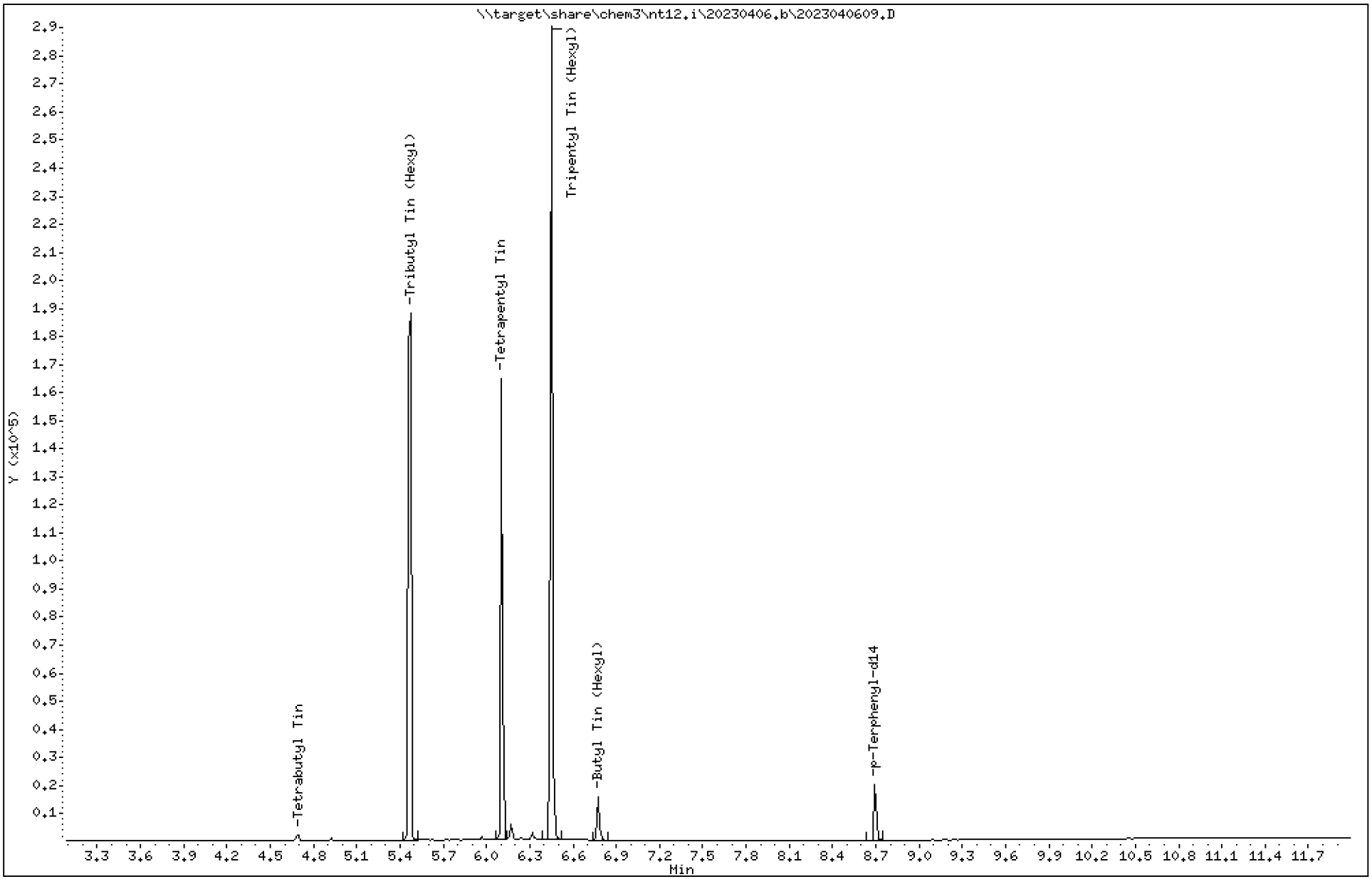
ANALYTE	EXPECTED (ug/mL)	FOUND (ug/mL)	% DRIFT	QC LIMIT
Tributyltin Ion	1.5460	1.79	15.5	20.00
Tripentyltin	1.5918	1.26	-20.6 *	20.00

* Values outside of QC limits

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D
Date : 06-APR-2023 17:18
Client ID:
Sample Info: SCV230406

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



23C0618 CLPLIKE (Rev0) - Page 154 of 269

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

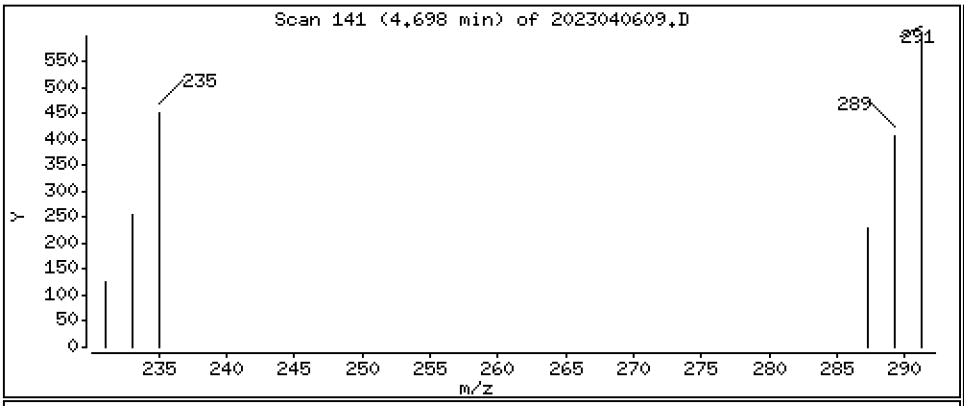
Operator: JZ

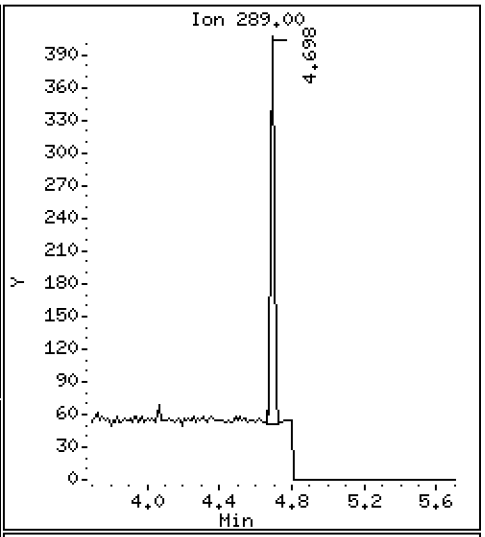
Column phase: ZB-5msi

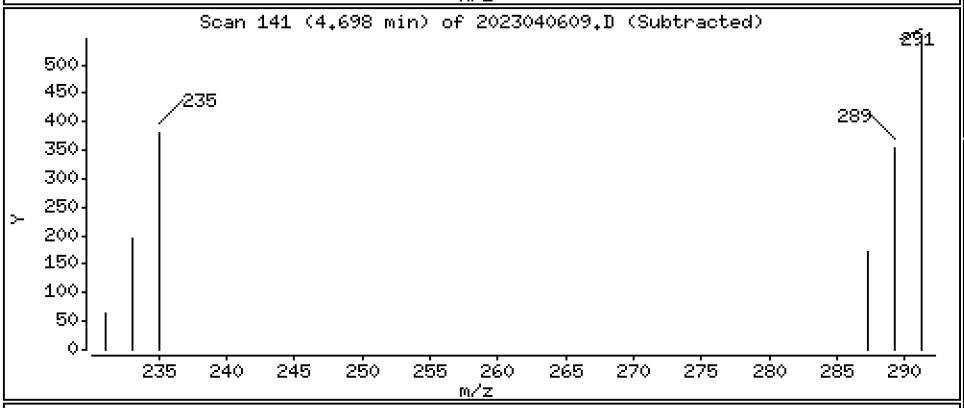
Column diameter: 0.25

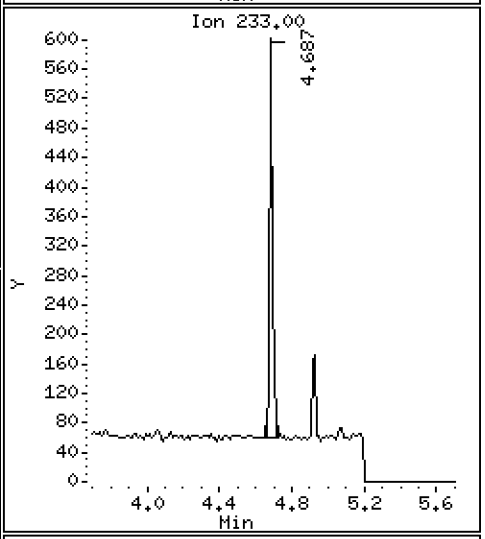
2 Tetrabutyl Tin

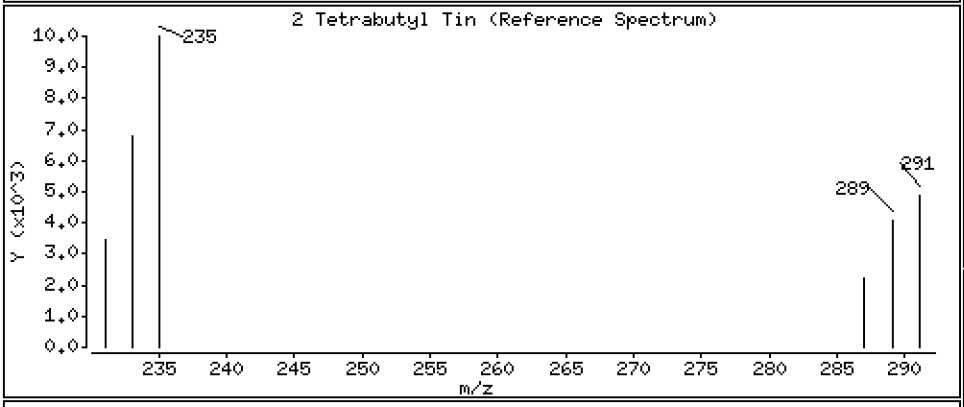
Concentration: 0.005817 ug/mL

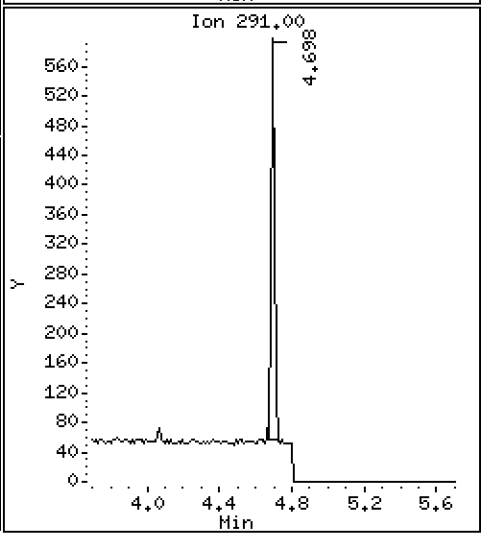


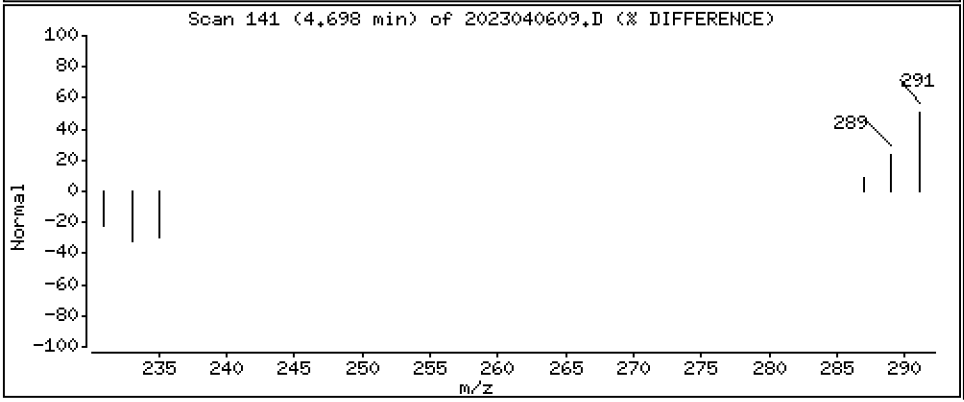












Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

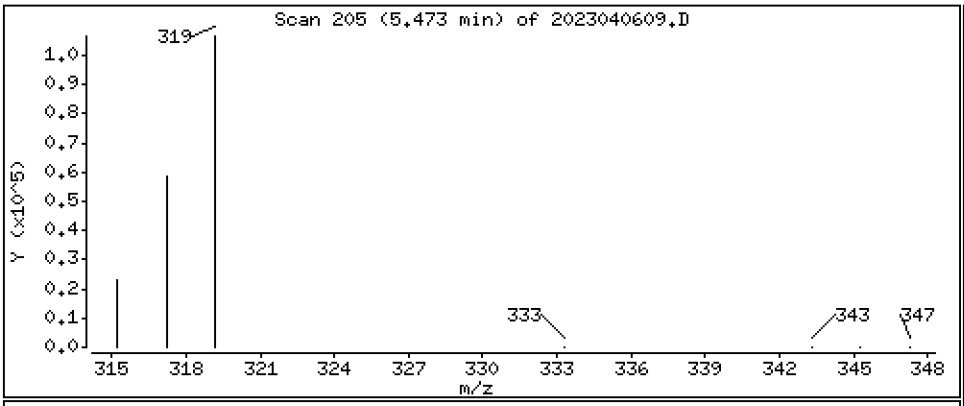
Operator: JZ

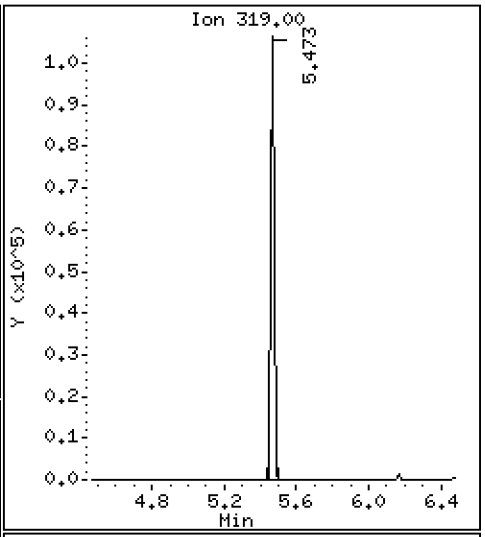
Column phase: ZB-5msi

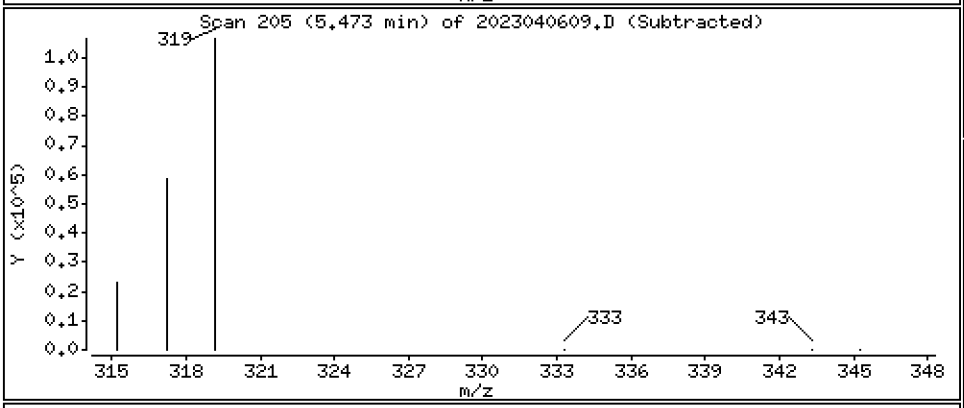
Column diameter: 0.25

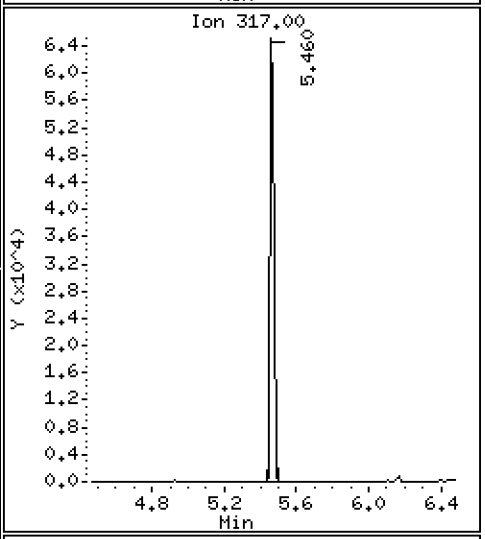
3 Tributyl Tin (Hexyl)

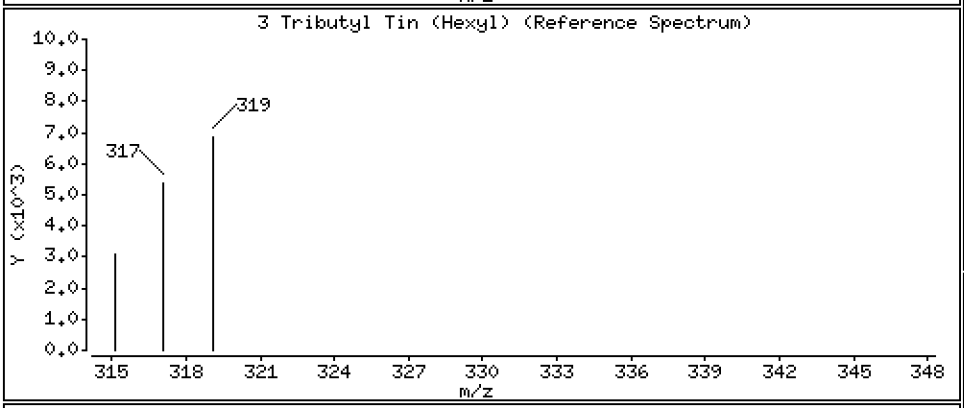
Concentration: 2.309 ug/mL

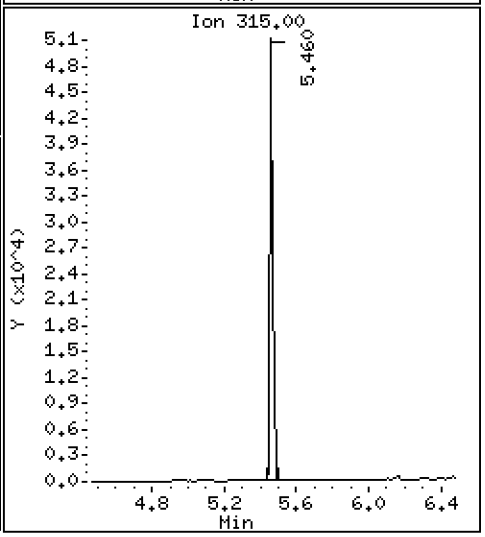


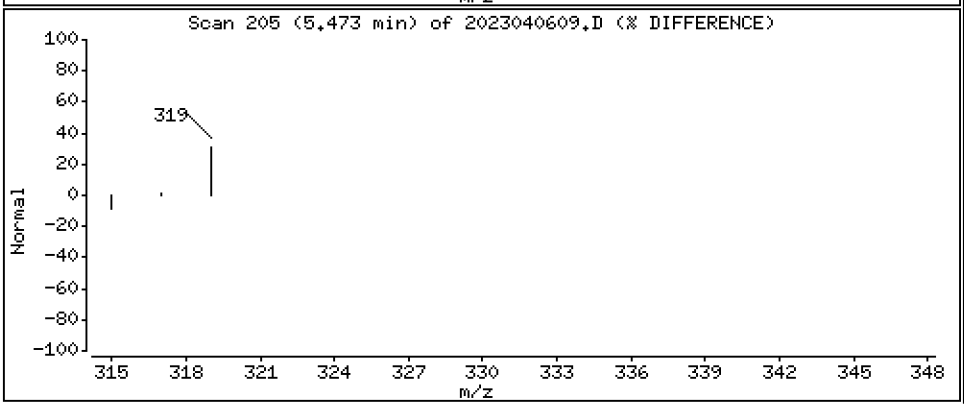












Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

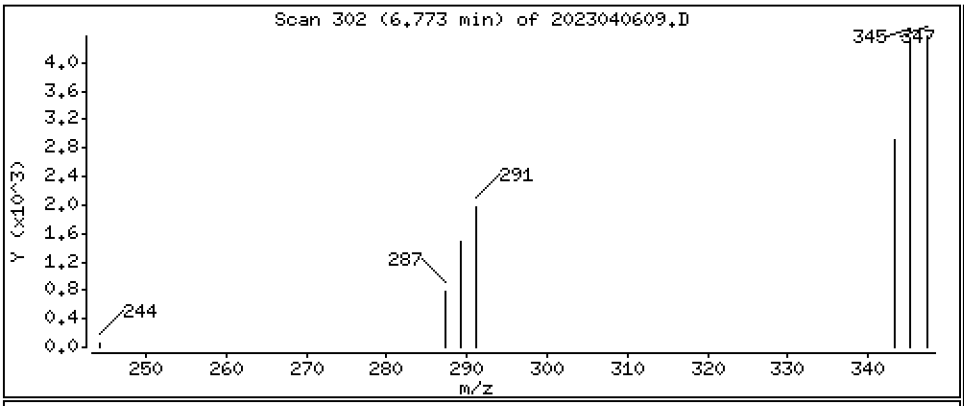
Operator: JZ

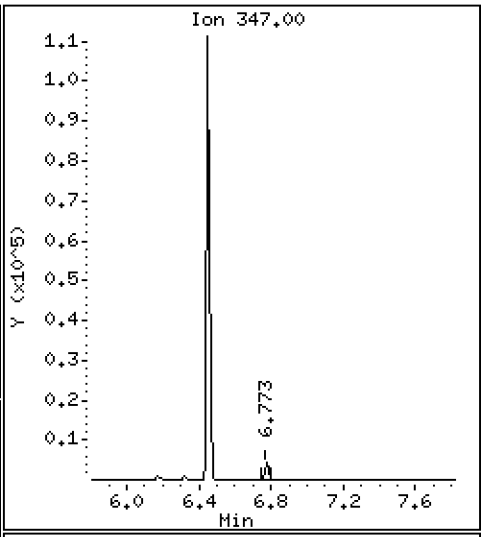
Column phase: ZB-5msi

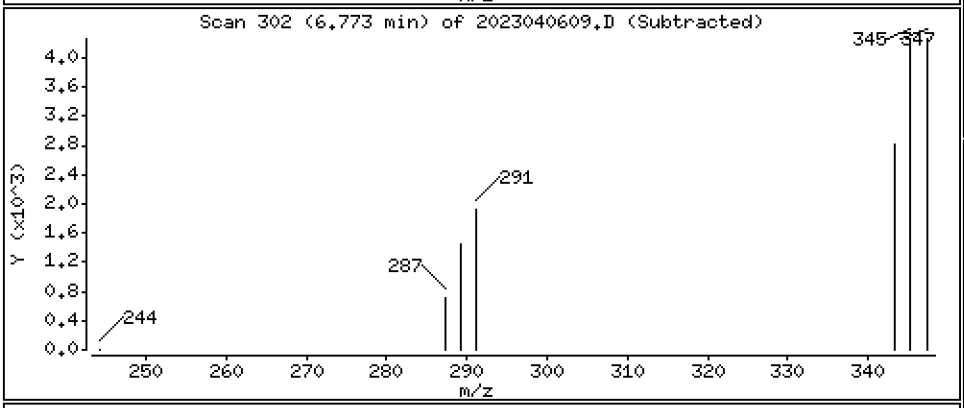
Column diameter: 0.25

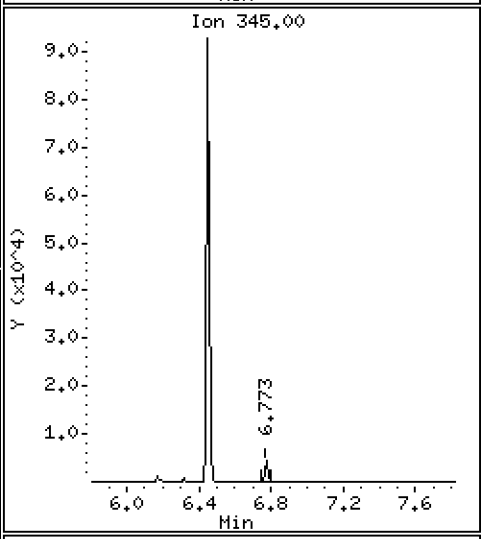
7 Butyl Tin (Hexyl)

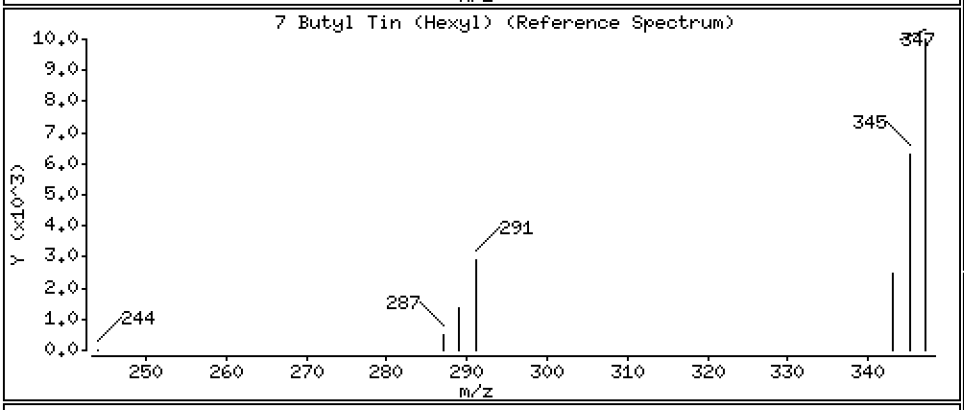
Concentration: 0.07833 ug/mL

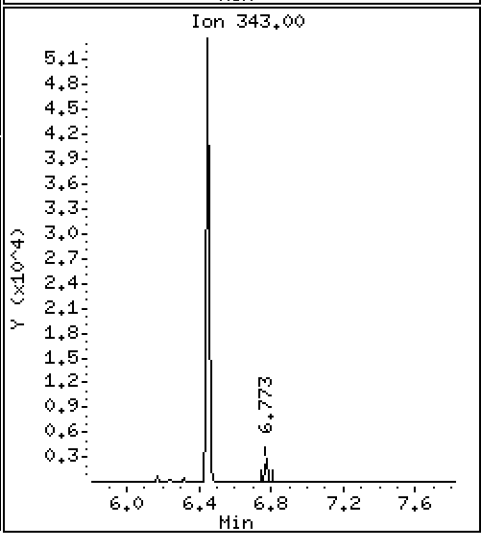


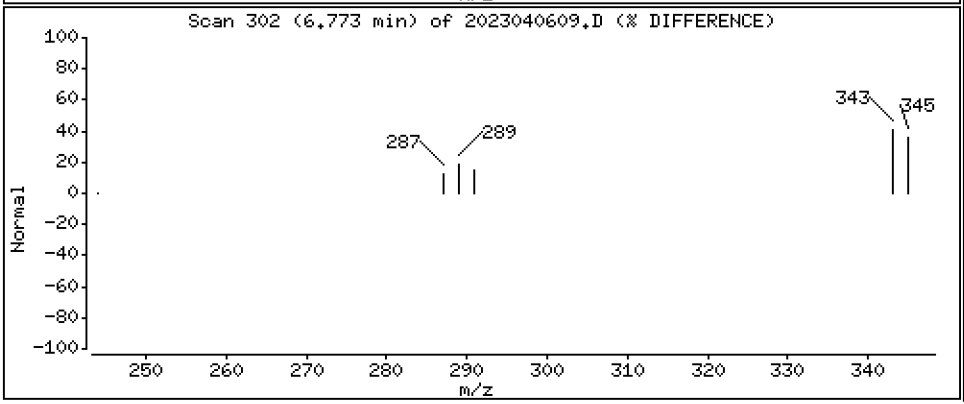












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040609.D
Lab Smp Id: SLD0101-SCV1
Inj Date : 06-APR-2023 17:18
Operator : JZ Inst ID: nt12.i
Smp Info : SCV230406
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:55 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 9
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	Compound Not Detected.					
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	428	0.00582	0.005817
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	136359	2.30946	2.309
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	178329	2.00000	
	5 Dibutyl Tin (Hexyl)	347	Compound Not Detected.					
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	107876	1.58791	1.588
	7 Butyl Tin (Hexyl)	347	6.773	6.813	(0.779)	5821	0.07833	0.07833
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	27505	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040609.D
Lab Smp Id: SLD0101-SCV1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	178329	8.62
8 p-Terphenyl-d14	22611	11306	45222	27505	21.64

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040609.D

Lab ID: SLD0101-SCV1
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 17:18

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

** FIRST SURROGATE NOT FOUND. ICAL Check not performed **

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

SECOND-SOURCE CALIBRATION VERIFICATION

EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Calibration: GD00019
Laboratory ID: SLD0101-SCV2
Sequence: SLD0101
Standard ID: L003829

ANALYTE	EXPECTED (ug/mL)	FOUND (ug/mL)	% DRIFT	QC LIMIT
Tributyltin Ion	1.5460	1.75	13.2	20.00
Tripentyltin	1.5918	1.37	-14.0	20.00

* Values outside of QC limits

Analytical Resources, LLC
Analytical Chemists and Consultants

INITIAL CALIBRATION CHECK
EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Instrument ID:	NT12	Calibration:	GD00019
Lab File ID:	2023040606A.D	Calibration Date:	04/06/2023
Sequence:	SLD0107	Injection Date:	04/06/23
Lab Sample ID:	SLD0107-ICV1	Injection Time:	16:28
Sequence Name:	Initial Cal Check		

		CONC. (ug/mL)		RESPONSE FACTOR			% DRIFT/DIFF	
COMPOUND	TYPE	STD	ICV	ICAL	ICV	MIN	ICV	LIMIT
Tributyltin Ion	A	0.77300	0.747	0.6621886	0.6396744	0.01	-3.4	+/-20
Dibutyltin Ion	A	1.1560	1.14	0.3357743	0.3304631	0.01	-1.6	+/-20
Butyltin Ion	A	0.81600	0.794	0.5403357	0.5258811	0.01	-2.7	+/-20
Tetrabutyltin	A	1.0000	0.956	0.8251907	0.7892381	0.01	-4.4	+/-20
Tripentyltin	A	1.5918	1.60	0.4939876	0.4954624	0.01	0.3	+/-20
Tripropyltin	A	0.74430	0.703	0.8456179	0.7985333	0.01	-5.6	+/-20
Tetrapentyltin	A	2.0000	2.00	86289.6700	1.0000		0.0	
p-Terphenyl-d14	A	0.20000	0.200	117726.7000	1.0000		0.0	

* Values outside of QC limits

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040606A.D

Date : 06-APR-2023 16:28

Client ID:

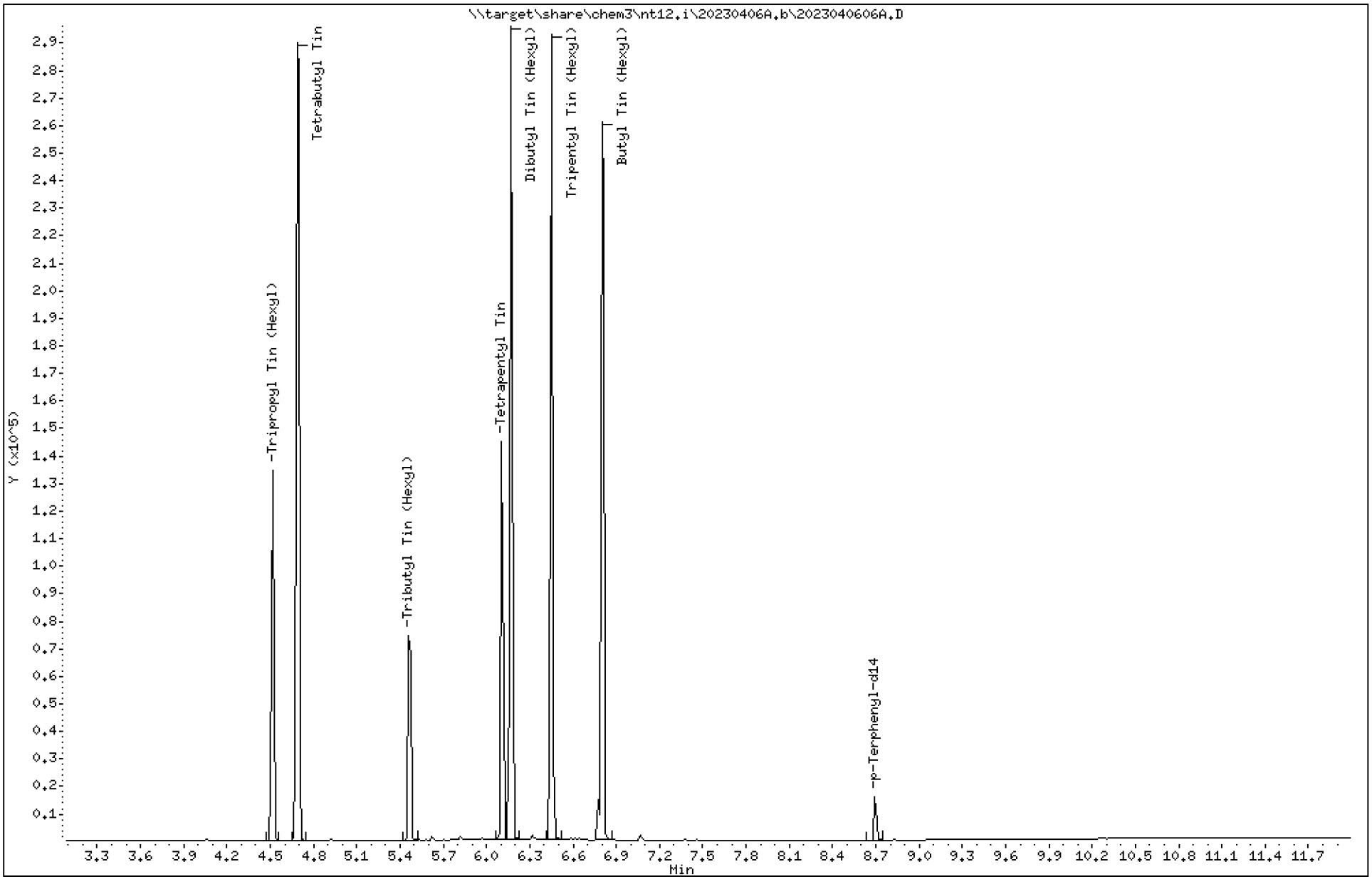
Instrument: nt12.i

Sample Info: IC1230406,

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0618 CLPLIKE (Rev0) - Page 163 of 269

ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040606A.D
Lab Smp Id: SLD0107-ICV1
Inj Date : 06-APR-2023 16:28
Operator : JZ Inst ID: nt12.i
Smp Info : IC1230406,
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 09:43 nt12.i Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 6 Continuing Calibration Sample
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/mL)	ON-COL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.514	4.514	(0.740)	65548	1.00000	0.9443
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	64785	1.00000	0.9564
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	52508	1.00000	0.9660
*	4 Tetrapentyl Tin	333	6.102	6.102	(1.000)	164171	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.169	6.169	(0.710)	74721	2.00000	1.968
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	112029	2.00000	2.006
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	118907	2.00000	1.946
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	22611	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040606A.D
Lab Smp Id: SLD0107-ICV1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Initial Calibration Level 4.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	164171	0.00
8 p-Terphenyl-d14	22611	11306	45222	22611	0.00

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040606A.D

Lab ID: SLD0107-ICV1
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 16:28

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

No RRT check. Ccal file.

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Q-FLAG SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406A.b

Instrument: nt12.i Date: 06-APR-2023 Method: 20230406A.b\TBT20230406.m

INITIAL CAL: 06-APR-2023

Compound	%RSD or R^2
NO Q-FLAGS	

ICV CAL: 2023040606A.D 06-APR-2023 16:28

Compound	%D
NO Q-FLAGS	

Analytical Resources, LLC
Analytical Chemists and Consultants

SECOND-SOURCE
CONTINUING CALIBRATION CHECK
EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Instrument ID:	NT12	Calibration:	GD00019
Lab File ID:	2023040609.D	Calibration Date:	04/06/2023
Sequence:	SLD0101	Injection Date:	04/06/23
Lab Sample ID:	SLD0101-SCV1	Injection Time:	17:18
Sequence Name:	Secondary Cal Check		

		CONC. (ug/mL)		RESPONSE FACTOR (RRF)			% DRIFT/DIFF		
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN	CCV	LIMIT	
Tributyltin Ion	A	1.5460	1.79	0.6621886	0.7646484	0.01	15.5	+/-20	
Tripentyltin	A	1.5918	1.26	0.4939876	0.3922051	0.01	-20.6	+/-20	*

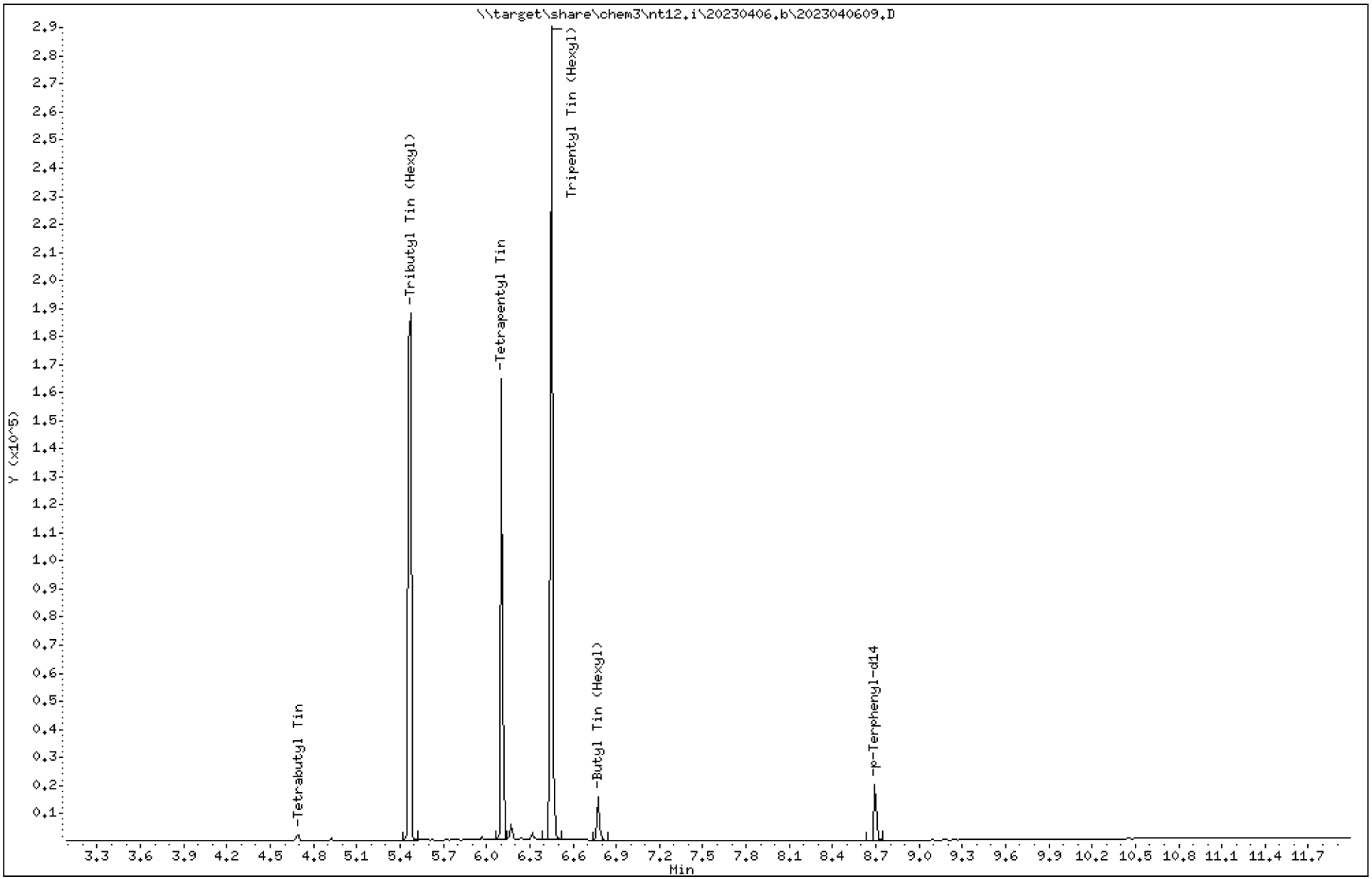
* Values outside of QC limits

* Values outside of QC limits

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D
Date : 06-APR-2023 17:18
Client ID:
Sample Info: SCV230406

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



23C0618 CLPLIKE (Rev0) - Page 169 of 269

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

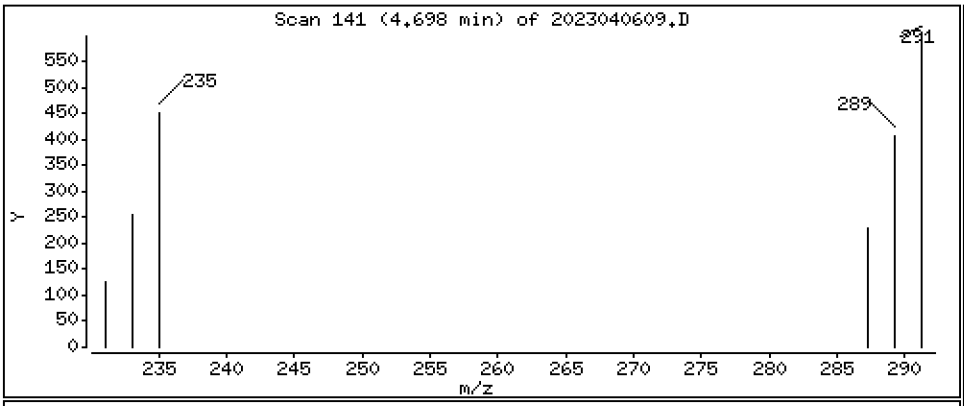
Operator: JZ

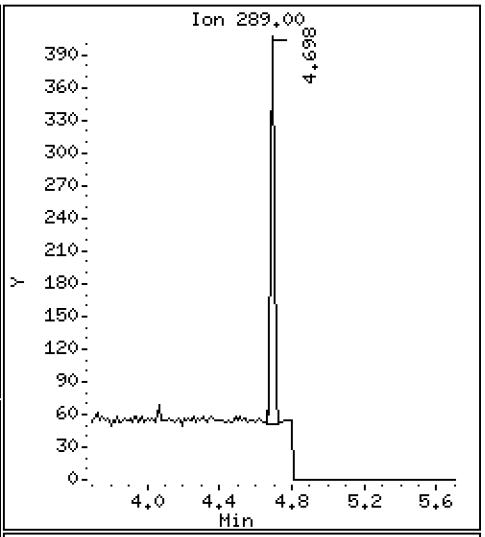
Column phase: ZB-5msi

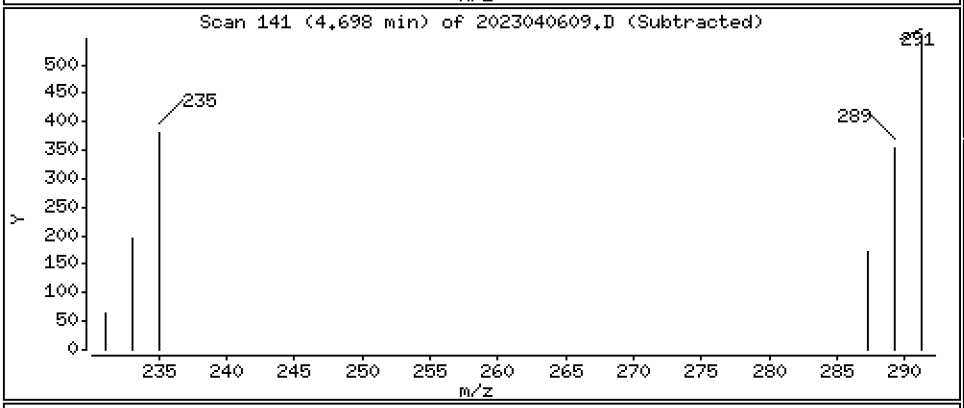
Column diameter: 0.25

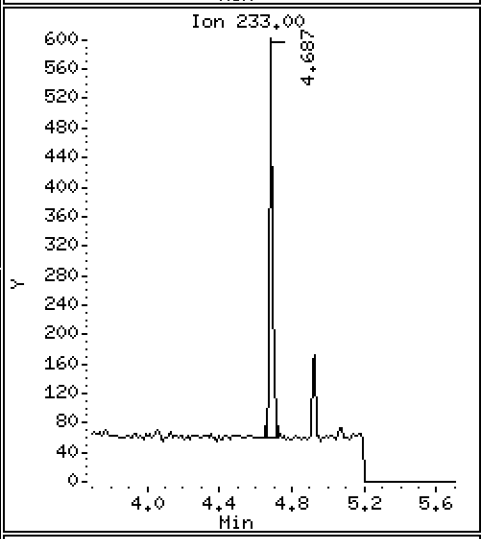
2 Tetrabutyl Tin

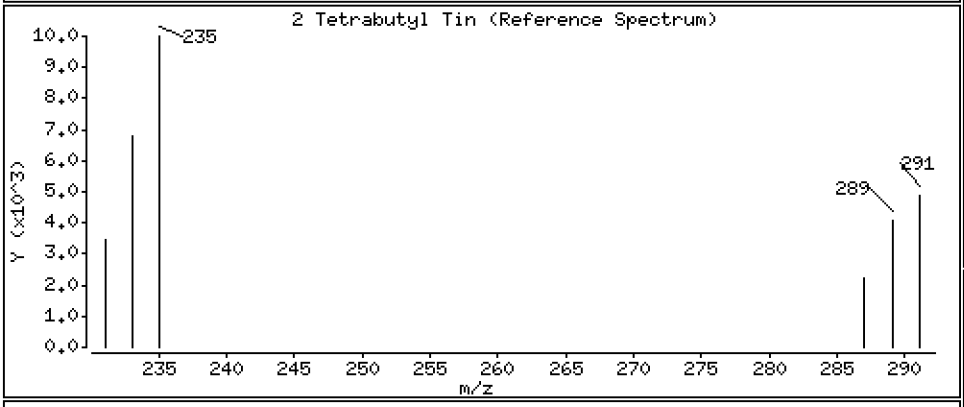
Concentration: 0.005817 ug/mL

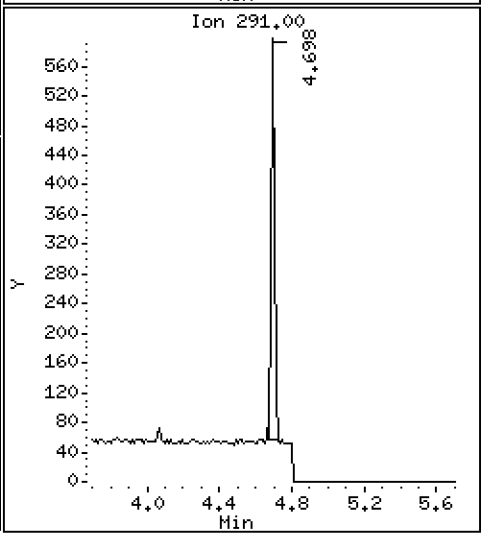


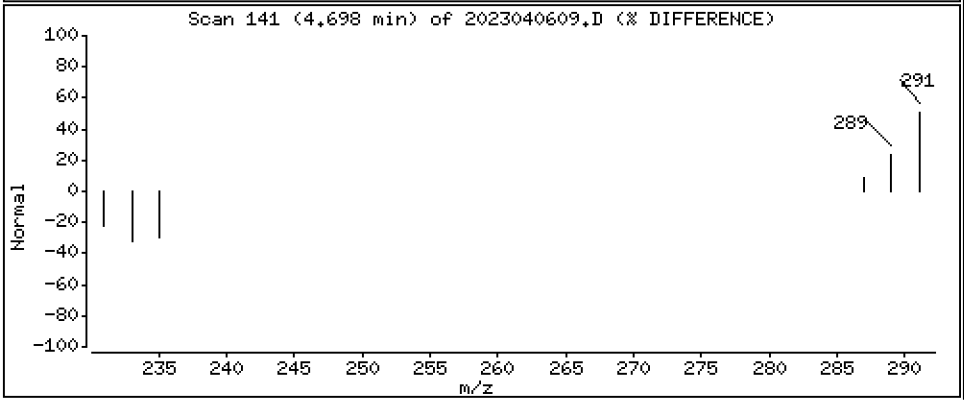












Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

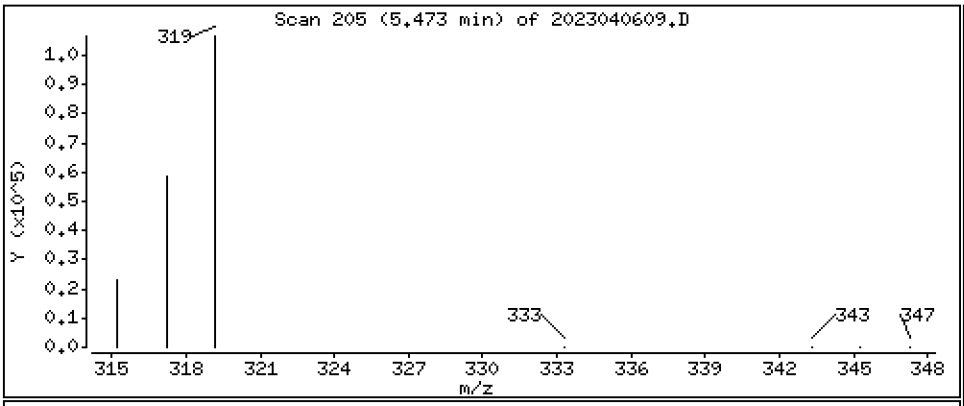
Operator: JZ

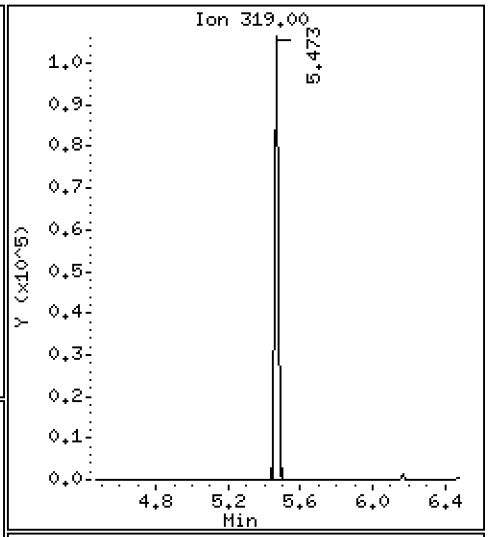
Column phase: ZB-5msi

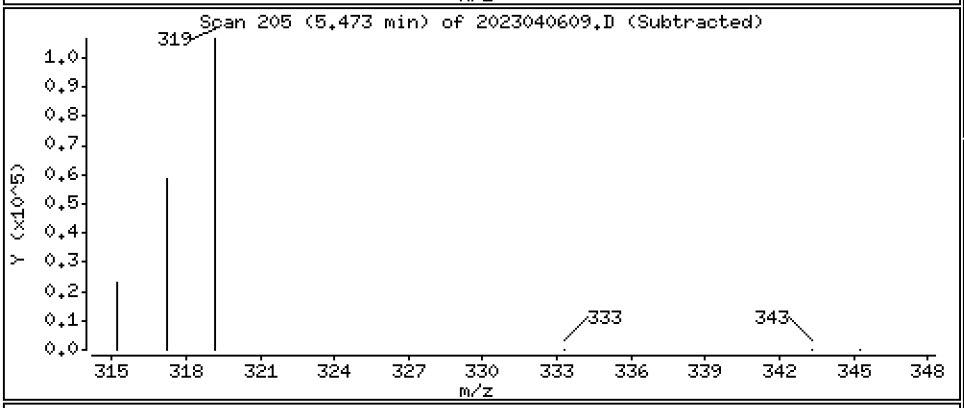
Column diameter: 0.25

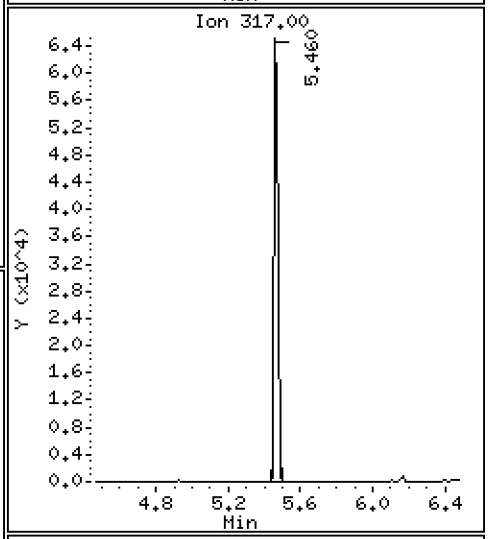
3 Tributyl Tin (Hexyl)

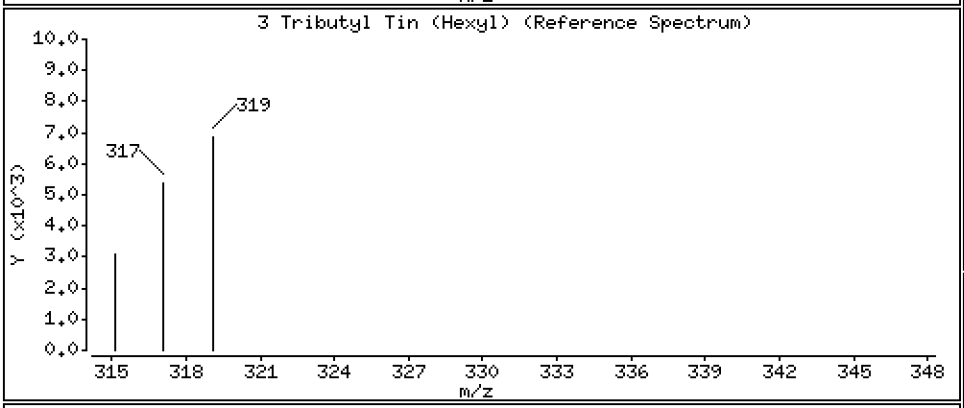
Concentration: 2.309 ug/mL

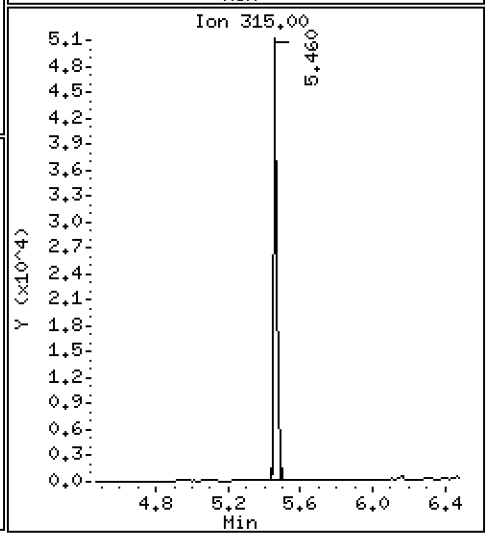


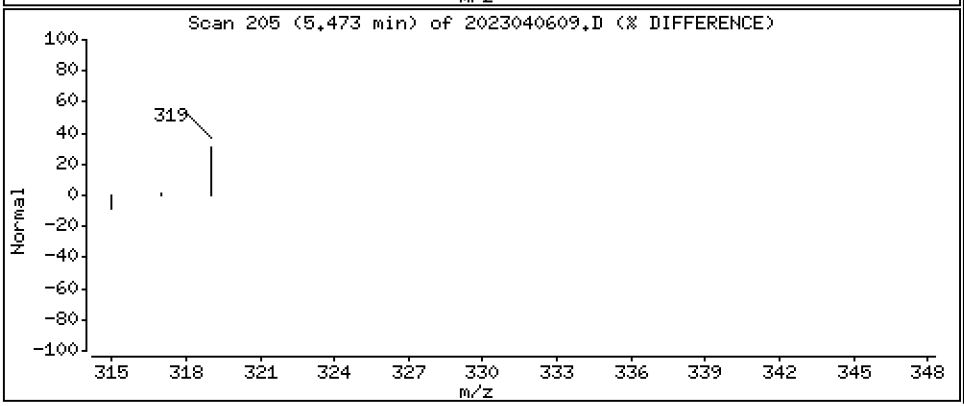












Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

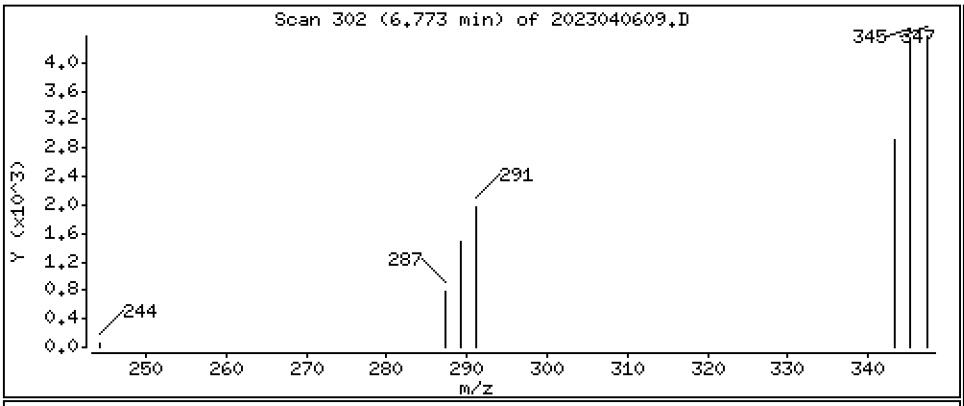
Operator: JZ

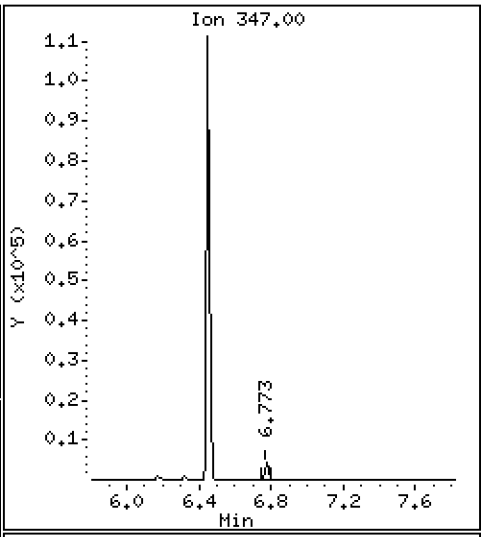
Column phase: ZB-5msi

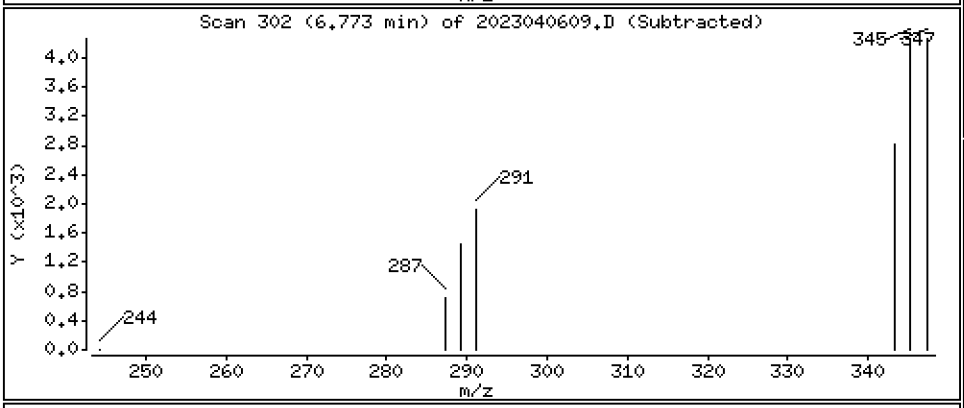
Column diameter: 0.25

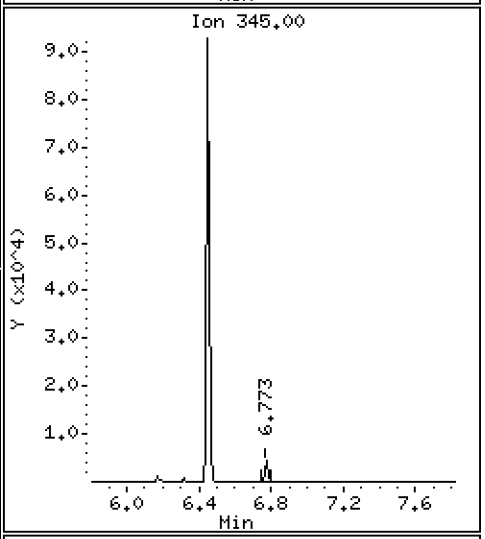
7 Butyl Tin (Hexyl)

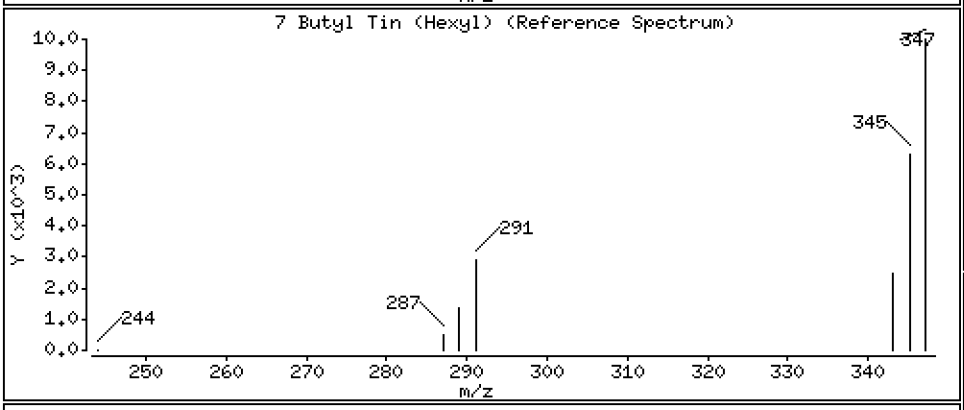
Concentration: 0.07833 ug/mL

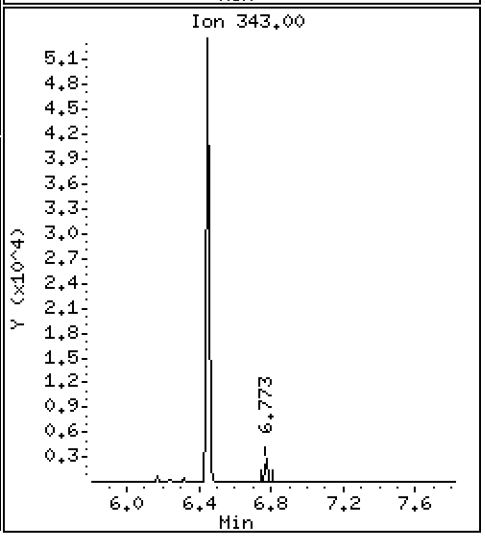


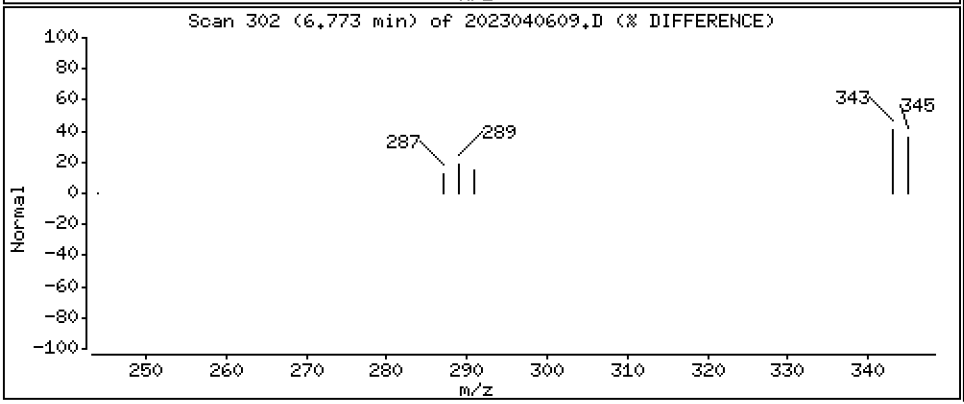












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040609.D
Lab Smp Id: SLD0101-SCV1
Inj Date : 06-APR-2023 17:18
Operator : JZ Inst ID: nt12.i
Smp Info : SCV230406
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:55 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 9
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	Compound Not Detected.					
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	428	0.00582	0.005817
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	136359	2.30946	2.309
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	178329	2.00000	
	5 Dibutyl Tin (Hexyl)	347	Compound Not Detected.					
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	107876	1.58791	1.588
	7 Butyl Tin (Hexyl)	347	6.773	6.813	(0.779)	5821	0.07833	0.07833
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	27505	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040609.D
Lab Smp Id: SLD0101-SCV1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

COMPOUND	STANDARD	AREA LIMIT LOWER	AREA LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	178329	8.62
8 p-Terphenyl-d14	22611	11306	45222	27505	21.64

COMPOUND	STANDARD	RT LIMIT LOWER	RT LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040609.D

Lab ID: SLD0101-SCV1
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 17:18

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

** FIRST SURROGATE NOT FOUND. ICAL Check not performed **

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Analytical Resources, LLC
Analytical Chemists and Consultants

SECOND-SOURCE
CONTINUING CALIBRATION CHECK
EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Instrument ID:	NT12	Calibration:	GD00019
Lab File ID:	2023041204.D	Calibration Date:	04/06/2023
Sequence:	SLD0101	Injection Date:	04/12/23
Lab Sample ID:	SLD0101-SCV2	Injection Time:	14:30
Sequence Name:	Secondary Cal Check		

		CONC. (ug/mL)		RESPONSE FACTOR (RRF)			% DRIFT/DIFF	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN	CCV	LIMIT
Tributyltin Ion	A	1.5460	1.75	0.6621886	0.7493400	0.01	13.2	+/-20
Tripentyltin	A	1.5918	1.37	0.4939876	0.4249420	0.01	-14.0	+/-20

* Values outside of QC limits

Analytical Resources, LLC
Analytical Chemists and Consultants

CONTINUING CALIBRATION CHECK

EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Instrument ID:	NT12	Calibration:	GD00019
Lab File ID:	2023040638.D	Calibration Date:	04/06/2023
Sequence:	SLD0107	Injection Date:	04/07/23
Lab Sample ID:	SLD0107-CCV1	Injection Time:	01:57
Sequence Name:	Calibration Check		

		CONC. (ug/mL)		RESPONSE FACTOR (RRF)			% DRIFT/DIFF	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN	CCV	LIMIT
Tributyltin Ion	A	0.77300	0.777	0.6621886	0.6660435	0.01	0.6	+/-50
Dibutyltin Ion	A	1.1560	0.935	0.3357743	0.2714646	0.01	-19.2	+/-50
Butyltin Ion	A	0.81600	0.600	0.5403357	0.3972474	0.01	-26.5	+/-50
Tetrabutyltin	A	1.0000	0.982	0.8251907	0.8105419	0.01	-1.8	+/-50
Tripentyltin	A	1.5918	1.23	0.4939876	0.3830592	0.01	-22.5	+/-50
Tripropyltin	A	0.74430	0.722	0.8456179	0.8197690	0.01	-3.1	+/-50

* Values outside of QC limits

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040638.D

Date : 07-APR-2023 01:57

Client ID:

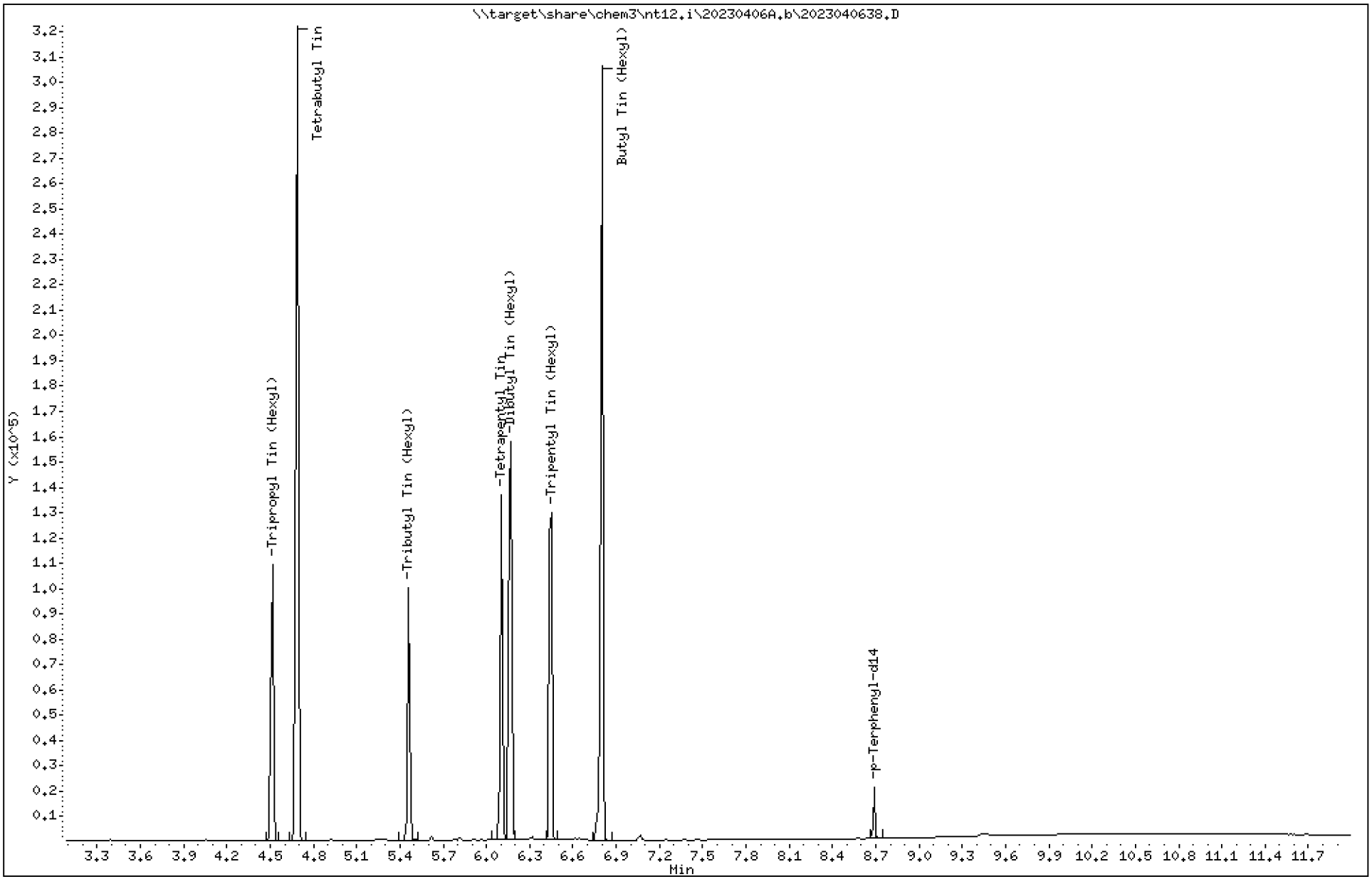
Instrument: nt12.i

Sample Info: CCV230406

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0618 CLPLIKE (Rev0) - Page 178 of 269

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040638.D

Date : 07-APR-2023 01:57

Client ID:

Instrument: nt12.i

Sample Info: CCV230406

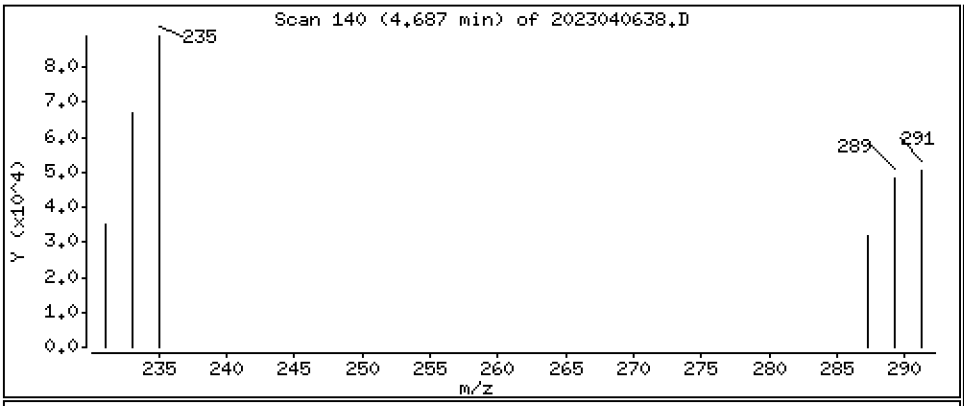
Operator: JZ

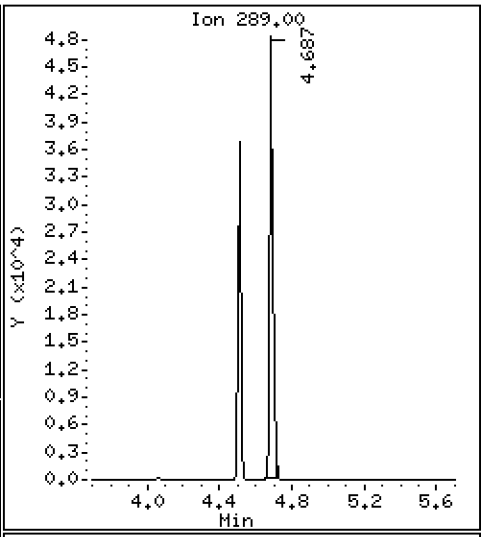
Column phase: ZB-5msi

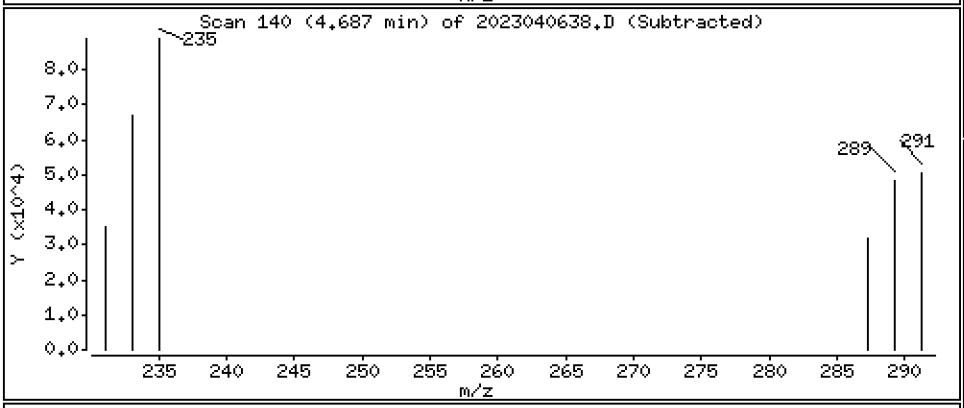
Column diameter: 0.25

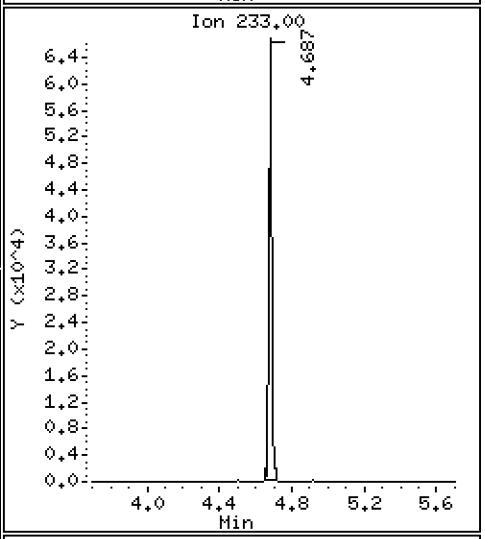
2 Tetrabutyl Tin

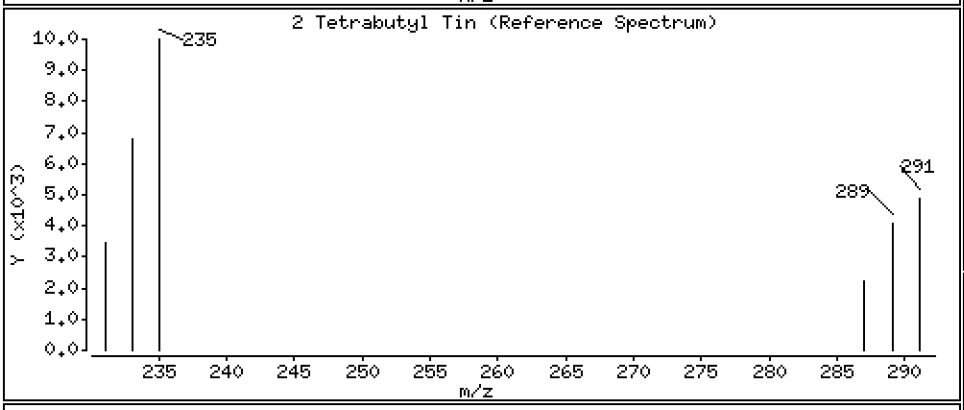
Concentration: 0.9822 ug/mL

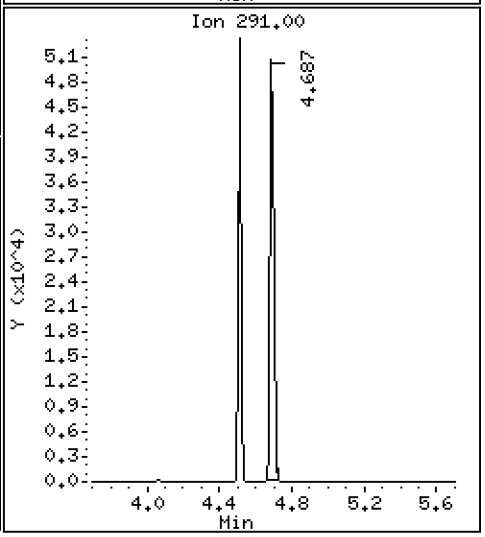


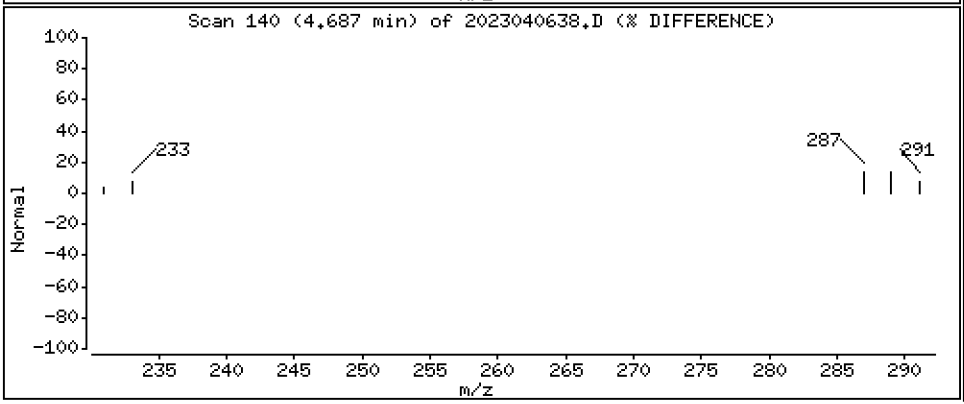












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040638.D

Date : 07-APR-2023 01:57

Client ID:

Instrument: nt12.i

Sample Info: CCV230406

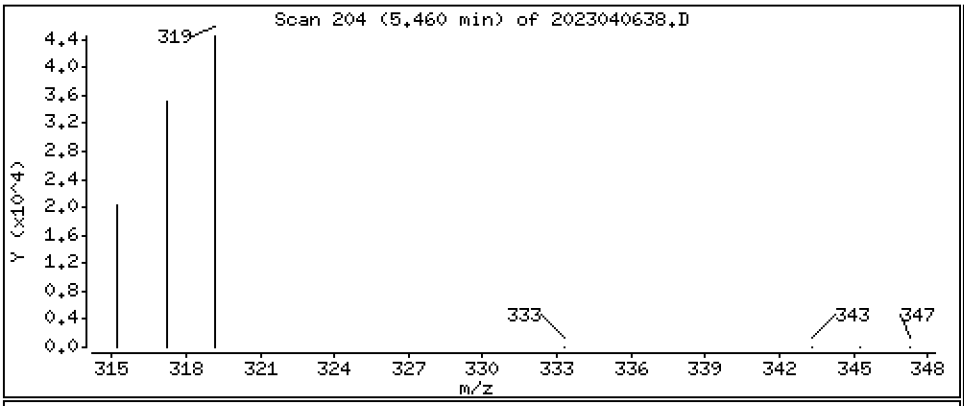
Operator: JZ

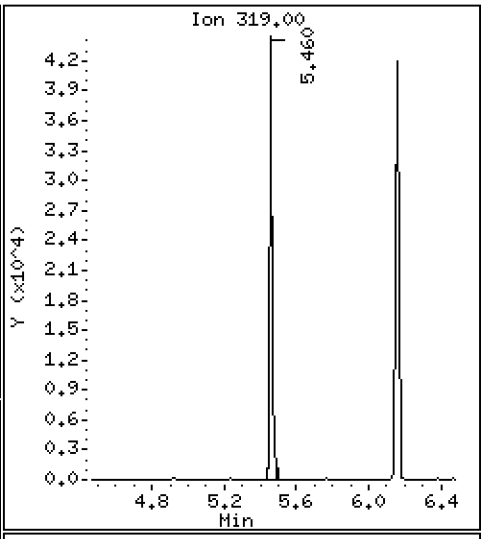
Column phase: ZB-5msi

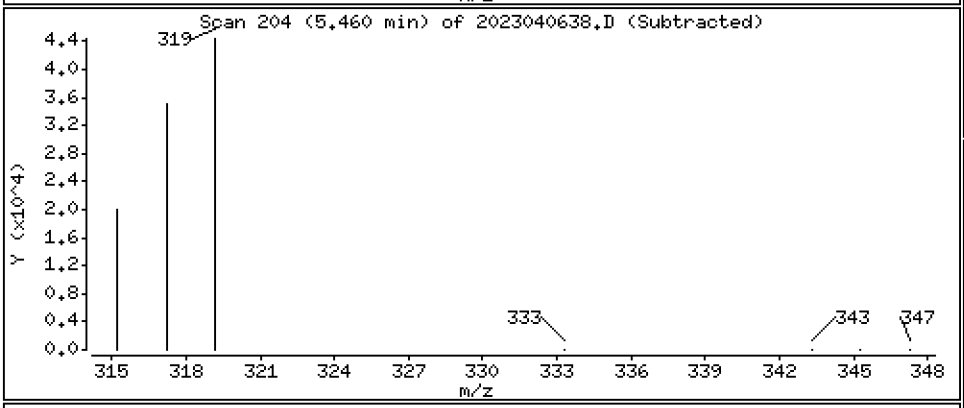
Column diameter: 0.25

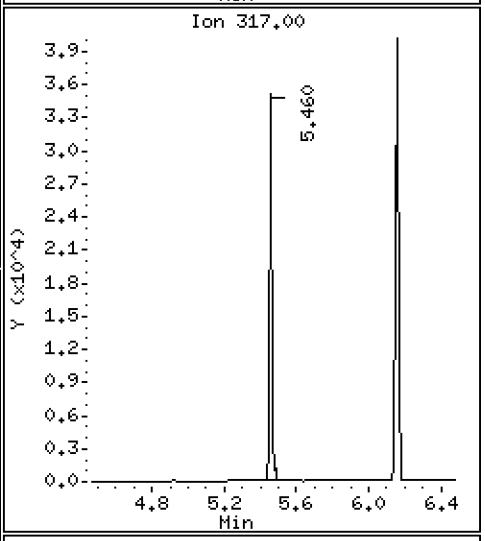
3 Tributyl Tin (Hexyl)

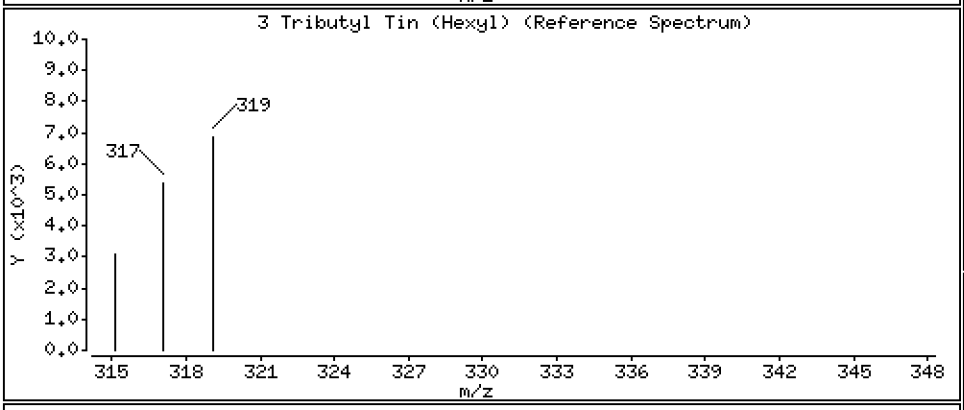
Concentration: 1.006 ug/mL

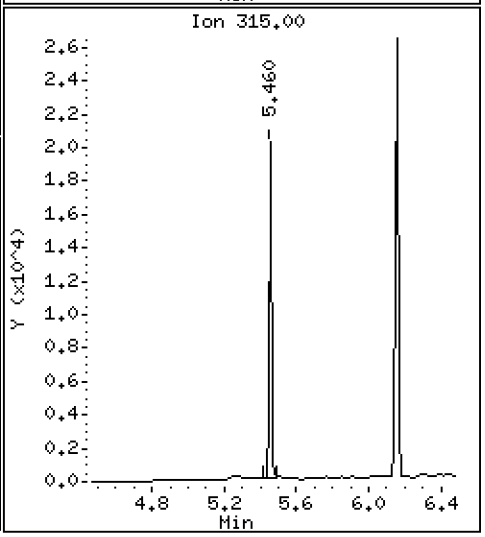


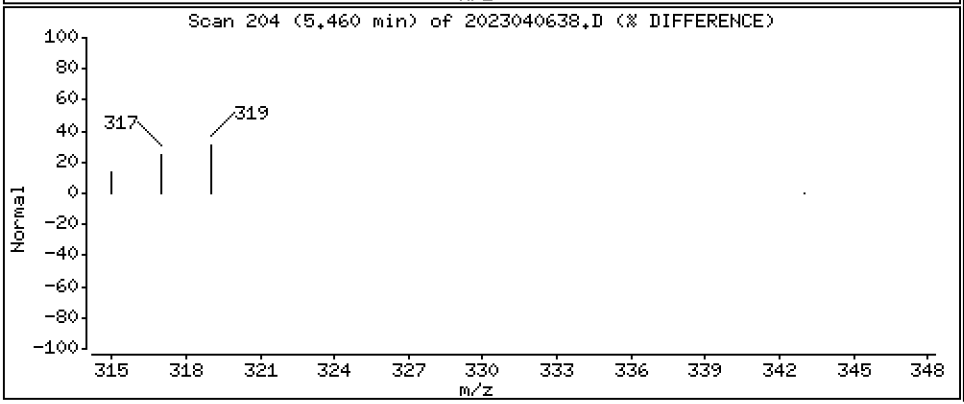












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040638.D

Date : 07-APR-2023 01:57

Client ID:

Instrument: nt12.i

Sample Info: CCV230406

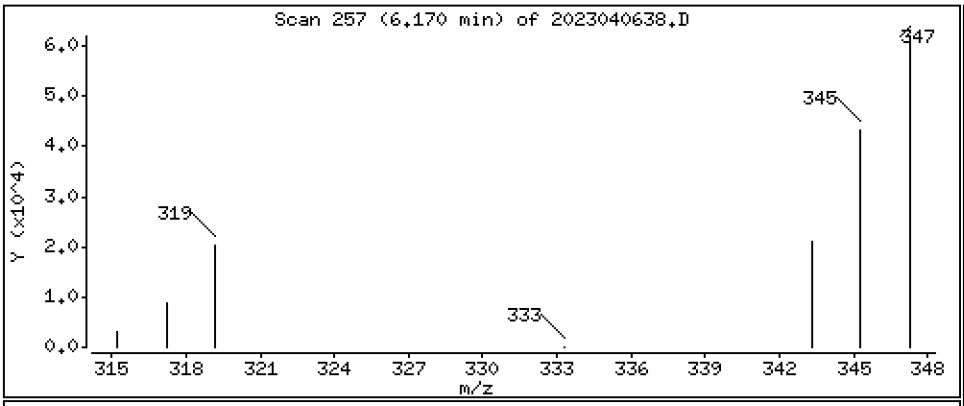
Operator: JZ

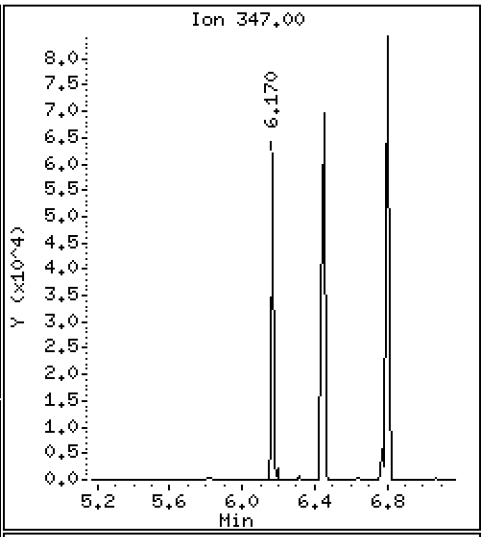
Column phase: ZB-5msi

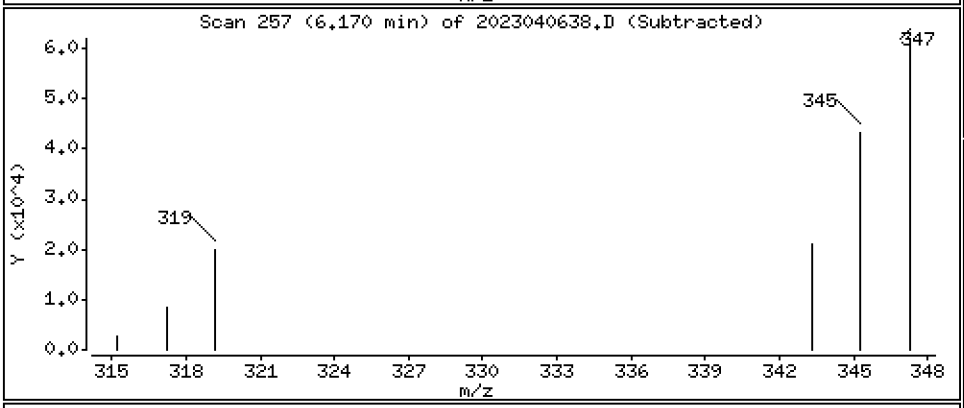
Column diameter: 0.25

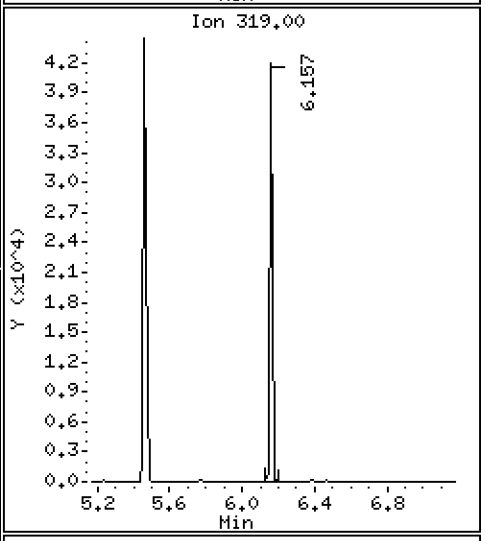
5 Dibutyl Tin (Hexyl)

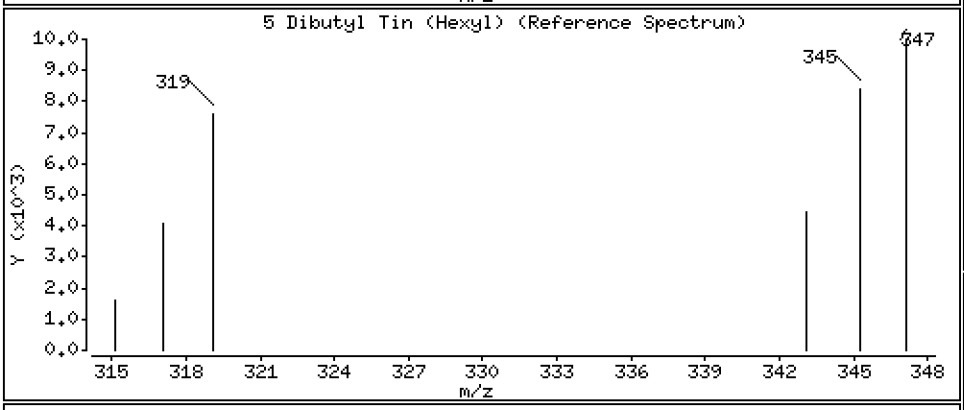
Concentration: 1.617 ug/mL

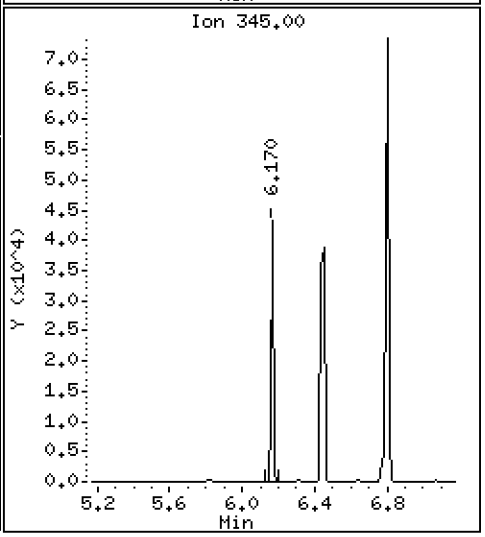


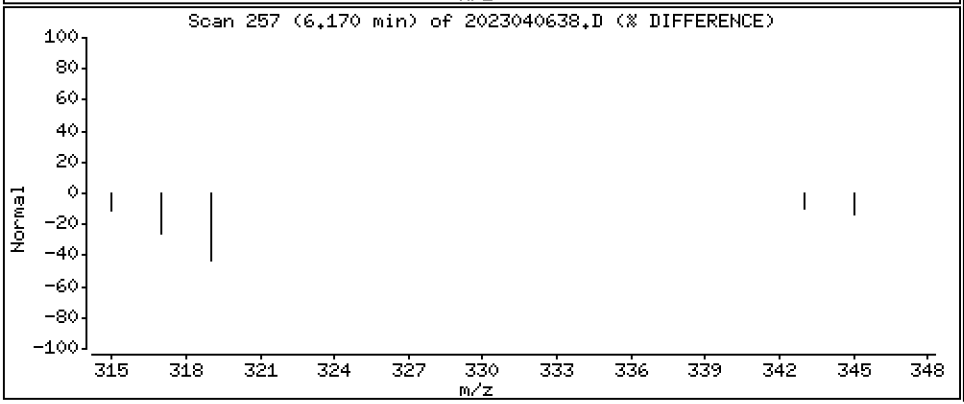












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040638.D

Date : 07-APR-2023 01:57

Client ID:

Instrument: nt12.i

Sample Info: CCV230406

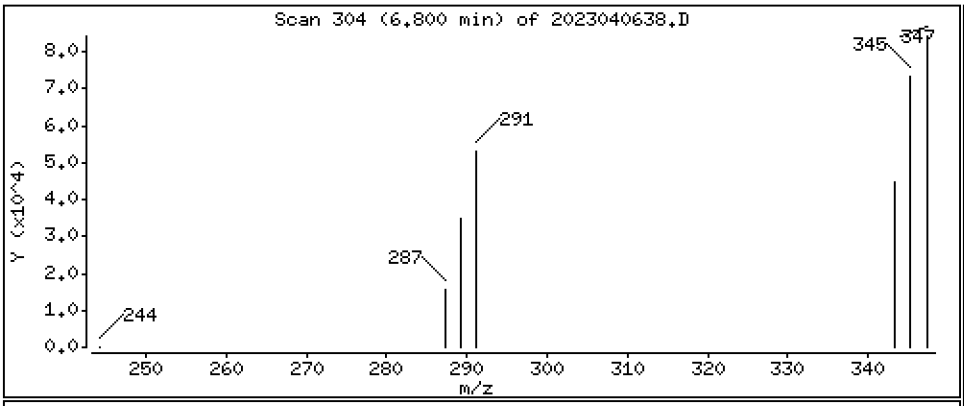
Operator: JZ

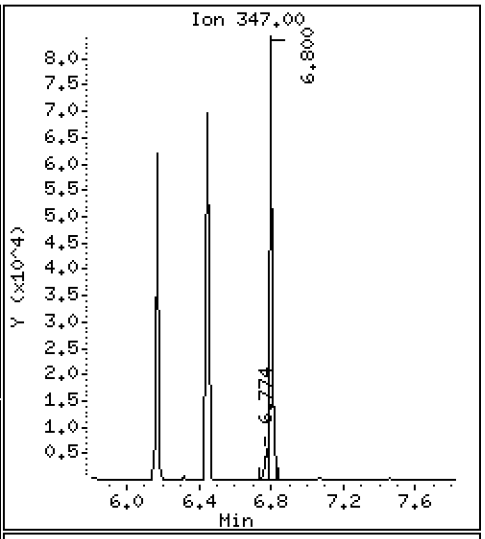
Column phase: ZB-5msi

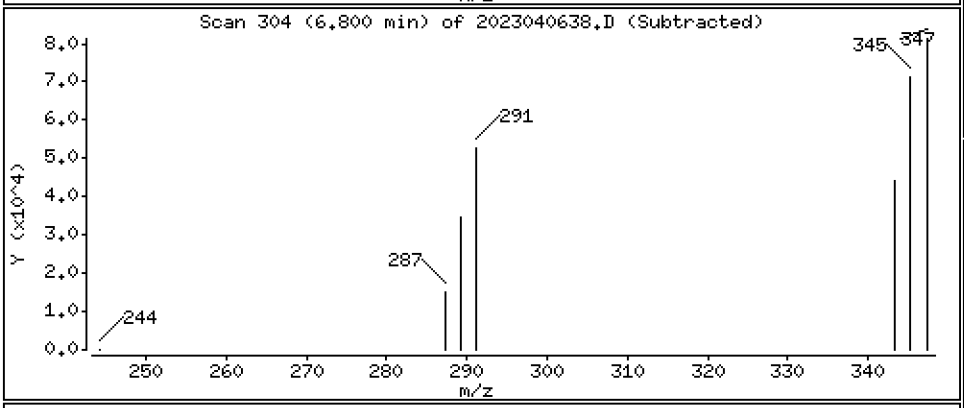
Column diameter: 0.25

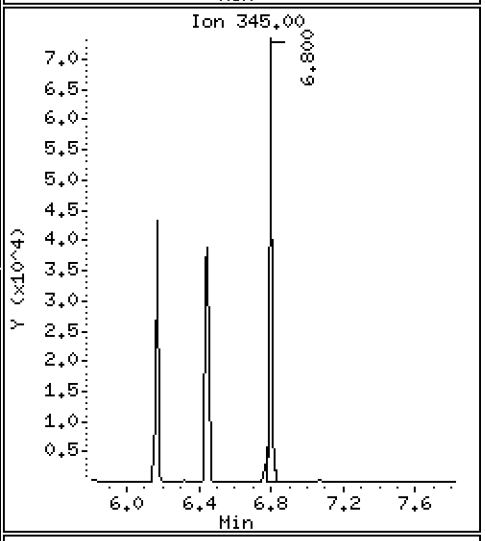
7 Butyl Tin (Hexyl)

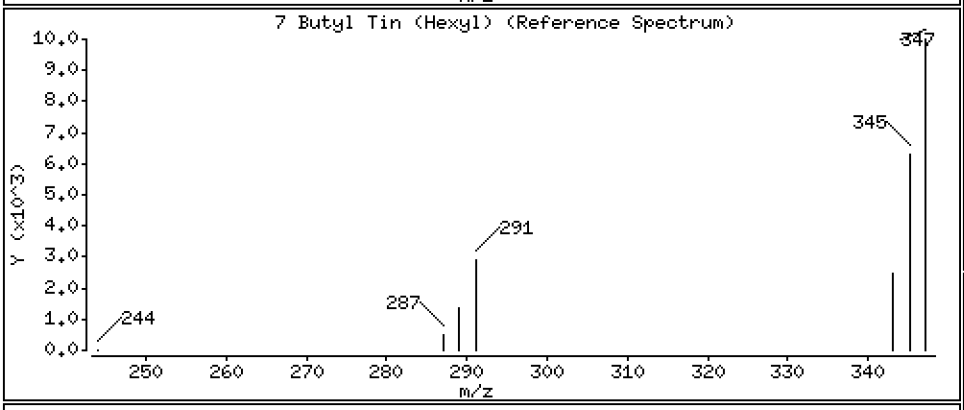
Concentration: 1.470 ug/mL

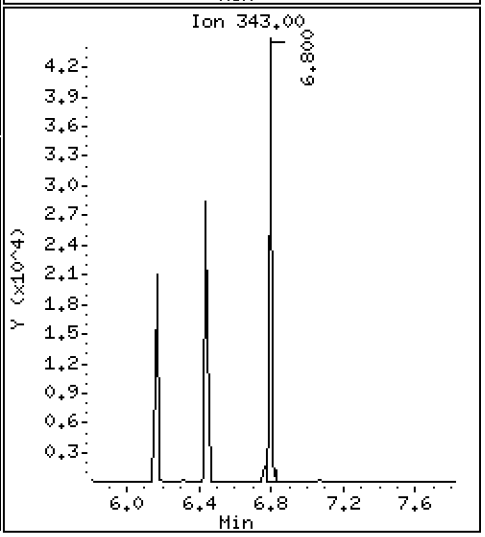


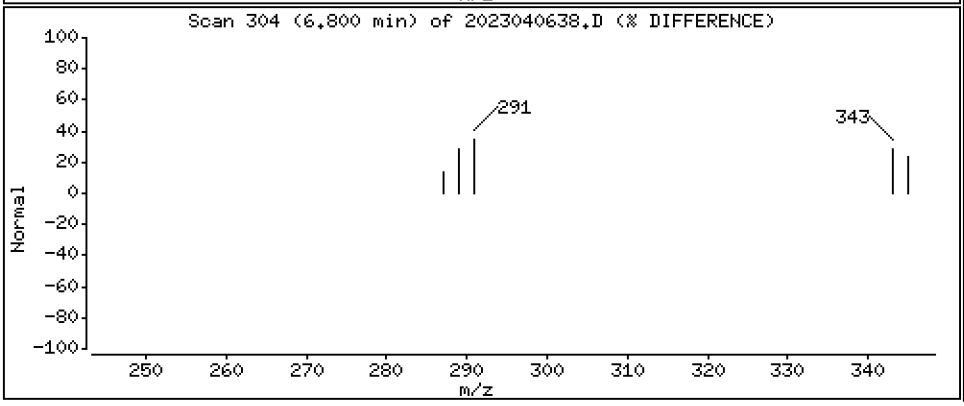












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040638.D
Lab Smp Id: SLD0107-CCV1
Inj Date : 07-APR-2023 01:57
Operator : JZ   Inst ID: nt12.i
Smp Info : CCV230406
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 09:53 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 38
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	CONCENTRATIONS FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.514	4.514	(0.740)	54372	0.96943	0.9694
	2 Tetrabutyl Tin	289	4.687	4.698	(0.768)	53760	0.98225	0.9822
	3 Tributyl Tin (Hexyl)	319	5.459	5.472	(0.895)	44176	1.00582	1.006
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	132652	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.170	6.169	(0.710)	58088	1.61695	1.617
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	81967	1.55089	1.551
	7 Butyl Tin (Hexyl)	347	6.800	6.813	(0.782)	85003	1.47037	1.470
*	8 p-Terphenyl-d14	244	8.691	8.690	(1.000)	21398	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040638.D
Lab Smp Id: SLD0107-CCV1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

COMPOUND	STANDARD	AREA LIMIT LOWER	AREA LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	132652	-19.20
8 p-Terphenyl-d14	22611	11306	45222	21398	-5.36

COMPOUND	STANDARD	RT LIMIT LOWER	RT LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040638.D

Lab ID: SLD0107-CCV1
nt12.i, 20230406A.b\TBT20230406.m,   07-APR-2023 01:57

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606A.D

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Sequence:	SLD0101	Instrument:	NT12
		Calibration:	GD00019

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
MS Tune	SLD0101-TUN1	2023040601.D	NA	04/06/23 15:06
Initial Cal Blank	SLD0101-ICB1	2023040602.D	NA	04/06/23 15:22
TBT Cal Standard	SLD0101-CAL1	2023040603.D	NA	04/06/23 15:39
TBT Cal Standard	SLD0101-CAL2	2023040604.D	NA	04/06/23 15:55
TBT Cal Standard	SLD0101-CAL3	2023040605.D	NA	04/06/23 16:12
TBT Cal Standard	SLD0101-CAL4	2023040606.D	NA	04/06/23 16:28
TBT Cal Standard	SLD0101-CAL5	2023040607.D	NA	04/06/23 16:45
TBT Cal Standard	SLD0101-CAL6	2023040608.D	NA	04/06/23 17:01
Secondary Cal Check	SLD0101-SCV1	2023040609.D	NA	04/06/23 17:18
Secondary Cal Check	SLD0101-SCV2	2023041204.D	NA	04/12/23 14:30

Analytical Resources, LLC
Analytical Chemists and Consultants

ANALYSIS SEQUENCE

SLD0101

Instrument: NT12
Calibration ID: GD00019

Printed: 4/6/2023 9:24:49PM

Lab Number	Analysis	Container	Order	Position	STD ID	ISTD ID	Client	Comments
SLD0101-TUN1	QC		1		K004775			
SLD0101-ICB1	QC		2			L003438		
SLD0101-CAL1	QC		3		L002070	L003438		
SLD0101-CAL2	QC		4		L002071	L003438		
SLD0101-CAL3	QC		5		L002072	L003438		
SLD0101-CAL4	QC		6		L002073	L003438		
SLD0101-CAL5	QC		7		L002074	L003438		
SLD0101-CAL6	QC		8		L002075	L003438		
SLD0101-SCV1	QC		9		L002076	L003438		

Samples Loaded By Date

Data Processed By Date

INTERNAL STANDARD SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406.b

	Time	Filename	LabID	ClientId	DF					
1	1506	2023040601.D	SLD0101-TUN1		1	NO ISTDS FOUND				
2	1522	2023040602.D	SLD0101-ICB1		1	6.12	161159	8.70	23719	
3	1539	2023040603.D	SLD0101-CAL1		1	6.10	157169	8.69	22292	
4	1555	2023040604.D	SLD0101-CAL2		1	6.10	164881	8.69	23279	
5	1612	2023040605.D	SLD0101-CAL3		1	6.10	167613	8.69	23227	
6	1628	2023040606.D	SLD0101-CAL4		1	6.10	164171	8.69	22611	
7	1645	2023040607.D	SLD0101-CAL5		1	6.10	182529	8.69	24468	
8	1701	2023040608.D	SLD0101-CAL6		1	6.10	199113	8.69	25395	
9	1718	2023040609.D	SLD0101-SCV1		1	6.10	178329	8.69	27505	

MANUAL INTEGRATION SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406.b

ARI Job No.: SLD0 Method: TBT20230406.m Instrument: nt12.i Date: 06-APR-2023

Time	Filename	LabID	ClientId	DF	Manually Integrated Compounds
1522	2023040602.D	SLD0101-ICB1		1	NO MANUAL INTEGRATION
1539	2023040603.D	SLD0101-CAL1		1	NO MANUAL INTEGRATION
1555	2023040604.D	SLD0101-CAL2		1	NO MANUAL INTEGRATION
1612	2023040605.D	SLD0101-CAL3		1	NO MANUAL INTEGRATION
1628	2023040606.D	SLD0101-CAL4		1	NO MANUAL INTEGRATION
1645	2023040607.D	SLD0101-CAL5		1	NO MANUAL INTEGRATION
1701	2023040608.D	SLD0101-CAL6		1	NO MANUAL INTEGRATION
1718	2023040609.D	SLD0101-SCV1		1	NO MANUAL INTEGRATION

Security Status Report

Date: 06-Apr-2023 21:28

2023040601.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040602.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040603.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040604.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040605.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040606.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040607.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040608.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040609.D	Data Locked	jianqing, 06-Apr-2023 21:28

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Sequence: SLD0107
Instrument: NT12
Calibration: GD00019

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
MS Tune	SLD0107-TUN1	2023040601A.D	NA	04/06/23 15:06
Initial Cal Check	SLD0107-ICV1	2023040606A.D	NA	04/06/23 16:28
Blank	BLC0727-BLK1	2023040610.D	Solid	04/06/23 18:16
LCS	BLC0727-BS1	2023040611.D	Solid	04/06/23 18:33
LCS Dup	BLC0727-BSD1	2023040612.D	Solid	04/06/23 18:49
ZZZZZ	23C0385-01RE1	2023040613.D	Solid	04/06/23 19:06
ZZZZZ	BLC0496-DUP2	2023040614.D	Solid	04/06/23 19:22
SED-07G:0-10	23C0618-01	2023040617.D	Solid	04/06/23 20:12
SED-14G:0-10	23C0618-03	2023040618.D	Solid	04/06/23 20:28
SED-15G:0-10	23C0618-04	2023040619.D	Solid	04/06/23 20:45
SED-14C:0-1	23C0618-11	2023040620.D	Solid	04/06/23 21:01
SED-14C:1-3	23C0618-12	2023040621.D	Solid	04/06/23 21:18
SED-DUPC	23C0618-13	2023040622.D	Solid	04/06/23 21:34
ZZZZZ	23C0619-01	2023040623.D	Solid	04/06/23 21:51
ZZZZZ	23C0619-02	2023040627.D	Solid	04/06/23 22:56
ZZZZZ	23C0619-03	2023040628.D	Solid	04/06/23 23:13
ZZZZZ	23C0619-04	2023040629.D	Solid	04/06/23 23:29
ZZZZZ	23C0619-05	2023040630.D	Solid	04/06/23 23:46
ZZZZZ	23C0619-06	2023040631.D	Solid	04/07/23 00:02
ZZZZZ	23C0619-08	2023040632.D	Solid	04/07/23 00:18
ZZZZZ	23C0619-09	2023040633.D	Solid	04/07/23 00:35
ZZZZZ	23C0619-10	2023040634.D	Solid	04/07/23 00:51
ZZZZZ	23C0619-11	2023040635.D	Solid	04/07/23 01:08
ZZZZZ	23C0619-12	2023040636.D	Solid	04/07/23 01:24
ZZZZZ	23C0619-13	2023040637.D	Solid	04/07/23 01:41
Calibration Check	SLD0107-CCV1	2023040638.D	NA	04/07/23 01:57

Analytical Resources, LLC
Analytical Chemists and Consultants

ANALYSIS SEQUENCE

SLD0107

Instrument: NT12
Calibration ID: GD00019

Printed: 4/11/2023 12:22:55PM

Lab Number	Analysis	Container	Order	Position	STD ID	ISTD ID	Client	Comments
SLD0107-TUN1	QC		1		K004775			
SLD0107-ICV1	QC		2		L002073	L003438		
BLC0727-BLK1	QC		3			L003438		
BLC0727-BS1	QC		4			L003438		
BLC0727-BSD1	QC		5			L003438		
23C0385-01RE1	8270E-SIM Butyl Tins	A 01	6			L003438	Maryland Spectral Services, Inc.	Added 4/7/2023 by JZ
BLC0496-DUP2	QC		7			L003438		
23C0618-01	8270E-SIM Butyl Tins	B 01	8			L003438	Friedman & Bruya Inc.	
23C0618-03	8270E-SIM Butyl Tins	B 01	9			L003438	Friedman & Bruya Inc.	
23C0618-04	8270E-SIM Butyl Tins	B 01	10			L003438	Friedman & Bruya Inc.	
23C0618-11	8270E-SIM Butyl Tins	A 01	11			L003438	Friedman & Bruya Inc.	
23C0618-12	8270E-SIM Butyl Tins	A 01	12			L003438	Friedman & Bruya Inc.	
23C0618-13	8270E-SIM Butyl Tins	A 01	13			L003438	Friedman & Bruya Inc.	
23C0619-01	8270E-SIM Butyl Tins	A 01	14			L003438	Friedman & Bruya Inc.	
BLC0727-DUP1	QC		15			L003438		
BLC0727-MS1	QC		16			L003438		
BLC0727-MSD1	QC		17			L003438		
23C0619-02	8270E-SIM Butyl Tins	A 01	18			L003438	Friedman & Bruya Inc.	
23C0619-03	8270E-SIM Butyl Tins	A 01	19			L003438	Friedman & Bruya Inc.	
23C0619-04	8270E-SIM Butyl Tins	A 01	20			L003438	Friedman & Bruya Inc.	
23C0619-05	8270E-SIM Butyl Tins	A 01	21			L003438	Friedman & Bruya Inc.	

Samples Loaded By Date

Data Processed By Date

Analytical Resources, LLC
Analytical Chemists and Consultants

ANALYSIS SEQUENCE

SLD0107

Instrument: NT12
Calibration ID: GD00019

Printed: 4/11/2023 12:22:55PM

Lab Number	Analysis	Container	Order	Position	STD ID	ISTD ID	Client	Comments
23C0619-06	8270E-SIM Butyl Tins	A 01	22			L003438	Friedman & Bruya Inc.	
23C0619-08	8270E-SIM Butyl Tins	A 01	23			L003438	Friedman & Bruya Inc.	
23C0619-09	8270E-SIM Butyl Tins	A 01	24			L003438	Friedman & Bruya Inc.	
23C0619-10	8270E-SIM Butyl Tins	A 01	25			L003438	Friedman & Bruya Inc.	
23C0619-11	8270E-SIM Butyl Tins	A 01	26			L003438	Friedman & Bruya Inc.	
23C0619-12	8270E-SIM Butyl Tins	A 01	27			L003438	Friedman & Bruya Inc.	
23C0619-13	8270E-SIM Butyl Tins	A 01	28			L003438	Friedman & Bruya Inc.	
SLD0107-CCV1	QC		29		L002073	L003438		

Samples Loaded By Date

Data Processed By Date

INTERNAL STANDARD SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406A.b

	Time	Filename	LabID	ClientId	DF							
1	1506	2023040601A.D	SLD0107-TUN1		1	NO ISTDS FOUND						
2	1628	2023040606A.D	SLD0107-ICV1		1	6.10	164171	8.69	22611			
3	1816	2023040610.D	BLC0727-BLK1		1	6.10	159063	8.69	23289			
4	1833	2023040611.D	BLC0727-BS1		1	6.10	160316	8.69	23214			
5	1849	2023040612.D	BLC0727-BSD1		1	6.12	154875	8.70	23051			
6	1906	2023040613.D	23C0385-01RE1		5	6.12	146669	8.69	20867			
7	1922	2023040614.D	BLC0496-DUP2		5	6.12	150394	8.70	21860			
8	1939	2023040615.D	BLC0496-MS1	no needed, NR		6.12	130913	8.69	18825			
9	1955	2023040616.D	BLC0496-MSD1	no needed, NR		6.10	204636	8.69	29045			
10	2012	2023040617.D	23C0618-01		1	6.12	149677	8.69	21193			
11	2028	2023040618.D	23C0618-03		1	6.12	139560	8.69	20284			
12	2045	2023040619.D	23C0618-04		1	6.12	137203	8.69	20427			
13	2101	2023040620.D	23C0618-11		1	6.12	148442	8.69	21999			
14	2118	2023040621.D	23C0618-12		1	6.10	134169	8.69	21756			
15	2134	2023040622.D	23C0618-13		1	6.12	145759	8.69	24040			
16	2151	2023040623.D	23C0619-01		1	6.12	143179	8.69	22833			
17	2207	2023040624.D	BLC0727-DUP1		1	6.12	128887	8.69	20346			
18	2223	2023040625.D	BLC0727-MS1		1	6.10	131952	8.69	20824			
19	2240	2023040626.D	BLC0727-MSD1		1	6.12	136624	8.69	21768			
20	2256	2023040627.D	23C0619-02		1	6.10	129737	8.69	20861			

JZ 04/11/23

INTERNAL STANDARD SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406A.b

	Time	Filename	LabID	ClientId	DF					
21	2313	2023040628.D	23C0619-03		1	6.12	132262	8.69	21513	
22	2329	2023040629.D	23C0619-04		1	6.10	120970	8.69	19466	
23	2346	2023040630.D	23C0619-05		1	6.12	122530	8.69	20530	
24	0002	2023040631.D	23C0619-06		1	6.10	128533	8.69	20676	
25	0018	2023040632.D	23C0619-08		1	6.12	128426	8.69	21977	
26	0035	2023040633.D	23C0619-09		1	6.10	123693	8.69	20165	
27	0051	2023040634.D	23C0619-10		1	6.10	120694	8.69	20141	
28	0108	2023040635.D	23C0619-11		1	6.10	128737	8.69	20567	
29	0124	2023040636.D	23C0619-12		1	6.12	124983	8.69	21688	
30	0141	2023040637.D	23C0619-13		1	6.10	127809	8.69	20874	
31	0157	2023040638.D	SLD0107-CCV1		1	6.10	132652	8.69	21398	

MANUAL INTEGRATION SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406A.b

ARI Job No.: SLD0 Method: TBT20230406.m Instrument: nt12.i Date: 06-APR-2023

Time	Filename	LabID	ClientId	DF	Manually Integrated Compounds
1628	2023040606A.D	SLD0107-ICV1		1	NO MANUAL INTEGRATION
1816	2023040610.D	BLC0727-BLK1		1	NO MANUAL INTEGRATION
1833	2023040611.D	BLC0727-BS1		1	NO MANUAL INTEGRATION
1849	2023040612.D	BLC0727-BSD1		1	NO MANUAL INTEGRATION
1906	2023040613.D	23C0385-01RE1		5	Butyl Tin (Hexyl),
1922	2023040614.D	BLC0496-DUP2		5	Butyl Tin (Hexyl),
1939	2023040615.D	BLC0496-MS1		5	NO MANUAL INTEGRATION
1955	2023040616.D	BLC0496-MSD1		5	Butyl Tin (Hexyl),
2012	2023040617.D	23C0618-01		1	NO MANUAL INTEGRATION
2028	2023040618.D	23C0618-03		1	NO MANUAL INTEGRATION
2045	2023040619.D	23C0618-04		1	NO MANUAL INTEGRATION
2101	2023040620.D	23C0618-11		1	NO MANUAL INTEGRATION
2118	2023040621.D	23C0618-12		1	NO MANUAL INTEGRATION
2134	2023040622.D	23C0618-13		1	NO MANUAL INTEGRATION
2151	2023040623.D	23C0619-01		1	Dibutyl Tin (Hexyl),
2207	2023040624.D	BLC0727-DUP1		1	Dibutyl Tin (Hexyl),
2223	2023040625.D	BLC0727-MS1		1	NO MANUAL INTEGRATION

MANUAL INTEGRATION SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406A.b

Time	Filename	LabID	ClientId	DF	Manually Integrated Compounds
2240	2023040626.D	BLC0727-MSD1		1	NO MANUAL INTEGRATION
2256	2023040627.D	23C0619-02		1	Dibutyl Tin (Hexyl),
2313	2023040628.D	23C0619-03		1	Butyl Tin (Hexyl),
2329	2023040629.D	23C0619-04		1	NO MANUAL INTEGRATION
2346	2023040630.D	23C0619-05		1	Butyl Tin (Hexyl),
0002	2023040631.D	23C0619-06		1	Tributyl Tin (Hexyl), Butyl Tin (Hexyl),
0018	2023040632.D	23C0619-08		1	Butyl Tin (Hexyl), p-Terphenyl-d14,
0035	2023040633.D	23C0619-09		1	p-Terphenyl-d14,
0051	2023040634.D	23C0619-10		1	Butyl Tin (Hexyl),
0108	2023040635.D	23C0619-11		1	Butyl Tin (Hexyl),
0124	2023040636.D	23C0619-12		1	Butyl Tin (Hexyl),
0141	2023040637.D	23C0619-13		1	NO MANUAL INTEGRATION
0157	2023040638.D	SLD0107-CCV1		1	NO MANUAL INTEGRATION

Security Status Report

Date: 11-Apr-2023 12:20

2023040601A.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040606A.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040610.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040611.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040612.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040613.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040614.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040615.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040616.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040617.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040618.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040619.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040620.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040621.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040622.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040623.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040624.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040625.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040626.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040627.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040628.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040629.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040630.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040631.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040632.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040633.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040634.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040635.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040636.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040637.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040638.D	Data Locked	jianqing, 11-Apr-2023 12:20

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Extract Dilution Bench Sheet

Sequence: SLD0107
Analyst: JZ Date: 230406

Sample ID	Primary Dilution				Secondary Dilution			
	Extract Volume (uL)	Diluent ID	Diluent Volume (uL)	Dilution Factor	Extract Volume (uL)	Diluent ID	Diluent Volume (uL)	Dilution Factor
23C0385-01RE1	60	L001957	240	5				
BLC0496-DOP2	60		240	5				

Form 12010F Version 002 03/01/2018

SURROGATE RECOVERY AND RT SUMMARY
EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG/WO:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Sequence:	SLD0101	Instrument:	NT12
Calibration:	GD00019	Calibration Date:	04/06/2023

Surrogate Compound	Spike Level ug/mL	% Recovery	Recovery Limits	RT	Calibration Mean RT	RT Diff	RT Diff Limit	Q
SLD0101-ICB1 (Water)			Lab File ID: 2023040602.D			Analyzed: 04/06/23 15:22		
Tripentyltin			30 - 160		6.451	-6.4510	N/A	
Tripropyltin			30 - 160		4.514	-4.5140	N/A	
SLD0101-SCV1 (Water)			Lab File ID: 2023040609.D			Analyzed: 04/06/23 17:18		
Tripentyltin	1.5918	79.4	80 - 120	6.451	6.451	0.0000	N/A	*
SLD0101-SCV2 (Water)			Lab File ID: 2023041204.D			Analyzed: 04/12/23 14:30		
Tripentyltin	1.5918	86.0	80 - 120	6.451	6.451	0.0000	N/A	

SURROGATE RECOVERY AND RT SUMMARY
EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG/WO: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Sequence: SLD0107
Instrument: NT12
Calibration: GD00019
Calibration Date: 04/06/2023

Surrogate Compound	Spike Level ug/mL	% Recovery	Recovery Limits	RT	Calibration Mean RT	RT Diff	RT Diff Limit	Q
SLD0107-ICV1 (Solid)			Lab File ID: 2023040606A.D			Analyzed: 04/06/23 16:28		
Tripentyltin	1.5918	100	80 - 120	6.451	6.451	0.0000	N/A	
Tripropyltin	0.74430	94.4	80 - 120	4.514	4.514	0.0000	N/A	
BLC0727-BLK1 (Solid)			Lab File ID: 2023040610.D			Analyzed: 04/06/23 18:16		
Tripentyltin	45.178	100	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.746	89.6	30 - 160	4.548	4.514	0.0340	N/A	
BLC0727-BS1 (Solid)			Lab File ID: 2023040611.D			Analyzed: 04/06/23 18:33		
Tripentyltin	45.178	97.3	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.746	85.1	30 - 160	4.548	4.514	0.0340	N/A	
BLC0727-BSD1 (Solid)			Lab File ID: 2023040612.D			Analyzed: 04/06/23 18:49		
Tripentyltin	45.178	95.3	30 - 160	6.464	6.451	0.0130	N/A	
Tripropyltin	43.746	87.4	30 - 160	4.548	4.514	0.0340	N/A	
23C0618-01 (Solid)			Lab File ID: 2023040617.D			Analyzed: 04/06/23 20:12		
Tripentyltin	44.995	85.4	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.569	75.0	30 - 160	4.56	4.514	0.0460	N/A	
23C0618-03 (Solid)			Lab File ID: 2023040618.D			Analyzed: 04/06/23 20:28		
Tripentyltin	45.181	87.7	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.749	77.6	30 - 160	4.571	4.514	0.0570	N/A	
23C0618-04 (Solid)			Lab File ID: 2023040619.D			Analyzed: 04/06/23 20:45		
Tripentyltin	45.002	92.8	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.575	81.5	30 - 160	4.56	4.514	0.0460	N/A	
23C0618-11 (Solid)			Lab File ID: 2023040620.D			Analyzed: 04/06/23 21:01		
Tripentyltin	45.179	85.1	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.747	80.4	30 - 160	4.548	4.514	0.0340	N/A	
23C0618-12 (Solid)			Lab File ID: 2023040621.D			Analyzed: 04/06/23 21:18		
Tripentyltin	45.083	74.0	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.654	73.1	30 - 160	4.548	4.514	0.0340	N/A	

SURROGATE RECOVERY AND RT SUMMARY
EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG/WO:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Sequence:	SLD0107	Instrument:	NT12
Calibration:	GD00019	Calibration Date:	04/06/2023

Surrogate Compound	Spike Level ug/kg dry	% Recovery	Recovery Limits	RT	Calibration Mean RT	RT Diff	RT Diff Limit	Q
23C0618-13 (Solid)			Lab File ID: 2023040622.D				Analyzed: 04/06/23 21:34	
Tripentyltin	45.121	75.2	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.691	71.2	30 - 160	4.548	4.514	0.0340	N/A	
SLD0107-CCV1 (Solid)			Lab File ID: 2023040638.D				Analyzed: 04/07/23 01:57	
Tripentyltin	1.5918	77.5	50 - 150	6.451	6.451	0.0000	N/A	
Tripropyltin	0.74430	96.9	50 - 150	4.514	4.514	0.0000	N/A	

Analytical Resources, LLC
Analytical Chemists and Consultants

INTERNAL STANDARD AREA AND RT SUMMARY

EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Sequence:	SLD0101	Instrument:	NT12
		Calibration:	GD00019

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Initial Cal Blank (SLD0101-ICB1)		(Water)		Lab File ID: 2023040602.D			Analyzed: 04/06/23 15:22		
Tetrapentyltin	161159	6.116	164171	6.102	98	50 - 200	0.014	+/-0.50	
p-Terphenyl-d14	23719	8.704	22611	8.69	105	50 - 200	0.014	+/-0.50	
Secondary Cal Check (SLD0101-SCV1)		(Water)		Lab File ID: 2023040609.D			Analyzed: 04/06/23 17:18		
Tetrapentyltin	178329	6.103	164171	6.102	109	50 - 200	0.001	+/-0.50	
p-Terphenyl-d14	27505	8.69	22611	8.69	122	50 - 200	0.000	+/-0.50	
Secondary Cal Check (SLD0101-SCV2)		(Water)		Lab File ID: 2023041204.D			Analyzed: 04/12/23 14:30		
Tetrapentyltin	97722	6.102	164171	6.102	60	50 - 200	0.000	+/-0.50	
p-Terphenyl-d14	13371	8.69	22611	8.69	59	50 - 200	0.000	+/-0.50	

Analytical Resources, LLC
Analytical Chemists and Consultants

INTERNAL STANDARD AREA AND RT SUMMARY

EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Sequence:	SLD0107	Instrument:	NT12
		Calibration:	GD00019

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Initial Cal Check (SLD0107-ICV1)		(Solid)		Lab File ID: 2023040606A.D			Analyzed: 04/06/23 16:28		
Tetrapentyltin	164171	6.102	164171	6.102	100	50 - 200	0.000	+/-0.50	
p-Terphenyl-d14	22611	8.69	22611	8.69	100	50 - 200	0.000	+/-0.50	
Blank (BLC0727-BLK1)		(Solid)		Lab File ID: 2023040610.D			Analyzed: 04/06/23 18:16		
Tetrapentyltin	159063	6.103	164171	6.102	97	50 - 200	0.001	+/-0.50	
p-Terphenyl-d14	23289	8.69	22611	8.69	103	50 - 200	0.000	+/-0.50	
LCS (BLC0727-BS1)		(Solid)		Lab File ID: 2023040611.D			Analyzed: 04/06/23 18:33		
Tetrapentyltin	160316	6.102	164171	6.102	98	50 - 200	0.000	+/-0.50	
p-Terphenyl-d14	23214	8.69	22611	8.69	103	50 - 200	0.000	+/-0.50	
LCS Dup (BLC0727-BSD1)		(Solid)		Lab File ID: 2023040612.D			Analyzed: 04/06/23 18:49		
Tetrapentyltin	154875	6.116	164171	6.102	94	50 - 200	0.014	+/-0.50	
p-Terphenyl-d14	23051	8.704	22611	8.69	102	50 - 200	0.014	+/-0.50	
SED-07G:0-10 (23C0618-01)		(Solid)		Lab File ID: 2023040617.D			Analyzed: 04/06/23 20:12		
Tetrapentyltin	149677	6.116	164171	6.102	91	50 - 200	0.014	+/-0.50	
p-Terphenyl-d14	21193	8.69	22611	8.69	94	50 - 200	0.000	+/-0.50	
SED-14G:0-10 (23C0618-03)		(Solid)		Lab File ID: 2023040618.D			Analyzed: 04/06/23 20:28		
Tetrapentyltin	139560	6.116	164171	6.102	85	50 - 200	0.014	+/-0.50	
p-Terphenyl-d14	20284	8.69	22611	8.69	90	50 - 200	0.000	+/-0.50	
SED-15G:0-10 (23C0618-04)		(Solid)		Lab File ID: 2023040619.D			Analyzed: 04/06/23 20:45		
Tetrapentyltin	137203	6.116	164171	6.102	84	50 - 200	0.014	+/-0.50	
p-Terphenyl-d14	20427	8.69	22611	8.69	90	50 - 200	0.000	+/-0.50	
SED-14C:0-1 (23C0618-11)		(Solid)		Lab File ID: 2023040620.D			Analyzed: 04/06/23 21:01		
Tetrapentyltin	148442	6.116	164171	6.102	90	50 - 200	0.014	+/-0.50	
p-Terphenyl-d14	21999	8.69	22611	8.69	97	50 - 200	0.000	+/-0.50	
SED-14C:1-3 (23C0618-12)		(Solid)		Lab File ID: 2023040621.D			Analyzed: 04/06/23 21:18		
Tetrapentyltin	134169	6.102	164171	6.102	82	50 - 200	0.000	+/-0.50	
p-Terphenyl-d14	21756	8.69	22611	8.69	96	50 - 200	0.000	+/-0.50	
SED-DUPC (23C0618-13)		(Solid)		Lab File ID: 2023040622.D			Analyzed: 04/06/23 21:34		
Tetrapentyltin	145759	6.116	164171	6.102	89	50 - 200	0.014	+/-0.50	
p-Terphenyl-d14	24040	8.69	22611	8.69	106	50 - 200	0.000	+/-0.50	
Calibration Check (SLD0107-CCV1)		(Water)		Lab File ID: 2023040638.D			Analyzed: 04/07/23 01:57		
Tetrapentyltin	132652	6.103	164171	6.102	81	50 - 200	0.001	+/-0.50	
p-Terphenyl-d14	21398	8.691	22611	8.69	95	50 - 200	0.001	+/-0.50	

HOLDING TIME SUMMARY

Analysis: EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SED-07G:0-10 23C0618-01	03/20/23 10:02	03/24/23 16:25	03/28/23 12:28	8	14	04/06/23 20:12	9	40	
SED-14G:0-10 23C0618-03	03/20/23 10:11	03/24/23 16:25	03/28/23 12:28	8	14	04/06/23 20:28	9	40	
SED-15G:0-10 23C0618-04	03/20/23 10:42	03/24/23 16:25	03/28/23 12:28	8	14	04/06/23 20:45	9	40	
SED-14C:0-1 23C0618-11	03/21/23 15:53	03/24/23 16:25	03/28/23 12:28	6	14	04/06/23 21:01	9	40	
SED-14C:1-3 23C0618-12	03/21/23 15:53	03/24/23 16:25	03/28/23 12:28	6	14	04/06/23 21:18	9	40	
SED-DUPC 23C0618-13	03/21/23 12:00	03/24/23 16:25	03/28/23 12:28	7	14	04/06/23 21:34	9	40	

* Indicates hold time exceedance.

METHOD DETECTION AND REPORTING LIMITS

EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Instrument: NT12

Analyte	MDL	RL	Units
Tributyltin Ion	1.93	3.86	ug/kg
Dibutyltin Ion	4.33	5.78	ug/kg
Butyltin Ion	3.06	4.08	ug/kg
Tetrabutyltin	5.00	5.00	ug/kg

Alfa Aesar

Certificate of analysis

Tri-n-propyltin chloride, 95%

Stock Number: 41459
Lot Number: K21Q046

Analysis

Appearance	Clear oil
Purity (based on Sn analysis)	≥ 97 %
Sn_{Th}	41.88 %
Sn_{Ex}	40.75 %

Certified by:

Quality Control

B001537
Tripropyltin (Chloride)-NEAT
Expires 2/19/2029
Prepared By Van Spohn 11/20/2012

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Appendix 20.1

ALTERNATE CERTIFICATE OF ANALYSIS

The manufacturer of the below chemical was unable to provide a Certificate of Analysis at the time of request by ARI.

Date Requested from Manufacturer: NA

Chemical: N-Butyltin-Chloride

Manufacturer: Alfa

Product #: C22E-on label

Lot #: NA

Purity: 95%

Analyst: VB

B001538
N-Butyltin Chloride-NEAT
Solvent / Lot: na
Prep: 11/20/2012 by VS
Exp. 2/19/2029
Location:

Certificate of Analysis

Product Name:	Dibutyltin dichloride
Product Description:	96%
Product Brand:	Sigma-Aldrich
Product Number:	205494
Molecular Weight:	303.84
Molecular Formula:	$(CH_3CH_2CH_2CH_2)_2SnCl_2$
CAS Number:	683-18-1

TEST	SPECIFICATION	LOT 09116AN RESULTS
APPEARANCE	MOIST WHITE TO OFF-WHITE CRYSTALS	MOIST OFF-WHITE CRYSTALS
INFRARED SPECTRUM	CONFORMS TO STRUCTURE AND STANDARD AS	CONFORMS TO STRUCTURE AND STANDARD AS
** **	ILLUSTRATED ON PAGE 1145D OF EDITION I,	ILLUSTRATED ON PAGE 1145D OF EDITION I,
** **	VOLUME 2 OF "THE ALDRICH LIBRARY OF FT-IR	VOLUME 2 OF "THE ALDRICH LIBRARY OF FT-IR
** **	SPECTRA".	SPECTRA".
TITRATION	95.5%-104.5%(WITH AGNO3 AFTER O2 COMBUSTION)	100.8 % (WITH AGNO3 AFTER OXYGEN COMBUSTION)
GAS LIQUID	95.5% (MINIMUM)	98.5 %

Barbara Rajzer, Supervisor
Quality Control
Milwaukee, Wisconsin USA

B001539
Dibutyltin (Dichloride)-NEAT
Expires 2/19/2029
Prepared By Van Spohn 11/20/2012

Appendix 20.1

ALTERNATE CERTIFICATE OF ANALYSIS

The manufacturer of the below chemical was unable to provide a Certificate of Analysis at the time of request by ARI.

Date Requested from Manufacturer: NA

Chemical: Tributyltin - Chloride

Manufacturer: Strem

Product #: 93-5056

Lot #: B1054021

Purity: 8/27/13 - 96%

Analyst: VP

B001540
Tributyltin Chloride-NEAT
Solvent / Lot: na
Prep: 11/20/2012 by VS
Exp: 2/19/2029
Location:

Certificate of Analysis

SIGMA-ALDRICH

Product Name	Tetrabutyltin, technical grade, 93%
Product Number	T6008
Product Brand	ALDRICH
CAS Number	1461-25-2
Molecular Formula	$(CH_3CH_2CH_2CH_2)_4Sn$
Molecular Weight	347.17

TEST	SPECIFICATION	LOT 00729TW RESULTS
APPEARANCE		COLORLESS LIQUID
REFRACTIVE INDEX AT		1.4740
INFRARED SPECTRUM		CONFORMS TO STRUCTURE AND STANDARD AS ILLUSTRATED ON PAGE 1144B OF EDITION I, VOLUME 2 OF "THE ALDRICH LIBRARY OF FT-IR SPECTRA".
GAS LIQUID		96.0 %

Barbara Rajzer, Supervisor
Quality Control
Milwaukee, Wisconsin USA

Certificate of Analysis

SIGMA-ALDRICH

Product Name	Butyltin trichloride, 95%
Product Number	201057
Product Brand	ALDRICH
CAS Number	1118-46-3
Molecular Formula	$CH_3(CH_2)_3SnCl_3$
Molecular Weight	282.18

TEST	SPECIFICATION	LOT 05509DF RESULTS
APPEARANCE	COLORLESS TO BROWN LIQUID	COLORLESS LIQUID
REFRACTIVE INDEX AT		1.5227
INFRARED SPECTRUM	CONFORMS TO STRUCTURE.	CONFORMS TO STRUCTURE AND STANDARD AS ILLUSTRATED ON PAGE 1145C OF EDITION I, VOLUME 2 OF "THE ALDRICH LIBRARY OF FT-IR SPECTRA".
TITRATION	94.0-106.0% (WITH AGNO3 AFTER O2 COMBUSTION)	98.1 % (WITH AGNO3 AFTER OXYGEN COMBUSTION)
GAS LIQUID	94.0% (MINIMUM)	99.9 %

Barbara Rajzer, Supervisor
Quality Control
Milwaukee, Wisconsin USA

Analytical Standard Record

Standard ID: B001688

Printed: 12/2/2020 10:31:13AM

Description:	Hexyltributyl Tin-Neat	Expires:	04-Mar-2029
Standard Type:	Calibration Standa	Prepared:	19-Mar-2013
Solvent:	NA	Prepared By:	Van Spohn
Final Volume (mls):	1	Department:	Organics
Vials:	1	Last Edit:	23-Nov-2013 14:53 by VTS
Vendor:	Aldrich	Lot #:	11421E4
Vendor Catalog #:			

Comments

NO I NUMBER-mass conversion to Tributyltin ion set at .773

Analyte	CAS Number	Concentration	Units
Tributyltin Ion	36643-28-4	773000	ug/mL

Reviewed By Date

Analytical Standard Record

Standard ID: B001689 **Printed: 12/2/2020 10:32:44AM**

Description:	Hexyltripropyl Tin-Neat	Expires:	04-Mar-2029
Standard Type:	Calibration Standa	Prepared:	19-Mar-2013
Solvent:	NA	Prepared By:	Van Spohn
Final Volume (mls):	1	Department:	Organics
Vials:	1	Last Edit:	23-Nov-2013 14:56 by VTS
Vendor:	NA	Lot #:	NA
Vendor Catalog #:			

Comments

I2702-mass conversion to Tripropyl tin set at .7443

Analyte	CAS Number	Concentration	Units
Tripropyltin	761-44-4	744300	ug/mL

Reviewed By Date

Analytical Standard Record

Standard ID: B001690 **Printed: 12/2/2020 10:34:10AM**

Description:	Hexyltripentyl Tin-Neat	Expires:	04-Mar-2029
Standard Type:	Calibration Standa	Prepared:	19-Mar-2013
Solvent:	NA	Prepared By:	Van Spohn
Final Volume (mls):	1	Department:	Organics
Vials:	1	Last Edit:	23-Nov-2013 15:04 by VTS
Vendor:	Aldrich	Lot #:	01601CF
Vendor Catalog #:			

Comments

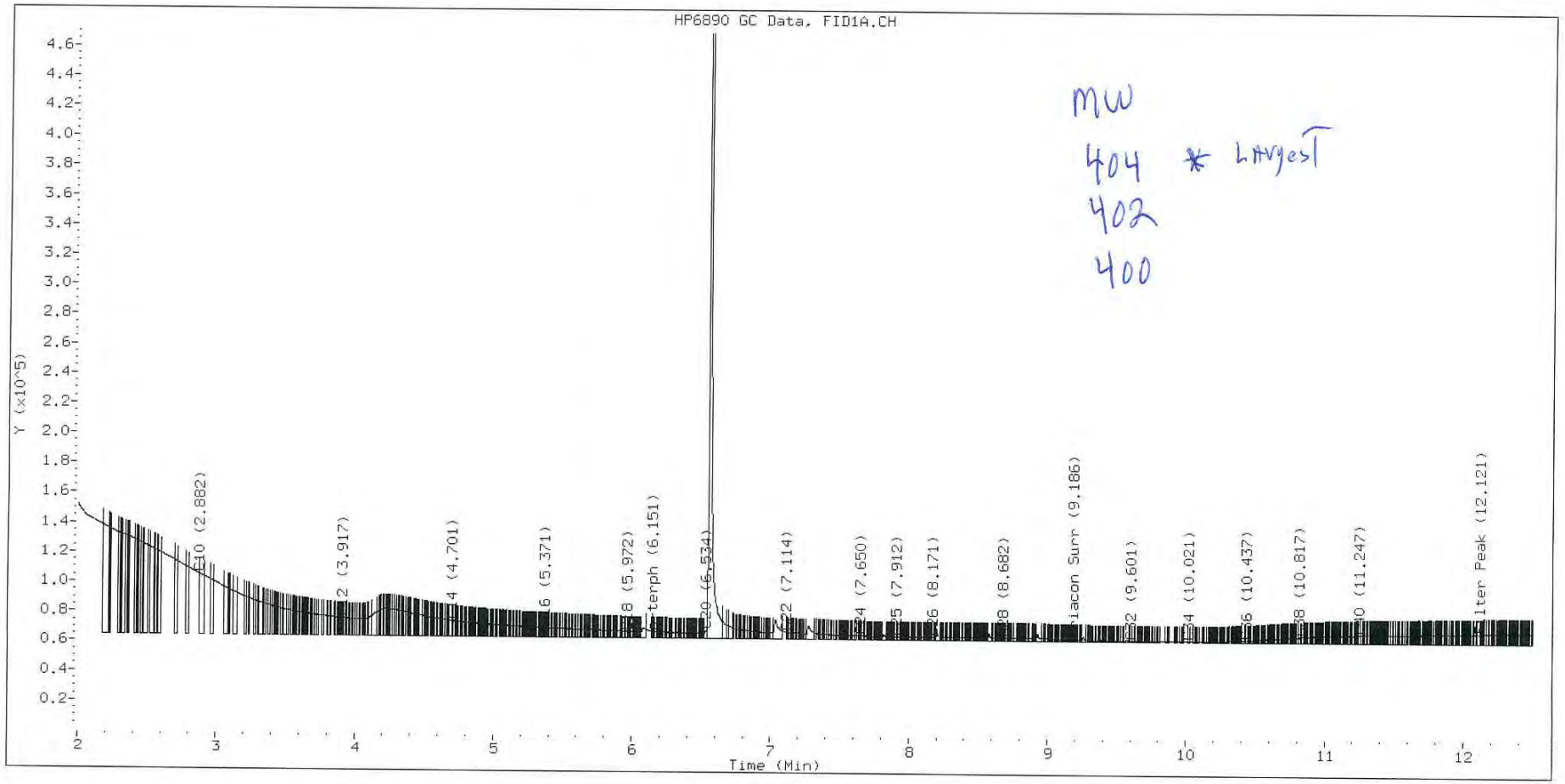
NO I NUMBER-mass conversion set at .7959

Analyte	CAS Number	Concentration	Units
Tripentyltin	41784-41-2	795900	ug/mL

Reviewed By Date

ALDRICH Dibutyl dichloride
LOT 09116AN 96%

Datafile: FID4A, 20210104.b/421A0409.D Dibutyl



MW
404 * Largest
402
400

J 000051
(Dibutyltin neat)

23C0618 CLPLIKE (Rev0) - Page 216 of 269

Certificate of Analysis

Phenova Certified Reference Materials are sold by Phenomenex.
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Certified Reference Material

This product is included in Phenova's ISO/IEC 17025 and ISO Guide 34 Scopes of Accreditation

Catalog No.:	AL0-101291	**Lot Number:**	CL11000
Description:	GC/MS Tuning Mix	**Certification Date:**	May 9, 2014
Storage:	4 °C	**Expiration Date:**	December 31, 2023
Provided As:	1 mL in 2 mL Ampoule in Methylene chloride	**Revision Date:**	August 5, 2015

Andrea L Gill

Andrea Gill, Certified Reference Materials Manager

Component	CAS #	Certified Value µg/mL	Expanded Uncertainty (%)
Benzidine	92-87-5	1000	± 0.208%
Decafluorotriphenylphosphine (DFTPP)	5074-71-5	1000	± 0.057%
4,4'-DDT	50-29-3	1000	± 0.056%
Pentachlorophenol	87-86-5	1000	± 0.061%

K003891
GC/MS Tune solution-1000ug/ml
Solvent / Lot: CL11000
Prep: 4/22/2022 by VS
Exp: 12/31/2023
Location:

ACCREDITED
Reference Material Producer
Certificate No. 2427.02

phenova® Certified Reference Materials

Manufactured by Phenova, Inc.

Phenova's testing and calibration results are internationally recognized through the ILAC MRA. Phenova is an accredited ISO Guide 34 Reference Material Provider and ISO/IEC 17025 accredited Chemical Testing Laboratory.

ilac-MRA ACCREDITED
Chemical Testing Laboratory
Certificate No. 2427.03

IL111106/3_us

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ACCREDITED

ISO 17025 Accredited Chemical Testing Lab
Cert. No. 3031.01

Date Received: _____

Certificate of Analysis

Catalog No.:	Lot No.:	Storage:	Solvent:	Exp. Date:	Description:
110760-01	469898	≤ -10 °C	Hexane	12-Dec-2024	Hexyl Derivatives of Tributyltin & Tripentyltin Solution, 1,000 mg/L, 1 ml

Compound	CAS No.	Purity (%)	Neat Material Lot No.	Concentration	
tripentyltin (as hexyl derivative)	3342-67-4	95	1988.237.1P	998.1 ± 27.92	mg/L
tributyltin (as hexyl derivative)	1461-22-9	97	934.29.1P	1017 ± 16.32	mg/L

K004354
TBTSCV MIX-1000ug/ml
Solvent / Lot: HEXANE
Prep: 5/6/2022 by JZ
Exp: 12/12/2024
Location:

Certified By: _____
Kerry Robinson
Manufacture Date 8-Dec-2021

Follow all storage requirements, keep tightly closed when not in use, and use good laboratory practices when handling.
This Reference Material was manufactured, produced, and/or certified under a quality management system that is accredited to ISO 17034 and ISO/IEC 17025.

All weights are traceable through N. I. S. T. Test No. 822/264157-00.
Concentration (correct for purity) and uncertainty (95% confidence) values listed are determined gravimetricly.

The stated uncertainty is the expanded uncertainty with a coverage factor of two to give a 95% confidence level.

RESTEK
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Tel: 1-814-353-1300
Fax: 1-814-353-1309

www.restek.com

Certificate of Analysis

chromatographic plus

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 31477 **Lot No.:** A0191853

Description : Tripentyltin Chloride Mixture

Tripentyltin Chloride Std 2000µg/mL, Methylene Chloride, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : November 30, 2025 **Storage:** 10°C or colder

Ship: Ambient

Elution Order	Compound	CAS #	Percent Purity	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)
1	Tripentyltin chloride	3342-67-4	94%	2,015.4 µg/mL	+/- 18.7418 µg/mL
Solvent:	Methylene chloride	75-09-2	99%		

Specific Reference Material Notes:

Derivatization in the sample preparation of this standard is required for internal acceptance testing as a result the acceptance criteria is ±15%.

L002508
Tripentyltin chloride mix
Solvent / Lot: Methylene chloride
Prep: 3/7/2023 by JZ
Exp: 11/30/2025
Location:

3/8/23

General Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the RM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Uncertainty Value Notes:

- Uncertainties are determined using data from balances and glassware, raw material purity, and, when significant, equipment tolerances or calibration results.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Stability of the unopened product, when stored in compliance with the recommended conditions, is guaranteed through the expiration displayed on the product label and certificate. Contact Restek for additional opened product stability information, with the knowledge/understanding that open product stability is subject to the specific handling and environmental conditions to which the product is exposed. For your convenience Restek supplies deactivated vials with most standards packed in 2mL ampules. Larger volume deactivated vials are available through Restek as a custom ordered item. Additionally, Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions.

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Phone: 866.272.0932 Fax: 866.509.5146 www.o2si.com

ACCREDITED

ISO 17025 Accredited Chemical Testing Lab
Cert. No. 3031.01

Date Received: _____

Certificate of Analysis

Catalog No.:	Lot No.:	Storage:	Solvent:	Exp. Date:	Description:
110760-01	469898	≤ -10 °C	Hexane	12-Dec-2024	Hexyl Derivatives of Tributyltin & Tripentyltin Solution, 1,000 mg/L, 1 ml

Compound	CAS No.	Purity (%)	Neat Material Lot No.	Concentration	
tripentyltin (as hexyl derivative)	3342-67-4	95	1988.237.1P	998.1 ± 28.8	mg/L
tributyltin (as hexyl derivative)	1461-22-9	97	934.29.1P	1017 ± 17.83	mg/L

L 3412

Certified By: _____

Kerry Robinson

Manufacture Date 8-Dec-2021

Follow all storage requirements, keep tightly closed when not in use, and use good laboratory practices when handling.
This Reference Material was manufactured, produced, and/or certified under a quality management system that is accredited to ISO 9001:2015.

All weights are traceable through N. I. S. T. Test No. 822/264157-00.
Concentration (correct for purity) and uncertainty (95% confidence) values listed are determined gravimetricly.

The stated uncertainty is the expanded uncertainty with a coverage factor of two to give a 95% confidence level.

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 9034

SED-05G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0618-09 C	SDG:	23C0618
Sampled:	03/21/23 13:10	Prepared:	03/28/23 16:36	File ID:	
% Solids:	52.16	Preparation:	No Prep Wet Chem	Analyzed:	04/04/23 15:00
Batch:	BLC0751	Sequence:	SLD0180	Initial/Final:	5.13 g Wet / 100 g
Instrument:	S2 Buret			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration (mg/kg dry)	Dilution Factor	MDL	MRL	Q
18496-25-8	Sulfide	262	1	37.4	37.4	

PREPARATION BATCH SUMMARY

EPA 9034

Laboratory:	Analytical Resources, LLC			SDG:	23C0618
Client:	Friedman & Bruya Inc.			Project:	Port of Friday Harbor
Batch:	BLC0751	Batch Matrix:	Solid	Preparation:	No Prep Wet Chem

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SED-05G:0-10	23C0618-09		03/28/23 16:36	
Blank	BLC0751-BLK1		03/28/23 16:36	
LCS	BLC0751-BS1		03/28/23 16:36	

Analytical Resources, LLC
Analytical Chemists and Consultants

Method: ***Sulfide, EPA 9034 Titration, Solid (PSEP)*** Analyst: CDE

Batch ID: BLC0751 Prep Date, Time: 3/28/2023 16:36

Revision Date & # : ***0*** ***7/1/2015***

Sample Preparation Log

Reagents, Equipment

HCl+Al:	***K010977***
pH Indicator:	J011724
0.2N ZnOAC:	K008611
Balance:	BAL9
Sulfide Stock:	L002834

Step By Step

5 grams sample
Fill traps to line with 0.2N ZnOAc
LCS and MS get 1mL S2 Stock
100mL dispersing water
~5mL HCl+Al to pH < 3 by
Bromophenol Blue Indicator
60 minutes at 90C
Decant to 100 mL with ZnOAc

Revision: ***0*** ***7/1/2015***

Lab Number	FALSE		Sample Amount (g/mL)	Final Volume (mL)	Spike ID	Spike Volume (µL)
23C0538-01			5.183	100		
23C0538-02			5.149	100		
23C0538-03			5.114	100		
23C0538-04			5.015	100		
23C0538-08			5.054	100		
23C0538-12			5.541	100		
23C0618-09			5.130	100		
23C0619-16			5.129	100		
BLC0751-BLK1			5.000	100		
BLC0751-BS1			5.000	100	L002834	1000
23C0538-01-DUP1			5.132	100		
23C0538-01-MS1			5.062	100	L002834	1000

Form I

METHOD BLANK DATA SHEET

EPA 9034

TotalAnalytes

Blank

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Batch: BLC0751
Laboratory ID: BLC0751-BLK1
Prepared: 03/28/23 16:36
Matrix: Solid
Preparation: No Prep Wet Chem
Analyzed: 04/04/23 15:00
Sequence: SLD0180
Calibration: N/A
Instrument: S2 Buret

CAS NO.	Analyte	Concentration (mg/kg wet)	Dilution Factor	MDL	MRL	Q
18496-25-8	Sulfide	ND	1	20.0	20.0	U

LCS / LCS DUPLICATE RECOVERY

EPA 9034

Laboratory:	Analytical Resources, LLC	SDG:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Matrix:	Solid	Analyzed:	04/04/23 15:00
Batch:	BLC0751	Laboratory ID:	BLC0751-BS1
Preparation:	No Prep Wet Chem	Sequence Name:	LCS
Initial/Final:	5 g / 100 g		

COMPOUND	SPIKE ADDED (mg/kg wet)	LCS CONCENTRATION (mg/kg wet)	Q	LCS % REC. #	QC LIMITS REC.
Sulfide	211	168		79.6	75 - 125

* Indicates values outside of QC limits

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 9034

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Sequence: SLD0180
Instrument: S2 Buret
Calibration: UNASSIGNED

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
Initial Cal Blank	SLD0180-ICB1		NA	04/04/23 15:00
Initial Cal Check	SLD0180-ICV1		NA	04/04/23 15:00
Low Cal Check	SLD0180-LCV1		NA	04/04/23 15:00
Blank	BLC0751-BLK1		Solid	04/04/23 15:00
LCS	BLC0751-BS1		Solid	04/04/23 15:00
SED-05G:0-10	23C0618-09		Solid	04/04/23 15:00
Calibration Blank	SLD0180-CCB1		NA	04/04/23 15:00
Calibration Check	SLD0180-CCV1		NA	04/04/23 15:00
Calibration Blank	SLD0180-CCB2		NA	04/04/23 15:00
Calibration Check	SLD0180-CCV2		NA	04/04/23 15:00

SULFIDE BENCHSHEET (TITRATION) **SLD0180**

			Date	Analyst
EPA 376.1		*Distillation*	3/28/23 16:38	CDE
If distilled, specify Procedure:	**PSEP**	*Finish*	4/4/23 15:00	CDE
Buret used for titrations:	S2			

CalibrationData *ZnOAc:* K008611

1. Standardization of sodium thiosulfate titrant

Thiosulfate ID: **L002861**

Bi-iodate ID: **L003502**

Stock bi-iodate = **0.8134** *grams to* 1000 *mL*

Normality = **0.025**

	Titration of bi-iodate with thiosulfate			
mL bi-iodate =	3.00	3.00	3.00	
mL thiosulfate =	3.07	3.08	3.06	*nthio*
*Normality thiosulfate = (mL bi-iodate*normbio) / mL thiosulfate =*	0.024	0.024	0.025	**0.024**

2. Normality of Iodine Soln

Iodine ID: **L002862**

	Titration of Iodine with thiosulfate			
mL iodine =	3.00	3.00	3.00	
mL thiosulfate =	3.12	3.10	3.11	*ni*
*Normality iodine = (mL thiosulfate*nthio) / mL iodine=*	0.025	0.025	0.025	**0.025**

3. Standardization (Sulfide Stock Solution)

Stock ID = **L002834**

Approx conc in 60ml

g Na2S = 0.4745 *mg /mL =* 1.056

	Titration of standard with thiosulfate			
mL Standard =	1.00	1.00	1.00	
mL iodine =	3.00	3.00	3.00	
mL thiosulfate =	0.98	0.99	0.99	*stkconc (mg/mL)*
*Sulfide (mg/mL) = {[(mL iodine*ni)-(mL thio *nthio)]*16} / mL standard =*	0.834	0.830	0.830	**0.831**

4. Verification Standard: L003965

Add 1.0 *mL Stock to* 50 *mL DI water* ***CV =*** **16.6** ***mg/L sulfide***

5. LCV Standard: L003964

Add 0.1 *mL Stock to* 50 *mL DI water* ***DQL =*** **1.0** ***mg/L sulfide*** confirm 1.0

6. Distillation Standard: L002834, Titrated standard: L003966

Add 1.0 *mL Stock to* 100 *mL DI water* ***Dist Chk =*** **8.3** ***mg/L sulfide***

SAMPLE DATA

Calculation: mg/L = [((mL I X N I) - (mL thio X N thio)) X 16,000] / mL sample

	DISTILL DATA		TITRATION DATA						
SAMPLE ID	Sample Volume (mL)	Trap Volume (mL)	Sample Volume (mL)	IODINE ADDED (mL)	Thiosulfate TITRANT (mL)	CONC (mg S/L)	Concentration If distilled (mg S/L wet)		
SLD0180-ICB1			50.0	3.0	3.08	0.2			
SLD0180-ICV1			50.0	3.0	1.02	16.4			*98.43%*
SLD0180-LCV1			50.0	3.0	2.95	1.3			*125.24%*
BLC0751-BLK1	100.0	100	50.0	3.0	3.12	-0.1	-0.1		
BLC0751-BS1	100.0	100	50.0	3.0	2.04	8.4	8.4	101%	*100.78%*
23C0538-01	5.183	100	50.0	3.0	2.63	3.8	72.5		
BLC0751-DUP1	5.132	100	50.0	3.0	2.90	1.6	32.0	*RPD =*	*78.3%*
BLC0751-MS1	5.062	100	50.0	3.0	1.62	11.7	230.4	*%Rec =*	*96.1%*
Spike =	1.0	*mL stk to*	100.00	*mL sample =*		8.2	*mg/L*		
23C0538-02	5.149	100.0	50.0	3.0	2.25	6.7	130.7		
23C0538-03	5.114	100.0	50.0	3.0	2.55	4.4	85.7		
23C0538-04	5.015	100.0	50.0	3.0	2.57	4.2	84.3		
23C0538-08	5.054	100.0	50.0	3.0	2.24	6.8	134.7		
23C0618-09	5.130	100.0	50.0	3.0	2.22	7.0	135.8		
SLD0180-CCB1			50.0	3.0	3.07	0.3		ND	
SLD0180-CCV1			50.0	3.0	1.00	16.5			*99.37%*
23C0538-12	5.541	100.0	50.0	3.0	1.93	9.2	166.7		
23C0619-16	5.129	100.0	50.0	3.0	2.75	2.8	54.9		
23C0538-01RE	5.183	100	50.0	3.0	2.68	3.4	64.9		
BLC0751-DUP1	5.132	100	50.0	3.0	2.95	1.3	24.4	*RPD =*	*91.5%*
SLD0180-CCB2			50.0	3.0	3.08	0.2			
SLD0180-CCV2			50.0	3.0	1.00	16.5			*99.37%*

INSTRUMENT BLANKS
EPA 9034

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Instrument ID: S2 Buret
Calibration: UNASSIGNED
Sequence: SLD0180
Date Analyzed: 04/04/23 15:00

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SLD0180-CCB1	Sulfide	0.300	1	1.00	mg/L	
SLD0180-CCB2	Sulfide	0.200	1	1.00	mg/L	
SLD0180-ICB1	Sulfide	0.200	1	1.00	mg/L	

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 9034

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Instrument ID: S2 Buret
Calibration: UNASSIGNED
Control Limt: +/- 10.00%
Sequence: SLD0180

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SLD0180-CCV1	Sulfide	16.620	16.5	99.3	mg/L	EPA 9034
SLD0180-CCV2	Sulfide	16.620	16.5	99.3	mg/L	EPA 9034
SLD0180-ICV1	Sulfide	16.620	16.4	98.7	mg/L	EPA 9034

* Values outside of QC limits

LOW-CONCENTRATION CALIBRATION VERIFICATION

EPA 9034

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Calibration: UNASSIGNED
Laboratory ID: SLD0180-LCV1
Sequence: SLD0180
Standard ID: L003964

ANALYTE	EXPECTED (mg/L)	FOUND (mg/L)	% DRIFT	QC LIMIT
Sulfide	1.6620	1.30	-21.8	

* Values outside of QC limits

HOLDING TIME SUMMARY

Analysis: EPA 9034

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SED-05G:0-10 23C0618-09	03/21/23 13:10	03/24/23 16:25	03/28/23 16:36	7	7	04/04/23 15:00			

* Indicates hold time exceedance.

METHOD DETECTION AND REPORTING LIMITS

EPA 9034

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Instrument: S2 Buret

Analyte	MDL	RL	Units
Sulfide	20.0	20.0	mg/kg

Analytical Resources, LLC
Analytical Chemists and Consultants

Analytical Standard Record

Standard ID: E007844 **Printed: 1/12/2023 12:49:51PM**

Description:	Sodium sulfide nonahydrate (98+%)	Expires:	31-Dec-2079
Standard Type:	Reagent	Prepared:	22-Dec-2016
Solvent:	NA	Prepared By:	Casey English
Final Volume (mls):	500	Department:	Conventionals
Vials:	1	Last Edit:	20-Sep-2017 17:17 by CDE
Vendor:	ACROS Organics	Lot #:	B0142157
Vendor Catalog #:	152580		

Comments

Analyte	CAS Number	Concentration	Units
Sulfide	18496-25-8	133500	mg/Kg
Soluble Sulfide	18496-25-8	133500	mg/Kg
Sodium sulfide nonahydrate	1313-84-4	1000000	mg/Kg

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2540 G-11

SED-05G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0618-09 A	SDG:	23C0618
Sampled:	03/21/23 13:10	Prepared:	03/29/23 09:49	File ID:	
% Solids:	57.24	Preparation:	No Prep Wet Chem	Analyzed:	03/29/23 09:55
Batch:	BLC0765	Sequence:		Initial/Final:	5 g Wet / 5 g
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids	57.24	1	0.04	0.04	

PREPARATION BATCH SUMMARY

SM 2540 G-11

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Batch: BLC0765 Batch Matrix: Solid
Preparation: No Prep Wet Chem

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SED-05G:0-10	23C0618-09		03/29/23 09:49	
Blank	BLC0765-BLK1		03/29/23 09:49	
SED-05G:0-10	BLC0765-DUP1		03/29/23 09:49	
SED-05G:0-10	BLC0765-DUP2		03/29/23 09:49	

TOTAL SOLIDS/VOLATILE SOLIDS (TS / TVS) BENCHSHEET for Solid samples

Method: PSEP 1986, SM2540, EPA 160.1

(dry at 104 (12-24 hr) then combust at 550 (30 min))

Batch:	BLC0765
Date:	3/29/2023 9:55
Analyst:	UW

Instrumentation

Drying Ovens:	12	**Analytical Balance:**	BAL2
Muffle Furnace:	2		

Batch drying time

record times as mm/dd/yy hh:mm

date/time in oven:	3/29/2023 11:11	
date/time out:	3/30/2023 8:40	
elapsed hrs =	21.5	OK

TS (%) calculated as:
Final dry wt (g) = (Dry Wt - Tare Wt)
TS = (Final Dry Wt)/ (grams Sample-Tare)

Oven Temps, °C	
Start Temp	106
Dry Cycle 1	104
Dry Cycle 2	
Dry Cycle 3	

TVS (mg/kg dry wt) calculated as:
Final ash wt (g) = (min ash wt - tare wt)
TVS (mg/kg) = [(Dry wt-Ash wt)/ (dry weight)] *1,000,000
if ash wt > dry wt, "Chk for Err"
if dry wt-ash wt < 0.001 g, "< (1/dry wt)*1,000,000

Balance Calibration Check

Record weights to 4 places

Cal Weight ID:	CV-02	CV-02	CV-02	CV-02	CV-02		CV-02	CV-02	CV-02	
Date & Time:	3/29/23 9:57	3/29/23 10:18	3/30/23 9:05							
Cal Wt (g): 10.0000	10.0000	10.0000	10.0000							
	Cal OK!	Cal OK!	Cal OK!							

Sample ID	Dish #	Tare Wt. (g)	Dish & Sample (g)	Dry Wt 104C (grams) 1	2	3	dry Wt (g)	TS (%)	Notes	ASH WT 550C (grams) 1	2	3	Ash Wt (g)	TVS (mg/kg)	(%)	Notes
BLC0765-BLK1	1	0.8239	0.0000	0.8237			-0.0002	0.02%								
23C0600-01	2	0.8208	5.9916	4.9370			4.1162	79.60%								
23C0600-02	3	0.8199	6.1657	4.9821			4.1622	77.86%								
23C0600-03	4	0.7997	7.9371	6.4947			5.6950	79.79%								
23C0618-01	5	0.7880	9.7728	6.9882			6.2002	69.01%								
23C0618-02	6	0.7854	8.1101	5.4838			4.6984	64.14%								
23C0618-03	7	0.8075	8.1046	4.9461			4.1386	56.72%								
23C0618-04	8	0.7932	7.2506	4.6301			3.8369	59.42%								
23C0618-05	9	0.8008	7.4678	4.3012			3.5004	52.50%								
23C0618-06	10	0.8081	8.7147	5.0248			4.2167	53.33%								
23C0618-07	11	0.8002	8.9153	5.3313			4.5311	55.84%								
23C0618-08	12	0.7953	7.9177	4.9924			4.1971	58.93%								
23C0618-09	13	0.8415	7.0869	4.4163			3.5748	57.24%								
BLC0765-DUP1	14	0.8183	6.5650	4.1266			3.3083	57.57%	RPD=0.6							
BLC0765-DUP2	15	0.7841	8.7534	5.3477			4.5636	57.26%	RSD=0.3							
23C0618-10	16	0.8501	6.9109	4.0621			3.2120	53.00%								
23C0618-11	17	0.8042	7.7030	5.2360			4.4318	64.24%								
23C0618-12	18	0.8042	7.4678	5.0945			4.2903	64.38%								
23C0618-13	19	0.8210	8.8059	6.1193			5.2983	66.35%								
23C0662-03	20	0.8545	5.3669	1.5991			0.7446	16.50%								

Form I

METHOD BLANK DATA SHEET

SM 2540 G-11

TotalAnalytes

Blank

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Batch: BLC0765
Laboratory ID: BLC0765-BLK1
Prepared: 03/29/23 09:49
Matrix: Solid
Preparation: No Prep Wet Chem
Analyzed: 03/29/23 09:55
Sequence:
Calibration:
Instrument: BAL2

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids	ND	1	0.04	0.04	U

DUPLICATES

SM 2540 G-11

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Laboratory ID: BLC0765-DUP1
Batch: BLC0765
Lab Source ID: 23C0618-09
Preparation: No Prep Wet Chem
Initial/Final: 5 g / 5 g
Source Sample Name: SED-05G:0-10
% Solids: 57.24

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION	DUPLICATE CONCENTRATION	RPD %	Q
Total Solids	20	57.24	57.57	0.574	

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

SED-05G:0-10

DUPLICATES

SM 2540 G-11

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Laboratory ID: BLC0765-DUP2
Batch: BLC0765
Lab Source ID: 23C0618-09
Preparation: No Prep Wet Chem
Initial/Final: 5 g / 5 g
Source Sample Name: SED-05G:0-10
% Solids: 57.24

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION	DUPLICATE CONCENTRATION	RPD %	Q
Total Solids	20	57.24	57.26	0.0451	

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

HOLDING TIME SUMMARY

Analysis: SM 2540 G-11

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SED-05G:0-10 23C0618-09	03/21/23 13:10	03/24/23 16:25	03/29/23 09:49	7	28	03/29/23 09:55	8	28	
Duplicate BLC0765-DUP1	03/21/23 13:10	03/24/23 16:25	03/29/23 09:49	7	28	03/29/23 09:55	8	28	
Duplicate BLC0765-DUP2	03/21/23 13:10	03/24/23 16:25	03/29/23 09:49	7	28	03/29/23 09:55	8	28	

* Indicates hold time exceedance.

METHOD DETECTION AND REPORTING LIMITS

SM 2540 G-11

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Instrument:

Analyte	MDL	RL	Units
Total Solids	0.04	0.04	%

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
SM 4500-NH3 H-11

SED-05G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0618-09 A	SDG:	23C0618
Sampled:	03/21/23 13:10	Prepared:	03/27/23 15:05	File ID:	032823 NH3A-024
% Solids:	57.24	Preparation:	No Prep Wet Chem	Analyzed:	03/28/23 13:28
Batch:	BLC0709	Sequence:	SLD0023	Initial/Final:	4.2 g Wet / 40 g
Instrument:	LACHAT1			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration ng/kg NH3-N dry	Dilution Factor	MDL	MRL	Q
7664-41-7	Ammonia-N	12.0	1	0.67	0.67	

PREPARATION BATCH SUMMARY

SM 4500-NH3 H-11

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Batch: BLC0709 Batch Matrix: Solid
Preparation: No Prep Wet Chem

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SED-05G:0-10	23C0618-09	032823 NH3A-024	03/27/23 15:05	
Blank	BLC0709-BLK1	032823 NH3A-011	03/27/23 15:05	
LCS	BLC0709-BS1	032823 NH3A-012	03/27/23 15:05	
MRL Check	BLC0709-MRL1	032823 NH3A-010	03/27/23 15:05	

Analytical Resources, LLC
Analytical Chemists and Consultants

Method: ***Ammonia-N, SM 4500-NH3 H-97 Solid*** Analyst: RMS

Batch ID: BLC0709 Prep Date, Time: 3/27/2023 15:05

Revision Date & # : ***0*** ***6/29/2016*** Balance ID: BAL5

Sample Preparation Log

Reagents, Equipment

Notes

Revision: ***0*** ***6/29/2016***

Lab Number	Sample Amount (g/mL)	Final Volume (mL)	Spike 1 ID	Spike 1 Volume (µL)	Spike 2 ID	Spike 2 Volume (µL)
23C0538-01	4.23	40				
23C0538-02	4.2	40				
23C0538-03	4.41	40				
23C0538-04	4.46	40				
23C0538-08	4.27	40				
23C0538-12	4.16	40				
23C0618-09	4.2	40				
23C0619-16	4.23	40				
BLC0709-BLK1	4	40				
BLC0709-BS1	4	40	K006560	400		
23C0538-01-DUP1	4.06	40				
BLC0709-MRL1	4	40	L003218	80		
BLC0709-MS1	4.01	40	K010908	400		
23C0538-01-MSD1	4.42	40	K010908	400		

Form I

METHOD BLANK DATA SHEET

SM 4500-NH3 H-11

TotalAnalytes

Blank

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Batch: BLC0709
Laboratory ID: BLC0709-BLK1
Prepared: 03/27/23 15:05
Matrix: Solid
Preparation: No Prep Wet Chem
Analyzed: 03/28/23 13:08
Sequence: SLD0023
Calibration: N/A
Instrument: LACHAT1

CAS NO.	Analyte	Concentration (mg/kg NH3-N wet)	Dilution Factor	MDL	MRL	Q
7664-41-7	Ammonia-N	ND	1	0.40	0.40	U

LCS / LCS DUPLICATE RECOVERY

SM 4500-NH3 H-11

Laboratory:	Analytical Resources, LLC	SDG:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Matrix:	Solid	Analyzed:	03/28/23 13:09
Batch:	BLC0709	Laboratory ID:	BLC0709-BS1
Preparation:	No Prep Wet Chem	Sequence Name:	LCS
Initial/Final:	4 g / 40 g		

COMPOUND	SPIKE ADDED (mg/kg NH3-N	LCS CONCENTRATION (mg/kg NH3-N wet)	Q	LCS % REC. #	QC LIMITS REC.
Ammonia-N	100	97.2	D	97.2	90 - 110

* Indicates values outside of QC limits

ANALYSIS BATCH (SEQUENCE) SUMMARY

SM 4500-NH3 H-11

Laboratory:	Analytical Resources, LLC	SDG:	23C0618
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Sequence:	SLD0023	Instrument:	LACHAT1
		Calibration:	UNASSIGNED

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
Cal Standard	SLD0023-CAL1	032823 NH3A-001	NA	03/28/23 12:52
Cal Standard	SLD0023-CAL2	032823 NH3A-002	NA	03/28/23 12:53
Cal Standard	SLD0023-CAL3	032823 NH3A-003	NA	03/28/23 12:54
Cal Standard	SLD0023-CAL4	032823 NH3A-004	NA	03/28/23 12:55
Cal Standard	SLD0023-CAL5	032823 NH3A-005	NA	03/28/23 12:56
Cal Standard	SLD0023-CAL6	032823 NH3A-006	NA	03/28/23 12:58
Cal Standard	SLD0023-CAL7	032823 NH3A-007	NA	03/28/23 12:59
Initial Cal Check	SLD0023-ICV1	032823 NH3A-008	NA	03/28/23 13:00
Initial Cal Blank	SLD0023-ICB1	032823 NH3A-009	NA	03/28/23 13:04
MRL Check	BLC0709-MRL1	032823 NH3A-010	Solid	03/28/23 13:07
Blank	BLC0709-BLK1	032823 NH3A-011	Solid	03/28/23 13:08
LCS	BLC0709-BS1	032823 NH3A-012	Solid	03/28/23 13:09
Calibration Check	SLD0023-CCV1	032823 NH3A-020	NA	03/28/23 13:19
Calibration Blank	SLD0023-CCB1	032823 NH3A-021	NA	03/28/23 13:22
SED-05G:0-10	23C0618-09	032823 NH3A-024	Solid	03/28/23 13:28
Calibration Check	SLD0023-CCV2	032823 NH3A-028	NA	03/28/23 13:35
Calibration Blank	SLD0023-CCB2	032823 NH3A-029	NA	03/28/23 13:39

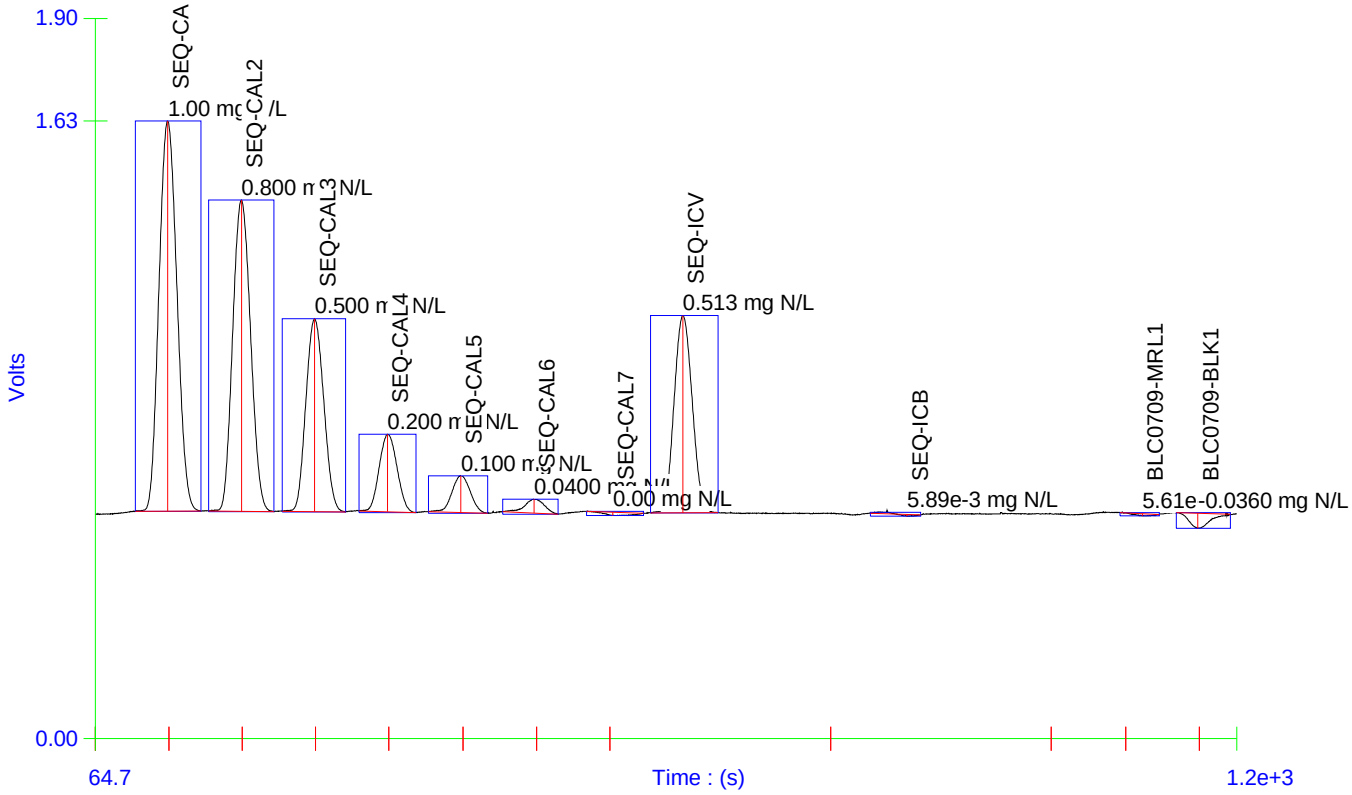
Original Run Filename: OM_3-28-2023_12-51-11PM.OMN Created: 3/28/2023 12:51:11 PM
Original Run Author's Signature: [RMS]
Current Run Filename: 032823 NH3A.omn Last Modified: 3/28/2023 1:49:54 PM
Current Run Author's Signature: [RMS]
Description: Default New Run

Sample	Rep.	Cup No.	Channel 1 NH3			Detection Time	MDF
			Conc. (mg N/L)	Area (V.s)	Height (V)		
SEQ-CAL1	1	S1	1.00	20.3	1.03	3/28/2023@12:52:18 PM	
SEQ-CAL2	1	S2	0.800	16.2	0.820	3/28/2023@12:53:28 PM	
SEQ-CAL3	1	S3	0.500	10.0	0.508	3/28/2023@12:54:38 PM	
SEQ-CAL4	1	S4	0.200	4.01	0.204	3/28/2023@12:55:49 PM	
SEQ-CAL5	1	S5	0.100	1.95	0.0965	3/28/2023@12:56:59 PM	
SEQ-CAL6	1	S6	0.0400	0.789	0.0364	3/28/2023@12:58:10 PM	
SEQ-CAL7	1	S7	0.00	-0.257	-8.79e-3	3/28/2023@12:59:21 PM	
SEQ-ICV	1	8	0.513	10.4	0.520	3/28/2023@1:00:31 PM	
Known Conc:			0.500				
Calibration:			Table/Fig. : 1				
SEQ-ICB	1	9	5.89e-3	-8.39e-3	-4.67e-3	3/28/2023@1:04:02 PM	
Known Conc:			0.00				
BLC0709-MRL1	1	10	5.61e-4	-0.117	-5.82e-3	3/28/2023@1:07:34 PM	
BLC0709-BLK1	1	11	-0.0360	-0.864	-0.0395	3/28/2023@1:08:45 PM	
BLC0709-BS1	1	12	0.486	9.80	0.495	3/28/2023@1:09:55 PM	20.00
23C0538-01	1	13	0.676	13.7	0.695	3/28/2023@1:11:06 PM	
BLC0709-DUP1	1	14	0.876	17.8	0.899	3/28/2023@1:12:16 PM	
BLC0709-MS1	1	15	0.605	12.2	0.618	3/28/2023@1:13:26 PM	20.00
BLC0709-MSD1	1	16	0.569	11.5	0.583	3/28/2023@1:14:38 PM	20.00
23C0538-02	1	17	0.906	18.4	0.931	3/28/2023@1:15:49 PM	
23C0538-03	1	18	0.778	15.8	0.799	3/28/2023@1:16:59 PM	
23C0538-04	1	19	0.310	6.22	0.314	3/28/2023@1:18:10 PM	
SEQ-CCV	1	8	0.514	10.4	0.521	3/28/2023@1:19:21 PM	
Known Conc:			0.500				
SEQ-CCB	1	9	0.0146	0.170	9.71e-3	3/28/2023@1:22:52 PM	
Known Conc:			0.00				
23C0538-08	1	20	0.254	5.06	0.257	3/28/2023@1:26:24 PM	
23C0538-12	1	21	0.501	10.1	0.514	3/28/2023@1:27:35 PM	
23C0618-09	1	22	0.722	14.6	0.741	3/28/2023@1:28:47 PM	
23C0619-16	1	23	0.384	7.72	0.391	3/28/2023@1:29:57 PM	
23C0538-01RE1	1	13	0.683	13.8	0.701	3/28/2023@1:31:08 PM	
BLC0709-DUP2	1	14	0.885	18.0	0.902	3/28/2023@1:32:18 PM	
SEQ-CCV	1	8	0.515	10.4	0.524	3/28/2023@1:35:50 PM	
Known Conc:			0.500				
SEQ-CCB	1	9	-5.73e-3	-0.246	-0.0100	3/28/2023@1:39:21 PM	
Known Conc:			0.00				

Author: RMS

Date : 3/28/2023

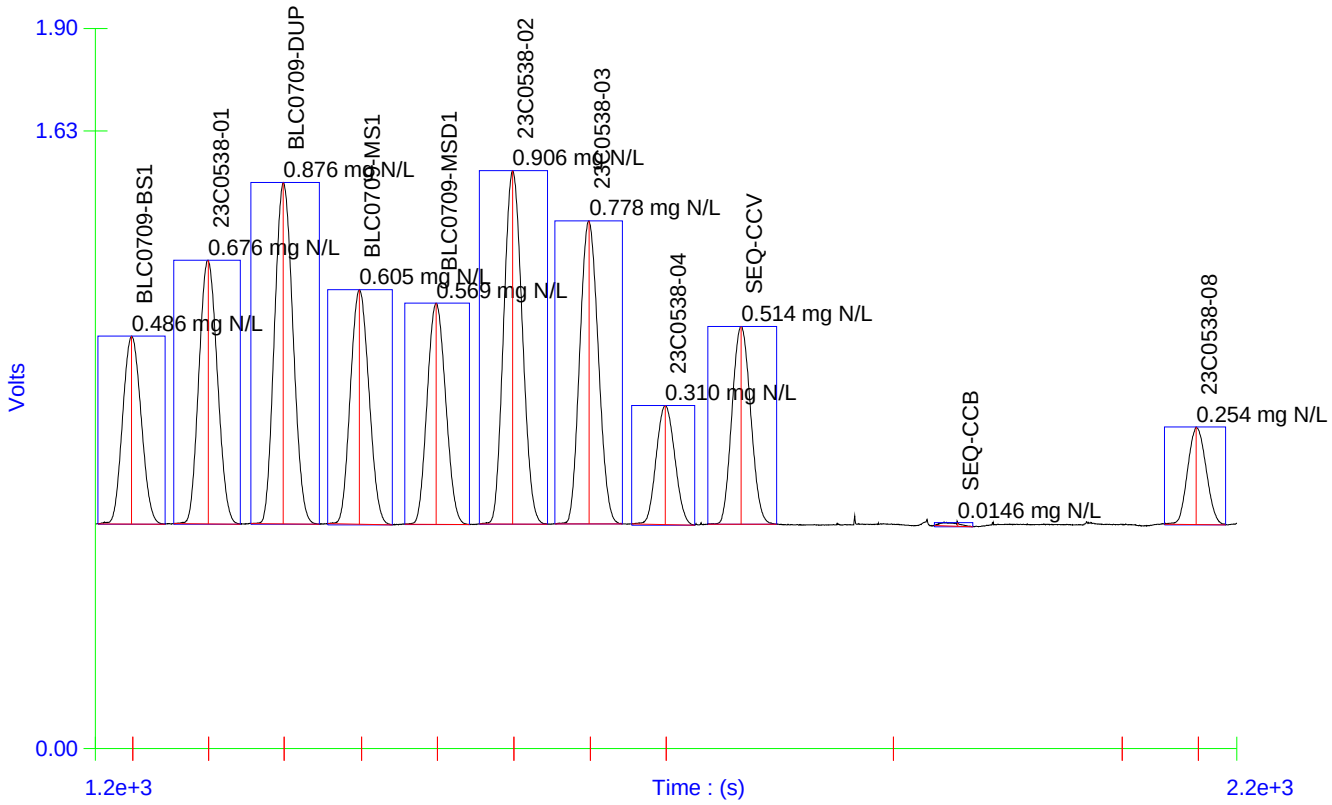
Channel 1 - Set: 1 / 3



Author: RMS

Date : 3/28/2023

Channel 1 - Set: 2 / 3



Author: RMS Date : 3/28/2023

Channel 1 - Set: 3 / 3

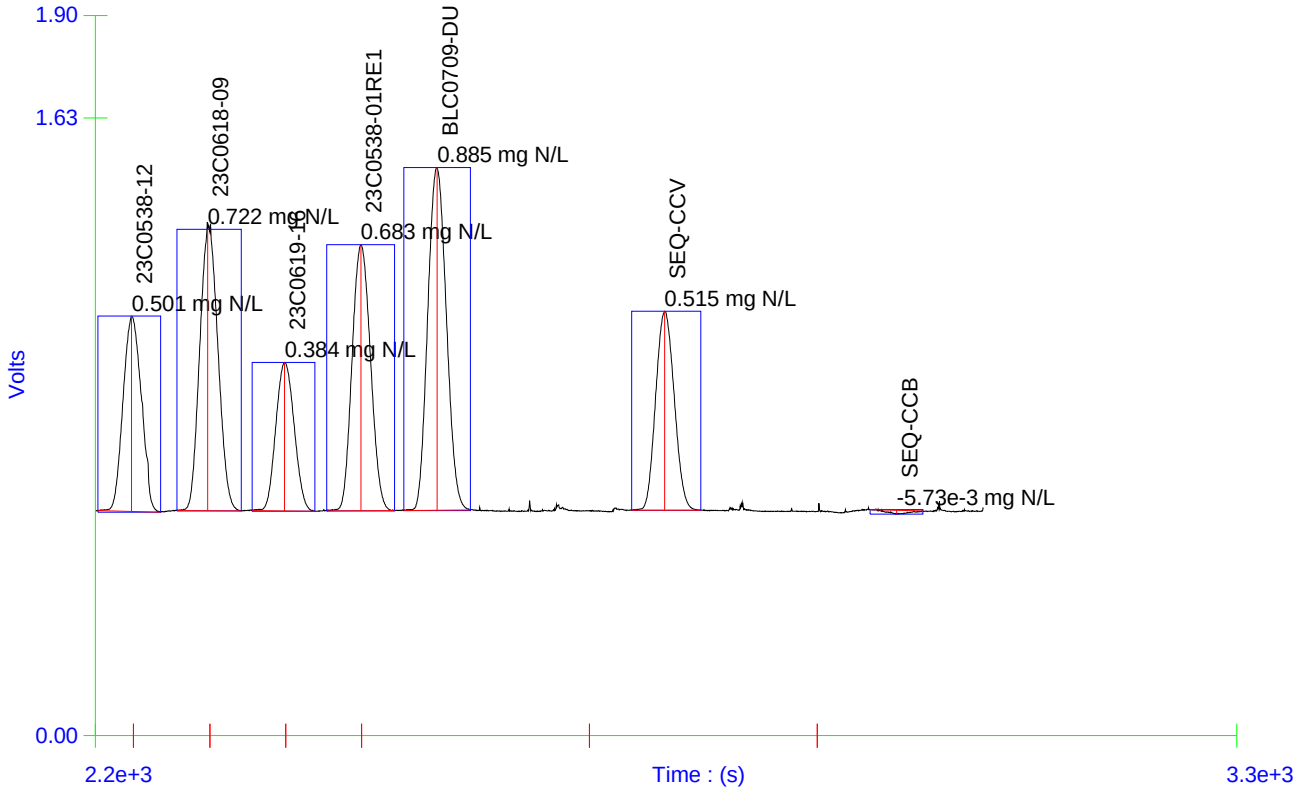
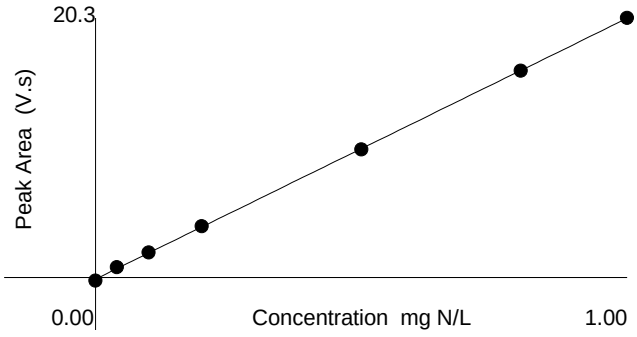


Table : 1 (NH3)

	Known Conc. (mg N/L)	Rep.	Peak Area (V.s)	Peak Height (V)	% RSD	% Residual	Det. Conc (mg N/L)	Detection Date	Detection Time
1	1.00	1	20.3	1.03	0.0	-0.1	1.00	3/28/2023	12:52:18 PM
2	0.800	1	16.2	0.820	0.0	0.1	0.799	3/28/2023	12:53:28 PM
3	0.500	1	10.0	0.508	0.0	0.5	0.497	3/28/2023	12:54:38 PM
4	0.200	1	4.01	0.204	0.0	-1.2	0.202	3/28/2023	12:55:49 PM
5	0.100	1	1.95	0.0965	0.0	-1.6	0.101	3/28/2023	12:56:59 PM
6	0.0400	1	0.789	0.0364	0.0	-14.4	0.0449	3/28/2023	12:58:10 PM
7	0.00	1	-0.257	-8.79e-3			-6.25e-3	3/28/2023	12:59:21 PM

Figure : 1 (NH3)



Area = 20.4 * Conc - 0.128
Conc = 0.0489 * Area + 6.30e-3
Correlation Coefficient (r) = 0.99996

Weighting : None

INSTRUMENT BLANKS
SM 4500-NH3 H-11

Laboratory: Analytical Resources, LLC
Client: Friedman & Bruya Inc.
Instrument ID: LACHAT1
Sequence: SLD0023

SDG: 23C0618
Project: Port of Friday Harbor
Calibration: UNASSIGNED
Date Analyzed: 03/28/23 13:04

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SLD0023-ICB1	Ammonia-N	0.006	0.04	0.04	mg/L NH3-N	
SLD0023-CCB1	Ammonia-N	0.01	0.04	0.04	mg/L NH3-N	
SLD0023-CCB2	Ammonia-N	-0.006	0.04	0.04	mg/L NH3-N	

INITIAL AND CONTINUING CALIBRATION CHECK

SM 4500-NH3 H-11

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Instrument ID: LACHAT1
Calibration: UNASSIGNED
Control Limt: +/- 10.00%
Sequence: SLD0023

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SLD0023-ICV1	Ammonia-N	0.50000	0.51	103	mg/L NH3-N	SM 4500-NH3 H-11
SLD0023-CCV1	Ammonia-N	0.50000	0.51	103	mg/L NH3-N	SM 4500-NH3 H-11
SLD0023-CCV2	Ammonia-N	0.50000	0.52	103	mg/L NH3-N	SM 4500-NH3 H-11

* Values outside of QC limits

HOLDING TIME SUMMARY

Analysis: SM 4500-NH3 H-11

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SED-05G:0-10 23C0618-09	03/21/23 13:10	03/24/23 16:25	03/27/23 15:05	6	7	03/28/23 13:28	1	7	

* Indicates hold time exceedance.

METHOD DETECTION AND REPORTING LIMITS

SM 4500-NH3 H-11

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Instrument: LACHAT1

Analyte	MDL	RL	Units
Ammonia-N	0.40	0.40	mg/kg NH3-N

Fisher Scientific

1 Reagent Lane
Fair Lawn, NJ 07410
201.796.7100 tel
201.796.1329 fax

Certificate of Analysis

Fisher Scientific's Quality System has been found to conform to Quality Management System Standard ISO9001:2008 standard by SAI Global Certificate Number CERT - 0090918

This is to certify that units of the lot number below were tested and found to comply with the specifications of the grade listed. Certain data have been supplied by third parties. Fisher Scientific expressly disclaims all warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose. Certain products (USP/FCC/NF/EP/BP/JP grades) are sold for use in food, drug, or medical device manufacturing. Fisher does not claim regulatory coverage under 21 CFR nor maintain DMF's with the FDA. The following are the actual analytical results obtained:

Catalog Number	**A649**	**Quality Test / Release Date**	**9/20/2017**
Lot Number	**174327**		
Description	**AMMONIUM CHLORIDE, USP/FCC**		
Country of Origin	**United States**	*** Suggested Retest Date**	**Sep-2020**
Chemical Origin	**Inorganic**		
BSE/TSE Comment	No animal products are used as starting raw material ingredients, or used in processing, including lubricants, processing aids, or any other material that might migrate to the finished product.		

USP Grade

Result name	Units	Specifications	Test Value
APPEARANCE		REPORT	White crystalline powder
ASSAY	%	Inclusive Between 99.5 - 100.5	99.7
HEAVY METALS (as Pb)	%	<= 0.001	<0.0010
IDENTIFICATION (ALL LISTED)	PASS/FAIL	= PASS TEST	PASS TEST
IGNITION RESIDUE	%	<= 0.1	<0.01
LIMIT OF THIOCYANATE	PASS/FAIL	= PASS TEST	PASS TEST
LOSS ON DRYING	%	<= 0.5	0.03
PH OF A 5% SOLUTION		Inclusive Between 4.6 - 6.0	4.7
RESIDUAL SOLVENTS	Meets Requirements	= MEETS REQUIREMENTS	MEETS REQUIREMENTS

FCC Grade

Result name	Units	Specifications	Test Value
APPEARANCE		REPORT	White crystalline powder
ASSAY	%	>= 99.0	99.7
IDENTIFICATION (ALL LISTED)	PASS/FAIL	= PASS TEST	PASS TEST
LEAD (Pb)	MG/KG	<= 4	<4.0
LOSS ON DRYING PER FCC	%	<= 0.5	0.03

Residual Solvents	No Class 1, Class 2, or Class 3 solvents are used in the manufacturing, processing, or subsequent handling of this product.

Teresa Bailey-Wyche

Quality Assurance Specialist - Certificate of Analysis Fair Lawn

Note: The data listed is valid for all package sizes of this lot of this product, expressed as a extension of this catalog number listed above. If there are any questions with this certificate, please call Chemical Services at (800) 227-6701.
*Based on suggested storage condition.

ERA
A Waters Company

J002956

Certified Reference Material

▪ Certificate of Analysis ▪

Product: 1000 mg/L Ammonia as N
Catalog Number: 045-125mL, 985-500mL
Lot No. 091120m
Starting Material: Ammonium Chloride (NH_4Cl)
Matrix: 18 megohm deionized water
Density: 0.9997 ± 0.0016 g/ml at 19.2 °C and 756 mm Hg
Verification Method: Ion Selective Electrode (ISE)
Certificate Issue Date: November 5, 2020
Expiration Date: November 3, 2022
Revision Number: Original

CERTIFICATION

Parameter	Certified Value[1]	Uncertainty[2]	NIST Traceability	
	mg/L	%	SRM Number[3]	Recovery %
Ammonia as N (NH_3-N)	1000	1.43	194a	99.5

16341 Table Mountain Pkwy ▪ Golden, CO 80403 ▪ 800.372.0122 ▪ 303.431.8454 ▪ fax 303.421.0159 ▪ www.eraqc.com

ERA
A Waters Company

Certified Reference Material

▪ Certificate of Analysis ▪

Product:	1000 mg/L Ammonia as N
Catalog Number:	045-125mL, 985-500mL
Lot No.	591021m
Starting Material:	Ammonium Chloride (NH_4Cl)
Matrix:	18 megohm deionized water
Density:	0.9998 ± 0.0003 g/mL 22.3 °C and 747 mm Hg
Verification Method:	Ion Selective Electrode (ISE)
Certificate Issue Date:	November 23, 2021
Expiration Date:	October 29, 2023
Revision Number:	Original

CERTIFICATION

Parameter	Certified Value[1]	Uncertainty[2]	NIST Traceability	
	mg/L	%	SRM Number[3]	Recovery %
Ammonia as N (NH_3-N)	1000	0.827	194a	99.8

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▪ Certificate of Analysis ▪

1. The **Certified Value** is the actual gravimetric/volumetric "made-to" concentration confirmed by ERA analytical verification. The certified value is monitored and the purchasers will be notified of any significant changes resulting in recertification or withdrawal of this certified reference material during the period of validity of this certificate.

2. The **Uncertainty** represents an expanded uncertainty and approximates a 95% confidence interval. The uncertainty is based on the characterization, homogeneity and stability characteristics of the product, multiplied by a coverage factor (k=2). The uncertainty applies to the product as supplied and does not take into account any required or optional dilution and/or preparations the laboratory may perform while using this product. The formula used to calculate the expanded uncertainty is:
$U_{expanded} = k * SQRT((U_{char}^2) + (U_{homogen}^2) + (U_{LTS}^2) + (U_{STS}^2) + (U_{RSS}^2))$

Where:

$U_{expanded}$ = Expanded uncertainty.
k = Coverage factor.
U_{char} = Combined standard uncertainty of the manufacturing and/or analytical verification assessment.
$U_{homogen}$ = Standard uncertainty of the homogeneity assessment.
U_{LTS} = Standard uncertainty associated with long-term stability.
U_{STS} = Standard uncertainty associated with short-term (transport) stability.
U_{RSS} = Standard uncertainty associated with repeated sampling of the product (where permitted by product use instructions).

3. Where NIST Standard Reference Materials (SRMs) are available, each analyte has been analytically traced to the NIST SRM listed. **Analytical Traceability Recovery (%)** = [(% recovery ERA certified reference material)/(% recovery NIST SRM)]*100
The traceability data shown were compiled by analyzing this ERA certified reference material and/or it's associated stock solution(s) against the applicable NIST SRMs.

4. **Metrological Traceability.** This certified reference material is metrologically traceable to NIST mass reference materials through an unbroken chain of comparisons.

5. **Storage:** 20-25°C

6. **Intended Use:** This standard is intended to be used to calibrate your analytical process and/or as a quality control check of the entire process for the analytes/matrix included in the standard.

7. **Minimum Sample Size:** ERA suggests that when subsampling this product prior to analysis, you use a minimum sample size of at least 1 mL. Using a smaller sample size may invalidate the assigned value and/or uncertainty shown.

8. **Repeat Sampling:** Repeated Sampling of this product is permitted, provided minimum sample sizes and storage instructions are adhered to.

9. **Safety:** ERA products may be hazardous and are intended for use by professional laboratory personnel trained in the competent handling of such materials. Responsibility for the safe use of these products rests entirely with the buyer and/or user. Safety Data Sheets (SDS) for all ERA products are available through our website: www.eraqc.com

If you have any questions or need technical assistance, please call ERA technical assistance at 1-800-372-0122 or send an email to info@eraqc.com.

Certifying Officer
Brian Miller

Brian Miller

Quality Officer
Matthew Seebeck

ISO 17034:2016 ACCREDITED Reference Material Producer CERT #1539.03

ISO/IEC 17025:2017 ACCREDITED Chemical Testing Laboratory CERT #1539.01

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Analytical Resources, LLC
Analytical Chemists and Consultants

Form I
INORGANIC ANALYSIS DATA SHEET
PSEP 1986

SED-05G:0-10

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0618-09 C	SDG:	23C0618
Sampled:	03/21/23 13:10	Prepared:	03/29/23 09:54	File ID:	
% Solids:	57.24	Preparation:	No Prep Wet Chem	Analyzed:	03/29/23 09:55
Batch:	BLC0769	Sequence:		Initial/Final:	5 g Wet / 5 g
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids, Sulfide	52.16	1	0.04	0.04	

PREPARATION BATCH SUMMARY

PSEP 1986

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Batch: BLC0769 Batch Matrix: Solid
Preparation: No Prep Wet Chem

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SED-05G:0-10	23C0618-09		03/29/23 09:54	
Blank	BLC0769-BLK1		03/29/23 09:54	
SED-05G:0-10	BLC0769-DUP1		03/29/23 09:54	

TOTAL SOLIDS/VOLATILE SOLIDS (TS / TVS) BENCHSHEET for Solid samples **TSPR**

Method: PSEP 1986, SM2540, EPA 160.1

(dry at 104 (12-24 hr) then combust at 550 (30 min))

Batch:	BLC0769
Date:	3/29/2023 9:55
Analyst:	UW

Instrumentation				
Drying Ovens:	12	**Analytical Balance:**	BAL2	
Muffle Furnace:	2			

Batch drying time				**Oven Temps, °C**	
record times as mm/dd/yy hh:mm		TS (%) calculated as:		Start Temp	106
date/time in oven:	3/29/2023 11:11	Final dry wt (g) = (Dry Wt - Tare Wt)		Dry Cycle 1	104
date/time out:	3/30/2023 8:40	TS = (Final Dry Wt)/ (grams Sample-Tare)		Dry Cycle 2	
elapsed hrs =	21.5	OK		Dry Cycle 3	

TVS (mg/kg dry wt) calculated as:
Final ash wt (g) = (min ash wt - tare wt)
TVS (mg/kg) = [(Dry wt-Ash wt)/ (dry weight)] *1,000,000
if ash wt > dry wt, "Chk for Err"
if dry wt-ash wt < 0.001 g, "< (1/dry wt)*1,000,000

Balance Calibration Check

Record weights to 4 places											
	Cal Weight ID:	CV-02	CV-02	CV-02	CV-02	CV-02		CV-02	CV-02	CV-02	
	Date & Time:	3/29/23 10:15	3/29/23 11:08	3/30/23 9:20							
Cal Wt (g):	10.0000	10.0000	10.0000	10.0000							
		Cal OK!	Cal OK!	Cal OK!							

Sample ID	**Dish #**	**Tare Wt. (g)**	**Dish & Sample (g)**	**Dry Wt 104C (grams) 1**	**2**	**3**	**dry Wt (g)**	**TS (%)**	**Notes**	**ASH WT 550C (grams) 1**	**2**	**3**	**Ash Wt (g)**	**TVS (mg/kg)**	**(%)**	**Notes**
BLC0769-BLK1	44	0.7929	0.0000	0.7928			-0.0001	0.01%								
23C0618-09	45	0.7889	8.1061	4.6055			3.8166	52.16%								
BLC0769-DUP1	46	0.7923	6.9510	4.0273			3.2350	52.53%	RPD=0.7							
23C0619-16	47	0.7997	8.1241	5.4300			4.6303	63.22%								

TOTAL SOLIDS BENCHSHEET

Method: PSEP 1986

(dry at 103-105 C)

Instrumentation

Batch:	BLC0685
Date:	3/27/2023 9:23
Analyst:	YL
Drying Oven:	15
Analytical Balance:	B46462614

Batch drying time		
Record times as mm/dd/yy hh:mm		
Date/time in oven:	3/27/2023 13:15	
Date/time out:	3/28/2023 9:34	
Elapsed hrs:	20.3	

Oven Temp, C	TS (%) calculated as:
104	Final dry wt (g) = (Dry Wt - Tare Wt)
100	TS = (Final Dry Wt X 100)/ (sample & dish -dish tare)

Oven Temps, °C	
Start Temp:	104
End Temp:	100

SAMPLE ID	Dish Tare Wt (g)	Dish with Sample (g)	Dry Wt (g)	Solids Wt (g)	TS (%)	Sample Decanted
23C0618-01	0.8400	11.4700	8.1700	7.33	**68.96%**	No
23C0618-03	0.8100	11.4700	6.9500	6.14	**57.60%**	Yes
23C0618-04	0.8300	12.5800	7.9700	7.14	**60.77%**	Yes
23C0618-11	0.7900	11.4313	8.1900	7.40	**69.54%**	Yes
23C0618-12	0.8200	12.8900	8.0800	7.26	**60.15%**	Yes
23C0618-13	0.8100	11.9500	8.4500	7.64	**68.58%**	No
23C0619-01	0.7800	12.1600	10.3500	9.57	**84.09%**	No
23C0619-02	0.8200	11.9200	9.2700	8.45	**76.13%**	Yes
23C0619-03	0.8200	11.9000	8.6000	7.78	**70.22%**	No
23C0619-04	0.8200	12.0200	9.1300	8.31	**74.20%**	Yes
23C0619-05	0.8200	11.9200	8.6600	7.84	**70.63%**	No
23C0619-06	0.8200	11.2200	8.8700	8.05	**77.40%**	Yes
23C0619-08	0.7900	12.7600	8.3100	7.52	**62.82%**	Yes
23C0619-09	0.7800	12.2500	9.7100	8.93	**77.86%**	Yes
23C0619-10	0.7800	11.8600	9.3200	8.54	**77.08%**	No
23C0619-11	0.8400	12.0000	9.8100	8.97	**80.38%**	No
23C0619-12	0.8100	12.7700	10.3400	9.53	**79.68%**	No
23C0619-13	0.7900	11.6400	9.5800	8.79	**81.01%**	No

TOTAL SOLIDS BENCHSHEET

Method: PSEP 1986

(dry at 103-105 C)

Batch:	BLC0685
Date:	3/27/2023 9:23
Analyst:	VL
Drying Oven:	Φ15
Analytical Balance:	B146462614

Instrumentation

Batch drying time			Oven Temp, C	TS (%) calculated as:	Oven Temps, °C	
Record times as mm/dd/yy hh:mm						
Date/time in oven:	03/27/23	13.15	104	Final dry wt (g) = (Dry Wt - Tare Wt)	Start Temp:	104
Date/time out:	03/28/23	09:34	101	TS = (Final Dry Wt X 100)/ (sample & dish -dish tare)	End Temp:	100
Elapsed hrs:	0.0					

SAMPLE ID	Dish Tare Wt (g)	Dish with Sample (g)	Dry Wt (g)	Solids Wt (g)	TS (%)	Sample Decanted
23C0618-01 B	Φ.84	11.47	8.17			No
23C0618-03 B	Φ.81	11.47	6.95			No yes
23C0618-04 B	Φ.83	12.58	7.97			No yes
23C0618-11 A	Φ.79	11.43	8.19			No yes
23C0618-12	Φ.82	12.39	8.08			No yes
23C0618-13	Φ.81	11.95	8.45			No
23C0619-01	Φ.78	12.16	10.35			No
23C0619-02	Φ.82	11.92	9.27			No yes
23C0619-03	Φ.82	11.90	8.60			No
23C0619-04	Φ.82	12.02	9.13			No yes
23C0619-05	Φ.82	11.92	8.66			No
23C0619-06	Φ.82	11.22	8.87			No yes
23C0619-08	Φ.79	12.76	8.31			No yes
23C0619-09	Φ.78	12.25	9.71			No yes
23C0619-10	Φ.78	11.86	9.32			No
23C0619-11	Φ.84	12.00	9.81			No
23C0619-12	Φ.81	12.77	10.34			No yes
23C0619-13 A	Φ.79	11.64	9.58			No

T/S only

no copies

Form I

METHOD BLANK DATA SHEET

PSEP 1986

TotalAnalytes

Blank

Laboratory: Analytical Resources, LLC | SDG: 23C0618

Client: Friedman & Bruya Inc. | Project: Port of Friday Harbor

Batch: BLC0769 | Laboratory ID: BLC0769-BLK1 | Prepared: 03/29/23 09:54

Matrix: Solid | Preparation: No Prep Wet Chem | Analyzed: 03/29/23 09:55

Sequence: | Calibration: | Instrument: BAL2

CAS NO.	Analyte	Concentration (%)	Dilution Factor	MDL	MRL	Q
	Total Solids, Sulfide	ND	1	0.04	0.04	U

SED-05G:0-10

DUPLICATES

PSEP 1986

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Laboratory ID: BLC0769-DUP1
Batch: BLC0769
Lab Source ID: 23C0618-09
Preparation: No Prep Wet Chem
Initial/Final: 5 g / 5 g
Source Sample Name: SED-05G:0-10
% Solids: 57.24

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION	DUPLICATE CONCENTRATION	RPD %	Q
Total Solids, Sulfide	20	52.16	52.53	0.703	

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

HOLDING TIME SUMMARY

Analysis: PSEP 1986

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SED-05G:0-10 23C0618-09	03/21/23 13:10	03/24/23 16:25	03/29/23 09:54	7	28	03/29/23 09:55	8	28	
Duplicate BLC0769-DUP1	03/21/23 13:10	03/24/23 16:25	03/29/23 09:54	7	28	03/29/23 09:55	8	28	

* Indicates hold time exceedance.

METHOD DETECTION AND REPORTING LIMITS

PSEP 1986

Laboratory: Analytical Resources, LLC
SDG: 23C0618
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Instrument:

Analyte	MDL	RL	Units
Total Solids, Sulfide	0.04	0.04	%

Analytical Resources, LLC
Analytical Chemists and Consultants

18 July 2024

Michael Erdahl
Friedman & Bruya Inc.
5500 4th Ave S
Seattle, WA 98108

RE: Port of Friday Harbor (303388)

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
23C0619	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclosed Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, LLC

Susan Dunnihoo For Shelly Fishel, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Cert# 100006-012

23C0619

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER
ARI

PROJECT NAME/NO.	PO #
303388	D-229

REMARKS

merdahl@friedmanandbruya.co

TURNAROUND TIME
☒ Standard TAT
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED: TBT	TOC	Total Solids	Dioxins/Furans	Ammonia	Sulfides					Notes
SED-07C:0-1		3/22/2023	729	sediment	2	X	X	X								
SED-07C:1-3		3/22/2023	729	sediment	2	X	X	X								
SED-08C:0-1		3/22/2023	807	sediment	3	X	X	X	X							
SED-08C:1-3		3/22/2023	807	sediment	2	X	X	X								
SED-09C:0-1		3/22/2023	833	sediment	3	X	X	X	X							
SED-09C:1-3		3/22/2023	833	sediment	3	X	X	X	X							
SED-12C:0-1		3/22/2023	925	sediment	2		X	X	X							
SED-26C:0-1		3/22/2023	1038	sediment	3	X	X	X	X							
SED-26C:1-3		3/22/2023	1038	sediment	2	X	X	X								
SED-25C:0-1		3/22/2023	1119	sediment	3	X	X	X	X							
SED-25C:1-3		3/22/2023	1119	sediment	2	X	X	X								
SED-10C:0-1		3/23/2023	817	sediment	3	X	X	X	X							
SED-10C:1-3		3/23/2023	817	sediment	3	X	X	X	X							

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Michael Erdahl	Friedman & Bruya	3/24/23	1330
Received by:	Phillip Baker	Phillip Baker	AR	3/24/23	16:25
Relinquished by:					
Received by:					

23C0619

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER
ARI

PROJECT NAME/NO.	PO #
303388	D-229

REMARKS

merdahl@friedmanandbruya.co

TURNAROUND TIME
☒ Standard TAT
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	TBT	TOC	Total Solids	Dioxins/Furans	Ammonia	Sulfides					Notes
SED-11C:0-1		3/23/2023	842	sediment	2		x	x	x							
SED-11C:1-3		3/23/2023	842	sediment	2		x	x	x							
SED-27G:0-10		3/23/2023	1017	sediment	2					x	x					
SED-DUP3C		3/23/2023	1200	sediment	2		x	x								

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Michael Erdahl	Friedman & Bruya	3/24/23	1330
Received by:	Phillip	Phillip Bates	AR	3/24/23	16:25
Relinquished by:					
Received by:					

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Friedman & Bruya

Project Name: 303388

COC No(s): NA

Delivered by: Fed-Ex UPS Courier Hand Delivered Other:

Assigned ARI Job No: 23C0619

Tracking No: NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler? YES NO

Were custody papers included with the cooler? YES NO

Were custody papers properly filled out (ink, signed, etc.) YES NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 8.3

Time 16:25

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID#: 30097708

Cooler Accepted by: PIB Date: 3/24/23 Time: 16:25

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES NO

What kind of packing material was used? Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other:

Was sufficient ice used (if appropriate)? NA YES NO

How were bottles sealed in plastic bags? Individually Grouped Not

Did all bottles arrive in good condition (unbroken)? YES NO

Were all bottle labels complete and legible? YES NO

Did the number of containers listed on COC match with the number of containers received? YES NO

Did all bottle labels and tags agree with custody papers? YES NO

Were all bottles used correct for the requested analyses? YES NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs) NA YES NO

Were all VOC vials free of air bubbles? NA YES NO

Was sufficient amount of sample sent in each bottle? YES NO

Date VOC Trip Blank was made at ARI NA

Were the sample(s) split by ARI? NA YES Date/Time: Equipment: Split by:

Samples Logged by: JJW Date: 03/25/23 Time: 0945 Labels checked by: JJW

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Temperature Compliance Form

ARI Work Order: 23C0619

Cooler#: _____ **Temperature(°C):** 8.3

Sample ID	Bottle Count	Bottle Type
Samples received above 6°C		

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Cooler#: _____ **Temperature(°C):** _____

Sample ID	Bottle Count	Bottle Type

Completed by: JFB Date: 3/24/23 Time: 16:25

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
5500 4th Ave S	Project Number: 303388	**Reported:**
Seattle, WA 98108	Project Manager: Michael Erdahl	07/18/2024 15:22

ANALYTICAL REPORT FOR SAMPLES

Laboratory ID	Sample ID	Matrix	Date Sampled	Date Received
23C0619-01	SED-07C:0-1	Solid	03/22/23 07:29	03/24/23 16:25
23C0619-02	SED-07C:1-3	Solid	03/22/23 07:29	03/24/23 16:25
23C0619-03	SED-08C:0-1	Solid	03/22/23 08:07	03/24/23 16:25
23C0619-04	SED-08C:1-3	Solid	03/22/23 08:07	03/24/23 16:25
23C0619-05	SED-09C:0-1	Solid	03/22/23 08:33	03/24/23 16:25
23C0619-06	SED-09C:1-3	Solid	03/22/23 08:33	03/24/23 16:25
23C0619-07	SED-12C:0-1	Solid	03/22/23 09:25	03/24/23 16:25
23C0619-08	SED-26C:0-1	Solid	03/22/23 10:38	03/24/23 16:25
23C0619-09	SED-26C:1-3	Solid	03/22/23 10:38	03/24/23 16:25
23C0619-10	SED-25C:0-1	Solid	03/22/23 11:19	03/24/23 16:25
23C0619-11	SED-25C:1-3	Solid	03/22/23 11:19	03/24/23 16:25
23C0619-12	SED-10C:0-1	Solid	03/23/23 08:17	03/24/23 16:25
23C0619-13	SED-10C:1-3	Solid	03/23/23 08:17	03/24/23 16:25
23C0619-14	SED-11C:0-1	Solid	03/23/23 08:42	03/24/23 16:25
23C0619-15	SED-11C:1-3	Solid	03/23/23 08:42	03/24/23 16:25
23C0619-16	SED-27G:0-10	Solid	03/23/23 10:17	03/24/23 16:25
23C0619-17	SED-DUP3C	Solid	03/23/23 12:00	03/24/23 16:25

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
5500 4th Ave S	Project Number: 303388	**Reported:**
Seattle WA, 98108	Project Manager: Michael Erdahl	18-Jul-2024 15:22

Case Narrative

Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Project Number: 303388
Work Order: 23C0619

Sample receipt

Samples as listed on the preceding page were received 24-Mar-2023 16:25 under ARI work order 23C0619. For details regarding sample receipt, please refer to the Cooler Receipt Form.

The total organic carbon analyses were cancelled in this work order and run under 23E0152 from frozen sample volumes.

Wet Chemistry

The sample(s) were prepared and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blank(s) were clean at the reporting limits.

The blank spike (BS/LCS) percent recoveries were within control limits.

The batch BLC0709 ammonia duplicate (DUP) relative percent difference (RPD) was outside advisory control limits and flagged on the summary sheet, reported under work order 23C0548.

The batch BLC0751 sulfide duplicate (DUP) relative percent difference (RPD) was outside advisory control limits and confirmed by reanalysis, also reported and flagged on the summary sheet, reported under work order 23C0548.

The batch BLC0751 sulfide matrix spike (MS) spike recovery was within advisory control limits, reported under work order 23C0548.

The batch BLC0709 ammonia matrix spike/matrix spike duplicate (MS/MSD) percent recoveries and relative percent difference (RPD) were within advisory control limits, reported under work order 23C0538.

Dioxin/Furans - EPA Method 1613

The sample(s) were extracted and analyzed within the recommended holding times. Analysis was performed using an application specific column developed by Restek. The RTX-Dioxin2 column has unique isomer separation for the 2378-TCDF, eliminating the need for confirmation analysis.

Initial calibrations were within method requirements. 13C12-123678-HpCDD was low of control limits in SLD0330-CCV3.

Labeled internal standard areas were within limits.

The cleanup surrogate percent recoveries were within control limits.

The method blank(s) were clean at the reporting limits, with low level response for 1234678-HpCDD and OCDD. Associated analyte results have been flagged with a "B" qualifier.

The OPR (Ongoing Precision and Recovery) standard percent recoveries were within control limits.

The reference material (SRM) percent recoveries were within control limits.

Friedman & Bruya Inc.	Project: Port of Friday Harbor	
5500 4th Ave S	Project Number: 303388	**Reported:**
Seattle WA, 98108	Project Manager: Michael Erdahl	18-Jul-2024 15:22

Case Narrative

Butyl Tin(s) - EPA Method SW8270E-SIM

The sample(s) were extracted and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

Internal standard areas were within limits.

The surrogate percent recoveries were within control limits.

The method blank(s) were clean at the reporting limits.

The blank spike (BS/LCS) percent recoveries were within control limits.

The duplicate (DUP) relative percent differences (RPD) were within advisory control limits except tributyltin which has been flagged.

The matrix spike/matrix spike duplicate (MS/MSD) percent recoveries and relative percent differences (RPD) were within advisory control limits.

QUALIFIERS AND NOTES

Qualifier	Definition
X	Indicates possible CDPE interference.
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
L	Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to +/- RL instead of 20% RPD
J	Estimated concentration value detected below the reporting limit.
H	Hold time violation - Hold time was exceeded.
EMPC	Estimated Maximum Possible Concentration qualifier for HRGCMS Dioxin
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL)
D	The reported value is from a dilution
B	This analyte was detected in the method blank.
*	Flagged value is not within established control limits.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Analytical Resources, LLC
Analytical Chemists and Consultants

SED-07C:0-1

Form I
ORGANIC ANALYSIS DATA SHEET
EPA 8270E-SIM
Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0619-01 A	SDG:	23C0619
Sampled:	03/22/23 07:29	Prepared:	03/28/23 12:28	File ID:	2023040623.D
% Solids:	84.09	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/06/23 21:51
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	5.98 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	3.61	J	0.447	3.84
14488-53-0	Dibutyltin Ion	1	5.75	U	1.72	5.75
78763-54-9	Butyltin Ion	1	4.06	U	1.88	4.06
1461-25-2	Tetrabutyltin	1	4.97	U	4.97	4.97

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	44.921	36.0	80.1	30 - 160	
Tripropyltin	43.497	33.5	77.0	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040623.D

Page 1

Date : 06-APR-2023 21:51

Client ID:

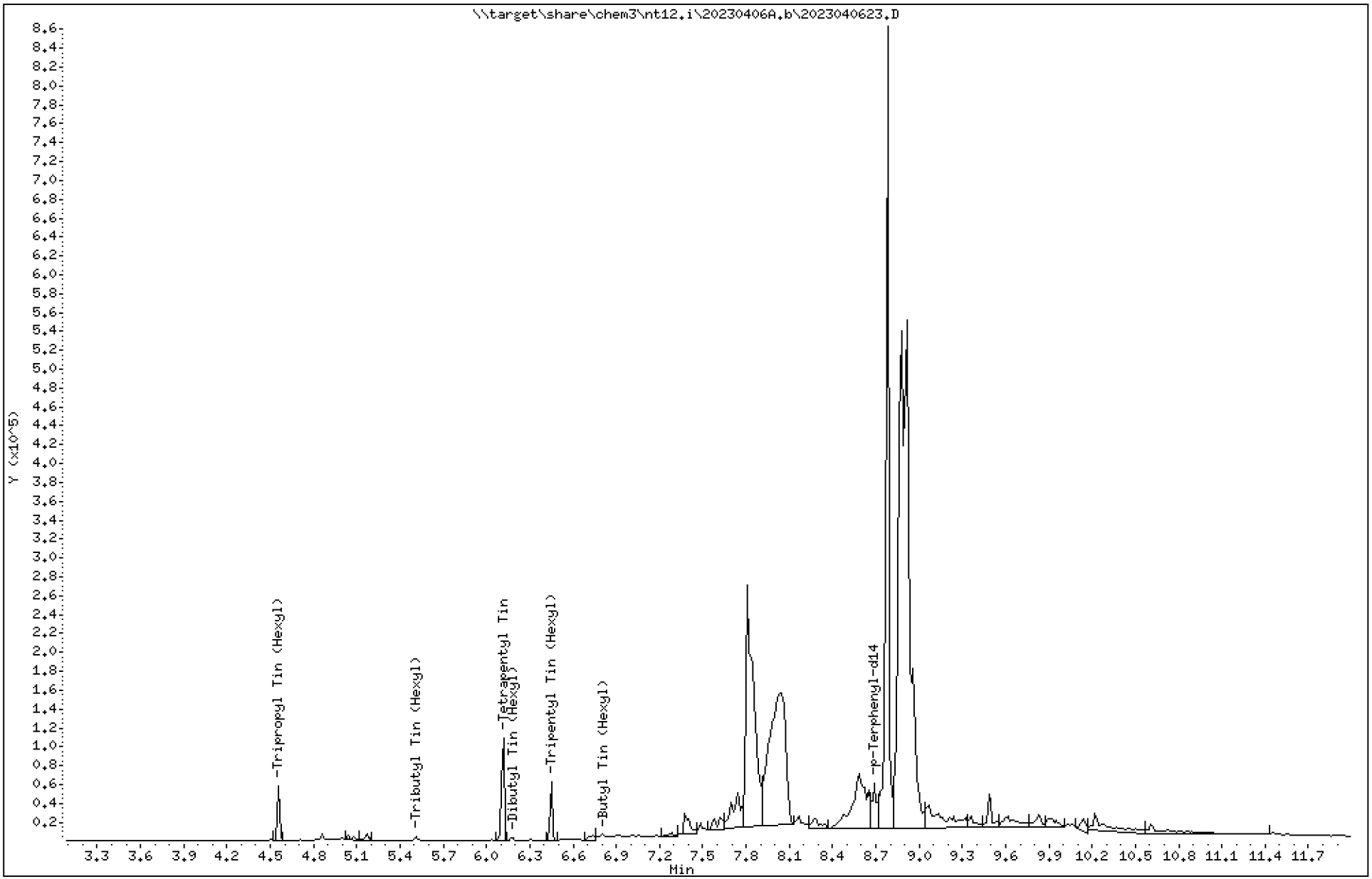
Instrument: nt12.i

Sample Info: 23C0619-01

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0619 CLPLIKE (Rev0) - Page 11 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040623.D

Date : 06-APR-2023 21:51

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-01

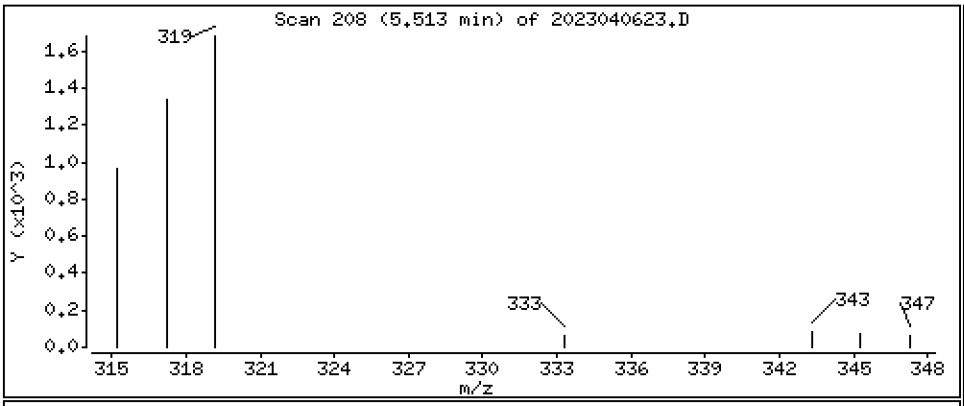
Operator: JZ

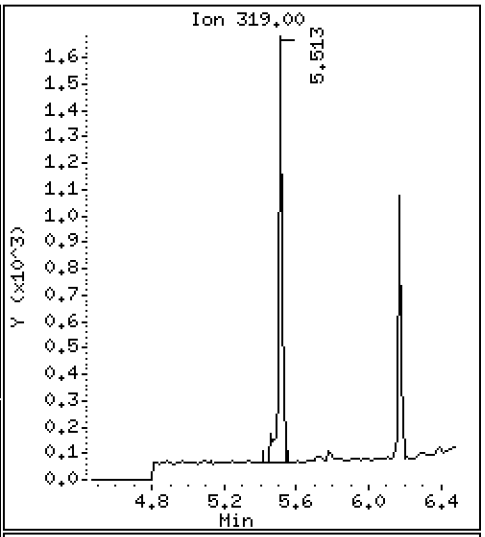
Column phase: ZB-5msi

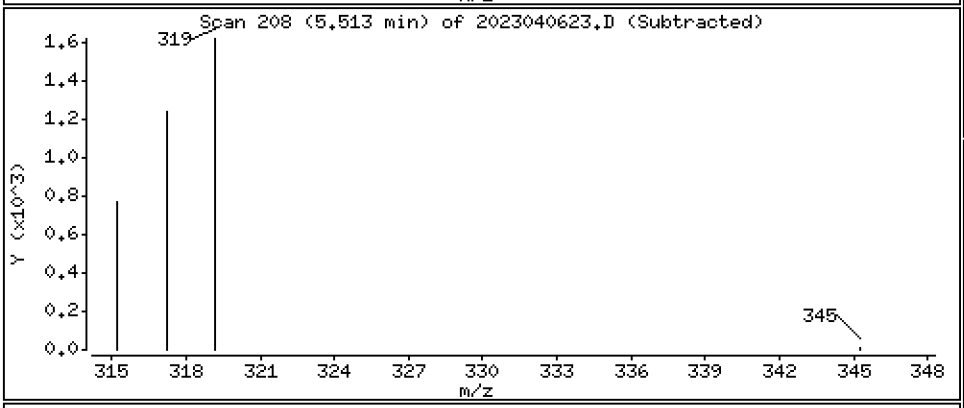
Column diameter: 0.25

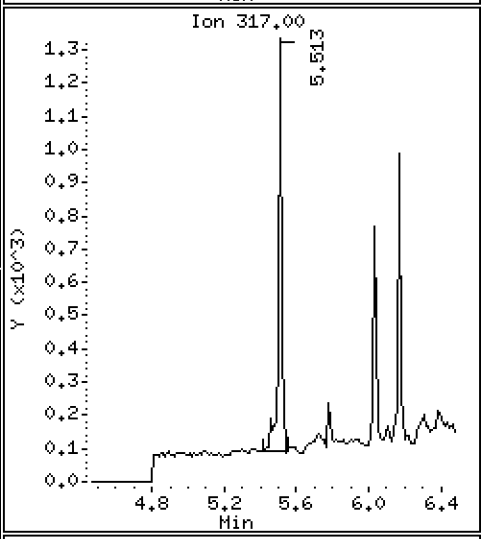
3 Tributyl Tin (Hexyl)

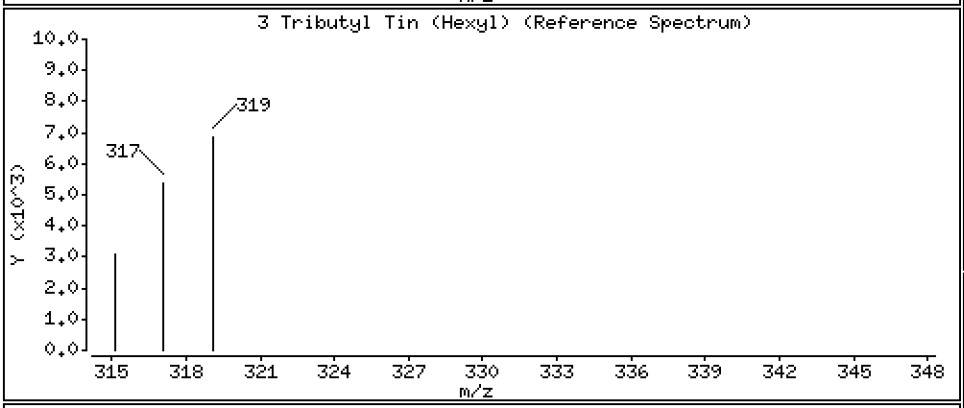
Concentration: 0.04691 ug/mL

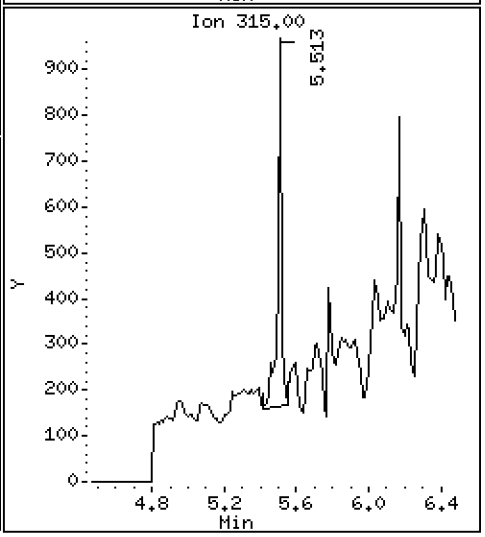


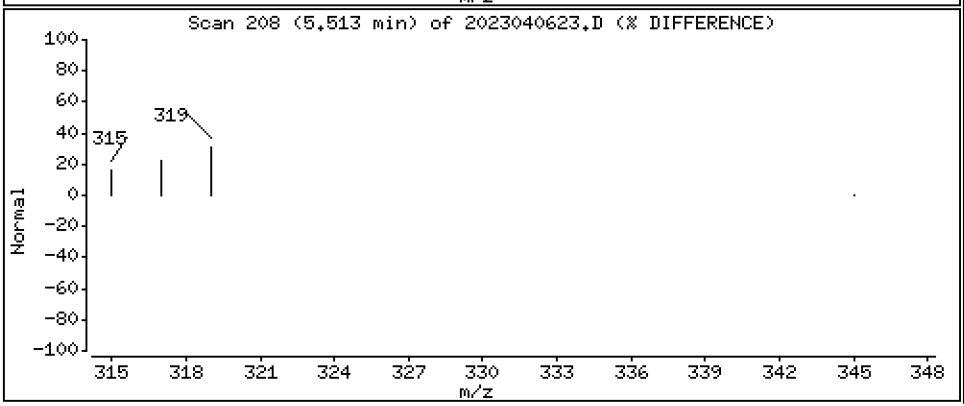












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Date : 06-APR-2023 21:51

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-01

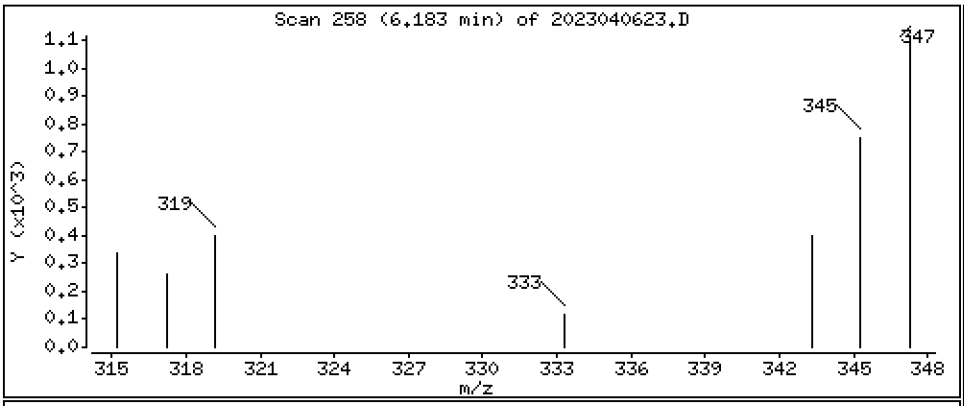
Operator: JZ

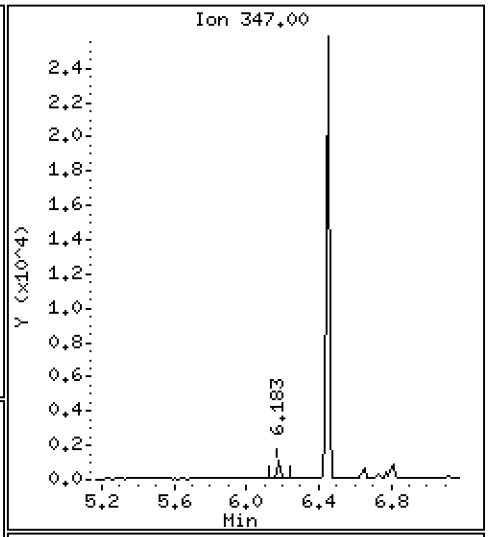
Column phase: ZB-5msi

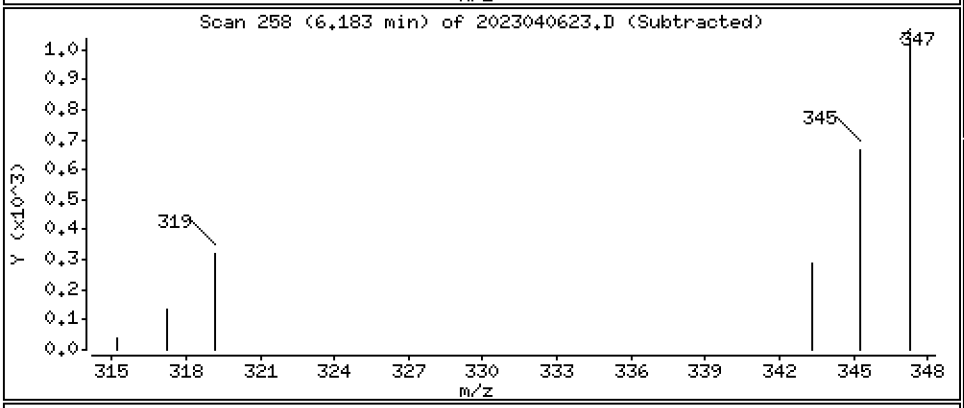
Column diameter: 0.25

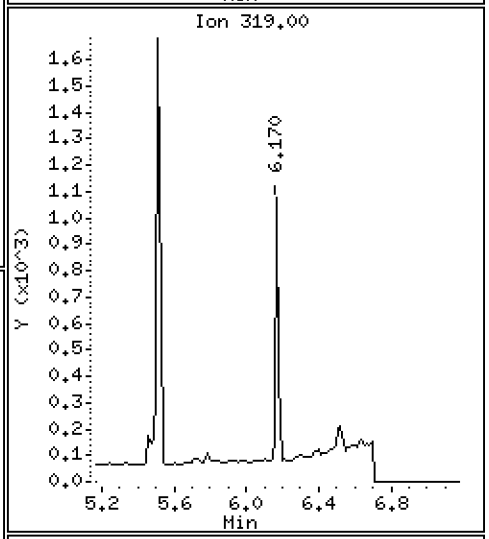
5 Dibutyl Tin (Hexyl)

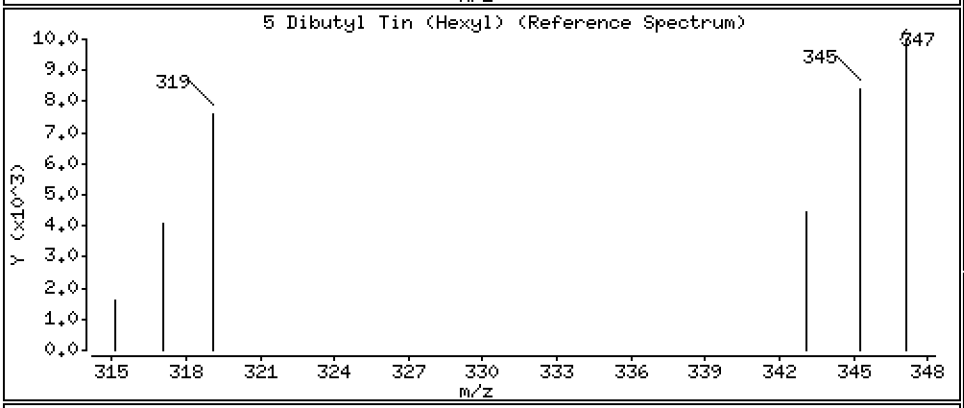
Concentration: 0.02697 ug/mL

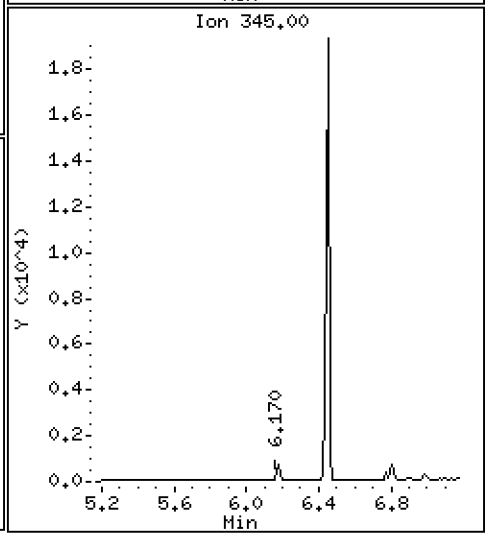


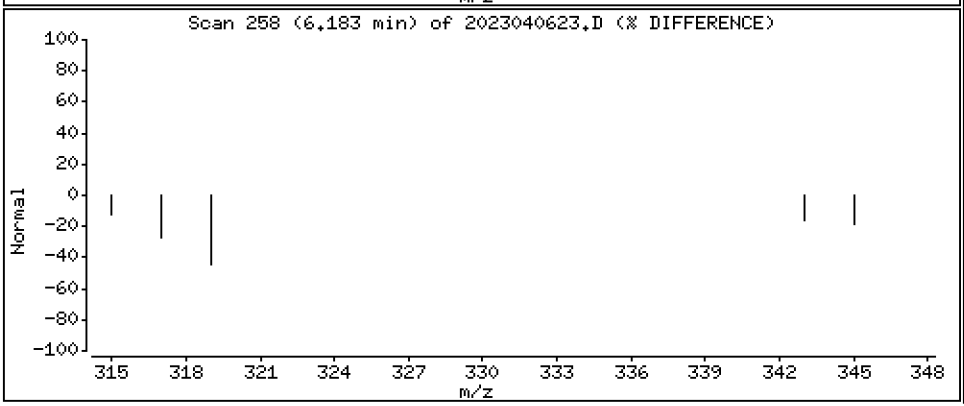












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040623.D

Date : 06-APR-2023 21:51

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-01

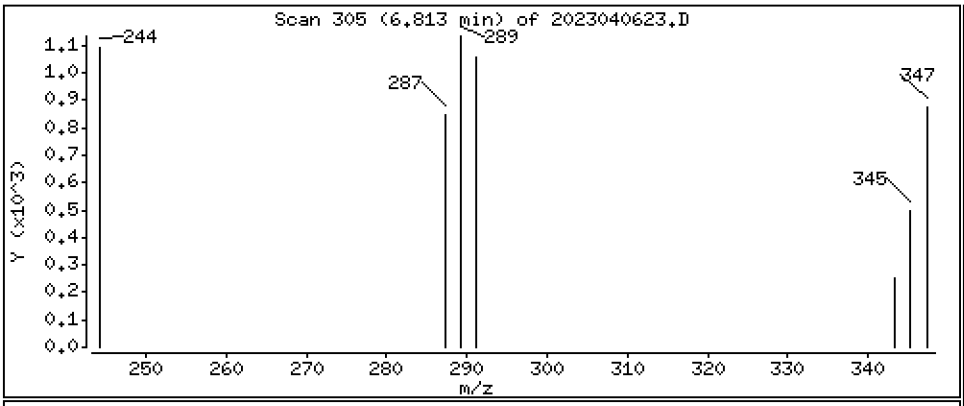
Operator: JZ

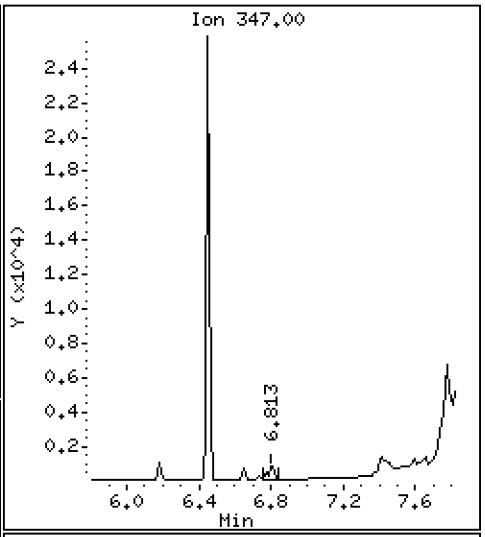
Column phase: ZB-5msi

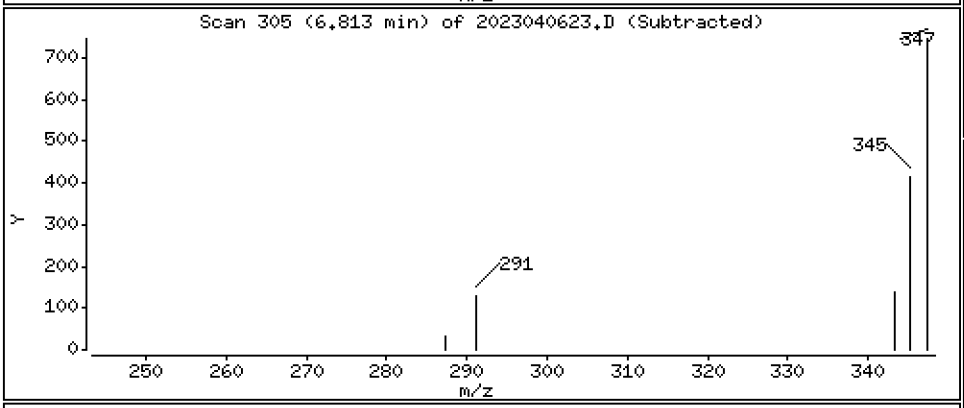
Column diameter: 0.25

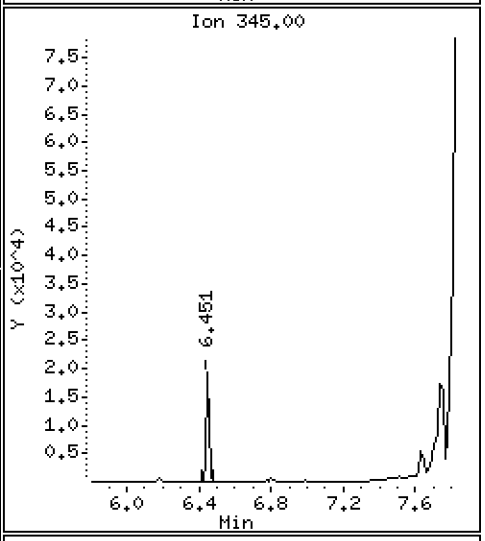
7 Butyl Tin (Hexyl)

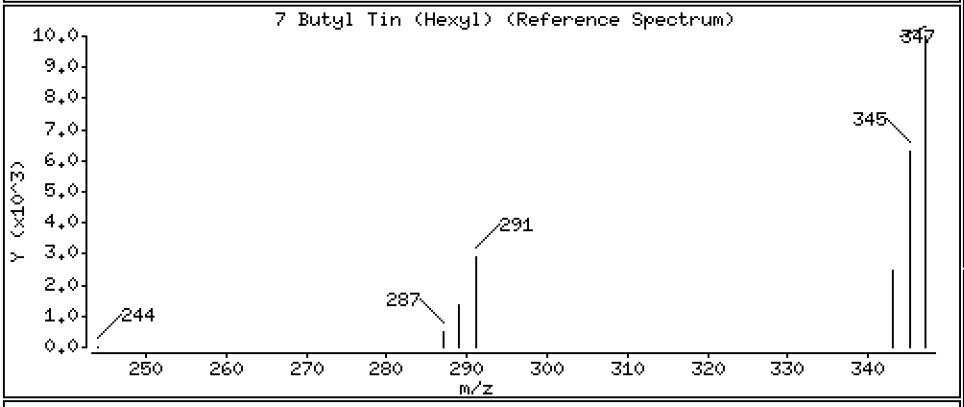
Concentration: 0.02796 ug/mL

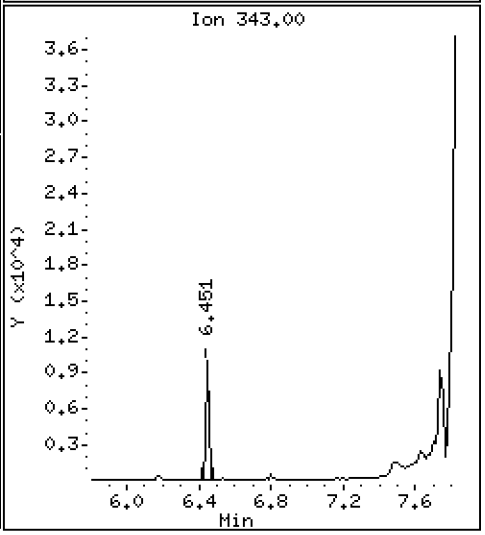


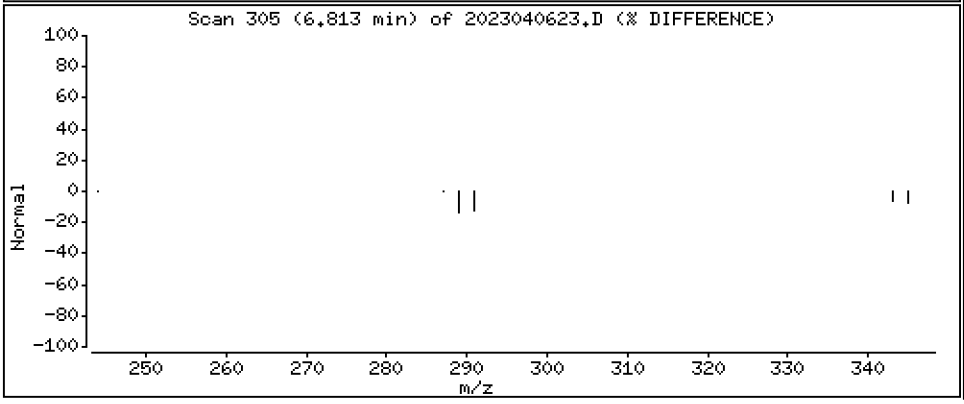












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040623.D
Lab Smp Id: 23C0619-01
Inj Date : 06-APR-2023 21:51
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0619-01
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 23
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.560	4.514	(0.746)	27388	0.45241	0.4524
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.513	5.472	(0.901)	2224	0.04691	0.04691
*	4 Tetrapentyl Tin	333	6.116	6.102	(1.000)	143179	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	1034	0.02697	0.02697(M)
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	25642	0.45468	0.4547
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	1725	0.02796	0.02796
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	22833	0.20000	

QC Flag Legend

M - Compound response manually integrated.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040623.D
Lab Smp Id: 23C0619-01
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

COMPOUND	STANDARD	AREA LIMIT LOWER	AREA LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	143179	-12.79
8 p-Terphenyl-d14	22611	11306	45222	22833	0.98

COMPOUND	STANDARD	RT LIMIT LOWER	RT LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.12	0.22
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040623.D

Lab ID: 23C0619-01
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 21:51

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.746	0.740	0.0059	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

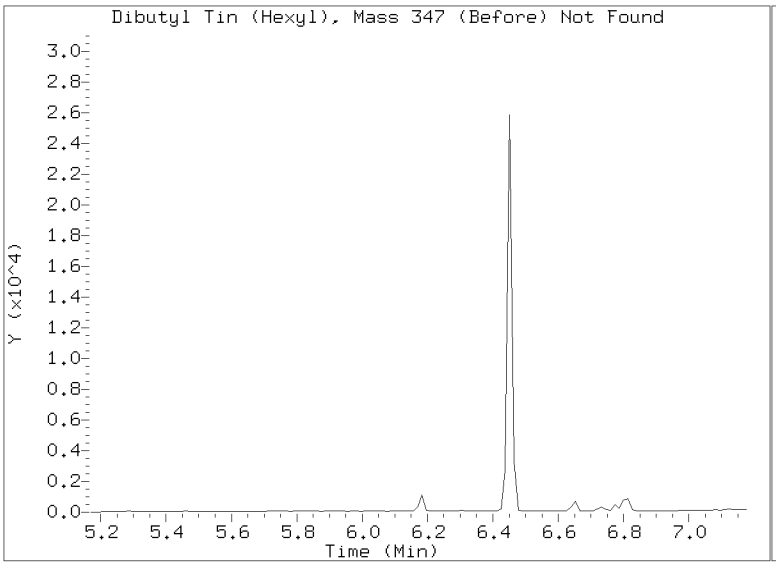
On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

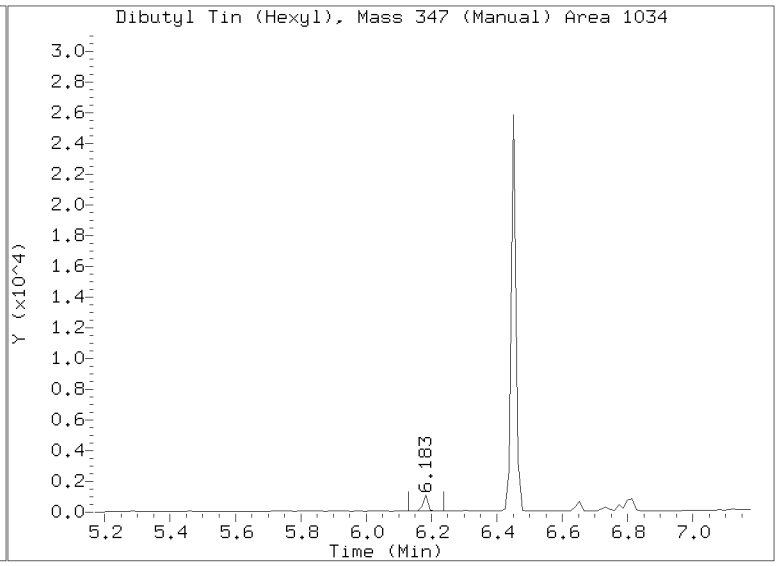
Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Quant Ion Manual Peak Adjustment Report

Datafile: //target/share/chem3/nt12.i/20230406A.b/2023040623.D
Injection Date: 06-APR-2023 21:51
Lab ID:23C0619-01 Client ID:
Report Date: 04/07/2023 10:50





Analytical Resources, LLC
Analytical Chemists and Consultants

SED-07C:1-3

Form I

ORGANIC ANALYSIS DATA SHEET

EPA 8270E-SIM

Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0619-02 A	SDG:	23C0619
Sampled:	03/22/23 07:29	Prepared:	03/28/23 12:28	File ID:	2023040627.D
% Solids:	76.13	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/06/23 22:56
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	6.59 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	1.22	J	0.448	3.85
14488-53-0	Dibutyltin Ion	1	5.76	U	1.72	5.76
78763-54-9	Butyltin Ion	1	4.07	U	1.88	4.07
1461-25-2	Tetrabutyltin	1	4.98	U	4.98	4.98

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	45.025	36.7	81.4	30 - 160	
Tripropyltin	43.598	36.4	83.4	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040627.D

Page 1

Date : 06-APR-2023 22:56

Client ID:

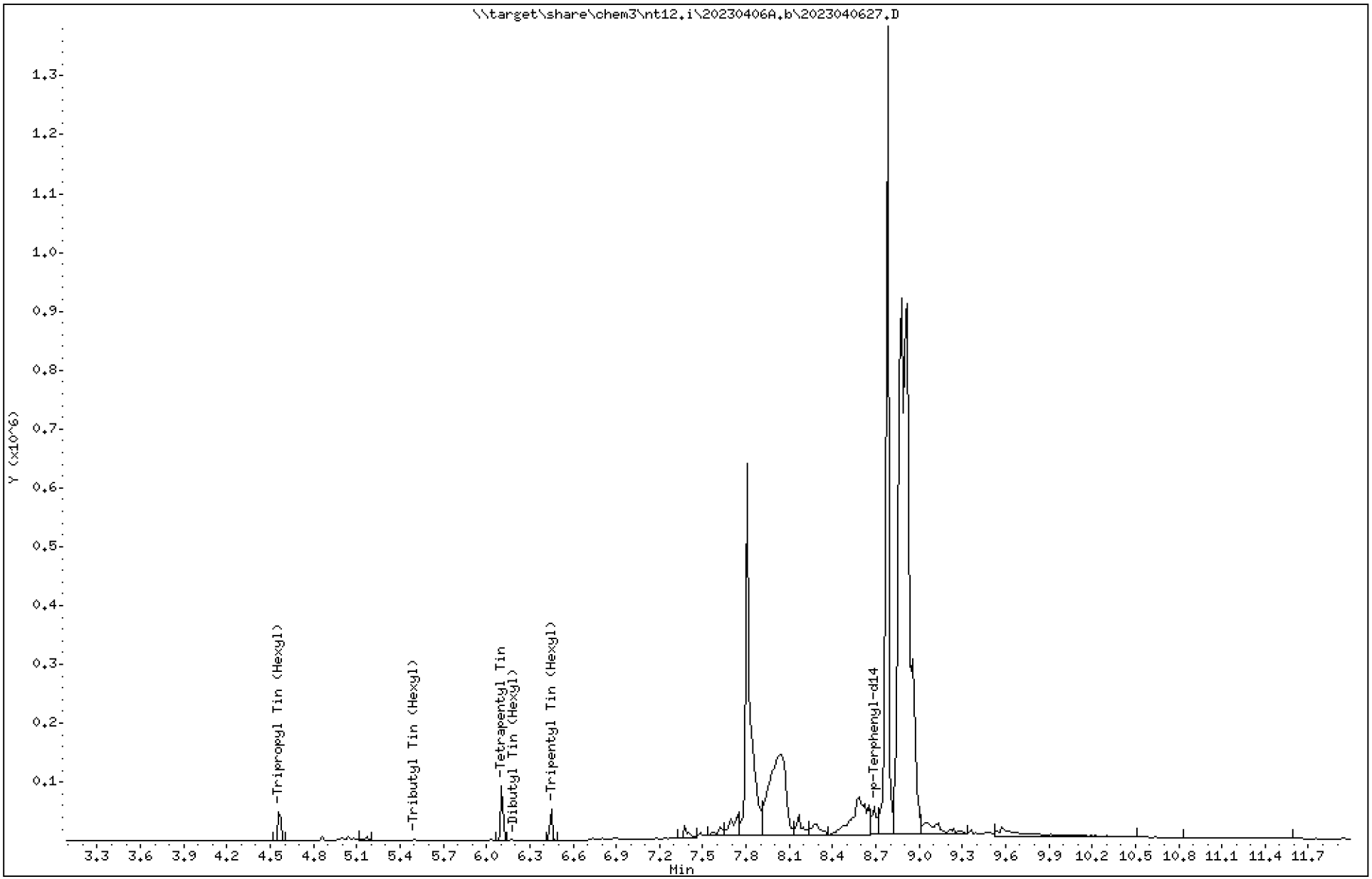
Instrument: nt12.i

Sample Info: 23C0619-02

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0619 CLPLIKE (Rev0) - Page 20 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040627.D

Date : 06-APR-2023 22:56

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-02

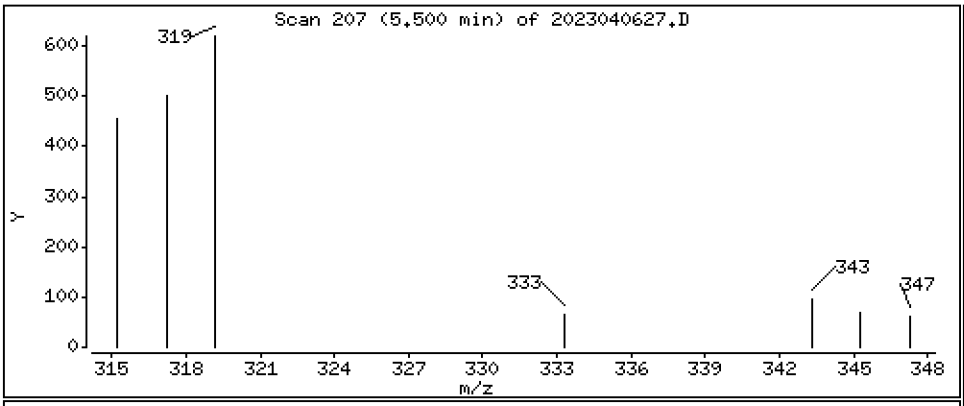
Operator: JZ

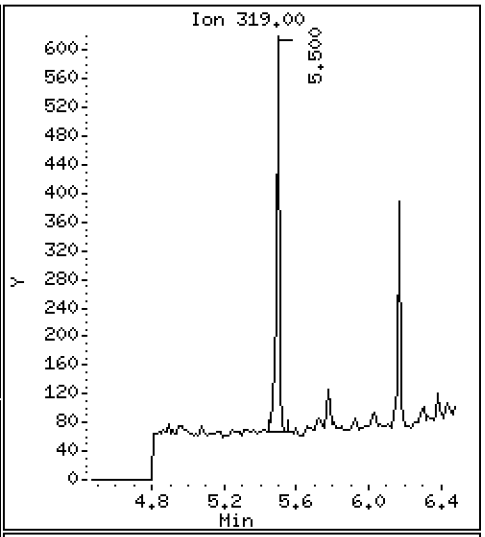
Column phase: ZB-5msi

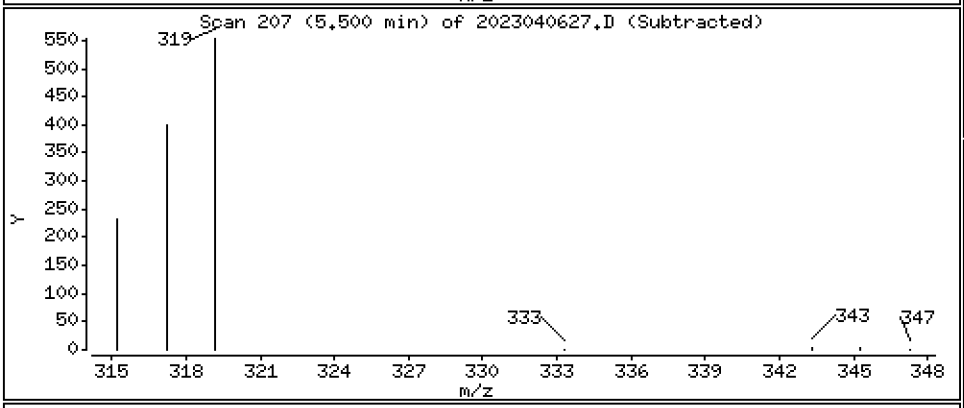
Column diameter: 0.25

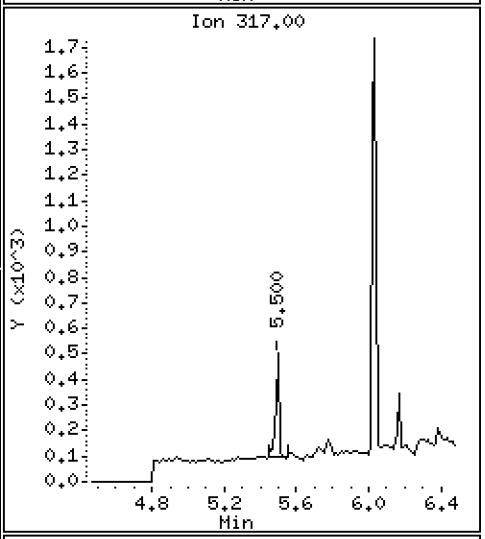
3 Tributyl Tin (Hexyl)

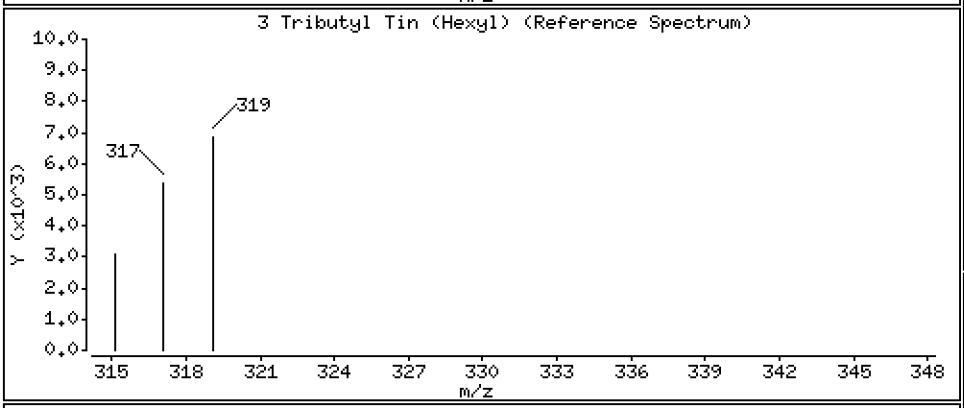
Concentration: 0.01590 ug/mL

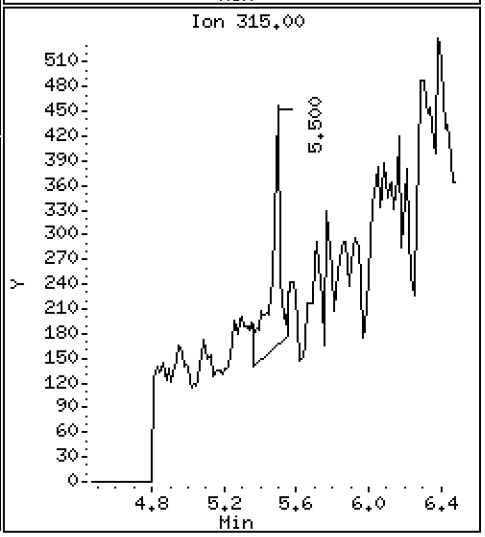


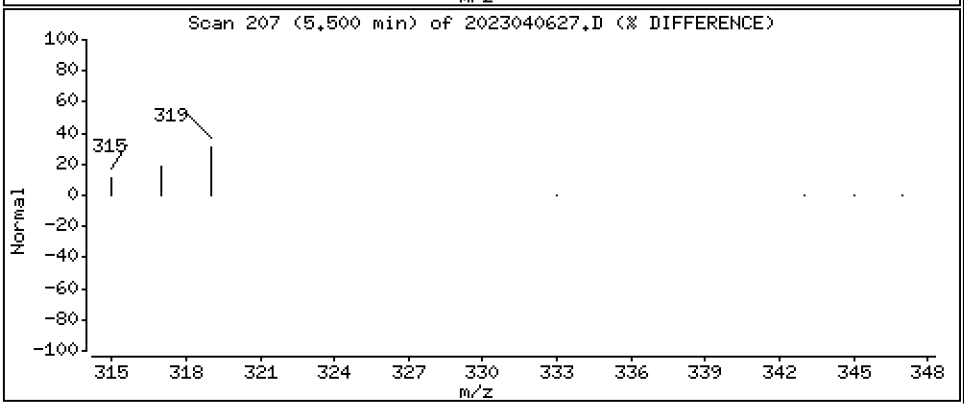












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Date : 06-APR-2023 22:56

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-02

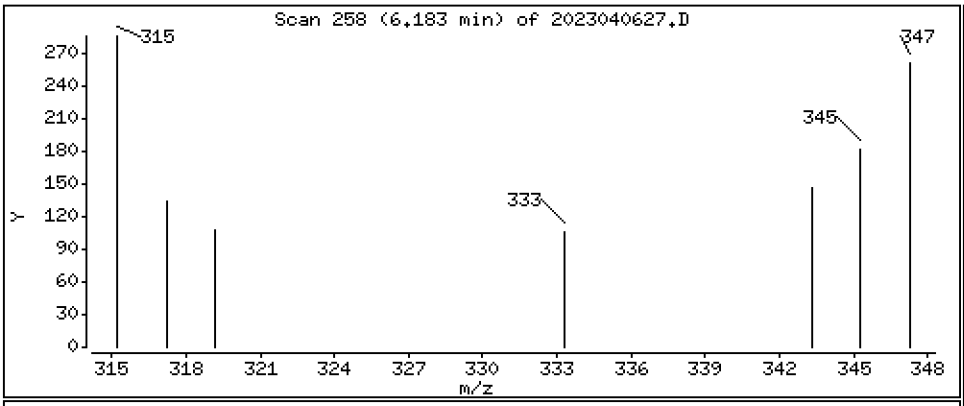
Operator: JZ

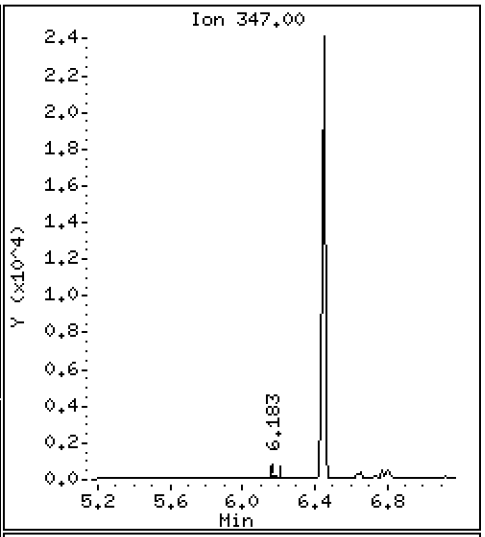
Column phase: ZB-5msi

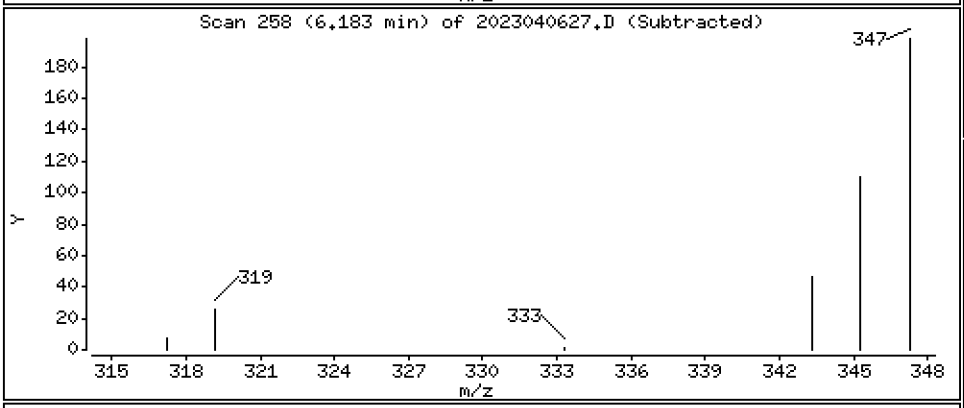
Column diameter: 0.25

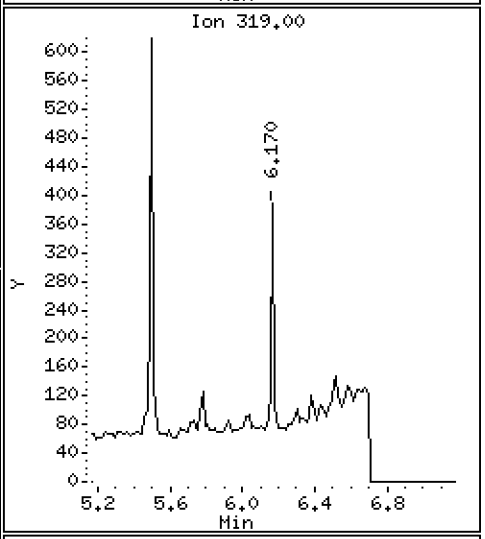
5 Dibutyl Tin (Hexyl)

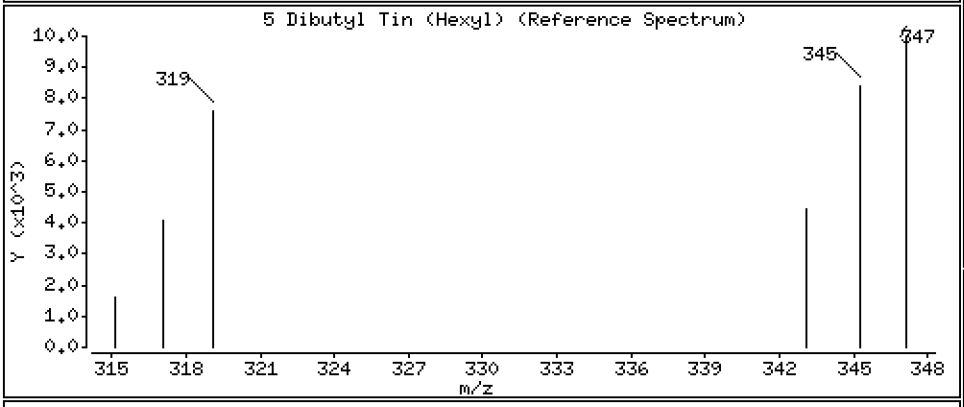
Concentration: 0.008138 ug/mL

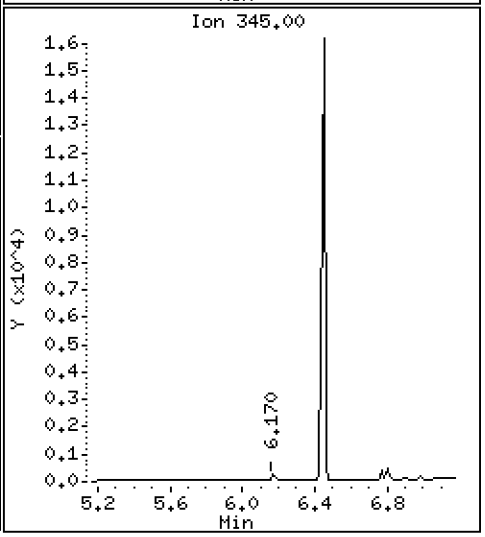


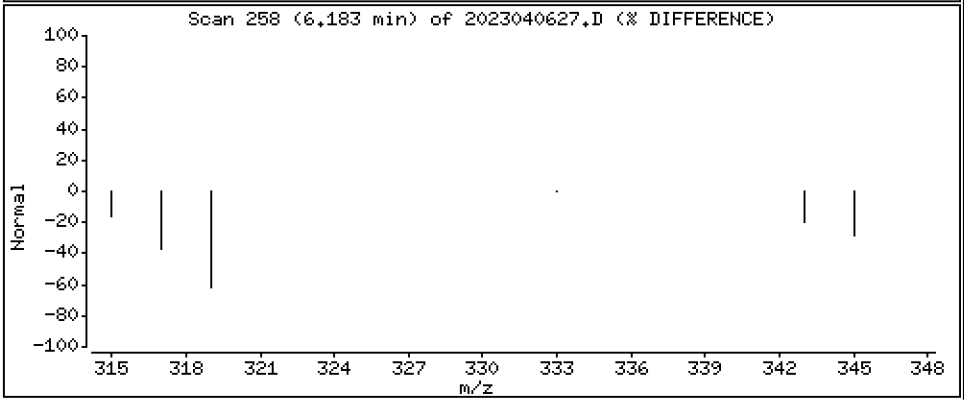












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040627.D
Lab Smp Id: 23C0619-02
Inj Date : 06-APR-2023 22:56
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0619-02
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 27
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.571	4.514	(0.749)	26890	0.49021	0.4902
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.499	5.472	(0.901)	683	0.01590	0.01590
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	129737	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	285	0.00814	0.008138(M)
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	23808	0.46206	0.4621
	7 Butyl Tin (Hexyl)	347	Compound Not Detected.					
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	20861	0.20000	

QC Flag Legend

M - Compound response manually integrated.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040627.D
Lab Smp Id: 23C0619-02
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	129737	-20.97
8 p-Terphenyl-d14	22611	11306	45222	20861	-7.74

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040627.D

Lab ID: 23C0619-02
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 22:56

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.749	0.740	0.0094	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

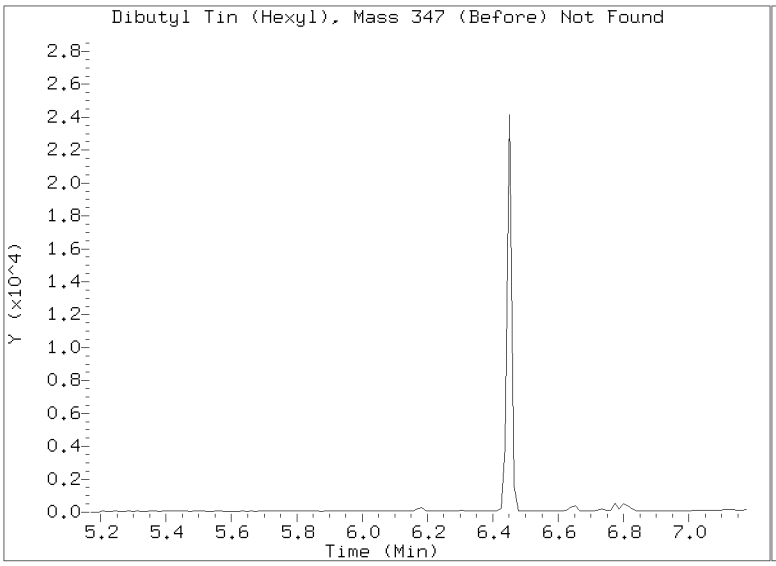
On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

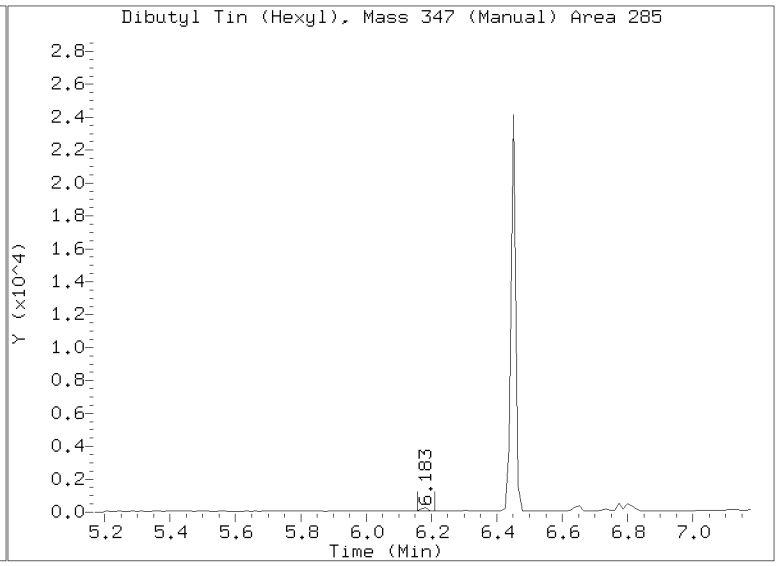
Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Quant Ion Manual Peak Adjustment Report

Datafile: //target/share/chem3/nt12.i/20230406A.b/2023040627.D
Injection Date: 06-APR-2023 22:56
Lab ID:23C0619-02 Client ID:
Report Date: 04/07/2023 10:50





Analytical Resources, LLC
Analytical Chemists and Consultants

SED-08C:0-1

Form I
ORGANIC ANALYSIS DATA SHEET
EPA 8270E-SIM
Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0619-03 A	SDG:	23C0619
Sampled:	03/22/23 08:07	Prepared:	03/28/23 12:28	File ID:	2023040628.D
% Solids:	70.22	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/06/23 23:13
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	7.17 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

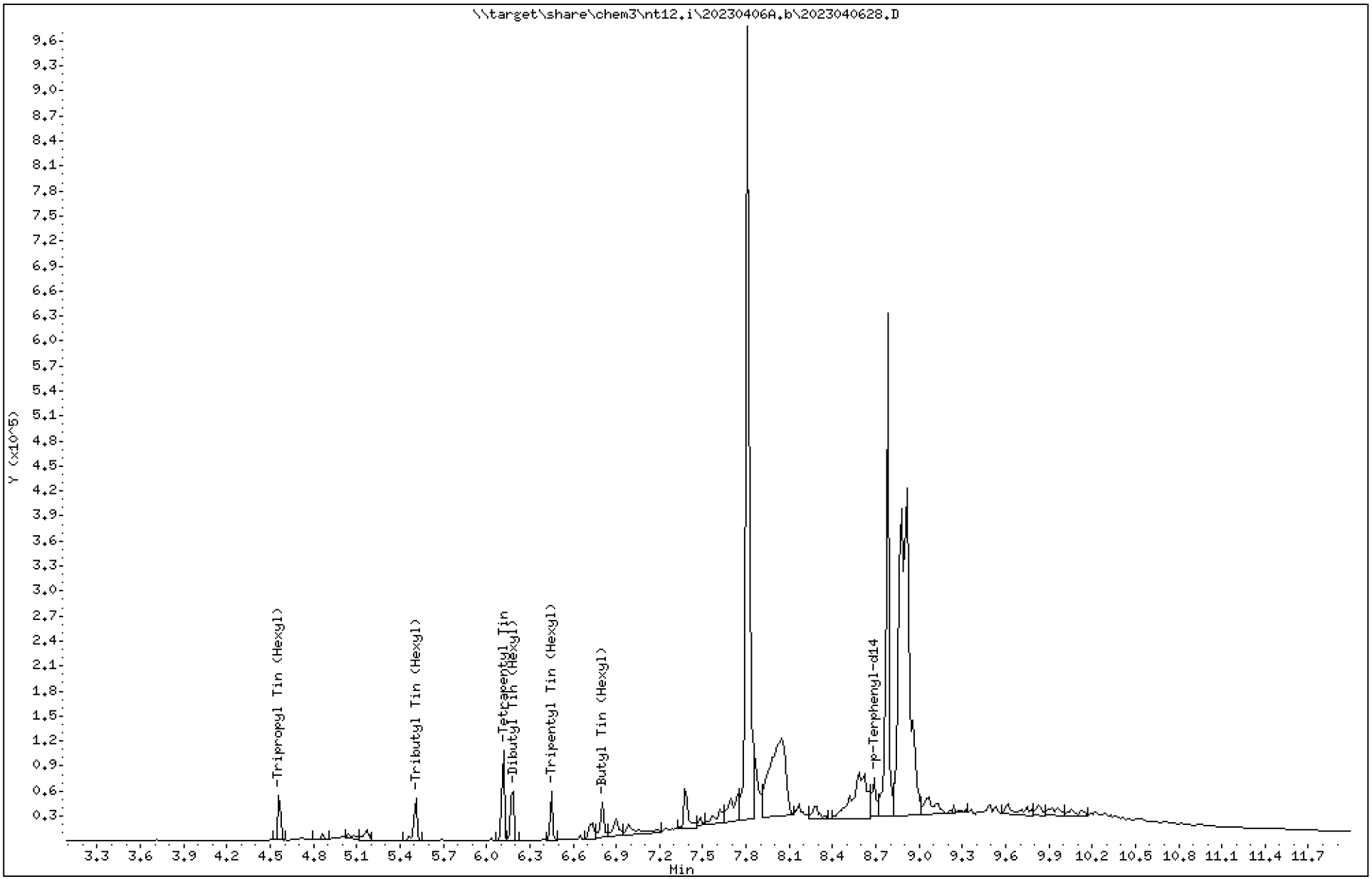
CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	58.3		0.447	3.83
14488-53-0	Dibutyltin Ion	1	36.4		1.72	5.74
78763-54-9	Butyltin Ion	1	10.4		1.88	4.05
1461-25-2	Tetrabutyltin	1	4.97	U	4.97	4.97

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	44.866	36.7	81.8	30 - 160	
Tripropyltin	43.444	34.8	80.0	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040628.D
Date : 06-APR-2023 23:13
Client ID:
Sample Info: 23C0619-03

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



23C0619 CLPLIKE (Rev0) - Page 28 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040628.D

Date : 06-APR-2023 23:13

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-03

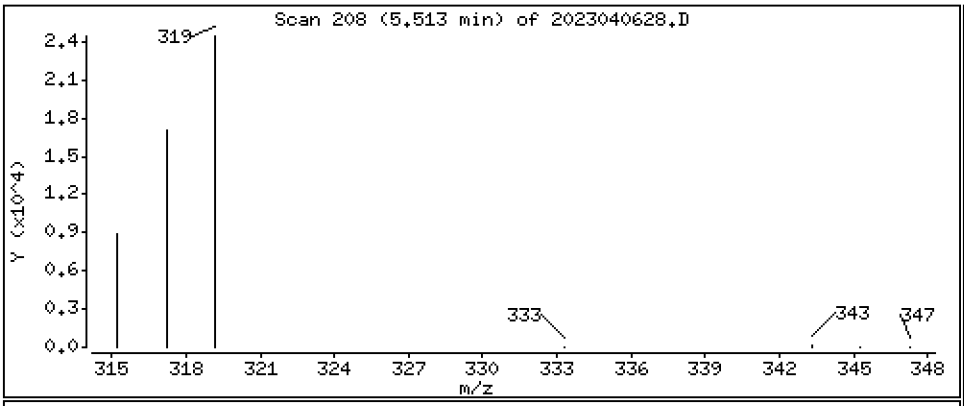
Operator: JZ

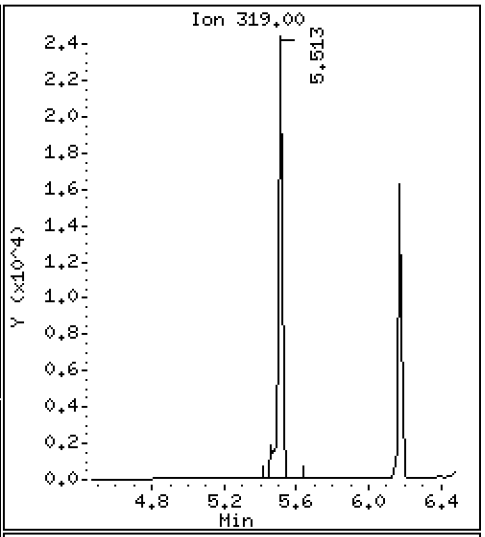
Column phase: ZB-5msi

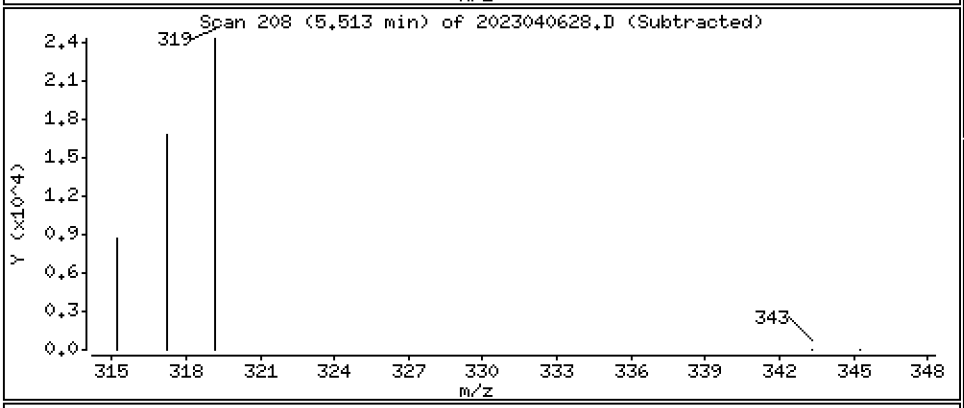
Column diameter: 0.25

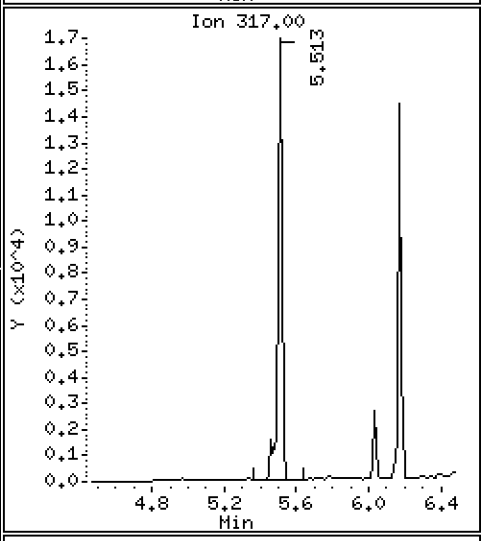
3 Tributyl Tin (Hexyl)

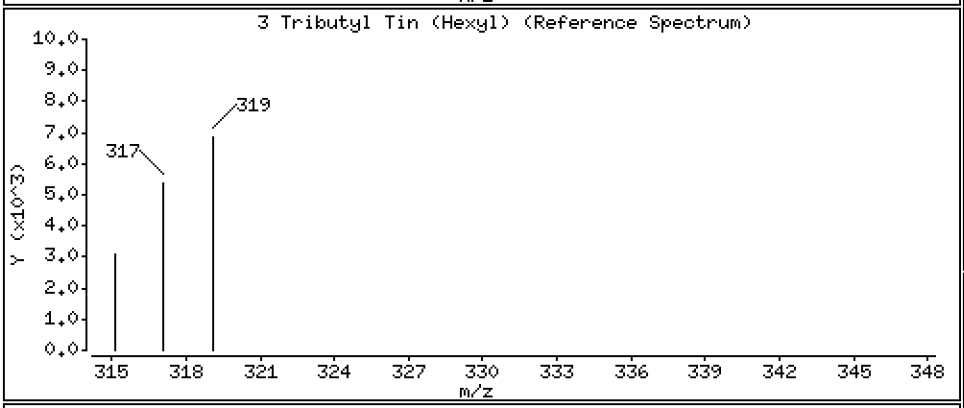
Concentration: 0.7598 ug/mL

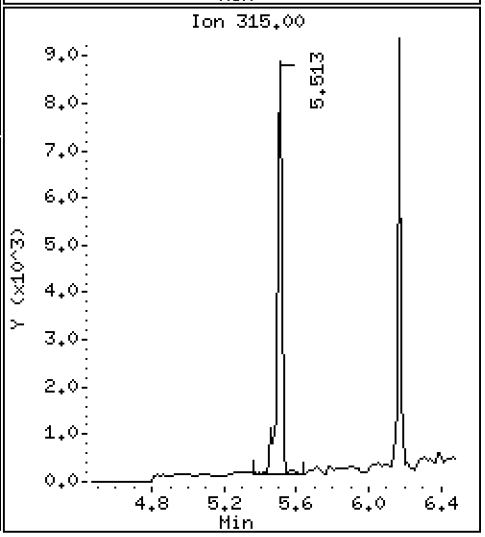


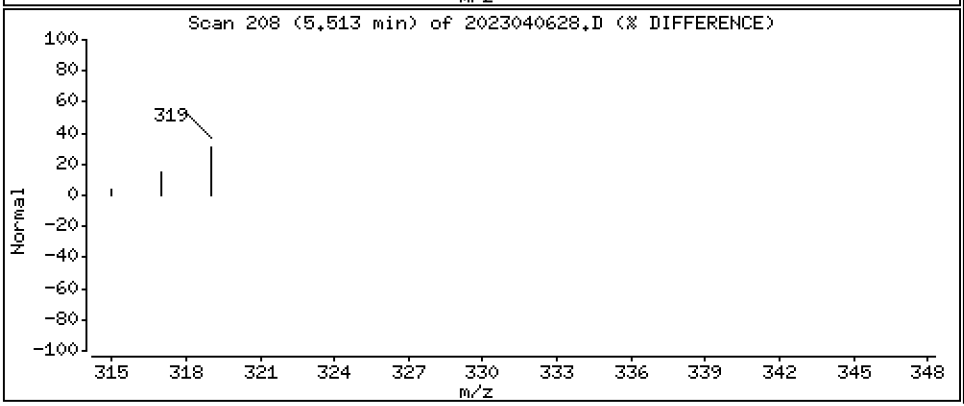












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Date : 06-APR-2023 23:13

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-03

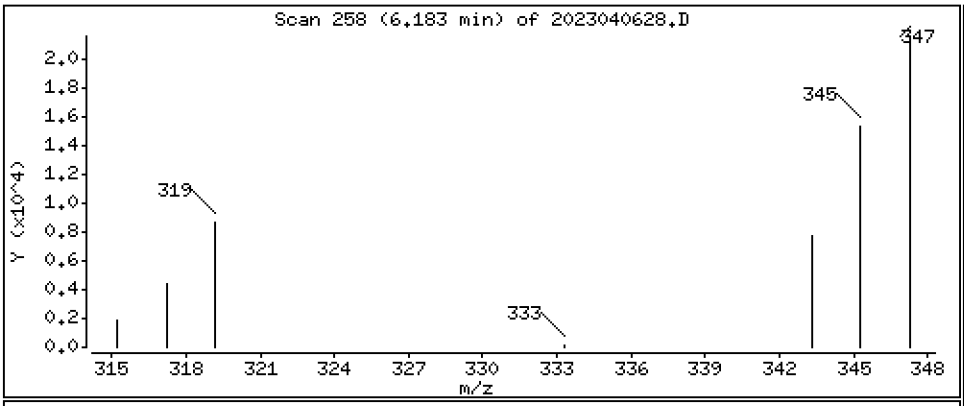
Operator: JZ

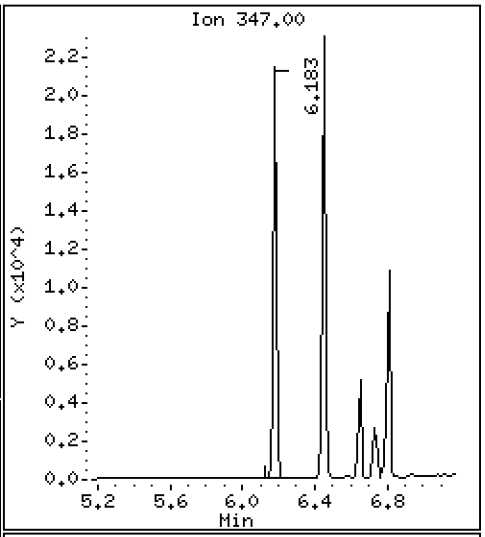
Column phase: ZB-5msi

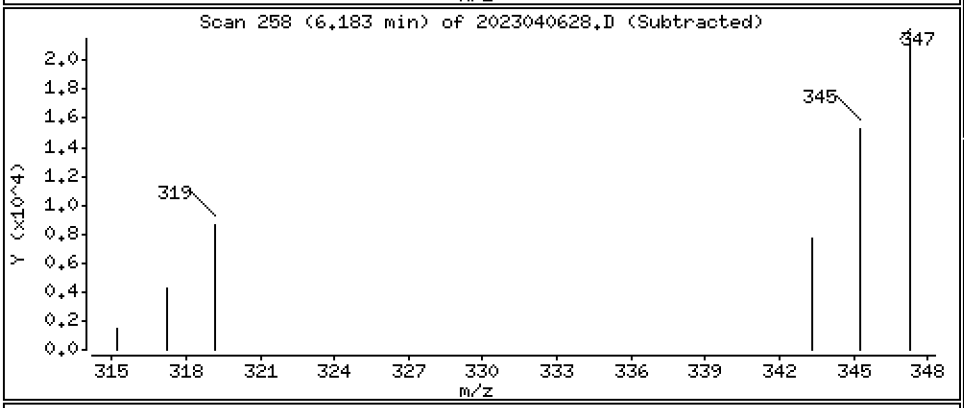
Column diameter: 0.25

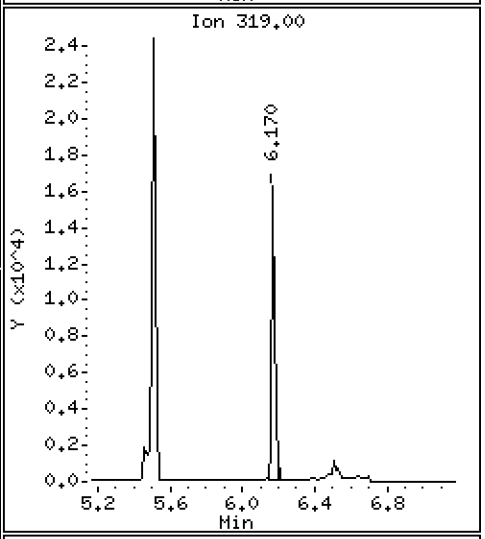
5 Dibutyl Tin (Hexyl)

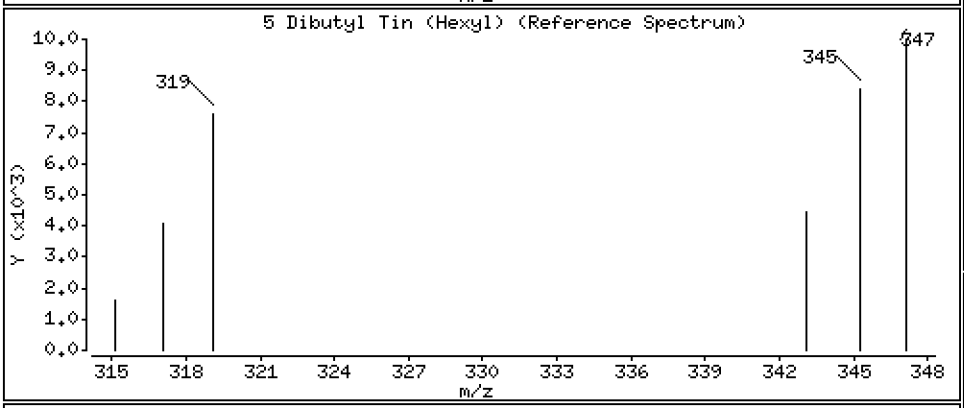
Concentration: 0.6334 ug/mL

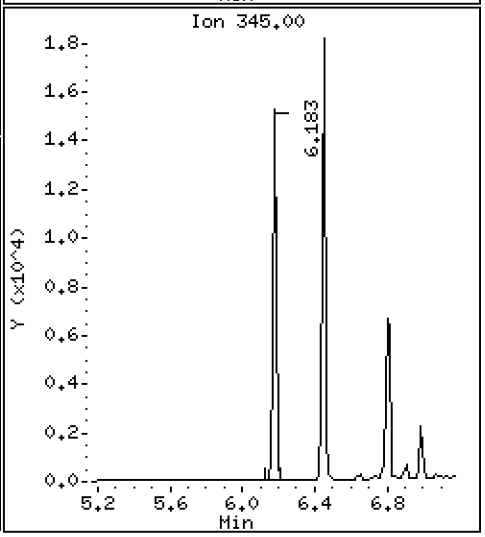


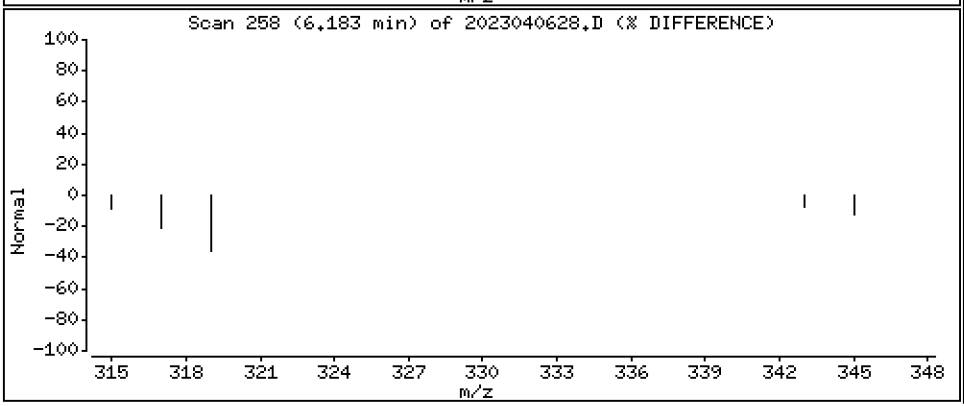












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Date : 06-APR-2023 23:13

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-03

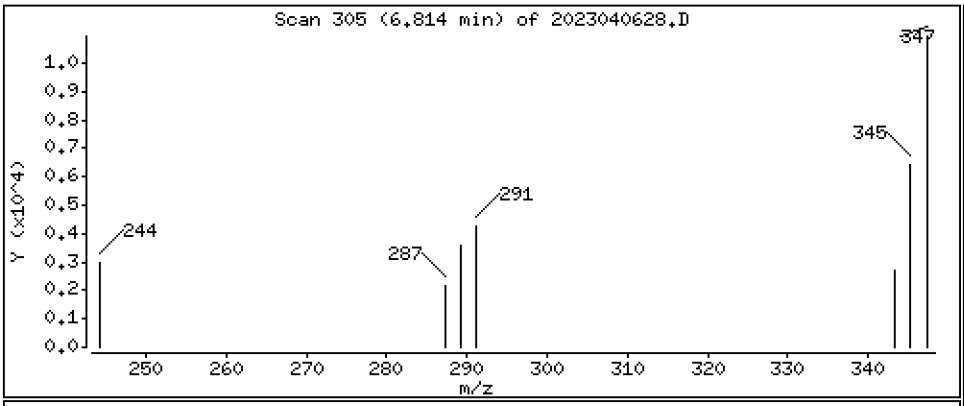
Operator: JZ

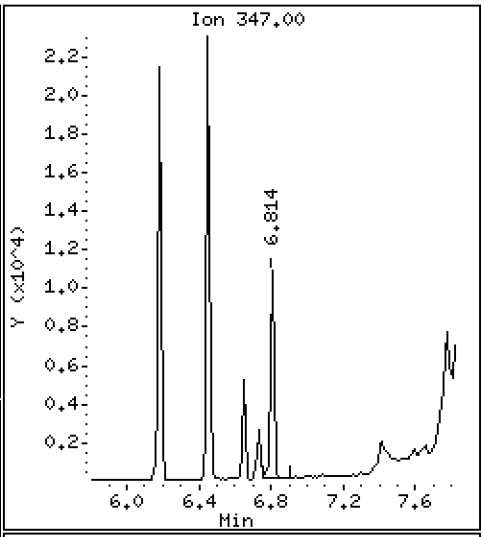
Column phase: ZB-5msi

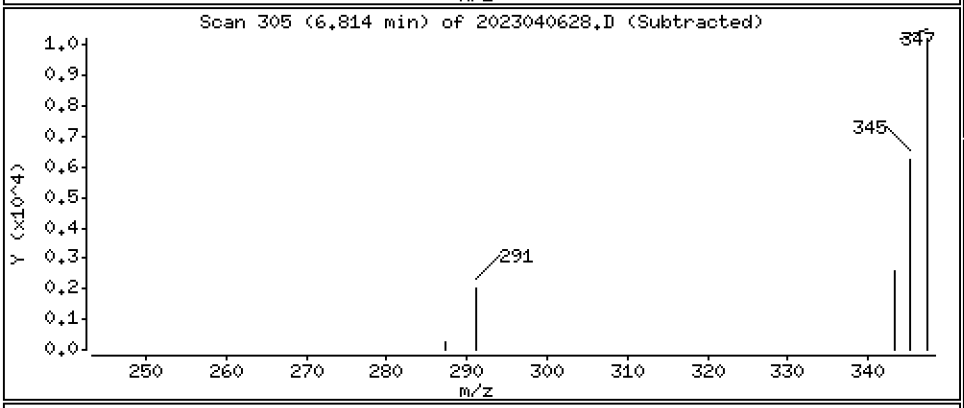
Column diameter: 0.25

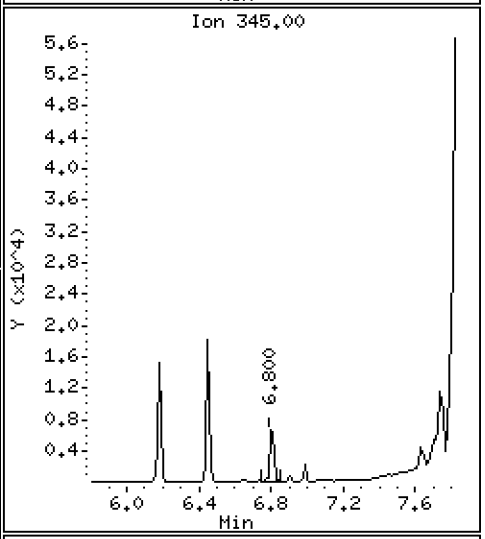
7 Butyl Tin (Hexyl)

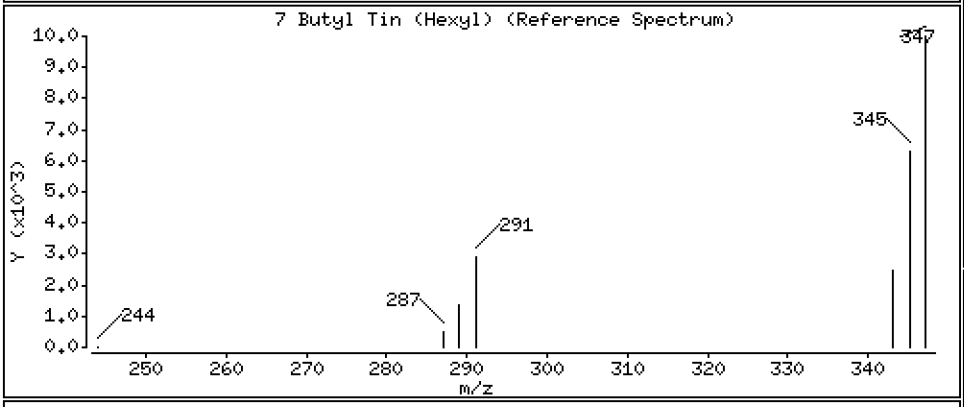
Concentration: 0.2556 ug/mL

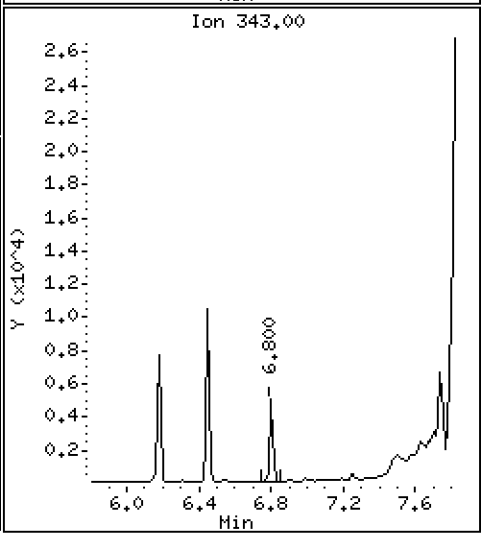


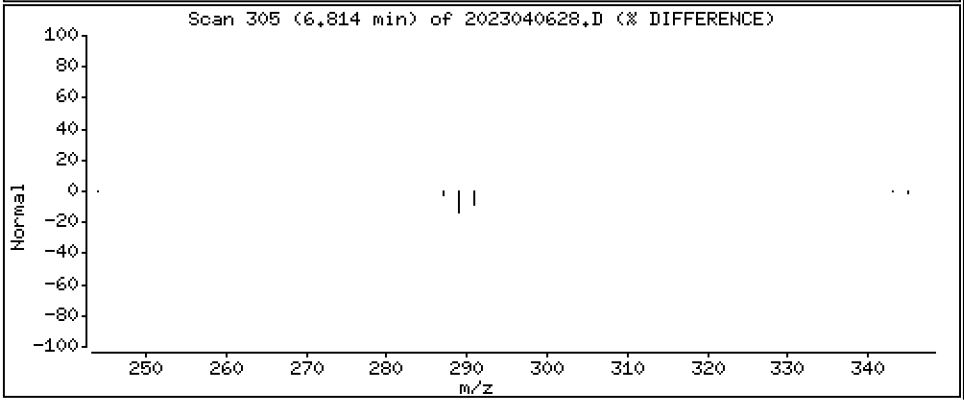












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040628.D
Lab Smp Id: 23C0619-03
Inj Date : 06-APR-2023 23:13
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0619-03
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 28
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.560	4.514	(0.746)	26301	0.47032	0.4703
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.513	5.472	(0.901)	33273	0.75981	0.7598
*	4 Tetrapentyl Tin	333	6.116	6.102	(1.000)	132262	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	22877	0.63340	0.6334
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	24679	0.46445	0.4645
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	14855	0.25559	0.2556(M)
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	21513	0.20000	

QC Flag Legend

M - Compound response manually integrated.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040628.D
Lab Smp Id: 23C0619-03
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	132262	-19.44
8 p-Terphenyl-d14	22611	11306	45222	21513	-4.86

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.12	0.22
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040628.D

Lab ID: 23C0619-03
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 23:13

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.746	0.740	0.0059	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

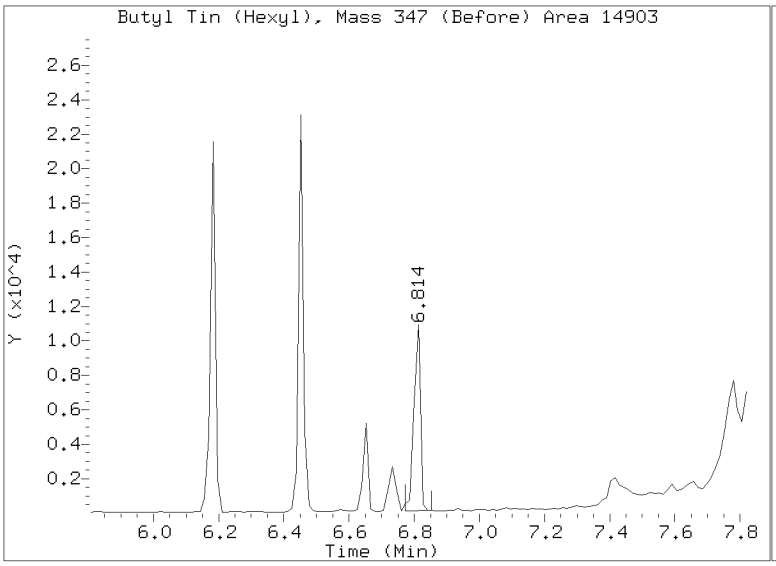
On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

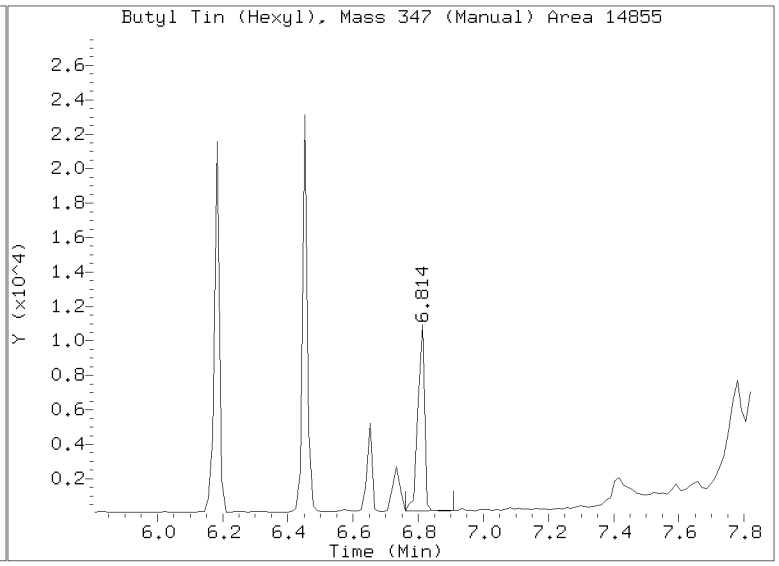
Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Quant Ion Manual Peak Adjustment Report

Datafile: //target/share/chem3/nt12.i/20230406A.b/2023040628.D
Injection Date: 06-APR-2023 23:13
Lab ID:23C0619-03 Client ID:
Report Date: 04/07/2023 11:09





SED-08C:1-3

Form I

ORGANIC ANALYSIS DATA SHEET

EPA 8270E-SIM

Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0619-04 A	SDG:	23C0619
Sampled:	03/22/23 08:07	Prepared:	03/28/23 12:28	File ID:	2023040629.D
% Solids:	74.20	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/06/23 23:29
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	6.76 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

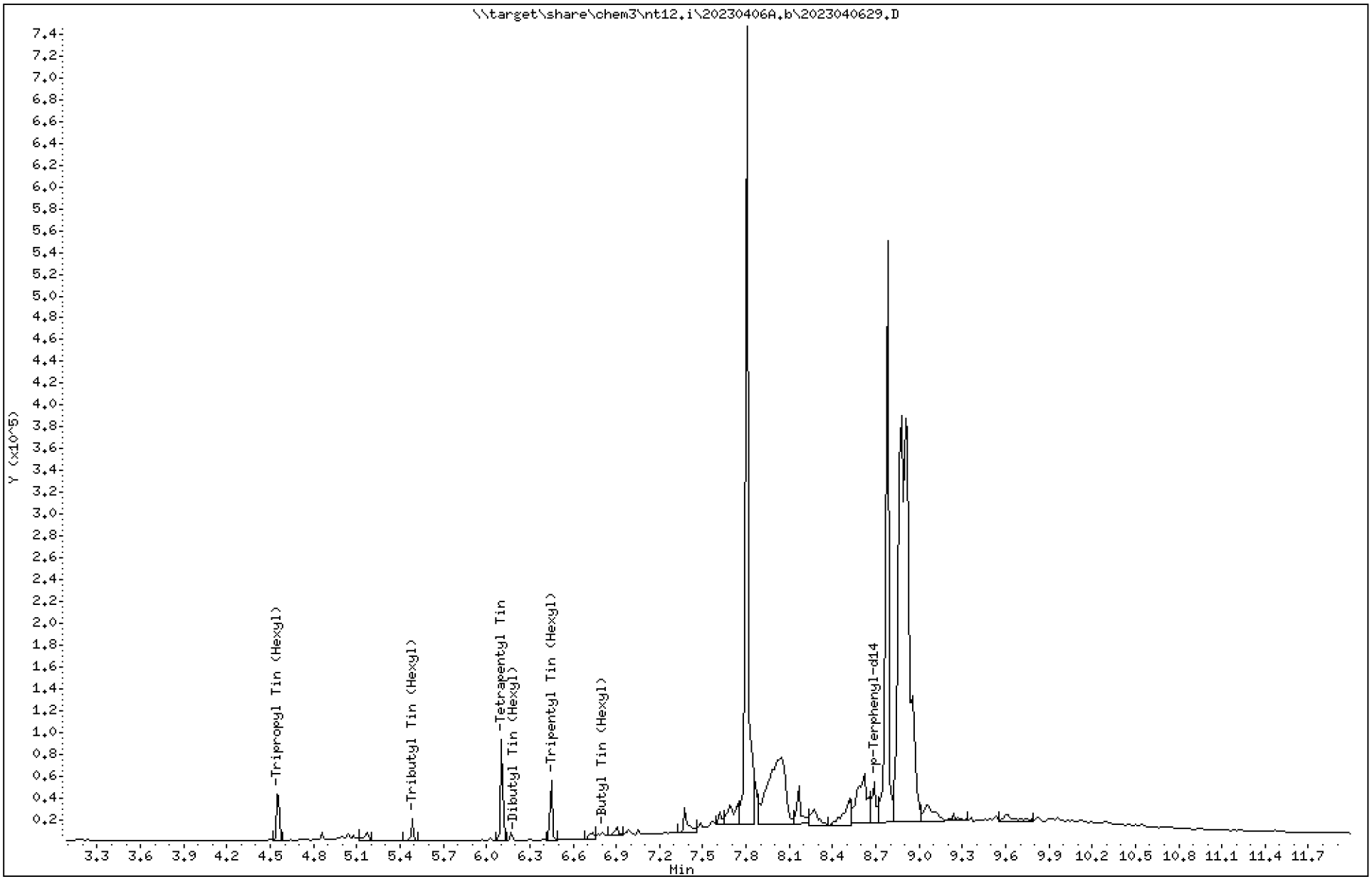
CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	19.7		0.449	3.85
14488-53-0	Dibutyltin Ion	1	3.28	J	1.72	5.76
78763-54-9	Butyltin Ion	1	4.07	U	1.88	4.07
1461-25-2	Tetrabutyltin	1	4.98	U	4.98	4.98

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	45.035	39.8	88.3	30 - 160	
Tripropyltin	43.607	39.5	90.6	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040629.D
Date : 06-APR-2023 23:29
Client ID:
Sample Info: 23C0619-04

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



23C0619 CLPLIKE (Rev0) - Page 37 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040629.D

Date : 06-APR-2023 23:29

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-04

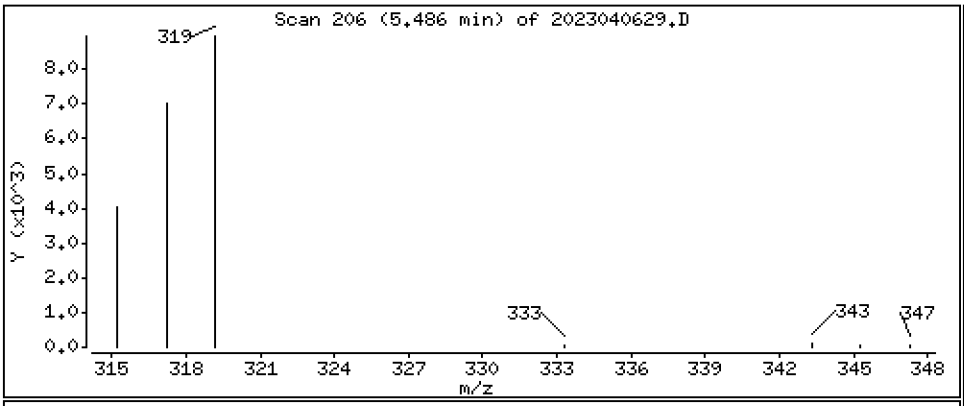
Operator: JZ

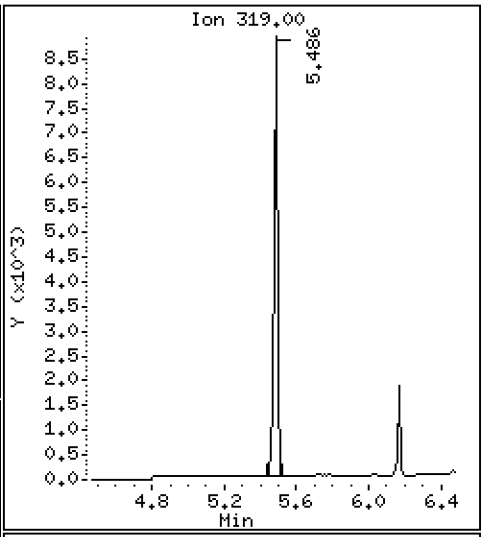
Column phase: ZB-5msi

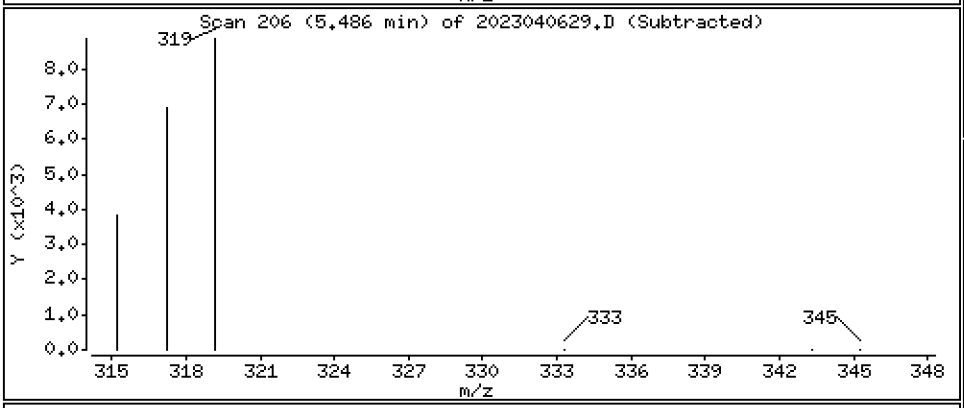
Column diameter: 0.25

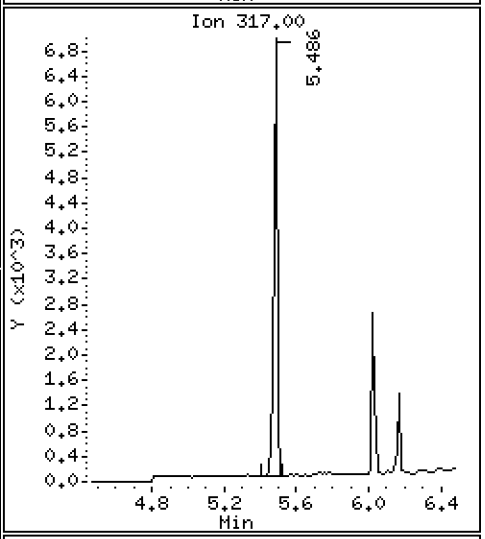
3 Tributyl Tin (Hexyl)

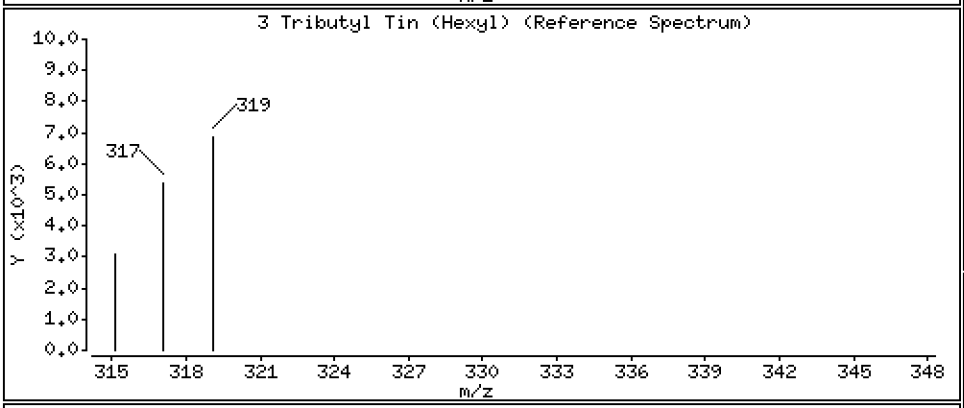
Concentration: 0.2561 ug/mL

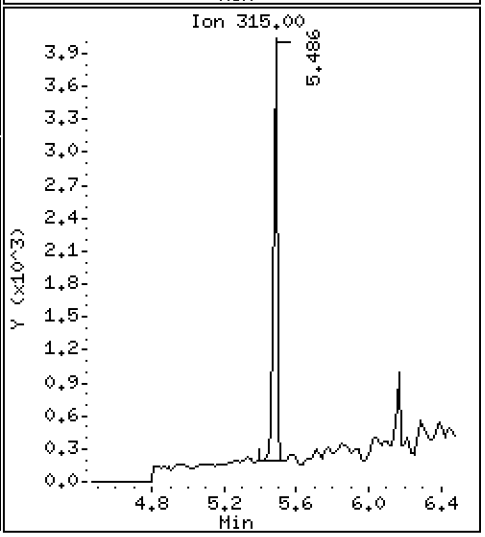


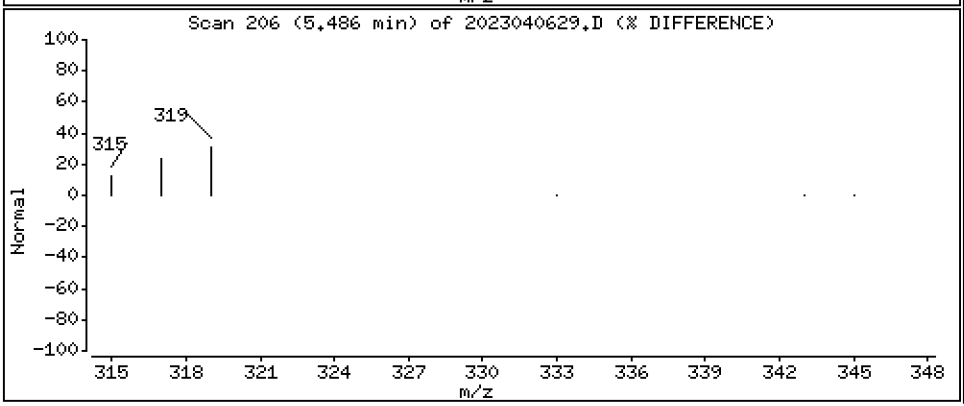












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040629.D

Date : 06-APR-2023 23:29

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-04

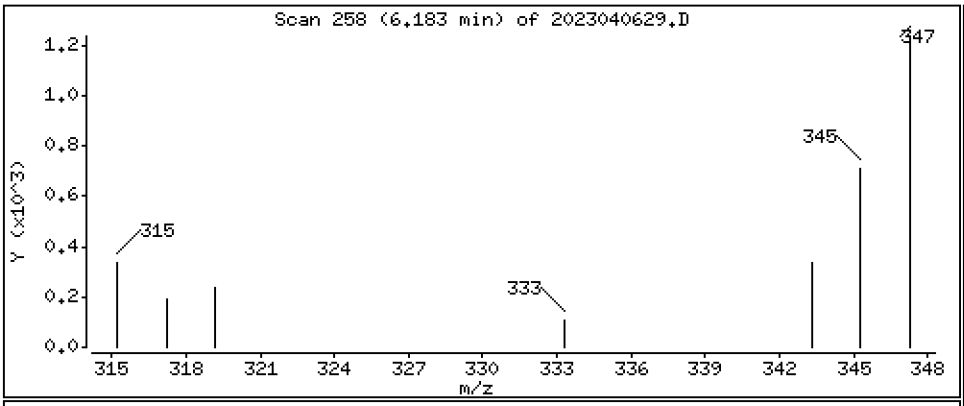
Operator: JZ

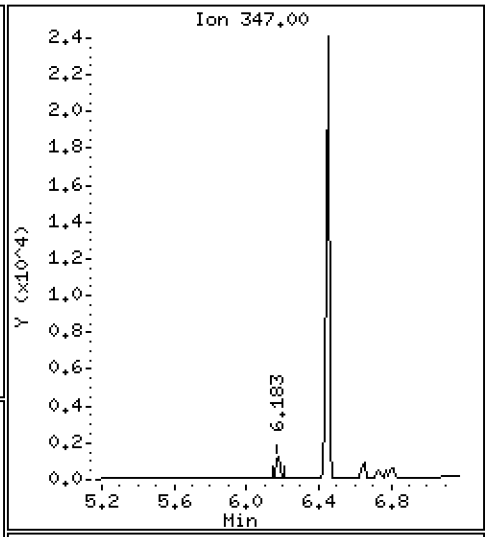
Column phase: ZB-5msi

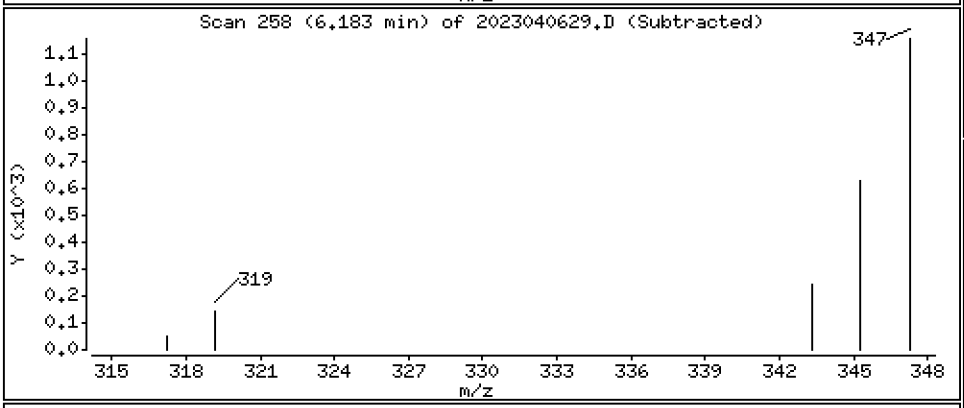
Column diameter: 0.25

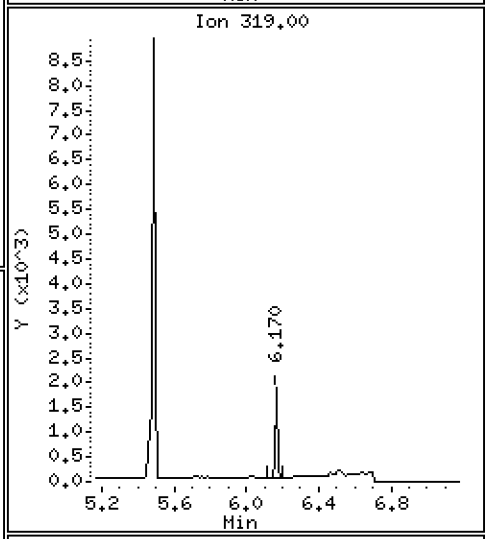
5 Dibutyl Tin (Hexyl)

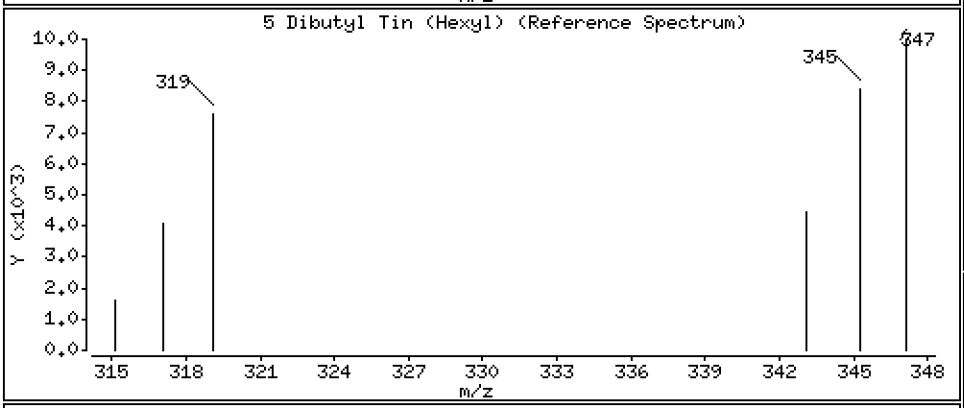
Concentration: 0.05685 ug/mL

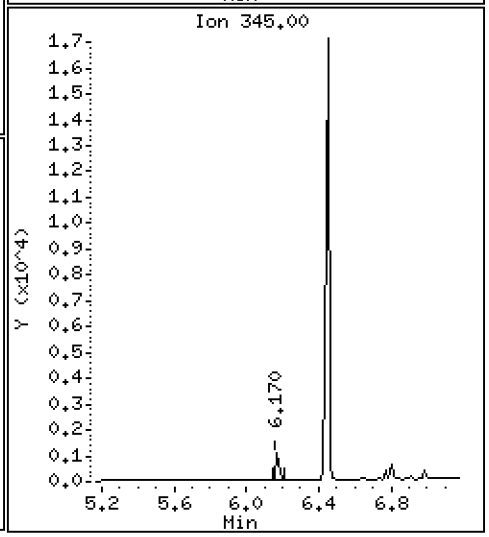


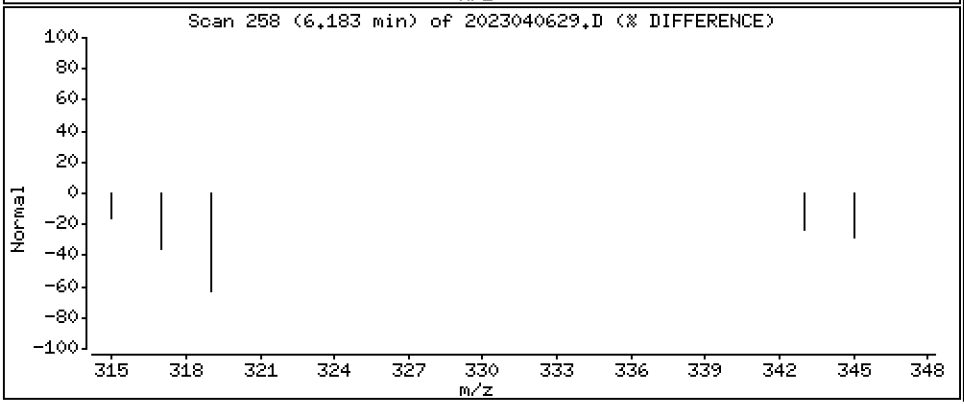












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040629.D

Date : 06-APR-2023 23:29

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-04

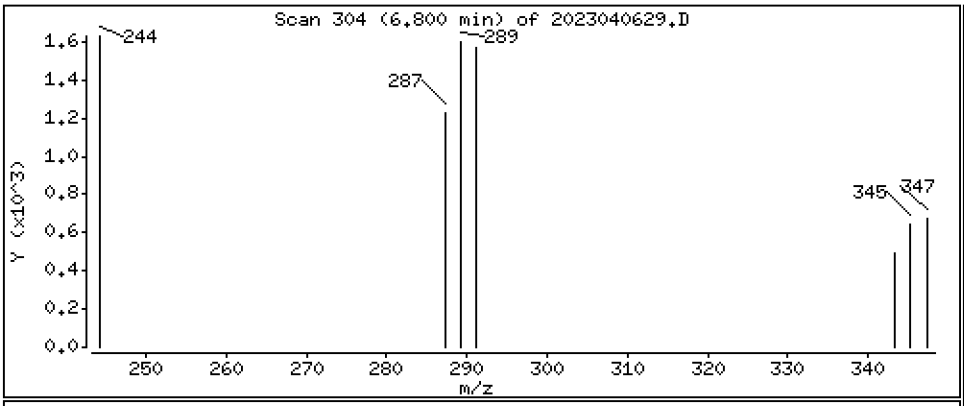
Operator: JZ

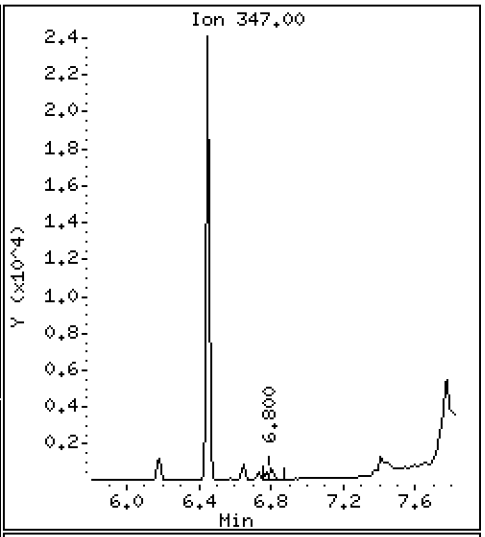
Column phase: ZB-5msi

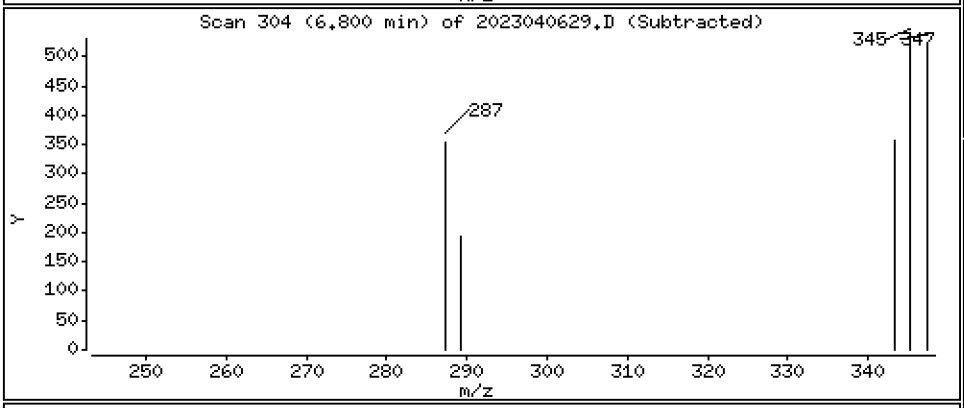
Column diameter: 0.25

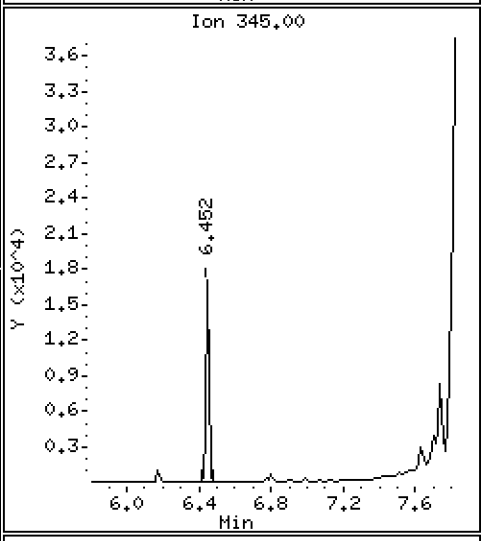
7 Butyl Tin (Hexyl)

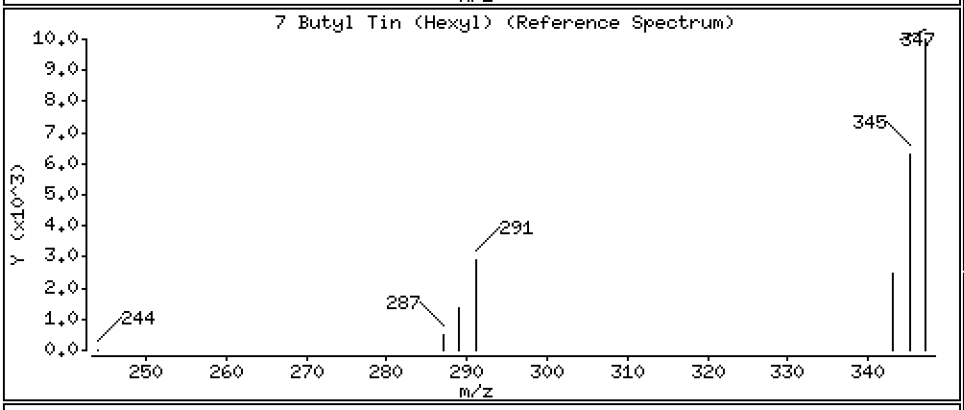
Concentration: 0.02662 ug/mL

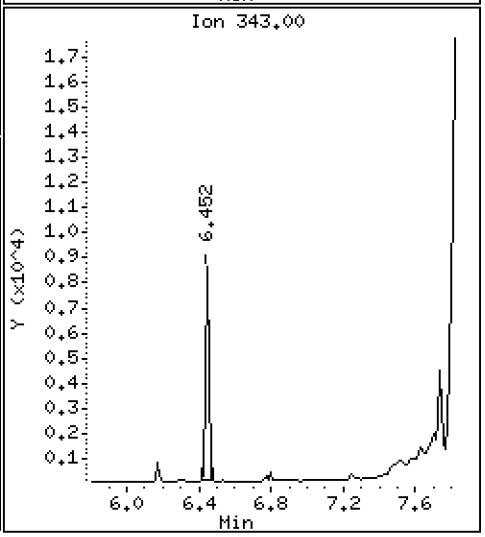


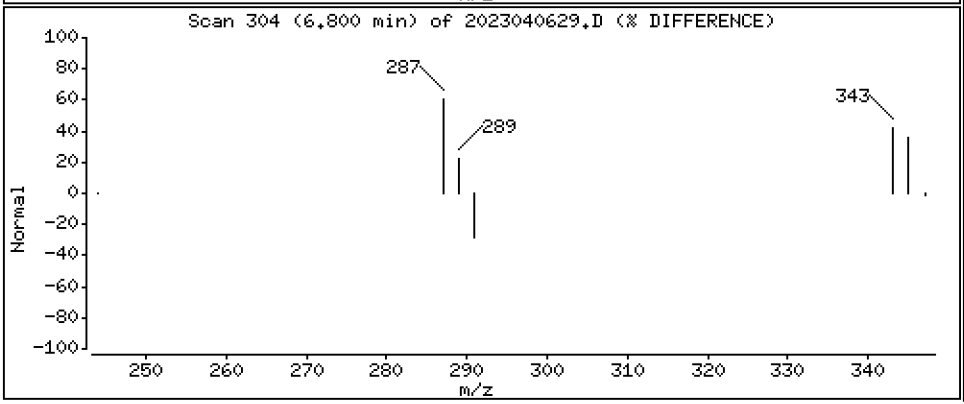












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040629.D
Lab Smp Id: 23C0619-04
Inj Date : 06-APR-2023 23:29
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0619-04
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 29
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.560	4.514	(0.747)	27221	0.53221	0.5322
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.486	5.472	(0.899)	10258	0.25611	0.2561
*	4 Tetrapentyl Tin	333	6.102	6.102	(1.000)	120970	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	1858	0.05685	0.05685
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	24103	0.50131	0.5013
	7 Butyl Tin (Hexyl)	347	6.800	6.813	(0.782)	1400	0.02662	0.02662
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	19466	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040629.D
Lab Smp Id: 23C0619-04
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	120970	-26.31
8 p-Terphenyl-d14	22611	11306	45222	19466	-13.91

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040629.D

Lab ID: 23C0619-04
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 23:29

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.747	0.740	0.0075	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Analytical Resources, LLC
Analytical Chemists and Consultants

SED-09C:0-1

Form I

ORGANIC ANALYSIS DATA SHEET

EPA 8270E-SIM

Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0619-05 A	SDG:	23C0619
Sampled:	03/22/23 08:33	Prepared:	03/28/23 12:28	File ID:	2023040630.D
% Solids:	70.63	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/06/23 23:46
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	7.08 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

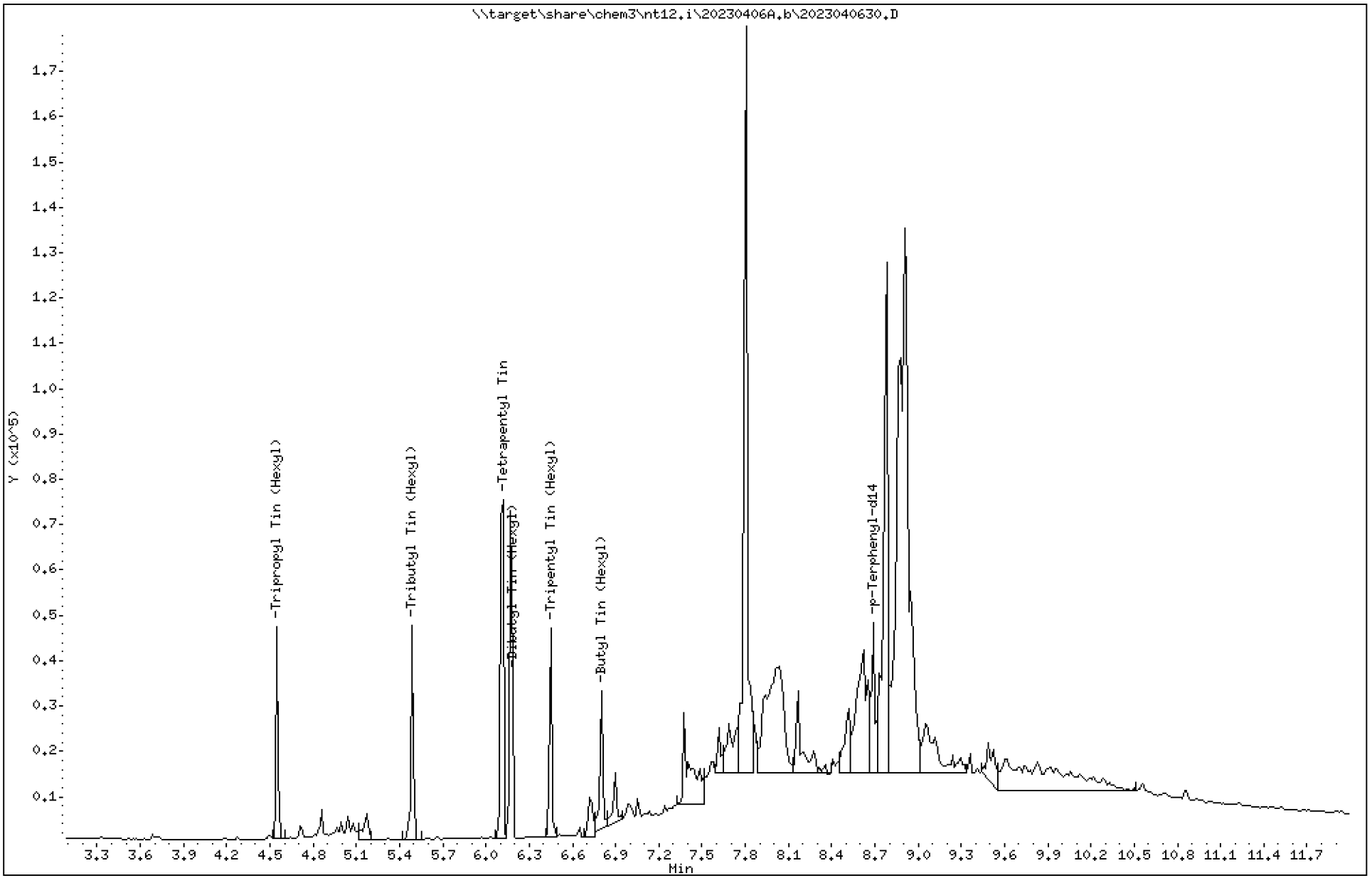
CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	52.6		0.450	3.86
14488-53-0	Dibutyltin Ion	1	37.1		1.73	5.78
78763-54-9	Butyltin Ion	1	7.19		1.89	4.08
1461-25-2	Tetrabutyltin	1	5.00	U	5.00	5.00

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	45.173	32.8	72.5	30 - 160	
Tripropyltin	43.741	30.5	69.7	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040630.D
Date : 06-APR-2023 23:46
Client ID:
Sample Info: 23C0619-05

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



23C0619 CLPLIKE (Rev0) - Page 45 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040630.D

Date : 06-APR-2023 23:46

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-05

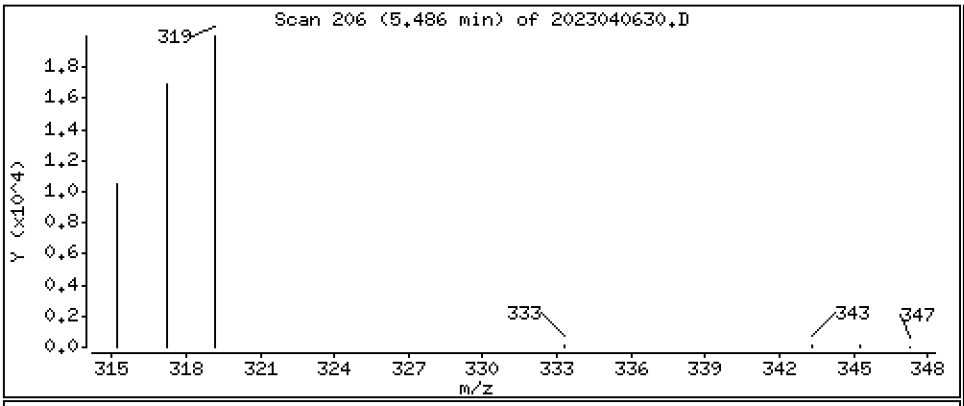
Operator: JZ

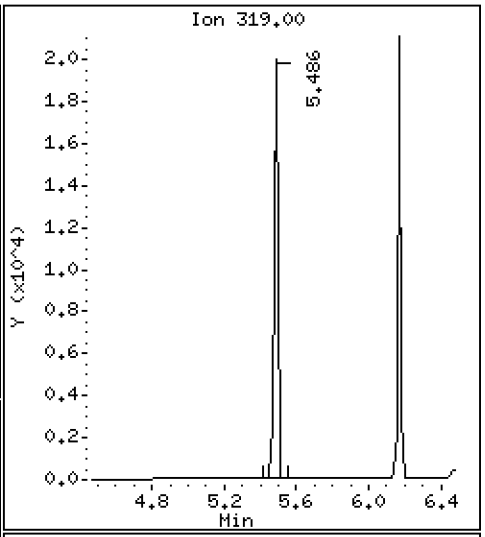
Column phase: ZB-5msi

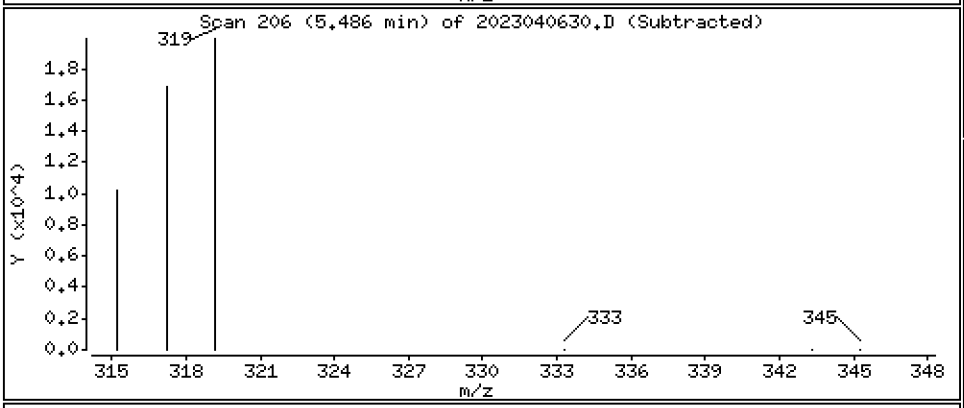
Column diameter: 0.25

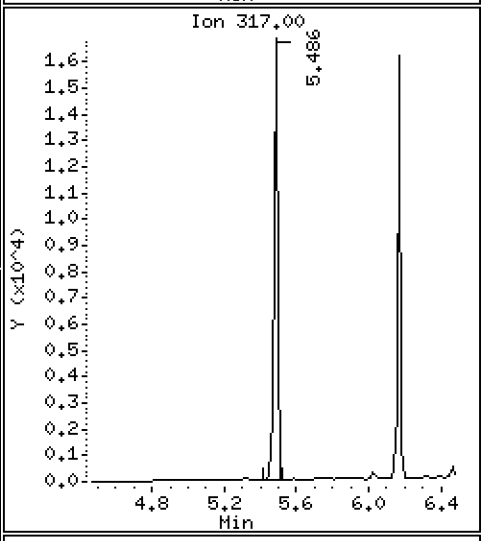
3 Tributyl Tin (Hexyl)

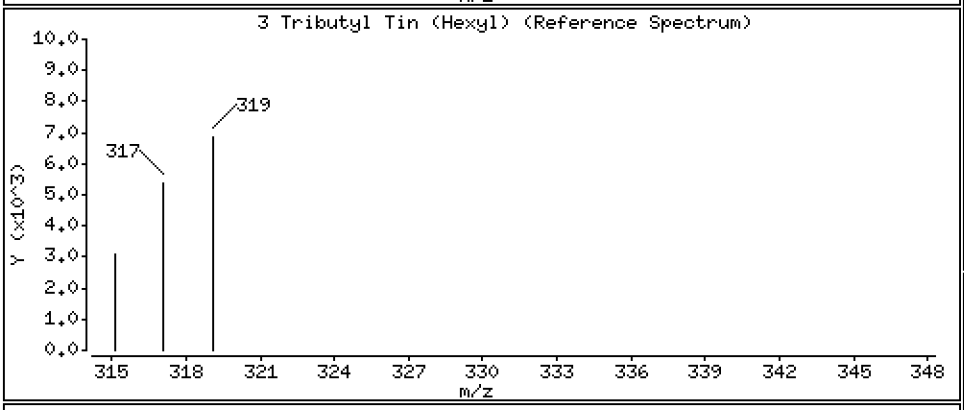
Concentration: 0.6806 ug/mL

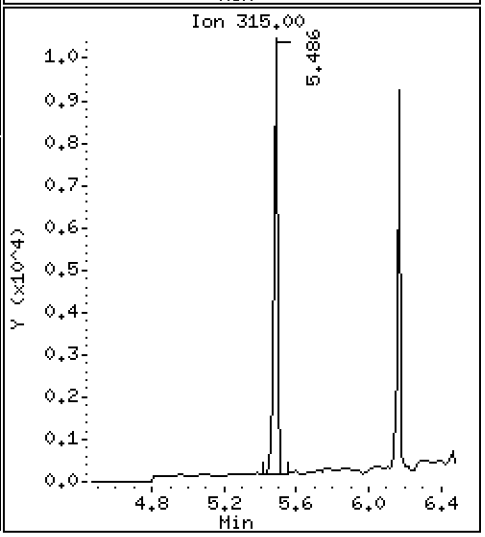


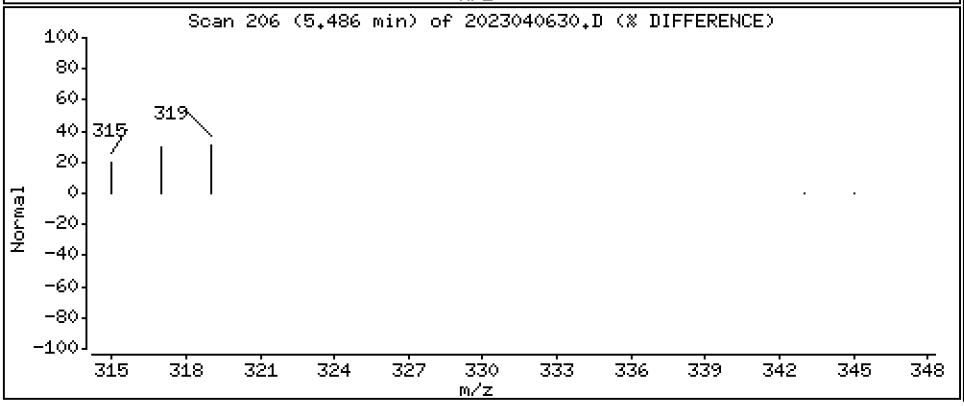












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040630.D

Date : 06-APR-2023 23:46

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-05

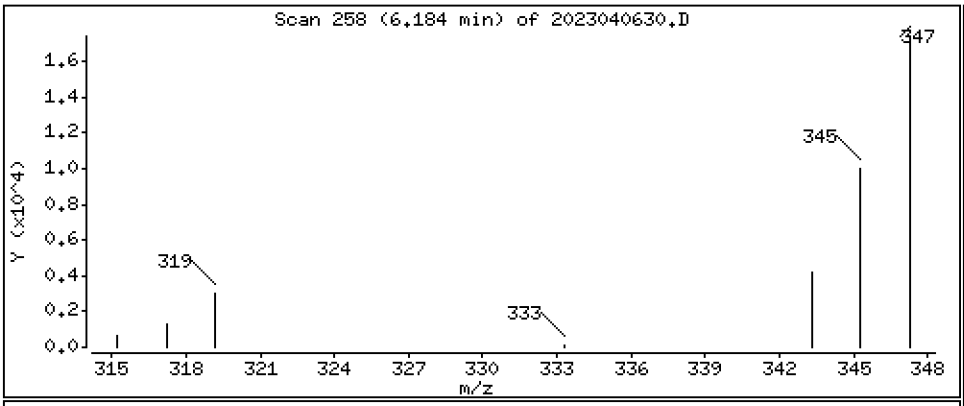
Operator: JZ

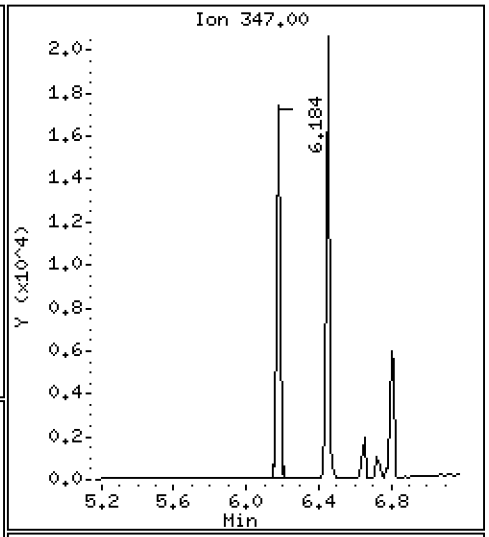
Column phase: ZB-5msi

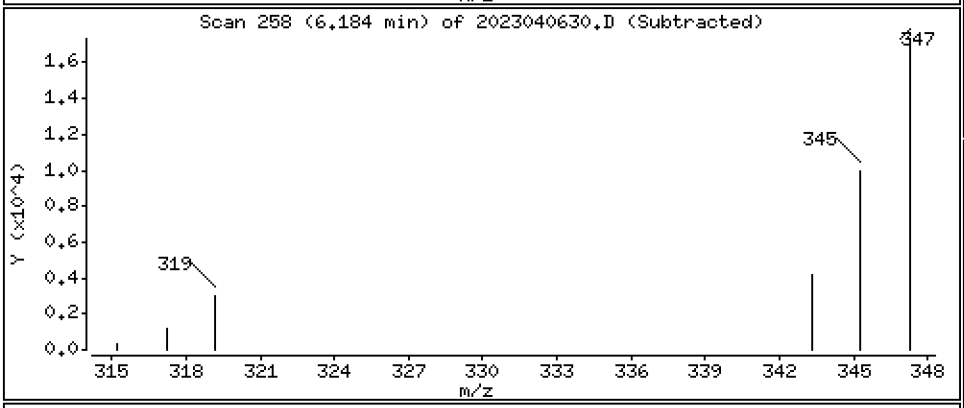
Column diameter: 0.25

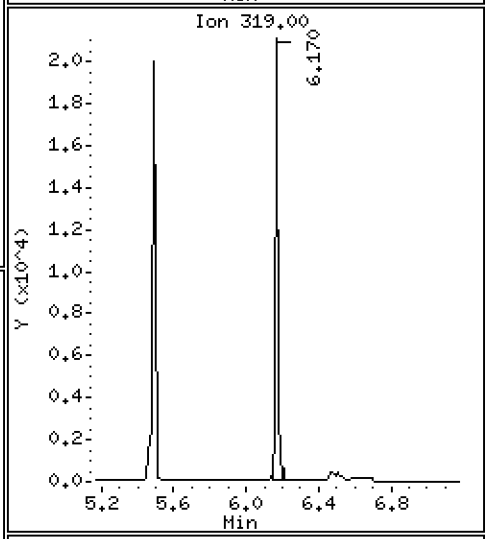
5 Dibutyl Tin (Hexyl)

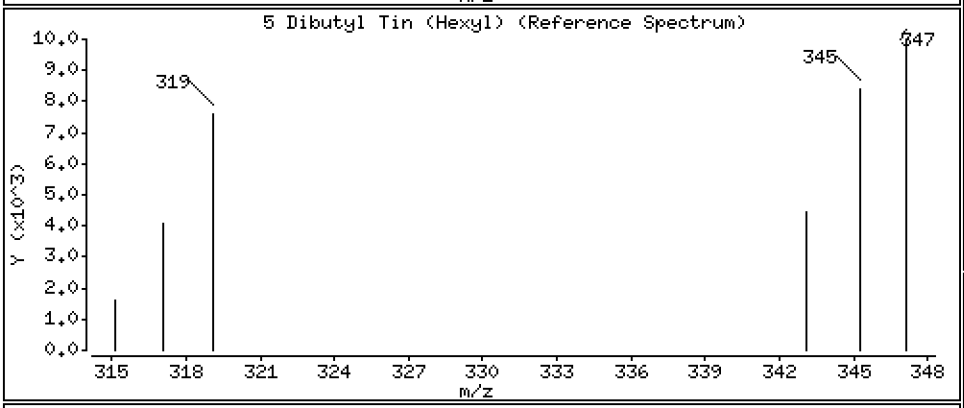
Concentration: 0.6428 ug/mL

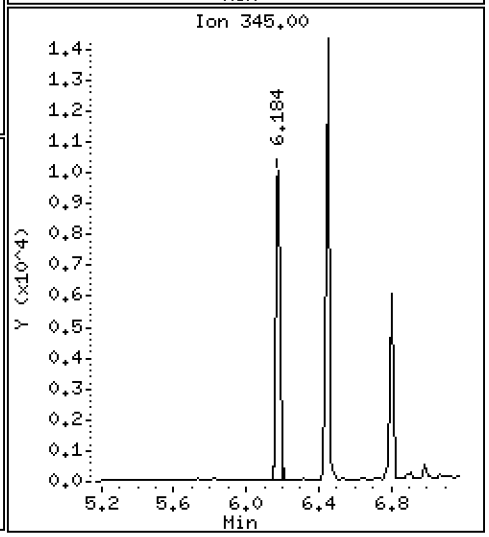


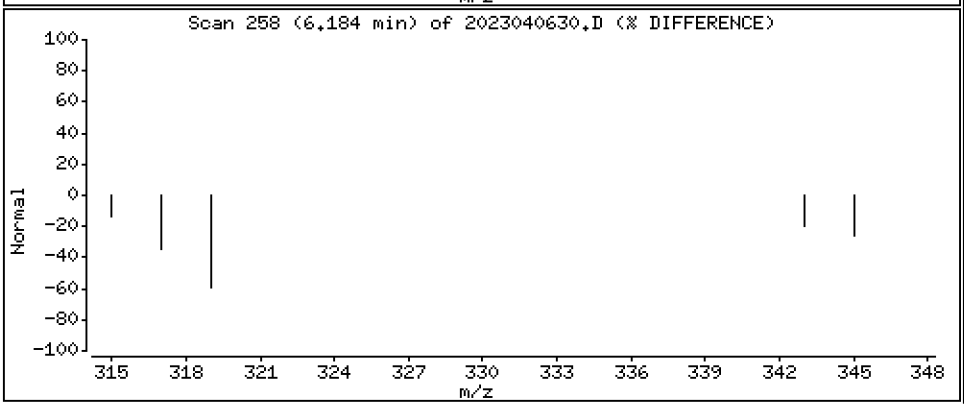












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040630.D

Date : 06-APR-2023 23:46

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-05

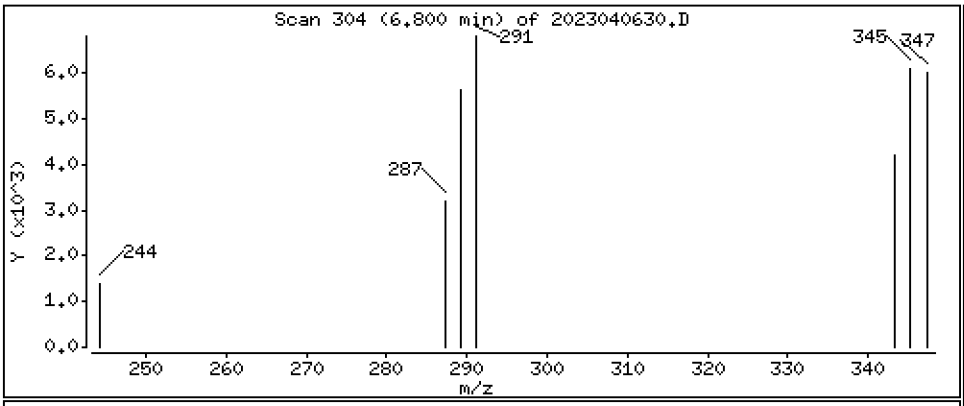
Operator: JZ

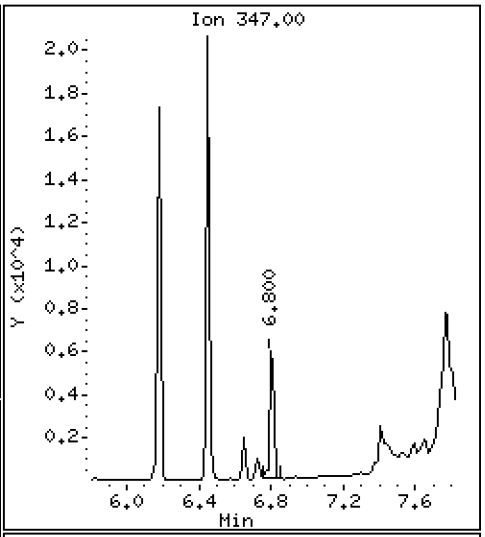
Column phase: ZB-5msi

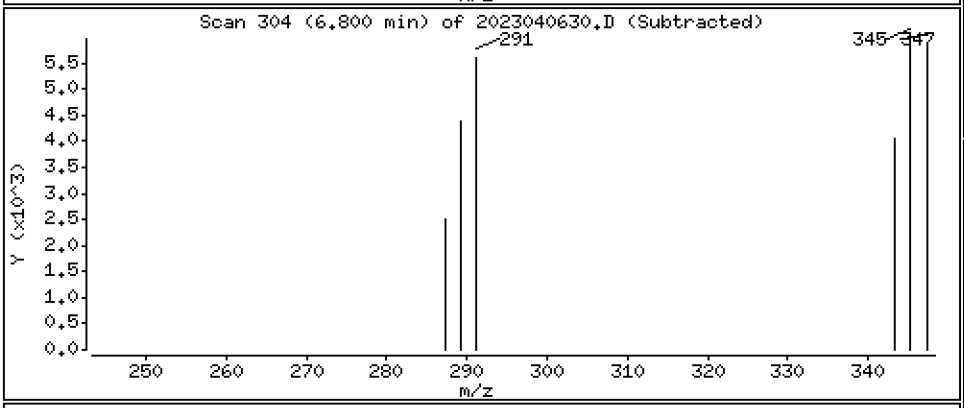
Column diameter: 0.25

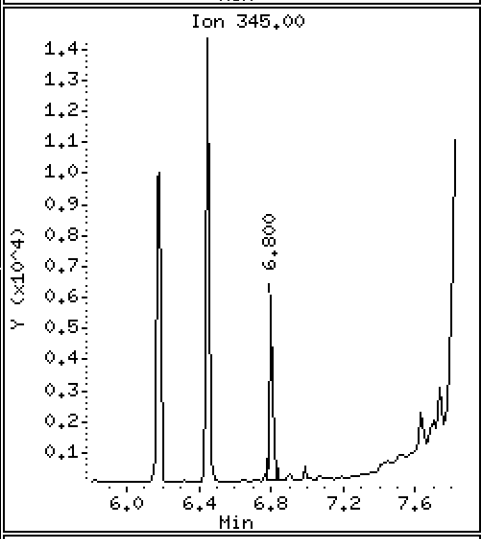
7 Butyl Tin (Hexyl)

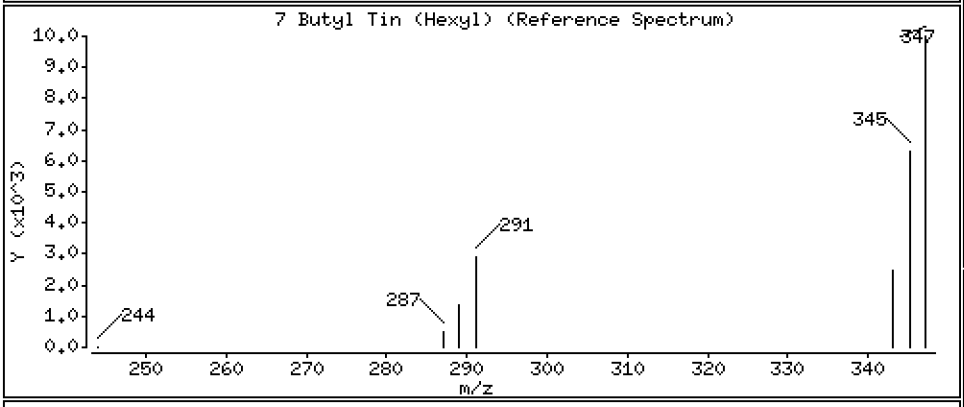
Concentration: 0.1764 ug/mL

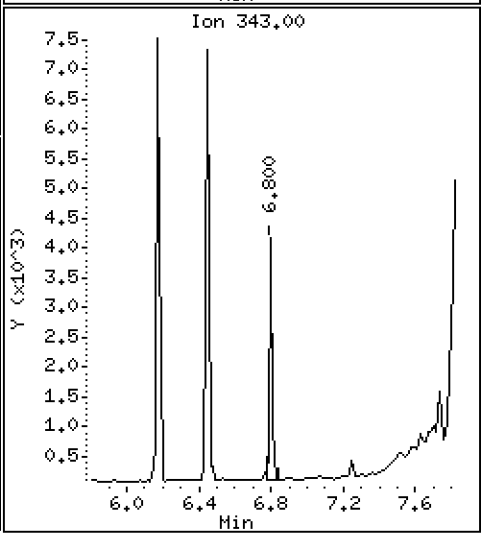


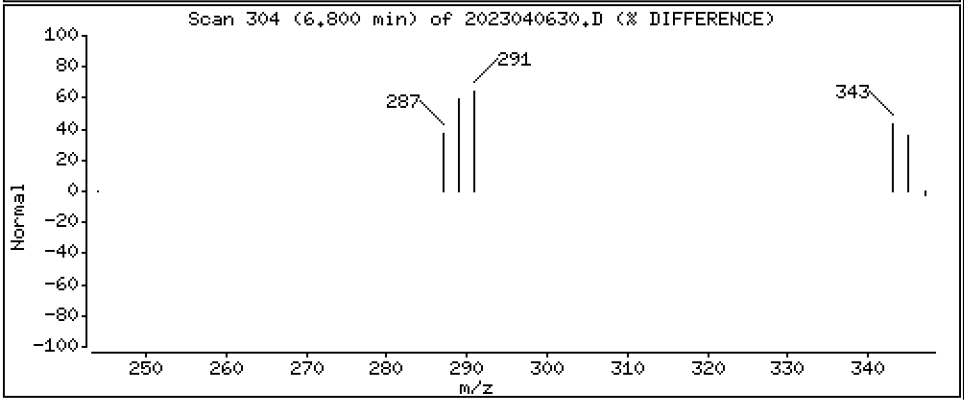












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040630.D
Lab Smp Id: 23C0619-05
Inj Date : 06-APR-2023 23:46
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0619-05
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 30
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.548	4.514	(0.744)	21224	0.40968	0.4097
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.486	5.472	(0.897)	27610	0.68057	0.6806
*	4 Tetrapentyl Tin	333	6.116	6.102	(1.000)	122530	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	22155	0.64278	0.6428
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	20869	0.41155	0.4116
	7 Butyl Tin (Hexyl)	347	6.800	6.813	(0.782)	9782	0.17636	0.1764(M)
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	20530	0.20000	

QC Flag Legend

M - Compound response manually integrated.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040630.D
Lab Smp Id: 23C0619-05
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	122530	-25.36
8 p-Terphenyl-d14	22611	11306	45222	20530	-9.20

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.12	0.22
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040630.D

Lab ID: 23C0619-05
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 23:46

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606A.D

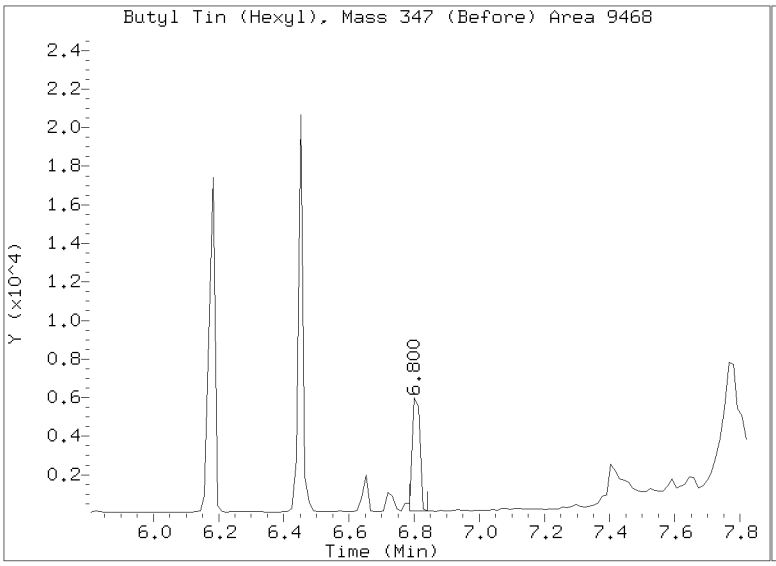
On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

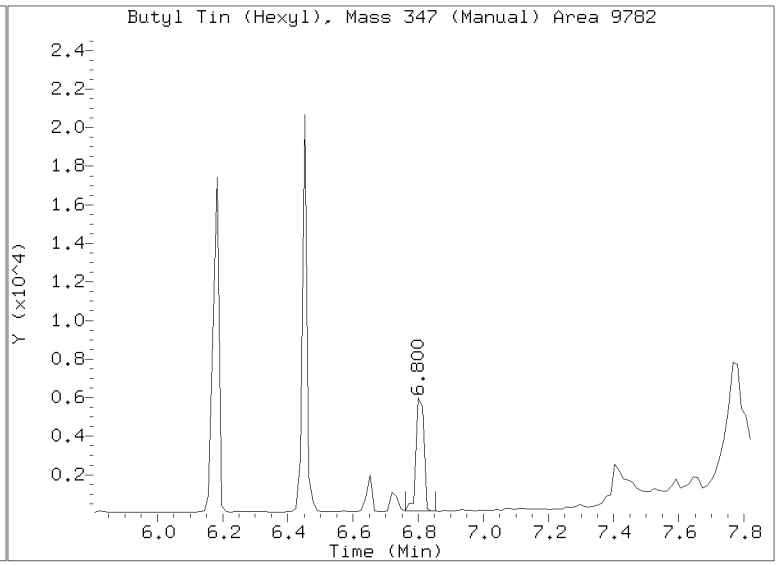
Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Quant Ion Manual Peak Adjustment Report

Datafile: //target/share/chem3/nt12.i/20230406A.b/2023040630.D
Injection Date: 06-APR-2023 23:46
Lab ID:23C0619-05 Client ID:
Report Date: 04/07/2023 11:09





SED-09C:1-3

Form I

ORGANIC ANALYSIS DATA SHEET

EPA 8270E-SIM

Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0619-06 A	SDG:	23C0619
Sampled:	03/22/23 08:33	Prepared:	03/28/23 12:28	File ID:	2023040631.D
% Solids:	77.40	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/07/23 00:02
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	6.49 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	3.84	U	0.448	3.84
14488-53-0	Dibutyltin Ion	1	5.75	U	1.72	5.75
78763-54-9	Butyltin Ion	1	4.06	U	1.88	4.06
1461-25-2	Tetrabutyltin	1	4.98	U	4.98	4.98

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	44.969	33.8	75.1	30 - 160	
Tripropyltin	43.543	34.7	79.7	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040631.D

Date : 07-APR-2023 00:02

Client ID:

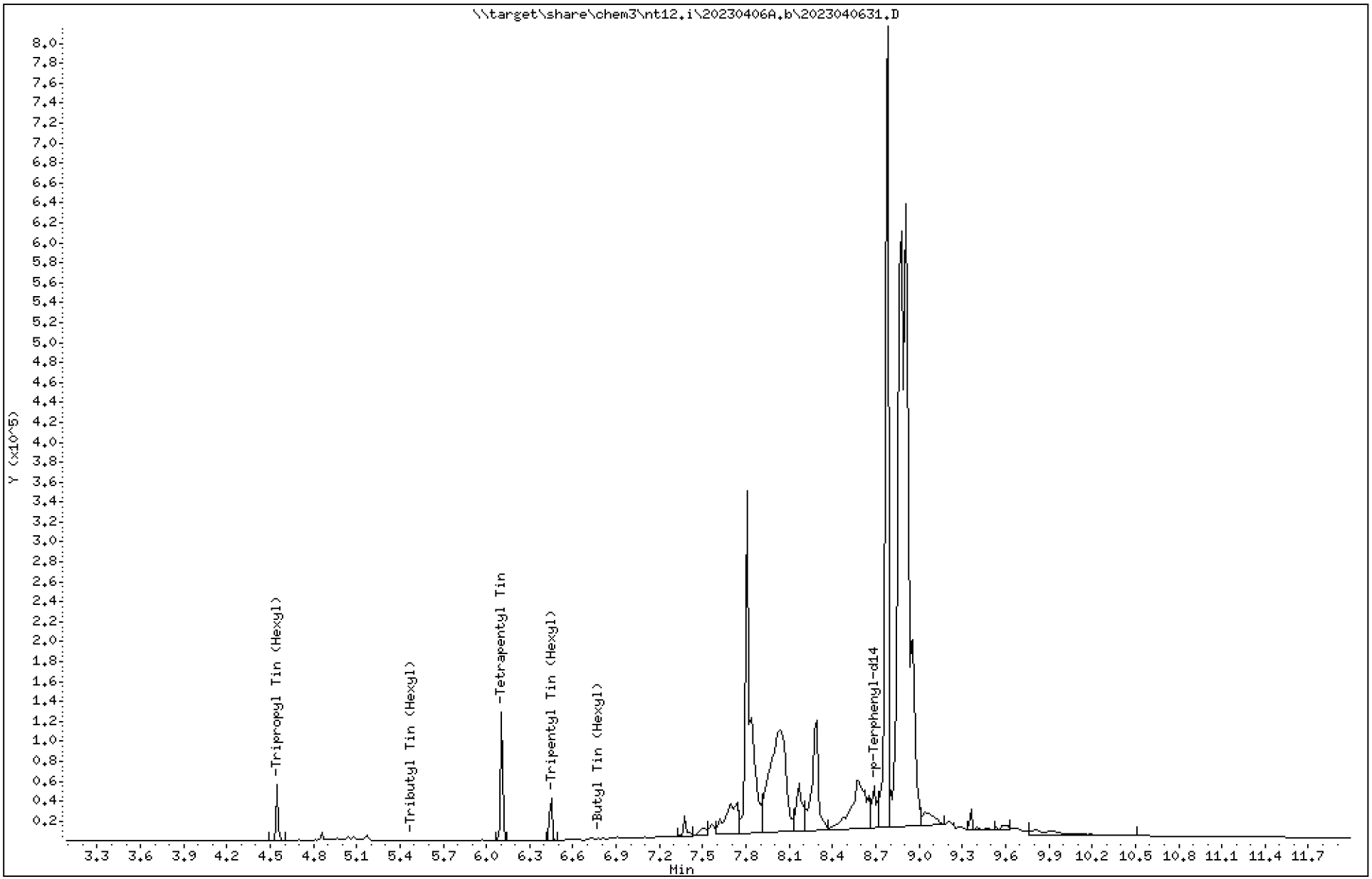
Instrument: nt12.i

Sample Info: 23C0619-06

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0619 CLPLIKE (Rev0) - Page 54 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040631.D

Date : 07-APR-2023 00:02

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-06

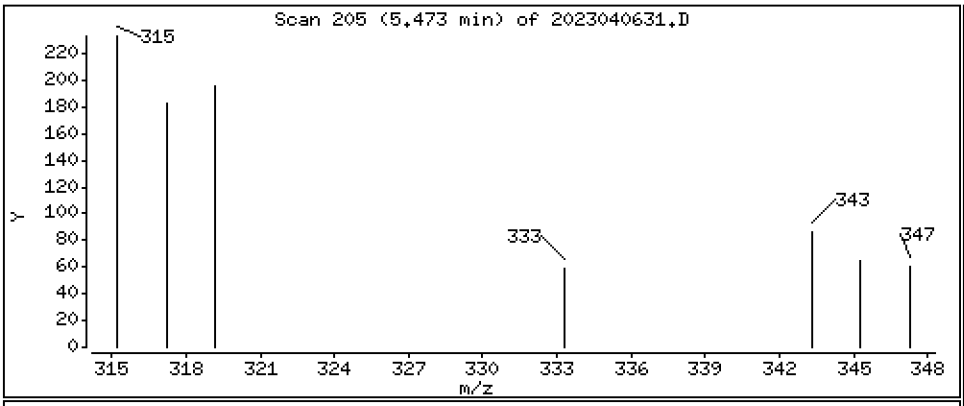
Operator: JZ

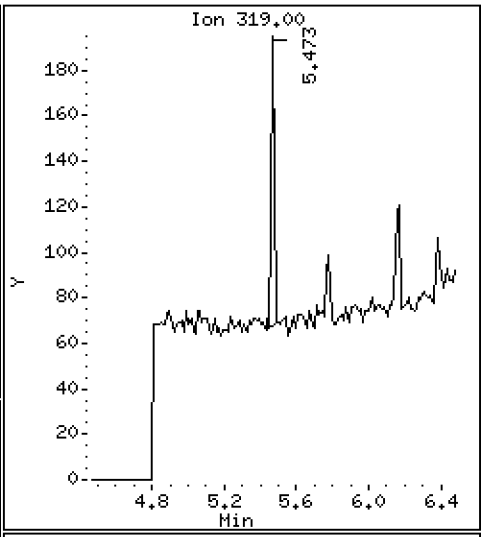
Column phase: ZB-5msi

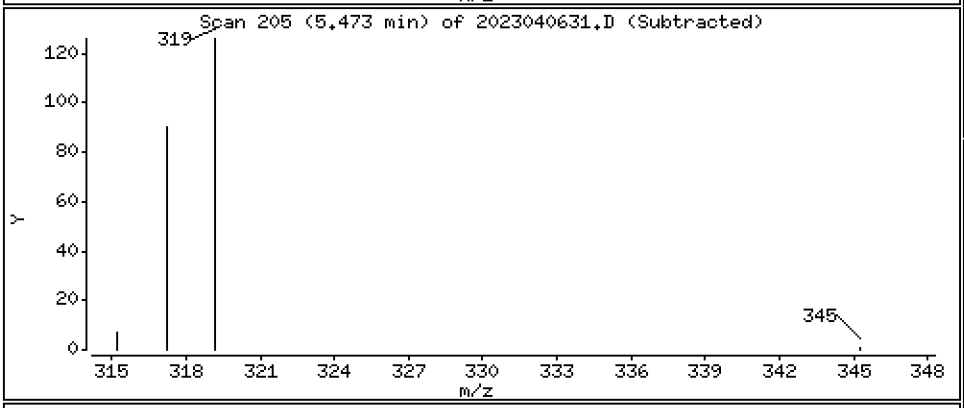
Column diameter: 0.25

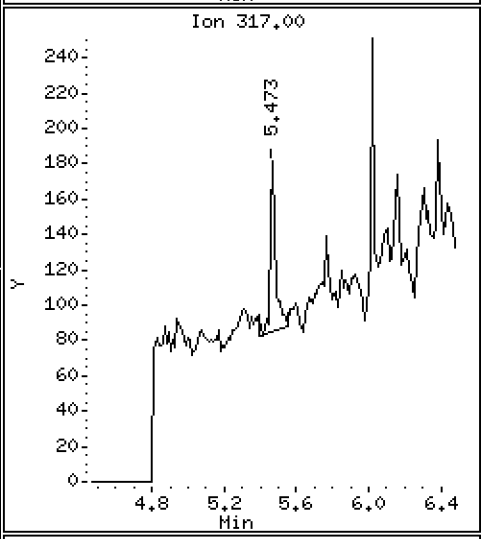
3 Tributyl Tin (Hexyl)

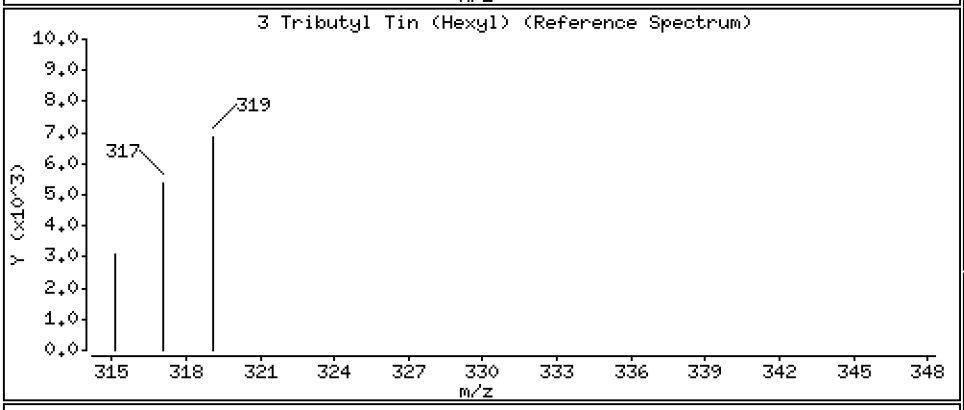
Concentration: 0.003219 ug/mL

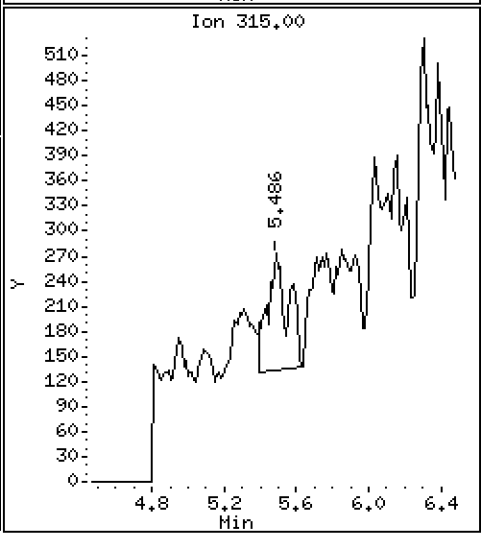


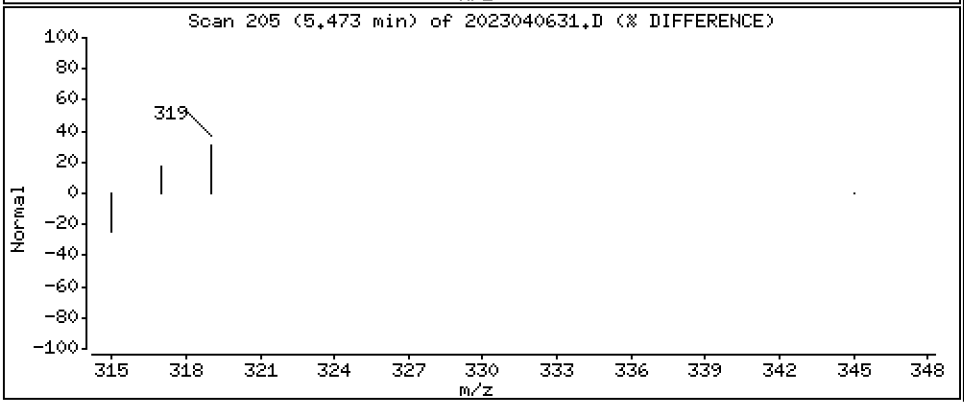












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040631.D

Date : 07-APR-2023 00:02

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-06

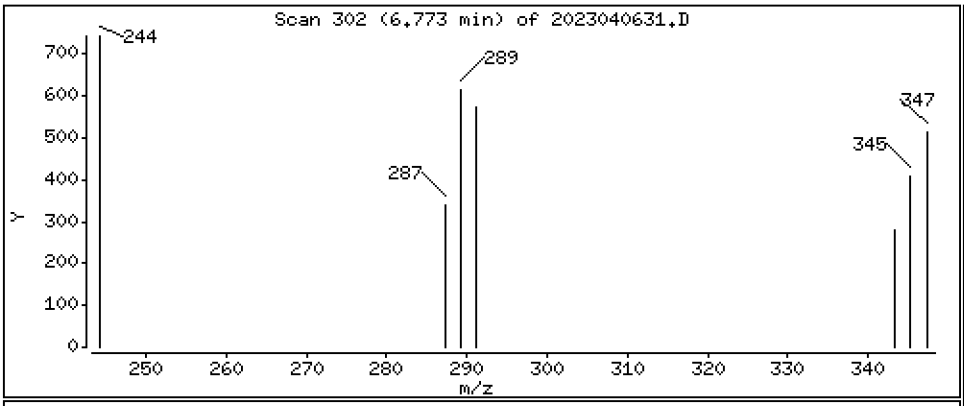
Operator: JZ

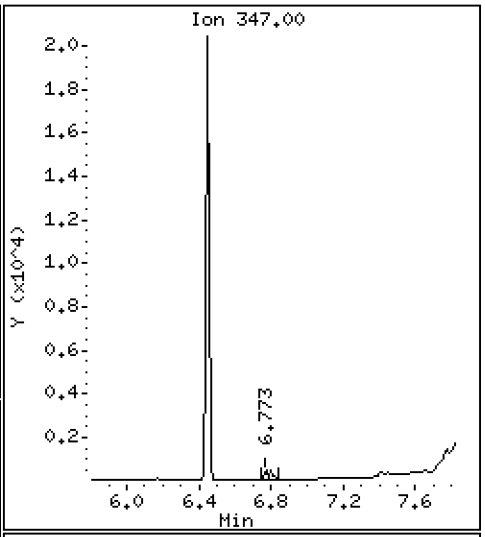
Column phase: ZB-5msi

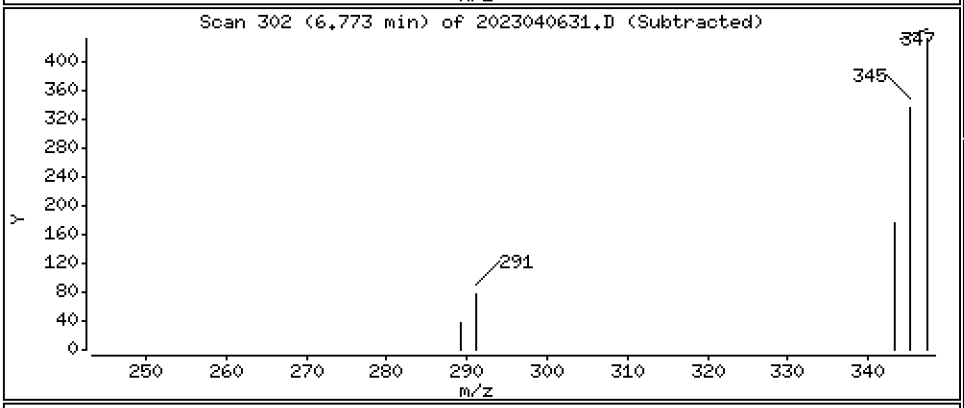
Column diameter: 0.25

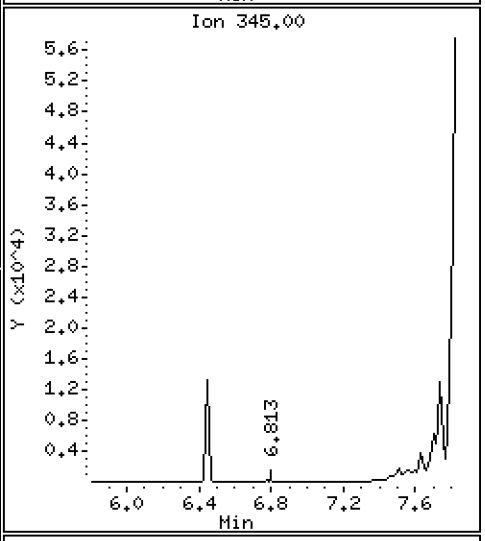
7 Butyl Tin (Hexyl)

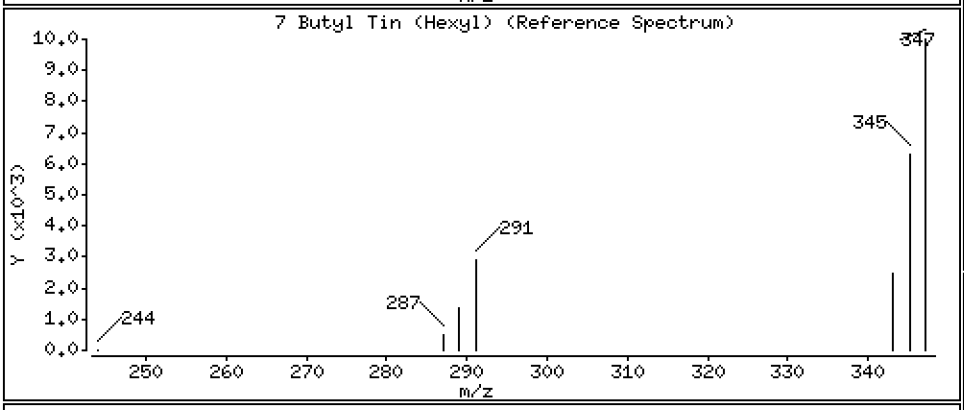
Concentration: 0.01613 ug/mL

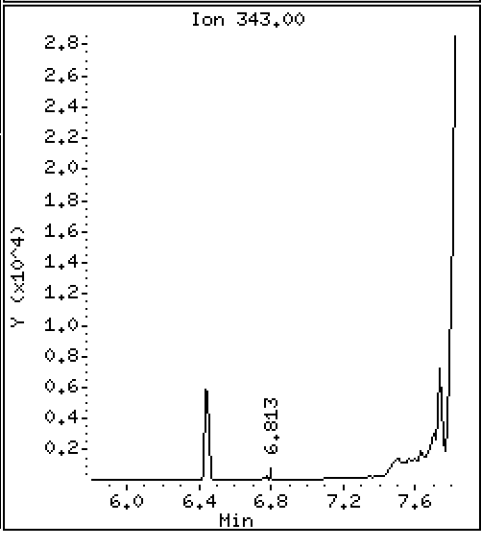


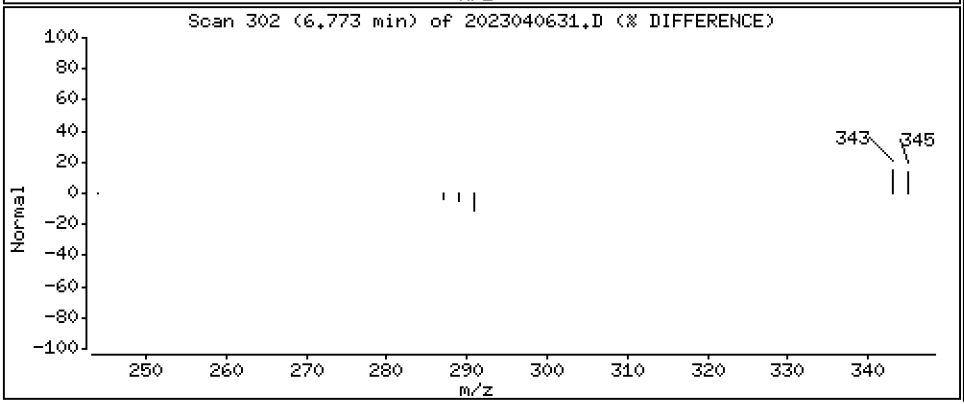












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040631.D
Lab Smp Id: 23C0619-06
Inj Date : 07-APR-2023 00:02
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0619-06
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 31
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.548	4.514	(0.745)	25470	0.46867	0.4687
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.473	5.472	(0.897)	137	0.00322	0.003219(M)
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	128533	2.00000	
	5 Dibutyl Tin (Hexyl)	347	Compound Not Detected.					
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	21783	0.42655	0.4265
	7 Butyl Tin (Hexyl)	347	6.773	6.813	(0.779)	901	0.01613	0.01613(MH)
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	20676	0.20000	

QC Flag Legend

M - Compound response manually integrated.
H - Operator selected an alternate compound hit.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040631.D
Lab Smp Id: 23C0619-06
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	128533	-21.71
8 p-Terphenyl-d14	22611	11306	45222	20676	-8.56

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040631.D

Lab ID: 23C0619-06
nt12.i, 20230406A.b\TBT20230406.m,   07-APR-2023 00:02

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.745	0.740	0.0057	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

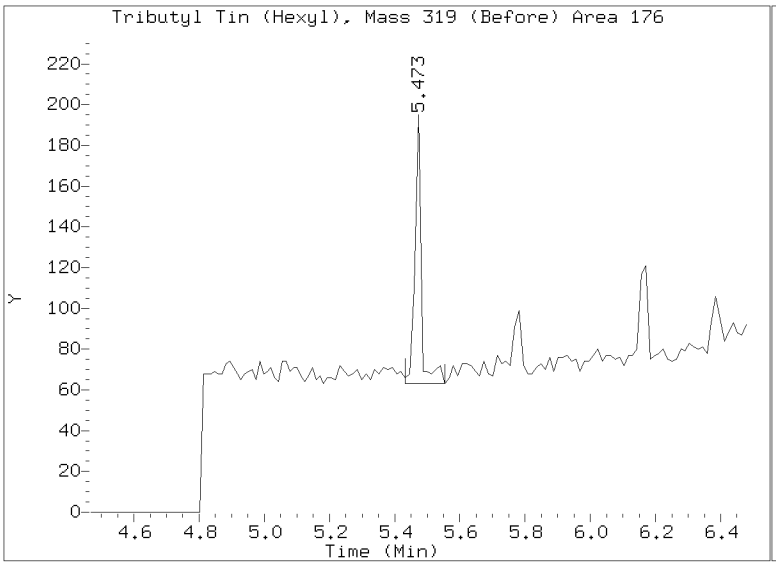
On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

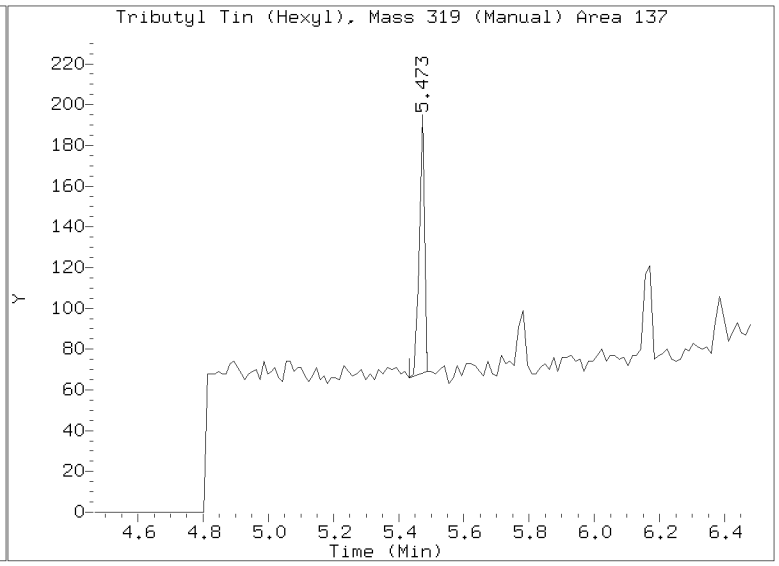
Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

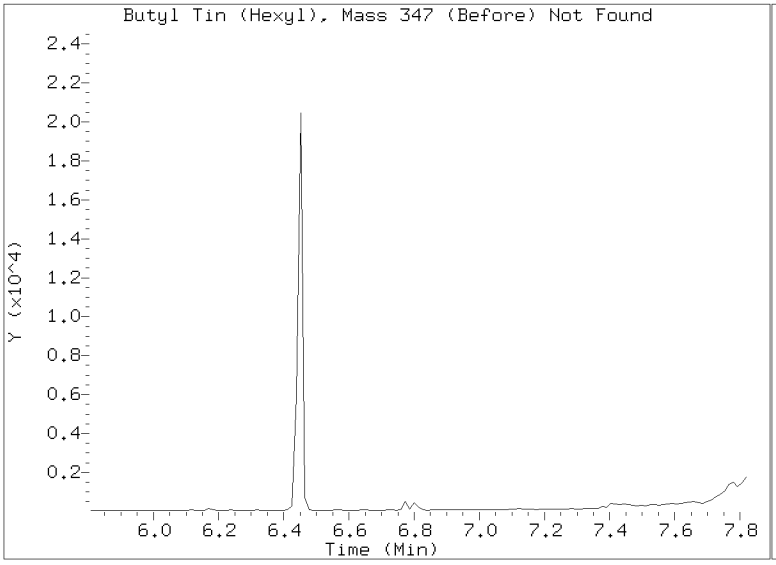
* Only compounds listed in the work order have been verified by the analyst *

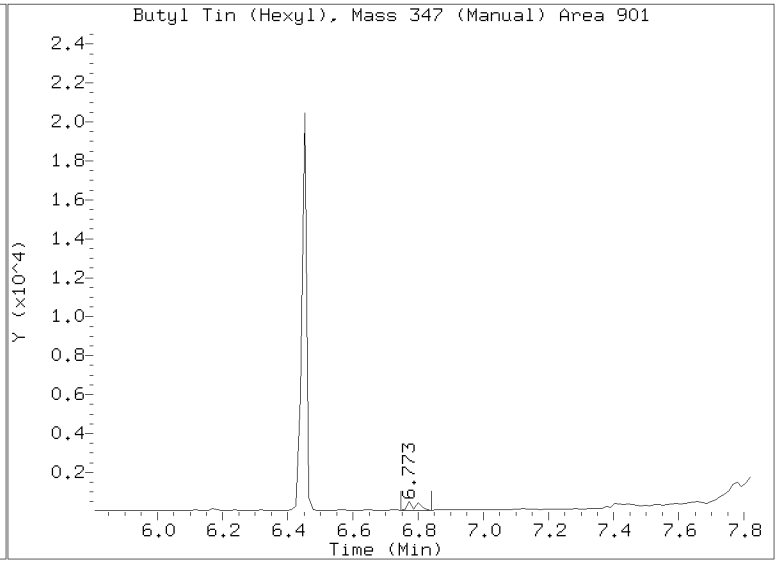
Quant Ion Manual Peak Adjustment Report

Datafile: //target/share/chem3/nt12.i/20230406A.b/2023040631.D
Injection Date: 07-APR-2023 00:02
Lab ID:23C0619-06 Client ID:
Report Date: 04/07/2023 11:09









Analytical Resources, LLC
Analytical Chemists and Consultants

SED-26C:0-1

Form I

ORGANIC ANALYSIS DATA SHEET

EPA 8270E-SIM

Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0619-08 A	SDG:	23C0619
Sampled:	03/22/23 10:38	Prepared:	03/28/23 12:28	File ID:	2023040632.D
% Solids:	62.82	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/07/23 00:18
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	7.97 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	214		0.449	3.85
14488-53-0	Dibutyltin Ion	1	216		1.73	5.77
78763-54-9	Butyltin Ion	1	40.6		1.89	4.07
1461-25-2	Tetrabutyltin	1	4.99	U	4.99	4.99

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	45.117	36.0	79.8	30 - 160	
Tripropyltin	43.687	36.8	84.3	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040632.D

Page 1

Date : 07-APR-2023 00:18

Client ID:

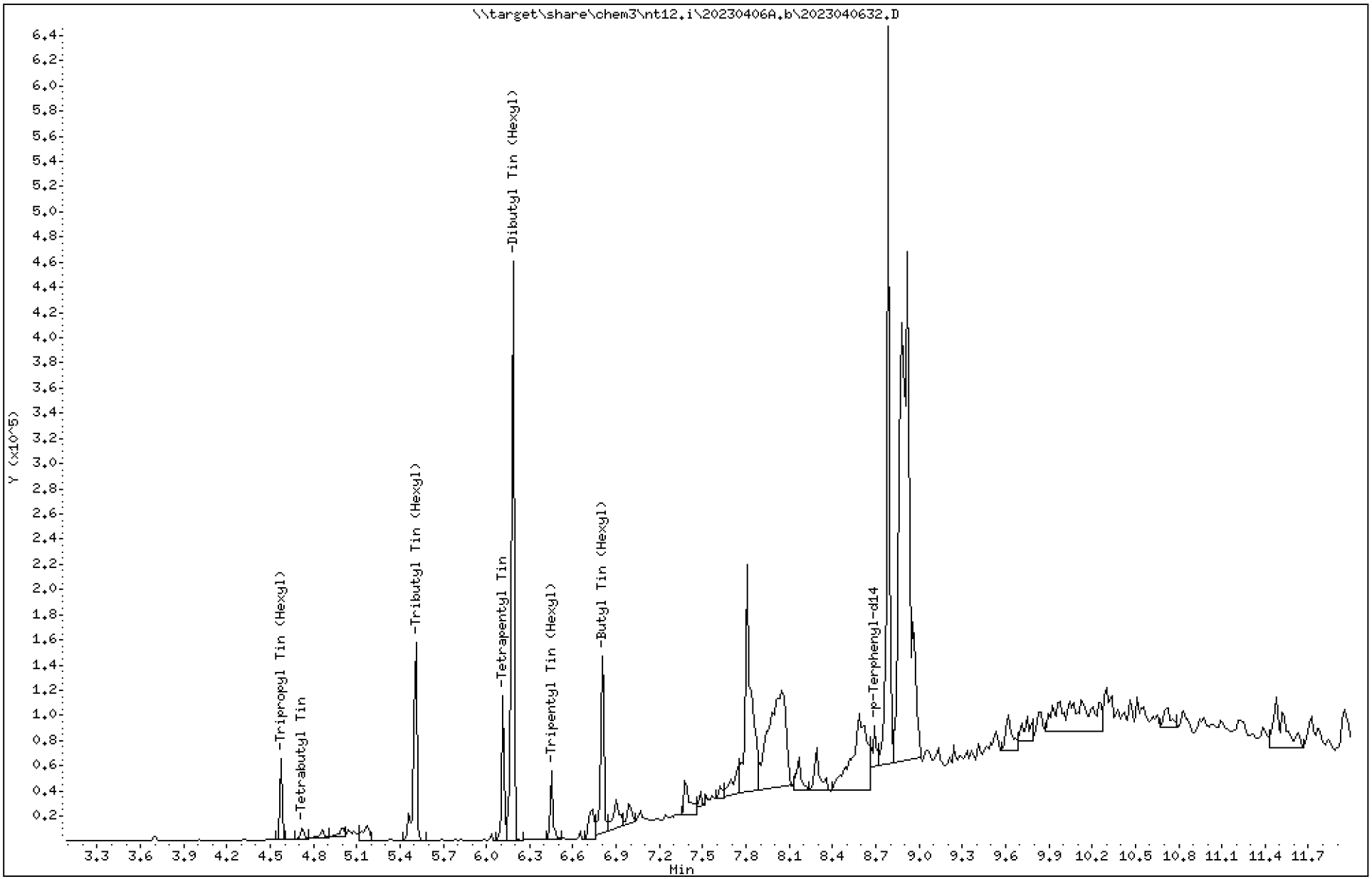
Instrument: nt12.i

Sample Info: 23C0619-08

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0619 CLPLIKE (Rev0) - Page 62 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040632.D

Date : 07-APR-2023 00:18

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-08

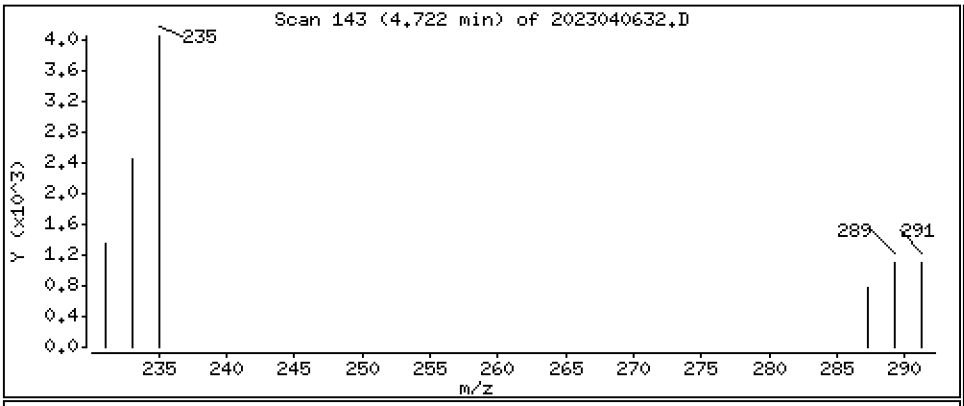
Operator: JZ

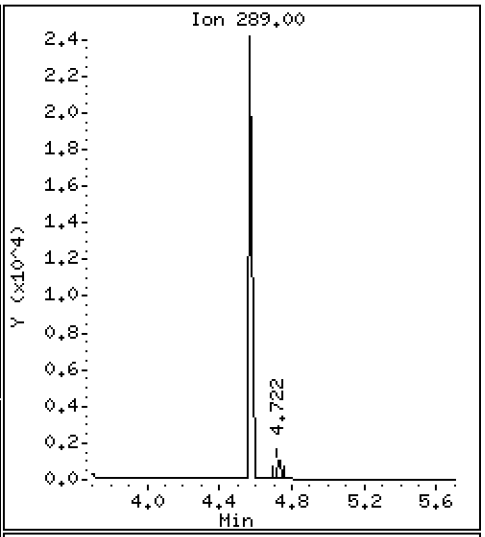
Column phase: ZB-5msi

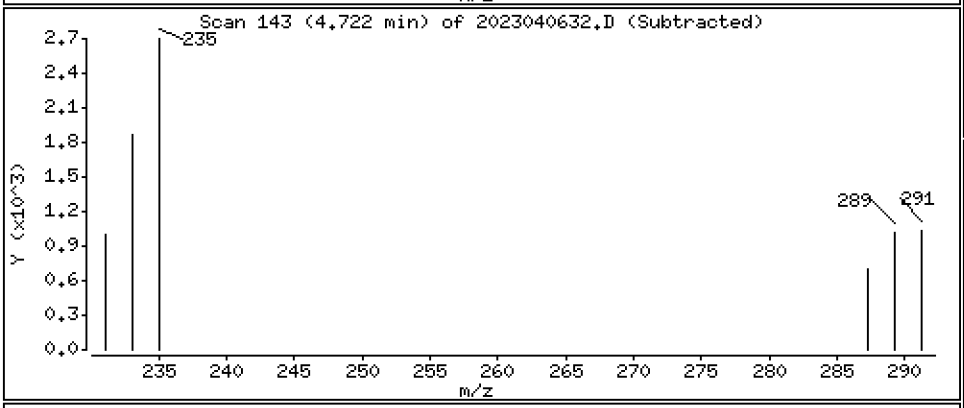
Column diameter: 0.25

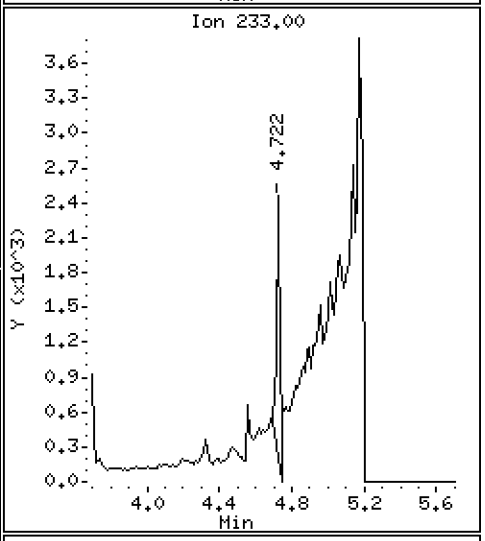
2 Tetrabutyl Tin

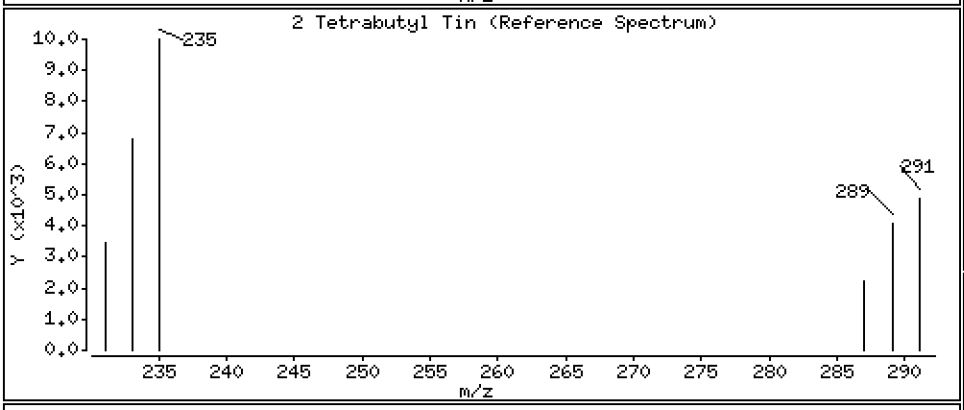
Concentration: 0.02742 ug/mL

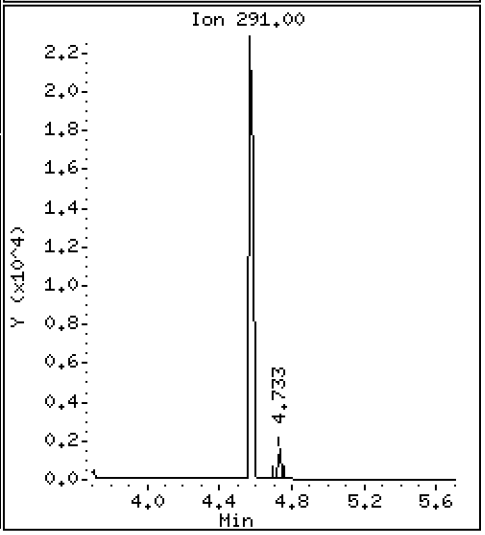


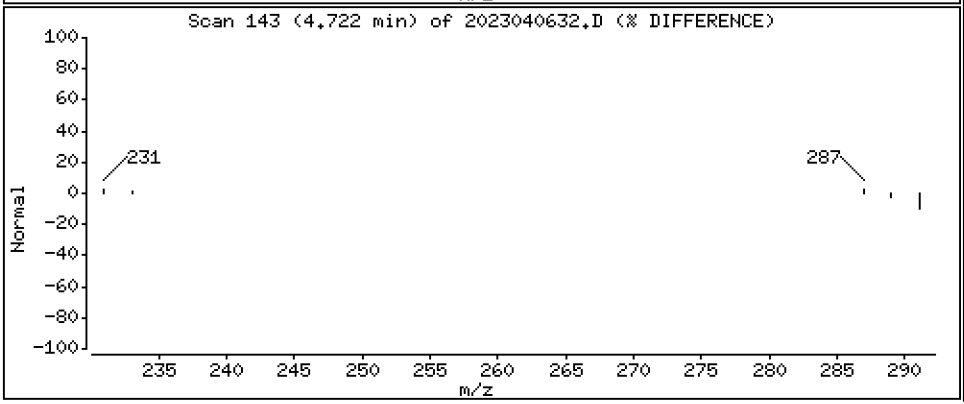












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Date : 07-APR-2023 00:18

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-08

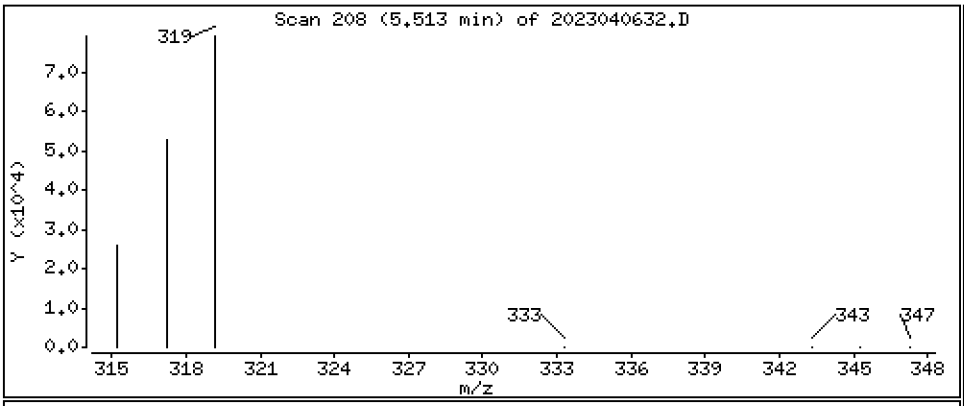
Operator: JZ

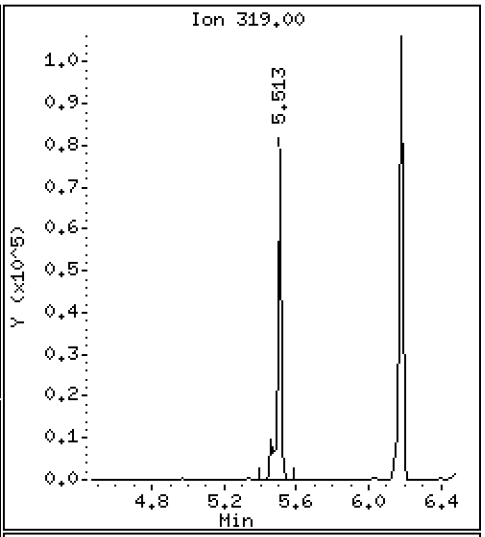
Column phase: ZB-5msi

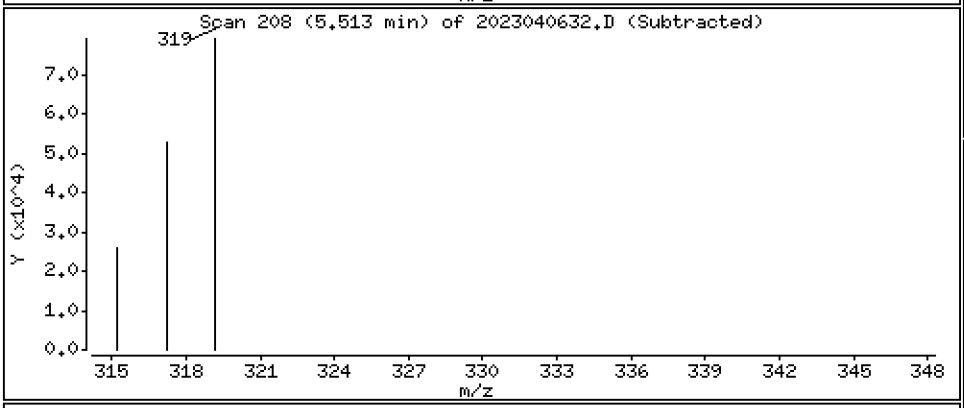
Column diameter: 0.25

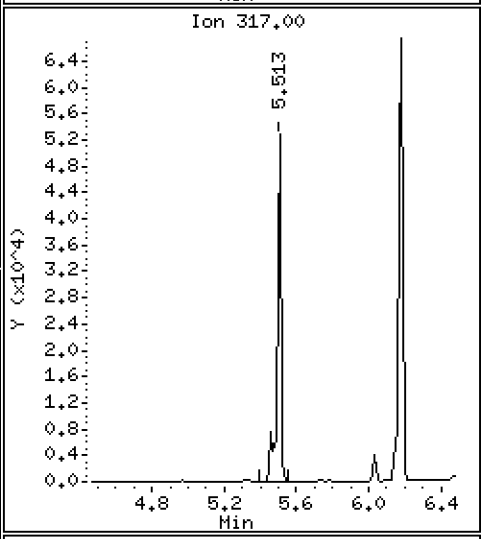
3 Tributyl Tin (Hexyl)

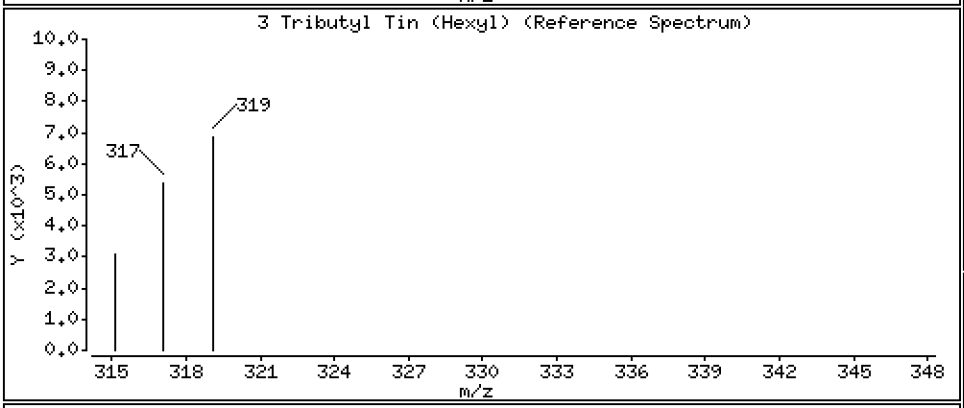
Concentration: 2.774 ug/mL

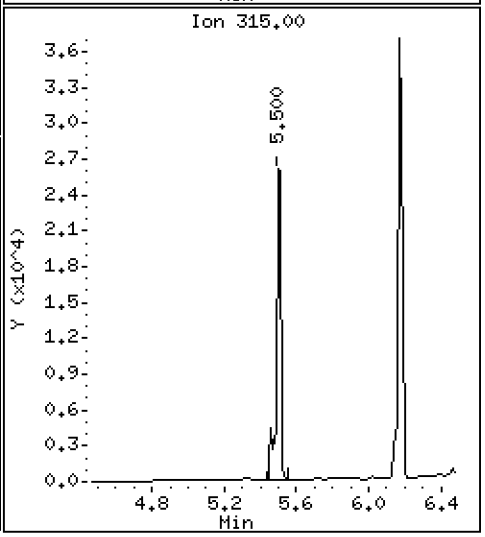


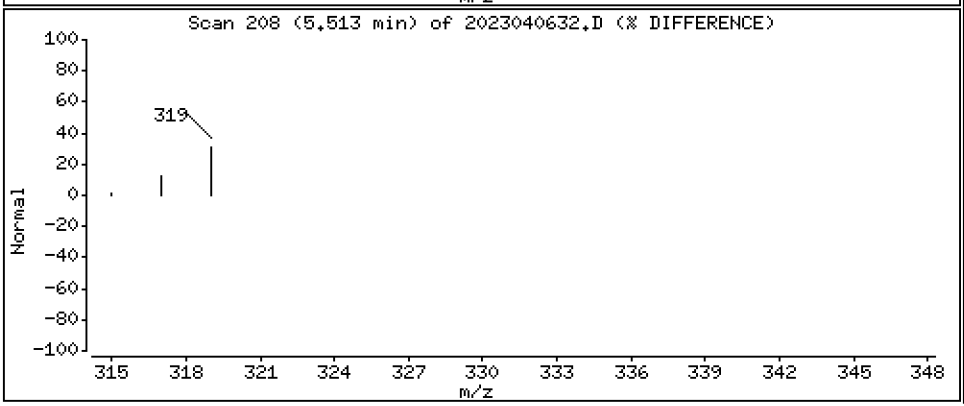












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040632.D

Date : 07-APR-2023 00:18

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-08

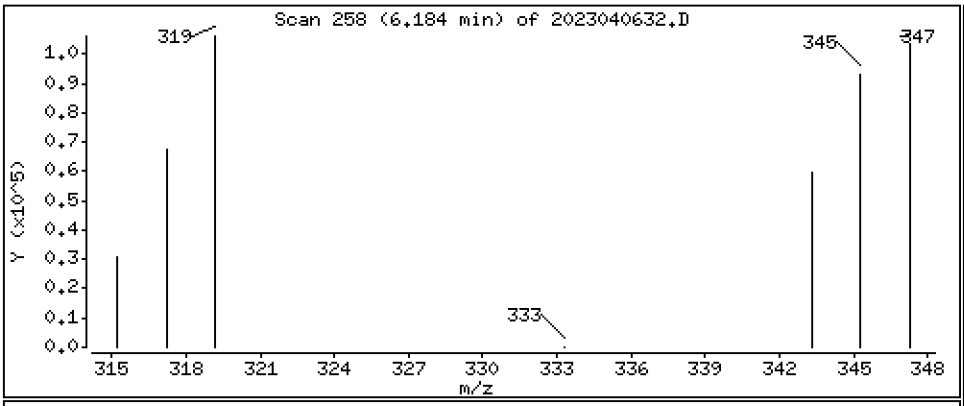
Operator: JZ

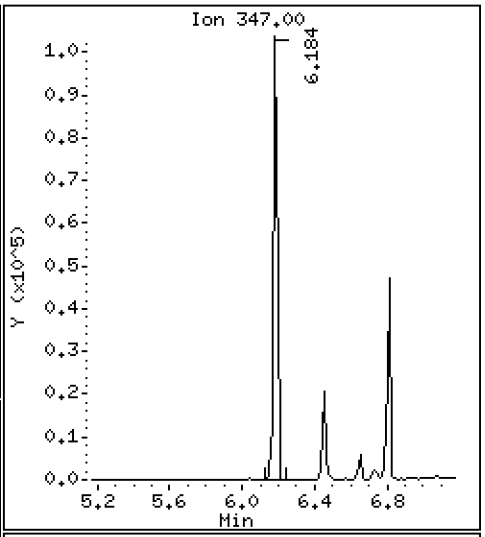
Column phase: ZB-5msi

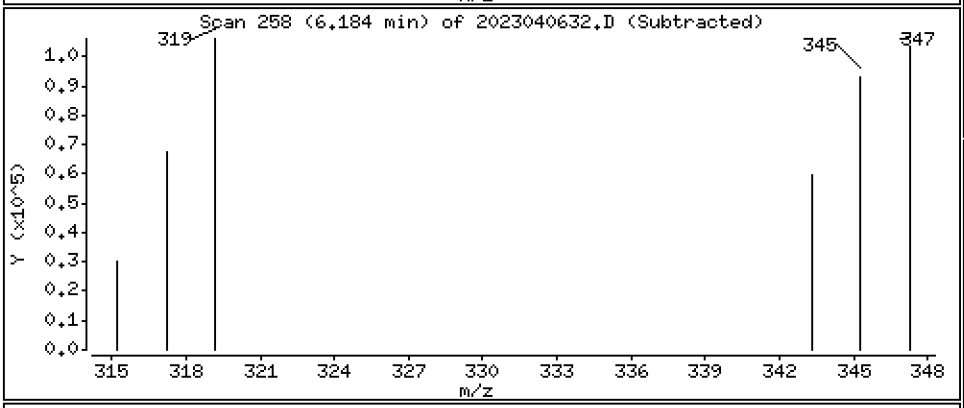
Column diameter: 0.25

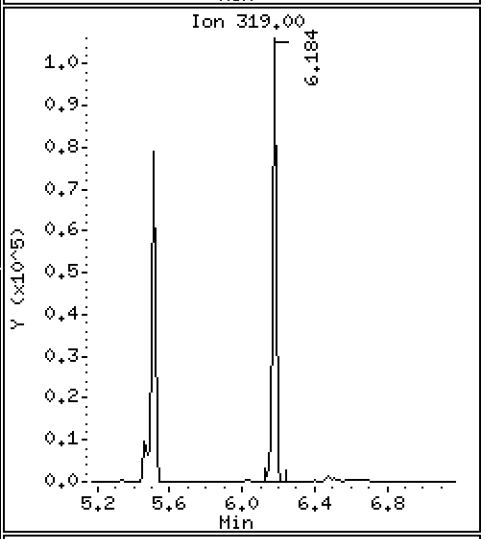
5 Dibutyl Tin (Hexyl)

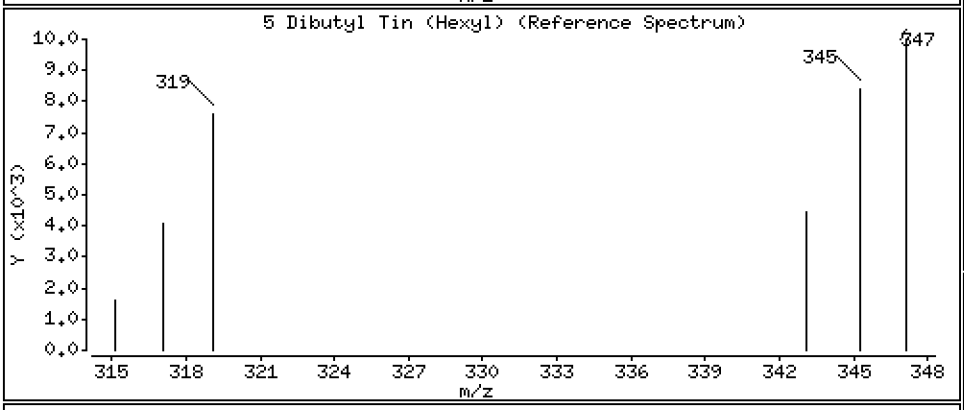
Concentration: 3.741 ug/mL

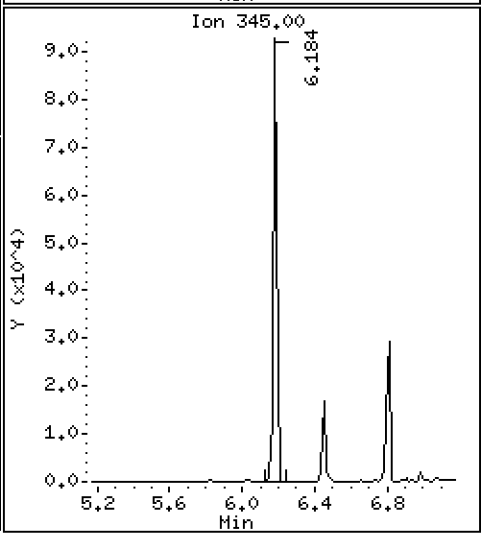


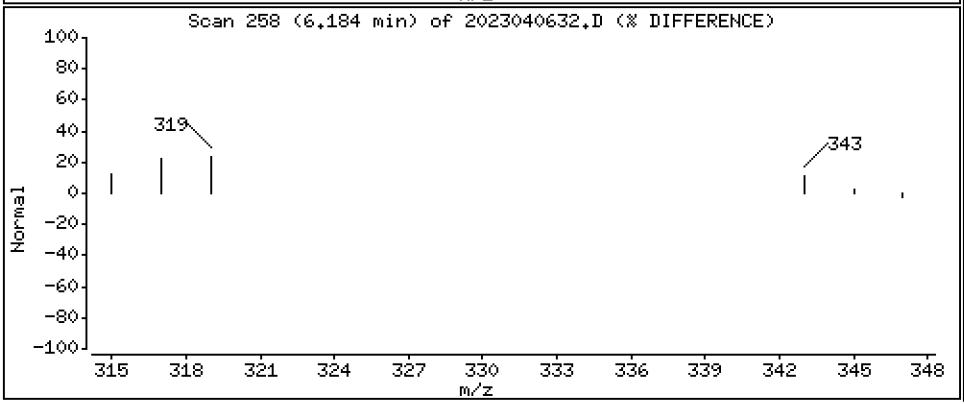












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040632.D

Date : 07-APR-2023 00:18

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-08

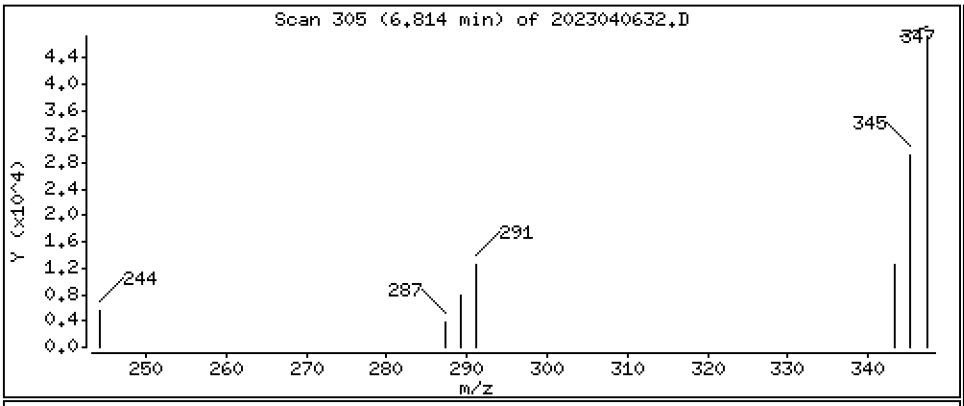
Operator: JZ

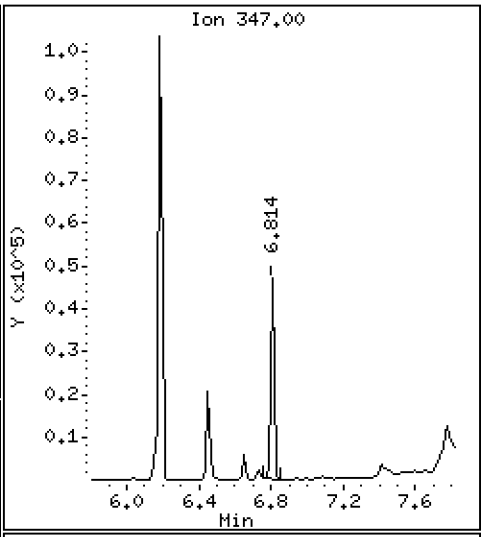
Column phase: ZB-5msi

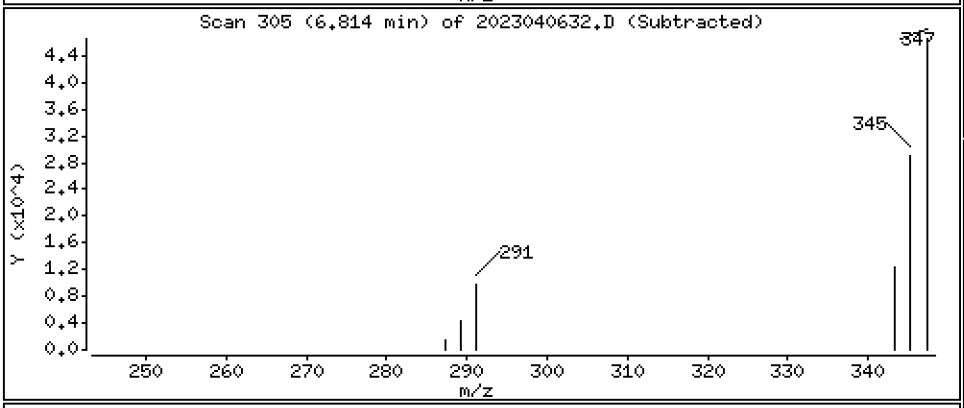
Column diameter: 0.25

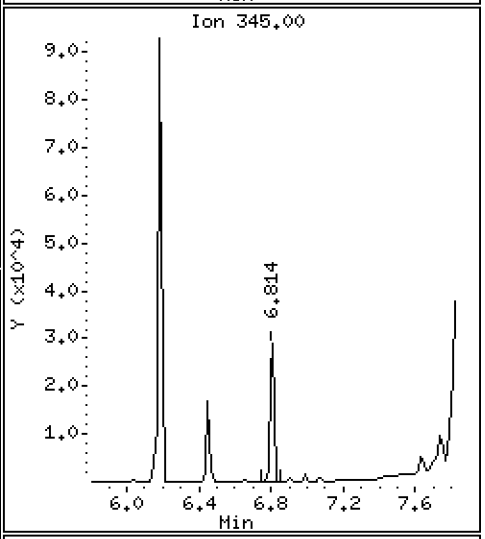
7 Butyl Tin (Hexyl)

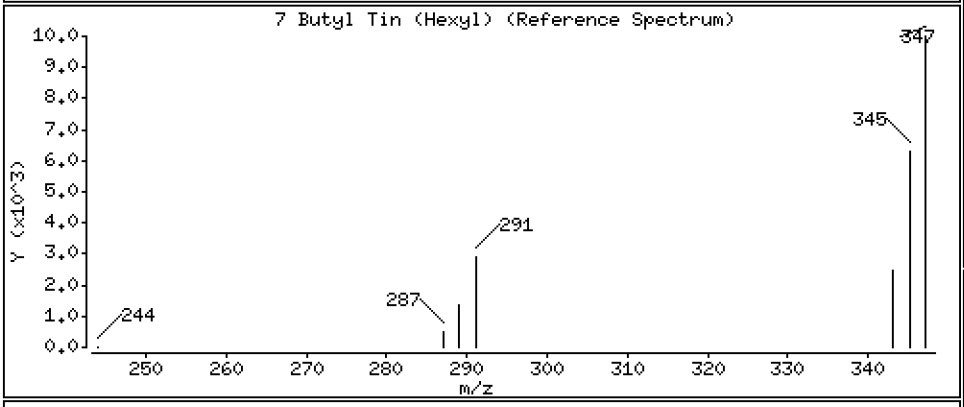
Concentration: 0.9959 ug/mL

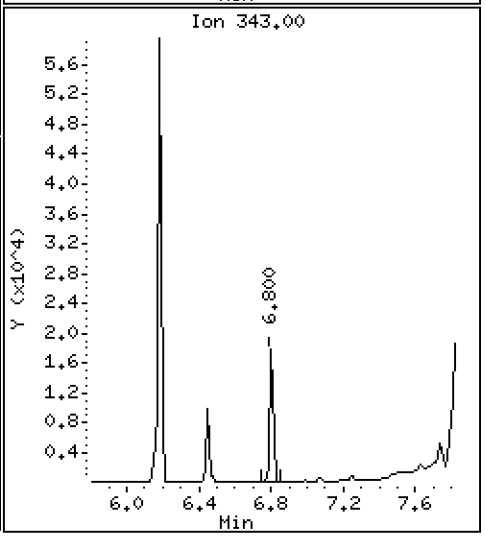


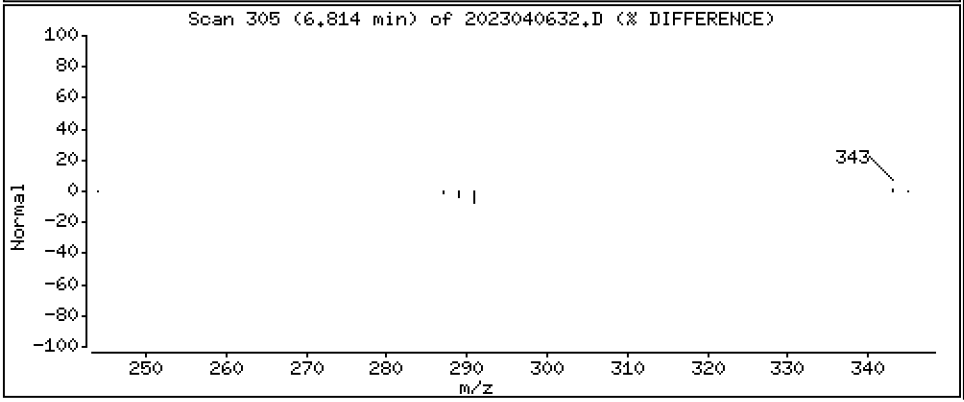












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040632.D
Lab Smp Id: 23C0619-08
Inj Date : 07-APR-2023 00:18
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0619-08
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 32
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)	
$ 1 Tripropyl Tin (Hexyl)	291	4.571	4.514	(0.747)	26898	0.49536	0.4954	
2 Tetrabutyl Tin	289	4.721	4.698	(0.772)	1453	0.02742	0.02742	
3 Tributyl Tin (Hexyl)	319	5.513	5.472	(0.901)	117942	2.77373	2.774	
* 4 Tetrapentyl Tin	333	6.116	6.102	(1.000)	128426	2.00000		
5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	138023	3.74081	3.741	
$ 6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	24598	0.45315	0.4532	
7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	59133	0.99593	0.9959	(M)
* 8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	21977	0.20000		(M)

QC Flag Legend

M - Compound response manually integrated.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040632.D
Lab Smp Id: 23C0619-08
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	128426	-21.77
8 p-Terphenyl-d14	22611	11306	45222	21977	-2.80

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.12	0.22
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040632.D

Lab ID: 23C0619-08
nt12.i, 20230406A.b\TBT20230406.m,   07-APR-2023 00:18

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.747	0.740	0.0078	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

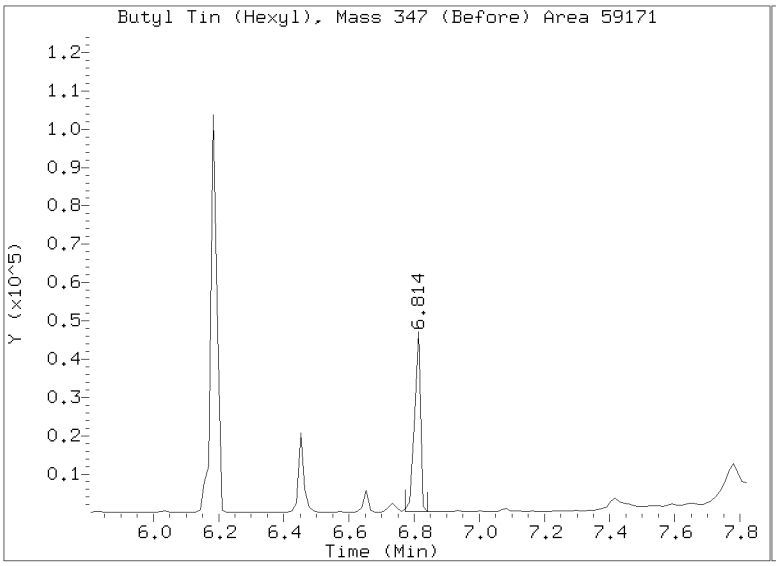
On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

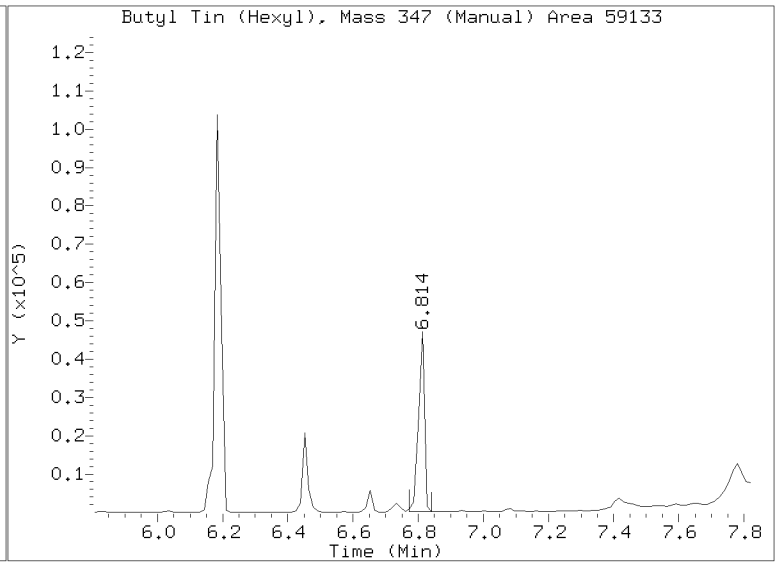
Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

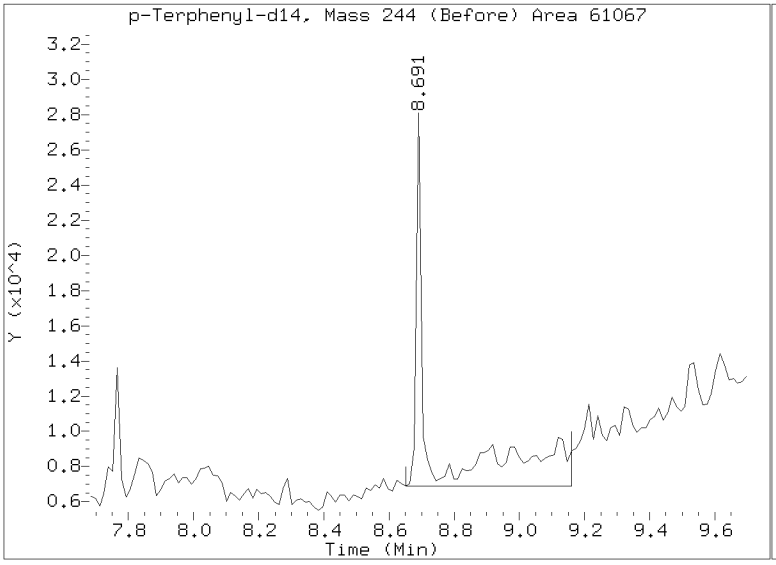
* Only compounds listed in the work order have been verified by the analyst *

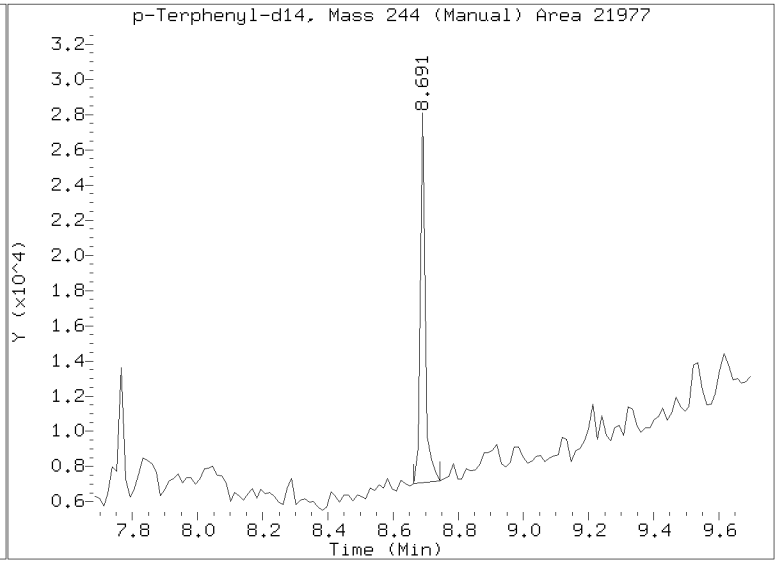
Quant Ion Manual Peak Adjustment Report

Datafile: //target/share/chem3/nt12.i/20230406A.b/2023040632.D
Injection Date: 07-APR-2023 00:18
Lab ID:23C0619-08 Client ID:
Report Date: 04/07/2023 11:09









SED-26C:1-3

Form I

ORGANIC ANALYSIS DATA SHEET

EPA 8270E-SIM

Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0619-09 A	SDG:	23C0619
Sampled:	03/22/23 10:38	Prepared:	03/28/23 12:28	File ID:	2023040633.D
% Solids:	77.86	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/07/23 00:35
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	6.43 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

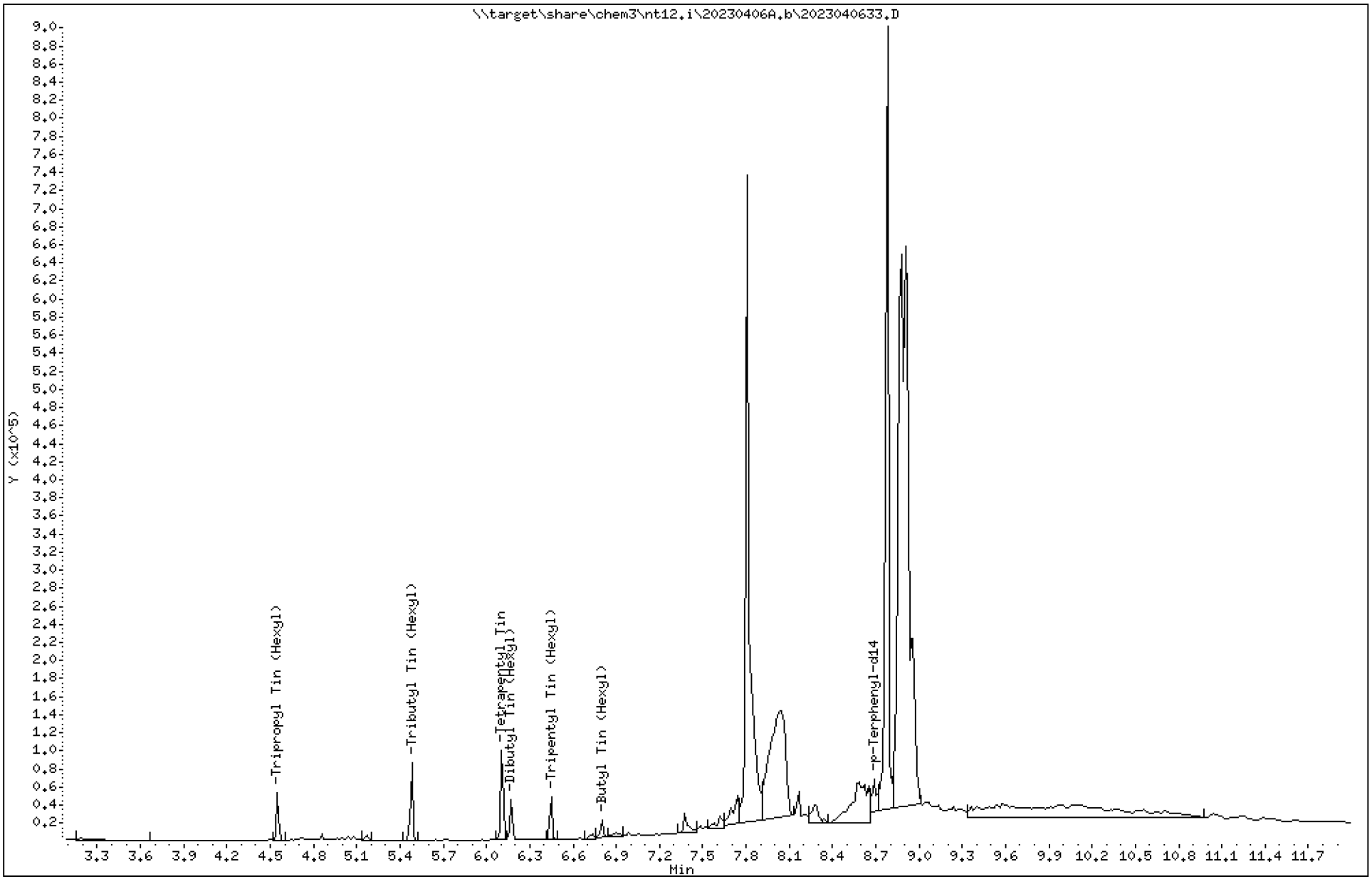
CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	98.7		0.449	3.86
14488-53-0	Dibutyltin Ion	1	20.3		1.73	5.77
78763-54-9	Butyltin Ion	1	4.81		1.89	4.07
1461-25-2	Tetrabutyltin	1	4.99	U	4.99	4.99

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	45.120	36.5	80.9	30 - 160	
Tripropyltin	43.690	36.9	84.4	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040633.D
Date : 07-APR-2023 00:35
Client ID:
Sample Info: 23C0619-09

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



23C0619 CLPLIKE (Rev0) - Page 72 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040633.D

Date : 07-APR-2023 00:35

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-09

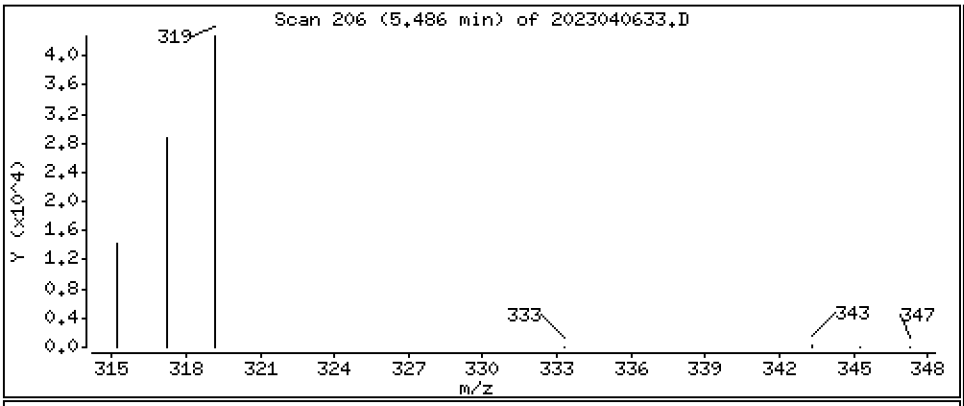
Operator: JZ

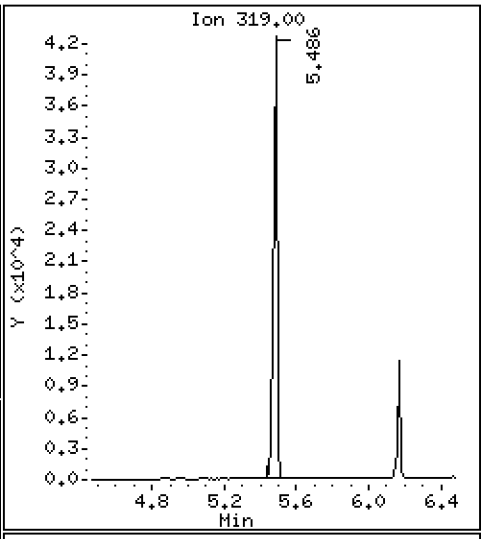
Column phase: ZB-5msi

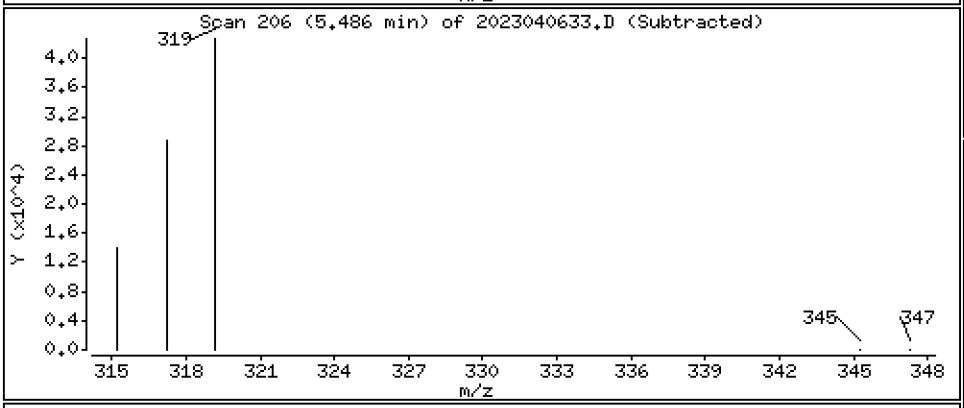
Column diameter: 0.25

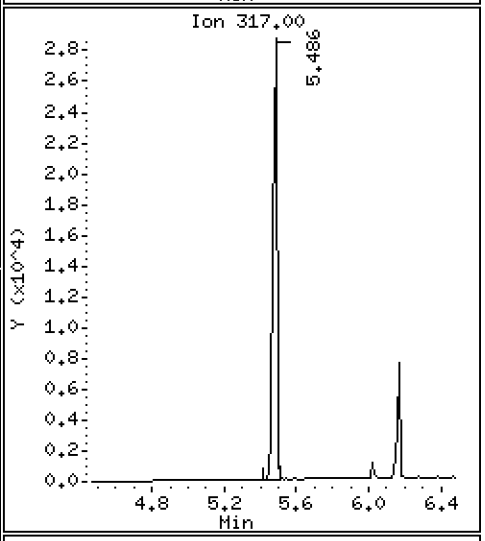
3 Tributyl Tin (Hexyl)

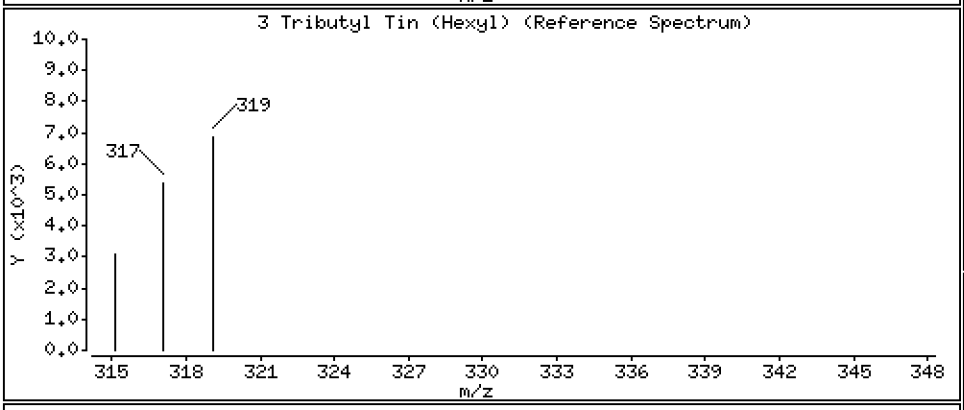
Concentration: 1.278 ug/mL

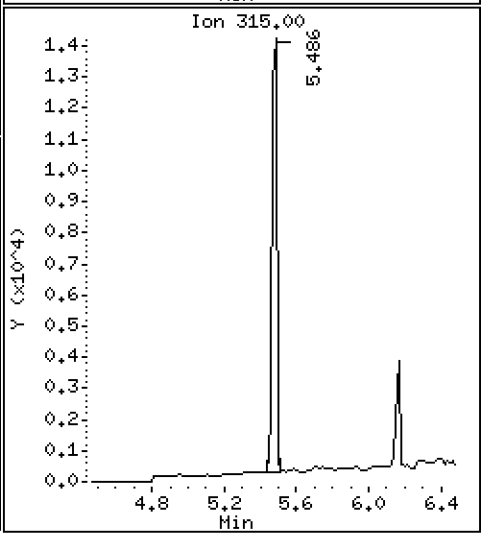


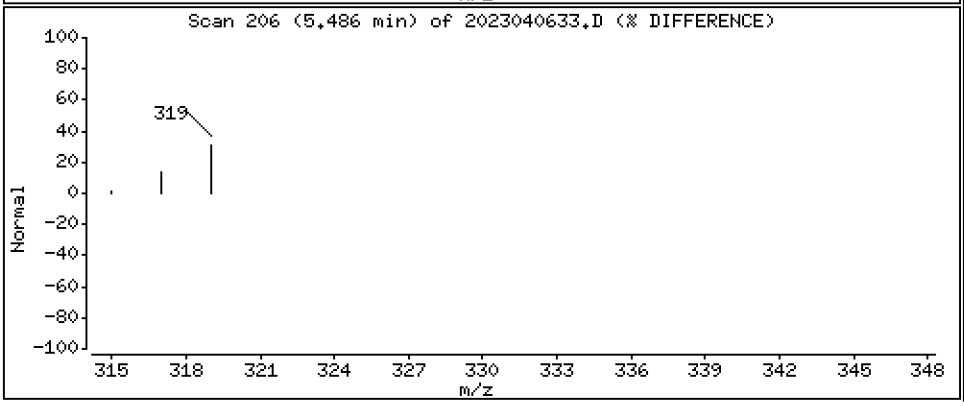












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040633.D

Date : 07-APR-2023 00:35

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-09

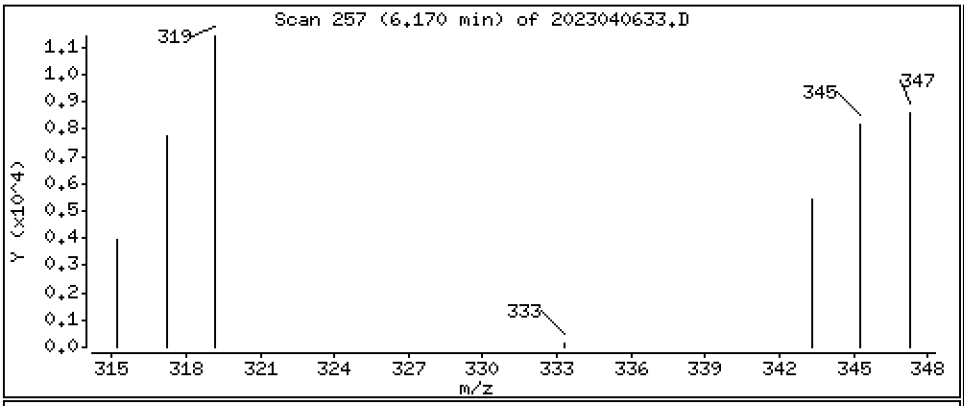
Operator: JZ

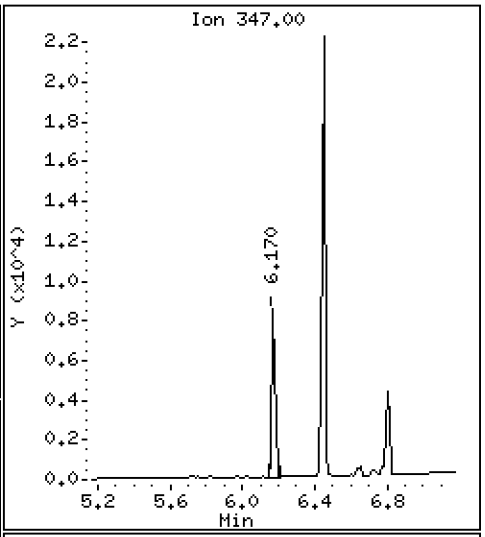
Column phase: ZB-5msi

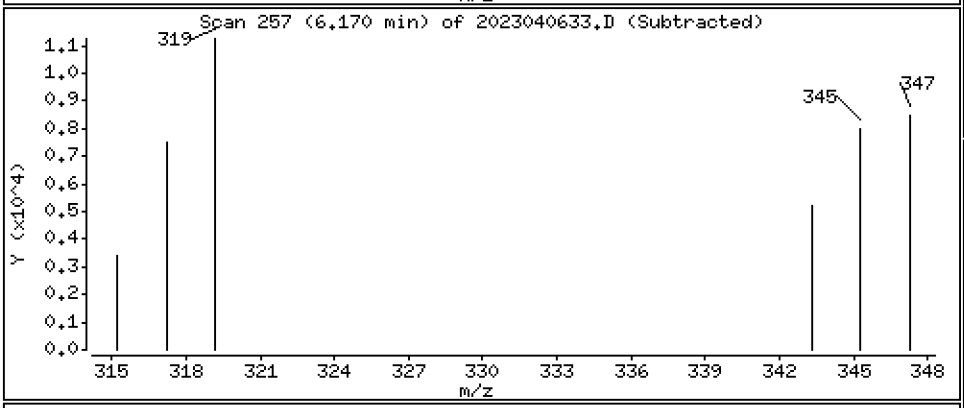
Column diameter: 0.25

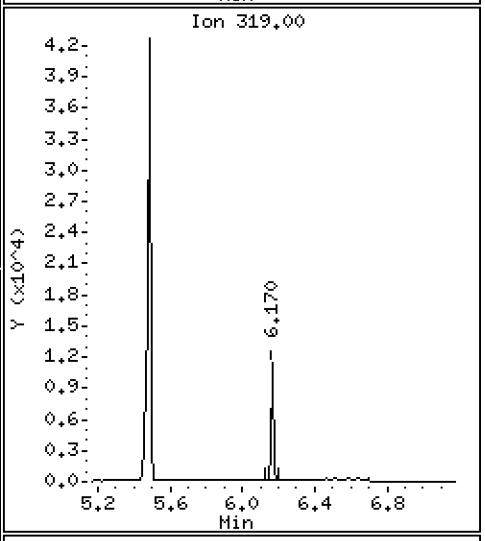
5 Dibutyl Tin (Hexyl)

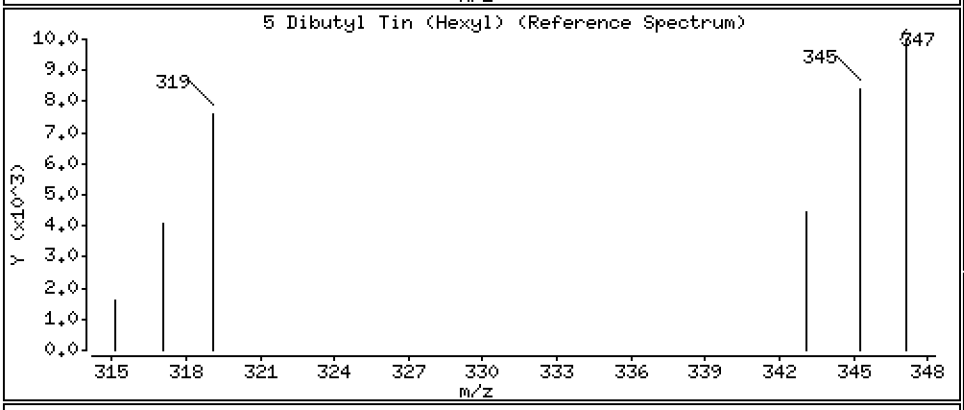
Concentration: 0.3525 ug/mL

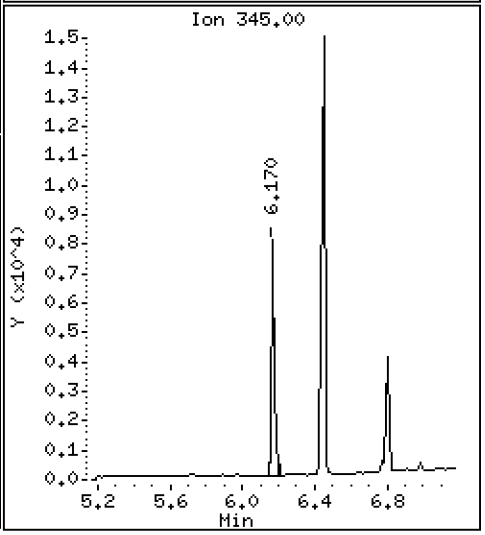


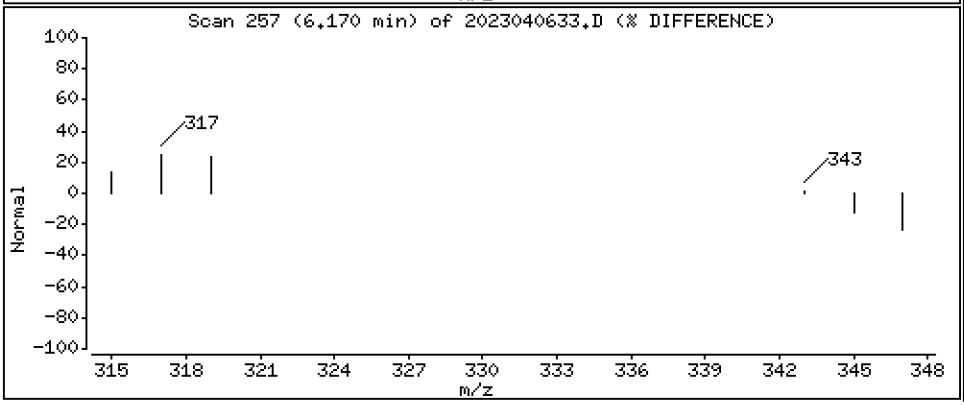












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Date : 07-APR-2023 00:35

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-09

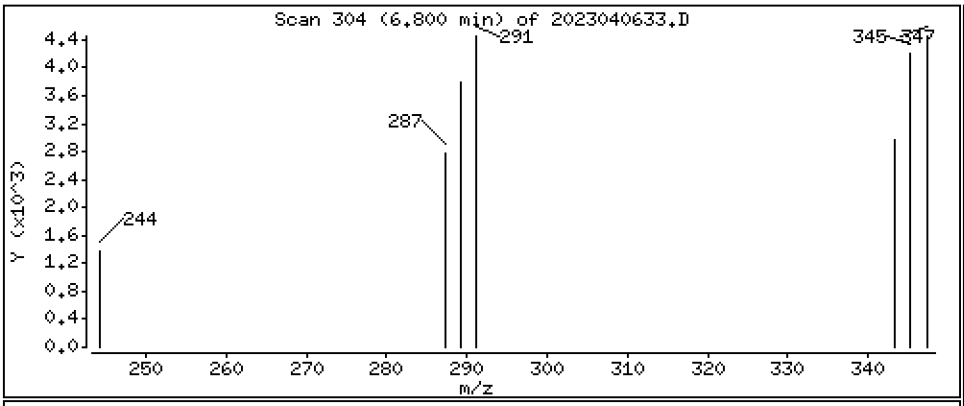
Operator: JZ

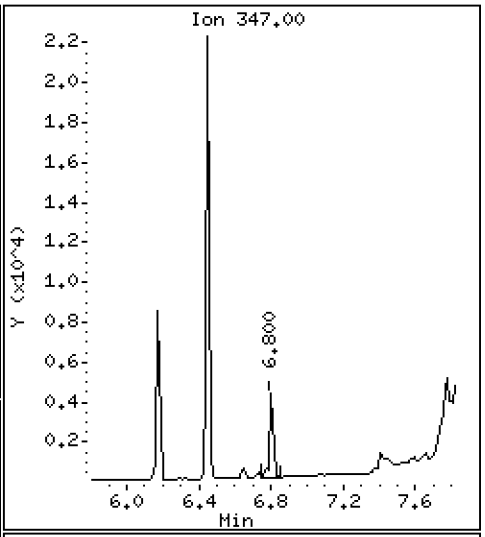
Column phase: ZB-5msi

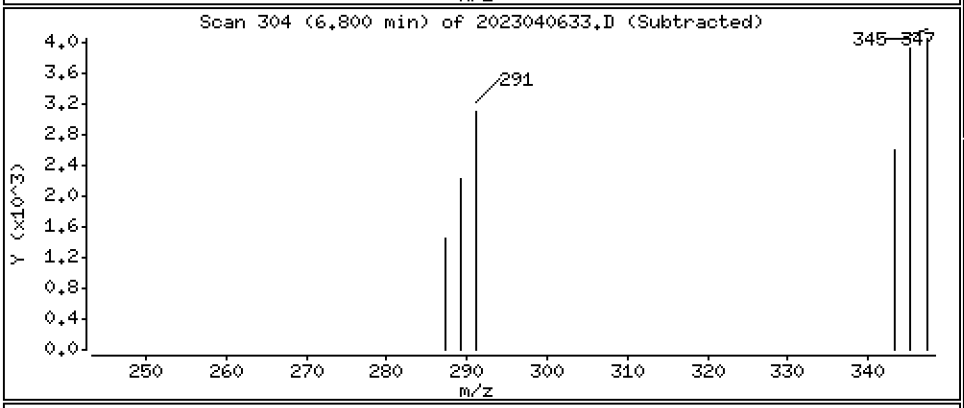
Column diameter: 0.25

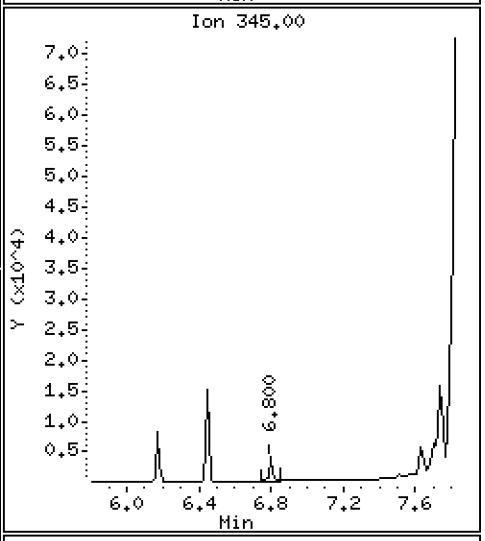
7 Butyl Tin (Hexyl)

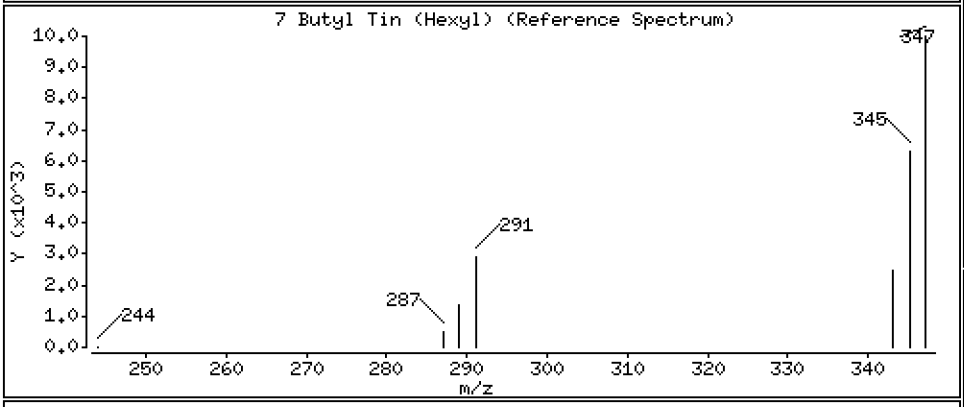
Concentration: 0.1181 ug/mL

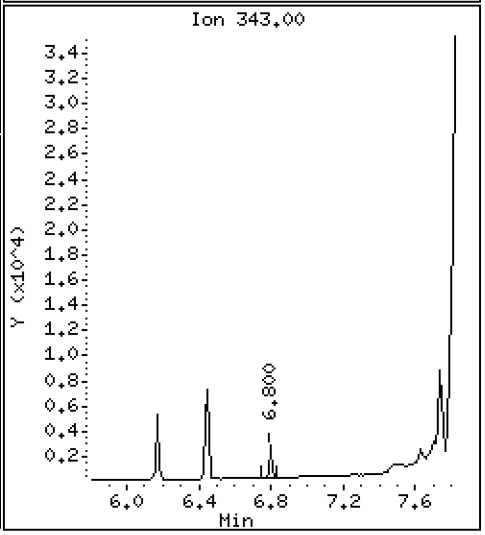


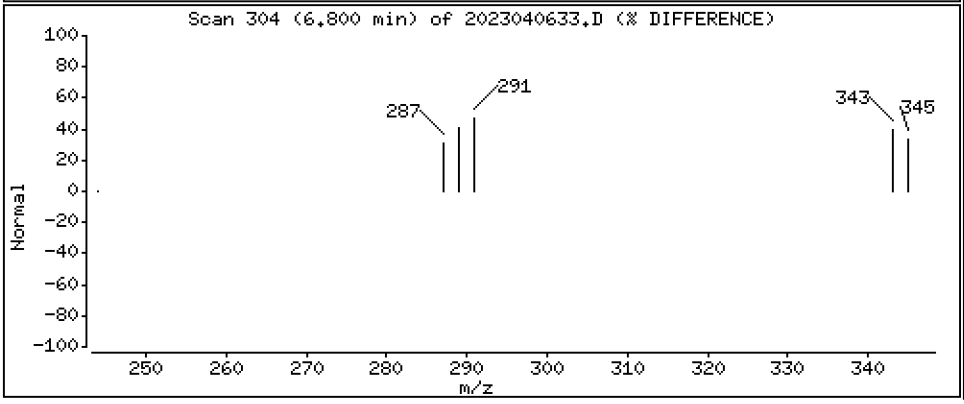












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040633.D
Lab Smp Id: 23C0619-09
Inj Date : 07-APR-2023 00:35
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0619-09
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 33
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.548	4.514	(0.745)	25947	0.49613	0.4961
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.486	5.472	(0.899)	52352	1.27831	1.278
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	123693	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.170	6.169	(0.710)	11932	0.35245	0.3525
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	22866	0.45910	0.4591
	7 Butyl Tin (Hexyl)	347	6.800	6.813	(0.782)	6432	0.11806	0.1181
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	20165	0.20000	(M)

QC Flag Legend

M - Compound response manually integrated.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040633.D
Lab Smp Id: 23C0619-09
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	123693	-24.66
8 p-Terphenyl-d14	22611	11306	45222	20165	-10.82

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040633.D

Lab ID: 23C0619-09
nt12.i, 20230406A.b\TBT20230406.m,   07-APR-2023 00:35

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.745	0.740	0.0057	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

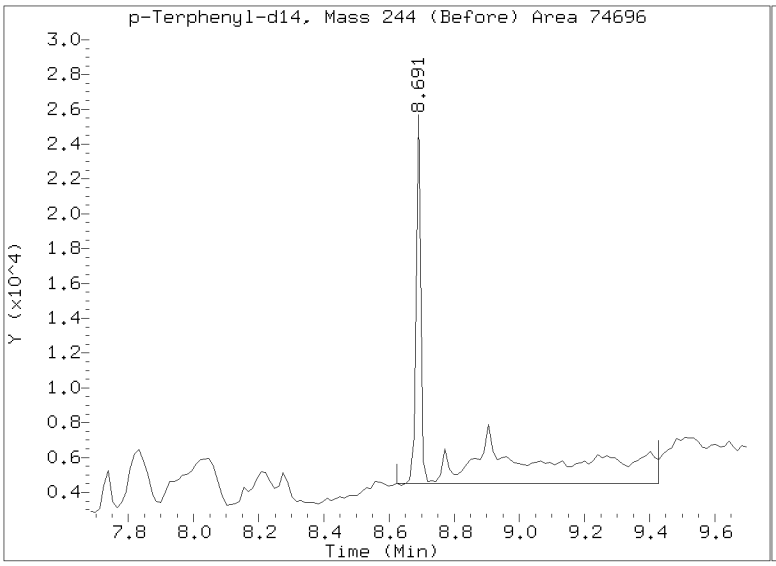
On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

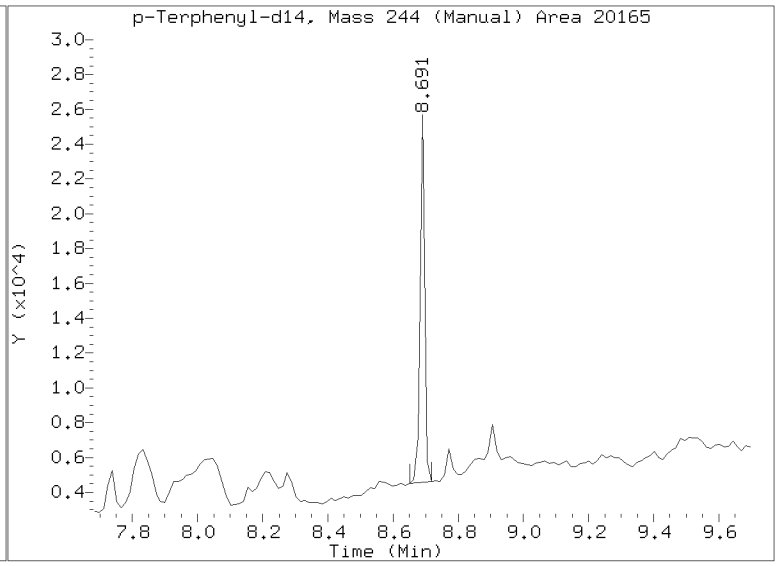
Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Quant Ion Manual Peak Adjustment Report

Datafile: //target/share/chem3/nt12.i/20230406A.b/2023040633.D
Injection Date: 07-APR-2023 00:35
Lab ID:23C0619-09 Client ID:
Report Date: 04/07/2023 11:09





Analytical Resources, LLC
Analytical Chemists and Consultants

SED-25C:0-1

Form I
ORGANIC ANALYSIS DATA SHEET
EPA 8270E-SIM
Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0619-10 A	SDG:	23C0619
Sampled:	03/22/23 11:19	Prepared:	03/28/23 12:28	File ID:	2023040634.D
% Solids:	77.08	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/07/23 00:51
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	6.49 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

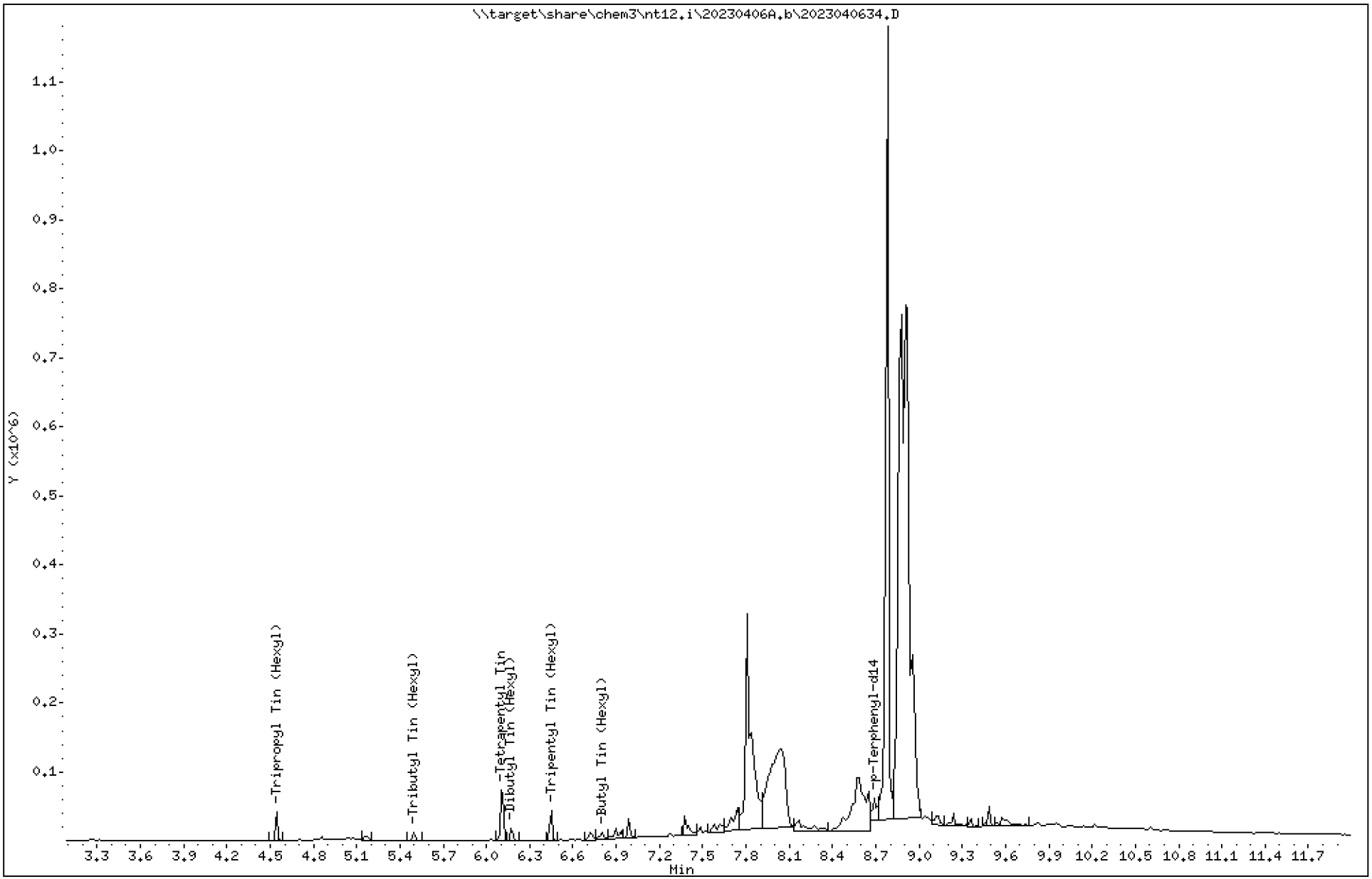
CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	12.6		0.450	3.86
14488-53-0	Dibutyltin Ion	1	8.47		1.73	5.78
78763-54-9	Butyltin Ion	1	2.13	J	1.89	4.08
1461-25-2	Tetrabutyltin	1	5.00	U	5.00	5.00

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	45.155	31.8	70.4	30 - 160	
Tripropyltin	43.724	33.0	75.4	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040634.D
Date : 07-APR-2023 00:51
Client ID:
Sample Info: 23C0619-10

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



23C0619 CLPLIKE (Rev0) - Page 81 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040634.D

Date : 07-APR-2023 00:51

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-10

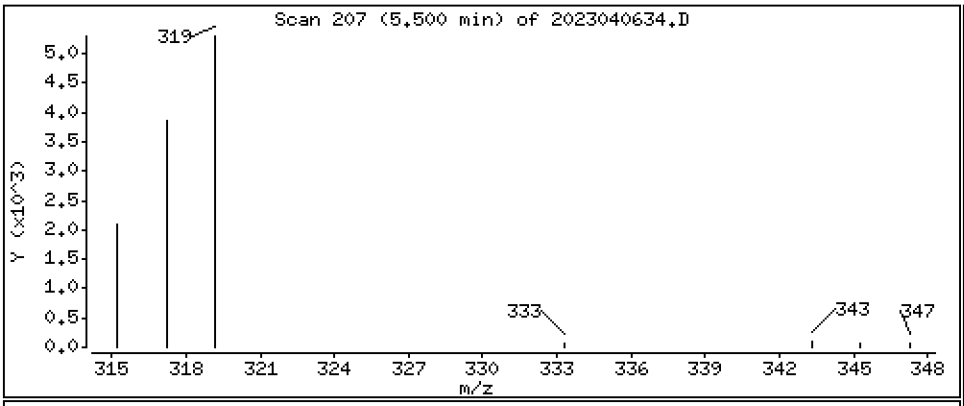
Operator: JZ

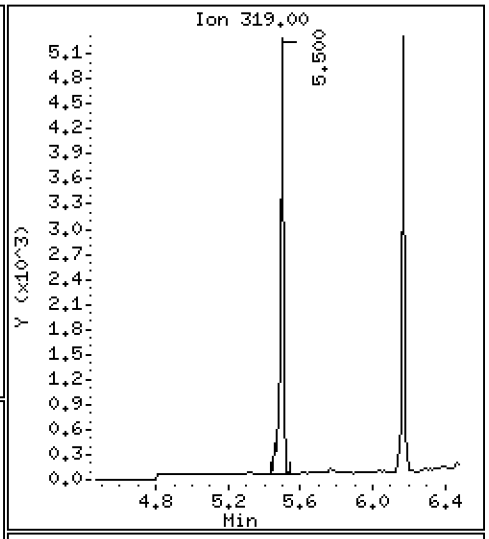
Column phase: ZB-5msi

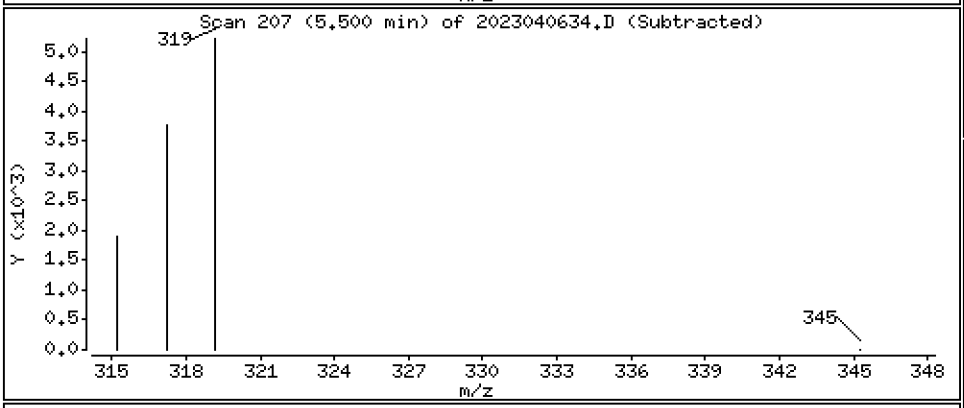
Column diameter: 0.25

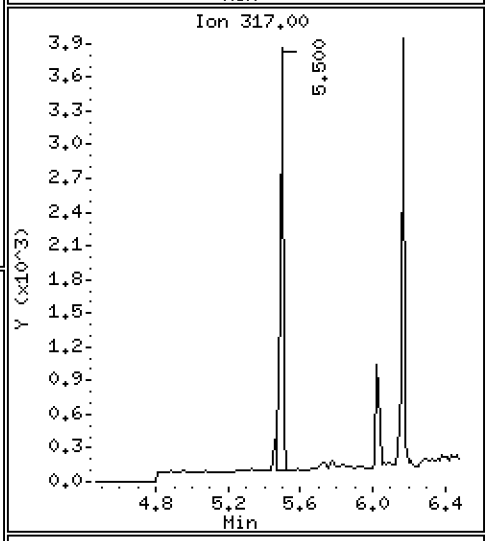
3 Tributyl Tin (Hexyl)

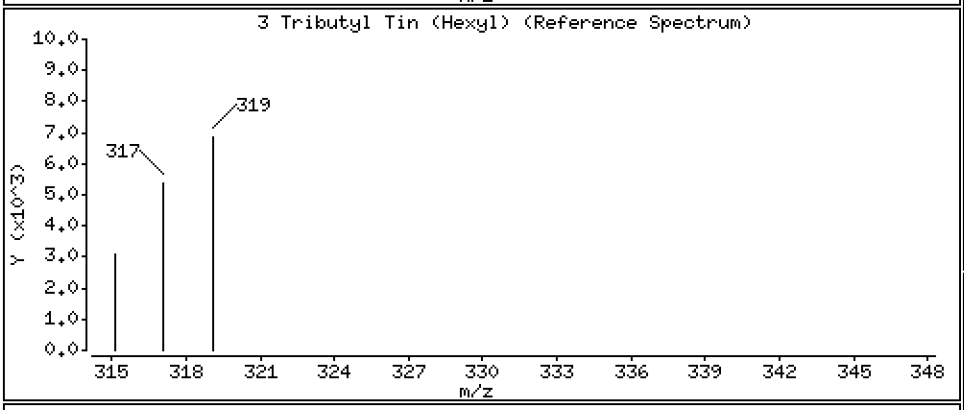
Concentration: 0.1626 ug/mL

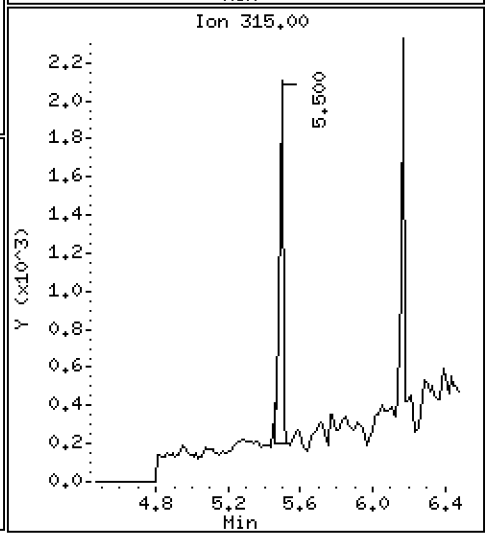


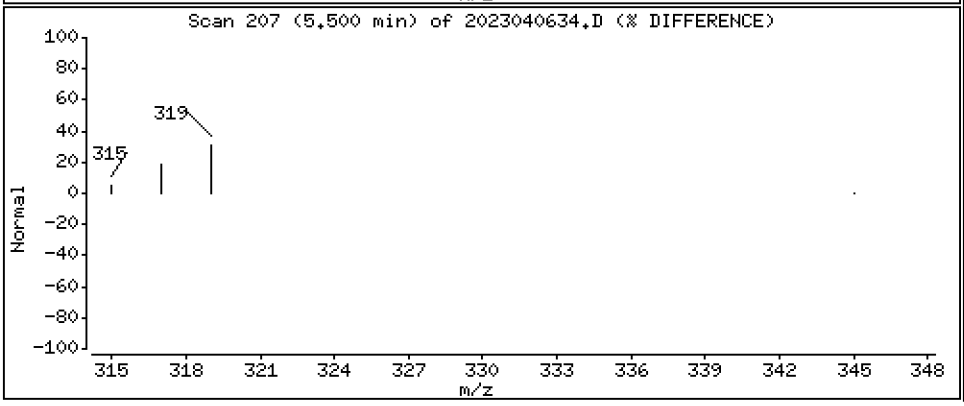












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040634.D

Date : 07-APR-2023 00:51

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-10

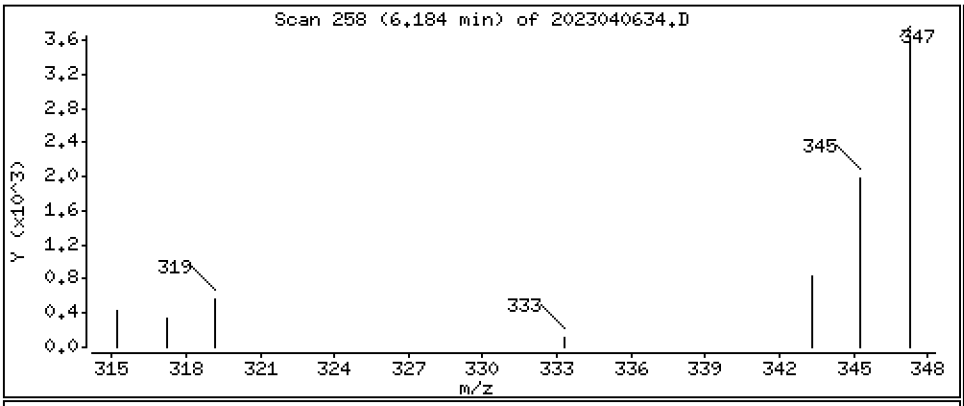
Operator: JZ

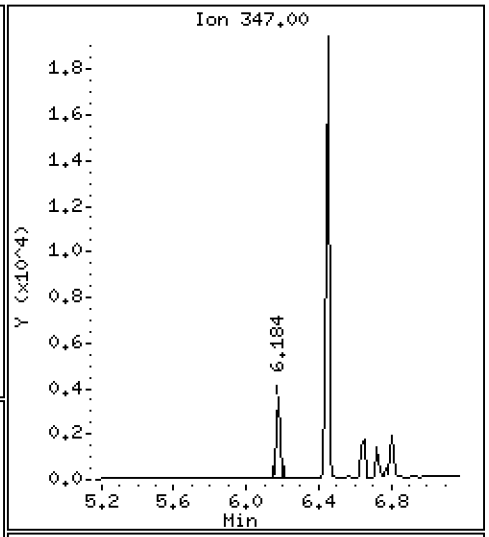
Column phase: ZB-5msi

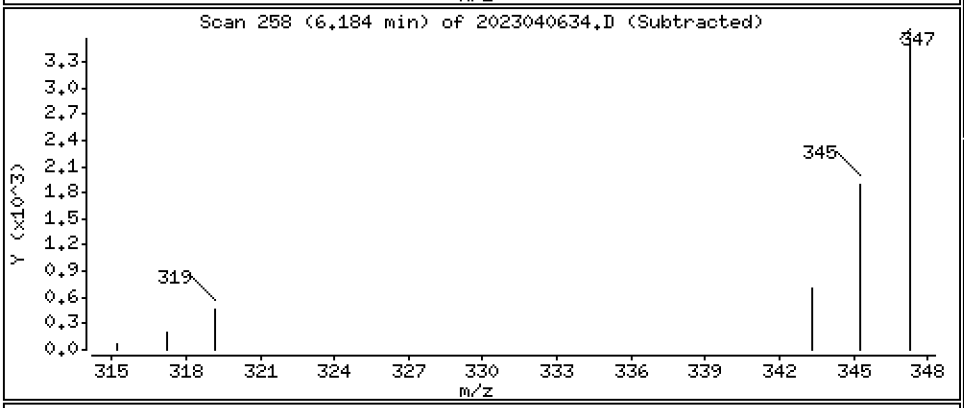
Column diameter: 0.25

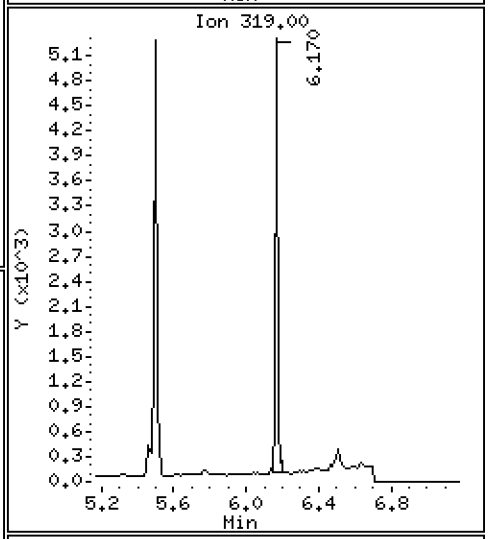
5 Dibutyl Tin (Hexyl)

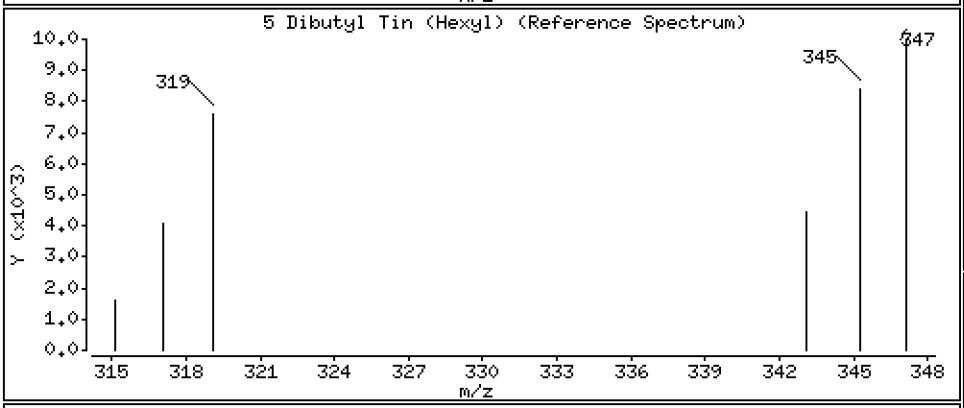
Concentration: 0.1467 ug/mL

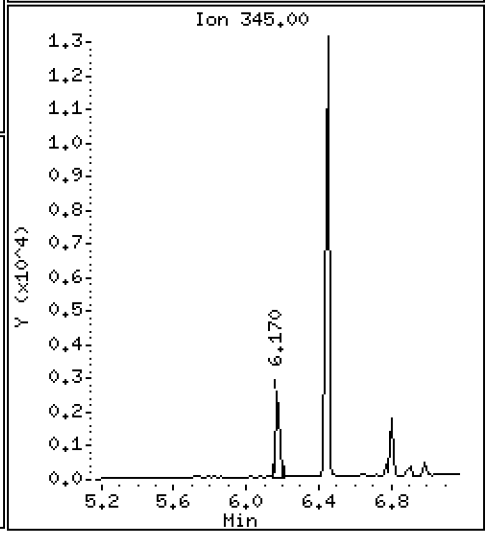


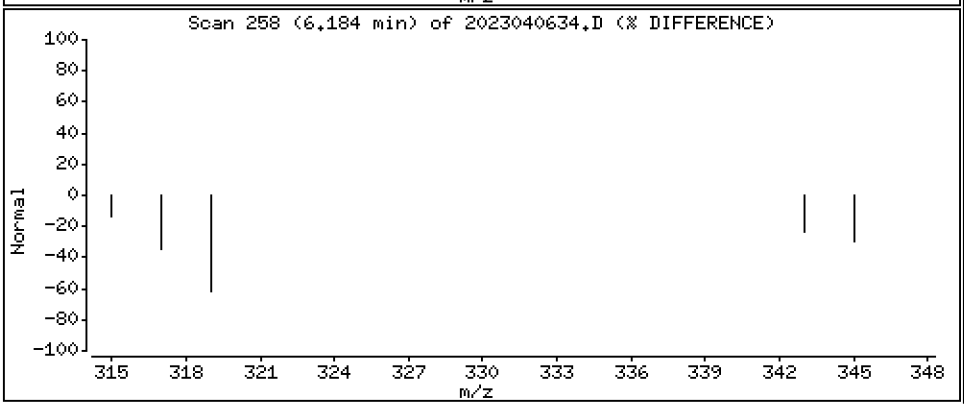












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040634.D

Date : 07-APR-2023 00:51

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-10

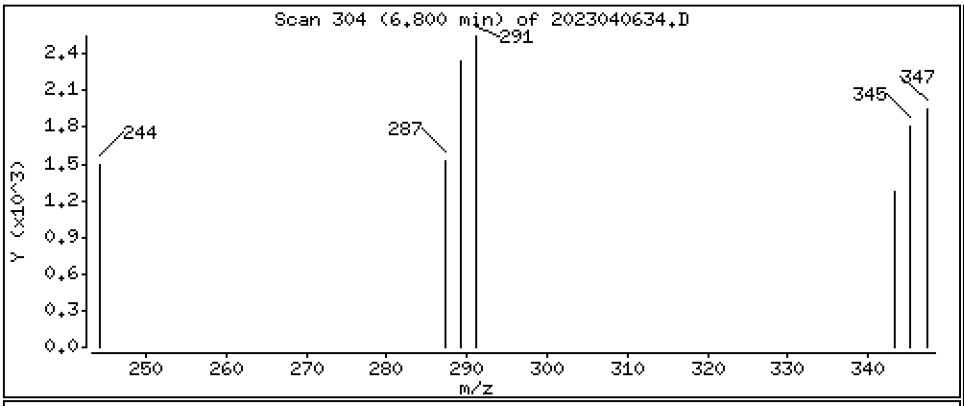
Operator: JZ

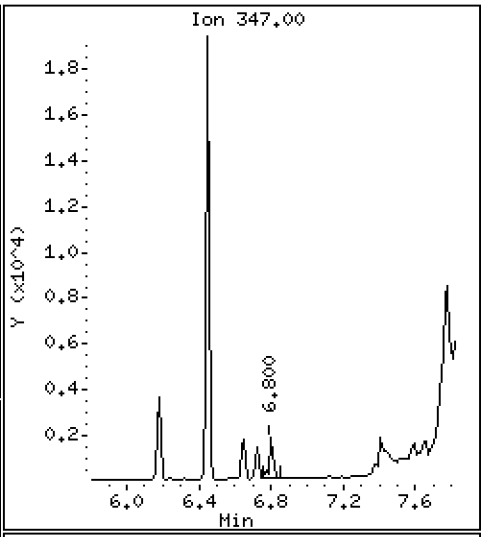
Column phase: ZB-5msi

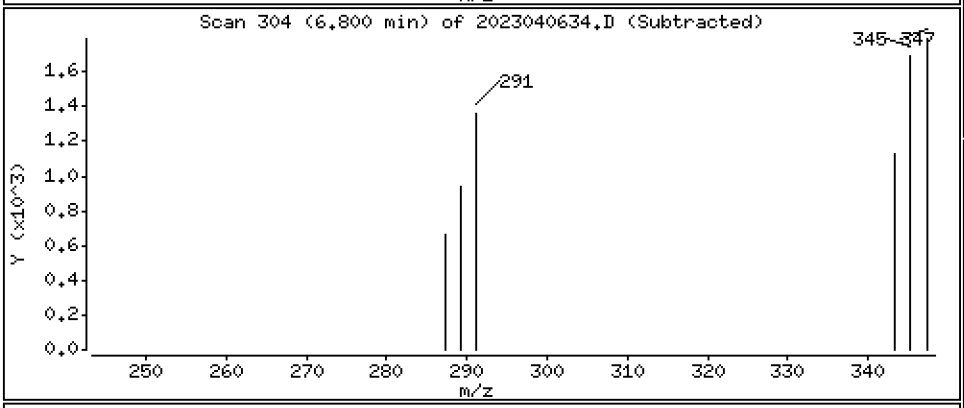
Column diameter: 0.25

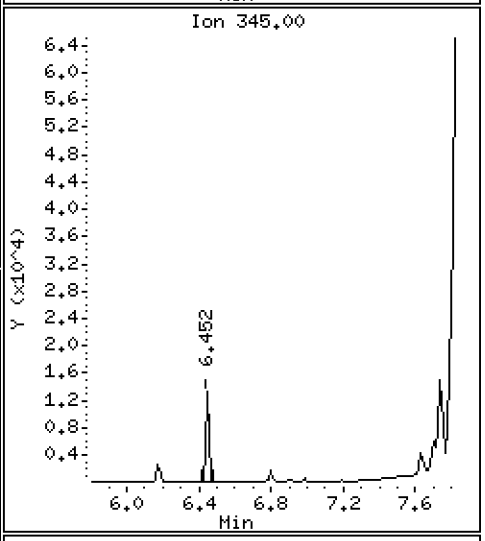
7 Butyl Tin (Hexyl)

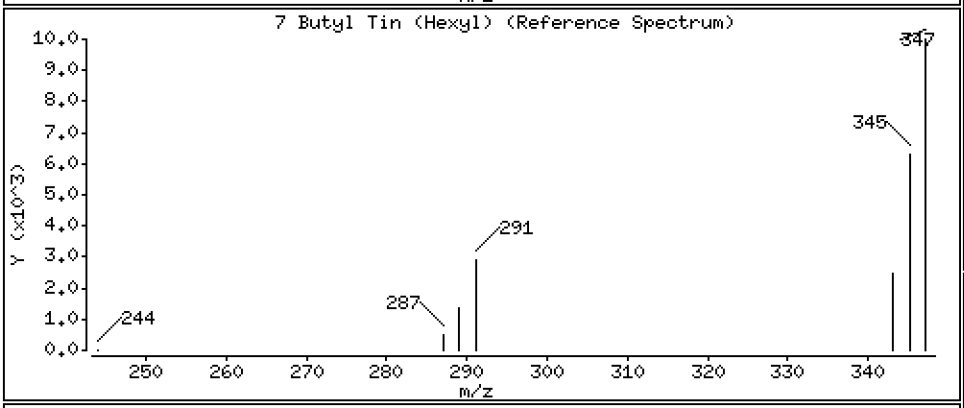
Concentration: 0.05225 ug/mL

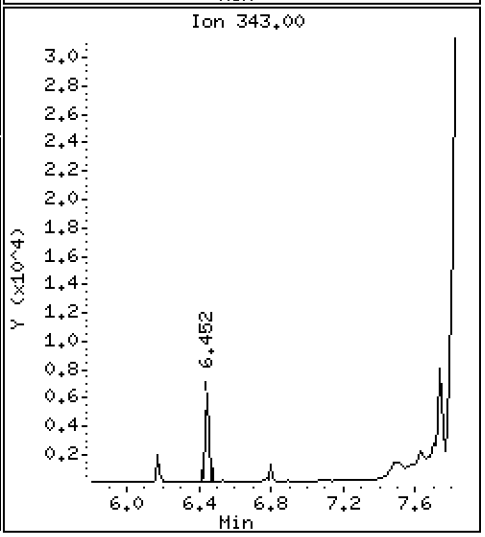


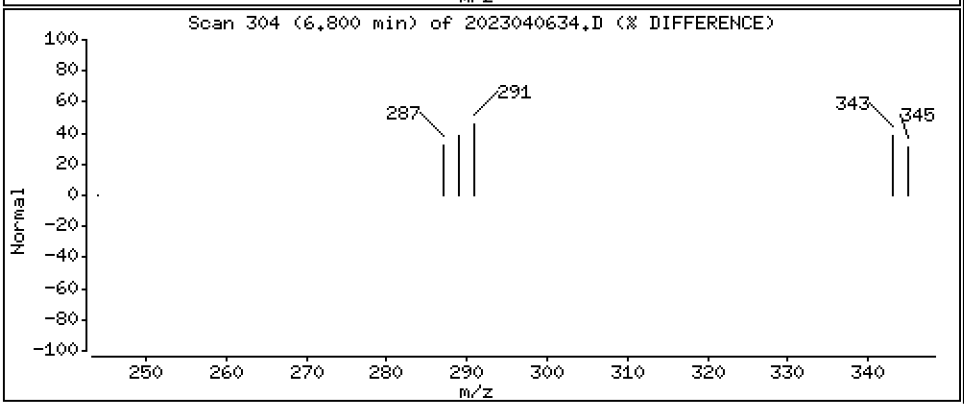












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040634.D
Lab Smp Id: 23C0619-10
Inj Date : 07-APR-2023 00:51
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0619-10
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 34
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$ 1	Tripropyl Tin (Hexyl)	291	4.548	4.514	(0.745)	22626	0.44338	0.4434
2	Tetrabutyl Tin	289	Compound Not Detected.					
3	Tributyl Tin (Hexyl)	319	5.499	5.472	(0.901)	6498	0.16261	0.1626
* 4	Tetrapentyl Tin	333	6.103	6.102	(1.000)	120694	2.00000	
5	Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	4960	0.14668	0.1467
$ 6	Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	19875	0.39952	0.3995
7	Butyl Tin (Hexyl)	347	6.800	6.813	(0.782)	2843	0.05225	0.05225(M)
* 8	p-Terphenyl-d14	244	8.691	8.690	(1.000)	20141	0.20000	

QC Flag Legend

M - Compound response manually integrated.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040634.D
Lab Smp Id: 23C0619-10
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	120694	-26.48
8 p-Terphenyl-d14	22611	11306	45222	20141	-10.92

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040634.D

Lab ID: 23C0619-10
nt12.i, 20230406A.b\TBT20230406.m,   07-APR-2023 00:51

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.745	0.740	0.0057	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

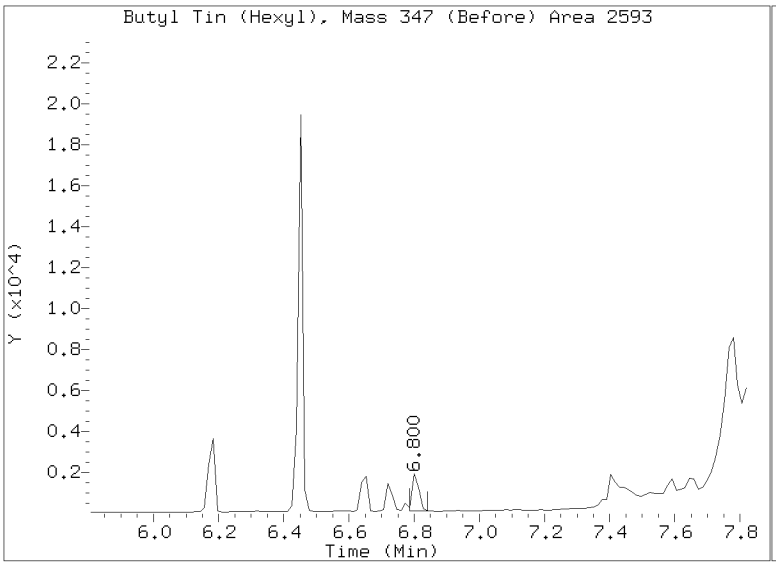
On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

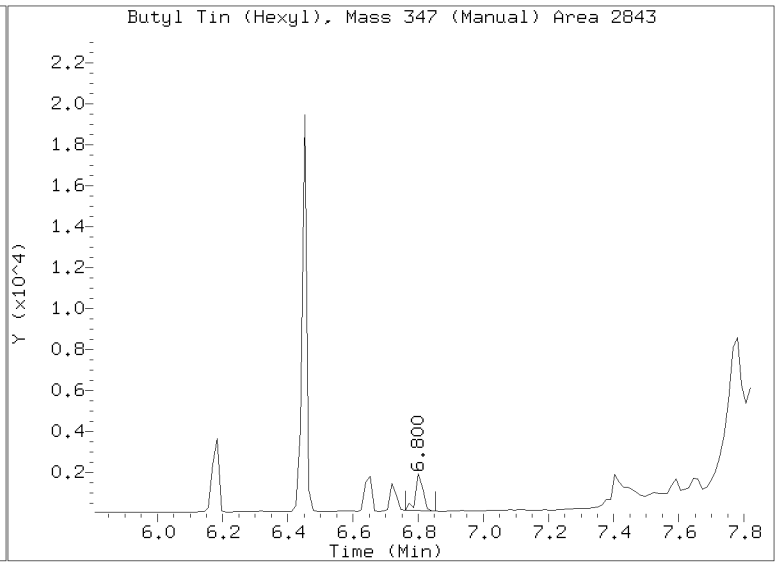
Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Quant Ion Manual Peak Adjustment Report

Datafile: //target/share/chem3/nt12.i/20230406A.b/2023040634.D
Injection Date: 07-APR-2023 00:51
Lab ID:23C0619-10 Client ID:
Report Date: 04/07/2023 11:09





Analytical Resources, LLC
Analytical Chemists and Consultants

SED-25C:1-3

Form I

ORGANIC ANALYSIS DATA SHEET

EPA 8270E-SIM

Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0619-11 A	SDG:	23C0619
Sampled:	03/22/23 11:19	Prepared:	03/28/23 12:28	File ID:	2023040635.D
% Solids:	80.38	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/07/23 01:08
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	6.23 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

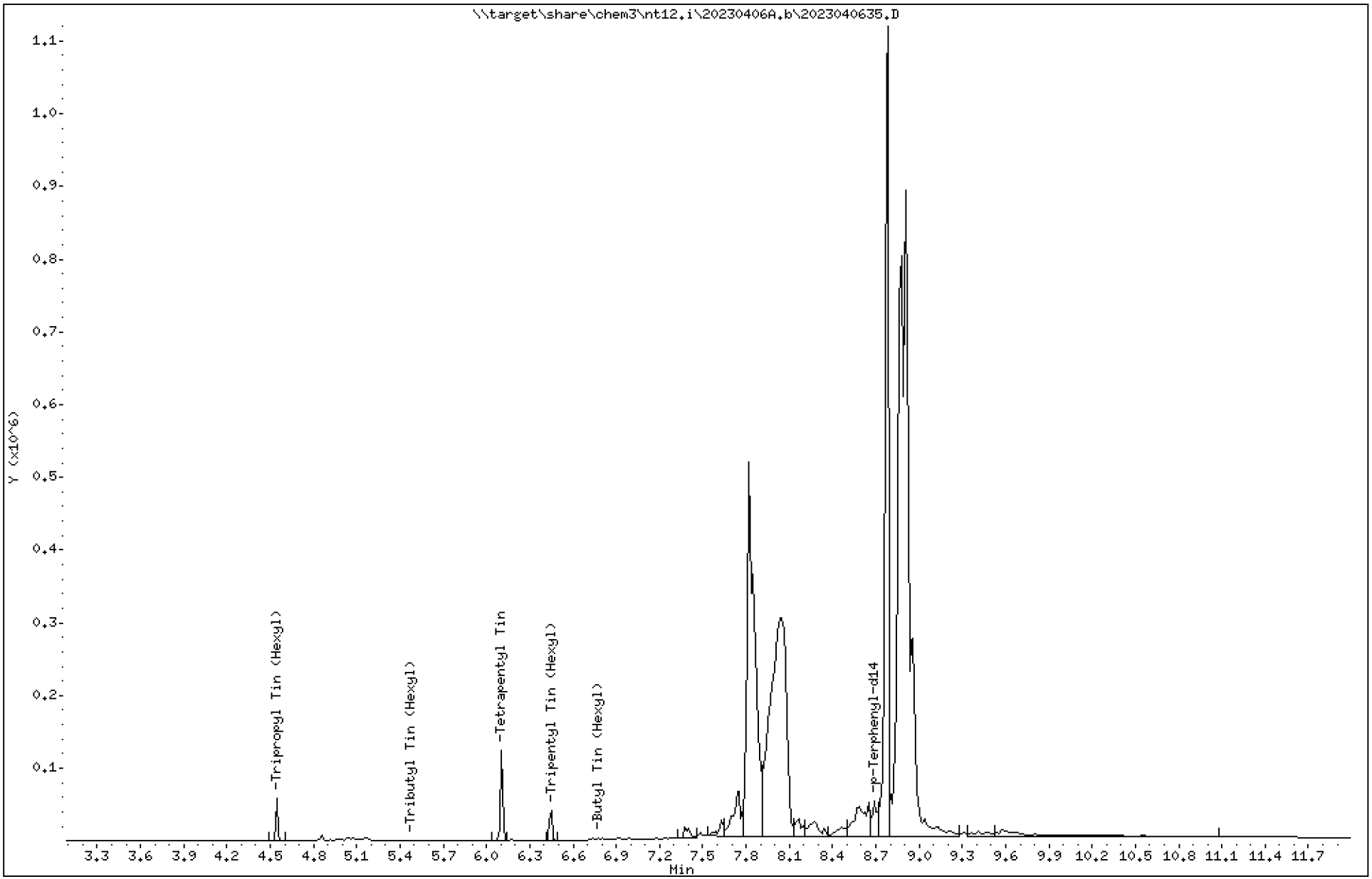
CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	0.952	J	0.449	3.85
14488-53-0	Dibutyltin Ion	1	5.77	U	1.73	5.77
78763-54-9	Butyltin Ion	1	4.07	U	1.89	4.07
1461-25-2	Tetrabutyltin	1	4.99	U	4.99	4.99

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	45.109	36.6	81.1	30 - 160	
Tripropyltin	43.679	37.5	85.8	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040635.D
Date : 07-APR-2023 01:08
Client ID:
Sample Info: 23C0619-11

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



23C0619 CLPLIKE (Rev0) - Page 90 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040635.D

Date : 07-APR-2023 01:08

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-11

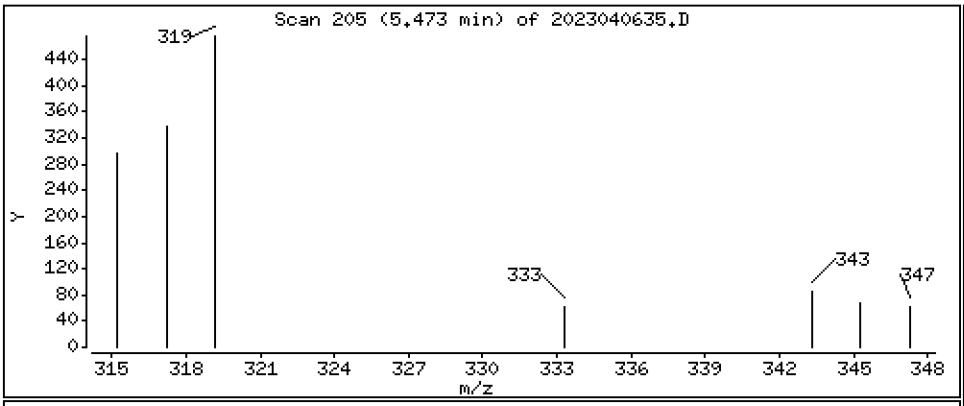
Operator: JZ

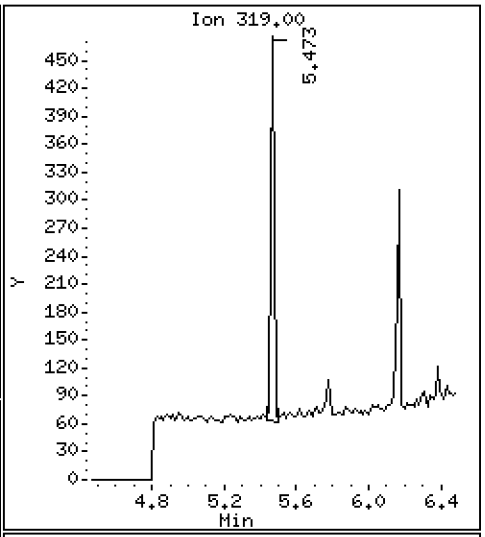
Column phase: ZB-5msi

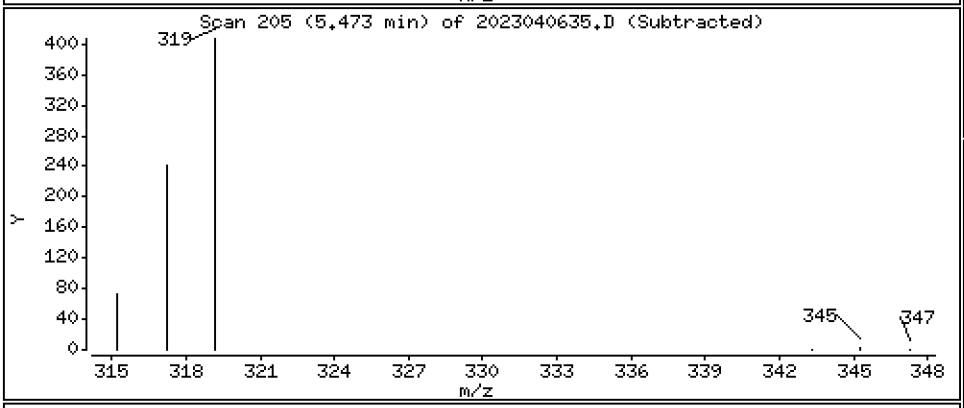
Column diameter: 0.25

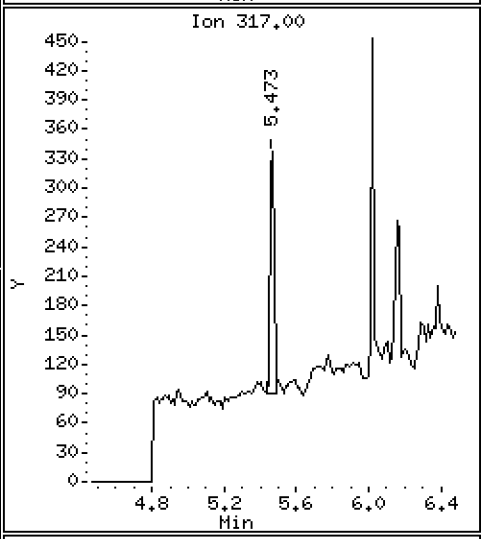
3 Tributyl Tin (Hexyl)

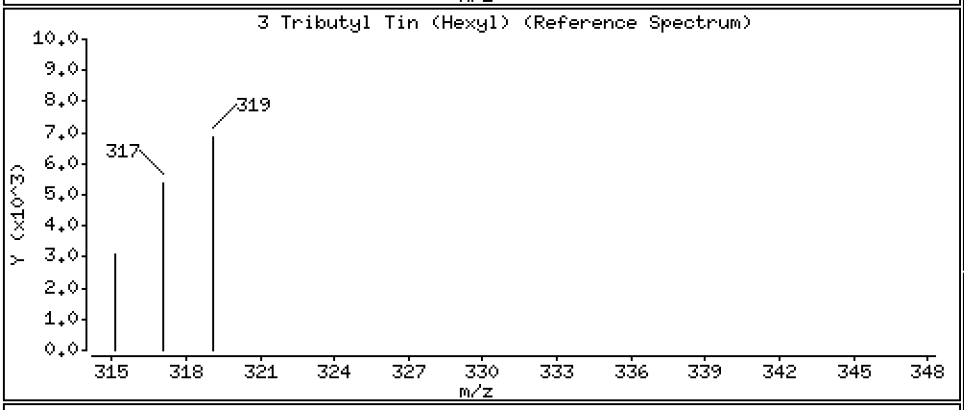
Concentration: 0.01234 ug/mL

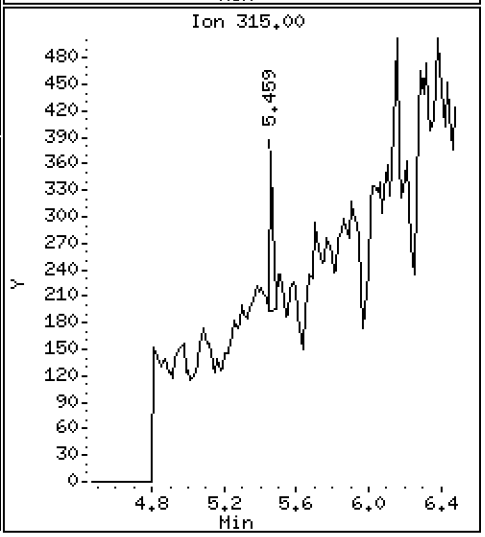


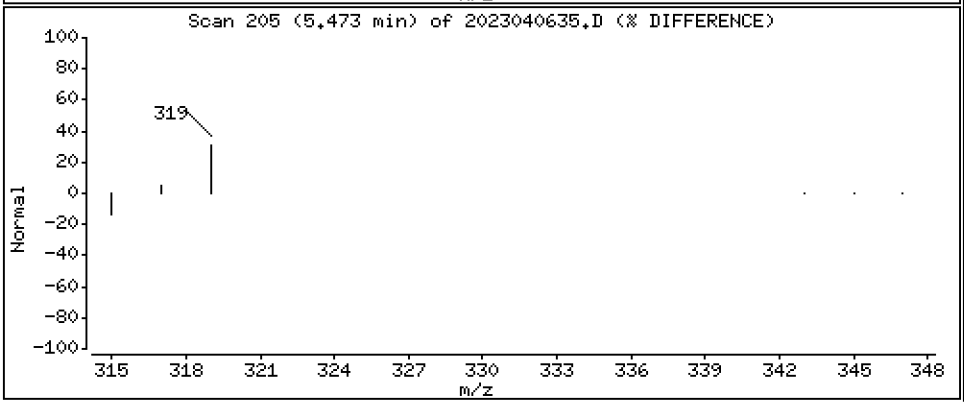












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040635.D

Date : 07-APR-2023 01:08

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-11

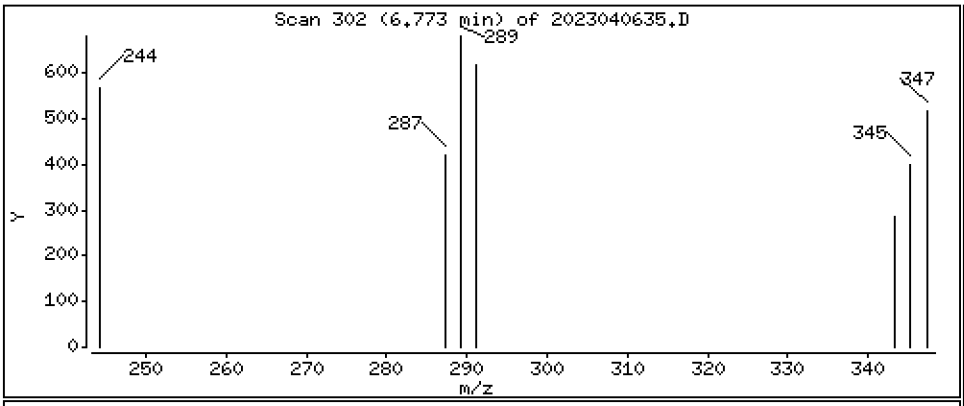
Operator: JZ

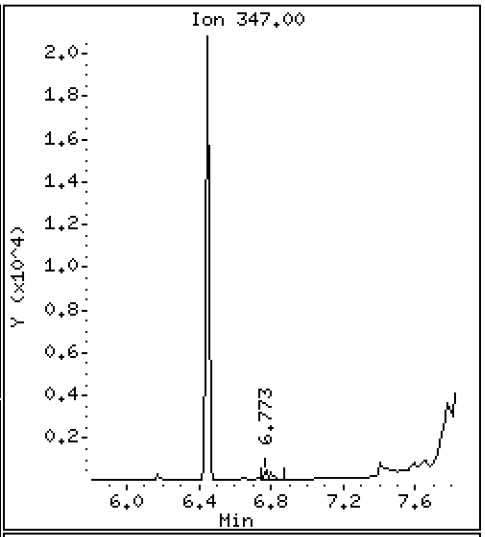
Column phase: ZB-5msi

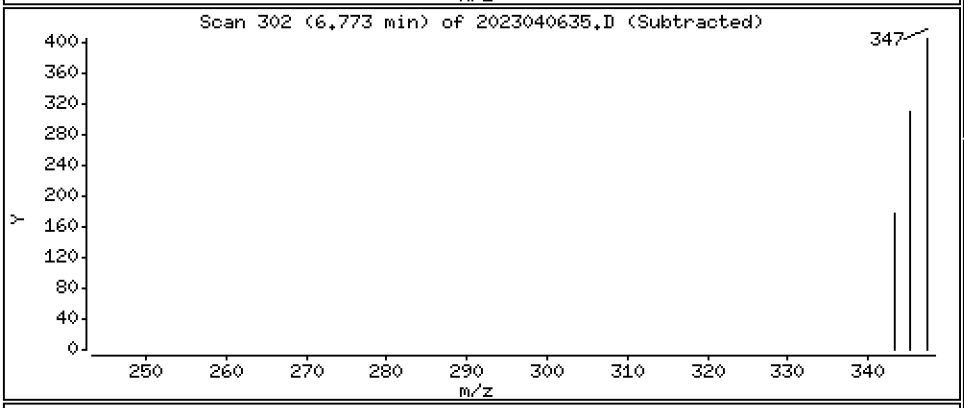
Column diameter: 0.25

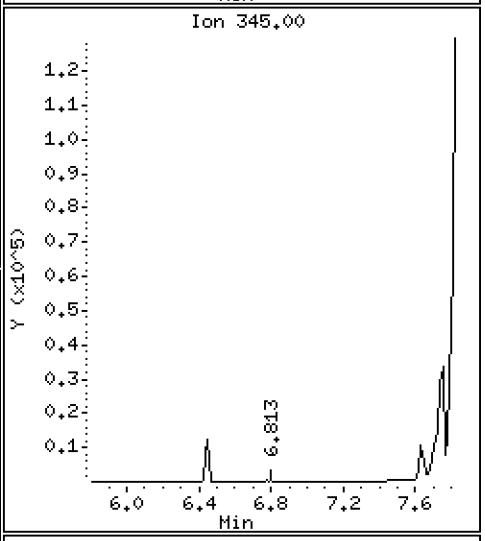
7 Butyl Tin (Hexyl)

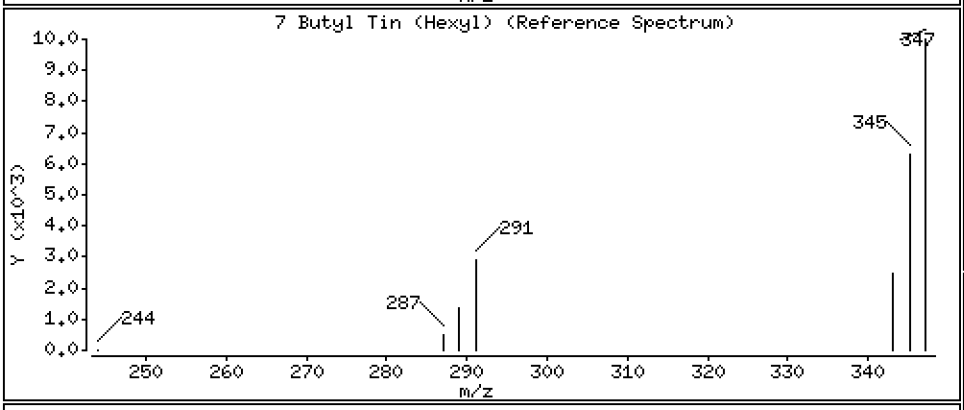
Concentration: 0.01569 ug/mL

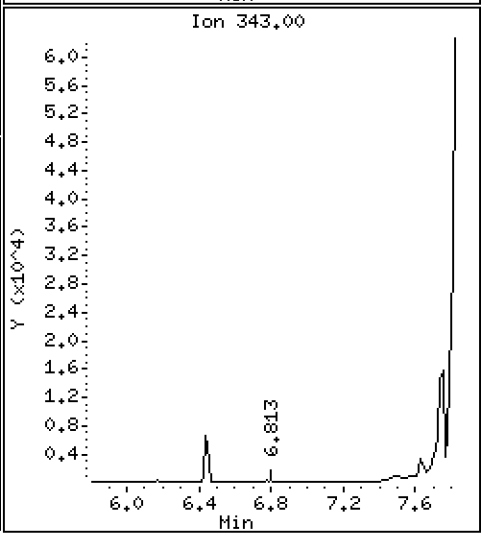


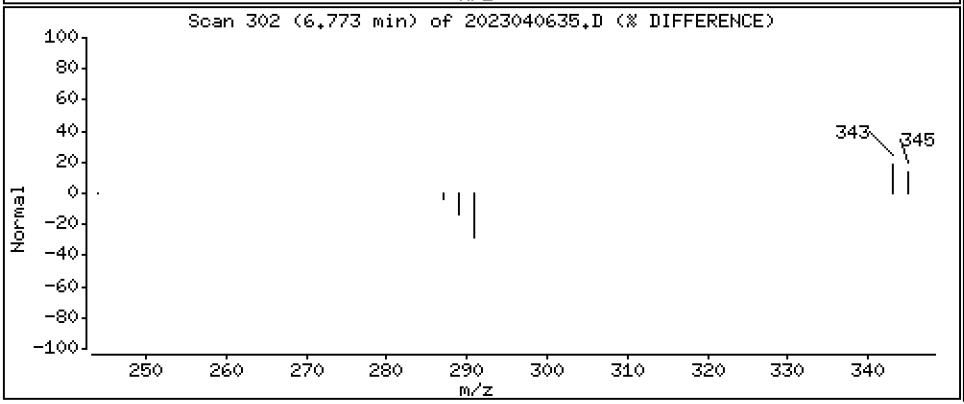












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040635.D
Lab Smp Id: 23C0619-11
Inj Date : 07-APR-2023 01:08
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0619-11
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 35
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.548	4.514	(0.745)	27434	0.50401	0.5040
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	526	0.01234	0.01234
*	4 Tetrapentyl Tin	333	6.102	6.102	(1.000)	128737	2.00000	
	5 Dibutyl Tin (Hexyl)	347	Compound Not Detected.					
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	23387	0.46038	0.4604
	7 Butyl Tin (Hexyl)	347	6.773	6.813	(0.779)	872	0.01569	0.01569(MH)
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	20567	0.20000	

QC Flag Legend

M - Compound response manually integrated.
H - Operator selected an alternate compound hit.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040635.D
Lab Smp Id: 23C0619-11
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	128737	-21.58
8 p-Terphenyl-d14	22611	11306	45222	20567	-9.04

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040635.D

Lab ID: 23C0619-11
nt12.i, 20230406A.b\TBT20230406.m,   07-APR-2023 01:08

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.745	0.740	0.0057	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

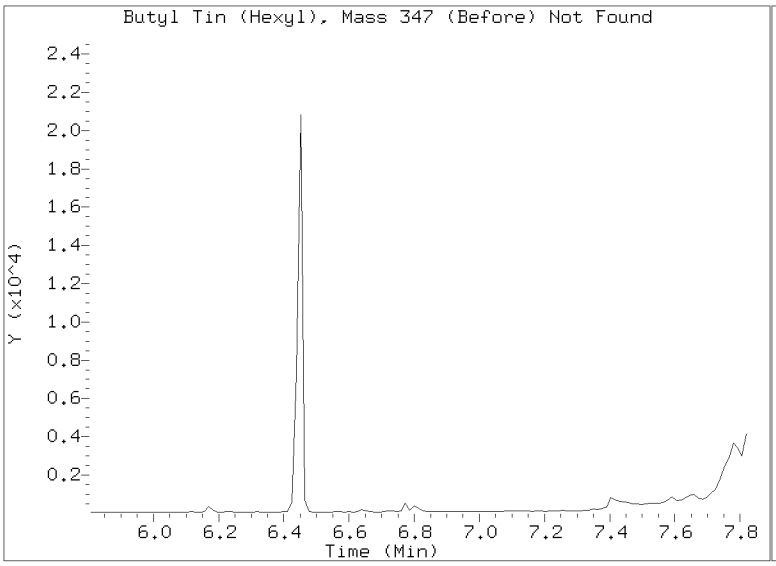
On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

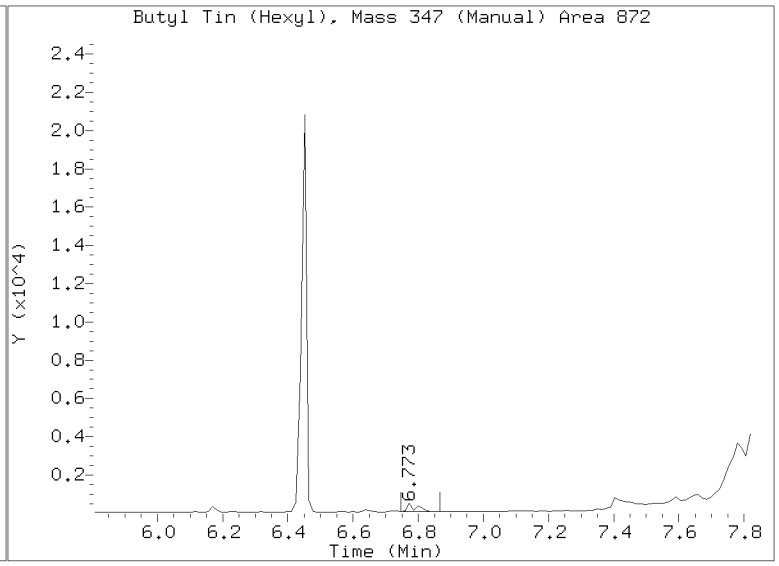
Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Quant Ion Manual Peak Adjustment Report

Datafile: //target/share/chem3/nt12.i/20230406A.b/2023040635.D
Injection Date: 07-APR-2023 01:08
Lab ID:23C0619-11 Client ID:
Report Date: 04/07/2023 11:09





Analytical Resources, LLC
Analytical Chemists and Consultants

SED-10C:0-1

Form I
ORGANIC ANALYSIS DATA SHEET
EPA 8270E-SIM
Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0619-12 A	SDG:	23C0619
Sampled:	03/23/23 08:17	Prepared:	03/28/23 12:28	File ID:	2023040636.D
% Solids:	79.68	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/07/23 01:24
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	6.38 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

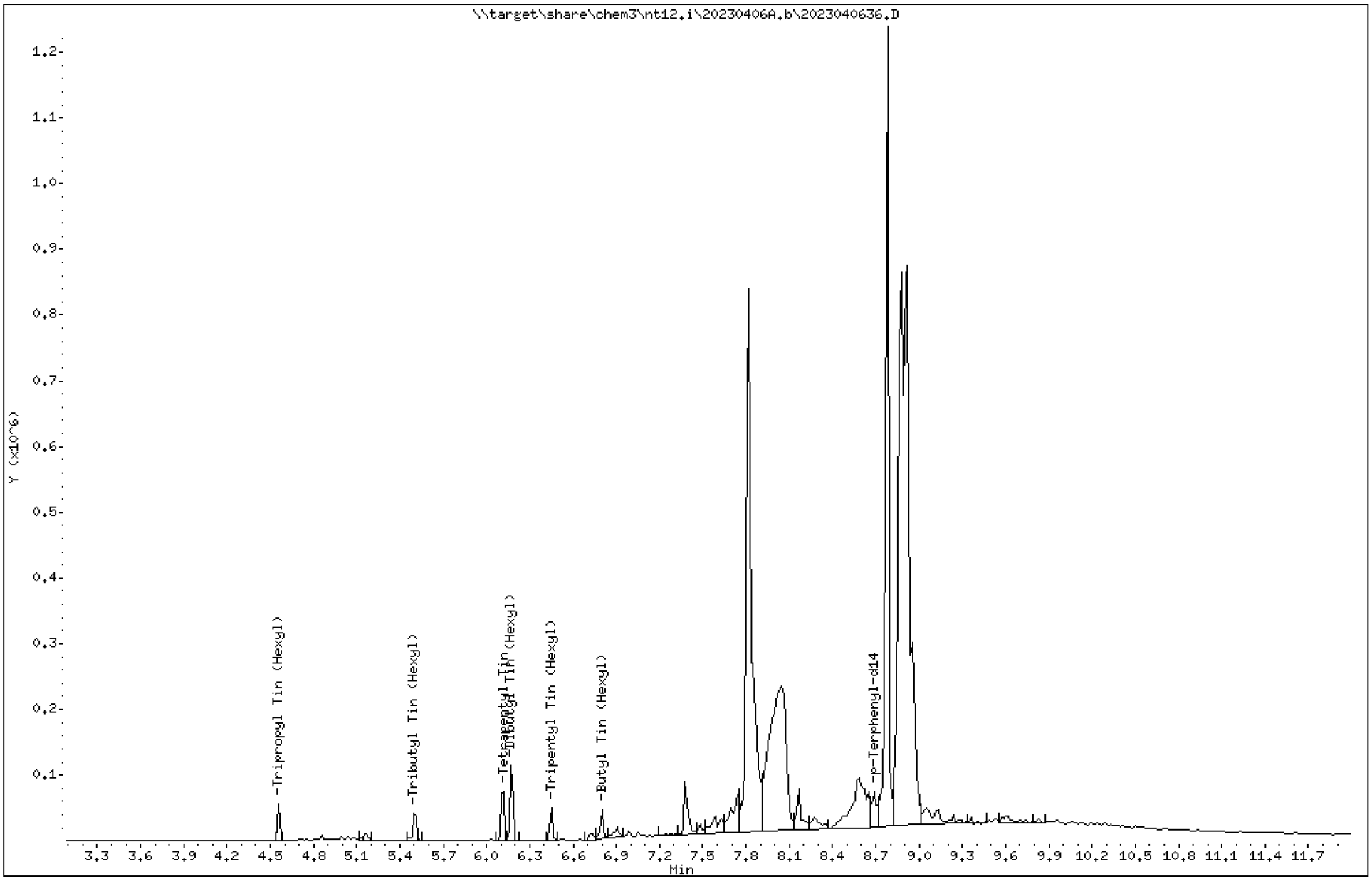
CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	63.8		0.443	3.80
14488-53-0	Dibutyltin Ion	1	56.1		1.70	5.68
78763-54-9	Butyltin Ion	1	9.46		1.86	4.01
1461-25-2	Tetrabutyltin	1	4.92	U	4.92	4.92

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	44.435	33.8	76.0	30 - 160	
Tripropyltin	43.027	35.7	82.9	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040636.D
Date : 07-APR-2023 01:24
Client ID:
Sample Info: 23C0619-12

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



23C0619 CLPLIKE (Rev0) - Page 98 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040636.D

Date : 07-APR-2023 01:24

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-12

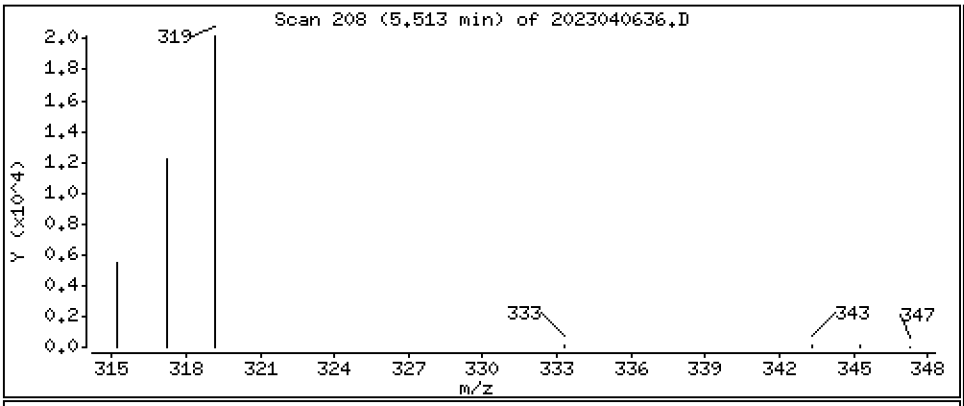
Operator: JZ

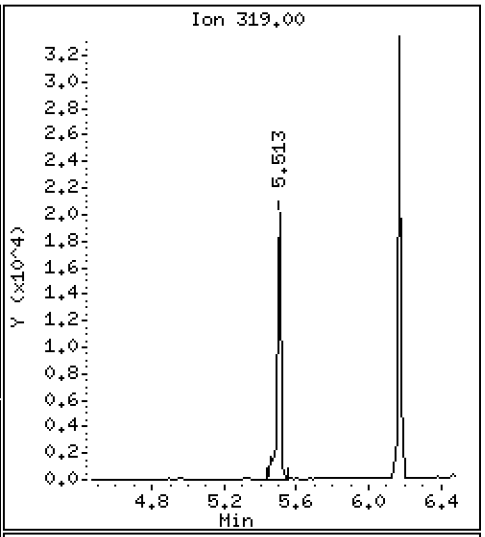
Column phase: ZB-5msi

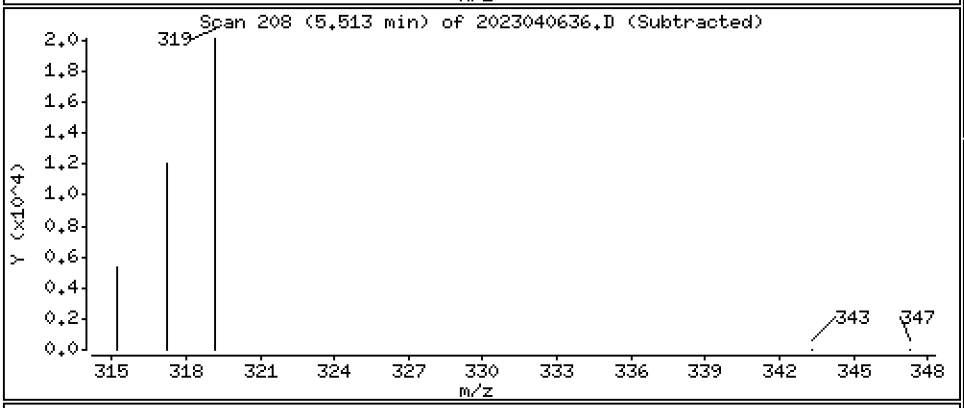
Column diameter: 0.25

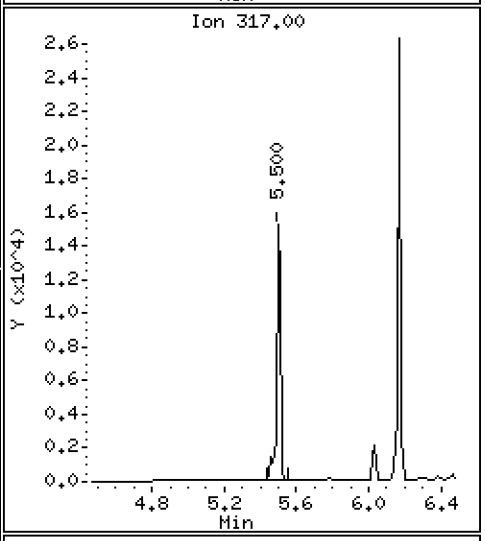
3 Tributyl Tin (Hexyl)

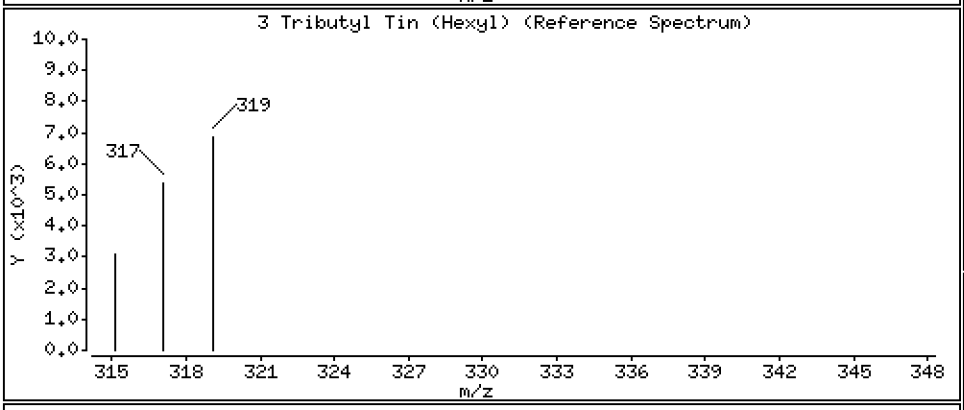
Concentration: 0.8387 ug/mL

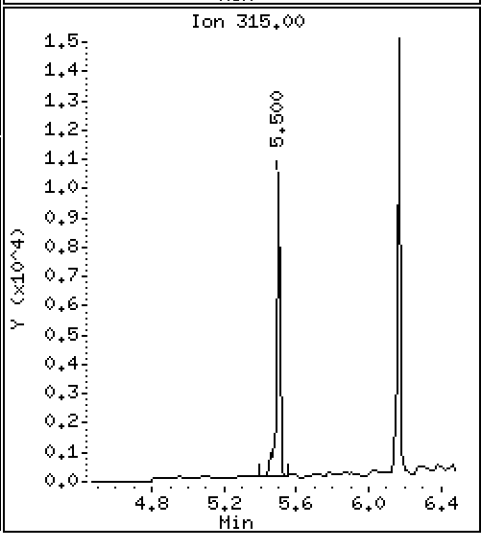


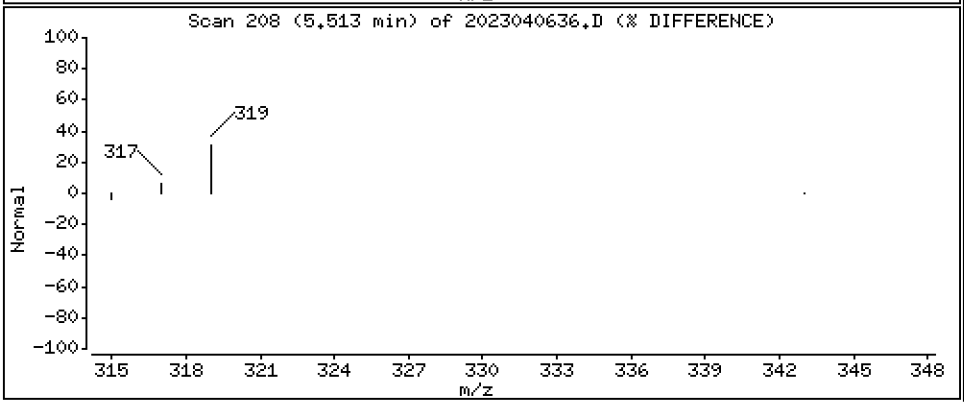












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040636.D

Date : 07-APR-2023 01:24

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-12

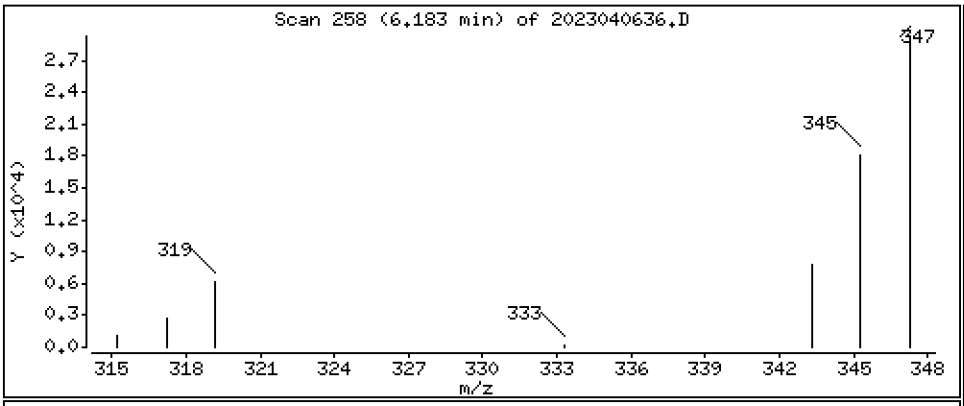
Operator: JZ

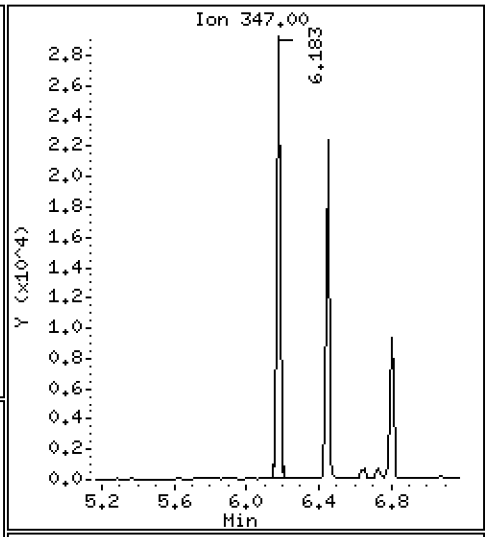
Column phase: ZB-5msi

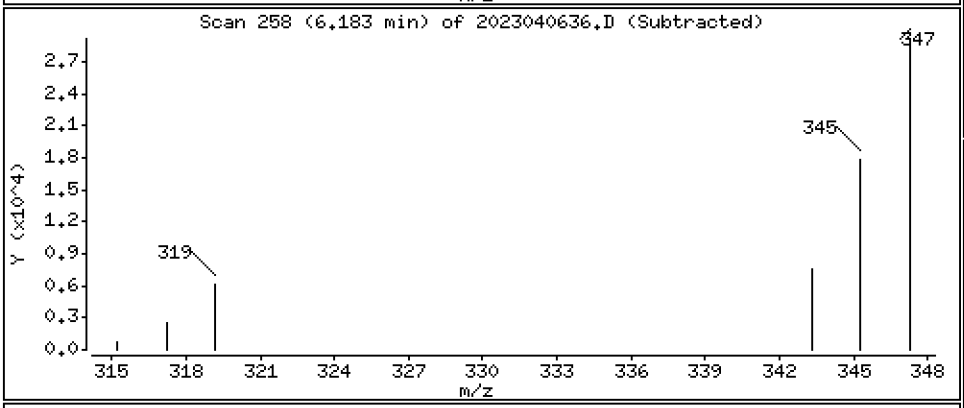
Column diameter: 0.25

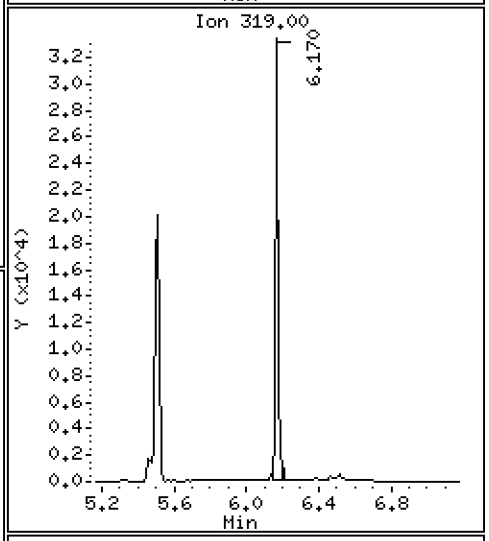
5 Dibutyl Tin (Hexyl)

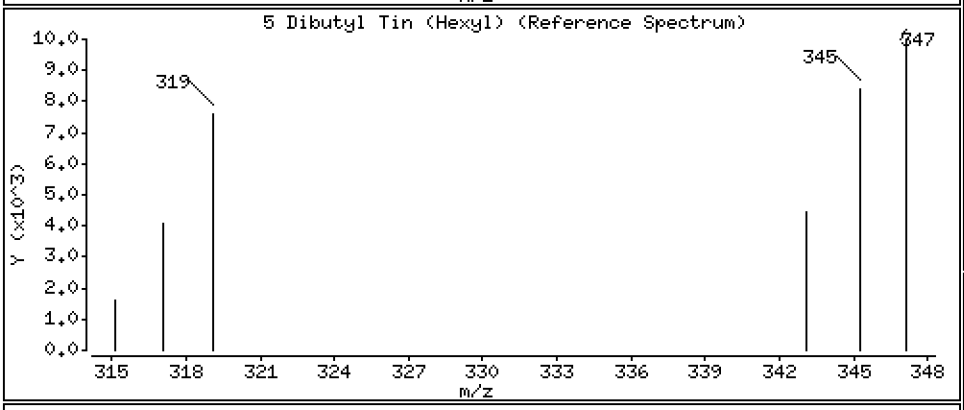
Concentration: 0.9861 ug/mL

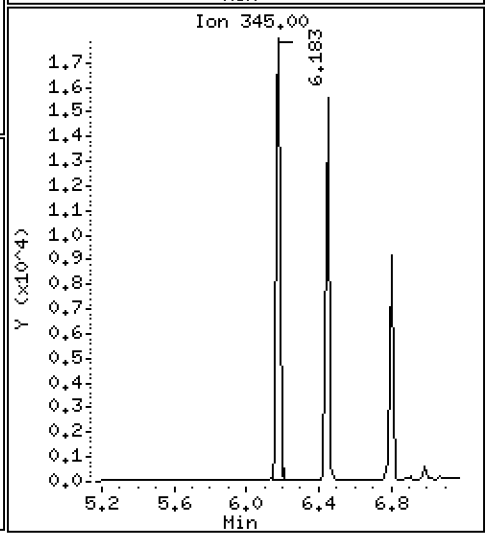


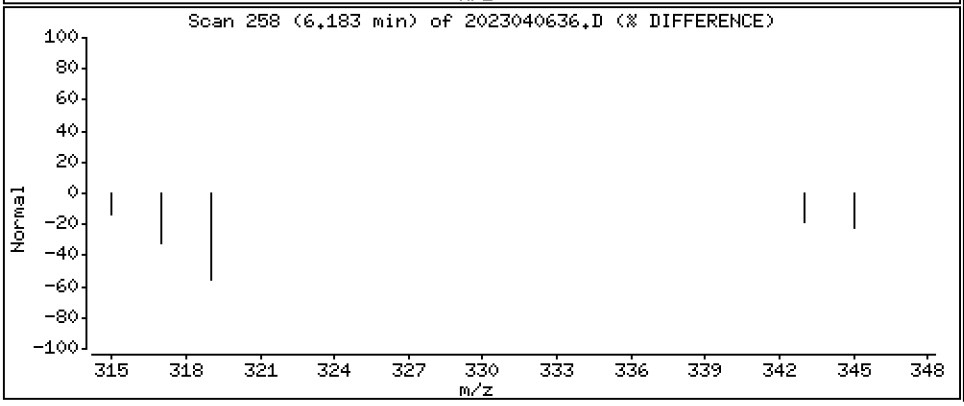












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040636.D

Date : 07-APR-2023 01:24

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-12

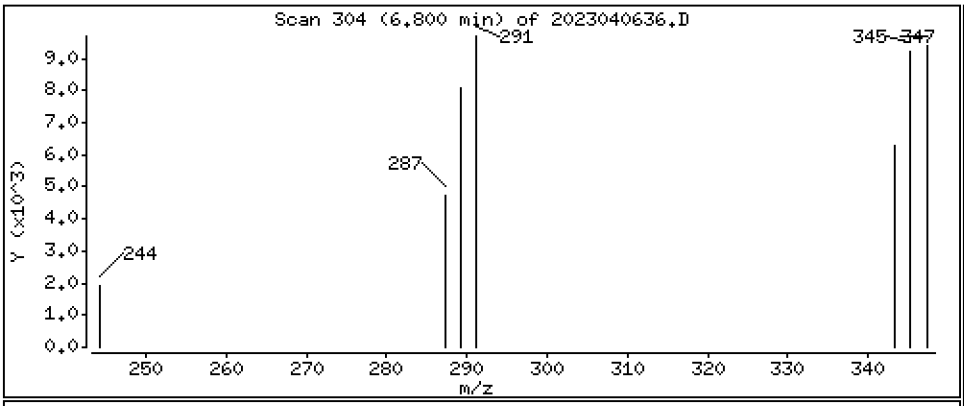
Operator: JZ

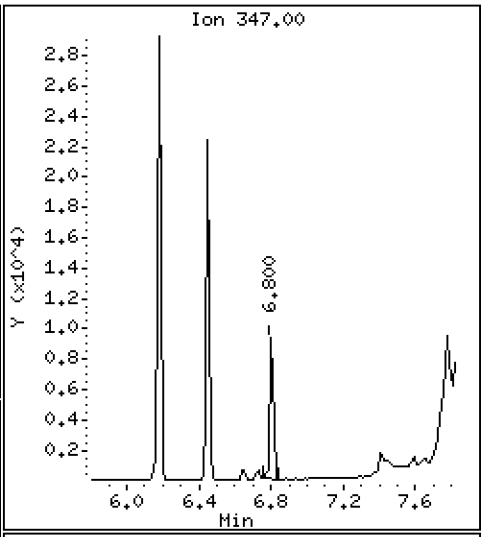
Column phase: ZB-5msi

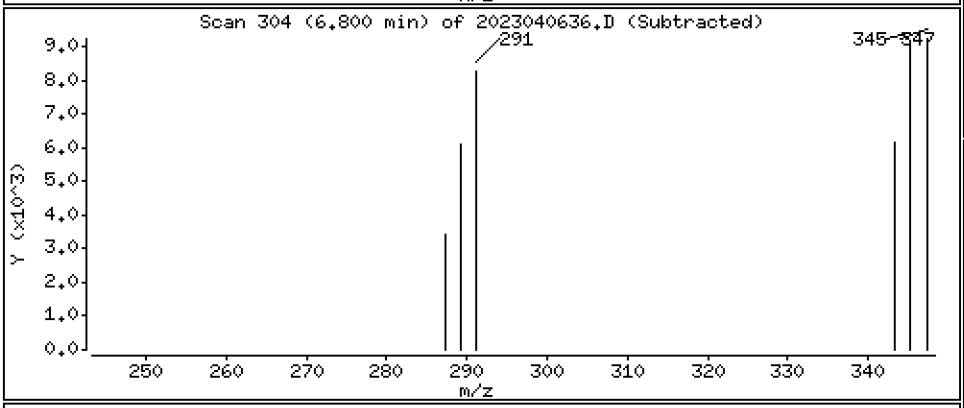
Column diameter: 0.25

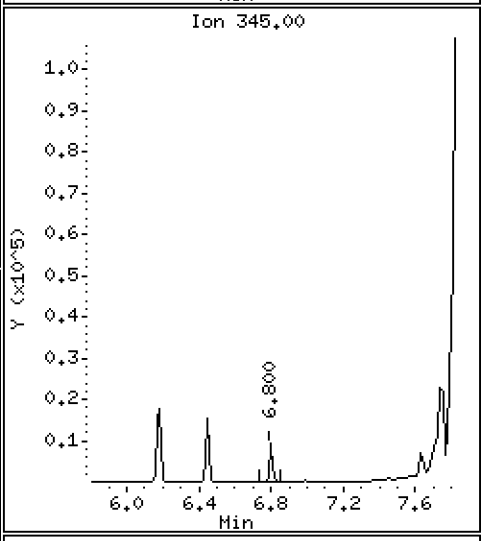
7 Butyl Tin (Hexyl)

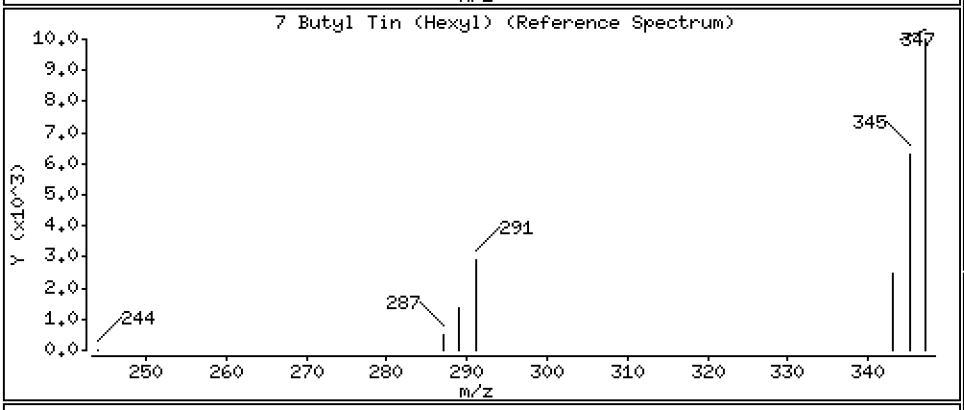
Concentration: 0.2358 ug/mL

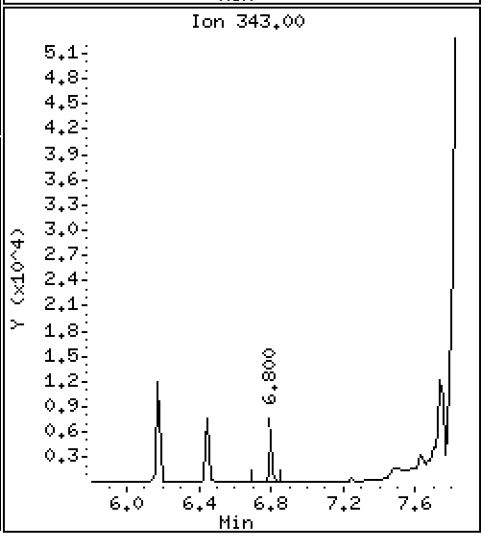


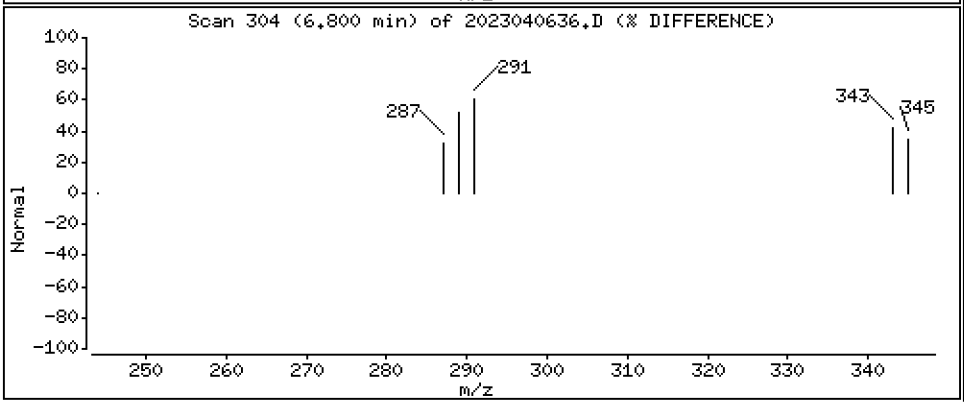












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040636.D
Lab Smp Id: 23C0619-12
Inj Date : 07-APR-2023 01:24
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0619-12
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 36
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$ 1 Tripropyl Tin (Hexyl)	291	4.560	4.514	(0.746)	25747	0.48723	0.4872
2 Tetrabutyl Tin	289	Compound Not Detected.					
3 Tributyl Tin (Hexyl)	319	5.513	5.472	(0.901)	34706	0.83869	0.8387
* 4 Tetrapentyl Tin	333	6.116	6.102	(1.000)	124983	2.00000	
5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	35904	0.98607	0.9861
$ 6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	23115	0.43151	0.4315
7 Butyl Tin (Hexyl)	347	6.800	6.813	(0.782)	13816	0.23579	0.2358(M)
* 8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	21688	0.20000	

QC Flag Legend

M - Compound response manually integrated.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040636.D
Lab Smp Id: 23C0619-12
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	124983	-23.87
8 p-Terphenyl-d14	22611	11306	45222	21688	-4.08

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.12	0.22
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040636.D

Lab ID: 23C0619-12
nt12.i, 20230406A.b\TBT20230406.m,   07-APR-2023 01:24

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.746	0.740	0.0059	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

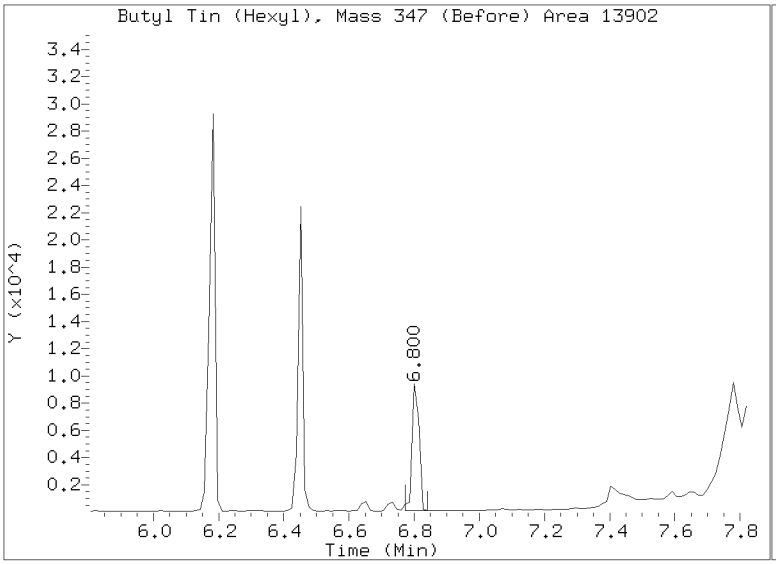
On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

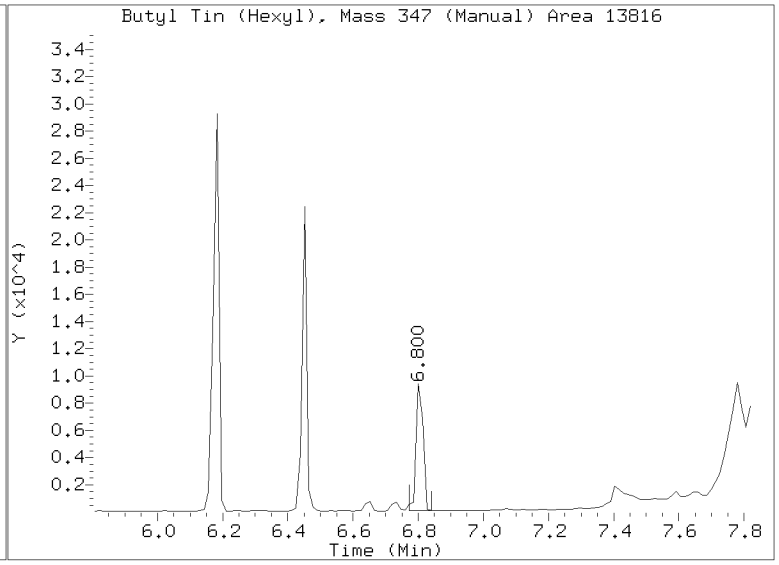
Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Quant Ion Manual Peak Adjustment Report

Datafile: //target/share/chem3/nt12.i/20230406A.b/2023040636.D
Injection Date: 07-APR-2023 01:24
Lab ID:23C0619-12 Client ID:
Report Date: 04/07/2023 11:09





Analytical Resources, LLC
Analytical Chemists and Consultants

SED-10C:1-3

Form I
ORGANIC ANALYSIS DATA SHEET
EPA 8270E-SIM
Butyl Tins

Laboratory:	Analytical Resources, LLC				
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0619-13 A	SDG:	23C0619
Sampled:	03/23/23 08:17	Prepared:	03/28/23 12:28	File ID:	2023040637.D
% Solids:	81.01	Preparation:	EPA 3546 (Microwave)	Analyzed:	04/07/23 01:41
Batch:	BLC0727	Sequence:	SLD0107	Initial/Final:	6.18 g Wet / 0.5 mL
Instrument:	NT12	Column:	ZB-5MS	Calibration:	GD00019
Cleanups:	Silica Gel				

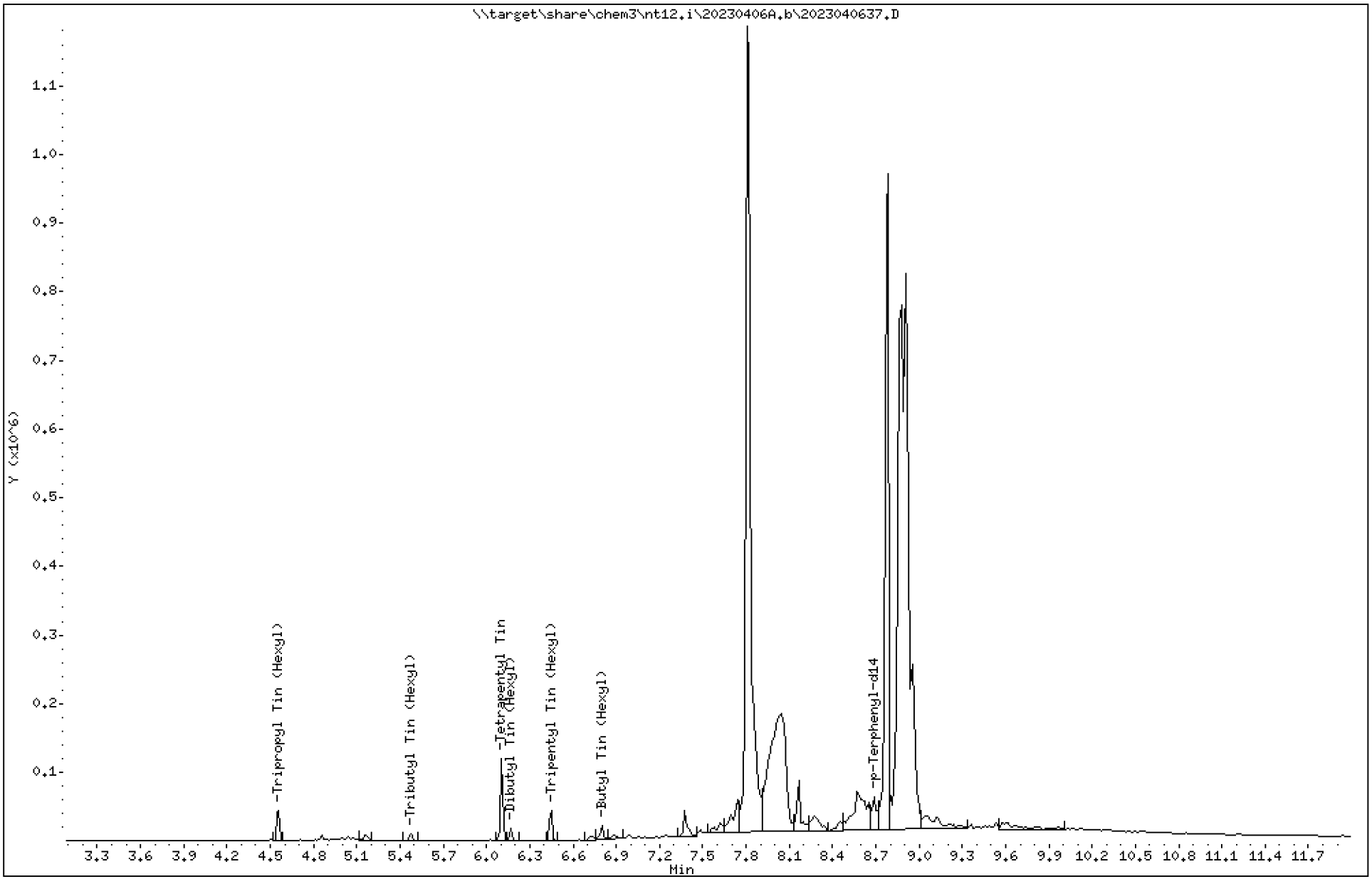
CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg dry)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	12.8		0.449	3.86
14488-53-0	Dibutyltin Ion	1	8.36		1.73	5.77
78763-54-9	Butyltin Ion	1	4.65		1.89	4.07
1461-25-2	Tetrabutyltin	1	4.99	U	4.99	4.99

SURROGATES	ADDED: (ug/kg dry)	FOUND: (ug/kg dry)	% REC	QC LIMITS	Q
Tripentyltin	45.120	36.1	80.0	30 - 160	
Tripropyltin	43.690	37.2	85.2	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040637.D
Date : 07-APR-2023 01:41
Client ID:
Sample Info: 23C0619-13

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040637.D

Date : 07-APR-2023 01:41

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-13

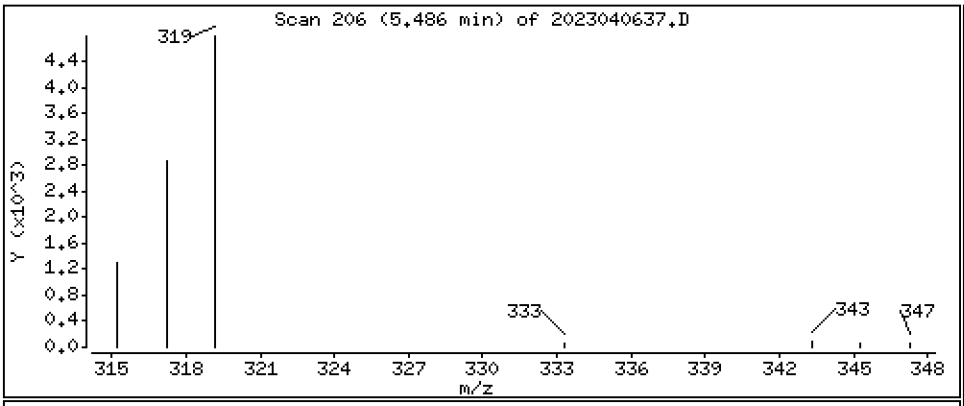
Operator: JZ

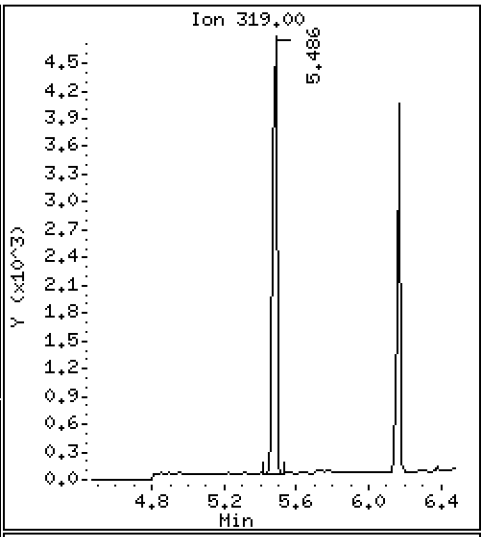
Column phase: ZB-5msi

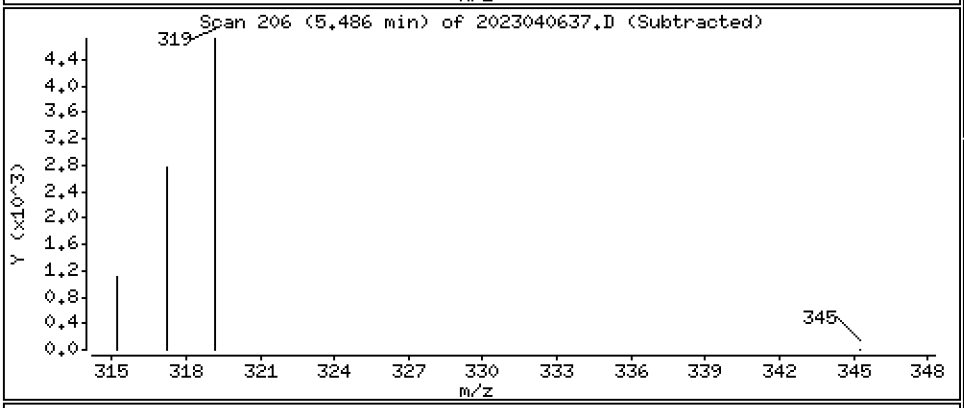
Column diameter: 0.25

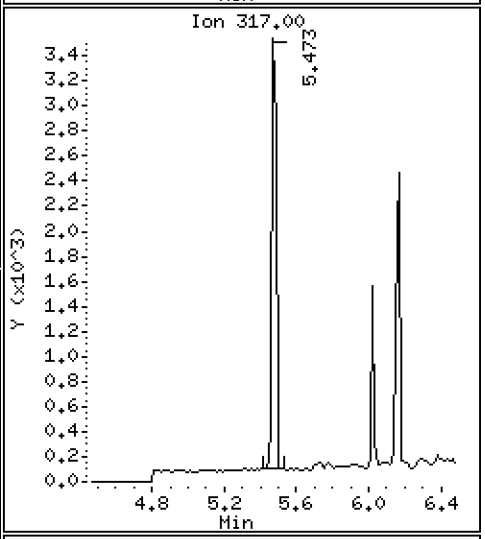
3 Tributyl Tin (Hexyl)

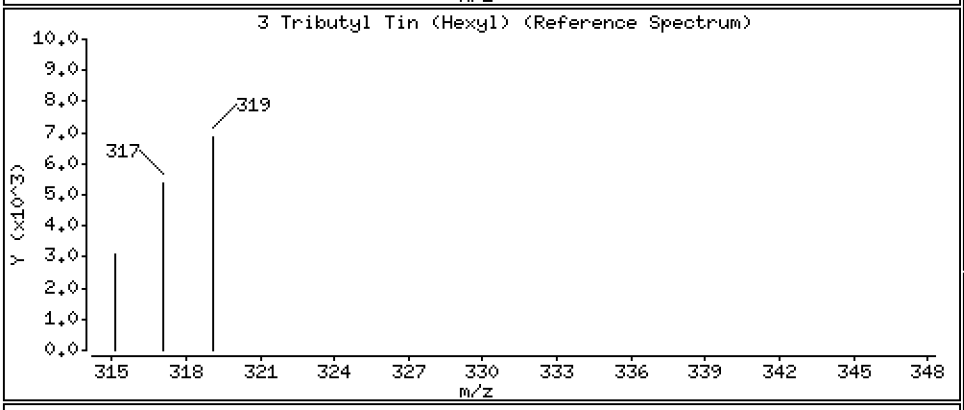
Concentration: 0.1655 ug/mL

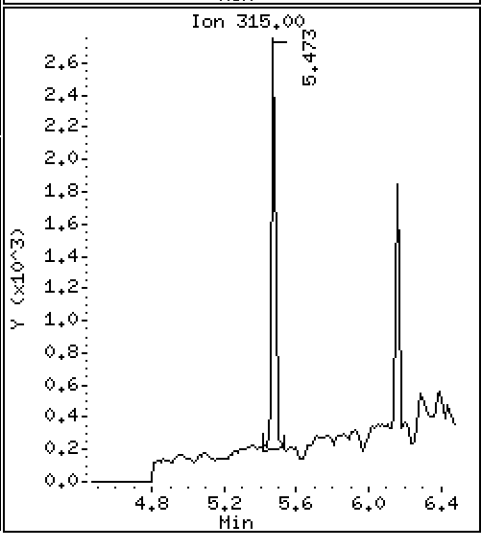


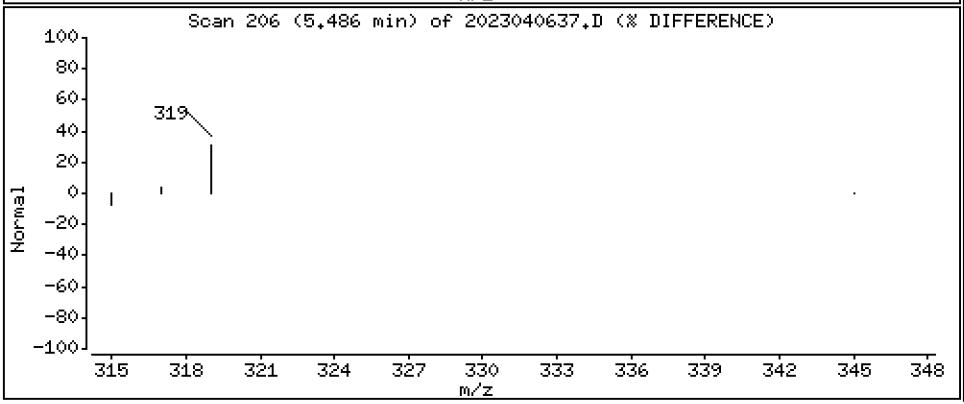












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040637.D

Date : 07-APR-2023 01:41

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-13

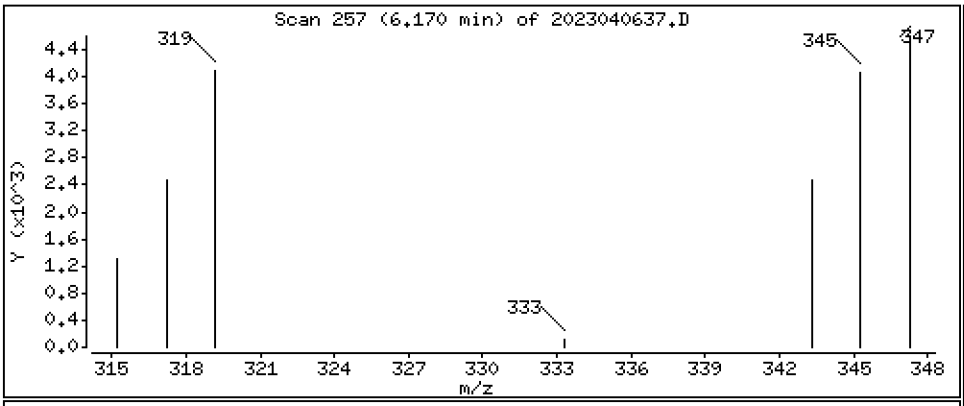
Operator: JZ

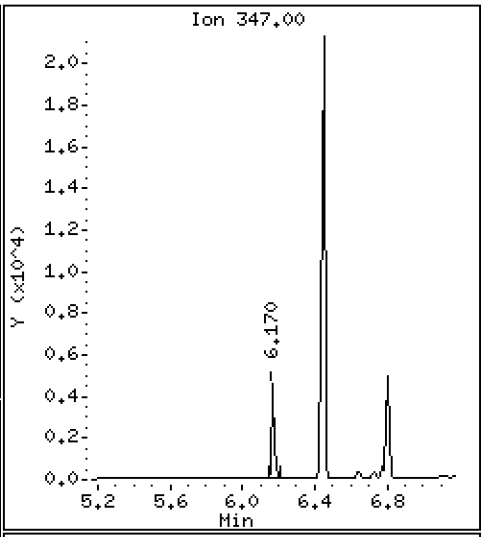
Column phase: ZB-5msi

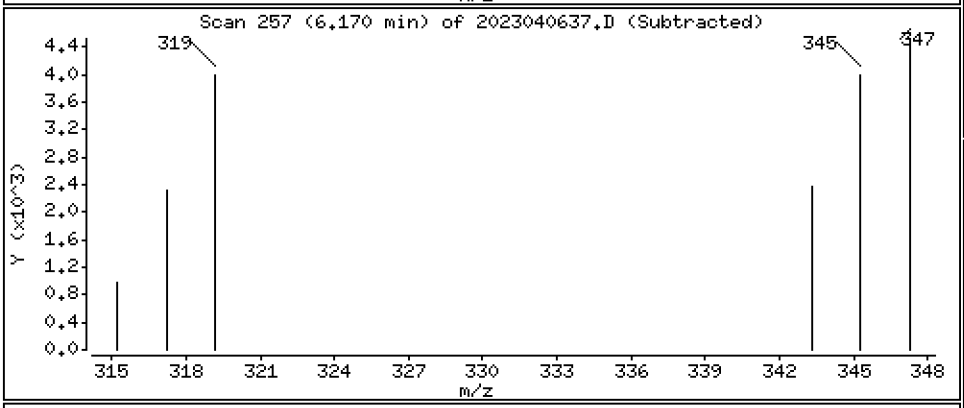
Column diameter: 0.25

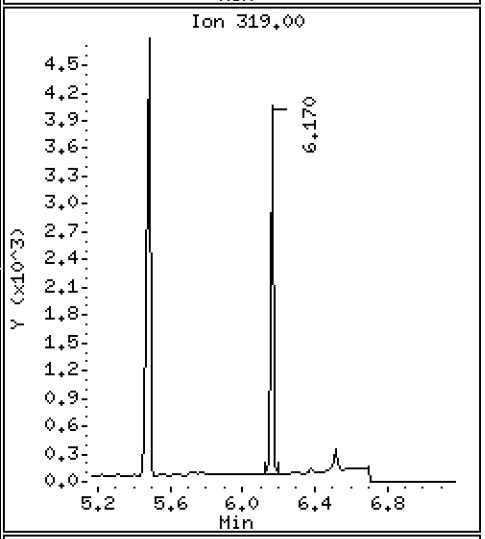
5 Dibutyl Tin (Hexyl)

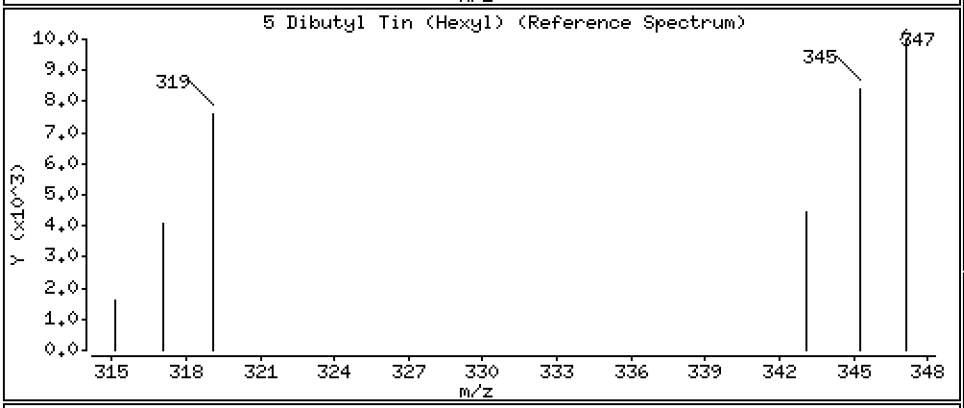
Concentration: 0.1448 ug/mL

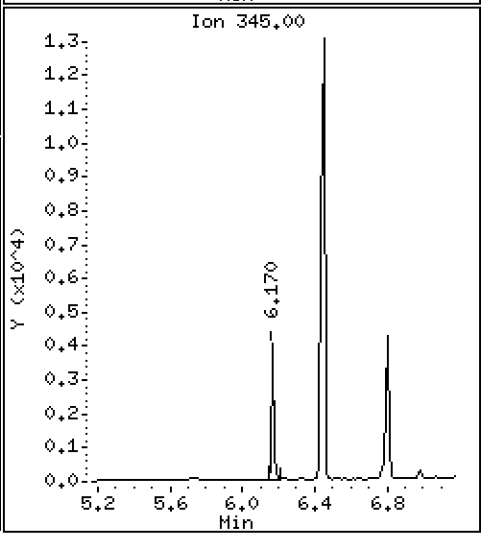


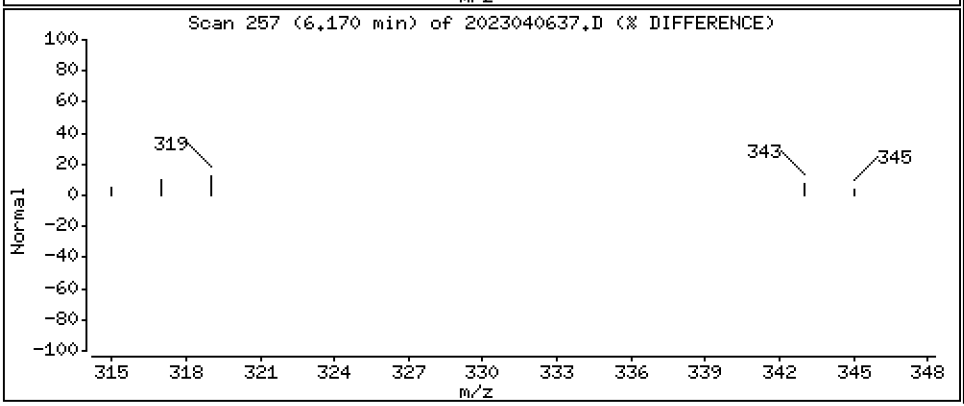












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040637.D

Date : 07-APR-2023 01:41

Client ID:

Instrument: nt12.i

Sample Info: 23C0619-13

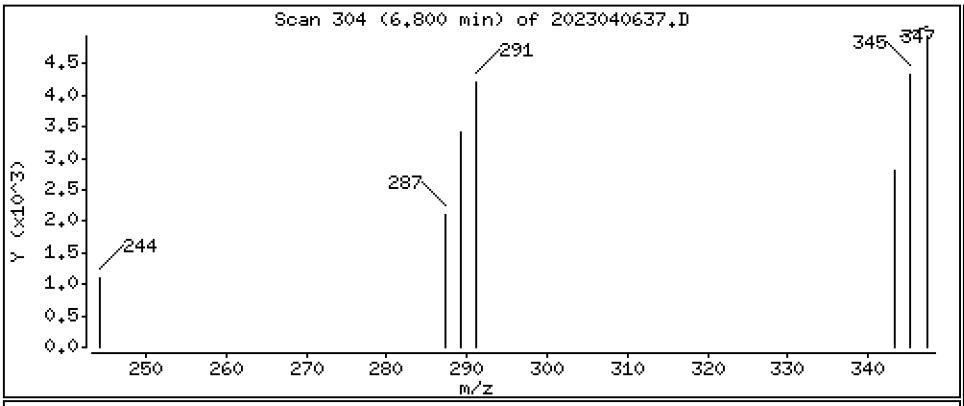
Operator: JZ

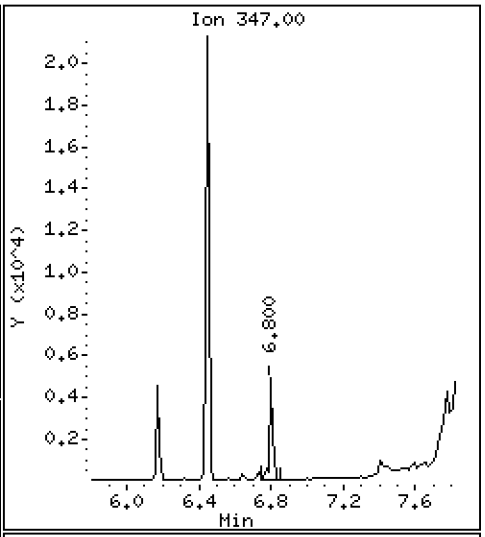
Column phase: ZB-5msi

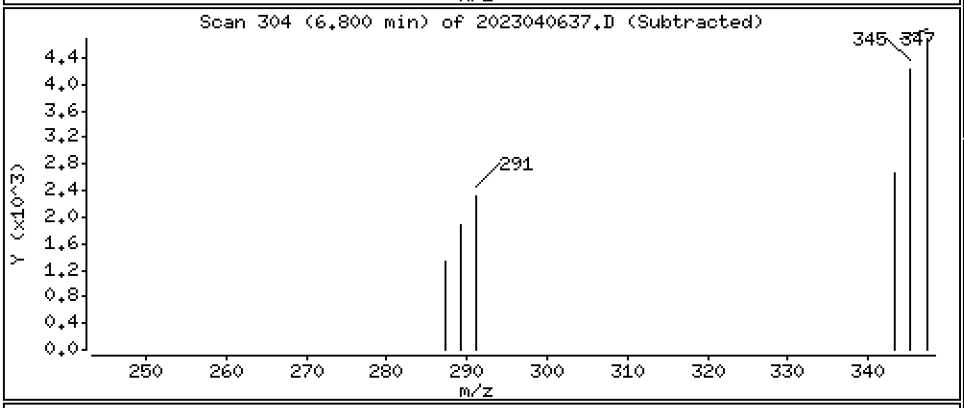
Column diameter: 0.25

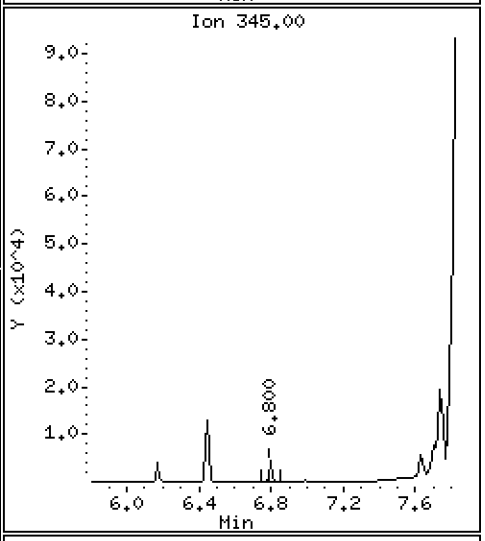
7 Butyl Tin (Hexyl)

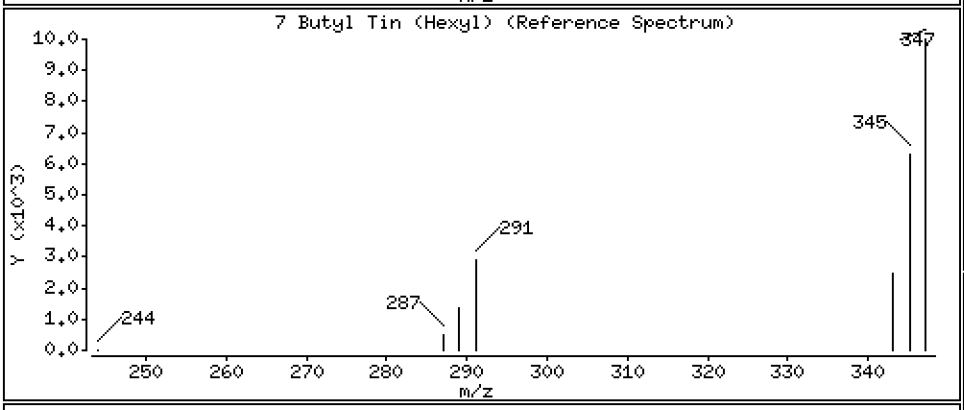
Concentration: 0.1142 ug/mL

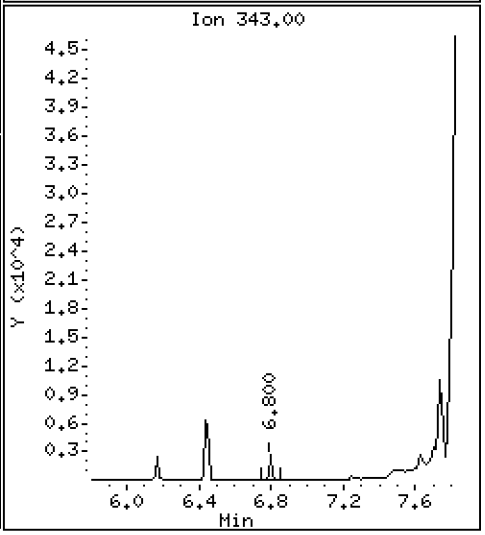


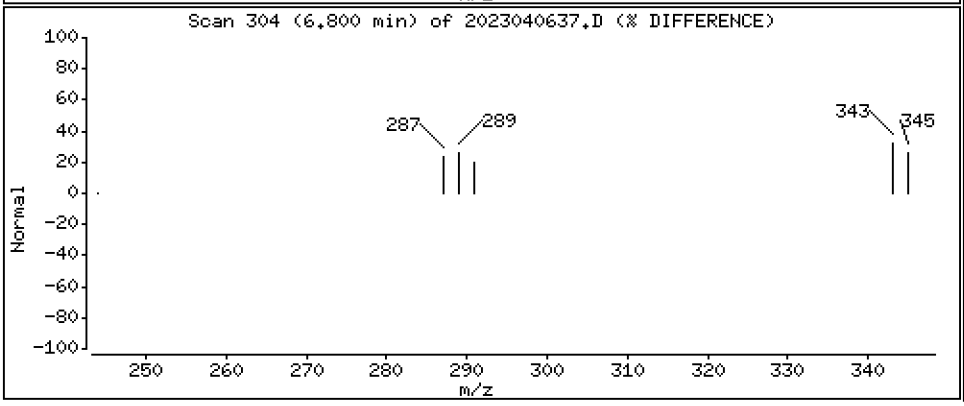












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040637.D
Lab Smp Id: 23C0619-13
Inj Date : 07-APR-2023 01:41
Operator : JZ   Inst ID: nt12.i
Smp Info : 23C0619-13
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 37
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.560	4.514	(0.747)	27055	0.50066	0.5007
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.486	5.472	(0.899)	7004	0.16551	0.1655
*	4 Tetrapentyl Tin	333	6.102	6.102	(1.000)	127809	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.169	6.169	(0.710)	5075	0.14481	0.1448
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	23407	0.45400	0.4540
	7 Butyl Tin (Hexyl)	347	6.800	6.813	(0.782)	6439	0.11418	0.1142
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	20874	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040637.D
Lab Smp Id: 23C0619-13
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	127809	-22.15
8 p-Terphenyl-d14	22611	11306	45222	20874	-7.68

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040637.D

Lab ID: 23C0619-13
nt12.i, 20230406A.b\TBT20230406.m,   07-APR-2023 01:41

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.747	0.740	0.0075	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

PREPARATION BATCH SUMMARY

EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG: 23C0619
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Batch: BLC0727 Batch Matrix: Solid
Preparation: EPA 3546 (Microwave)

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SED-07C:0-1	23C0619-01	2023040623.D	03/28/23 12:28	
SED-07C:1-3	23C0619-02	2023040627.D	03/28/23 12:28	
SED-08C:0-1	23C0619-03	2023040628.D	03/28/23 12:28	
SED-08C:1-3	23C0619-04	2023040629.D	03/28/23 12:28	
SED-09C:0-1	23C0619-05	2023040630.D	03/28/23 12:28	
SED-09C:1-3	23C0619-06	2023040631.D	03/28/23 12:28	
SED-26C:0-1	23C0619-08	2023040632.D	03/28/23 12:28	
SED-26C:1-3	23C0619-09	2023040633.D	03/28/23 12:28	
SED-25C:0-1	23C0619-10	2023040634.D	03/28/23 12:28	
SED-25C:1-3	23C0619-11	2023040635.D	03/28/23 12:28	
SED-10C:0-1	23C0619-12	2023040636.D	03/28/23 12:28	
SED-10C:1-3	23C0619-13	2023040637.D	03/28/23 12:28	
Blank	BLC0727-BLK1	2023040610.D	03/28/23 12:28	
LCS	BLC0727-BS1	2023040611.D	03/28/23 12:28	
LCS Dup	BLC0727-BSD1	2023040612.D	03/28/23 12:28	
SED-07C:0-1	BLC0727-DUP1	2023040624.D	03/28/23 12:28	
SED-07C:0-1	BLC0727-MS1	2023040625.D	03/28/23 12:28	
SED-07C:0-1	BLC0727-MSD1	2023040626.D	03/28/23 12:28	

Analytical Resources, LLC
Analytical Chemists and Consultants

ORGANICS PREPARATION BENCH SHEET

Batch: BLC0727

Prepared using: EPA 3546 (Microwave)

8270E-SIM Butyl Tins in Solid

WO Comments

23C0618: <C> MS/MSD, SRM for TOC, run one sample in triplicate for solids</C>

23C0619: <C> MS/MSD, SRM for TOC, run one sample in triplicate for solids</C>

Analysis: 8270E-SIM Butyl Tins

Lab Number & Container	% Solids	Initial (g) Target Dry: 5 (Wet) Actual	Actual Wet Wt (g)	Final Effective Vol (mL)	Vol (mL) to Lab	Extraction Comments
23C0618-01 B	69.0	(7.25)	7.28	0.5	0.5	
23C0618-03 B	57.6	(8.68)	8.68	0.5	0.5	
23C0618-04 B	60.8	(8.23)	8.26	0.5	0.5	
23C0618-11 A	69.5	(7.19)	7.19	0.5	0.5	
23C0618-12 A	60.2	(8.31)	8.33	0.5	0.5	
23C0618-13 A	68.6	(7.29)	7.30	0.5	0.5	
23C0619-01 A	84.1	(5.95)	5.98	0.5	0.5	
23C0619-02 A	76.1	(6.57)	6.59	0.5	0.5	
23C0619-03 A	70.2	(7.12)	7.17	0.5	0.5	
23C0619-04 A	74.2	(6.74)	6.76	0.5	0.5	
23C0619-05 A	70.6	(7.08)	7.08	0.5	0.5	
23C0619-06 A	77.4	(6.46)	6.49	0.5	0.5	
23C0619-08 A	62.8	(7.96)	7.97	0.5	0.5	
23C0619-09 A	77.9	(6.42)	6.43	0.5	0.5	
23C0619-10 A	77.1	(6.49)	6.49	0.5	0.5	
23C0619-11 A	80.4	(6.22)	6.23	0.5	0.5	
23C0619-12 A	79.7	(6.28)	6.38	0.5	0.5	
23C0619-13 A	81.0	(6.17)	6.18	0.5	0.5	

Batch QC

Lab Number	% Solids	Initial (g) Target Dry: 5 (Wet) Actual	Actual Wet Wt (g)	Final Effective Vol (mL)	Vol (mL) to Lab	Extraction Comments
BLC0727-BLK1	100.0	(5.00)	5.00	0.5	0.5	
BLC0727-BS1	100.0	(5.00)	5.00	0.5	0.5	
BLC0727-BSD1	100.0	(5.00)	5.00	0.5	0.5	
BLC0727-DUP1	84.1	(5.95)	5.95	0.5	0.5	Use 23C0619-01
BLC0727-MS1	84.1	(5.95)	5.95	0.5	0.5	Use 23C0619-01
BLC0727-MSD1	84.1	(5.95)	5.95	0.5	0.5	Use 23C0619-01

03/28/23 — Client ID verified By — 3/28/23 Date

NRB 4/4/23 — Preparation Reviewed By — Date

03/28/23 12:28 — Extraction Date and Time

Printed: 3/28/2023 10:05:02AM

Analytical Resources, LLC
Analytical Chemists and Consultants

ORGANICS PREPARATION BENCH SHEET

Batch: BLC0727

Prepared using: EPA 3546 (Microwave)

8270E-SIM Butyl Tins in Solid

WO Comments

23C0618: <C> MS/MSD, SRM for TOC, run one sample in triplicate for solids</C>

23C0619: <C> MS/MSD, SRM for TOC, run one sample in triplicate for solids</C>

Prep Steps

Microwave
1 (2) 3
CT 3/28/23
Analyst/Date

TurboVap Hexane Exchange (15 mL)
1 2 3 (4) 5
SH 3/28/23
Analyst/Date

Derivitization (Vortex + Heating)
SH 3/28/23
Analyst/Date

(REQ) Hydrolisys (~4mL) Vortex
ZH/ 4/4/23
Analyst/Date

(REQ) SPE (1mL)
ZH/ 4/4/23
Analyst/Date

TurboVap Post SPE
1 2 (3) 4 5
ZH/ 4/4/23
Analyst/Date

Vialing
ZH/ 4/4/23
Analyst/Date

Reagents Used

Station/Reagent	Standard ID
Microwave Analyst: CT/MJ Date: 3/28/23	
Hexane	L0001957
Neutral Glass Wool	L0004497
0.10% Tropolone in Methylene Chloride	L0002243
Anhydrous Sodium Sulfate	L0002484
Vialing/HexMgBr Addition Analyst: SH Date: 3/28/23	
(Turbovap exchange): Hexane:	L0001957
HexylMagnesiumBromide	K0009032
Hydrolysis/Silica/Final Vialing Analyst: ZH/MJS Date: 4/4/23	
Silica Gel (SPE) Dart (EPH)	S013211
1:1 HCL/DI H2O	~~K0004~~ K0009815
Anhydrous Sodium Sulfate	L002114
(Final Vialing):Hexane	L001957

Surrogates & Spike Standards Used

Type	Vial ID / Standard ID	Vol uL	Analyst	Witness
Surrogate 2.5µg/mL	L L002512 Exp Date: 12/15/2023	100µL	CT	✓
Spike 2.5µg/mL	8 K011887 Exp Date: 12/15/2023	100µL	CT	✓

MANUALLY ENTER EXPIRATION DATES!

(V) indicates a virtual standard combining two or more physical standards. In these cases the Standard ID refers to the virtual standard, not the parent standards.

If a Standard ID is missing, but should be present, check the standard definition in Element LIMS to be sure Standard Info 6 has the correct letter or number designator matching the vial designator inthe Standard ID column. If it is correct, check the batch and bench sheet in Element LIMS to be sure the correct standards are selected for surrogate(s) and spike(s).

Analytical Resources, LLC
Analytical Chemists and Consultants

ORGANICS PREPARATION BENCH SHEET

Batch: BLC0727

Prepared using: EPA 3546 (Microwave)

8270E-SIM Butyl Tins in Solid

Matrix: Solid **Date Prepared:** 3/28/23 **Balance ID:** B14646264 **Set Up By:** CO 3/28/23

WO Comments

23C0618: <C> MS/MSD, SRM for TOC, run one sample in triplicate for solids</C>

23C0619: <C> MS/MSD, SRM for TOC, run one sample in triplicate for solids</C>

The following standards may be missing from this batch!

Designator	Description
QLS 3	QLS Spike

Analytical Resources, LLC
Analytical Chemists and Consultants

ORGANICS PREPARATION BENCH SHEET

Batch: BLC0727

Prepared using: EPA 3546 (Microwave)

8270E-SIM Butyl Tins in Solid

WO Comments

23C0618: <C> MS/MSD, SRM for TOC, run one sample in triplicate for solids</C>

23C0619: <C> MS/MSD, SRM for TOC, run one sample in triplicate for solids</C>

Prep Instructions	
SPECIAL INSTRUCTIONS: NOTE: TBT Extractions must be completed within 48 hours! 1. Blanks = Solvent Only (NO Sulfate). 2. Weigh samples into 100mL beakers-dry with Sodium Sulfate. 3. Pre-Rinse microwave vessel with 0.10% Tropolone in DCM. 4. Transfer soil to microwave vessel. 5. Add 0.10% Tropolone in DCM to vessel until solvent is 1" above soil layer after homogenization). 6. Add surr/spike. 7. Microwave on appropriate power setting determined by # of samples. 8. After microwave-Re-homogenize while hot then let cool 15 min. in cold water bath. Re-homogenize while cool. 9. Decant into 0.10% troplone rinsed turbo tube with small Funnel containing glass wool and 1" sodium sulfate. 10. Add (2) 10mL Hexane rinses to vessel and transfer to turbo tube. VIALING 11. TurboVap to ~2mL and exchange with 15 mL of Hexane - mix well. 12. TurboVap to ~3mL-Transfer with Hexane to 40mL VOA vial. 13. Derivitize with 1 pipet HexMgBr (Mix by hand) then Vortex for 10 seconds then place vials on KD water bath until warm. Repeat vortex and heating 3 times.Then let sit overnite. 14. Hydrolisys: Add 2 pipets of 1:1 HCL. Vortex for 30 sec. Draw off/discard HCL (bottom layer). Add 1 pipet of 1:1 HCL and ~5mL DI H2O. Vortex for 30 sec. Draw off/discard H20 (bottom layer). Add ~5mL DI H2O. Vortex for 30 sec. Draw off/discard H2O (bottom layer). 15. Add sodium sulfate and Let sit 15min. 16. Transfer to culture tube and TurboVap to 1mL. 17. SPE Clean with EPH darts 18. TurboVap 19. Vial in hexane. 20. NOTE: DERIVITIZATIONS MUST BE DONE IN THE HOOD TO PROTECT FROM POTENTIAL CHEMICAL REACTIONS, ODORS AND FUMES. A. Need Total Solids Y (N) B. Archive/Freeze (Y) N	

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Organic Extractions Laboratory Analyst Notes

Extraction Parameter: TBT Extraction Batch BLC0727

Total Solids Batch: BLC0685 Work Order(s): 23C0618, 619

Screens: Soil/Sediment/Solid/Other:	Analyst/Date
☐ No Anomalies (standard soil/wet sediment/sand/gravel)=	
☑ Standing Water Decanted (Not shared)= 23C0618 Φ3, Φ4, 11, 12. 619 = Φ2, Φ4, Φ6, Φ8, Φ9, 12 13.	✓ Φ3/27/23
☐ Standing Water Homogenized (Shared samples)=	
☐ Clay/Clumps (Difficult to homogenize)=	
☑ Rocks (%+size)? 23C0618 30.% = Φ1 Φ11 10.% 619 Φ11 = 12 30.0/0 Φ11 = 13	✓ Φ3/27/23
☐ Organics (Leaves/sticks/grass)=	
☑ Oily, obvious fuel/sulfur odors= 618 Φ1, Φ3, Φ4, 12, 13, 619 = Φ3, 14.	✓ Φ3/27/23
☐ Received in 32oz jar(s)=Homogenized in Pyrex dish=	
☐ Previously Frozen =	
☑ Other (Details)= 23C0618 = Φ3 had a piece plastic 10.% shell pieces 619 = Φ1, Φ2, Φ4, Φ5, Φ6, Φ8, Φ9, 11,	✓ Φ3/27/23
Aqueous:	
☐ No Anomalies	
☐ Turbid/Color=	
☐ Particulates(%)=(Note: >5%=Notify Supervisor/Lead)	
☐ Emulsions (%)=	
☐ Oily, obvious fuel/sulfur odors=	
☐ Other (Details)=	
☐ Received in 1.0L Bottle(s)=No Bottle Rinse=	
☐ Other Notes/Comments= (Note problems, concerns, corrective actions).	
☑ Share Samples Y / N 23C0618 = 12.	✓ Φ3/27/23
☑ Multiple Jars Y / N	✓ Φ3/27/23
☐ Sample Pre-Screens indicate analyte activity=	
☐ Sample weights/volumes reduced based on Pre-Screen=	

CLEANUP BATCH SUMMARY

Laboratory:	Analytical Resources, LLC	SDG:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Cleanup Batch:	CLD0022	Cleanup Type:	Silica Gel
Cleanup Method:	EPA 3630C Silica Gel Cleanup - uL	Analysis:	EPA 8270E-SIM

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
Blank	BLC0727-BLK1	2023040610.D	04/04/2023	
SED-07C:0-1	23C0619-01	2023040623.D	04/04/2023	
SED-26C:1-3	23C0619-09	2023040633.D	04/04/2023	
SED-26C:0-1	23C0619-08	2023040632.D	04/04/2023	
SED-25C:0-1	23C0619-10	2023040634.D	04/04/2023	
SED-10C:0-1	23C0619-12	2023040636.D	04/04/2023	
SED-09C:1-3	23C0619-06	2023040631.D	04/04/2023	
SED-10C:1-3	23C0619-13	2023040637.D	04/04/2023	
SED-08C:1-3	23C0619-04	2023040629.D	04/04/2023	
SED-25C:1-3	23C0619-11	2023040635.D	04/04/2023	
Duplicate	BLC0727-DUP1	2023040624.D	04/04/2023	
LCS	BLC0727-BS1	2023040611.D	04/04/2023	
LCS Dup	BLC0727-BSD1	2023040612.D	04/04/2023	
Matrix Spike	BLC0727-MS1	2023040625.D	04/04/2023	
Matrix Spike Dup	BLC0727-MSD1	2023040626.D	04/04/2023	
SED-08C:0-1	23C0619-03	2023040628.D	04/04/2023	
SED-07C:1-3	23C0619-02	2023040627.D	04/04/2023	
SED-09C:0-1	23C0619-05	2023040630.D	04/04/2023	

Analytical Resources, LLC
Analytical Chemists and Consultants

CLEANUP BENCH SHEET

CLD0022

Matrix: Solid **Cleanup using: Organics - EPA 3630C Silica Gel Cleanup - uL** **Printed: 4/4/2023 3:09:11PM**

Lab Number	Sample Container	Sample Name	Extract Container	Initial (uL)	Final (uL)	Analysis	Clean Up Date	Cleaned By	Cleanup Comments
23C0618-01	B	SED-07G:0-10	B 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0618-03	B	SED-14G:0-10	B 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0618-04	B	SED-15G:0-10	B 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0618-11	A	SED-14C:0-1	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0618-12	A	SED-14C:1-3	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0618-13	A	SED-DUPC	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-01	A	SED-07C:0-1	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-02	A	SED-07C:1-3	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-03	A	SED-08C:0-1	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-04	A	SED-08C:1-3	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-05	A	SED-09C:0-1	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-06	A	SED-09C:1-3	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-08	A	SED-26C:0-1	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-09	A	SED-26C:1-3	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-10	A	SED-25C:0-1	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-11	A	SED-25C:1-3	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-12	A	SED-10C:0-1	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
23C0619-13	A	SED-10C:1-3	A 01	0.5	0.5	8270E-SIM Butyl Tins	4/4/2023	NRB	
BLC0727-BLK1	-	Blank	-	0.5	0.5	-	4/4/2023	NRB	
BLC0727-BS1	-	LCS	-	0.5	0.5	-	4/4/2023	NRB	
BLC0727-BSD1	-	LCS Dup	-	0.5	0.5	-	4/4/2023	NRB	
BLC0727-DUP1	-	Duplicate	-	0.5	0.5	-	4/4/2023	NRB	

Analytical Resources, LLC
Analytical Chemists and Consultants

CLEANUP BENCH SHEET

CLD0022

Matrix: Solid **Cleanup using: Organics - EPA 3630C Silica Gel Cleanup - uL** **Printed: 4/4/2023 3:09:11PM**

Lab Number	Sample Container	Sample Name	Extract Container	Initial (uL)	Final (uL)	Analysis	Clean Up Date	Cleaned By	Cleanup Comments
BLC0727-MS1	-	Matrix Spike	-	0.5	0.5	-	4/4/2023	NRB	
BLC0727-MSD1	-	Matrix Spike Dup	-	0.5	0.5	-	4/4/2023	NRB	

Analytical Resources, LLC
Analytical Chemists and Consultants

Form I

METHOD BLANK DATA SHEET

EPA 8270E-SIM

Blank

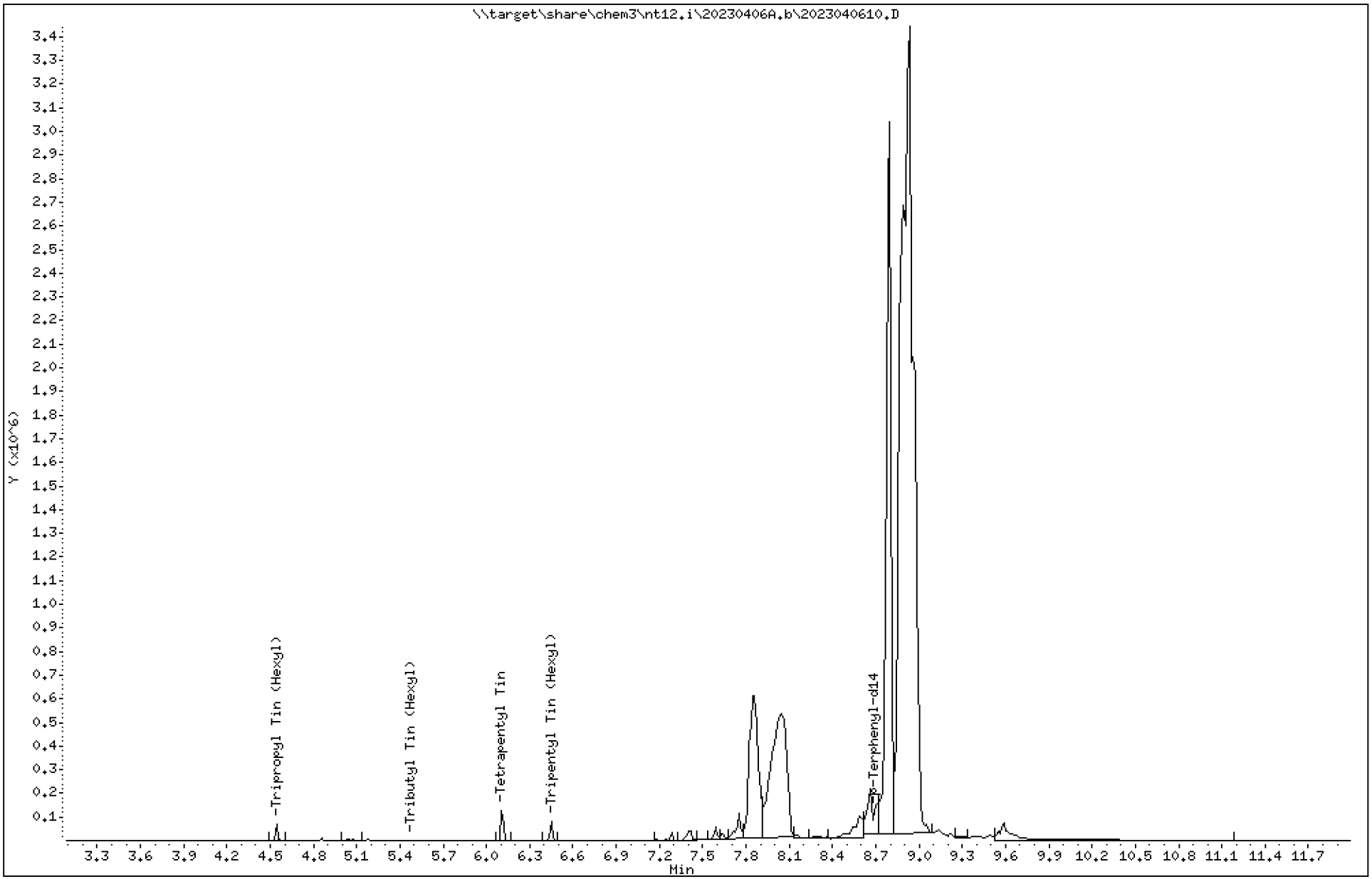
Laboratory:	Analytical Resources, LLC			SDG:	23C0619
Client:	Friedman & Bruya Inc.			Project:	Port of Friday Harbor
Matrix:	Solid	Laboratory ID:	BLC0727-BLK1	File ID:	2023040610.D
Sampled:	N/A	Prepared:	03/28/23 12:28	Analyzed:	04/06/23 18:16
Solids:		Preparation:	EPA 3546 (Microwave)	Initial/Final:	5 g / 0.5 mL
Batch:	BLC0727	Sequence:	SLD0107	Calibration:	GD00019
Instrument:	NT12	Column:	ZB-5MS	Cleanups:	Silica Gel

CAS NO.	COMPOUND	DILUTION	CONC: (ug/kg wet)	Q	DL	RL
36643-28-4	Tributyltin Ion	1	3.86	U	0.450	3.86
14488-53-0	Dibutyltin Ion	1	5.78	U	1.73	5.78
78763-54-9	Butyltin Ion	1	4.08	U	1.89	4.08
1461-25-2	Tetrabutyltin	1	5.00	U	5.00	5.00

SURROGATES	ADDED: (ug/kg wet)	FOUND: (ug/kg wet)	% REC	QC LIMITS	Q
Tripentyltin	45.178	45.3	100	30 - 160	
Tripropyltin	43.746	39.2	89.6	30 - 160	

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040610.D
Date : 06-APR-2023 18:16
Client ID:
Sample Info: BLC0727-BLK1,
Column phase: ZB-5msi

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25



23C0619 CLPLIKE (Rev0) - Page 124 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040610.D

Date : 06-APR-2023 18:16

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-BLK1,

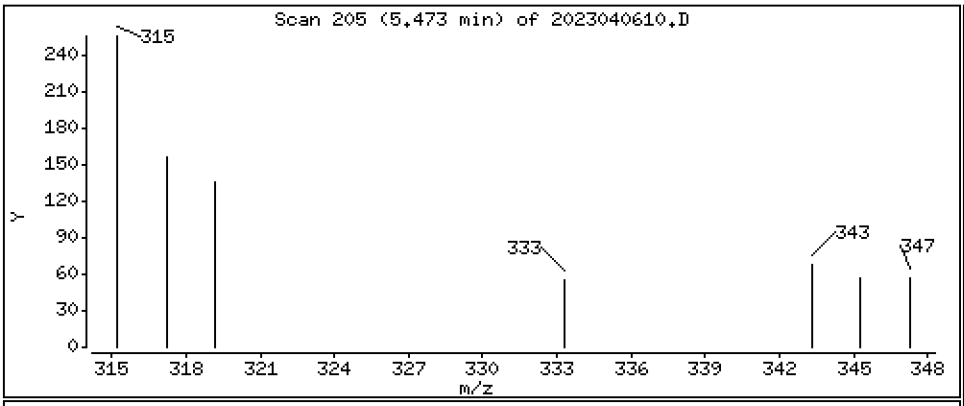
Operator: JZ

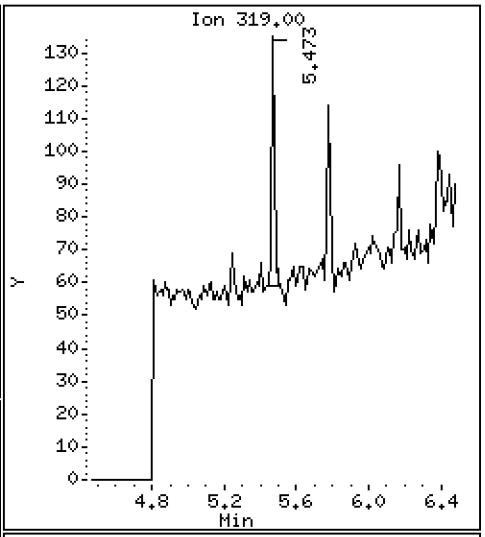
Column phase: ZB-5msi

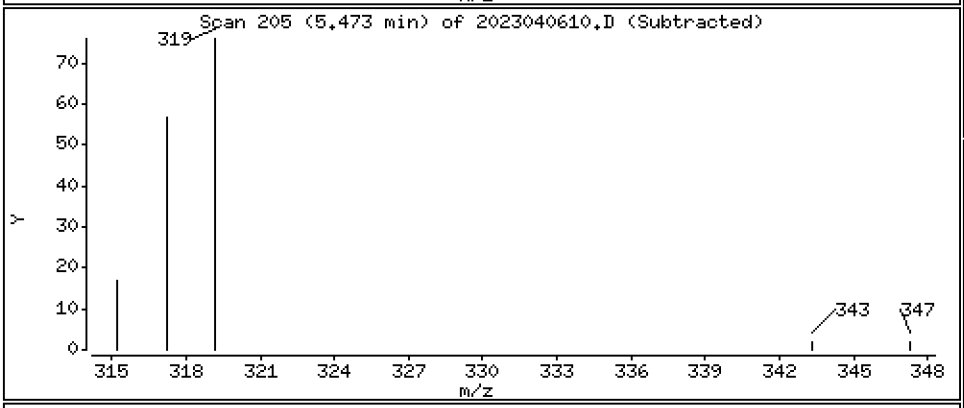
Column diameter: 0.25

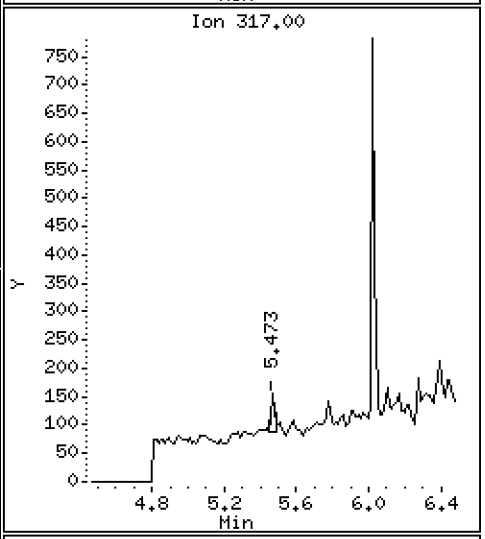
3 Tributyl Tin (Hexyl)

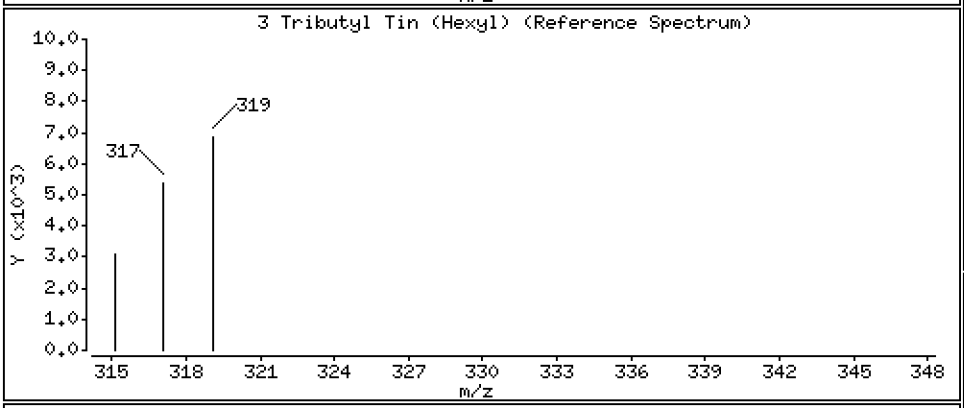
Concentration: 0.001405 ug/mL

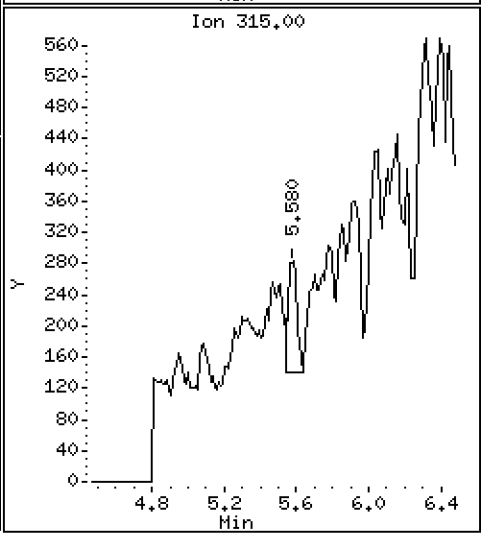


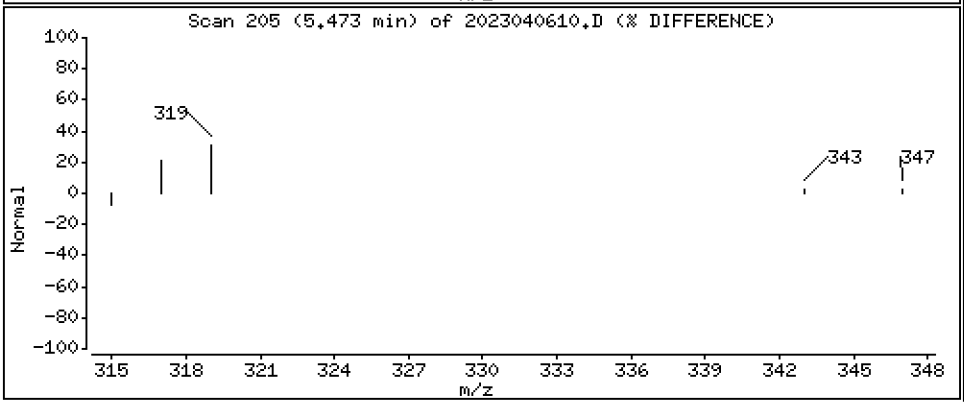












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040610.D
Lab Smp Id: BLC0727-BLK1
Inj Date : 06-APR-2023 18:16
Operator : JZ   Inst ID: nt12.i
Smp Info : BLC0727-BLK1,
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 09:53 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 10
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	CONCENTRATIONS FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.548	4.514	(0.745)	35424	0.52673	0.5267
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	74	0.00141	0.001405
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	159063	2.00000	
	5 Dibutyl Tin (Hexyl)	347	Compound Not Detected.					
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	32740	0.56917	0.5692
	7 Butyl Tin (Hexyl)	347	Compound Not Detected.					
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	23289	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040610.D
Lab Smp Id: BLC0727-BLK1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

COMPOUND	STANDARD	AREA LIMIT LOWER	AREA LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	159063	-3.11
8 p-Terphenyl-d14	22611	11306	45222	23289	3.00

COMPOUND	STANDARD	RT LIMIT LOWER	RT LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040610.D

Lab ID: BLC0727-BLK1
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 18:16

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.745	0.740	0.0057	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

LCS / LCS DUPLICATE RECOVERY

EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Matrix:	Solid	Analyzed:	04/06/23 18:33
Batch:	BLC0727	Laboratory ID:	BLC0727-BS1
Preparation:	EPA 3546 (Microwave)	Sequence Name:	LCS
Initial/Final:	5 g / 0.5 mL		

COMPOUND	SPIKE ADDED (ug/kg wet)	LCS CONCENTRATION (ug/kg wet)	Q	LCS % REC. #	QC LIMITS REC.
Tributyltin Ion	44.6	44.7		100	30 - 160
Dibutyltin Ion	38.4	29.9		78.1	30 - 160
Butyltin Ion	31.2	21.7		69.6	30 - 160

* Indicates values outside of QC limits

LCS / LCS DUPLICATE RECOVERY

EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Matrix:	Solid	Analyzed:	04/06/23 18:49
Batch:	BLC0727	Laboratory ID:	BLC0727-BSD1
Preparation:	EPA 3546 (Microwave)	Sequence Name:	LCS Dup
Initial/Final:	5 g / 0.5 mL		

COMPOUND	SPIKE ADDED (ug/kg wet)	LCSD CONCENTRATION (ug/kg wet)	Q	LCSD % REC. #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Tributyltin Ion	44.6	49.1		110	9.37	30	30 - 160
Dibutyltin Ion	38.4	31.9		83.3	6.44	30	30 - 160
Butyltin Ion	31.2	23.4		75.1	7.67	30	30 - 160

* Indicates values outside of QC limits

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040611.D

Page 1

Date : 06-APR-2023 18:33

Client ID:

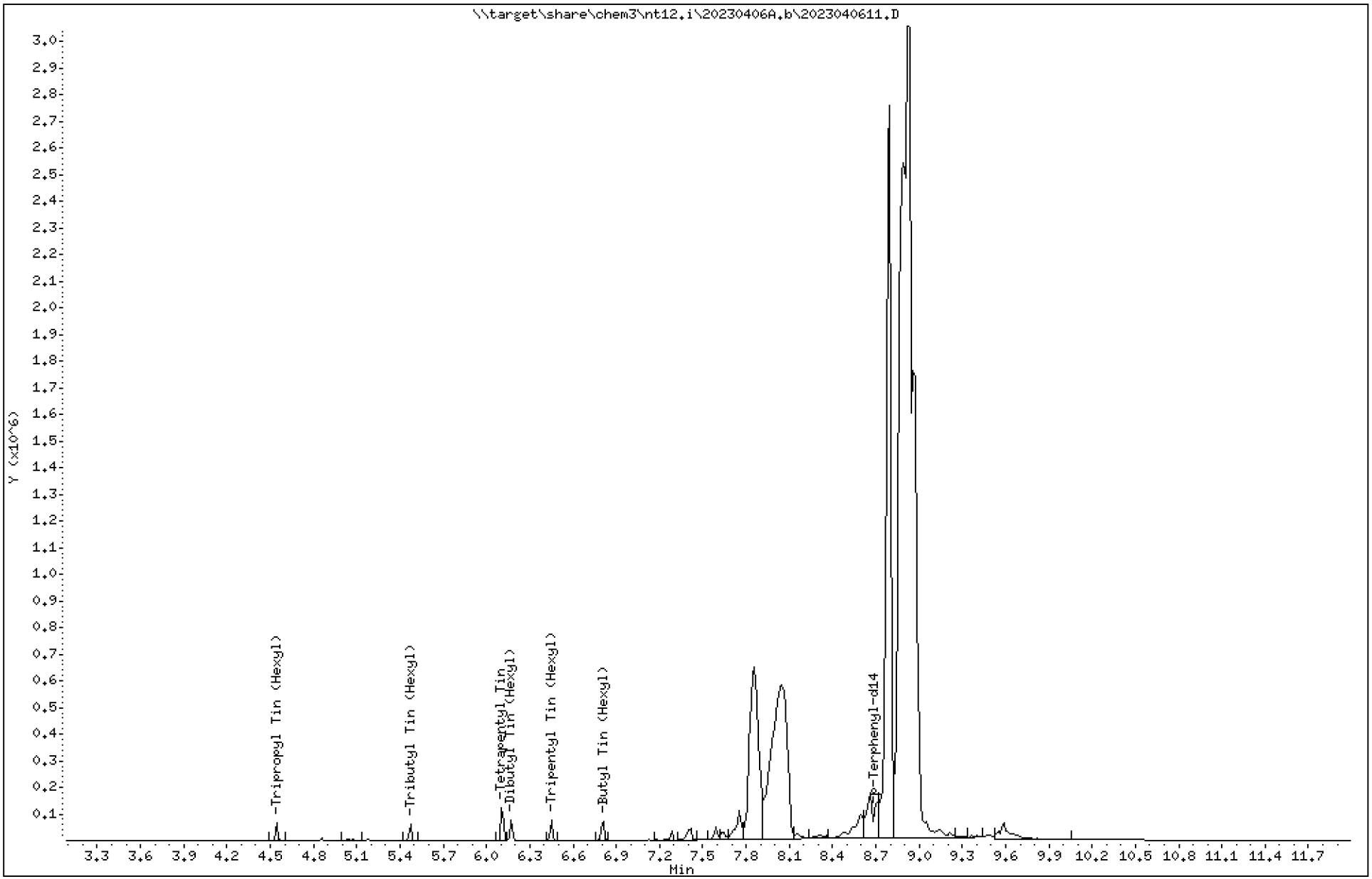
Instrument: nt12.i

Sample Info: BLC0727-BS1,

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0619 CLPLIKE (Rev0) - Page 131 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040611.D

Date : 06-APR-2023 18:33

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-BS1,

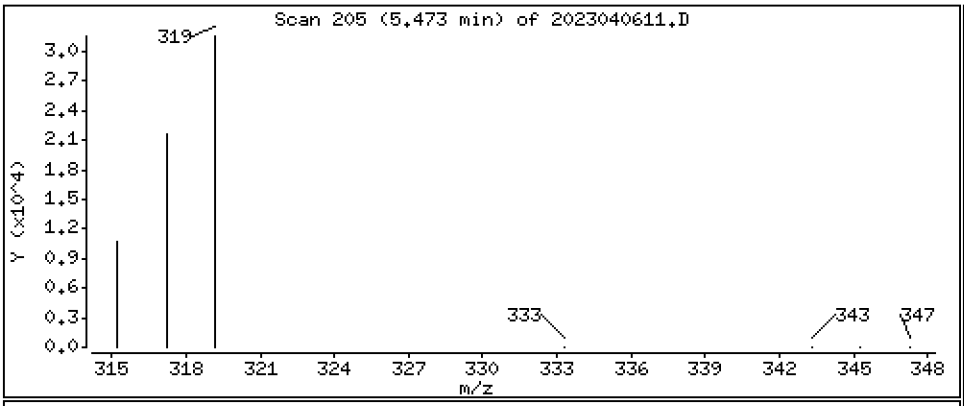
Operator: JZ

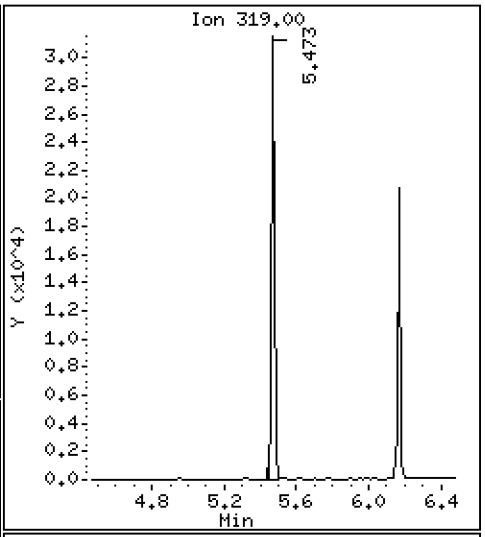
Column phase: ZB-5msi

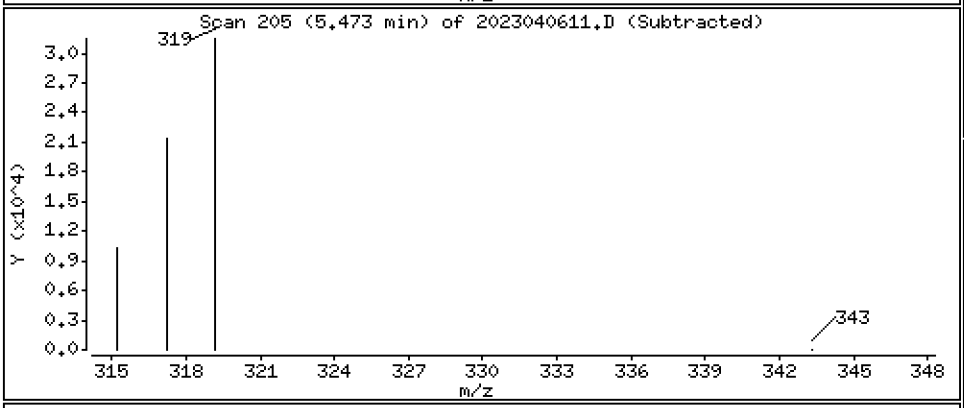
Column diameter: 0.25

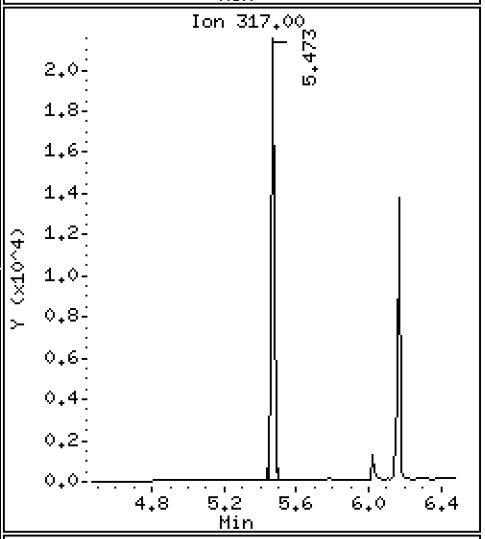
3 Tributyl Tin (Hexyl)

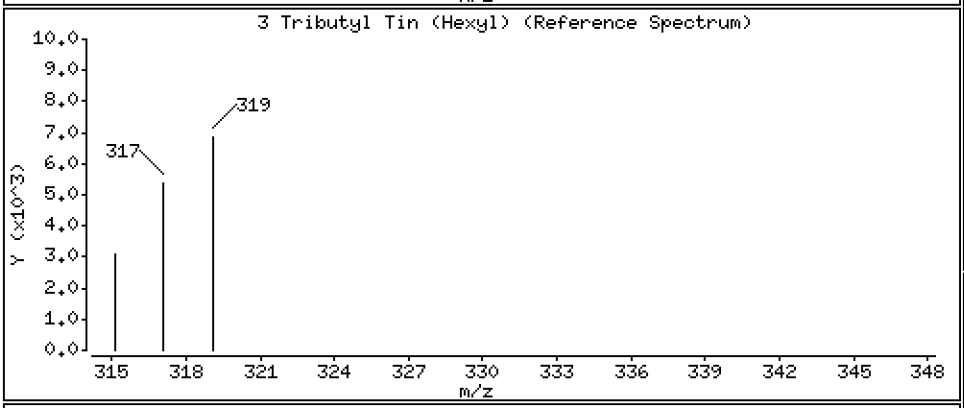
Concentration: 0.5784 ug/mL

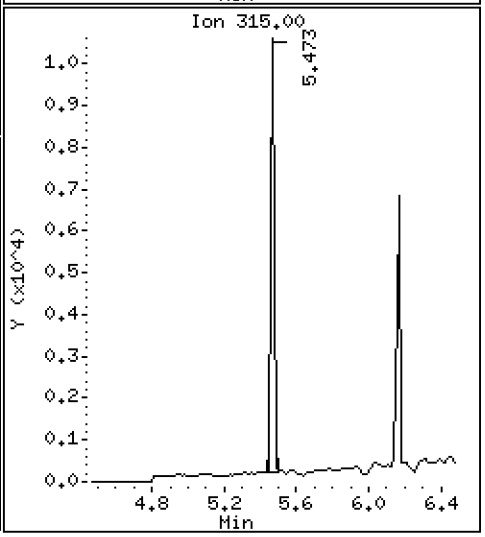


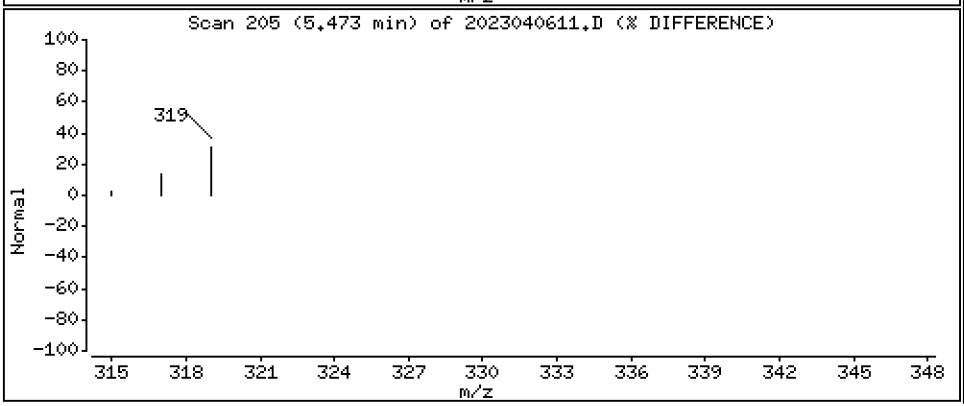












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040611.D

Date : 06-APR-2023 18:33

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-BS1,

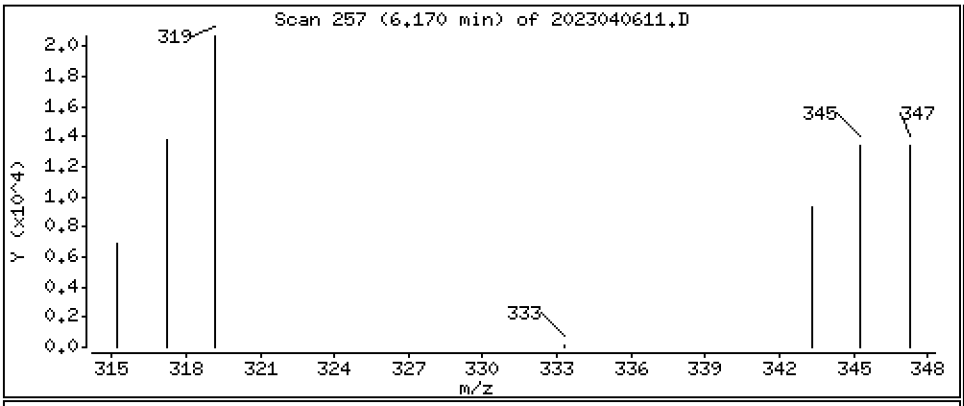
Operator: JZ

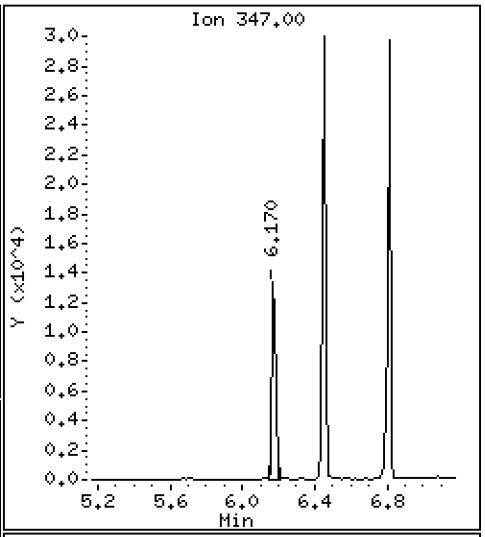
Column phase: ZB-5msi

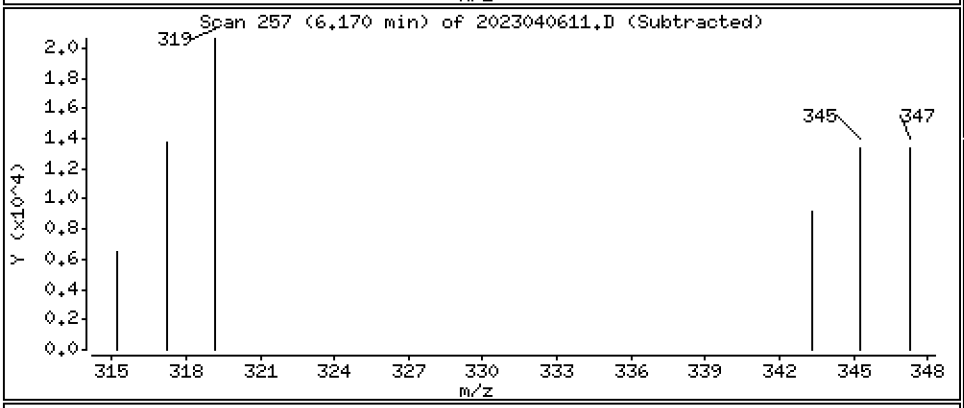
Column diameter: 0.25

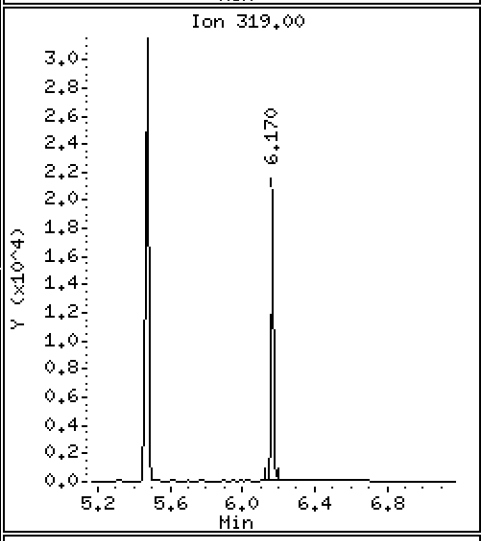
5 Dibutyl Tin (Hexyl)

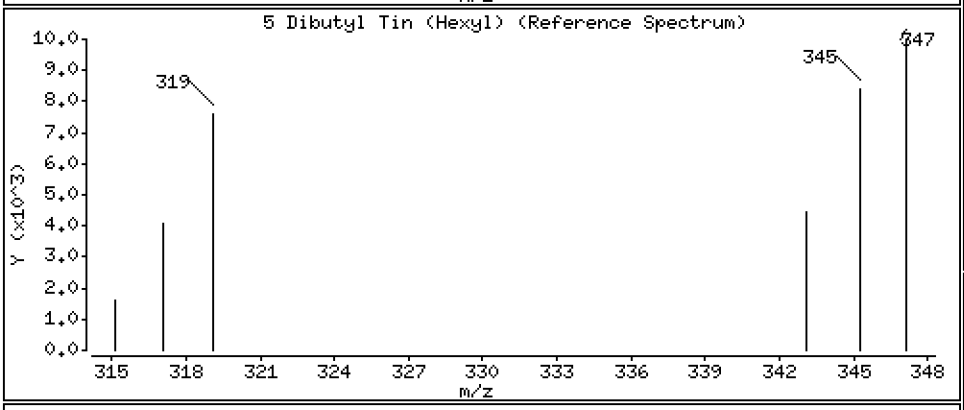
Concentration: 0.5181 ug/mL

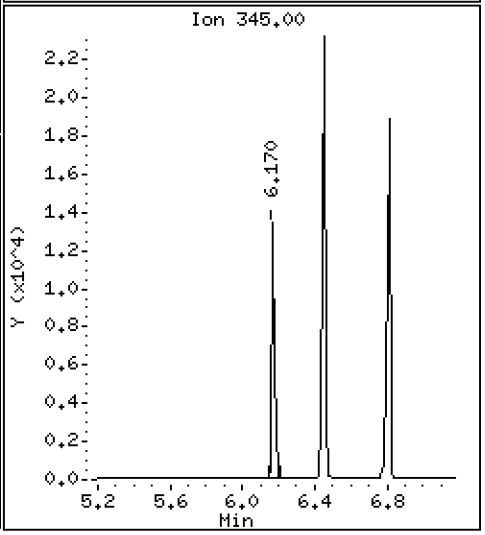


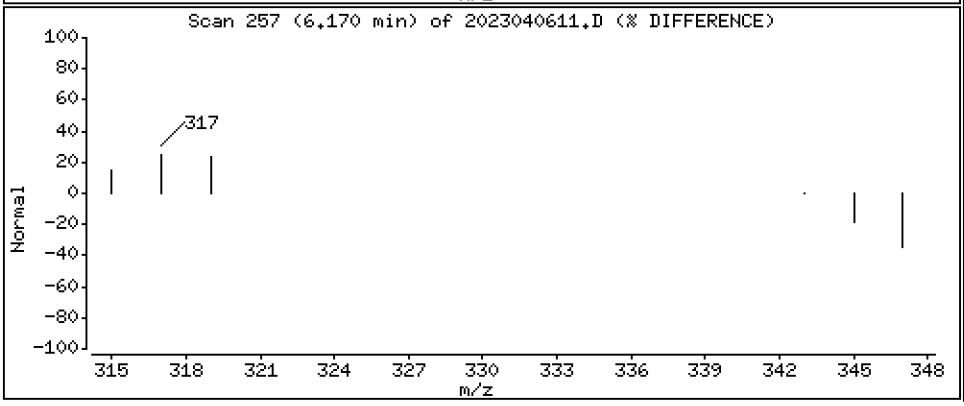












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040611.D

Date : 06-APR-2023 18:33

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-BS1,

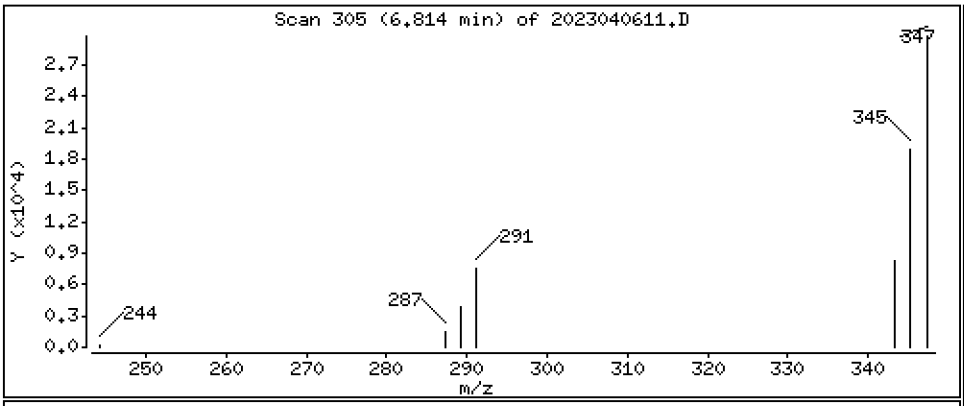
Operator: JZ

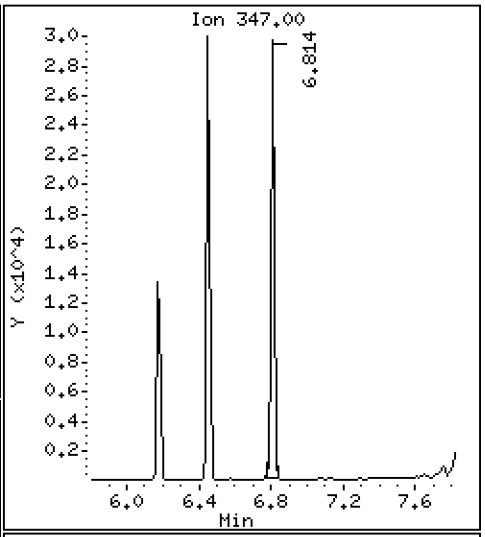
Column phase: ZB-5msi

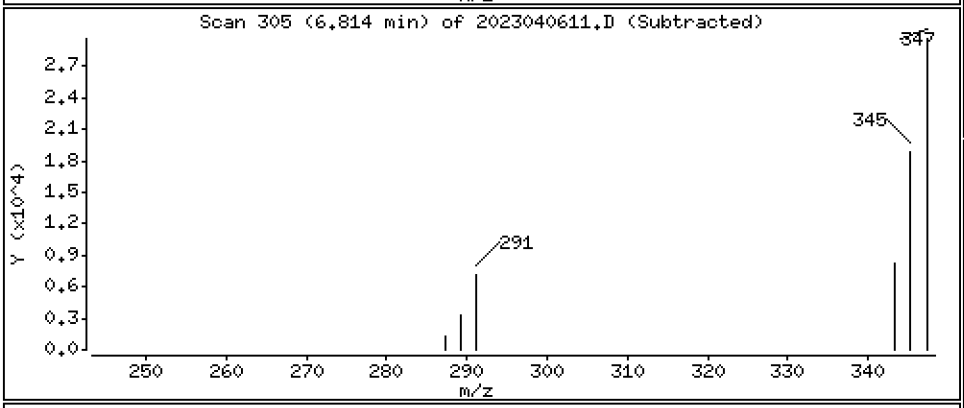
Column diameter: 0.25

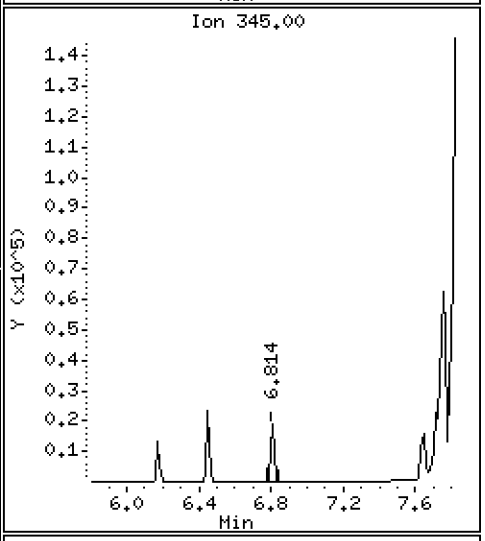
7 Butyl Tin (Hexyl)

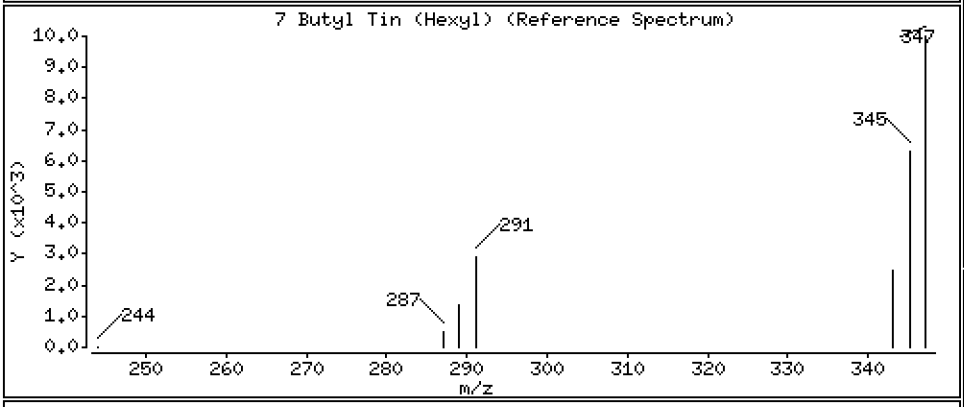
Concentration: 0.5313 ug/mL

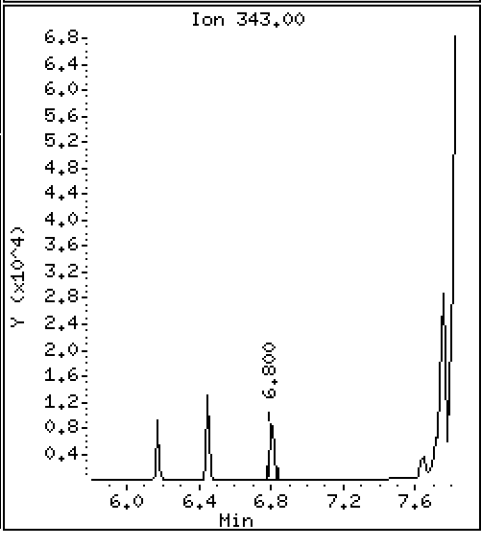


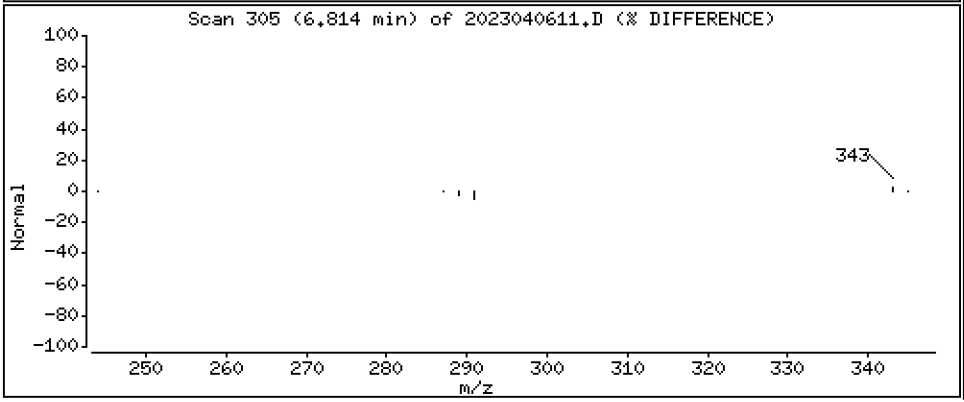












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040611.D
Lab Smp Id: BLC0727-BS1
Inj Date : 06-APR-2023 18:33
Operator : JZ   Inst ID: nt12.i
Smp Info : BLC0727-BS1,
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 09:53 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 11
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	CONCENTRATIONS FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.548	4.514	(0.745)	33906	0.50021	0.5002
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	30701	0.57839	0.5784
*	4 Tetrapentyl Tin	333	6.102	6.102	(1.000)	160316	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.170	6.169	(0.710)	20192	0.51810	0.5181
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	31668	0.55231	0.5523
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	33321	0.53129	0.5313
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	23214	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040611.D
Lab Smp Id: BLC0727-BS1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

COMPOUND	STANDARD	AREA LIMIT LOWER	AREA LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	160316	-2.35
8 p-Terphenyl-d14	22611	11306	45222	23214	2.67

COMPOUND	STANDARD	RT LIMIT LOWER	RT LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040611.D

Lab ID: BLC0727-BS1
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 18:33

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.745	0.740	0.0057	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

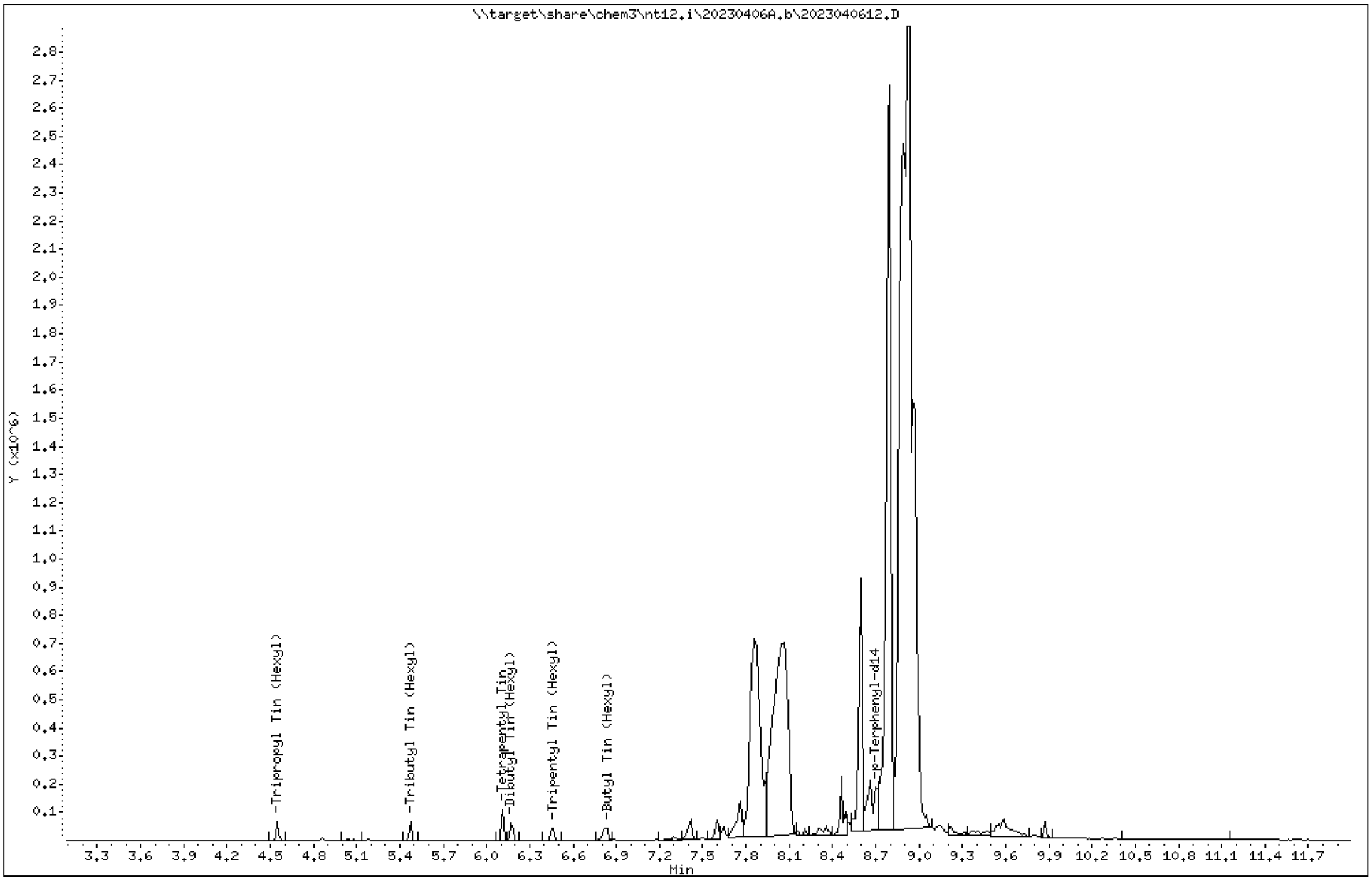
On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040612.D
Date : 06-APR-2023 18:49
Client ID:
Sample Info: BLC0727-BSD1,

Instrument: nt12.i
Operator: JZ
Column phase: ZB-5msi
Column diameter: 0.25



23C0619 CLPLIKE (Rev0) - Page 138 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040612.D

Date : 06-APR-2023 18:49

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-BSD1,

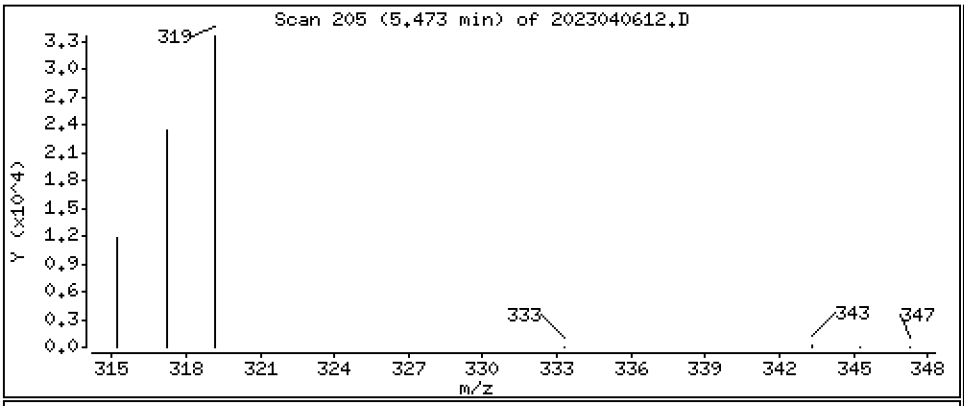
Operator: JZ

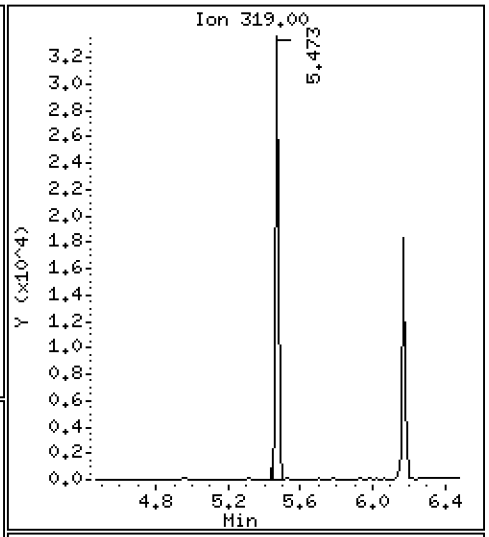
Column phase: ZB-5msi

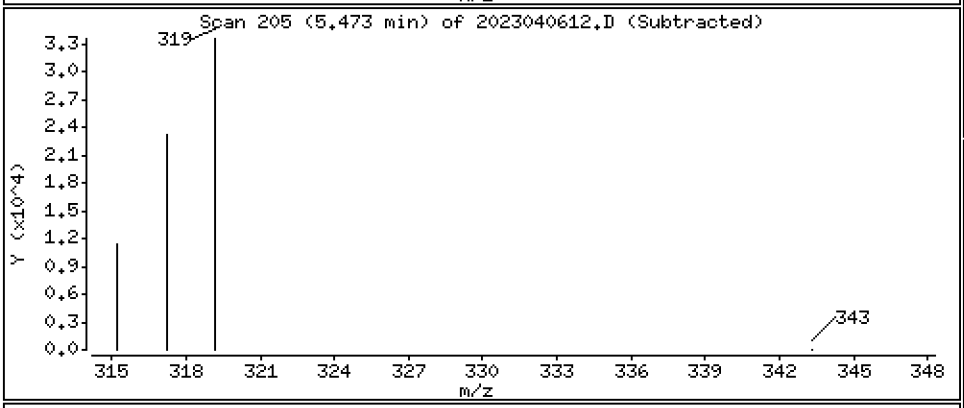
Column diameter: 0.25

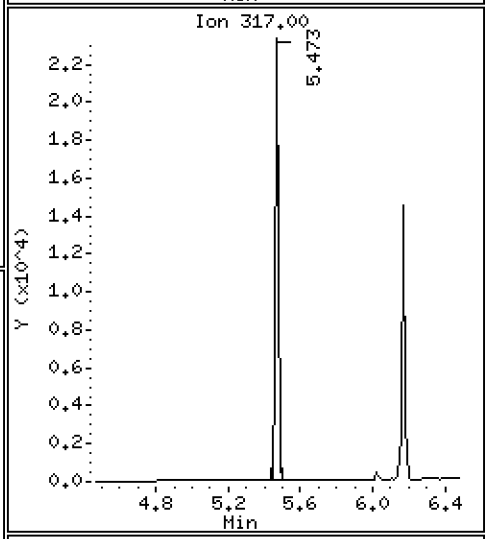
3 Tributyl Tin (Hexyl)

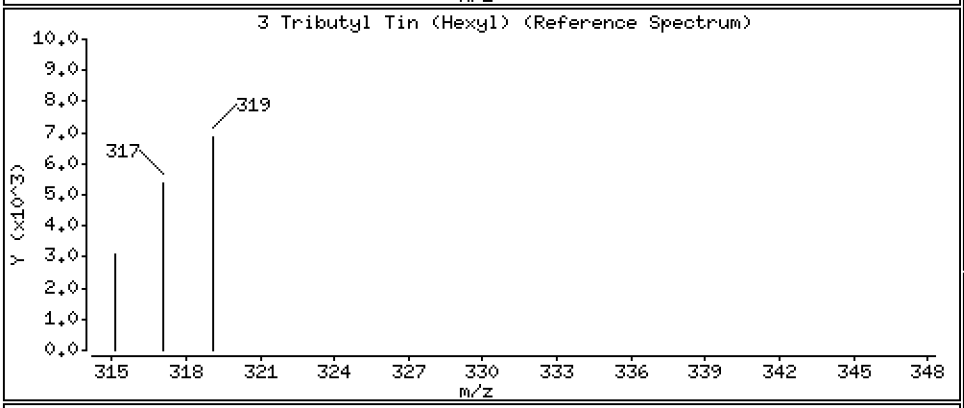
Concentration: 0.6352 ug/mL

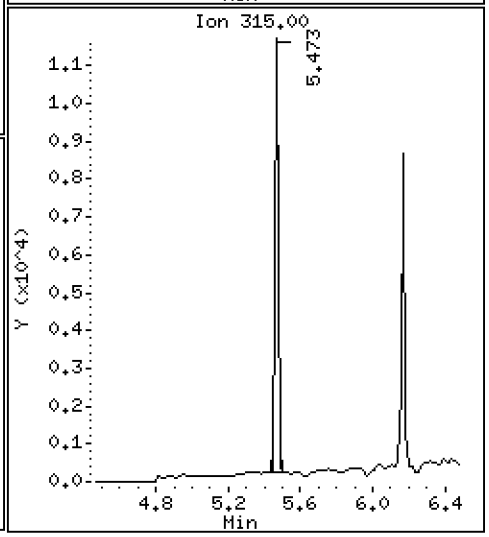


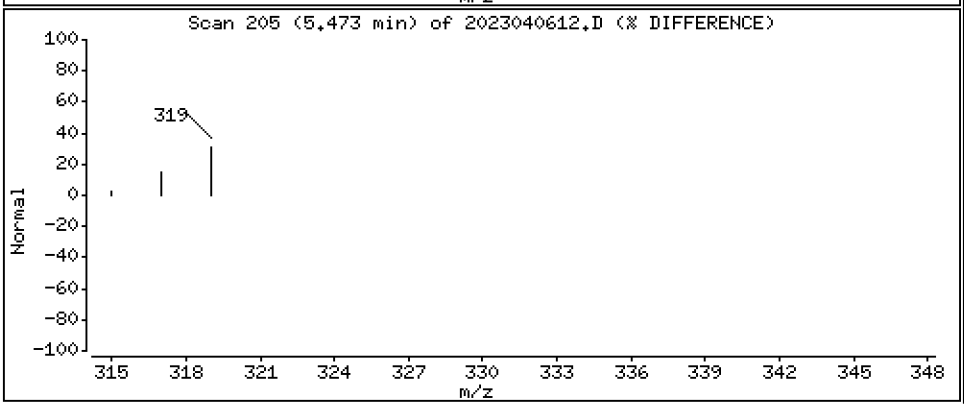












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040612.D

Date : 06-APR-2023 18:49

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-BSD1,

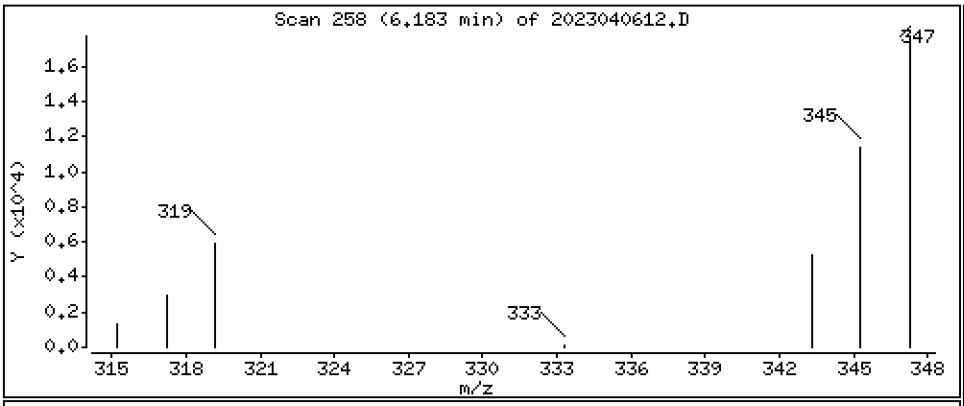
Operator: JZ

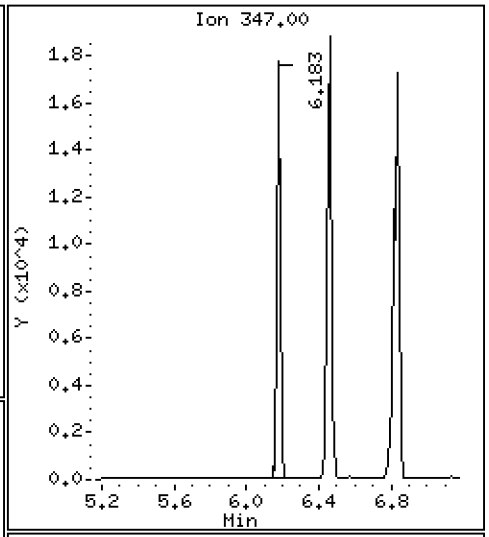
Column phase: ZB-5msi

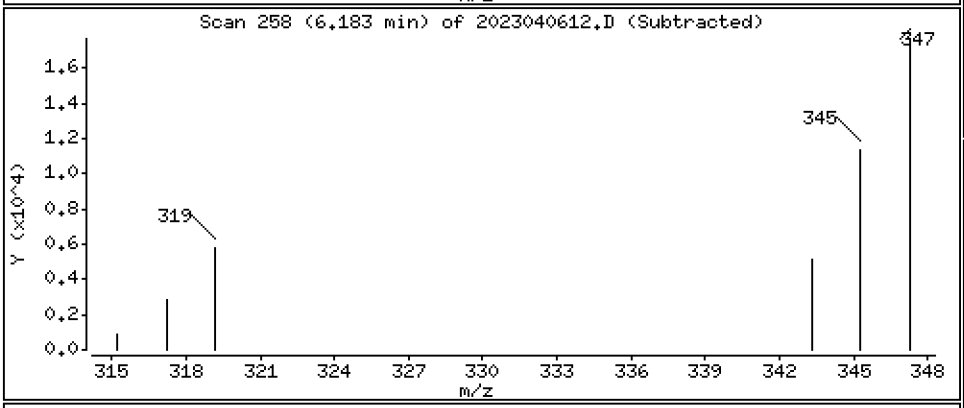
Column diameter: 0.25

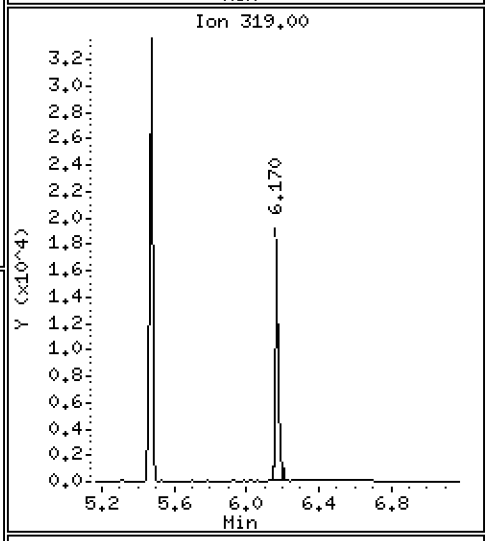
5 Dibutyl Tin (Hexyl)

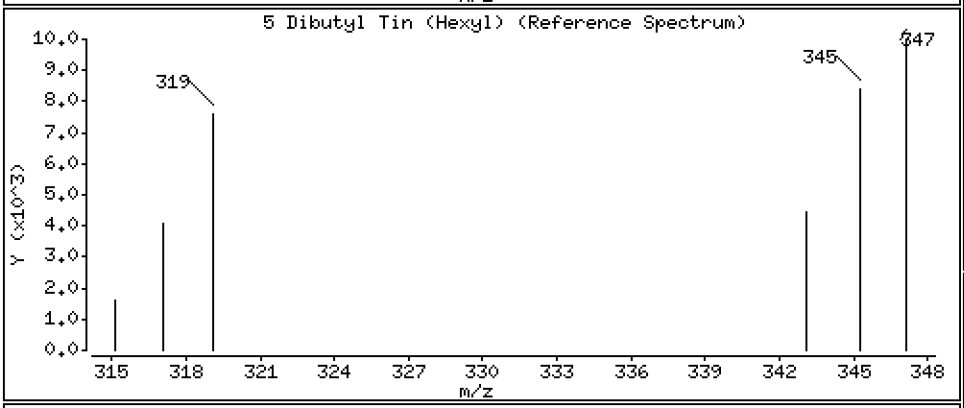
Concentration: 0.5526 ug/mL

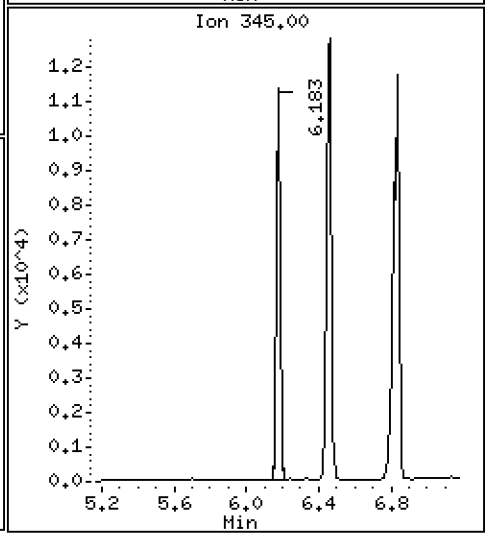


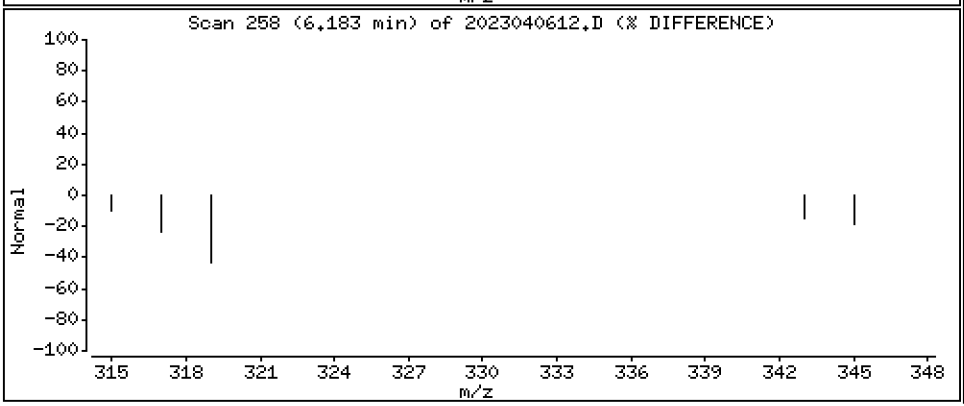












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040612.D

Date : 06-APR-2023 18:49

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-BSD1,

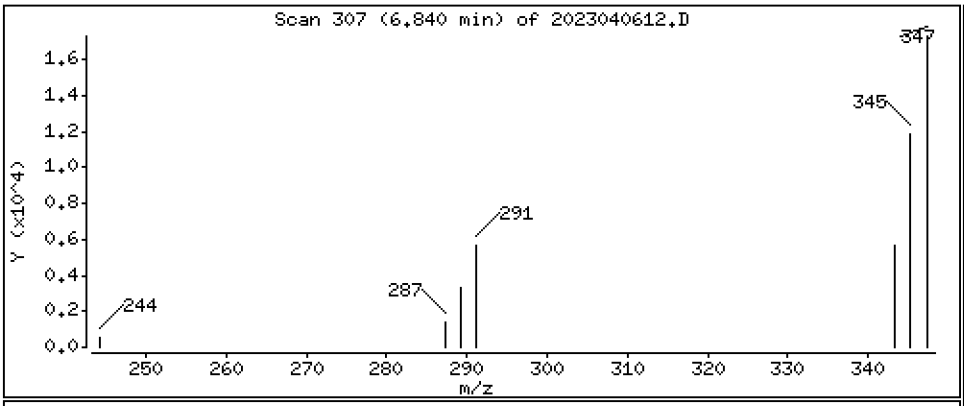
Operator: JZ

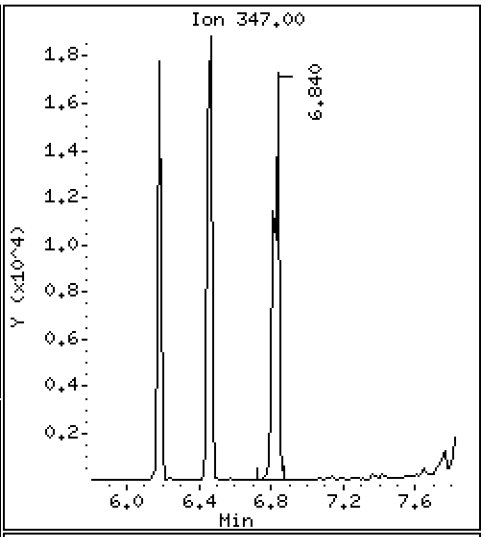
Column phase: ZB-5msi

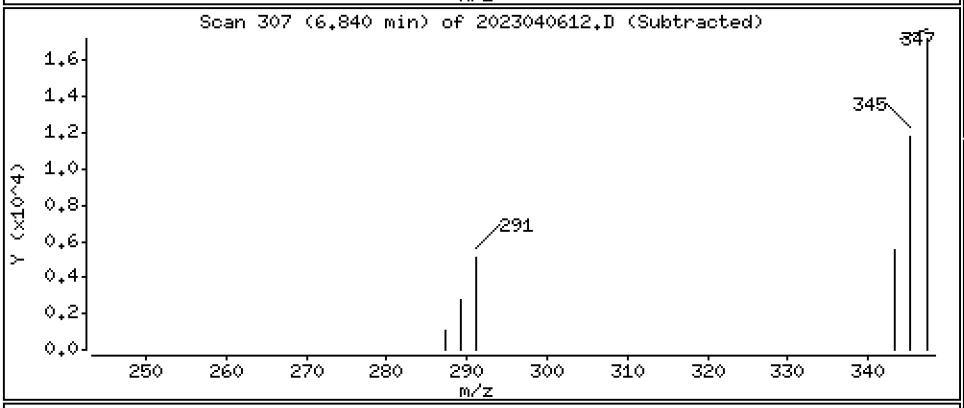
Column diameter: 0.25

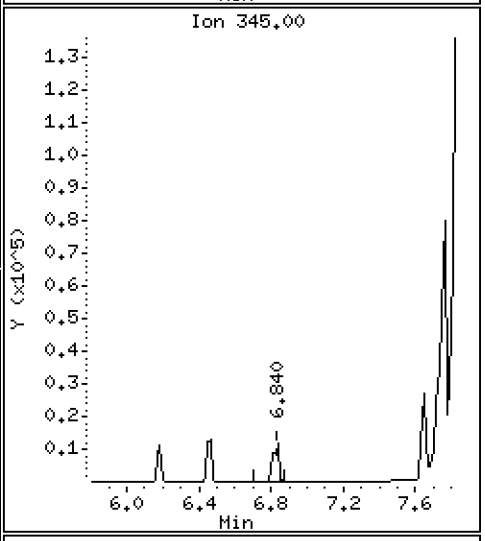
7 Butyl Tin (Hexyl)

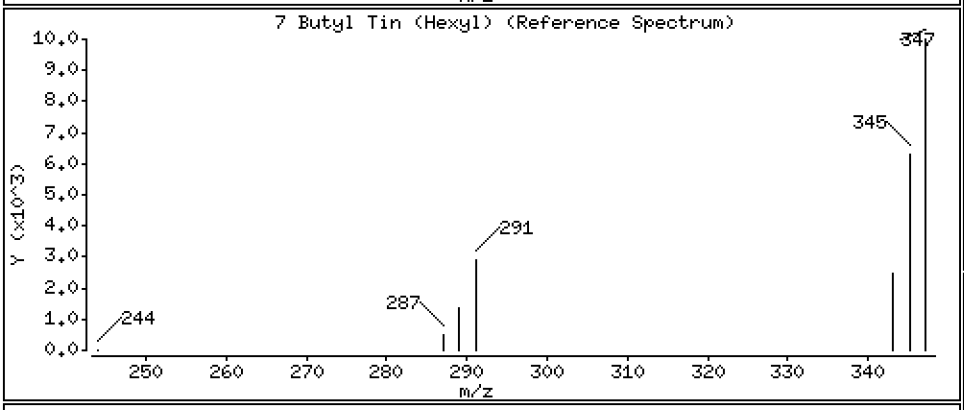
Concentration: 0.5737 ug/mL

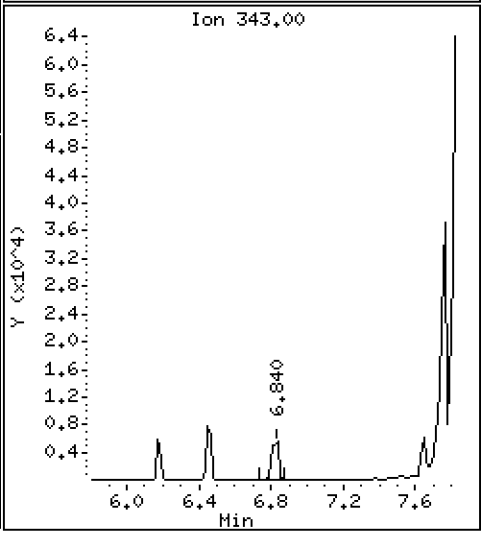


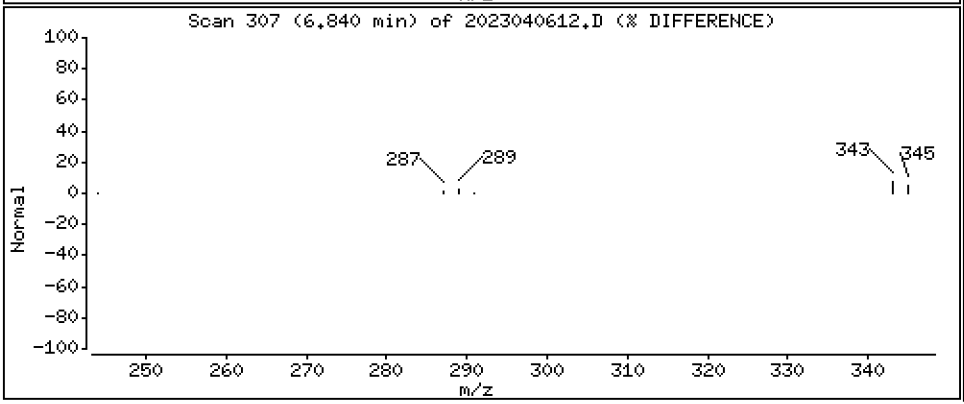












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040612.D
Lab Smp Id: BLC0727-BSD1
Inj Date : 06-APR-2023 18:49
Operator : JZ   Inst ID: nt12.i
Smp Info : BLC0727-BSD1,
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 09:53 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 12
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.548	4.514	(0.744)	33636	0.51366	0.5137
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.895)	32573	0.63522	0.6352
*	4 Tetrapentyl Tin	333	6.116	6.102	(1.000)	154875	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.710)	21384	0.55256	0.5526
$	6 Tripentyl Tin (Hexyl)	347	6.464	6.451	(0.743)	30809	0.54113	0.5411
	7 Butyl Tin (Hexyl)	347	6.840	6.813	(0.786)	35726	0.57367	0.5737
*	8 p-Terphenyl-d14	244	8.704	8.690	(1.000)	23051	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040612.D
Lab Smp Id: BLC0727-BSD1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

COMPOUND	STANDARD	AREA LIMIT LOWER	AREA LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	154875	-5.66
8 p-Terphenyl-d14	22611	11306	45222	23051	1.95

COMPOUND	STANDARD	RT LIMIT LOWER	RT LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.12	0.22
8 p-Terphenyl-d14	8.69	8.19	9.19	8.70	0.15

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040612.D

Lab ID: BLC0727-BSD1
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 18:49

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606A.D

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

SED-07C:0-1

DUPLICATES

EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG: 23C0619
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Laboratory ID: BLC0727-DUP1
Batch: BLC0727
Lab Source ID: 23C0619-01
Preparation: EPA 3546 (Microwave)
Initial/Final: 5.95 g / 0.5 mL
Source Sample Name: SED-07C:0-1
% Solids: 84.09

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION	DUPLICATE CONCENTRATION	RPD %	Q
Tributyltin Ion	30	3.61	1.74	69.7	*
Dibutyltin Ion	30	ND	ND		
Butyltin Ion	30	ND	ND		
Tetrabutyltin	200	ND	ND		
Tripentyltin		36.0	40.7		
Tripropyltin		33.5	36.0		

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040624.D

Date : 06-APR-2023 22:07

Client ID:

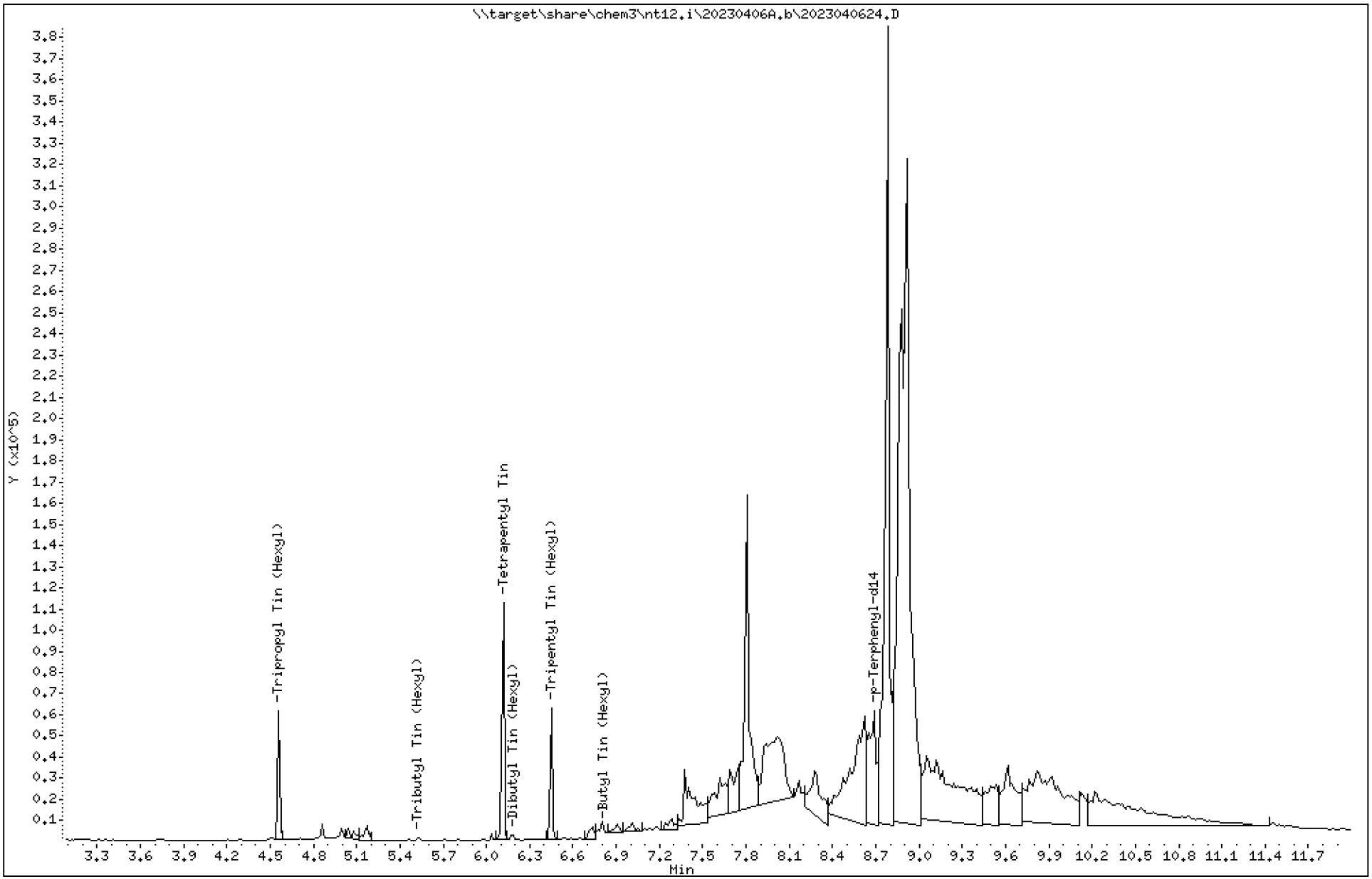
Instrument: nt12.i

Sample Info: BLC0727-DUP1,

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0619 CLPLIKE (Rev0) - Page 146 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040624.D

Date : 06-APR-2023 22:07

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-DUP1,

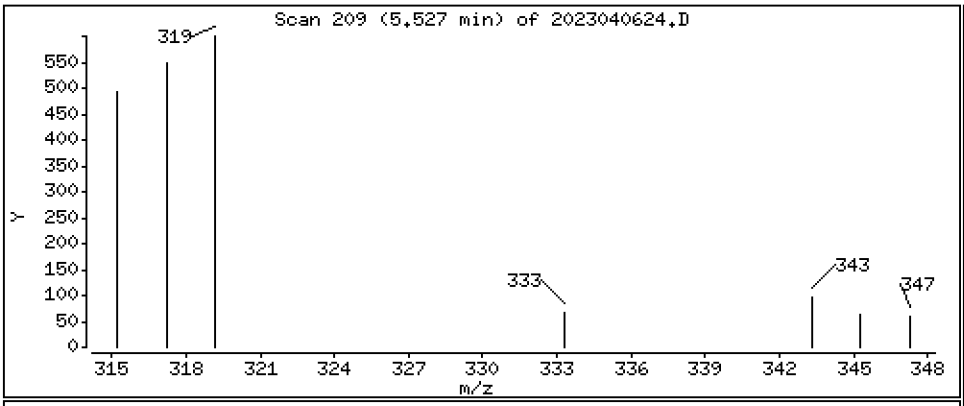
Operator: JZ

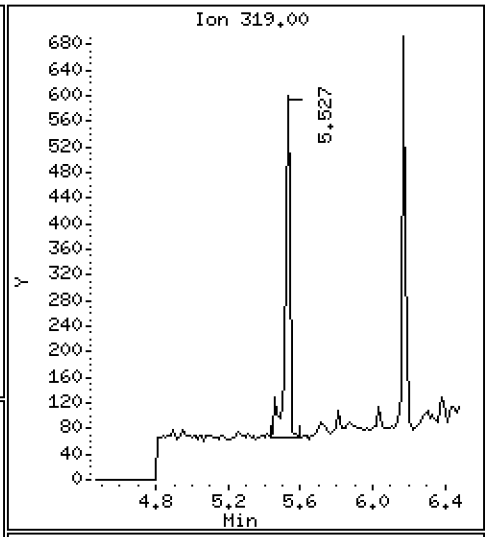
Column phase: ZB-5msi

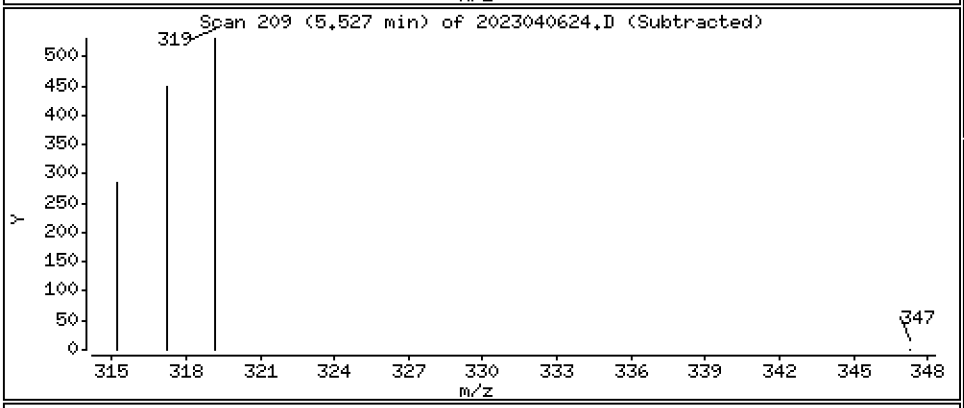
Column diameter: 0.25

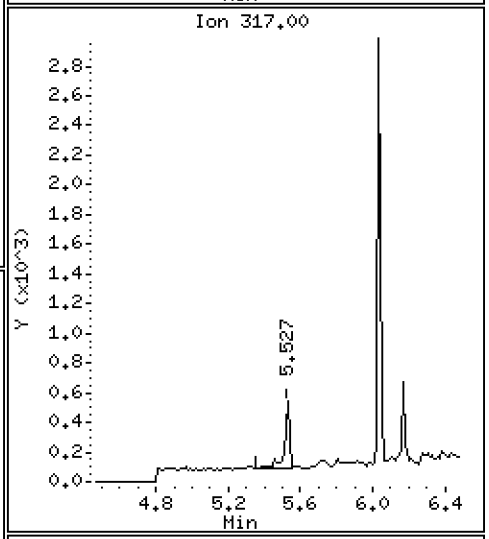
3 Tributyl Tin (Hexyl)

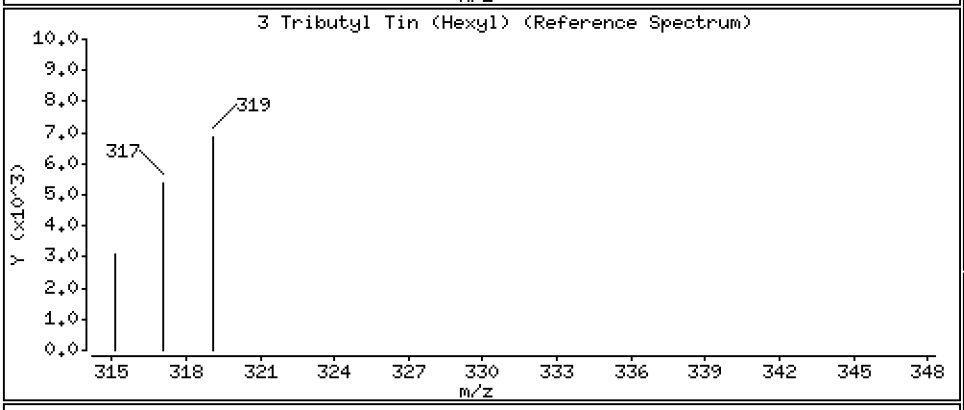
Concentration: 0.02254 ug/mL

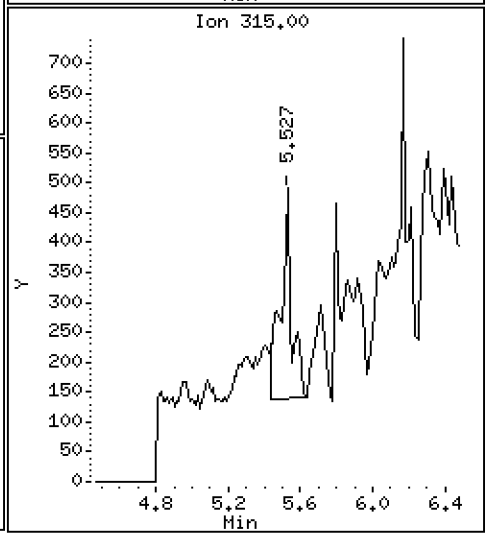


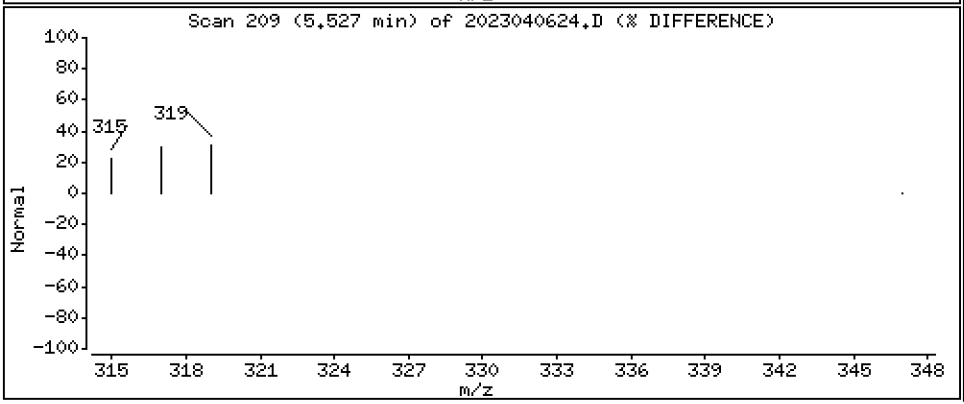












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040624.D

Date : 06-APR-2023 22:07

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-DUP1,

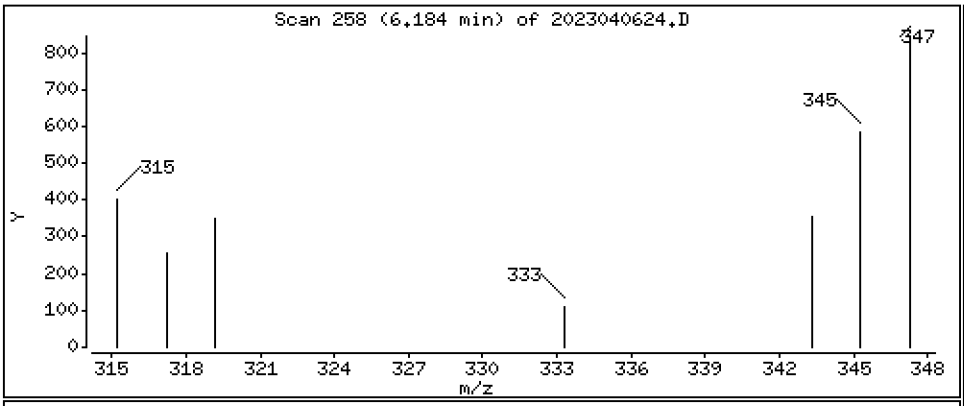
Operator: JZ

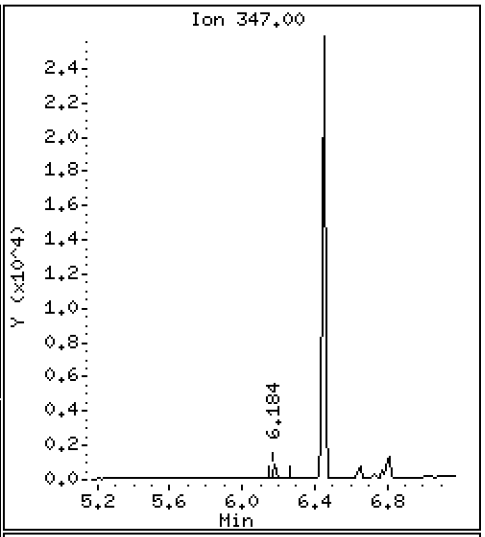
Column phase: ZB-5msi

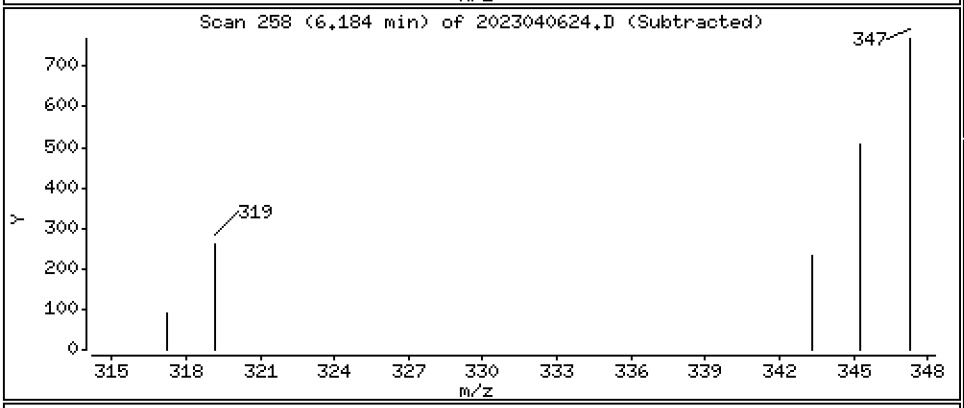
Column diameter: 0.25

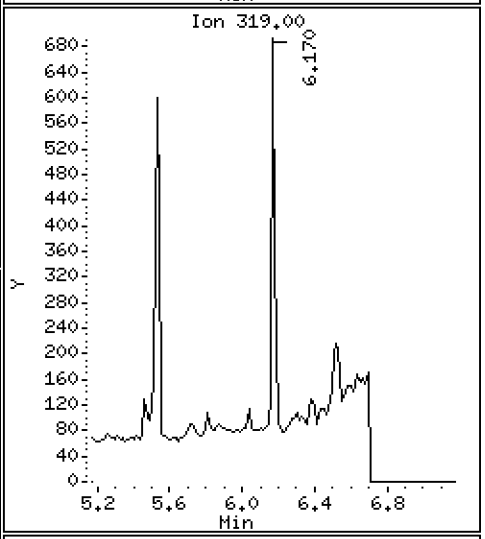
5 Dibutyl Tin (Hexyl)

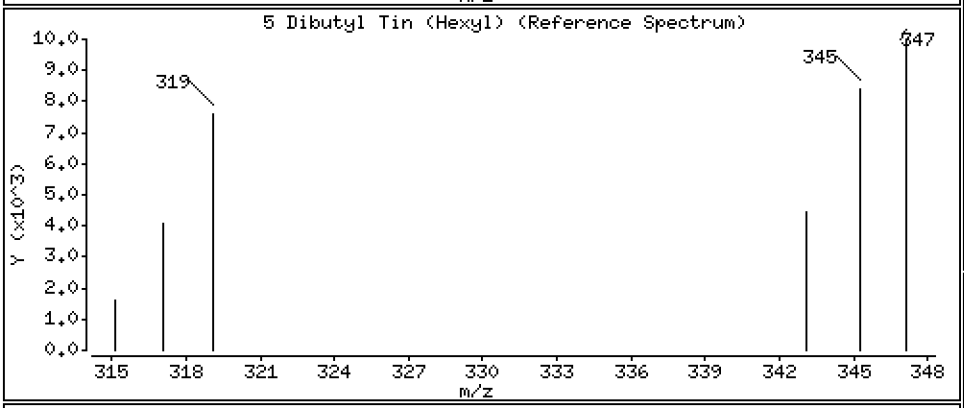
Concentration: 0.02333 ug/mL

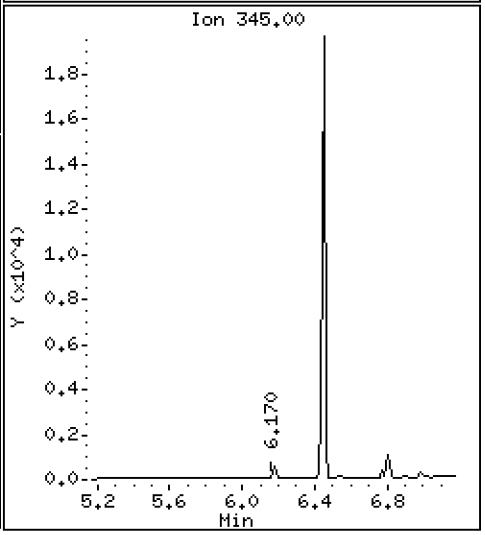


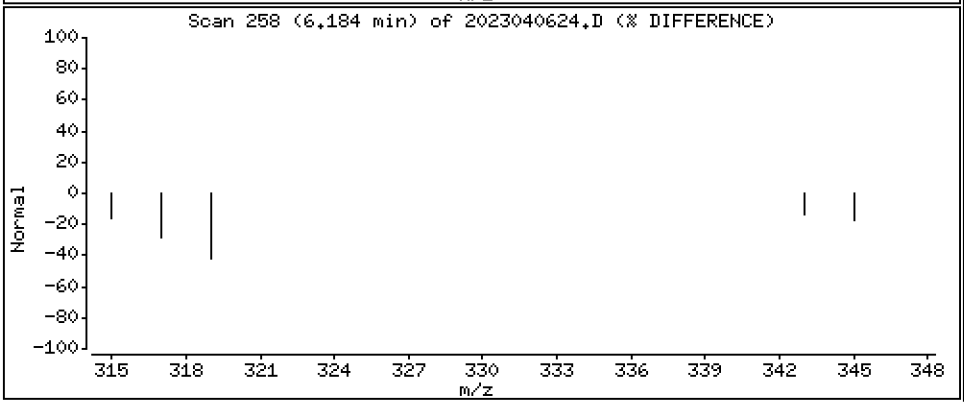












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040624.D

Date : 06-APR-2023 22:07

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-DUP1,

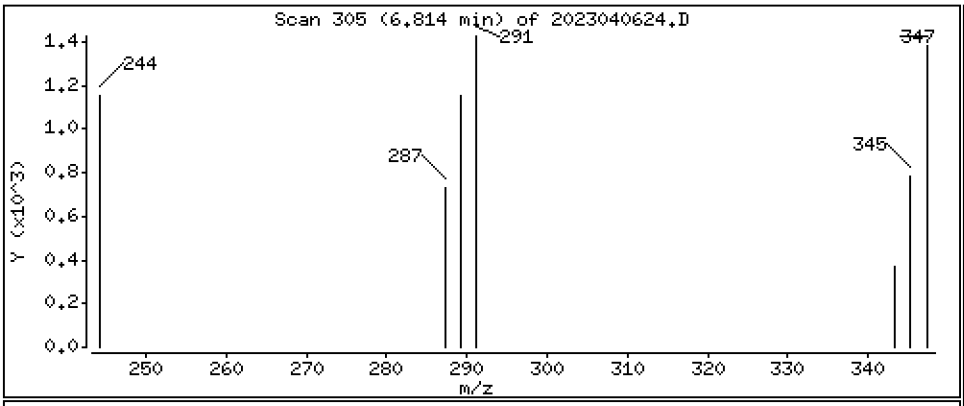
Operator: JZ

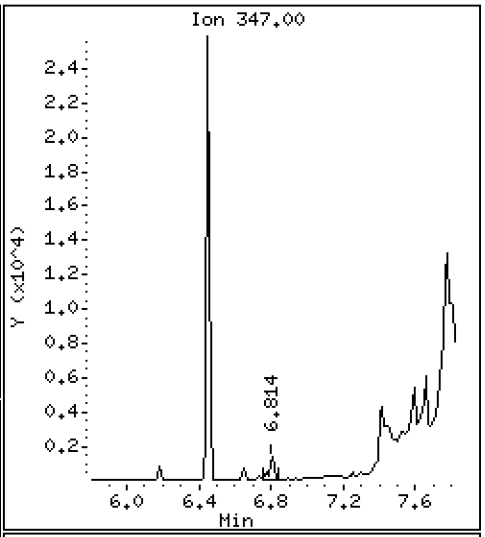
Column phase: ZB-5msi

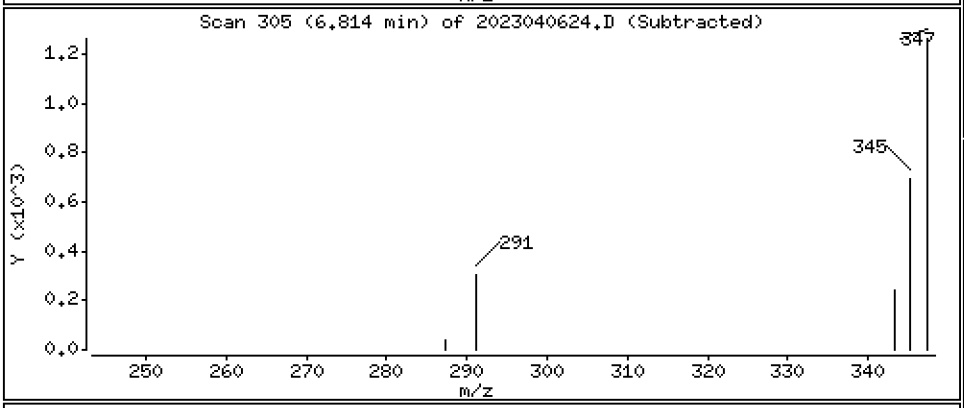
Column diameter: 0.25

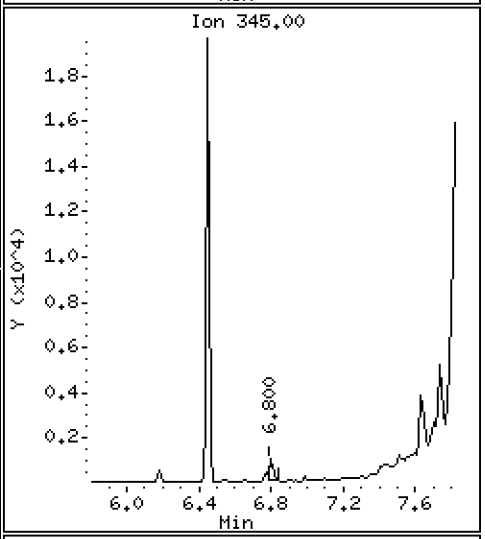
7 Butyl Tin (Hexyl)

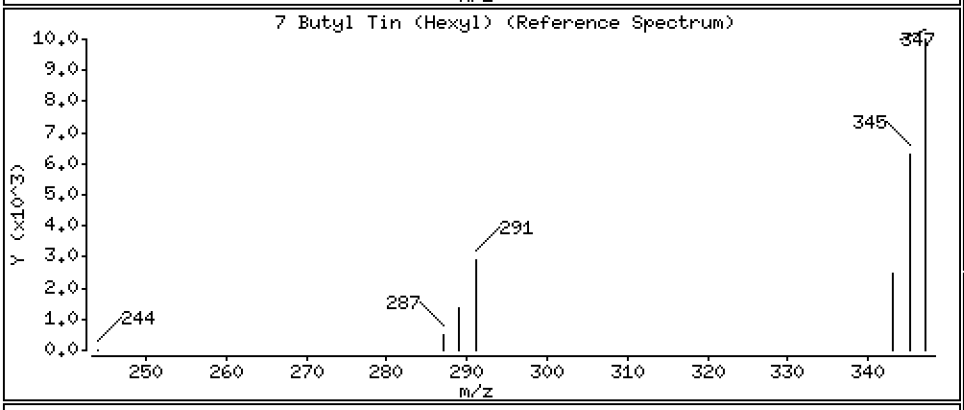
Concentration: 0.04248 ug/mL

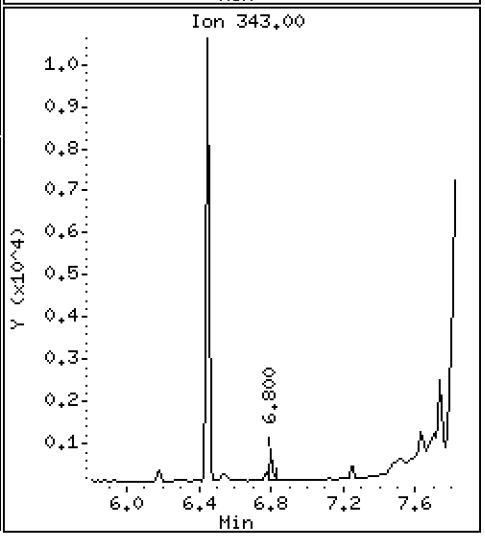


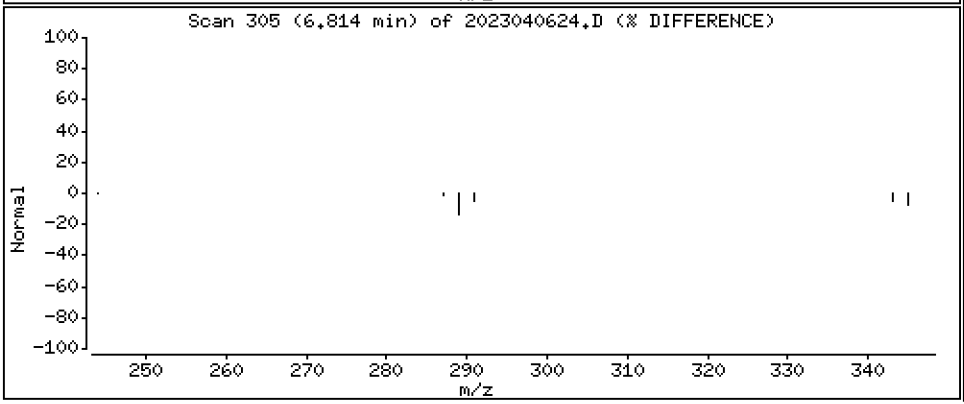












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040624.D
Lab Smp Id: BLC0727-DUP1
Inj Date : 06-APR-2023 22:07
Operator : JZ   Inst ID: nt12.i
Smp Info : BLC0727-DUP1,
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 24
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.560	4.514	(0.746)	26410	0.48464	0.4846
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.526	5.472	(0.904)	962	0.02254	0.02254
*	4 Tetrapentyl Tin	333	6.116	6.102	(1.000)	128887	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	797	0.02333	0.02333(M)
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	25718	0.51177	0.5118
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	2335	0.04248	0.04248
*	8 p-Terphenyl-d14	244	8.691	8.690	(1.000)	20346	0.20000	

QC Flag Legend

M - Compound response manually integrated.

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040624.D
Lab Smp Id: BLC0727-DUP1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	128887	-21.49
8 p-Terphenyl-d14	22611	11306	45222	20346	-10.02

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.12	0.22
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040624.D

Lab ID: BLC0727-DUP1
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 22:07

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.904	0.897	0.0068	Tributyl Tin (Hexyl)
0.746	0.740	0.0059	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

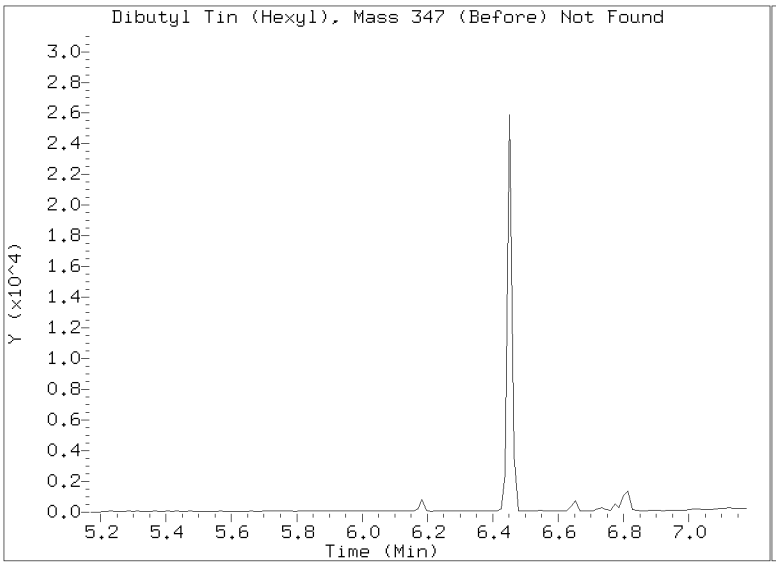
On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

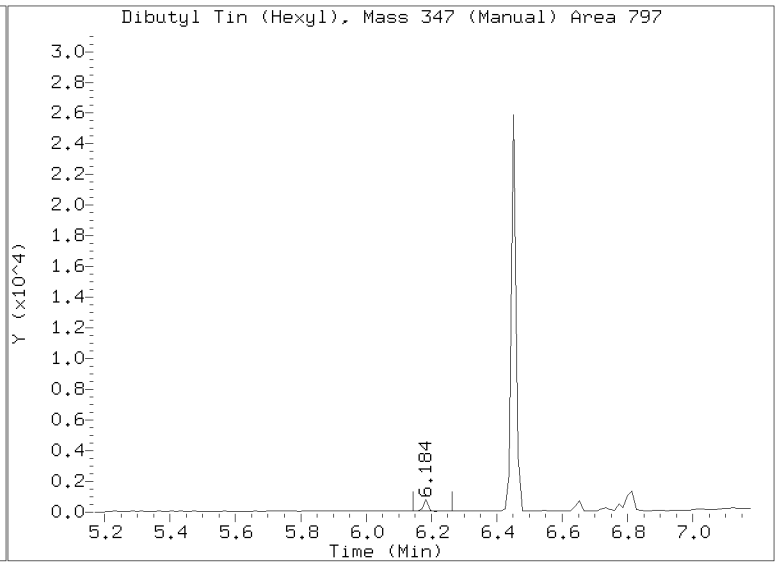
Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Quant Ion Manual Peak Adjustment Report

Datafile: //target/share/chem3/nt12.i/20230406A.b/2023040624.D
Injection Date: 06-APR-2023 22:07
Lab ID:BLC0727-DUP1 Client ID:
Report Date: 04/07/2023 10:50





MS / MS DUPLICATE RECOVERY
EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Matrix:	Solid	Analyzed:	04/06/23 22:23
Batch:	BLC0727	Laboratory ID:	BLC0727-MS1
Preparation:	EPA 3546 (Microwave)	Sequence Name:	Matrix Spike
Initial/Final:	5.95 g / 0.5 mL	Source Sample:	SED-07C:0-1

COMPOUND	SPIKE ADDED (ug/kg dry)	SAMPLE CONCENTRATION (ug/kg dry)	Q	MS CONCENTRATION (ug/kg dry)	Q	MS % REC. #	QC LIMITS REC.
Tributyltin Ion	44.5	3.61	J	48.5		101	30 - 160
Dibutyltin Ion	38.3	ND	U	32.1		83.8	30 - 160
Butyltin Ion	31.1	ND	U	14.9		48.0	30 - 160

* Values outside of QC limits

MS / MS DUPLICATE RECOVERY
EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Matrix:	Solid	Analyzed:	04/06/23 22:40
Batch:	BLC0727	Laboratory ID:	BLC0727-MSD1
Preparation:	EPA 3546 (Microwave)	Sequence Name:	Matrix Spike Dup
Initial/Final:	5.95 g / 0.5 mL	Source Sample:	SED-07C:0-1

COMPOUND	SPIKE ADDED (ug/kg dry)	MSD CONCENTRATION (ug/kg dry)	Q	MSD % REC. #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Tributyltin Ion	44.5	46.3		96.0	4.49	30	30 - 160
Dibutyltin Ion	38.3	30.0		78.2	6.87	30	30 - 160
Butyltin Ion	31.1	17.8		57.3	17.6	30	30 - 160

* Values outside of QC limits

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040625.D

Date : 06-APR-2023 22:23

Client ID:

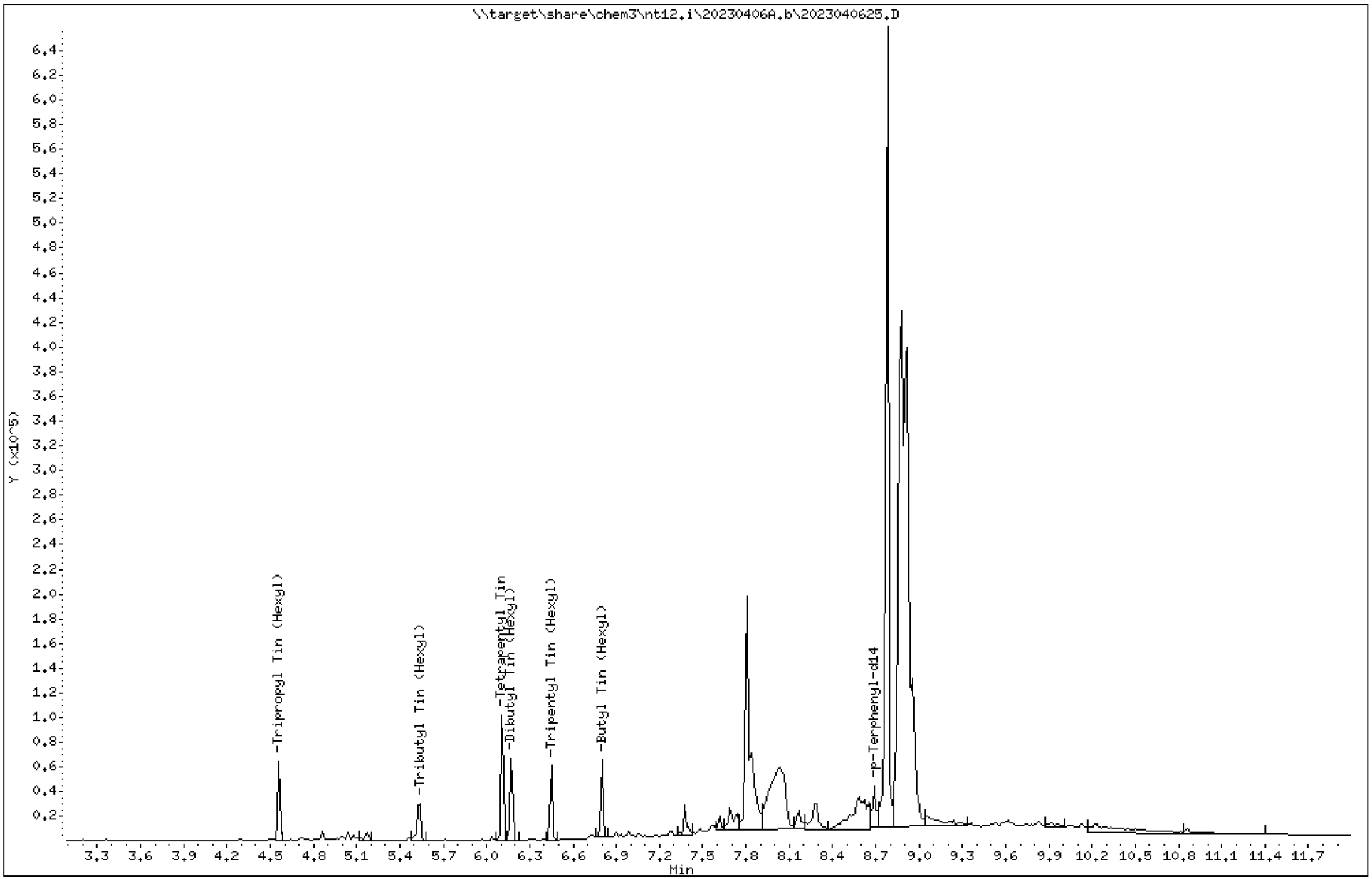
Instrument: nt12.i

Sample Info: BLC0727-MS1,

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0619 CLPLIKE (Rev0) - Page 156 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040625.D

Date : 06-APR-2023 22:23

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-MS1,

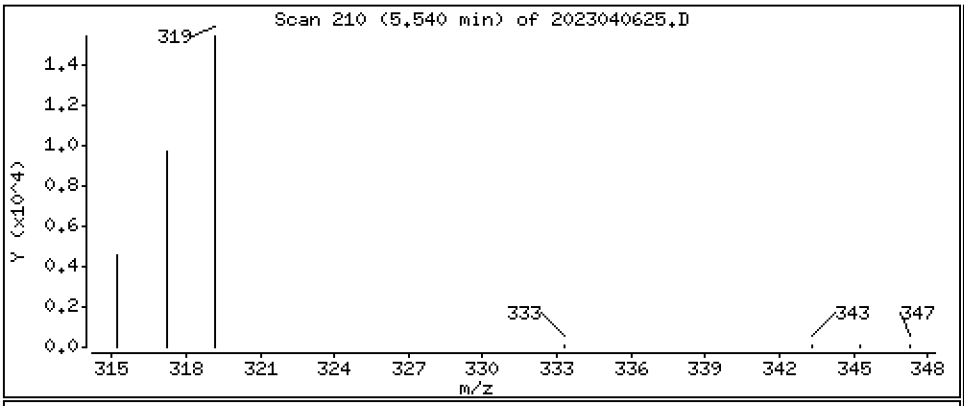
Operator: JZ

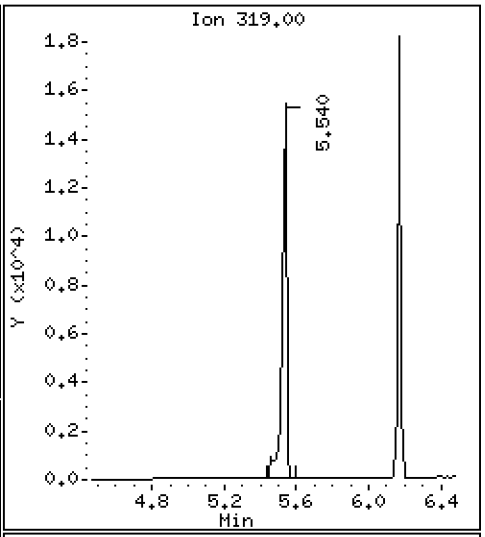
Column phase: ZB-5msi

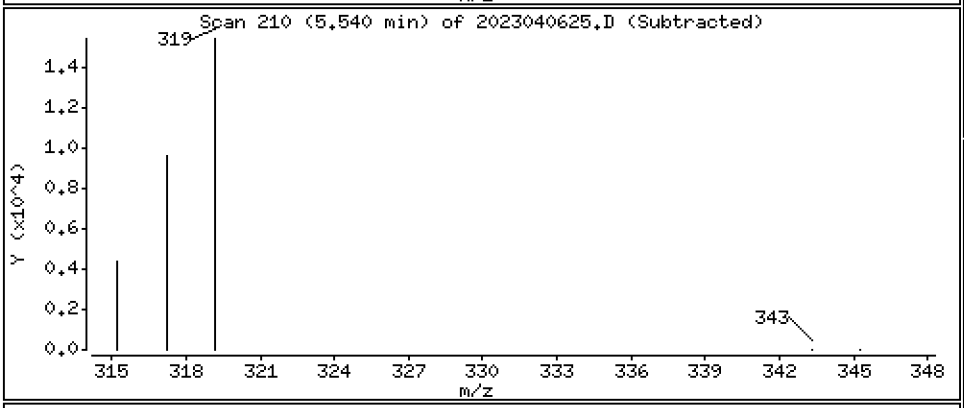
Column diameter: 0.25

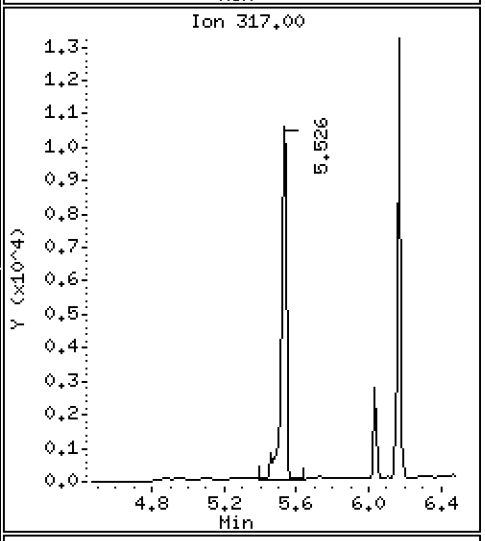
3 Tributyl Tin (Hexyl)

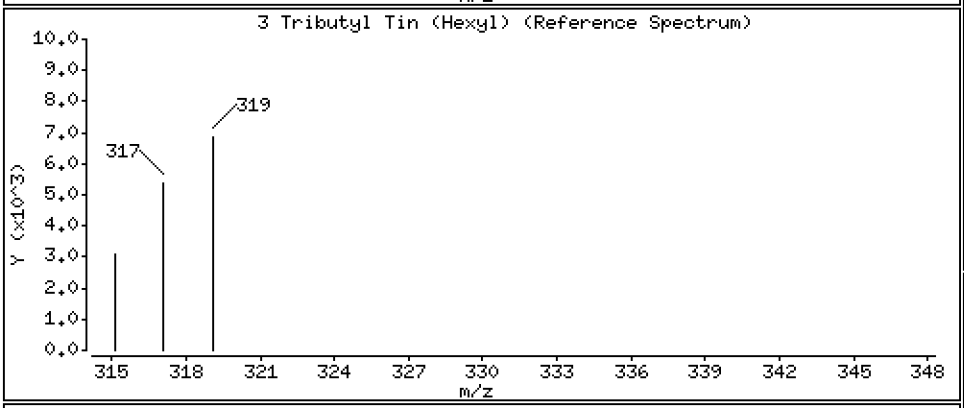
Concentration: 0.6275 ug/mL

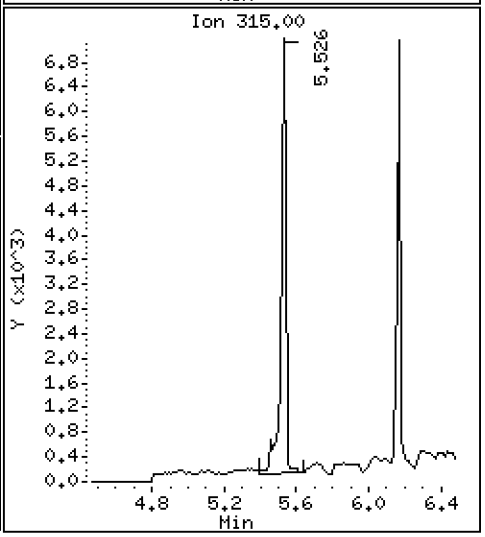


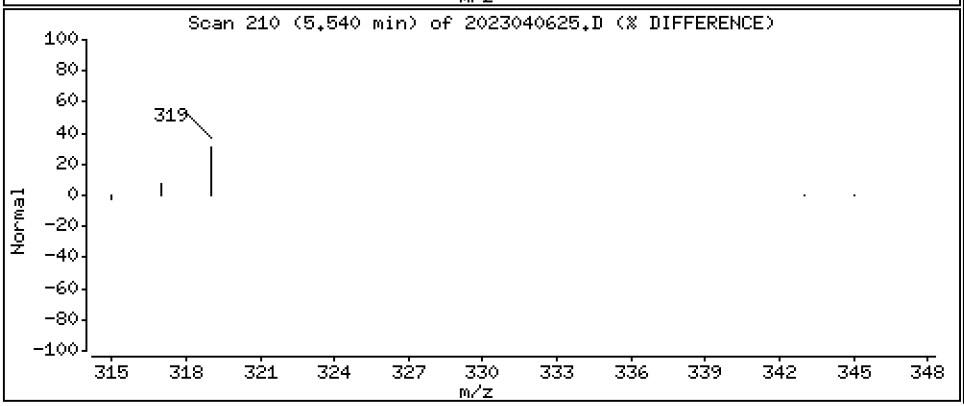












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040625.D

Date : 06-APR-2023 22:23

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-MS1,

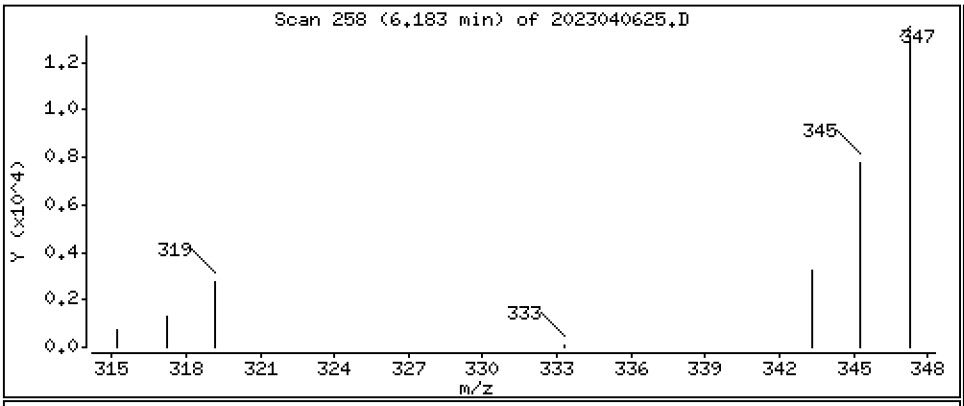
Operator: JZ

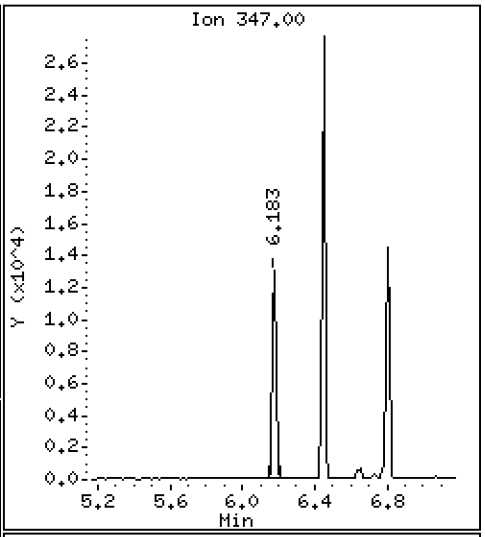
Column phase: ZB-5msi

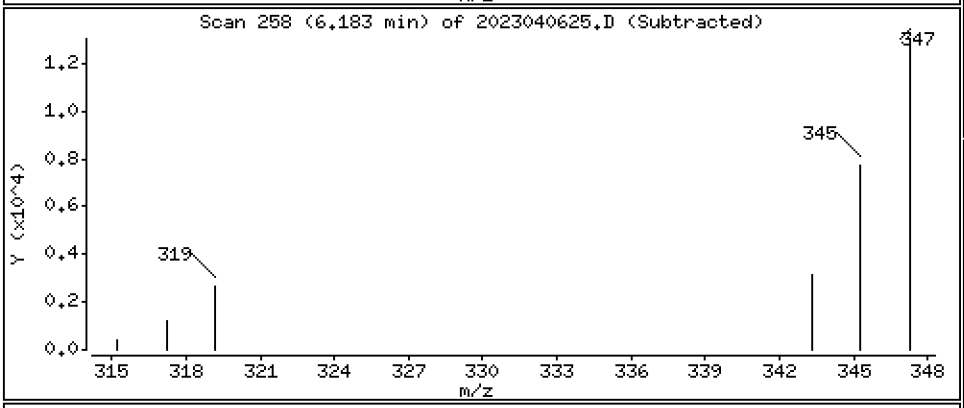
Column diameter: 0.25

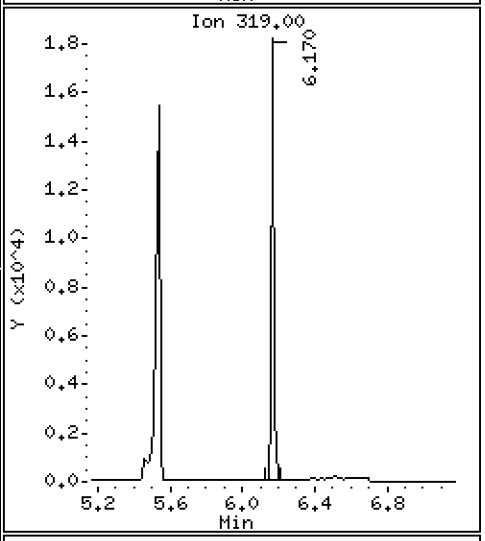
5 Dibutyl Tin (Hexyl)

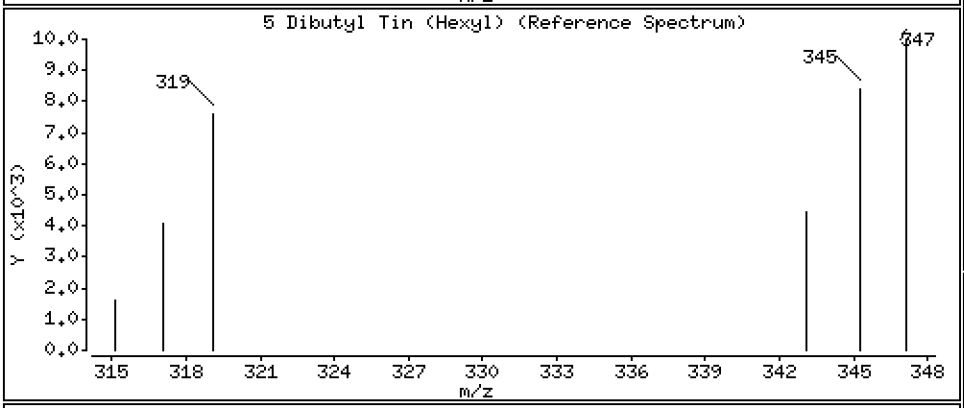
Concentration: 0.5559 ug/mL

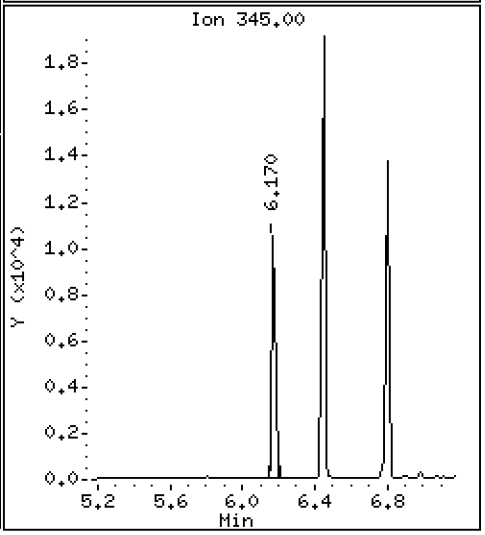


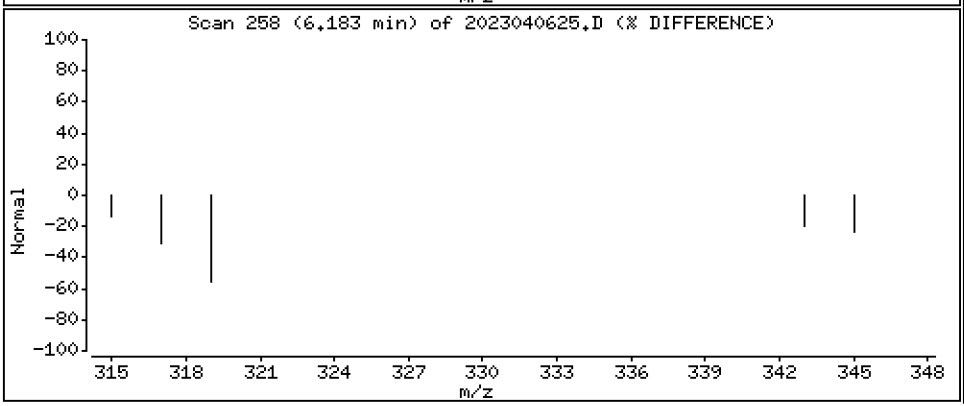












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040625.D

Date : 06-APR-2023 22:23

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-MS1,

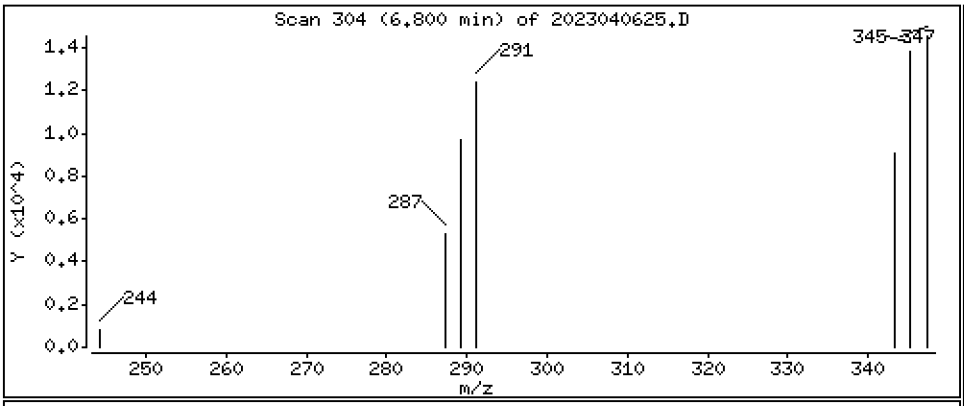
Operator: JZ

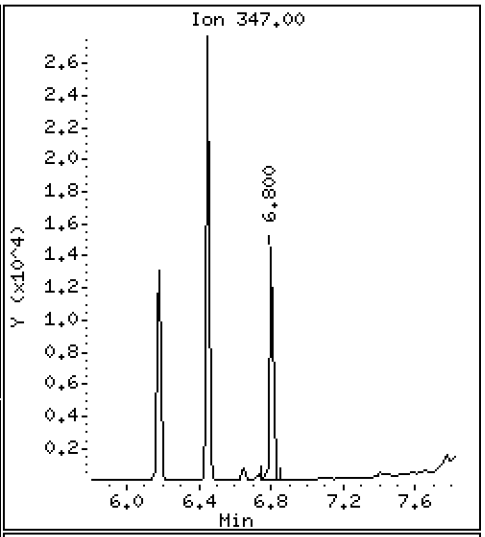
Column phase: ZB-5msi

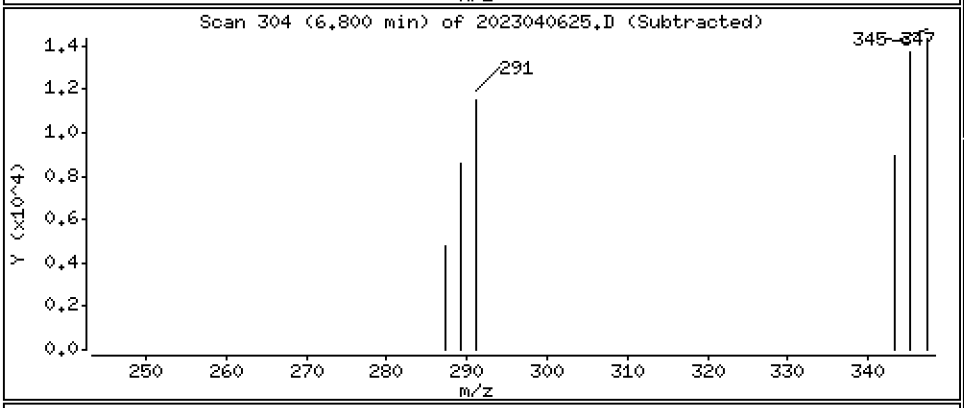
Column diameter: 0.25

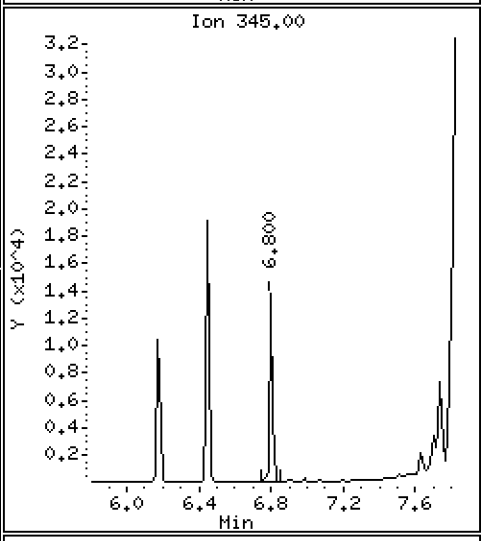
7 Butyl Tin (Hexyl)

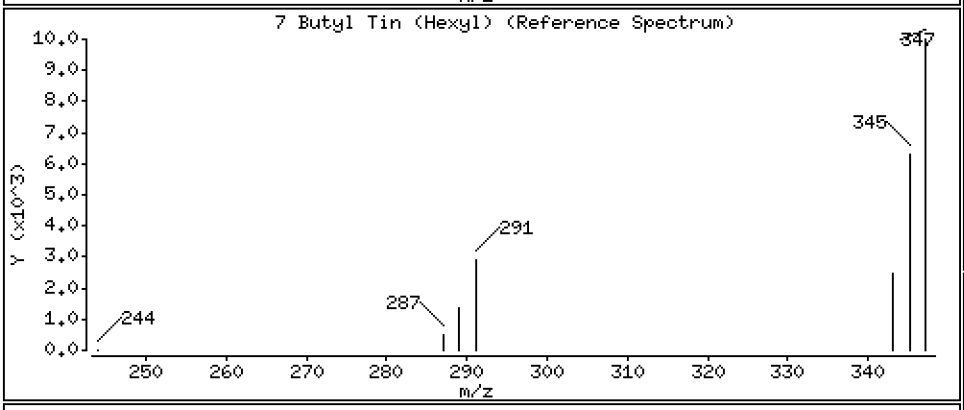
Concentration: 0.3663 ug/mL

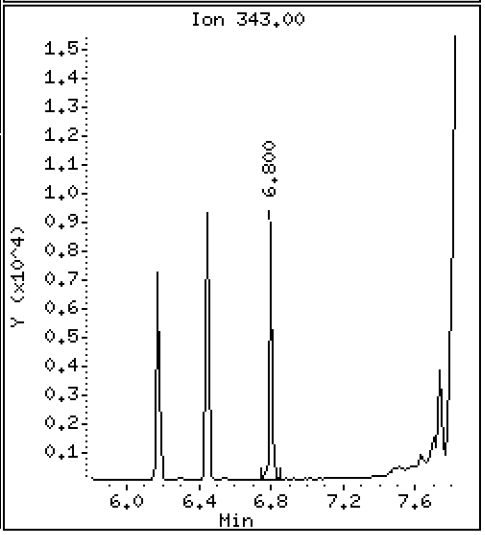


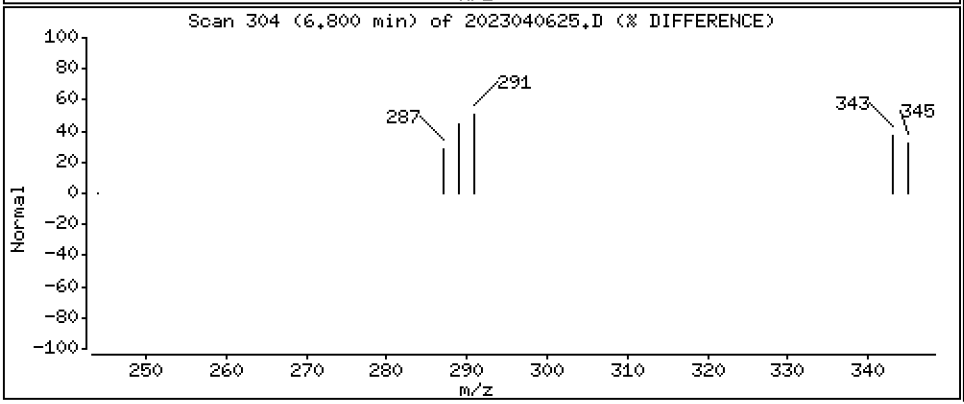












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040625.D
Lab Smp Id: BLC0727-MS1
Inj Date : 06-APR-2023 22:23
Operator : JZ   Inst ID: nt12.i
Smp Info : BLC0727-MS1,
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 25
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.560	4.514	(0.747)	27439	0.49182	0.4918
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.539	5.472	(0.908)	27416	0.62753	0.6275
*	4 Tetrapentyl Tin	333	6.102	6.102	(1.000)	131952	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	19436	0.55594	0.5559
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	27017	0.52528	0.5253
	7 Butyl Tin (Hexyl)	347	6.800	6.813	(0.782)	20608	0.36630	0.3663
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	20824	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040625.D
Lab Smp Id: BLC0727-MS1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

COMPOUND	STANDARD	AREA LIMIT LOWER	AREA LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	131952	-19.63
8 p-Terphenyl-d14	22611	11306	45222	20824	-7.90

COMPOUND	STANDARD	RT LIMIT LOWER	RT LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040625.D

Lab ID: BLC0727-MS1
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 22:23

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.908	0.897	0.0110	Tributyl Tin (Hexyl)
0.747	0.740	0.0075	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

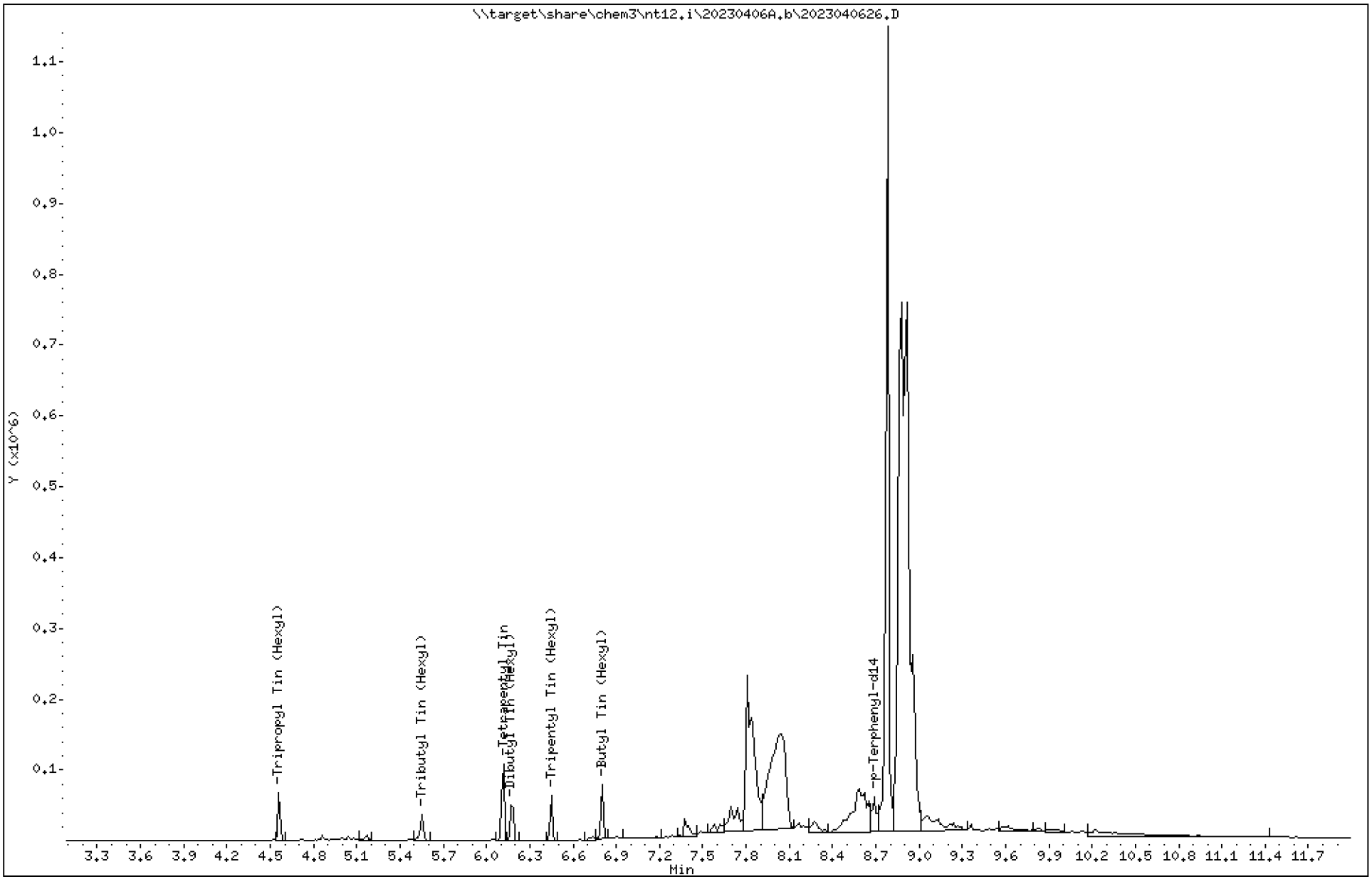
* Only compounds listed in the work order have been verified by the analyst *

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040626.D
Date : 06-APR-2023 22:40
Client ID:
Sample Info: BLC0727-MSD1,

Column phase: ZB-5msi

Instrument: nt12.i

Operator: JZ
Column diameter: 0.25



23C0619 CLPLIKE (Rev0) - Page 163 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040626.D

Date : 06-APR-2023 22:40

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-MSD1,

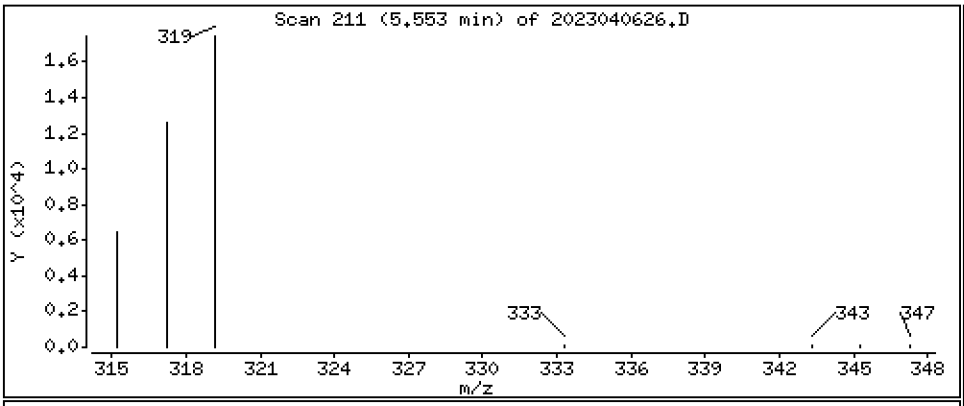
Operator: JZ

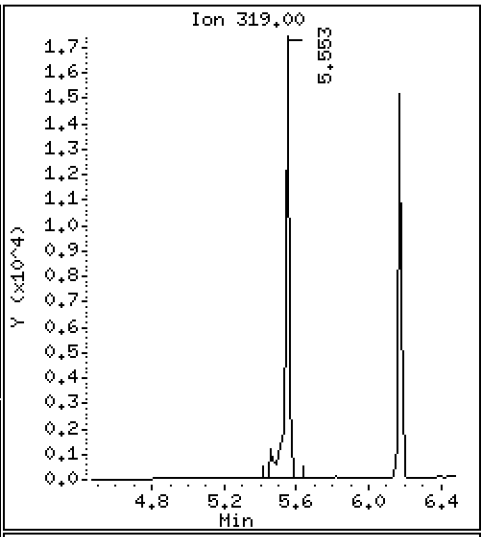
Column phase: ZB-5msi

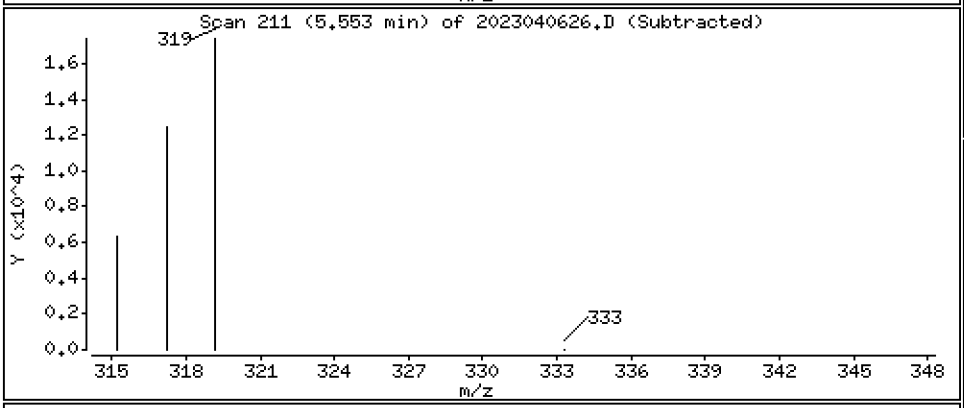
Column diameter: 0.25

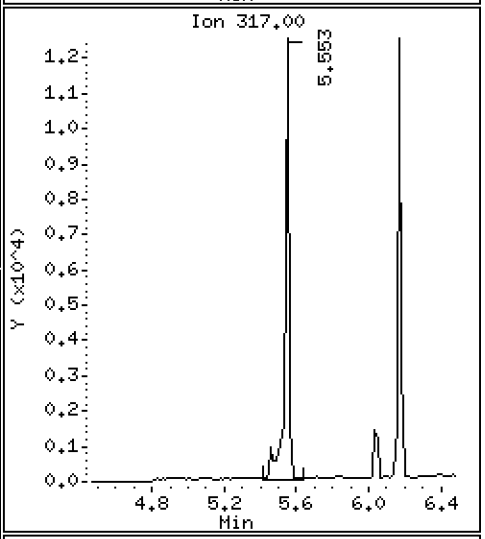
3 Tributyl Tin (Hexyl)

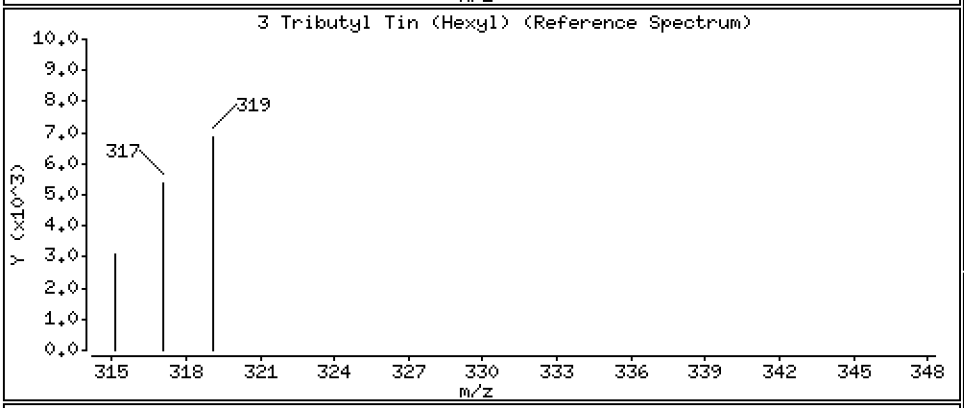
Concentration: 0.6000 ug/mL

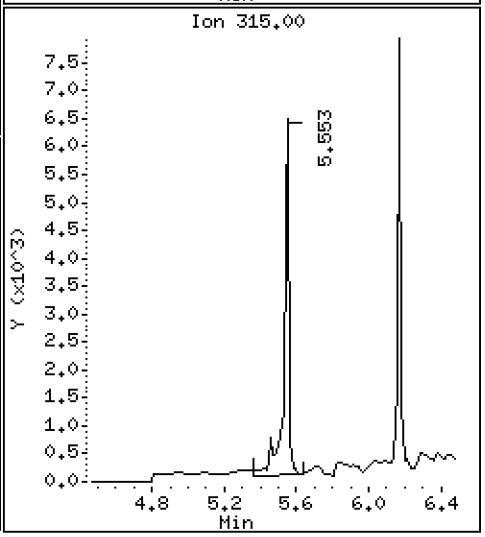


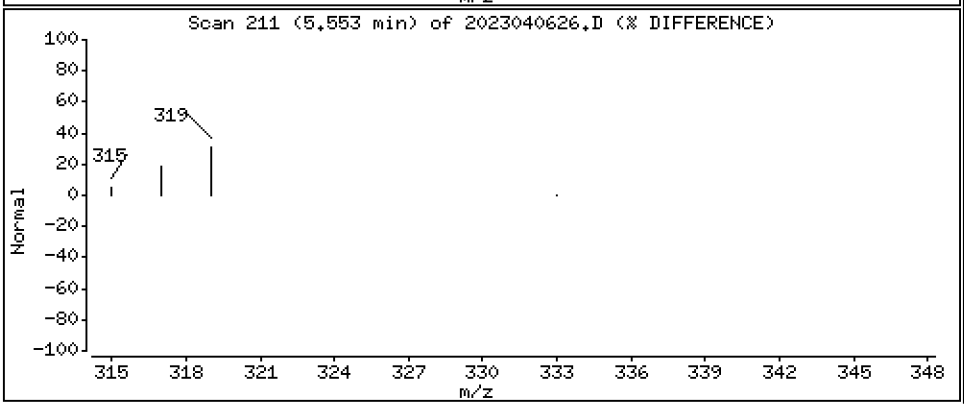












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040626.D

Date : 06-APR-2023 22:40

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-MSD1,

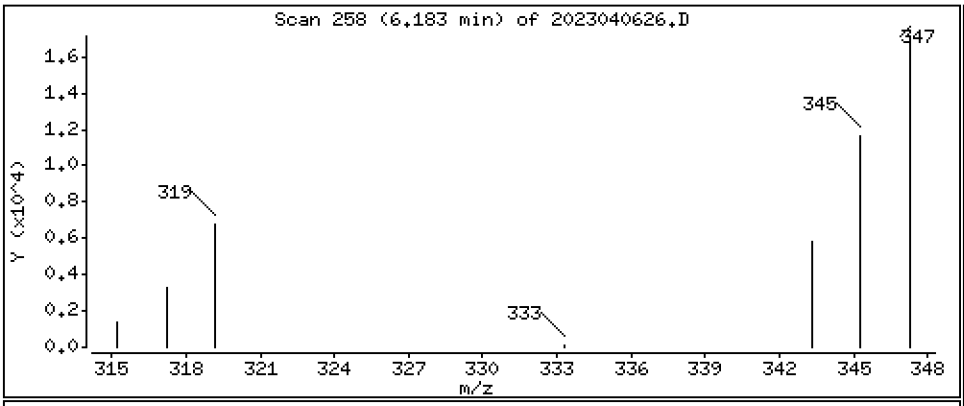
Operator: JZ

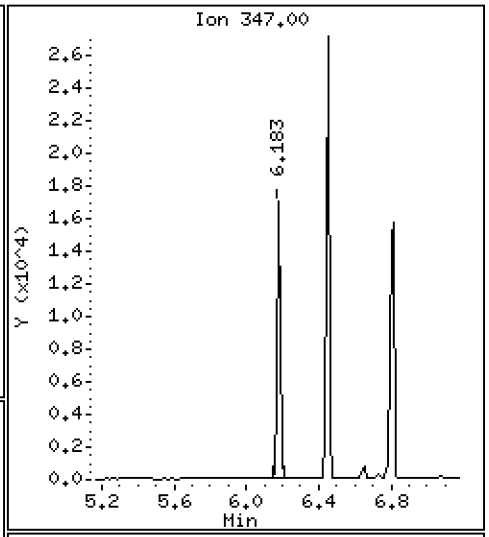
Column phase: ZB-5msi

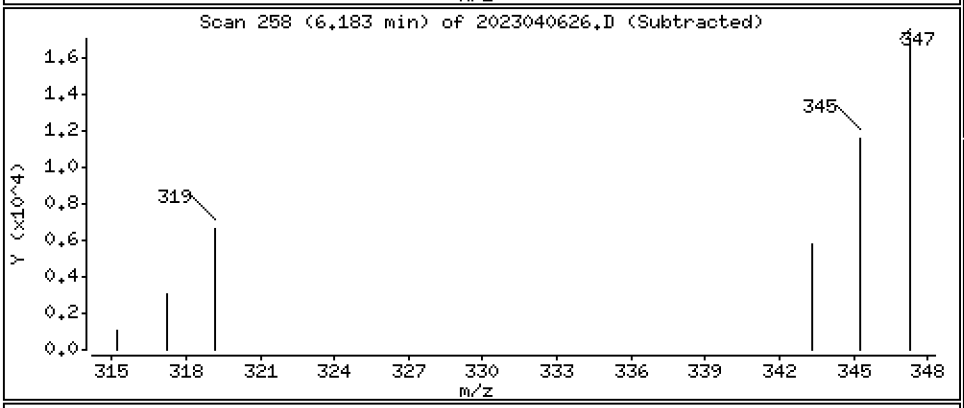
Column diameter: 0.25

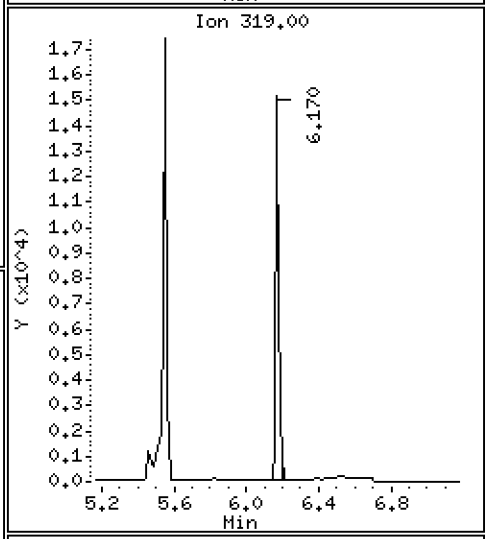
5 Dibutyl Tin (Hexyl)

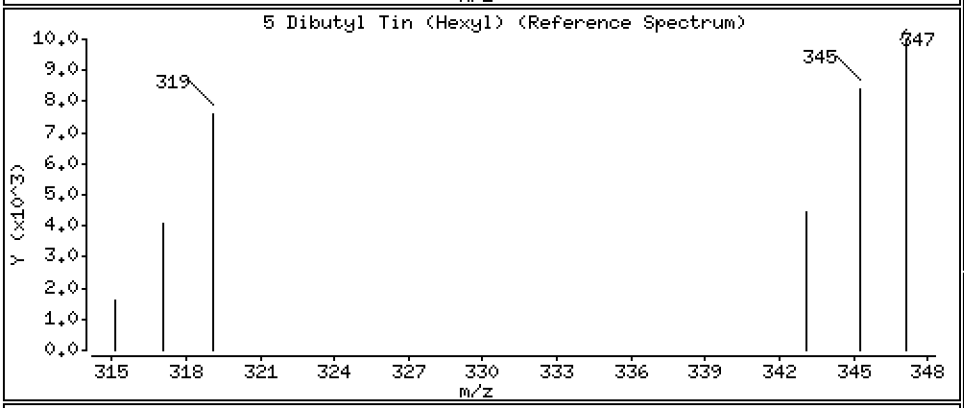
Concentration: 0.5190 ug/mL

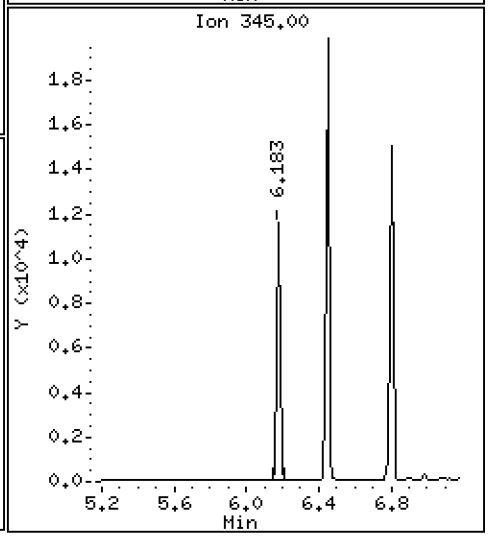


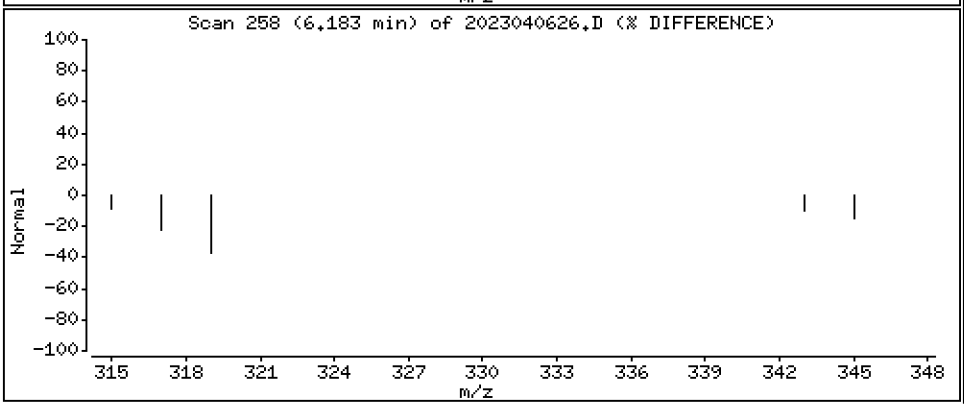












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040626.D

Date : 06-APR-2023 22:40

Client ID:

Instrument: nt12.i

Sample Info: BLC0727-MSD1,

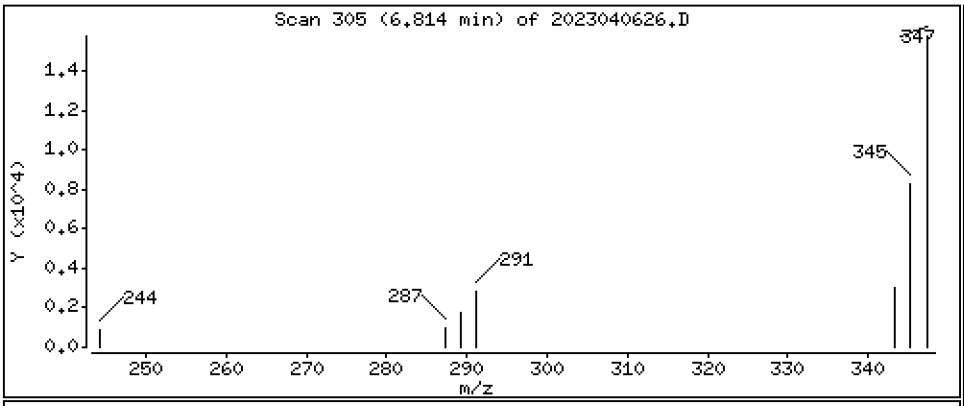
Operator: JZ

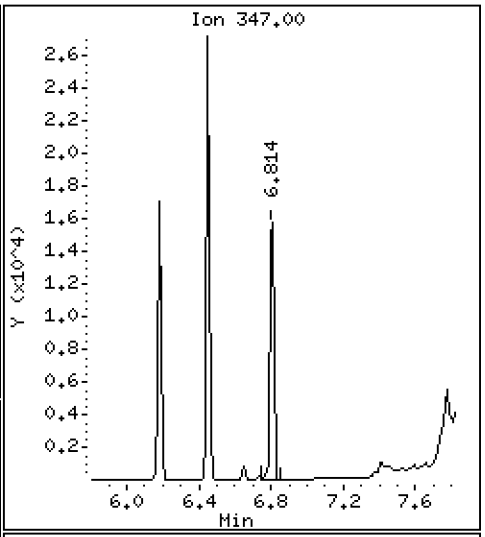
Column phase: ZB-5msi

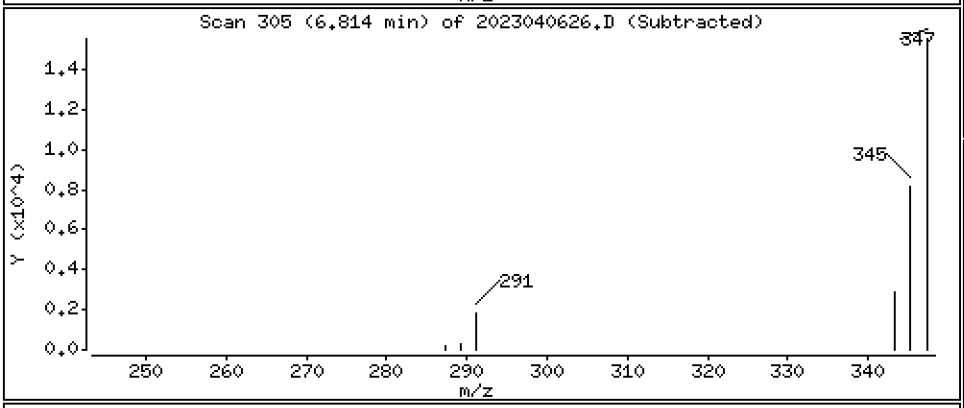
Column diameter: 0.25

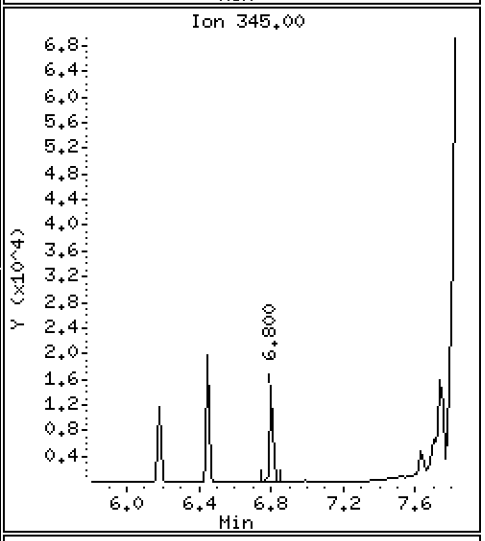
7 Butyl Tin (Hexyl)

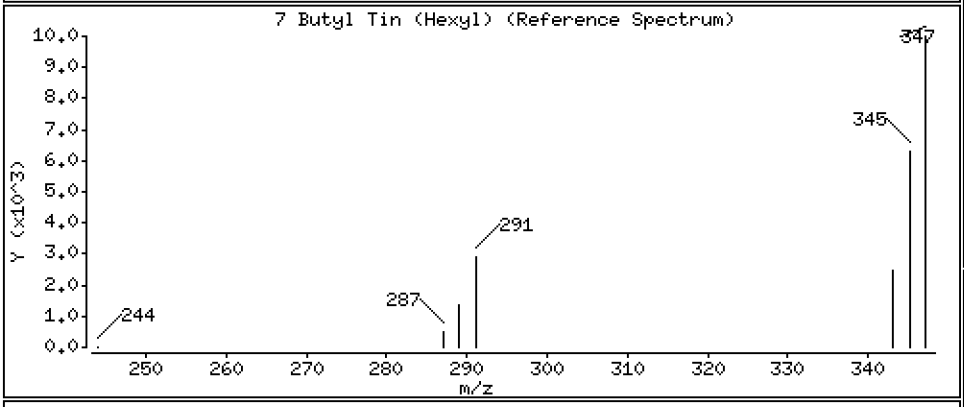
Concentration: 0.4372 ug/mL

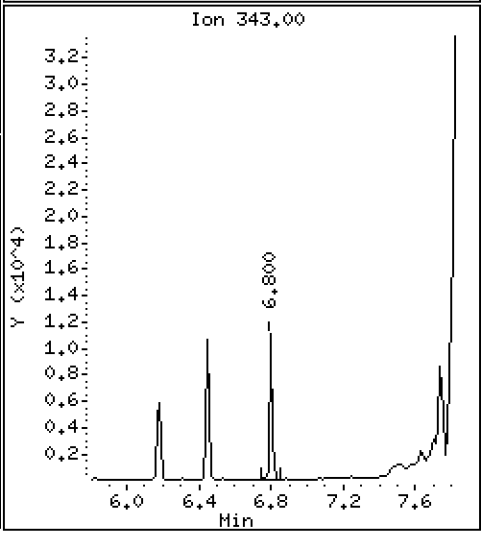


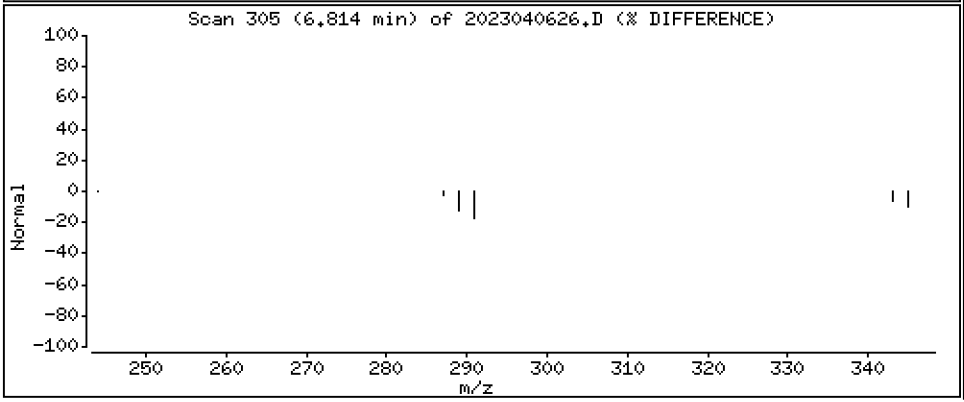












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040626.D
Lab Smp Id: BLC0727-MSD1
Inj Date : 06-APR-2023 22:40
Operator : JZ   Inst ID: nt12.i
Smp Info : BLC0727-MSD1,
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 10:21 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 26
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.560	4.514	(0.746)	28327	0.49038	0.4904
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	5.553	5.472	(0.908)	27140	0.59997	0.6000
*	4 Tetrapentyl Tin	333	6.116	6.102	(1.000)	136624	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	18967	0.51899	0.5190
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	26377	0.49059	0.4906
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	25711	0.43719	0.4372
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	21768	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040626.D
Lab Smp Id: BLC0727-MSD1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	136624	-16.78
8 p-Terphenyl-d14	22611	11306	45222	21768	-3.73

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.12	0.22
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040626.D

Lab ID: BLC0727-MSD1
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 22:40

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
0.908	0.897	0.0112	Tributyl Tin (Hexyl)
0.746	0.740	0.0059	Tripropyl Tin (Hexyl)

RRT check based on Ccal File: 2023040606A.D

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Analytical Resources, LLC
Analytical Chemists and Consultants

MASS SPECTROMETER
INSTRUMENT PERFORMANCE CHECK
EPA 8270E-SIM

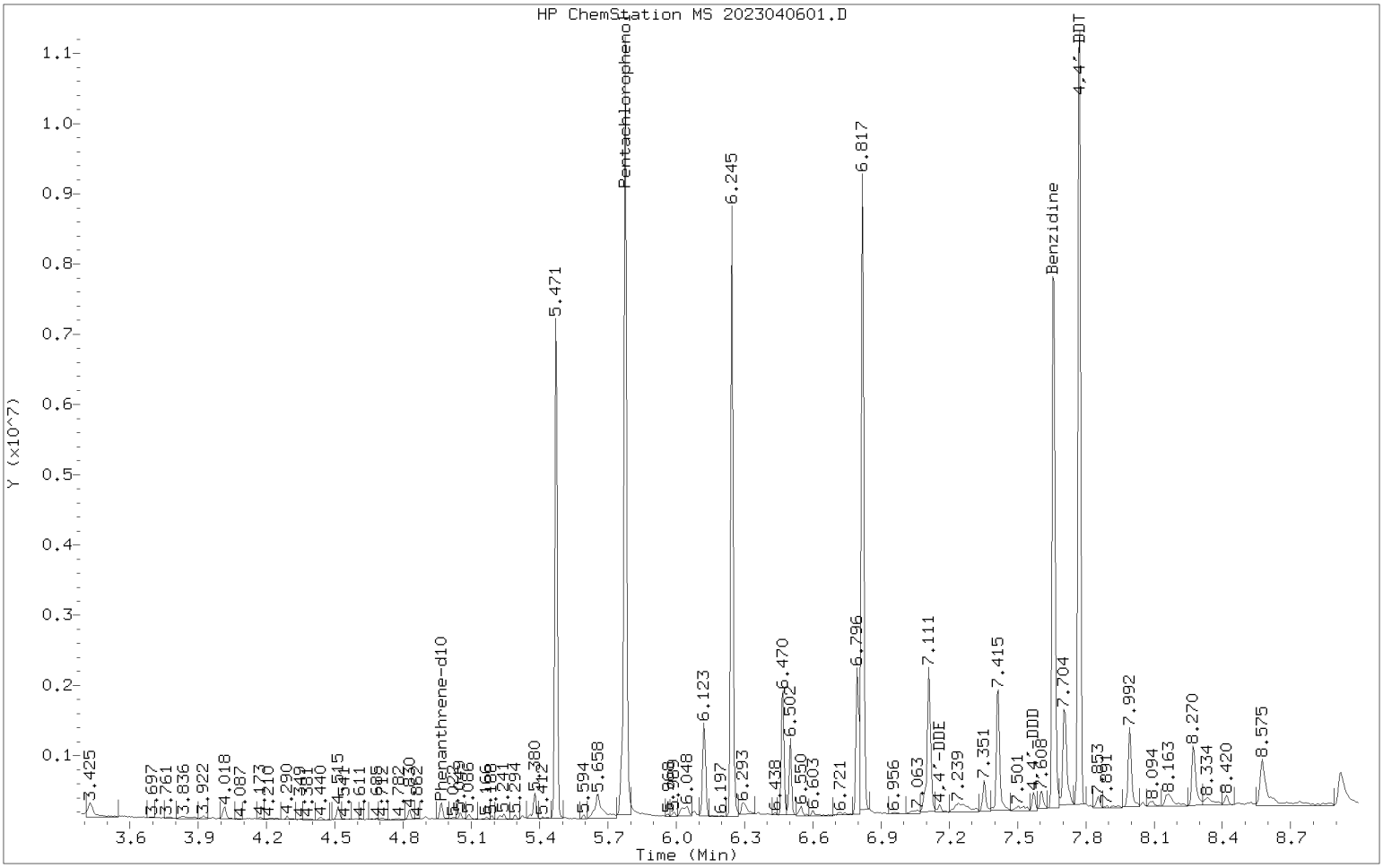
Laboratory:	Analytical Resources, LLC	SDG:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Lab File ID:	2023040601.D	Injection Date:	04/06/23
Instrument ID:	NT12	Injection Time:	15:06
Sequence:	SLD0101	Lab Sample ID:	SLD0101-TUN1

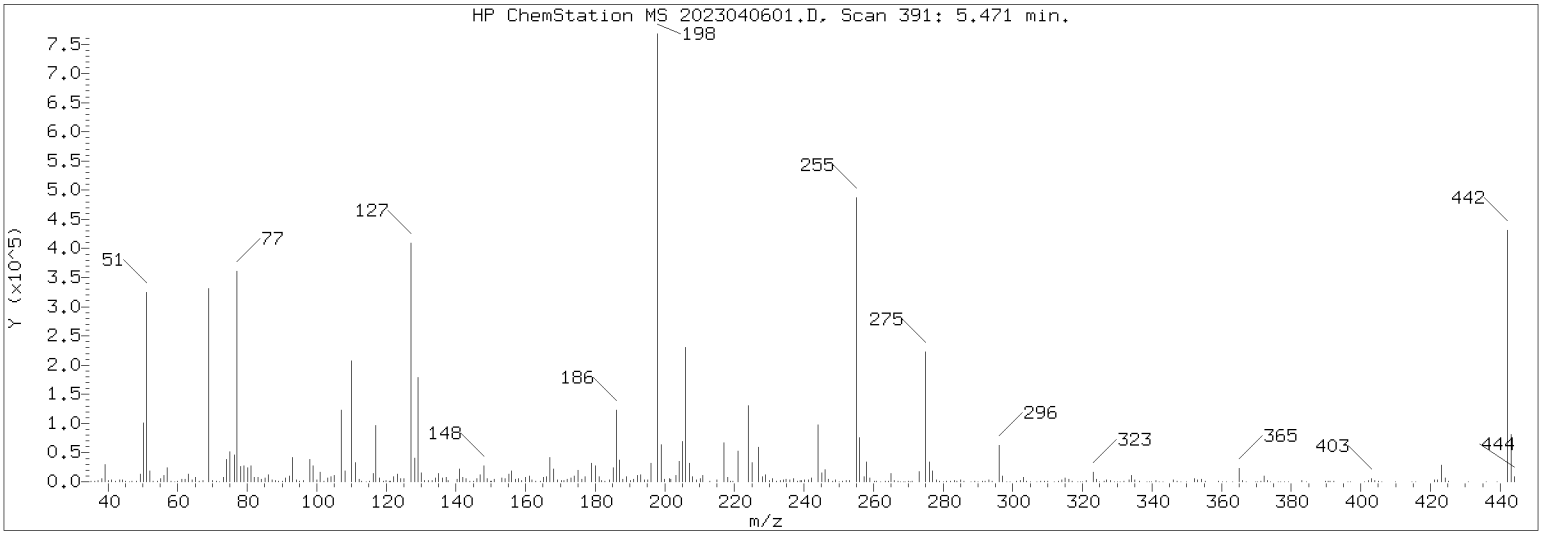
m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
68	Less than 2% of 69	0	PASS
69	Less than 100% of 198	40.7	PASS
70	Less than 2% of 69	0.353	PASS
197	Less than 2% of 198	0	PASS
198	Base peak, 100% relative abundance	100	PASS
199	5 - 9% of 198	7.86	PASS
365	1 - 100% of 198	3.38	PASS
441	Less than 150% of 443	53.8	PASS
442	1 - 200% of 198	68.5	PASS
443	15 - 24% of 442	20.4	PASS
4,4'-DDD	Less than 20% of 4,4'-DDT		
4,4'-DDE	Less than 20% of 4,4'-DDT		
4,4'-DDT	Base peak, 100% relative abundance		

Client Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
MS Tune	SLD0101-TUN1	2023040601.D	04/06/2023	15:06
Initial Cal Blank	SLD0101-ICB1	2023040602.D	04/06/2023	15:22
Cal Standard	SLD0101-CAL1	2023040603.D	04/06/2023	15:39
Cal Standard	SLD0101-CAL2	2023040604.D	04/06/2023	15:55
Cal Standard	SLD0101-CAL3	2023040605.D	04/06/2023	16:12
Cal Standard	SLD0101-CAL4	2023040606.D	04/06/2023	16:28
Cal Standard	SLD0101-CAL5	2023040607.D	04/06/2023	16:45
Cal Standard	SLD0101-CAL6	2023040608.D	04/06/2023	17:01
Secondary Cal Check	SLD0101-SCV1	2023040609.D	04/06/2023	17:18
Secondary Cal Check	SLD0101-SCV2	2023041204.D	04/12/2023	14:30

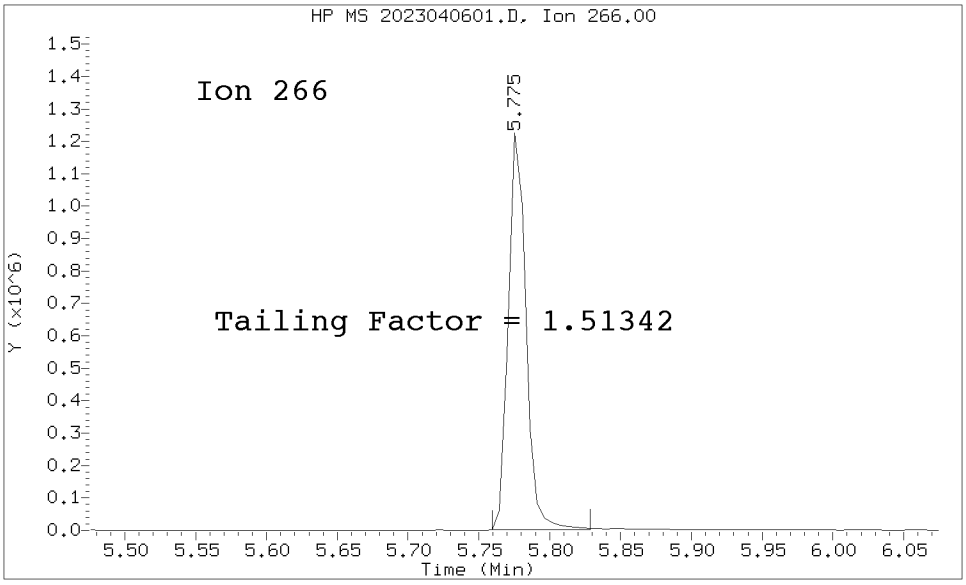
DFTPP TAILING FACTOR AND BREAKDOWN GRAPHIC REPORT

Datafile Analyzed: /20230406.b/tune.b/2023040601.D/2023040601.D
Method Used: \20230406.b\tune.b\DFTPP.m Inst: nt12
Injection Date: 06-APR-2023 15:06 Operator: JZ
Sample Info: SLD0101-TUN1 DFTPP20230406
Report Date: 04/06/2023 20:59



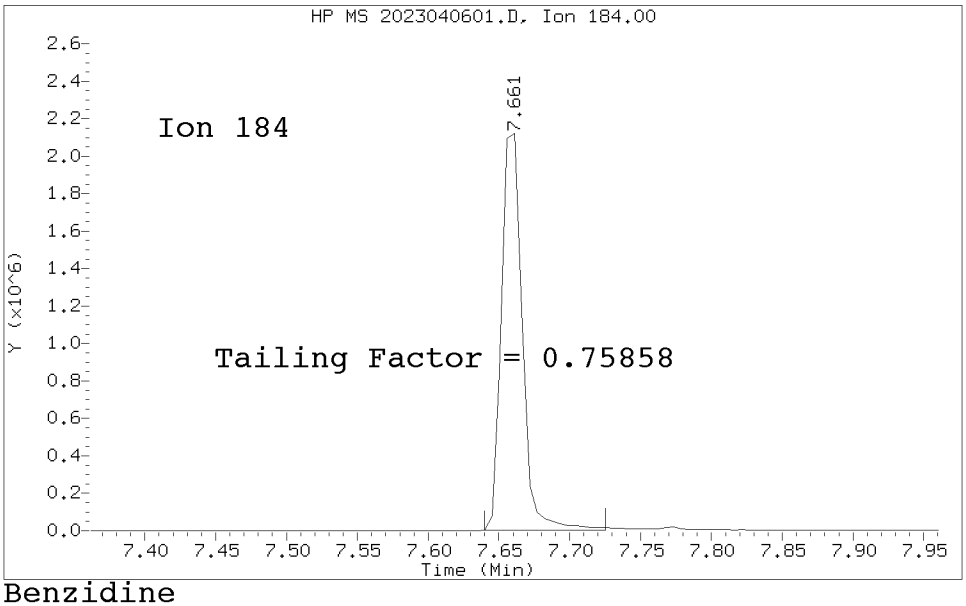


Datafile Analyzed: /20230406.b/tune.b/2023040601.D/2023040601.D
Method Used: \20230406.b\tune.b\DFTPP.m\sw846ddt.m Inst: nt12
Injection Date: 06-APR-2023 15:06 Operator: JZ
Sample Info: DFTPP20230406
Report Date: 04/06/2023 20:59



Pentachlorophenol
==========
Exp. RT = 5.775
Found RT = 5.775

Tail Factor = 1.513 Maximum Allowed = 2.0



Benzidine
==========
Exp. RT = 7.661
Found RT = 7.661

Tail Factor = 0.759 Maximum Allowed = 2.0

8270 TAILING FACTOR/BREAKDOWN SUMMARY RESULTS

TAILING ANALYSIS SUMMARY

Compound	Tail Factor	Max Allowed	Test
Pentachlorophenol	1.5134228	2.000	PASS
Benzidine	0.7585825	2.000	PASS

DDT DEGRADATION BREAKDOWN ANALYSIS SUMMARY

Compound	Response	%Breakdown	Max Allowed	Test
4,4-DDT	1580787			N/A
4,4-DDE	7601	0.5	20.0	PASS
4,4-DDD	39368	2.4	20.0	PASS
4,4-DDD + DDE	46969	2.9	20.0	PASS

Tuning Sample, nt12.i/20230406.b/tune.b/2023040601.D, *** PASSED ***

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
198	Base Peak, 100% relative abundance	100.00
51	10.00 - 80.00% of mass 198	40.61
68	Less than 2.00% of mass 69	0.00 (0.00)
69	Mass 69 relative abundance	40.72
70	Less than 2.00% of mass 69	0.14 (0.35)
127	10.00 - 80.00% of mass 198	51.24
197	Less than 2.00% of mass 198	0.00
199	5.00 - 9.00% of mass 198	7.86
275	10.00 - 60.00% of mass 198	29.70
365	Greater than 1.00% of mass 198	3.38
441	0.01 - 24.00% of mass 442	7.52 (10.98)
442	50.00 - 200.00% of mass 198	68.55
443	15.00 - 24.00% of mass 442	13.97 (20.38)

Data File: 2023040601.D
Spectrum: Avg. Scans 390-392 (5.47), Background Scan 386
Location of Maximum: 198.00
Number of points: 352

m/z	Y	m/z	Y	m/z	Y	m/z	Y
35.00	934	137.00	5291	231.00	3787	328.00	1233
36.00	134	138.00	1407	232.00	1009	329.00	305
37.00	912	139.00	230	233.00	1052	330.00	73
38.00	3820	140.00	2972	234.00	3500	331.00	417
39.00	18080	141.00	15198	235.00	2491	332.00	1240
40.00	243	142.00	4853	236.00	2237	333.00	1048
41.00	482	143.00	3599	237.00	3879	334.00	8817
43.00	276	144.00	991	238.00	953	335.00	2756
45.00	422	145.00	731	239.00	2416	336.00	575
46.00	129	146.00	3724	240.00	1823	338.00	68
49.00	5077	147.00	8084	241.00	2669	339.00	240
50.00	68608	148.00	18304	242.00	4906	340.00	315
51.00	226496	149.00	3492	244.00	71984	341.00	1673
52.00	11730	150.00	963	245.00	10836	342.00	402
53.00	306	151.00	2399	246.00	14890	343.00	192
54.00	268	152.00	733	247.00	3342	344.00	64
55.00	1771	153.00	4659	248.00	851	345.00	99
56.00	6665	154.00	4248	249.00	3014	346.00	2764
57.00	15399	155.00	9624	250.00	543	347.00	793
58.00	606	156.00	13334	251.00	721	348.00	176
60.00	2	157.00	3402	252.00	787	349.00	53
61.00	2775	158.00	3321	253.00	1712	350.00	184
62.00	3701	159.00	2214	255.00	358976	351.00	141
63.00	9745	160.00	5142	256.00	56856	352.00	4460
64.00	1833	161.00	7084	257.00	5369	353.00	2627
65.00	5031	162.00	2303	258.00	24264	354.00	4074
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70.00	801	165.00	5167	261.00	873	359.00	377
71.00	155	166.00	6270	262.00	304	360.00	231
73.00	3742	167.00	31248	263.00	515	361.00	135
74.00	25720	168.00	16351	264.00	360	365.00	18856
75.00	37472	169.00	2256	265.00	9172	366.00	1793
76.00	32416	170.00	1278	266.00	1326	367.00	283
77.00	257600	171.00	1486	267.00	447	370.00	633
78.00	17848	172.00	2907	268.00	239	371.00	378
79.00	17640	173.00	4123	269.00	268	372.00	6826
80.00	15634	174.00	7639	270.00	725	373.00	1925
81.00	19184	175.00	13108	271.00	765	374.00	227
82.00	4772	176.00	2656	272.00	172	376.00	272
83.00	4114	177.00	6112	273.00	13642	378.00	139
85.00	4016	178.00	588	274.00	4783	379.00	79
86.00	5700	179.00	22784	275.00	165632	383.00	1863
87.00	2097	180.00	17880	276.00	24704	384.00	453
88.00	802	181.00	6203	277.00	13899	385.00	55
89.00	936	182.00	1290	278.00	2430	390.00	1364
90.00	32	183.00	748	279.00	475	391.00	724
91.00	4338	184.00	2769	280.00	361	392.00	726
92.00	6926	185.00	13954	282.00	773	395.00	198

93.00	30480	186.00	87216	283.00	1708	396.00	138
94.00	1883	187.00	25688	284.00	1211	397.00	154
95.00	481	188.00	3310	285.00	2147	398.00	91
96.00	1267	189.00	6300	286.00	735	401.00	437
98.00	25544	190.00	1201	287.00	135	402.00	2523
99.00	18560	191.00	2647	288.00	312	403.00	4002
100.00	2272	192.00	7958	289.00	772	404.00	2035
101.00	10814	193.00	8567	290.00	384	405.00	293
102.00	706	194.00	1789	291.00	587	406.00	91
103.00	4258	195.00	1339	292.00	815	409.00	80
104.00	7261	196.00	21568	293.00	2528	410.00	194
105.00	6724	198.00	557760	294.00	1114	415.00	391
107.00	82648	199.00	43824	296.00	46800	416.00	121
108.00	12203	200.00	3097	297.00	6673	419.00	92
110.00	144384	201.00	4066	298.00	401	421.00	3064
111.00	23776	202.00	2002	299.00	458	422.00	3429
112.00	2847	203.00	7186	301.00	590	423.00	24600
113.00	880	204.00	25608	302.00	1001	424.00	6771
114.00	304	205.00	48280	303.00	5044	425.00	897
115.00	118	206.00	167488	304.00	1432	426.00	73
116.00	4357	207.00	20968	305.00	18	429.00	100
117.00	69192	208.00	5879	306.00	100	431.00	119
118.00	5193	209.00	2348	307.00	299	435.00	182
119.00	636	210.00	2340	308.00	669	436.00	54
120.00	1350	211.00	7053	309.00	537	438.00	56
121.00	921	212.00	265	310.00	628	439.00	508
122.00	6271	213.00	680	312.00	283	441.00	41968
123.00	8610	214.00	333	313.00	834	442.00	382336
124.00	3594	215.00	2024	314.00	2613	443.00	77936
125.00	3555	216.00	4064	315.00	4957	444.00	7505
127.00	285824	217.00	47112	316.00	3029	445.00	198
128.00	27544	218.00	5518	317.00	520	451.00	58
129.00	120544	219.00	1133	319.00	362	457.00	56
130.00	10482	221.00	40328	320.00	39	467.00	52
131.00	1933	224.00	96152	321.00	1397	470.00	58
132.00	1163	225.00	24168	323.00	13693	480.00	50
133.00	756	227.00	42032	324.00	2570		
134.00	3587	228.00	6204	325.00	207		
135.00	9210	229.00	7812	326.00	369		
136.00	3691	230.00	1846	327.00	2665		

INITIAL CALIBRATION DATA

EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Calibration:	GD00019	Instrument:	NT12
Calibration Date:	04/06/2023	Column (1):	ZB-5MS

Compound	Level 01		Level 02		Level 03		Level 04		Level 05		Level 06	
	Conc	RRF	Conc	RRF	Conc	RRF	Conc	RRF	Conc	RRF	Conc	RRF
Tributyltin Ion	0.03865	0.7266064	0.1546	0.6086814	0.3865	0.6727639	0.773	0.6396744	1.546	0.6716686	3.092	0.653737
Dibutyltin Ion	0.0578	0.3486452	0.2312	0.3097427	0.578	0.3411116	1.156	0.3304631	2.312	0.3336031	4.624	0.3510799
Butyltin Ion	0.0408	0.50637	0.1632	0.4553246	0.408	0.5551986	0.816	0.5258812	1.632	0.6076835	3.264	0.5915564
Tetrabutyltin	0.05	0.9279184	0.2	0.7772272	0.5	0.8343506	1	0.7892381	2	0.8289532	4	0.7934565
Tripentyltin	0.07959	0.4903103	0.31836	0.4493965	0.7959	0.5177509	1.5918	0.4954624	3.1836	0.5226827	6.3672	0.4883226
Tripropyltin	0.037215	0.9945981	0.14886	0.8153157	0.37215	0.8785713	0.7443	0.7985333	1.4886	0.8140349	2.9772	0.7726542

INITIAL CALIBRATION DATA

EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Calibration:	GD00019	Instrument:	NT12
Calibration Date:	04/06/2023	Column (1):	ZB-5MS

COMPOUND	Mean RRF	RRF RSD	Linear COD	Quad COD	Limit Type & Limit	Q
Tributyltin Ion	0.6621886	6.0			RSD (15)	
Dibutyltin Ion	0.3357743	4.5			RSD (15)	
Butyltin Ion	0.5403357	10.5			RSD (15)	
Tetrabutyltin	0.8251907	6.7			RSD (15)	
Tripentyltin	0.4939876	5.3			RSD (15)	
Tripropyltin	0.8456179	9.6			RSD (15)	

Analytical Resources, LLC
Analytical Chemists and Consultants

ANALYSIS SEQUENCE

SLD0101

Instrument: NT12
Calibration ID: GD00019

Printed: 4/6/2023 9:24:49PM

Lab Number	Analysis	Container	Order	Position	STD ID	ISTD ID	Client	Comments
SLD0101-TUN1	QC		1		K004775			
SLD0101-ICB1	QC		2			L003438		
SLD0101-CAL1	QC		3		L002070	L003438		
SLD0101-CAL2	QC		4		L002071	L003438		
SLD0101-CAL3	QC		5		L002072	L003438		
SLD0101-CAL4	QC		6		L002073	L003438		
SLD0101-CAL5	QC		7		L002074	L003438		
SLD0101-CAL6	QC		8		L002075	L003438		
SLD0101-SCV1	QC		9		L002076	L003438		

Samples Loaded By Date

Data Processed By Date

INTERNAL STANDARD SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406.b

	Time	Filename	LabID	ClientId	DF					
1	1506	2023040601.D	SLD0101-TUN1		1	NO ISTDS FOUND				
2	1522	2023040602.D	SLD0101-ICB1		1	6.12	161159	8.70	23719	
3	1539	2023040603.D	SLD0101-CAL1		1	6.10	157169	8.69	22292	
4	1555	2023040604.D	SLD0101-CAL2		1	6.10	164881	8.69	23279	
5	1612	2023040605.D	SLD0101-CAL3		1	6.10	167613	8.69	23227	
6	1628	2023040606.D	SLD0101-CAL4		1	6.10	164171	8.69	22611	
7	1645	2023040607.D	SLD0101-CAL5		1	6.10	182529	8.69	24468	
8	1701	2023040608.D	SLD0101-CAL6		1	6.10	199113	8.69	25395	
9	1718	2023040609.D	SLD0101-SCV1		1	6.10	178329	8.69	27505	

MANUAL INTEGRATION SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406.b

ARI Job No.: SLD0 Method: TBT20230406.m Instrument: nt12.i Date: 06-APR-2023

Time	Filename	LabID	ClientId	DF	Manually Integrated Compounds
1522	2023040602.D	SLD0101-ICB1		1	NO MANUAL INTEGRATION
1539	2023040603.D	SLD0101-CAL1		1	NO MANUAL INTEGRATION
1555	2023040604.D	SLD0101-CAL2		1	NO MANUAL INTEGRATION
1612	2023040605.D	SLD0101-CAL3		1	NO MANUAL INTEGRATION
1628	2023040606.D	SLD0101-CAL4		1	NO MANUAL INTEGRATION
1645	2023040607.D	SLD0101-CAL5		1	NO MANUAL INTEGRATION
1701	2023040608.D	SLD0101-CAL6		1	NO MANUAL INTEGRATION
1718	2023040609.D	SLD0101-SCV1		1	NO MANUAL INTEGRATION

Security Status Report

Date: 06-Apr-2023 21:28

2023040601.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040602.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040603.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040604.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040605.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040606.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040607.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040608.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040609.D	Data Locked	jianqing, 06-Apr-2023 21:28

ARI Labs, Inc.

INITIAL CALIBRATION DATA

Start Cal Date : 06-APR-2023 15:39
End Cal Date : 06-APR-2023 17:01
Quant Method : ISTD
Origin : Disabled
Target Version : 4.14
Integrator : HP RTE
Method file : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Last Edit : 06-Apr-2023 17:24 nt12.i
Curve Type : Average

Calibration File Names:
Level 1: \\target\share\chem3\nt12.i\20230406.b\2023040603.D
Level 2: \\target\share\chem3\nt12.i\20230406.b\2023040604.D
Level 3: \\target\share\chem3\nt12.i\20230406.b\2023040605.D
Level 4: \\target\share\chem3\nt12.i\20230406.b\2023040606.D
Level 5: \\target\share\chem3\nt12.i\20230406.b\2023040607.D
Level 6: \\target\share\chem3\nt12.i\20230406.b\2023040608.D

Compound	0.05000 Level 1	0.20000 Level 2	0.50000 Level 3	1.000 Level 4	2.000 Level 5	4.000 Level 6	___ RRF	% RSD
2 Tetrabutyl Tin	0.92792	0.77723	0.83435	0.78924	0.82895	0.79346	0.82519	6.693
3 Tributyl Tin (Hexyl)	0.72661	0.60868	0.67276	0.63967	0.67167	0.65374	0.66219	5.962
5 Dibutyl Tin (Hexyl)	0.34865	0.30974	0.34111	0.33046	0.33360	0.35108	0.33577	4.495
7 Butyl Tin (Hexyl)	0.50637	0.45532	0.55520	0.52588	0.60768	0.59156	0.54034	10.459
$ 1 Tripropyl Tin (Hexyl)	0.99460	0.81532	0.87857	0.79853	0.81404	0.77265	0.84562	9.569
$ 6 Tripentyl Tin (Hexyl)	0.49031	0.44940	0.51775	0.49546	0.52268	0.48832	0.49399	5.298

ARI Labs, Inc.
RETENTION TIME SUMMARY REPORT

Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Batch File: \\target\share\chem3\nt12.i\20230406.b
Inst ID: nt12.i

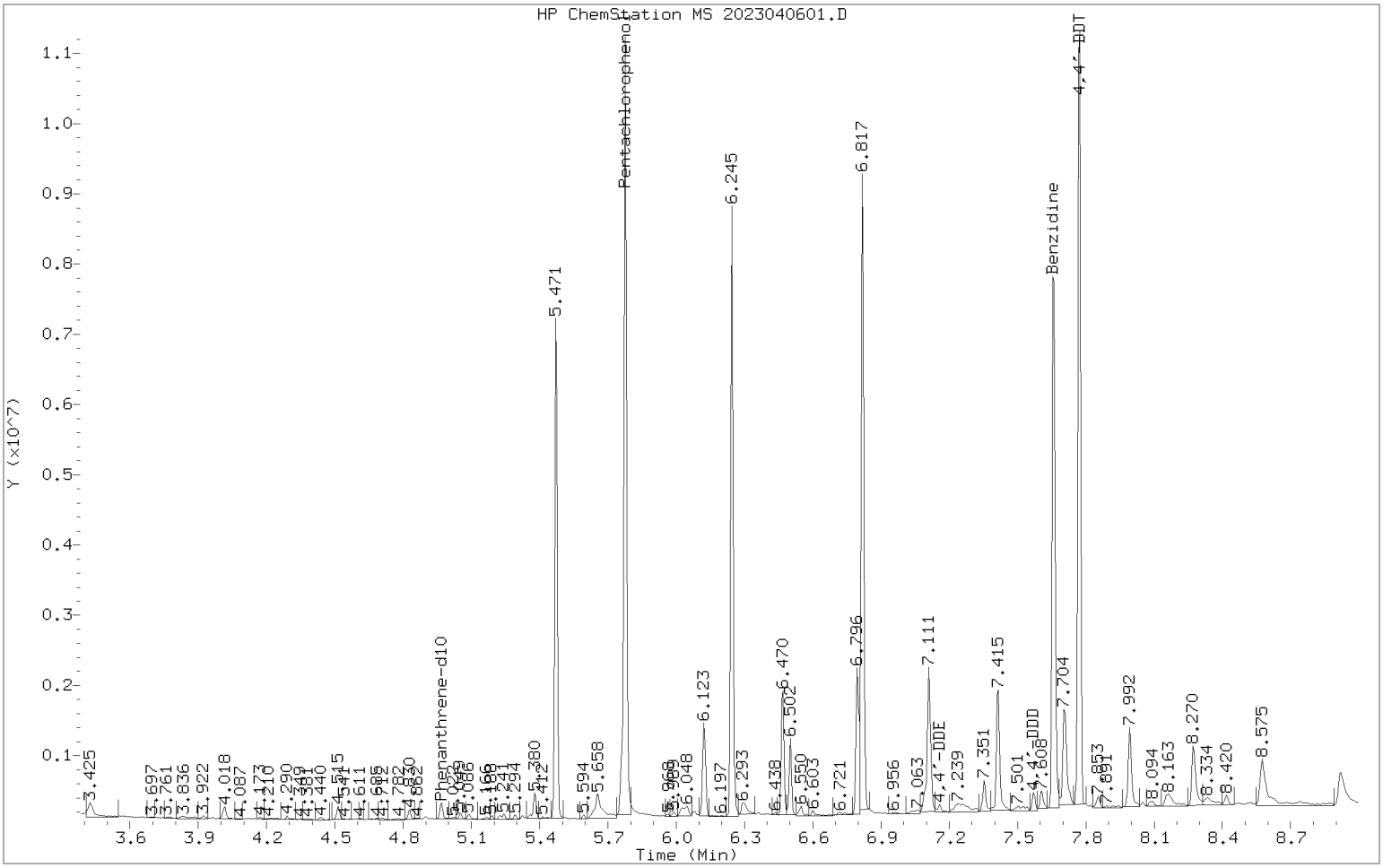
ID:	RT01	RT02	RT03	RT04	RT05	RT06
FILENAME:	2023040603	2023040604	2023040605	2023040606	2023040607	2023040608
INJ.DATE:	06-APR-2023	06-APR-2023	06-APR-2023	06-APR-2023	06-APR-2023	06-APR-2023
INJ.TIME:	15:39	15:55	16:12	16:28	16:45	17:01

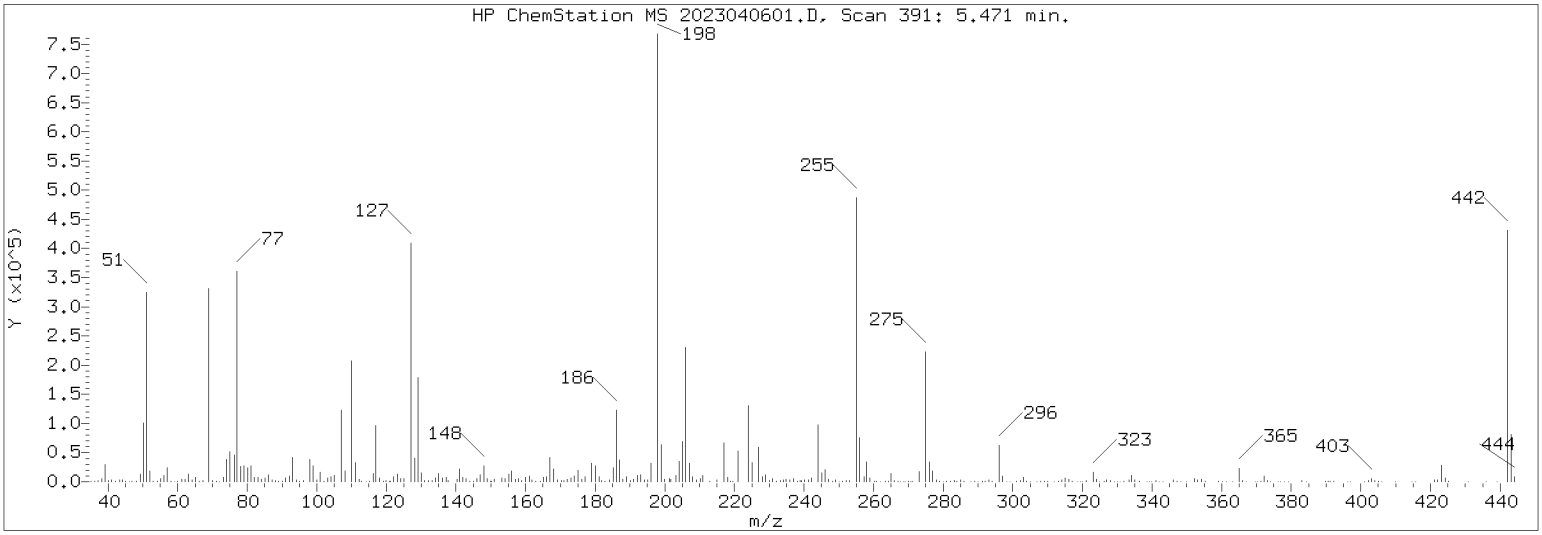
	Compound	RT01	RT02	RT03	RT04	RT05	RT06	EXPEC RT	RT WINDOW	AVG RT	STD DEV
$	1 Tripropyl Tin (Hexyl)	4.514	4.514	4.514	4.514	4.514	4.514	4.514	4.424-4.604	4.514	0.000
	2 Tetrabutyl Tin	4.698	4.698	4.698	4.698	4.698	4.698	4.698	4.604-4.792	4.698	0.000
	3 Tributyl Tin (Hexyl)	5.473	5.473	5.473	5.473	5.473	5.473	5.473	5.363-5.582	5.473	0.000
*	4 Tetrapentyl Tin	6.103	6.103	6.103	6.103	6.103	6.103	6.103	5.981-6.225	6.103	0.000
	5 Dibutyl Tin (Hexyl)	6.170	6.170	6.170	6.170	6.170	6.184	6.170	6.047-6.293	6.172	0.005
$	6 Tripentyl Tin (Hexyl)	6.452	6.452	6.452	6.451	6.452	6.452	6.451	6.322-6.580	6.452	0.000
	7 Butyl Tin (Hexyl)	6.814	6.814	6.814	6.813	6.814	6.814	6.813	6.677-6.950	6.814	0.000
*	8 p-Terphenyl-d14	8.691	8.691	8.691	8.691	8.691	8.691	8.691	8.517-8.865	8.691	0.000

Reviewer 1 _____ Date:_____
Reviewer 2 _____ Date:_____

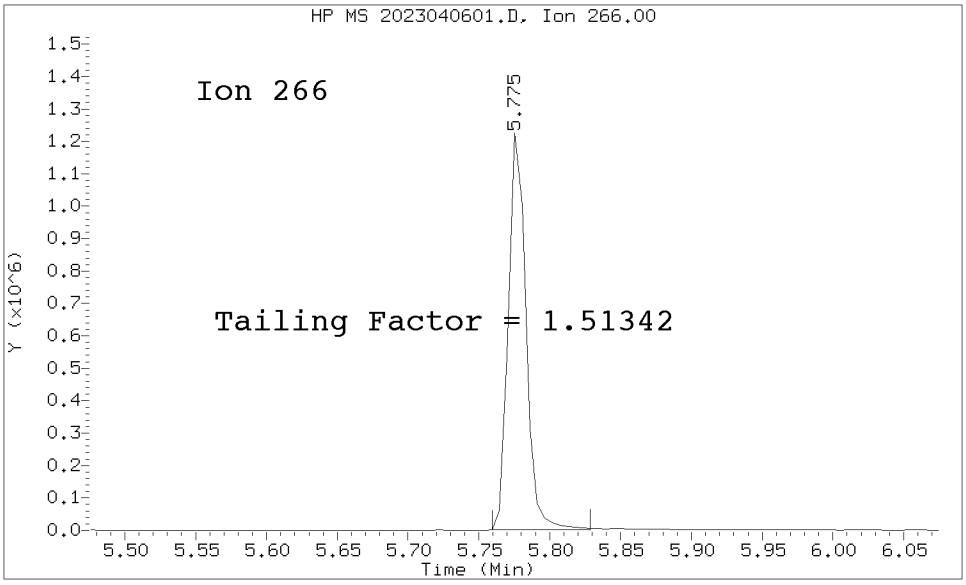
DFTPP TAILING FACTOR AND BREAKDOWN GRAPHIC REPORT

Datafile Analyzed: /20230406.b/tune.b/2023040601.D/2023040601.D
Method Used: \20230406.b\tune.b\DFTPP.m Inst: nt12
Injection Date: 06-APR-2023 15:06 Operator: JZ
Sample Info: SLD0101-TUN1 DFTPP20230406
Report Date: 04/06/2023 20:59



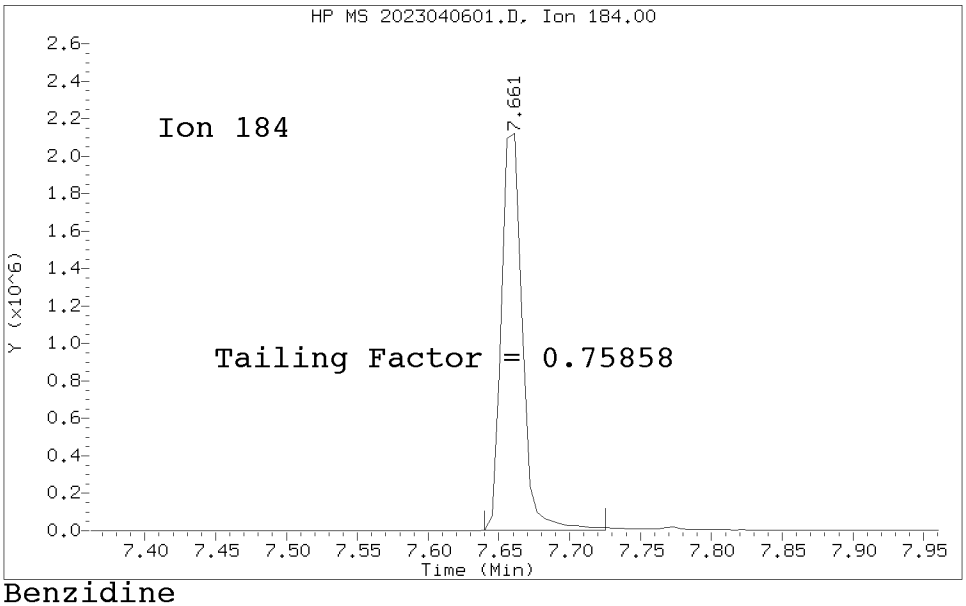


Datafile Analyzed: /20230406.b/tune.b/2023040601.D/2023040601.D
Method Used: \20230406.b\tune.b\DFTPP.m\sw846ddt.m Inst: nt12
Injection Date: 06-APR-2023 15:06 Operator: JZ
Sample Info: DFTPP20230406
Report Date: 04/06/2023 20:59



Pentachlorophenol
==========
Exp. RT = 5.775
Found RT = 5.775

Tail Factor = 1.513 Maximum Allowed = 2.0



Benzidine
==========
Exp. RT = 7.661
Found RT = 7.661

Tail Factor = 0.759 Maximum Allowed = 2.0

8270 TAILING FACTOR/BREAKDOWN SUMMARY RESULTS

TAILING ANALYSIS SUMMARY

Compound	Tail Factor	Max Allowed	Test
Pentachlorophenol	1.5134228	2.000	PASS
Benzidine	0.7585825	2.000	PASS

DDT DEGRADATION BREAKDOWN ANALYSIS SUMMARY

Compound	Response	%Breakdown	Max Allowed	Test
4,4-DDT	1580787			N/A
4,4-DDE	7601	0.5	20.0	PASS
4,4-DDD	39368	2.4	20.0	PASS
4,4-DDD + DDE	46969	2.9	20.0	PASS

Tuning Sample, nt12.i/20230406.b/tune.b/2023040601.D, *** PASSED ***

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
198	Base Peak, 100% relative abundance	100.00
51	10.00 - 80.00% of mass 198	40.61
68	Less than 2.00% of mass 69	0.00 (0.00)
69	Mass 69 relative abundance	40.72
70	Less than 2.00% of mass 69	0.14 (0.35)
127	10.00 - 80.00% of mass 198	51.24
197	Less than 2.00% of mass 198	0.00
199	5.00 - 9.00% of mass 198	7.86
275	10.00 - 60.00% of mass 198	29.70
365	Greater than 1.00% of mass 198	3.38
441	0.01 - 24.00% of mass 442	7.52 (10.98)
442	50.00 - 200.00% of mass 198	68.55
443	15.00 - 24.00% of mass 442	13.97 (20.38)

Data File: 2023040601.D
Spectrum: Avg. Scans 390-392 (5.47), Background Scan 386
Location of Maximum: 198.00
Number of points: 352

m/z	Y	m/z	Y	m/z	Y	m/z	Y
35.00	934	137.00	5291	231.00	3787	328.00	1233
36.00	134	138.00	1407	232.00	1009	329.00	305
37.00	912	139.00	230	233.00	1052	330.00	73
38.00	3820	140.00	2972	234.00	3500	331.00	417
39.00	18080	141.00	15198	235.00	2491	332.00	1240
40.00	243	142.00	4853	236.00	2237	333.00	1048
41.00	482	143.00	3599	237.00	3879	334.00	8817
43.00	276	144.00	991	238.00	953	335.00	2756
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51.00	226496	149.00	3492	244.00	71984	341.00	1673
52.00	11730	150.00	963	245.00	10836	342.00	402
53.00	306	151.00	2399	246.00	14890	343.00	192
54.00	268	152.00	733	247.00	3342	344.00	64
55.00	1771	153.00	4659	248.00	851	345.00	99
56.00	6665	154.00	4248	249.00	3014	346.00	2764
57.00	15399	155.00	9624	250.00	543	347.00	793
58.00	606	156.00	13334	251.00	721	348.00	176
60.00	2	157.00	3402	252.00	787	349.00	53
61.00	2775	158.00	3321	253.00	1712	350.00	184
62.00	3701	159.00	2214	255.00	358976	351.00	141
63.00	9745	160.00	5142	256.00	56856	352.00	4460
64.00	1833	161.00	7084	257.00	5369	353.00	2627
65.00	5031	162.00	2303	258.00	24264	354.00	4074
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70.00	801	165.00	5167	261.00	873	359.00	377
71.00	155	166.00	6270	262.00	304	360.00	231
73.00	3742	167.00	31248	263.00	515	361.00	135
74.00	25720	168.00	16351	264.00	360	365.00	18856
75.00	37472	169.00	2256	265.00	9172	366.00	1793
76.00	32416	170.00	1278	266.00	1326	367.00	283
77.00	257600	171.00	1486	267.00	447	370.00	633
78.00	17848	172.00	2907	268.00	239	371.00	378
79.00	17640	173.00	4123	269.00	268	372.00	6826
80.00	15634	174.00	7639	270.00	725	373.00	1925
81.00	19184	175.00	13108	271.00	765	374.00	227
82.00	4772	176.00	2656	272.00	172	376.00	272
83.00	4114	177.00	6112	273.00	13642	378.00	139
85.00	4016	178.00	588	274.00	4783	379.00	79
86.00	5700	179.00	22784	275.00	165632	383.00	1863
87.00	2097	180.00	17880	276.00	24704	384.00	453
88.00	802	181.00	6203	277.00	13899	385.00	55
89.00	936	182.00	1290	278.00	2430	390.00	1364
90.00	32	183.00	748	279.00	475	391.00	724
91.00	4338	184.00	2769	280.00	361	392.00	726
92.00	6926	185.00	13954	282.00	773	395.00	198

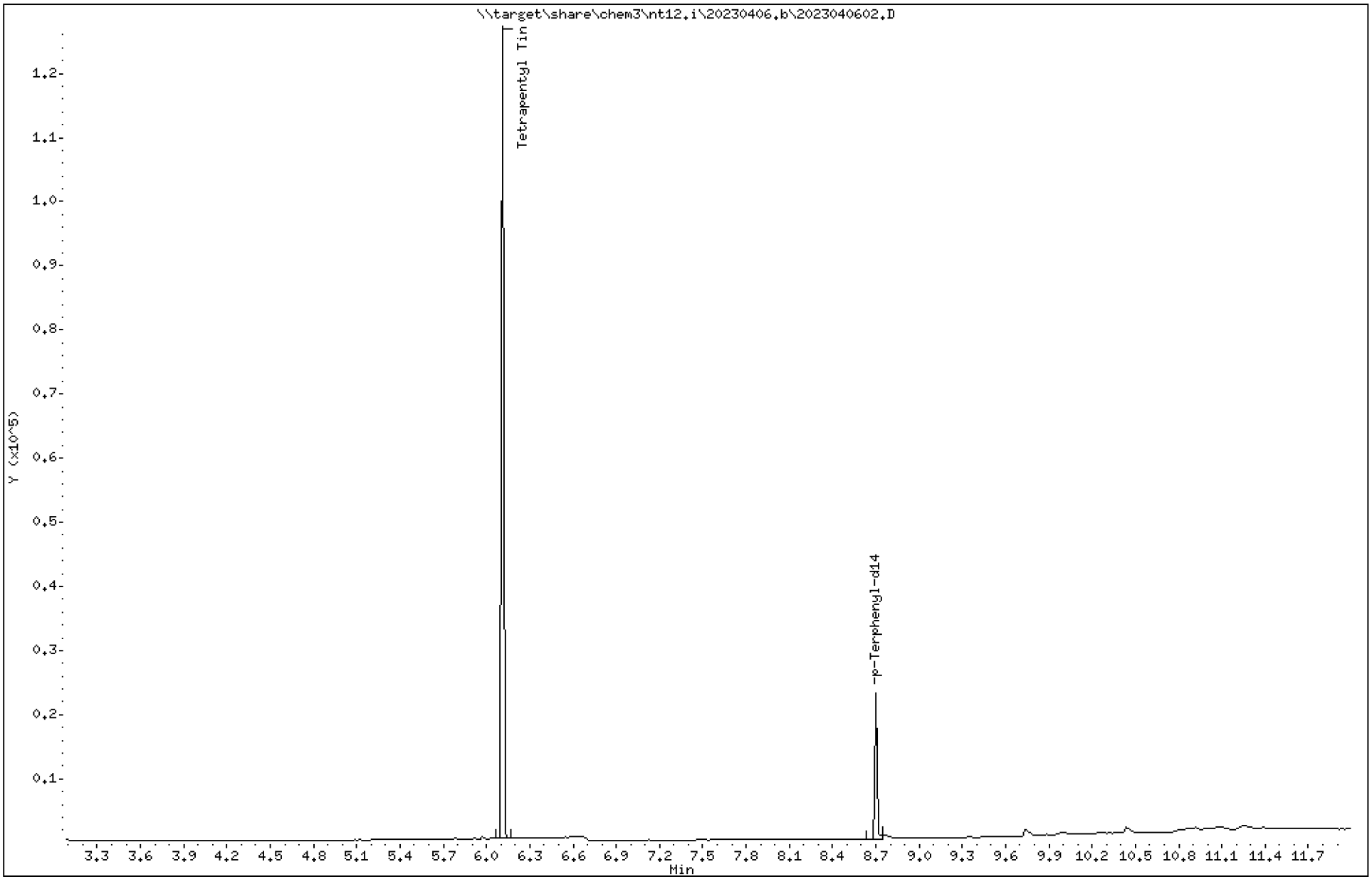
93.00	30480	186.00	87216	283.00	1708	396.00	138
94.00	1883	187.00	25688	284.00	1211	397.00	154
95.00	481	188.00	3310	285.00	2147	398.00	91
96.00	1267	189.00	6300	286.00	735	401.00	437
98.00	25544	190.00	1201	287.00	135	402.00	2523
99.00	18560	191.00	2647	288.00	312	403.00	4002
100.00	2272	192.00	7958	289.00	772	404.00	2035
101.00	10814	193.00	8567	290.00	384	405.00	293
102.00	706	194.00	1789	291.00	587	406.00	91
103.00	4258	195.00	1339	292.00	815	409.00	80
104.00	7261	196.00	21568	293.00	2528	410.00	194
105.00	6724	198.00	557760	294.00	1114	415.00	391
107.00	82648	199.00	43824	296.00	46800	416.00	121
108.00	12203	200.00	3097	297.00	6673	419.00	92
110.00	144384	201.00	4066	298.00	401	421.00	3064
111.00	23776	202.00	2002	299.00	458	422.00	3429
112.00	2847	203.00	7186	301.00	590	423.00	24600
113.00	880	204.00	25608	302.00	1001	424.00	6771
114.00	304	205.00	48280	303.00	5044	425.00	897
115.00	118	206.00	167488	304.00	1432	426.00	73
116.00	4357	207.00	20968	305.00	18	429.00	100
117.00	69192	208.00	5879	306.00	100	431.00	119
118.00	5193	209.00	2348	307.00	299	435.00	182
119.00	636	210.00	2340	308.00	669	436.00	54
120.00	1350	211.00	7053	309.00	537	438.00	56
121.00	921	212.00	265	310.00	628	439.00	508
122.00	6271	213.00	680	312.00	283	441.00	41968
123.00	8610	214.00	333	313.00	834	442.00	382336
124.00	3594	215.00	2024	314.00	2613	443.00	77936
125.00	3555	216.00	4064	315.00	4957	444.00	7505
127.00	285824	217.00	47112	316.00	3029	445.00	198
128.00	27544	218.00	5518	317.00	520	451.00	58
129.00	120544	219.00	1133	319.00	362	457.00	56
130.00	10482	221.00	40328	320.00	39	467.00	52
131.00	1933	224.00	96152	321.00	1397	470.00	58
132.00	1163	225.00	24168	323.00	13693	480.00	50
133.00	756	227.00	42032	324.00	2570		
134.00	3587	228.00	6204	325.00	207		
135.00	9210	229.00	7812	326.00	369		
136.00	3691	230.00	1846	327.00	2665		

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040602.D
Date : 06-APR-2023 15:22
Client ID:
Sample Info: ICB230406

Instrument: nt12.i

Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



23C0619 CLPLIKE (Rev0) - Page 191 of 1484

ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040602.D
Lab Smp Id: SLD0101-ICB1
Inj Date : 06-APR-2023 15:22
Operator : JZ Inst ID: nt12.i
Smp Info : ICB230406
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 21:02 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 2
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	Compound Not Detected.					
	2 Tetrabutyl Tin	289	Compound Not Detected.					
	3 Tributyl Tin (Hexyl)	319	Compound Not Detected.					
*	4 Tetrapentyl Tin	333	6.116	6.102	(1.000)	161159	2.00000	
	5 Dibutyl Tin (Hexyl)	347	Compound Not Detected.					
$	6 Tripentyl Tin (Hexyl)	347	Compound Not Detected.					
	7 Butyl Tin (Hexyl)	347	Compound Not Detected.					
*	8 p-Terphenyl-d14	244	8.704	8.690	(1.000)	23719	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040602.D
Lab Smp Id: SLD0101-ICB1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

COMPOUND	STANDARD	AREA LIMIT LOWER	AREA LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	161159	-1.83
8 p-Terphenyl-d14	22611	11306	45222	23719	4.90

COMPOUND	STANDARD	RT LIMIT LOWER	RT LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.12	0.22
8 p-Terphenyl-d14	8.69	8.19	9.19	8.70	0.16

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040602.D

Lab ID: SLD0101-ICB1
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 15:22

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

** FIRST SURROGATE NOT FOUND. ICAL Check not performed **

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

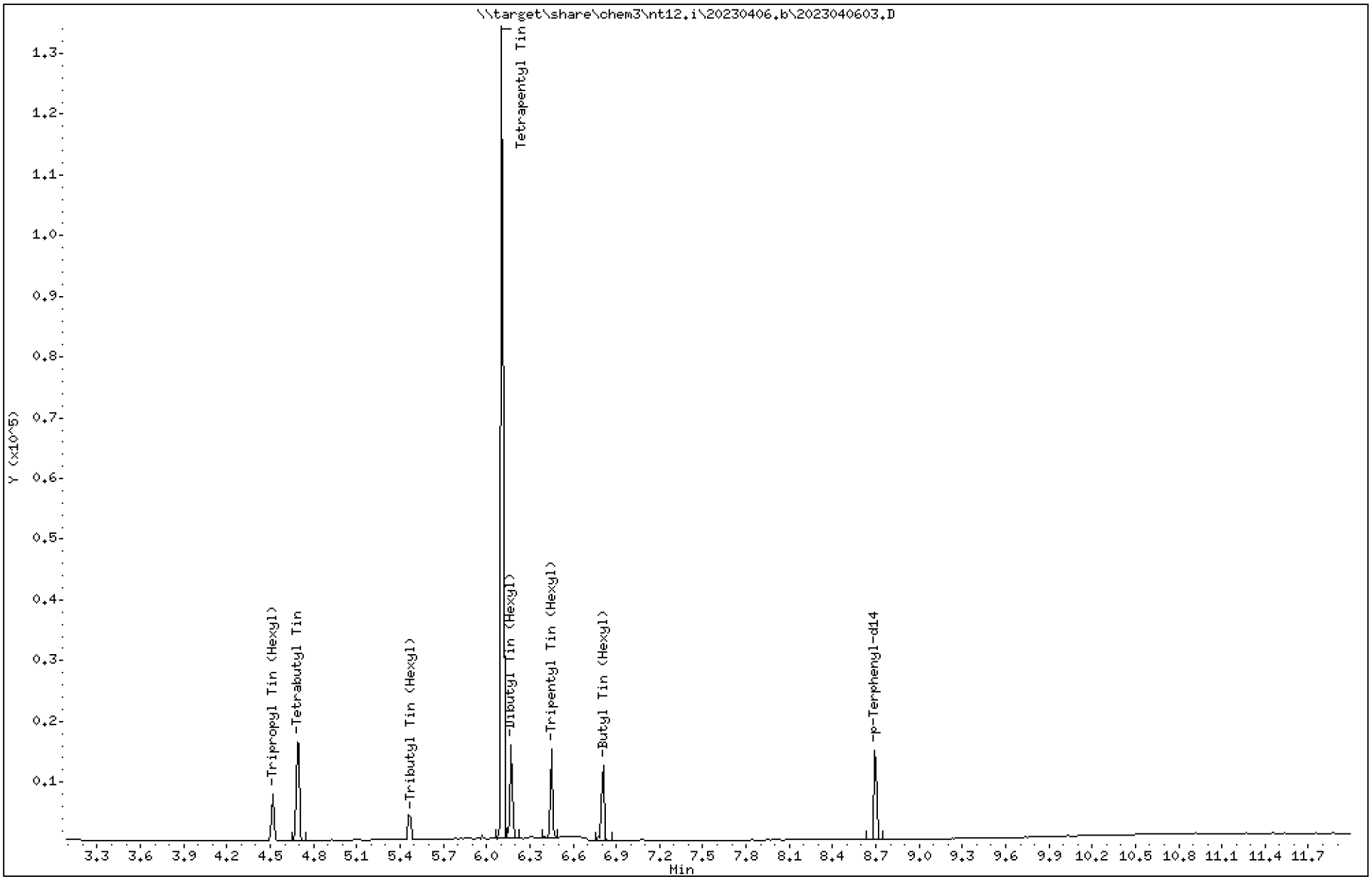
Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040603.D
Date : 06-APR-2023 15:39
Client ID:
Sample Info: IC005230406,

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



23C0619 CLPLIKE (Rev0) - Page 195 of 1484

ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040603.D
Lab Smp Id: SLD0101-CAL1
Inj Date : 06-APR-2023 15:39
Operator : JZ Inst ID: nt12.i
Smp Info : IC005230406,
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:57 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 3 Calibration Sample, Level: 1
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/mL)	ON-COL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.514	4.514	(0.740)	3908	0.05000	0.05881
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	3646	0.05000	0.05622
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	2855	0.05000	0.05486
*	4 Tetrapentyl Tin	333	6.102	6.102	(1.000)	157169	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.170	6.169	(0.710)	3886	0.10000	0.1038
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	5465	0.10000	0.09926
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	5644	0.10000	0.09371
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	22292	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040603.D
Lab Smp Id: SLD0101-CAL1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Initial Calibration Level 4.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	157169	-4.27
8 p-Terphenyl-d14	22611	11306	45222	22292	-1.41

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040603.D

Lab ID: SLD0101-CAL1
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 15:39

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

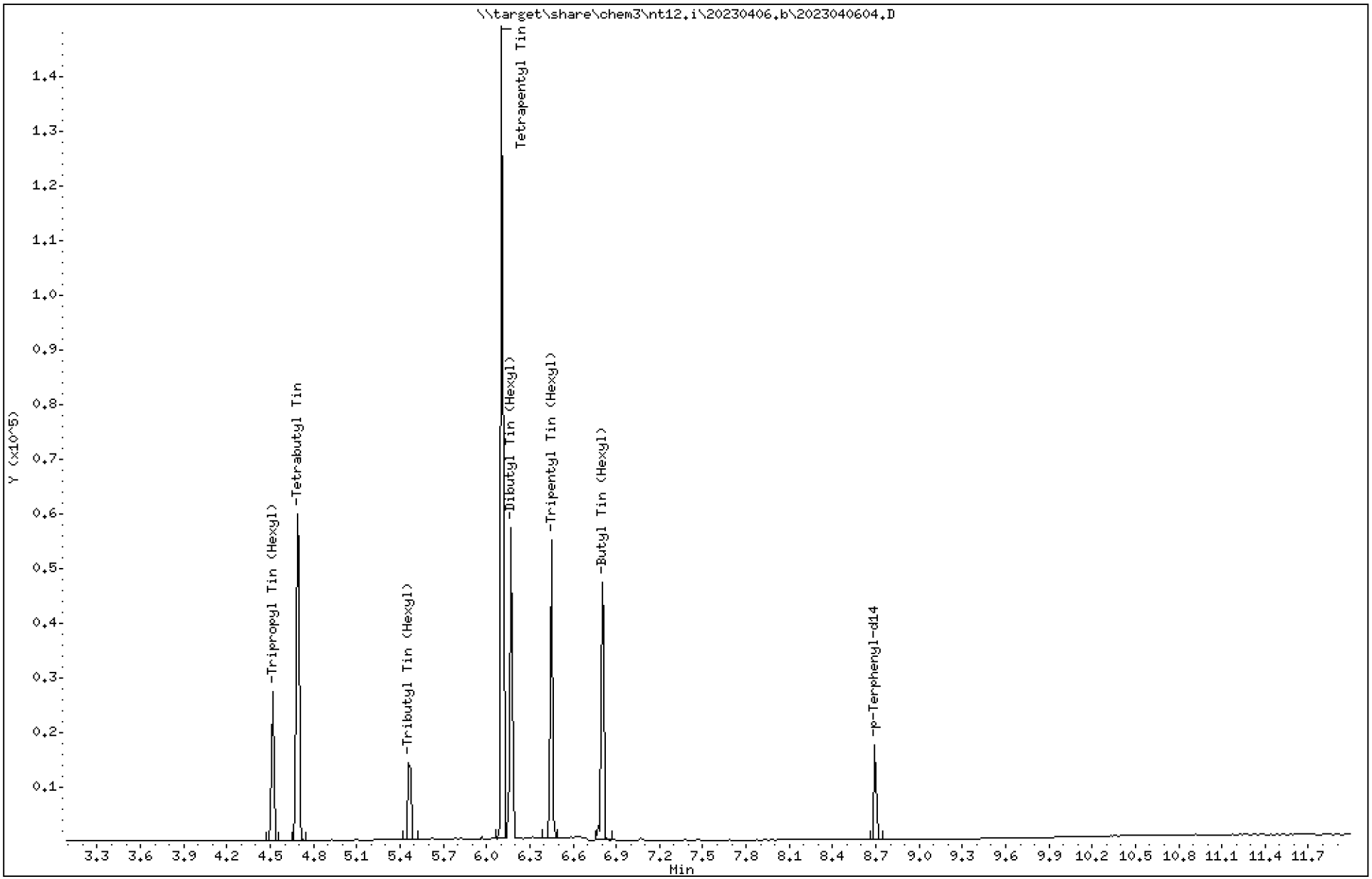
On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040604.D
Date : 06-APR-2023 15:55
Client ID:
Sample Info: IC02230406,

Instrument: nt12.i
Operator: JZ
Column phase: ZB-5msi
Column diameter: 0.25



23C0619 CLPLIKE (Rev0) - Page 199 of 1484

ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040604.D
Lab Smp Id: SLD0101-CAL2
Inj Date : 06-APR-2023 15:55
Operator : JZ Inst ID: nt12.i
Smp Info : IC02230406,
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:57 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 4 Calibration Sample, Level: 2
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/mL)	ON-COL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.514	4.514	(0.740)	13443	0.20000	0.1928
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	12815	0.20000	0.1884
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	10036	0.20000	0.1838
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	164881	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.170	6.169	(0.710)	14421	0.40000	0.3690
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	20923	0.40000	0.3639
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	21199	0.40000	0.3371
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	23279	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040604.D
Lab Smp Id: SLD0101-CAL2
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Initial Calibration Level 4.

COMPOUND	STANDARD	AREA LIMIT LOWER	AREA LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	164881	0.43
8 p-Terphenyl-d14	22611	11306	45222	23279	2.95

COMPOUND	STANDARD	RT LIMIT LOWER	RT LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040604.D

Lab ID: SLD0101-CAL2
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 15:55

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040605.D

Date : 06-APR-2023 16:12

Client ID:

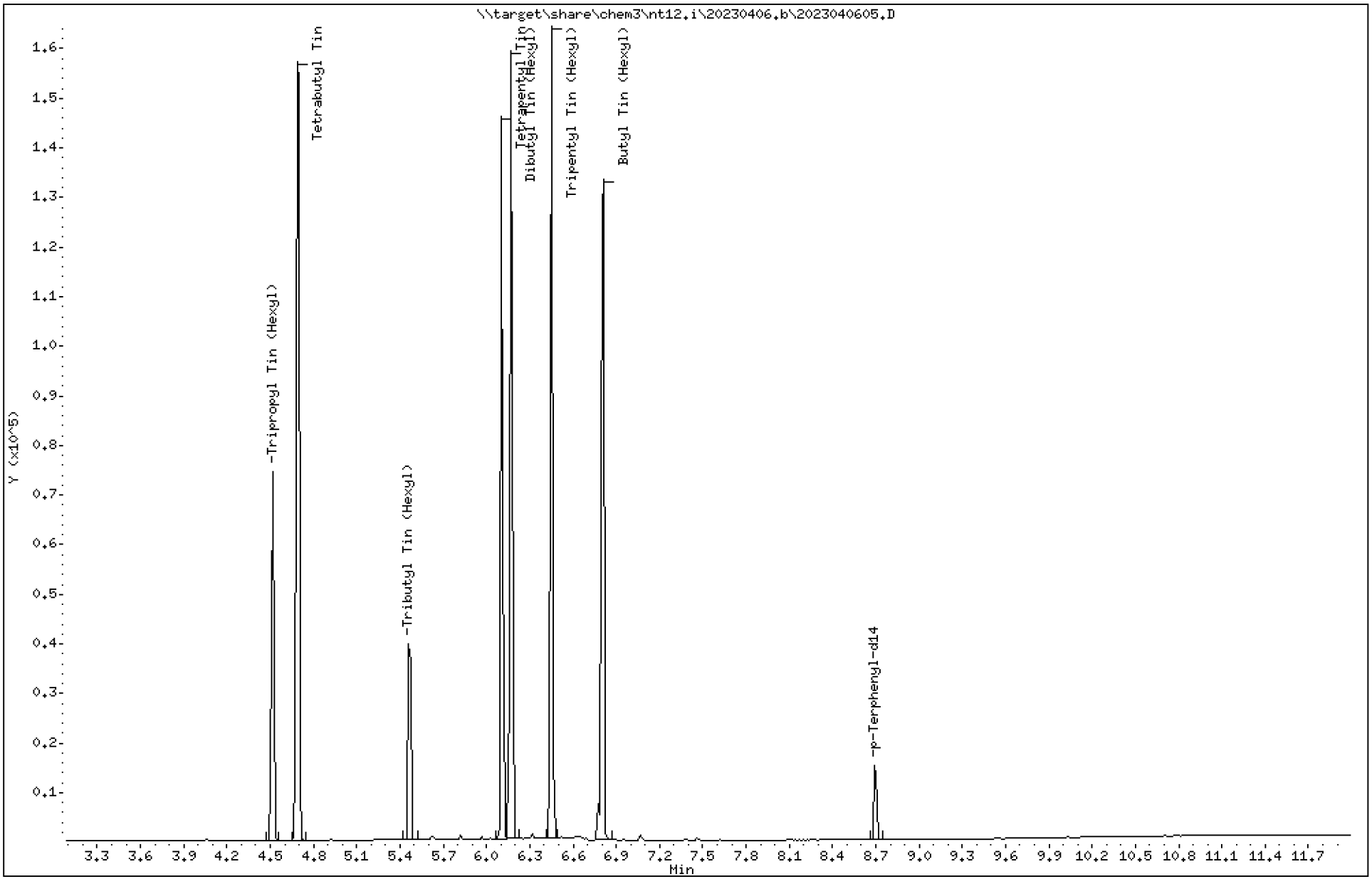
Instrument: nt12.i

Sample Info: IC05230406,

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040605.D
Lab Smp Id: SLD0101-CAL3
Inj Date : 06-APR-2023 16:12
Operator : JZ Inst ID: nt12.i
Smp Info : IC05230406,
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:57 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 5 Calibration Sample, Level: 3
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/mL)	ON-COL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.514	4.514	(0.740)	36815	0.50000	0.5195
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	34962	0.50000	0.5056
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	28191	0.50000	0.5080
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	167613	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.170	6.169	(0.710)	39615	1.00000	1.016
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	60129	1.00000	1.048
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	64478	1.00000	1.028
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	23227	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040605.D
Lab Smp Id: SLD0101-CAL3
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Initial Calibration Level 4.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	167613	2.10
8 p-Terphenyl-d14	22611	11306	45222	23227	2.72

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040605.D

Lab ID: SLD0101-CAL3
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 16:12

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040606.D

Date : 06-APR-2023 16:28

Client ID:

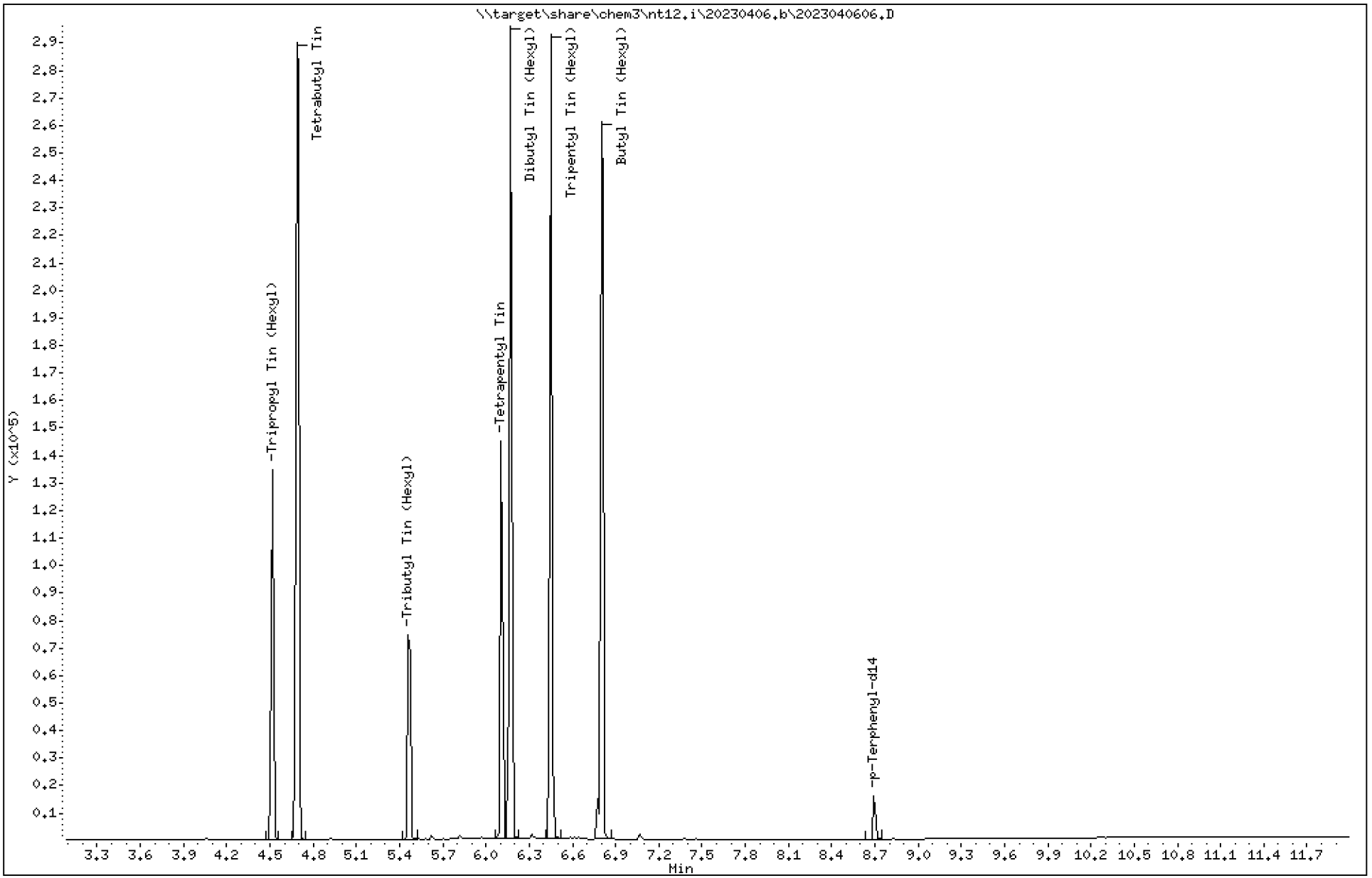
Instrument: nt12.i

Sample Info: IC1230406,

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0619 CLPLIKE (Rev0) - Page 207 of 1484

ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040606.D
Lab Smp Id: SLD0101-CAL4
Inj Date : 06-APR-2023 16:28
Operator : JZ Inst ID: nt12.i
Smp Info : IC1230406,
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:57 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 6 Calibration Sample, Level: 4
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/mL)	ON-COL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.514	4.514	(0.740)	65548	1.00000	0.9443
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	64785	1.00000	0.9564
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	52508	1.00000	0.9660
*	4 Tetrapentyl Tin	333	6.102	6.102	(1.000)	164171	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.169	6.169	(0.710)	74721	2.00000	1.968
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	112029	2.00000	2.006
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	118907	2.00000	1.946
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	22611	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040606.D
Lab Smp Id: SLD0101-CAL4
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Initial Calibration Level 4.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	164171	0.00
8 p-Terphenyl-d14	22611	11306	45222	22611	0.00

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040606.D

Lab ID: SLD0101-CAL4
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 16:28

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Q-FLAG SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406.b

Instrument: nt12.i Date: 06-APR-2023 Method: 20230406.b\TBT20230406.m

INITIAL CAL: 06-APR-2023

Compound	%RSD or R^2
NO Q-FLAGS	

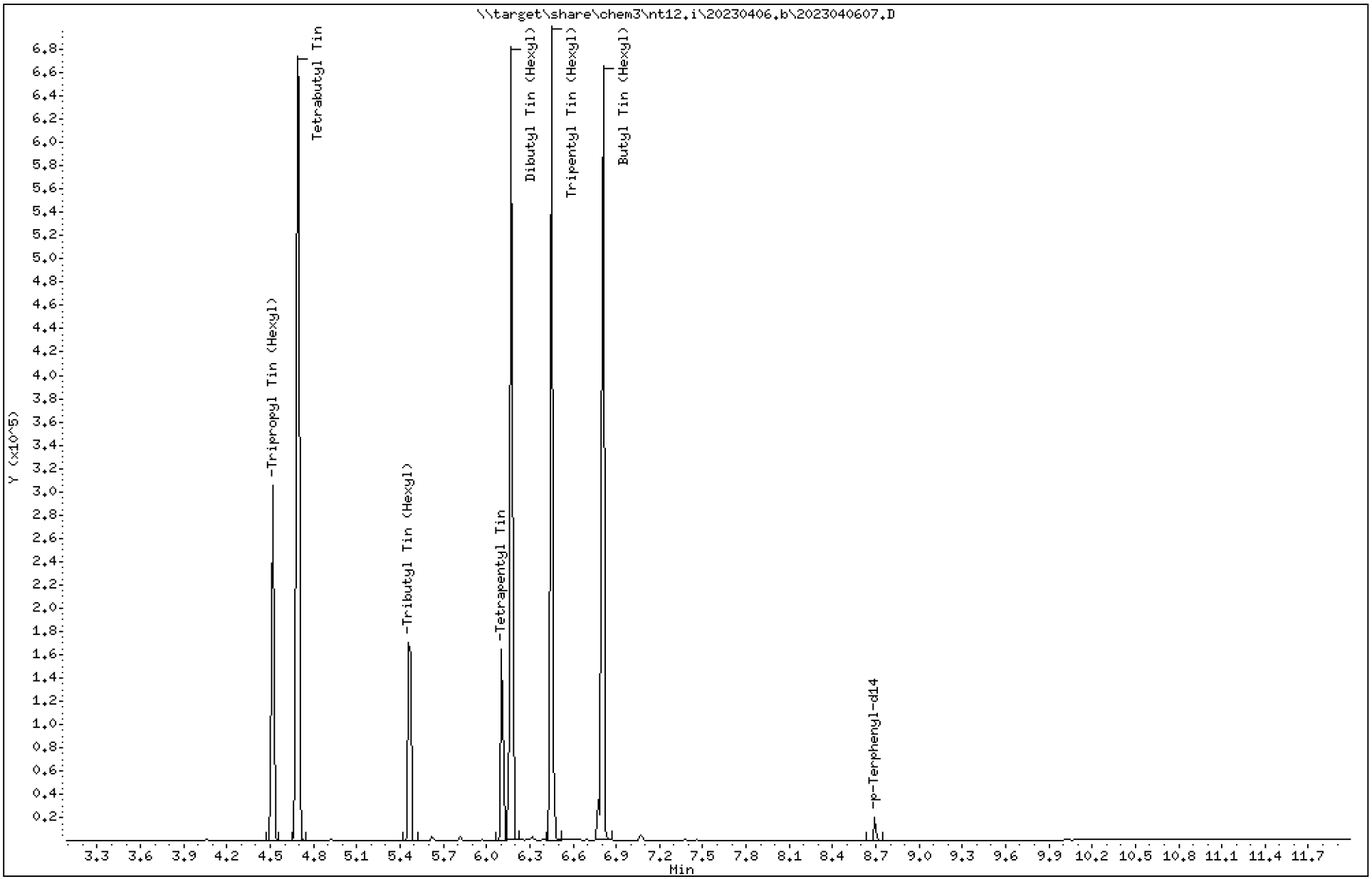
ICV CAL: 2023040606.D 06-APR-2023 16:28

Compound	%D
NO Q-FLAGS	

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040607.D
Date : 06-APR-2023 16:45
Client ID:
Sample Info: IC2230406,

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040607.D
Lab Smp Id: SLD0101-CAL5
Inj Date : 06-APR-2023 16:45
Operator : JZ Inst ID: nt12.i
Smp Info : IC2230406,
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:57 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 7 Calibration Sample, Level: 5
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/mL)	ON-COL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.514	4.514	(0.740)	148585	2.00000	1.925
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	151308	2.00000	2.009
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	122599	2.00000	2.029
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	182529	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.170	6.169	(0.710)	163252	4.00000	3.974
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	255780	4.00000	4.232
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	297376	4.00000	4.499
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	24468	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040607.D
Lab Smp Id: SLD0101-CAL5
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Initial Calibration Level 4.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	182529	11.18
8 p-Terphenyl-d14	22611	11306	45222	24468	8.21

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040607.D

Lab ID: SLD0101-CAL5
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 16:45

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

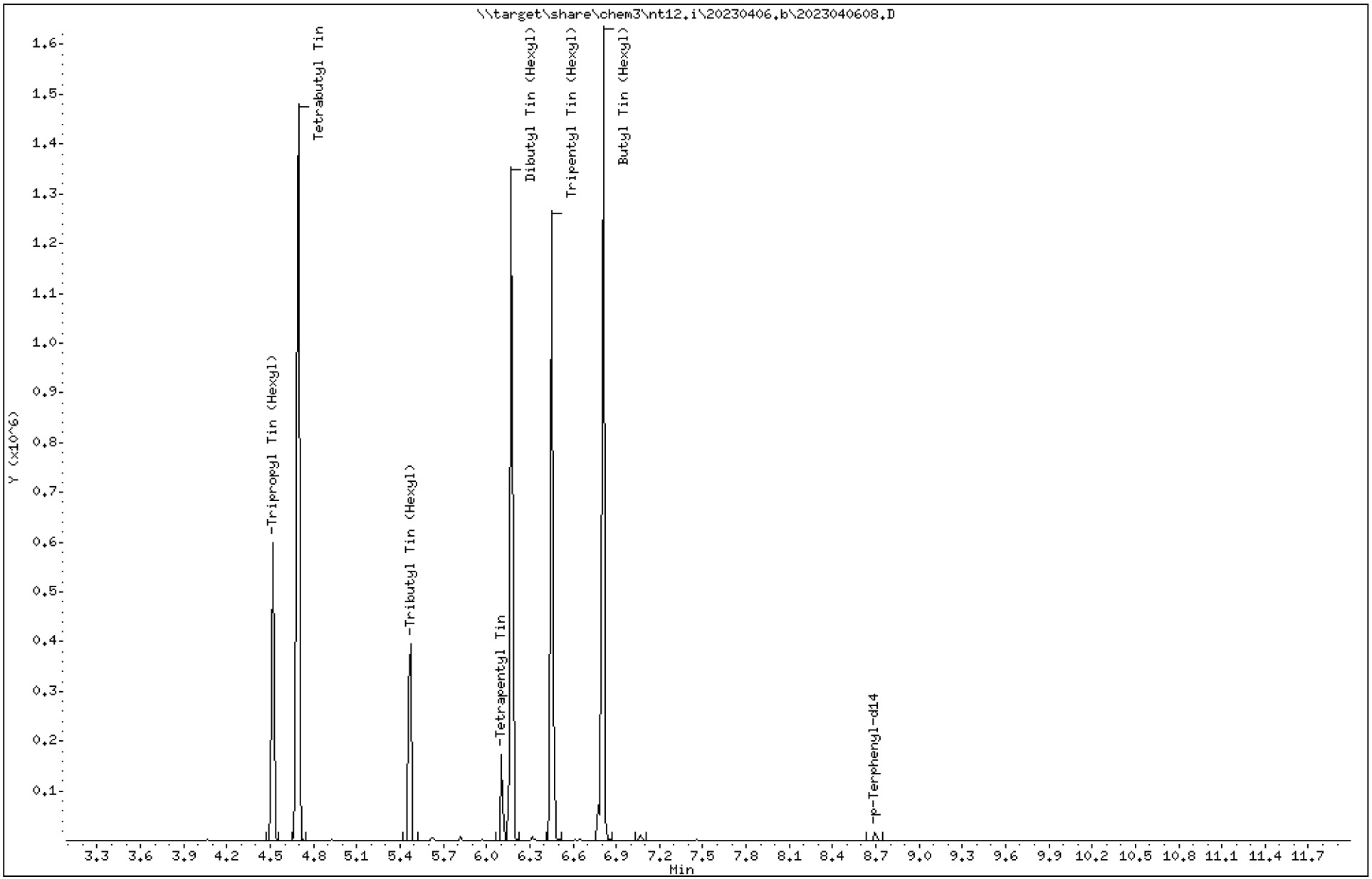
On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040608.D
Date : 06-APR-2023 17:01
Client ID:
Sample Info: IC5230406,

Instrument: nt12.i
Operator: JZ
Column phase: ZB-5msi
Column diameter: 0.25



ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040608.D
Lab Smp Id: SLD0101-CAL6
Inj Date : 06-APR-2023 17:01
Operator : JZ Inst ID: nt12.i
Smp Info : IC5230406,
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:57 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 8 Calibration Sample, Level: 6
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/mL)	ON-COL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.514	4.514	(0.740)	307691	4.00000	3.655
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	315975	4.00000	3.846
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	260335	4.00000	3.949
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	199113	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.183	6.169	(0.711)	356627	8.00000	8.365
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	496038	8.00000	7.908
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	600903	8.00000	8.758
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	25395	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040608.D
Lab Smp Id: SLD0101-CAL6
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Initial Calibration Level 4.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	199113	21.28
8 p-Terphenyl-d14	22611	11306	45222	25395	12.31

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040608.D

Lab ID: SLD0101-CAL6
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 17:01

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

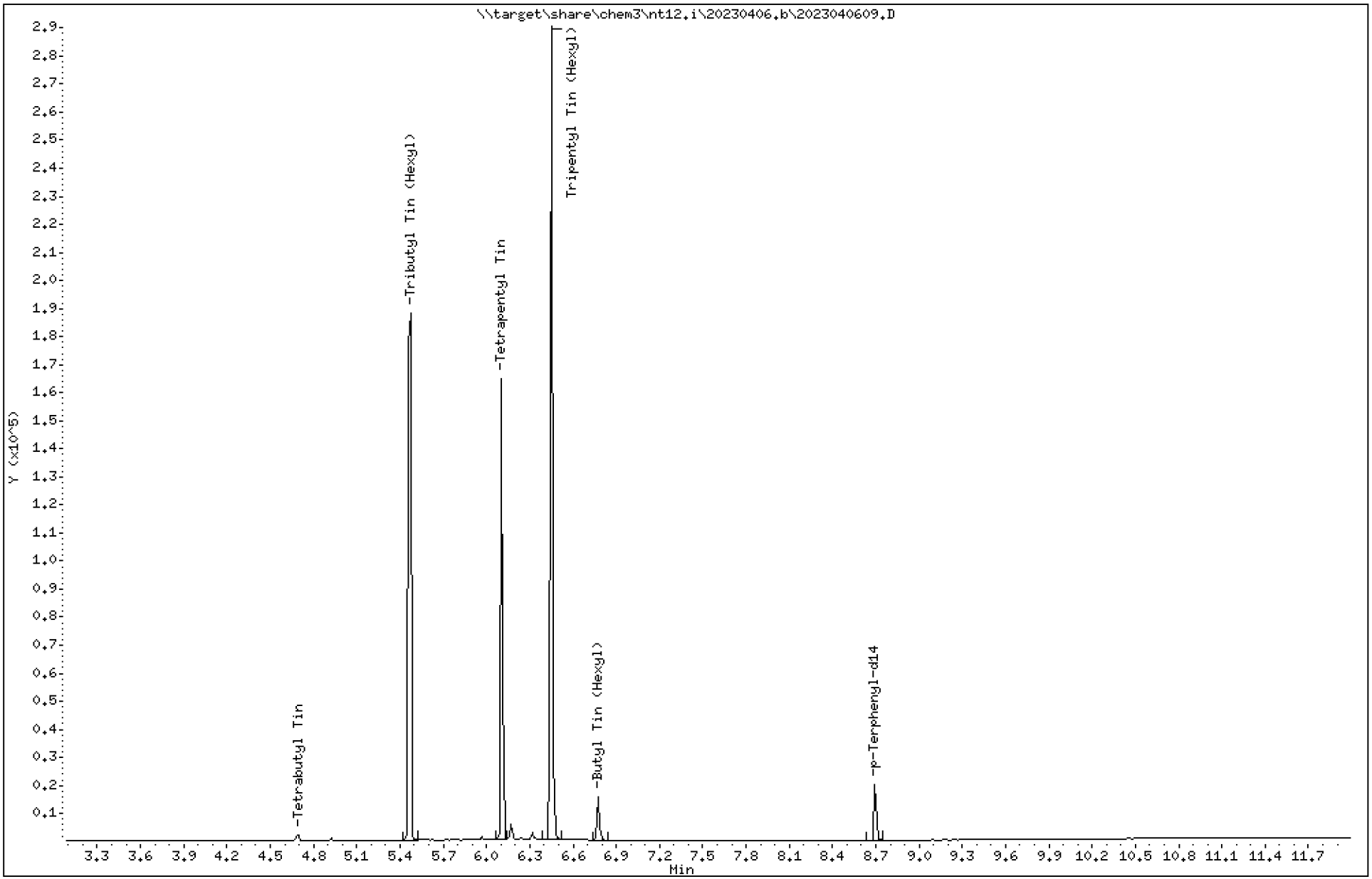
Instrument: nt12.i

Sample Info: SCV230406

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0619 CLPLIKE (Rev0) - Page 220 of 1484

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

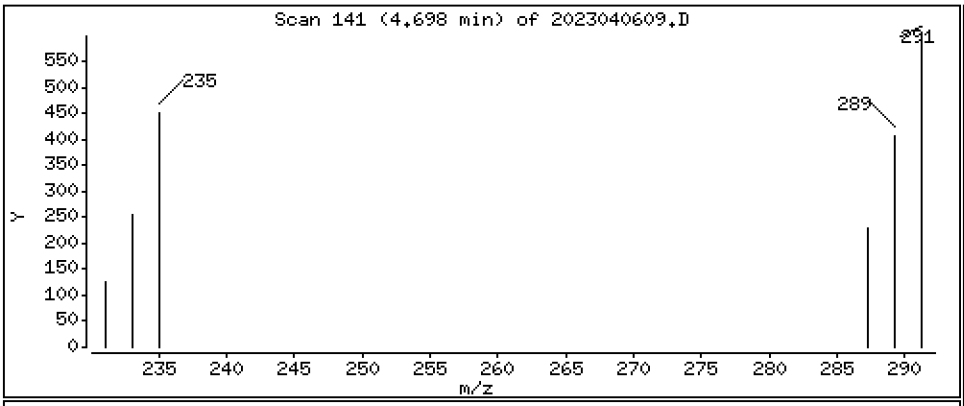
Operator: JZ

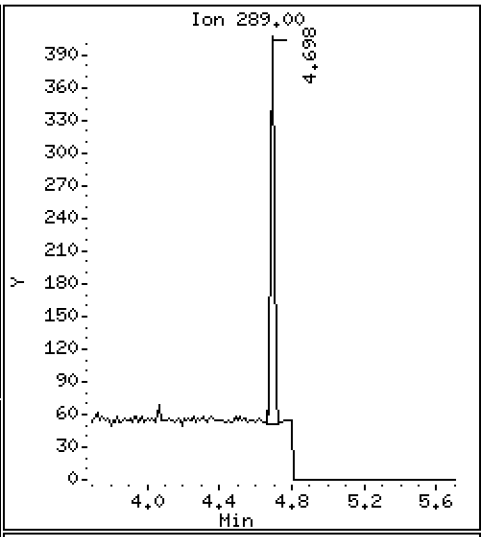
Column phase: ZB-5msi

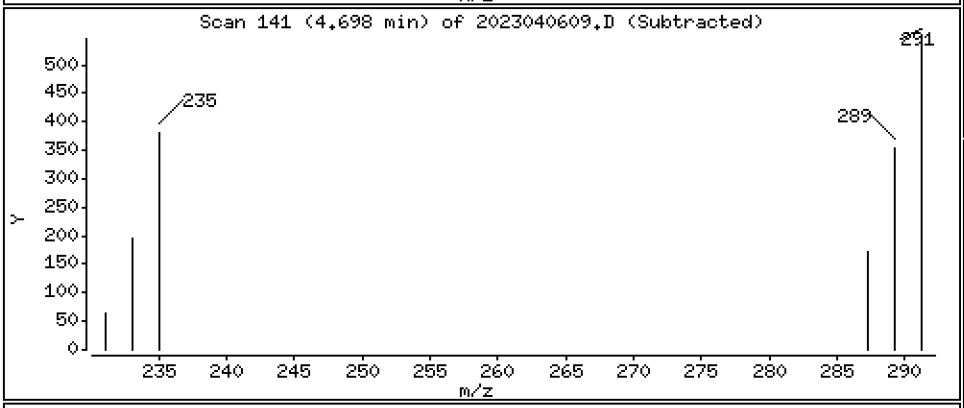
Column diameter: 0.25

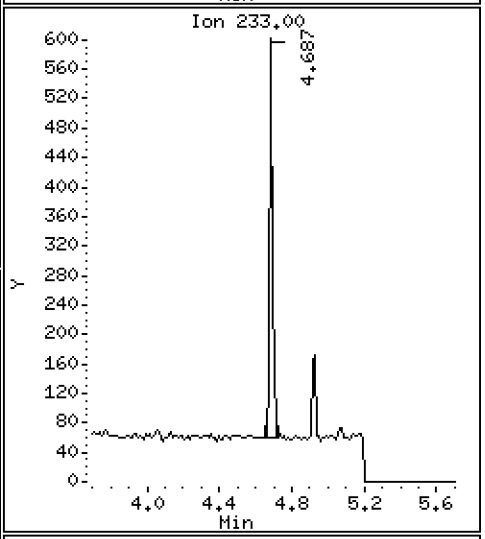
2 Tetrabutyl Tin

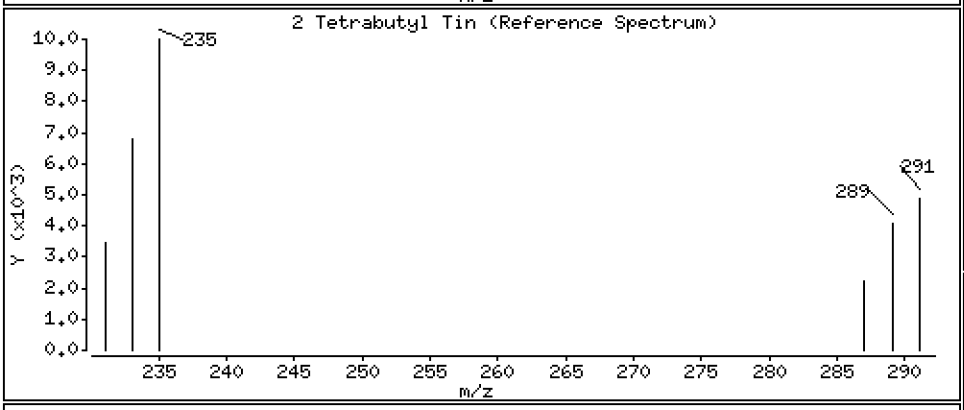
Concentration: 0.005817 ug/mL

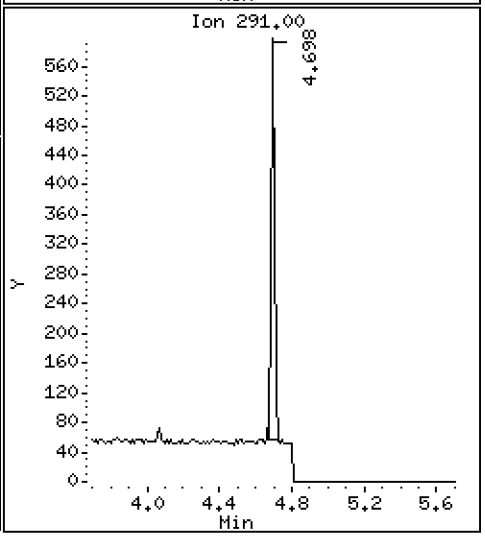


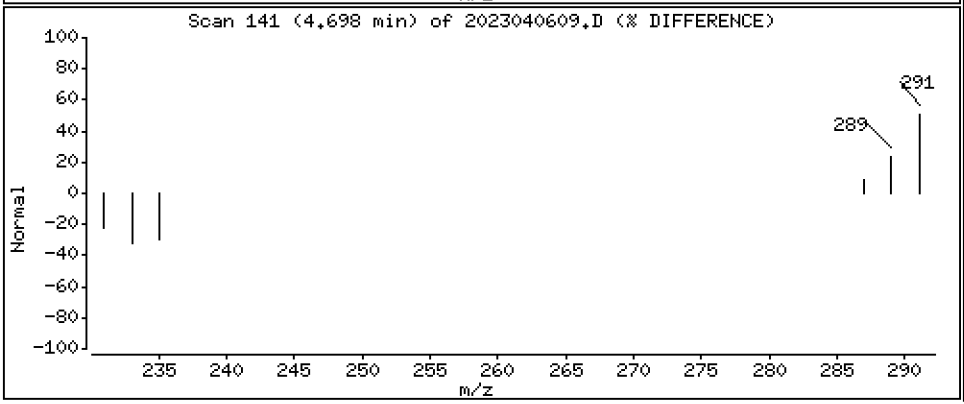












Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

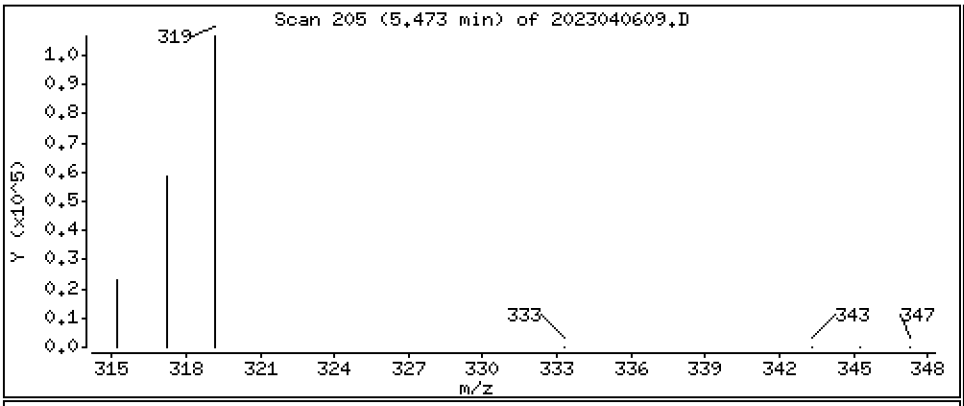
Operator: JZ

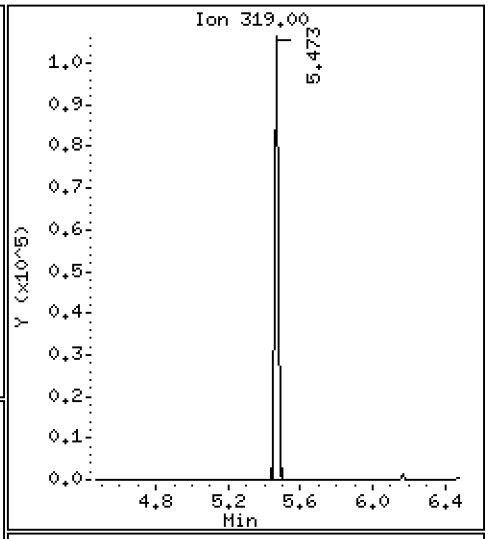
Column phase: ZB-5msi

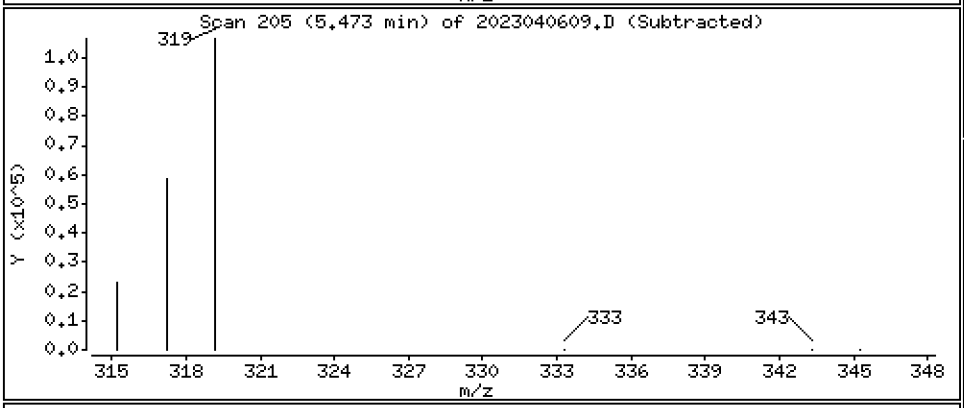
Column diameter: 0.25

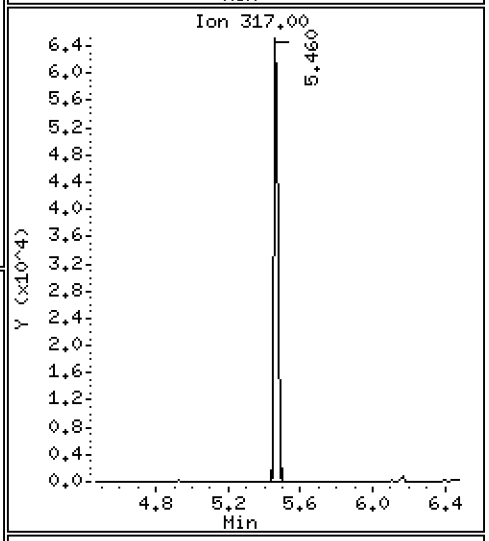
3 Tributyl Tin (Hexyl)

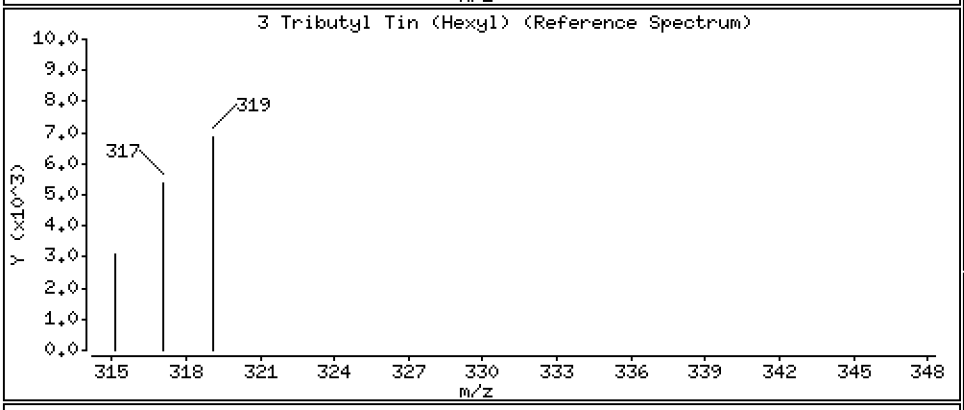
Concentration: 2.309 ug/mL

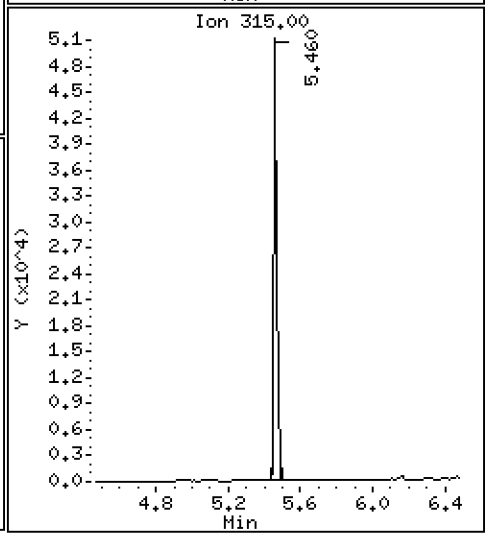


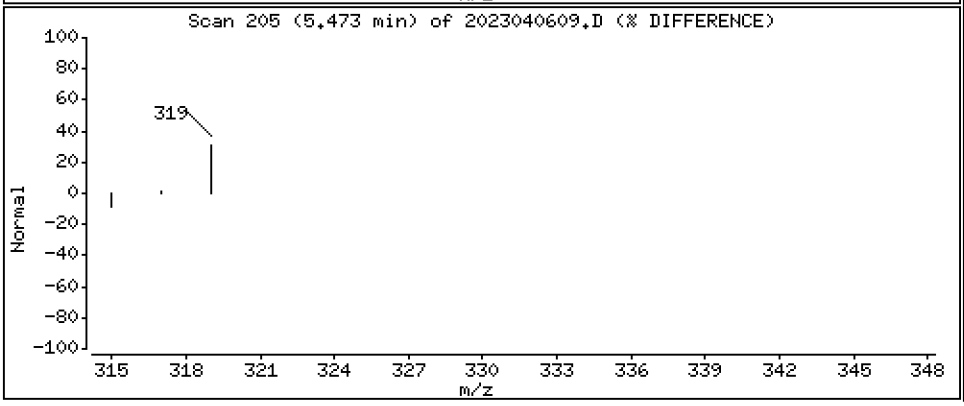












Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

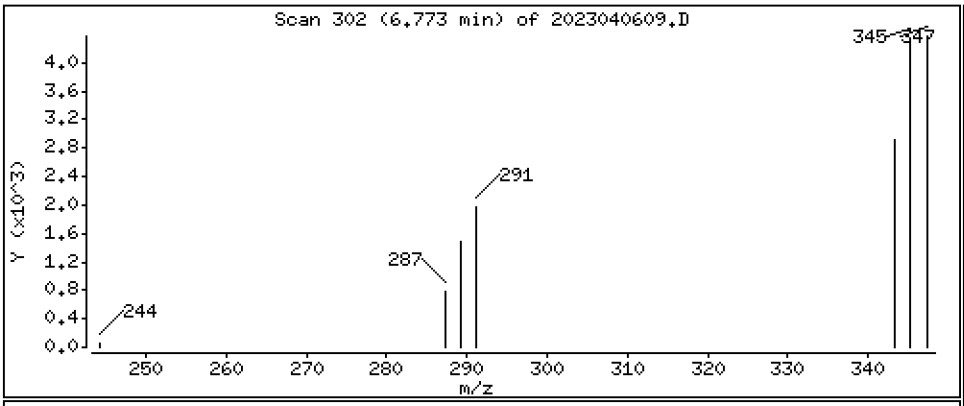
Operator: JZ

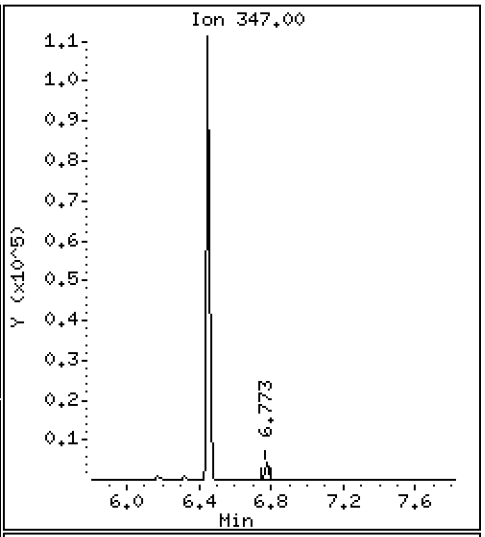
Column phase: ZB-5msi

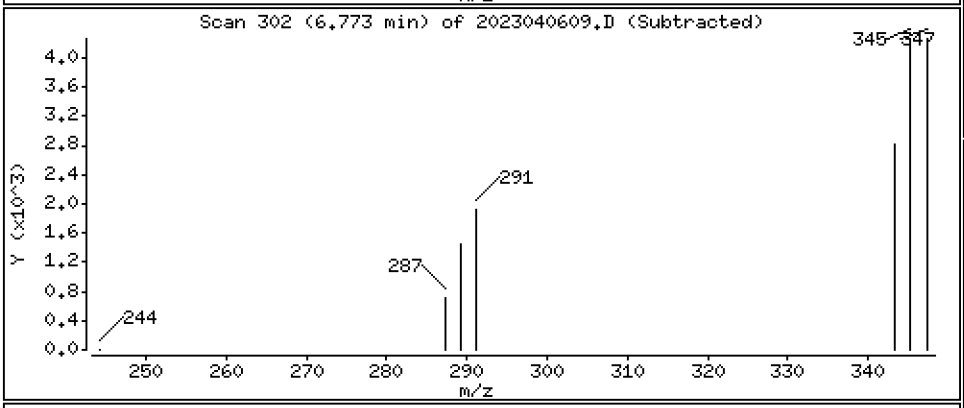
Column diameter: 0.25

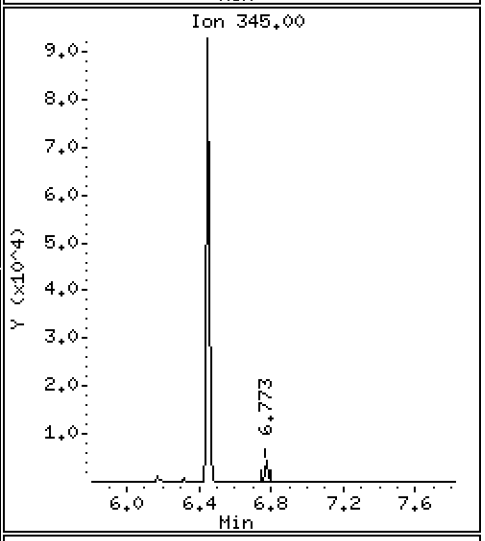
7 Butyl Tin (Hexyl)

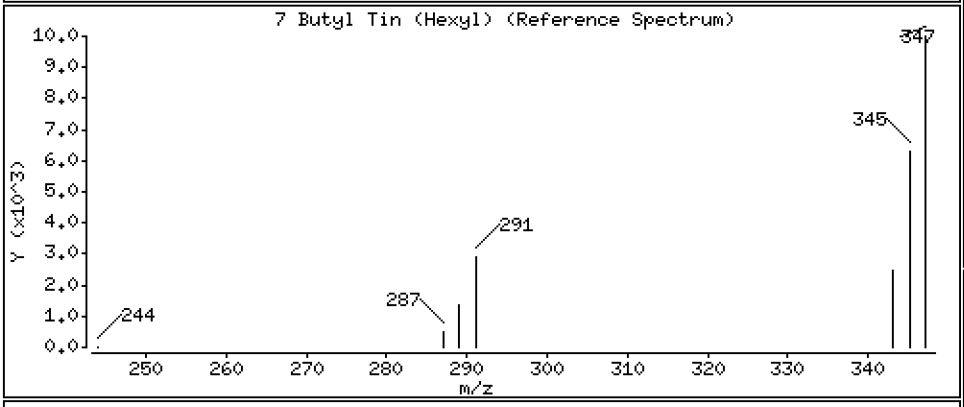
Concentration: 0.07833 ug/mL

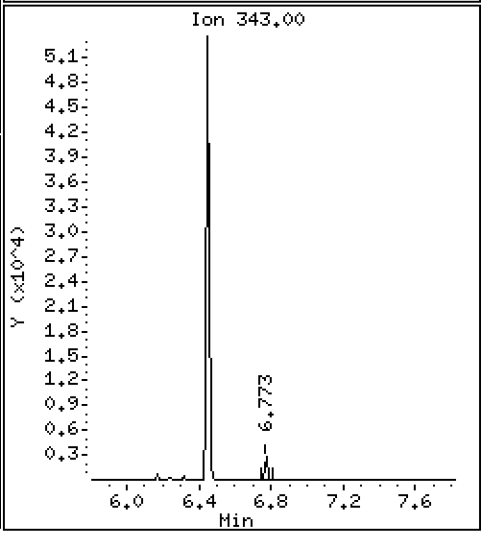


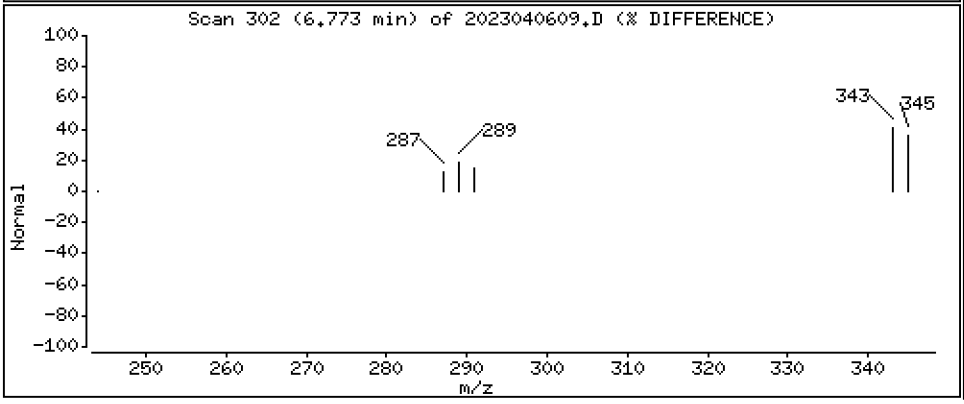












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040609.D
Lab Smp Id: SLD0101-SCV1
Inj Date : 06-APR-2023 17:18
Operator : JZ Inst ID: nt12.i
Smp Info : SCV230406
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:55 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 9
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	CONCENTRATIONS FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	Compound Not Detected.					
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	428	0.00582	0.005817
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	136359	2.30946	2.309
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	178329	2.00000	
	5 Dibutyl Tin (Hexyl)	347	Compound Not Detected.					
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	107876	1.58791	1.588
	7 Butyl Tin (Hexyl)	347	6.773	6.813	(0.779)	5821	0.07833	0.07833
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	27505	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040609.D
Lab Smp Id: SLD0101-SCV1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

COMPOUND	STANDARD	AREA LIMIT LOWER	AREA LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	178329	8.62
8 p-Terphenyl-d14	22611	11306	45222	27505	21.64

COMPOUND	STANDARD	RT LIMIT LOWER	RT LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040609.D

Lab ID: SLD0101-SCV1
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 17:18

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

** FIRST SURROGATE NOT FOUND. ICAL Check not performed **

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

SECOND-SOURCE CALIBRATION VERIFICATION

EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG: 23C0619
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Calibration: GD00019
Laboratory ID: SLD0101-SCV1
Sequence: SLD0101
Sequence Name: Secondary Cal Check
Standard ID: L002076

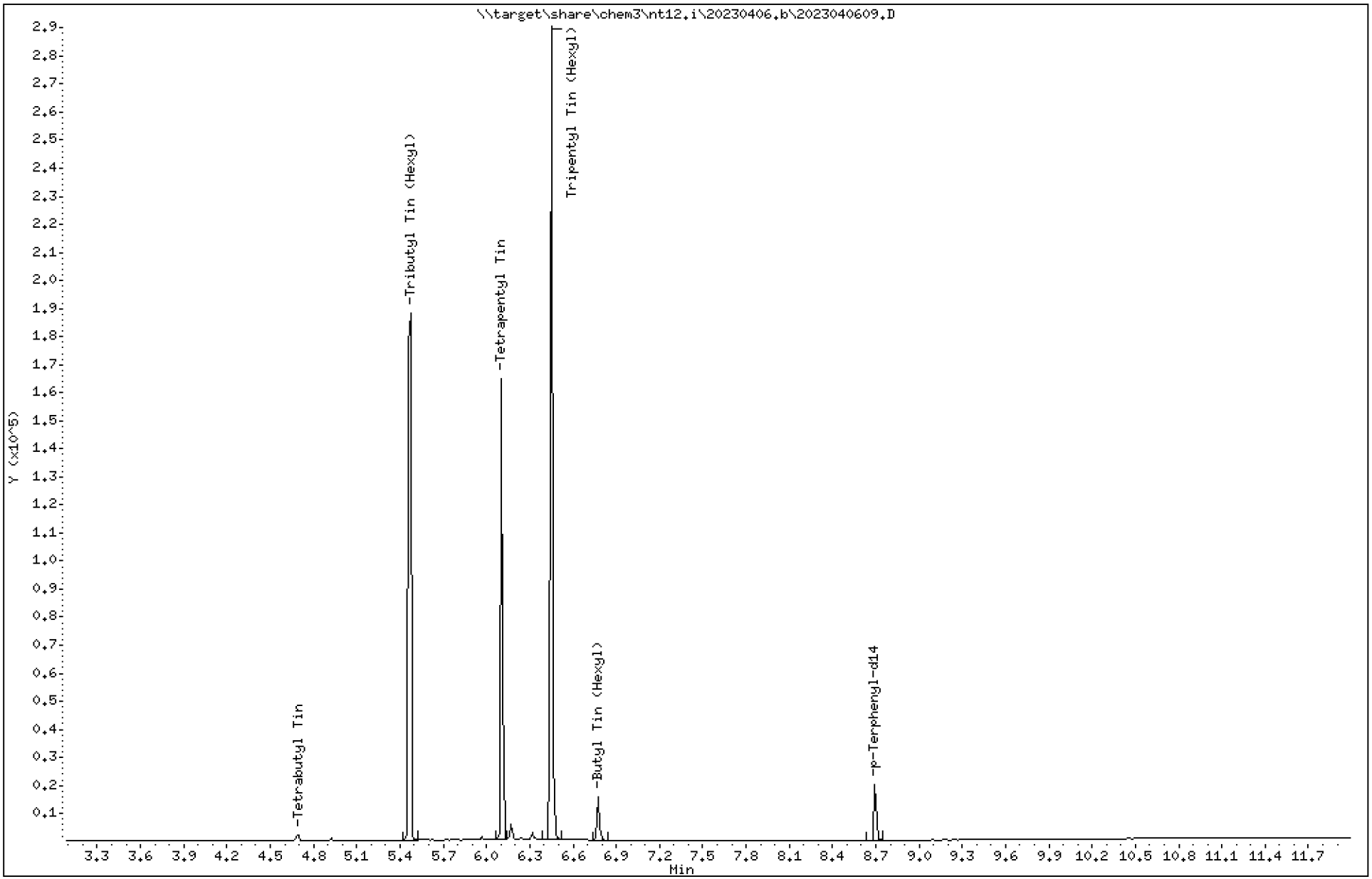
ANALYTE	EXPECTED (ug/mL)	FOUND (ug/mL)	% DRIFT	QC LIMIT
Tributyltin Ion	1.5460	1.79	15.5	20.00
Tripentyltin	1.5918	1.26	-20.6 *	20.00

* Indicates values outside of QC limits

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D
Date : 06-APR-2023 17:18
Client ID:
Sample Info: SCV230406

Instrument: nt12.i
Operator: JZ
Column diameter: 0.25

Column phase: ZB-5msi



23C0619 CLPLIKE (Rev0) - Page 228 of 1484

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

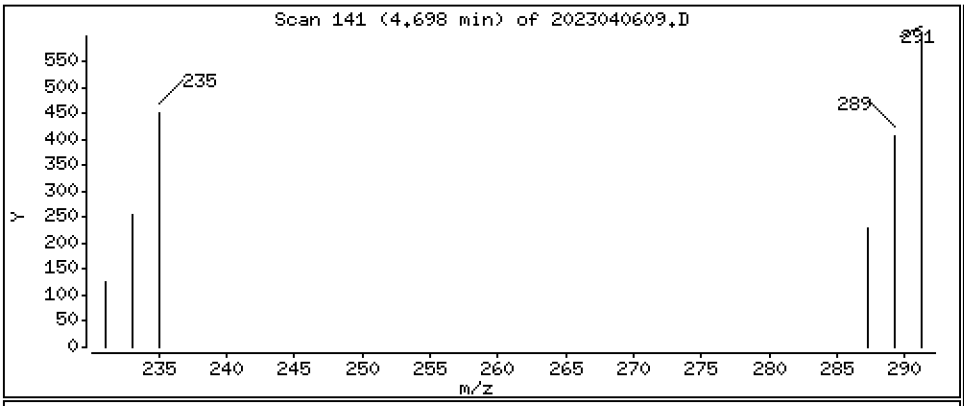
Operator: JZ

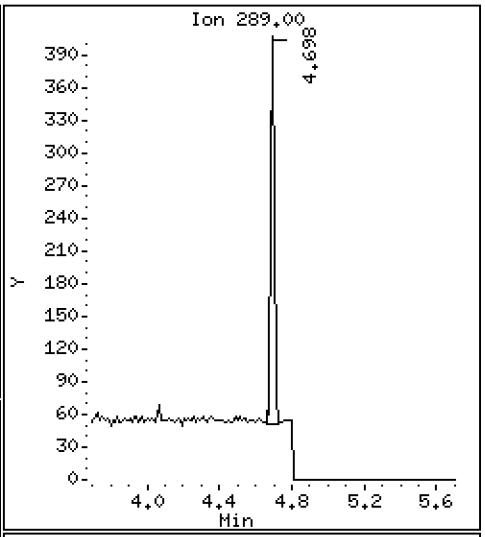
Column phase: ZB-5msi

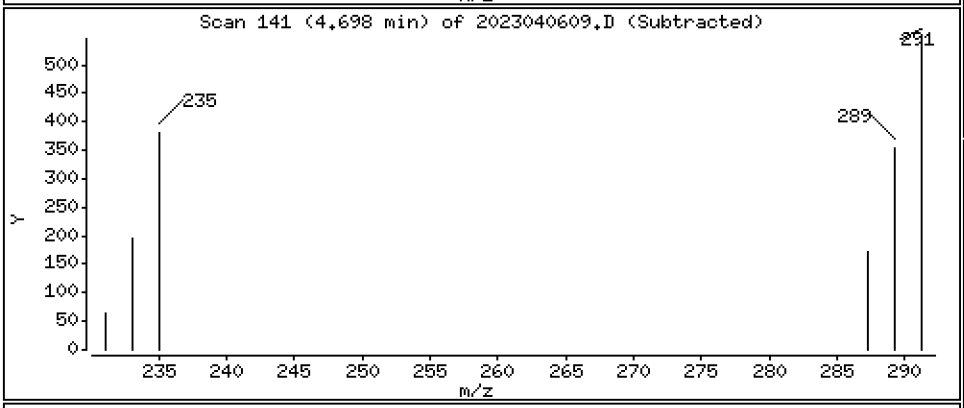
Column diameter: 0.25

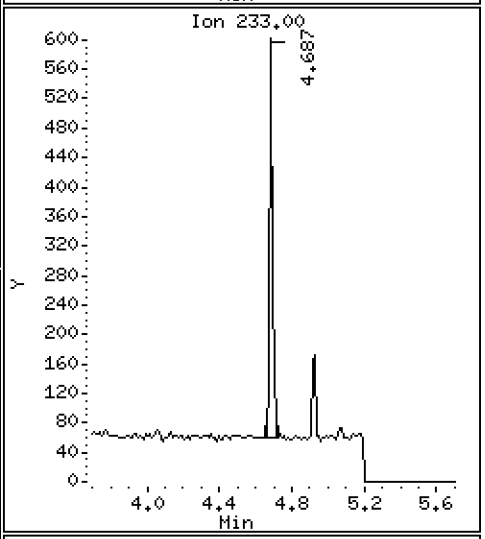
2 Tetrabutyl Tin

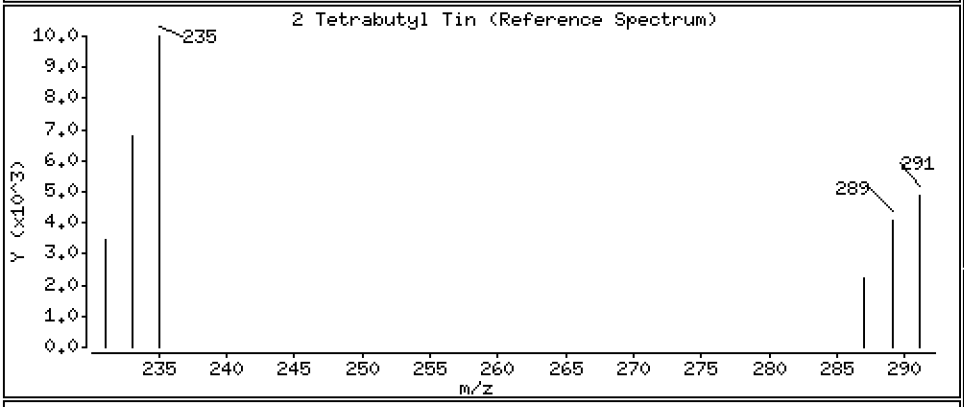
Concentration: 0.005817 ug/mL

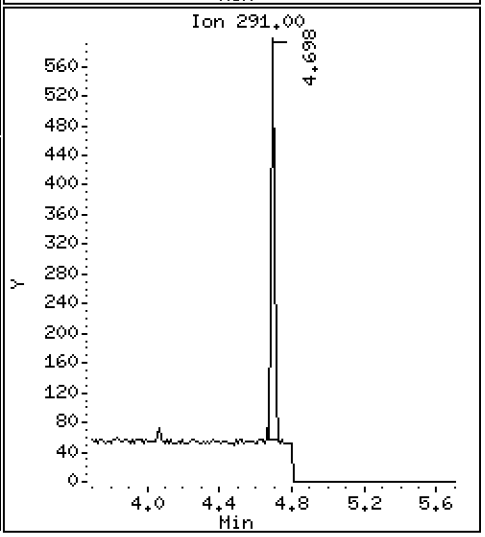


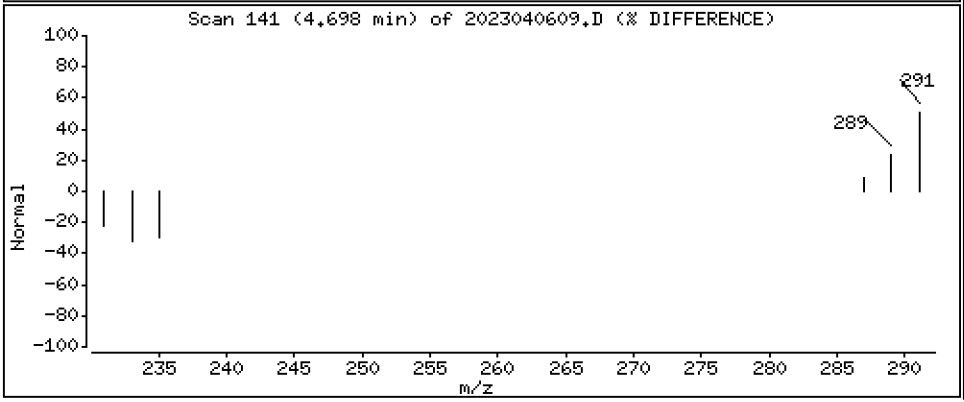












Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

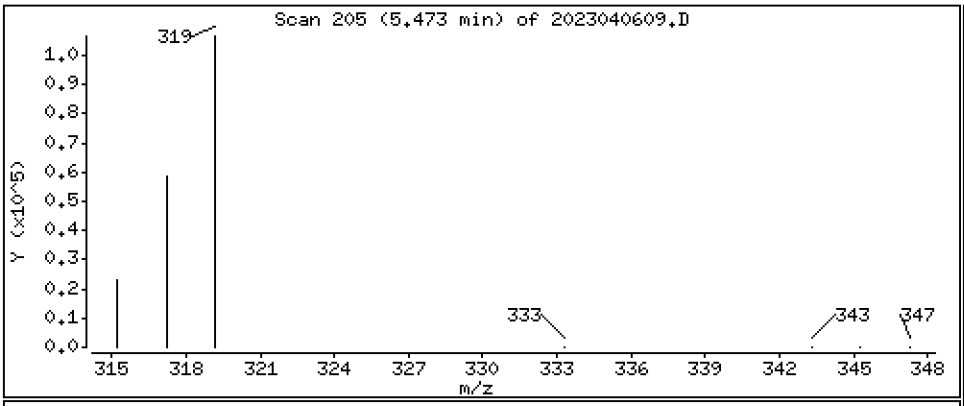
Operator: JZ

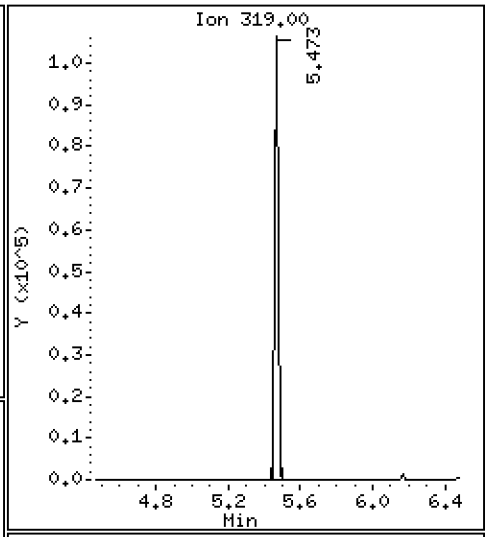
Column phase: ZB-5msi

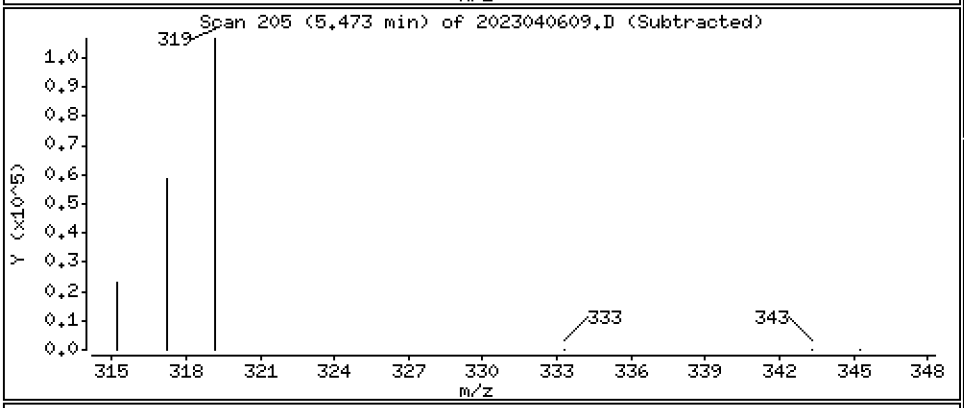
Column diameter: 0.25

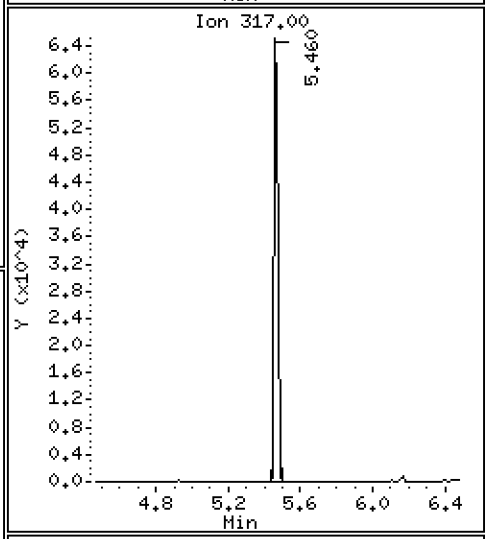
3 Tributyl Tin (Hexyl)

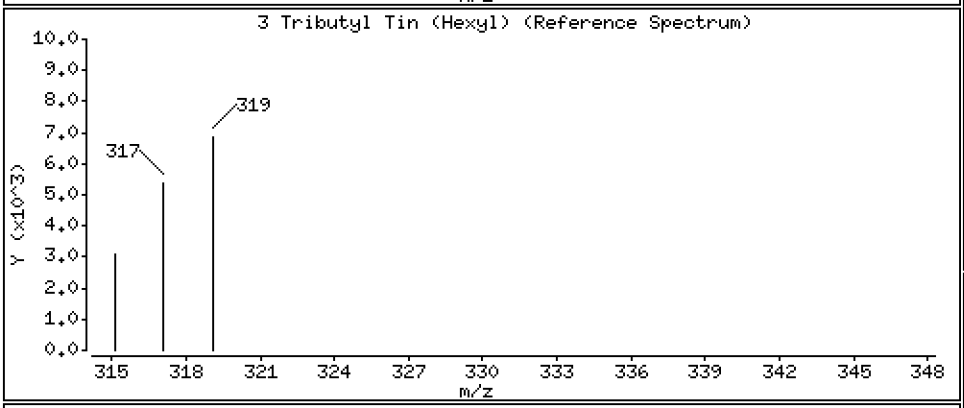
Concentration: 2.309 ug/mL

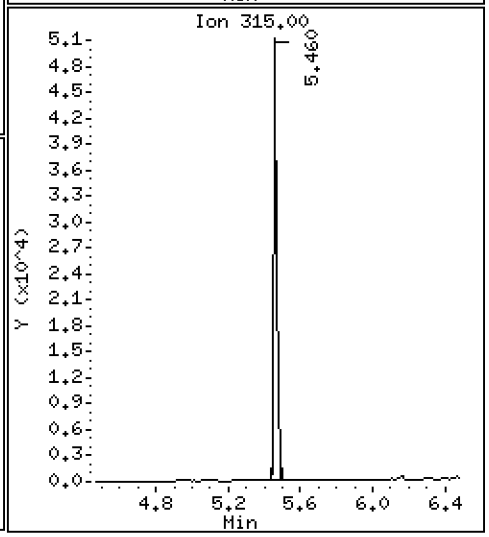


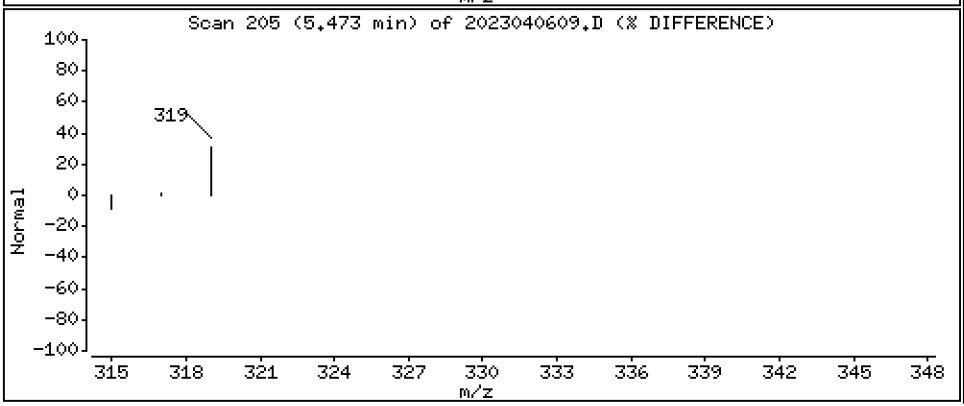












Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

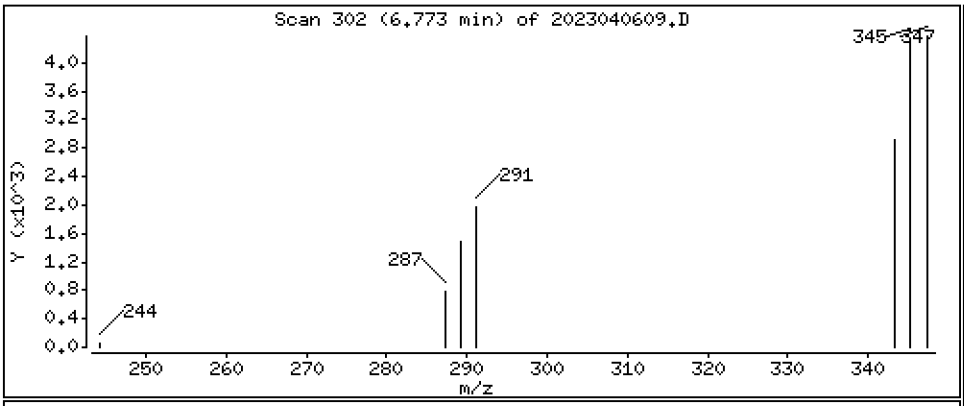
Operator: JZ

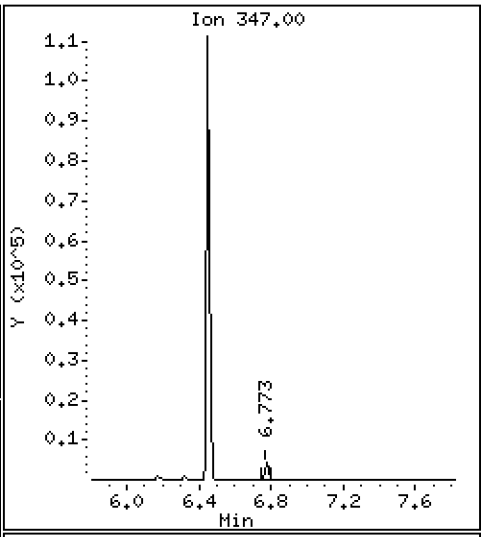
Column phase: ZB-5msi

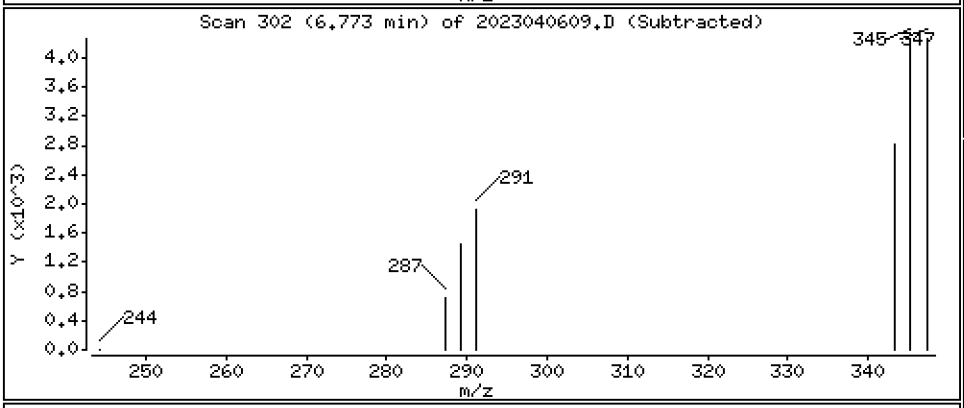
Column diameter: 0.25

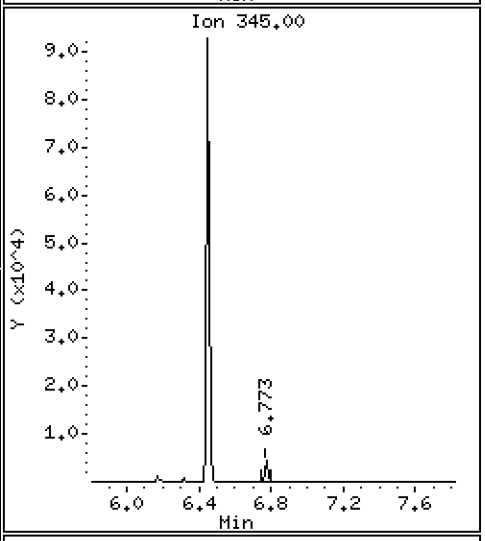
7 Butyl Tin (Hexyl)

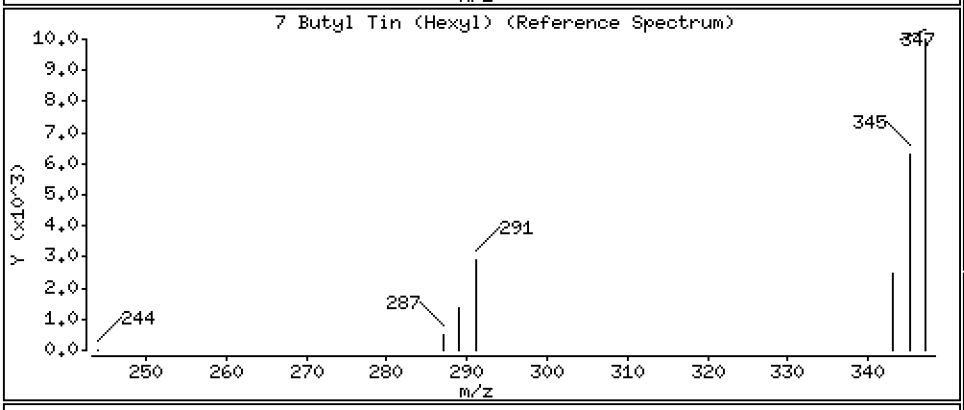
Concentration: 0.07833 ug/mL

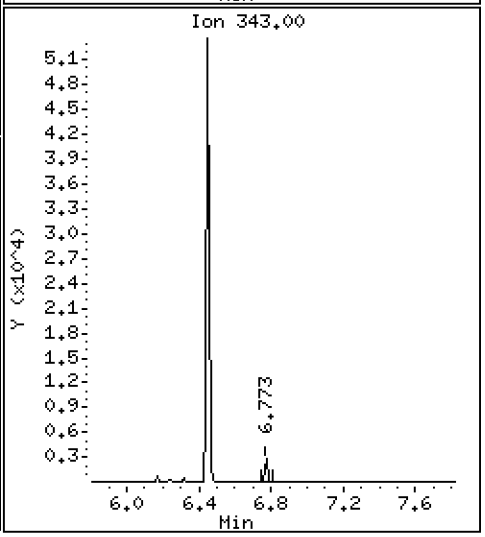


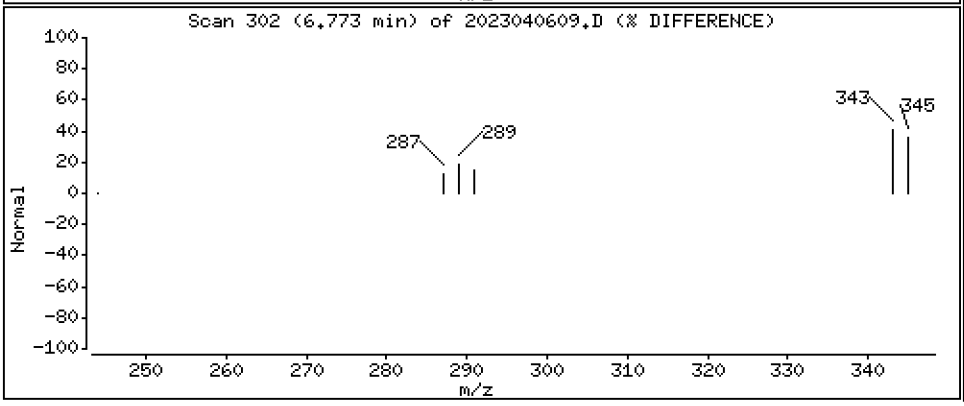












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040609.D
Lab Smp Id: SLD0101-SCV1
Inj Date : 06-APR-2023 17:18
Operator : JZ Inst ID: nt12.i
Smp Info : SCV230406
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:55 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 9
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	Compound Not Detected.					
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	428	0.00582	0.005817
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	136359	2.30946	2.309
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	178329	2.00000	
	5 Dibutyl Tin (Hexyl)	347	Compound Not Detected.					
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	107876	1.58791	1.588
	7 Butyl Tin (Hexyl)	347	6.773	6.813	(0.779)	5821	0.07833	0.07833
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	27505	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040609.D
Lab Smp Id: SLD0101-SCV1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

COMPOUND	STANDARD	AREA LIMIT LOWER	AREA LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	178329	8.62
8 p-Terphenyl-d14	22611	11306	45222	27505	21.64

COMPOUND	STANDARD	RT LIMIT LOWER	RT LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040609.D

Lab ID: SLD0101-SCV1
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 17:18

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

** FIRST SURROGATE NOT FOUND. ICAL Check not performed **

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

SECOND-SOURCE CALIBRATION VERIFICATION

EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG: 23C0619
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Calibration: GD00019
Laboratory ID: SLD0101-SCV2
Sequence: SLD0101
Sequence Name: Secondary Cal Check
Standard ID: L003829

ANALYTE	EXPECTED (ug/mL)	FOUND (ug/mL)	% DRIFT	QC LIMIT
Tributyltin Ion	1.5460	1.75	13.2	20.00
Tripentyltin	1.5918	1.37	-14.0	20.00

* Indicates values outside of QC limits

SECOND-SOURCE CALIBRATION VERIFICATION

EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG: 23C0619
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Calibration: GD00019
Laboratory ID: SLD0101-SCV1
Sequence: SLD0101
Standard ID: L002076

ANALYTE	EXPECTED (ug/mL)	FOUND (ug/mL)	% DRIFT	QC LIMIT
Tributyltin Ion	1.5460	1.79	15.5	20.00
Tripentyltin	1.5918	1.26	-20.6 *	20.00

* Values outside of QC limits

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

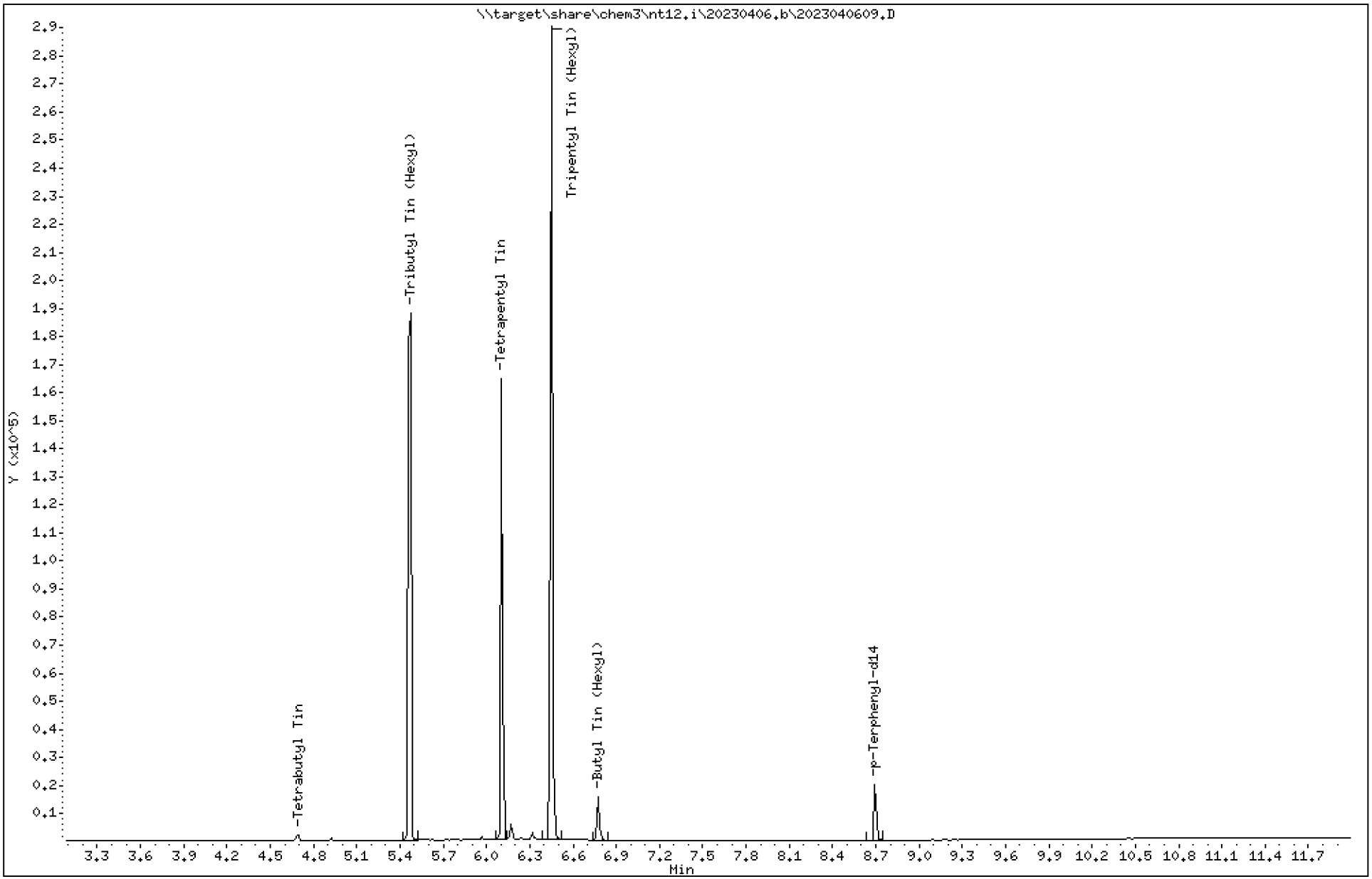
Instrument: nt12.i

Sample Info: SCV230406

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0619 CLPLIKE (Rev0) - Page 237 of 1484

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

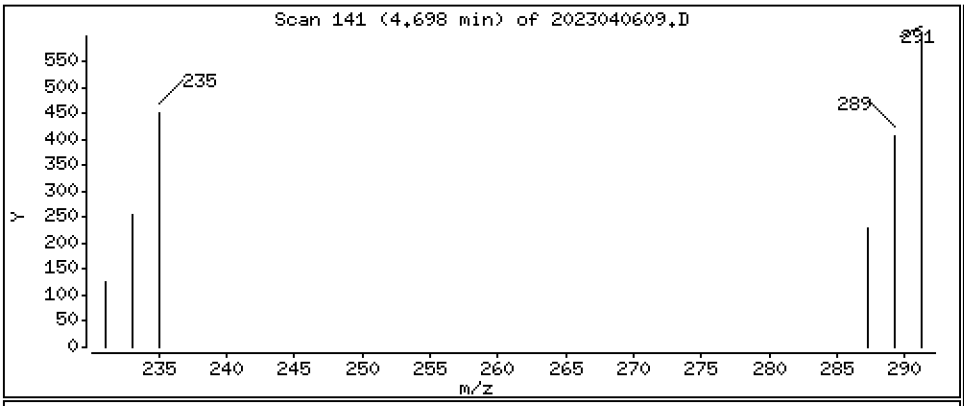
Operator: JZ

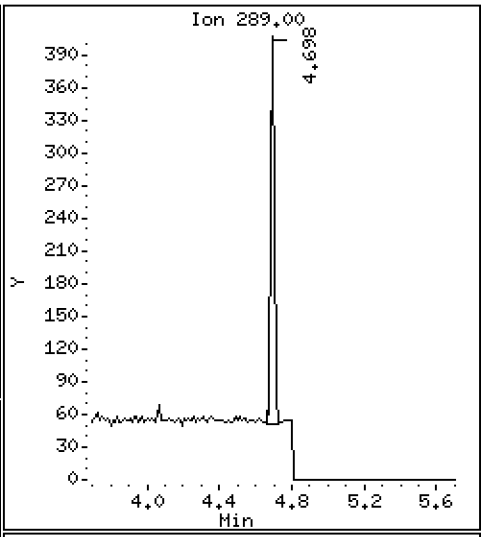
Column phase: ZB-5msi

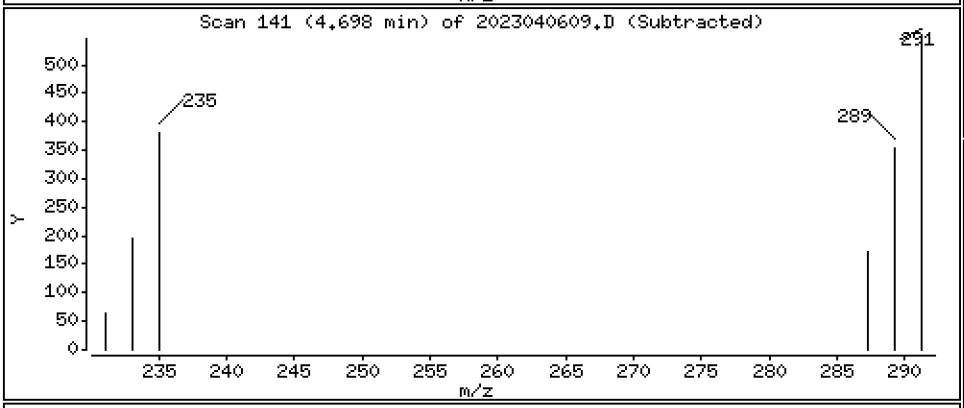
Column diameter: 0.25

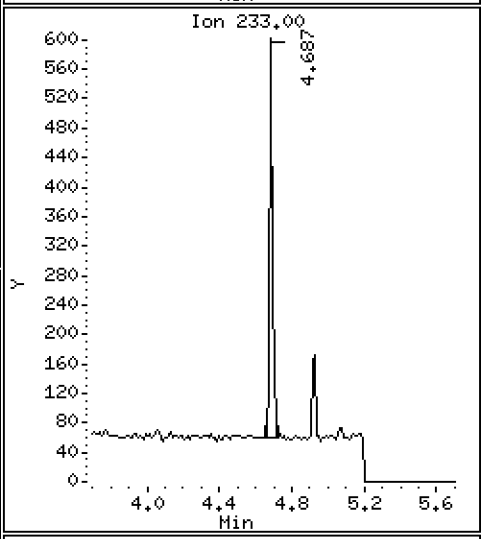
2 Tetrabutyl Tin

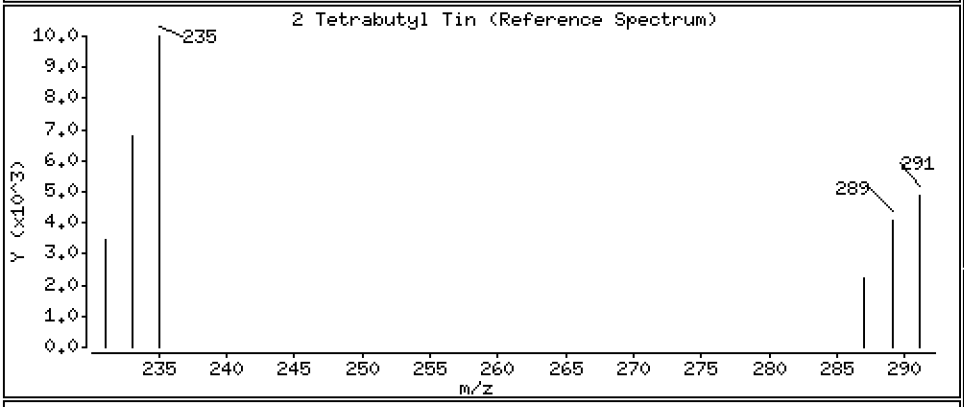
Concentration: 0.005817 ug/mL

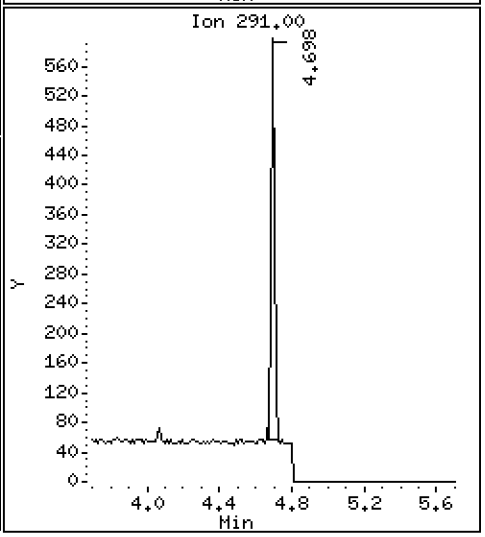


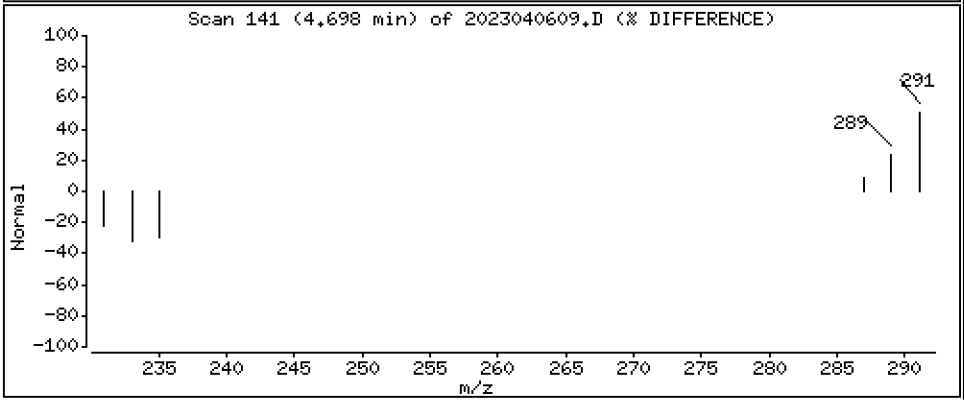












Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

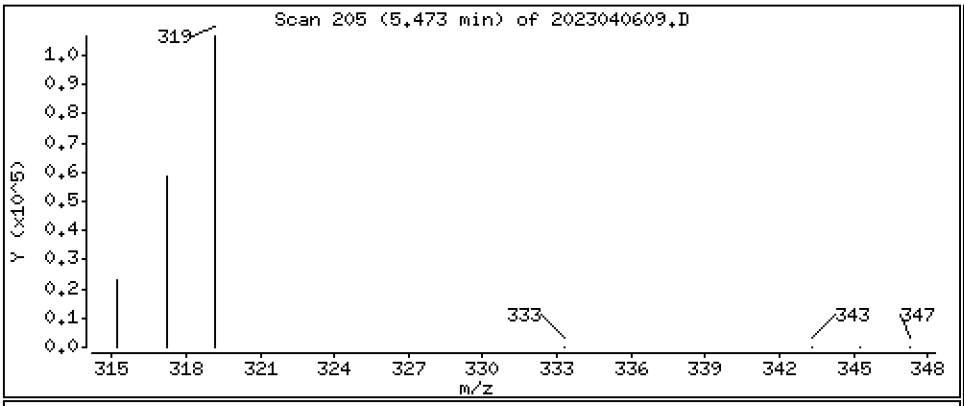
Operator: JZ

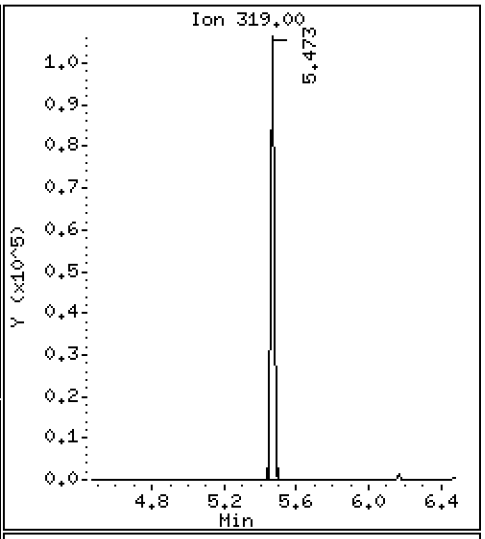
Column phase: ZB-5msi

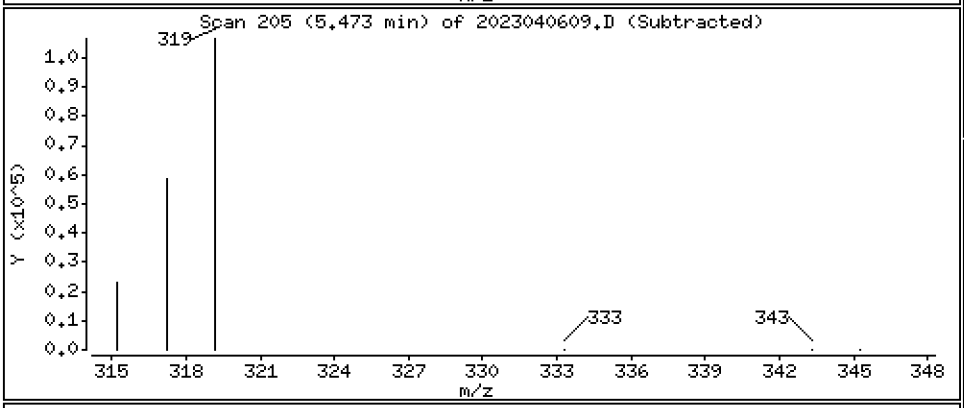
Column diameter: 0.25

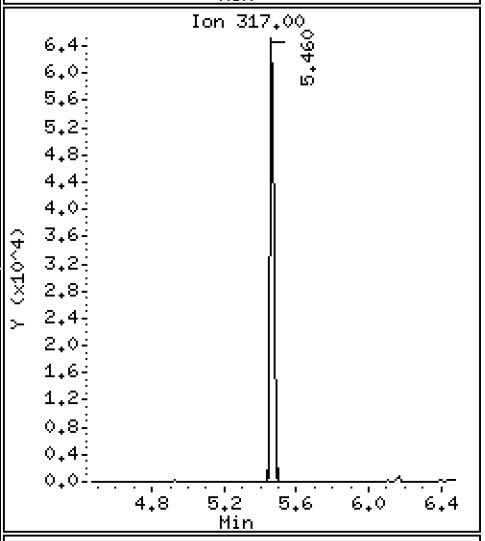
3 Tributyl Tin (Hexyl)

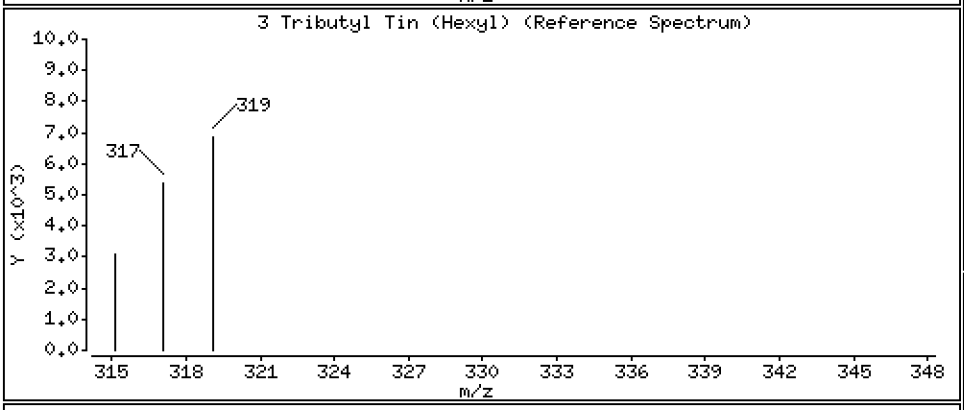
Concentration: 2.309 ug/mL

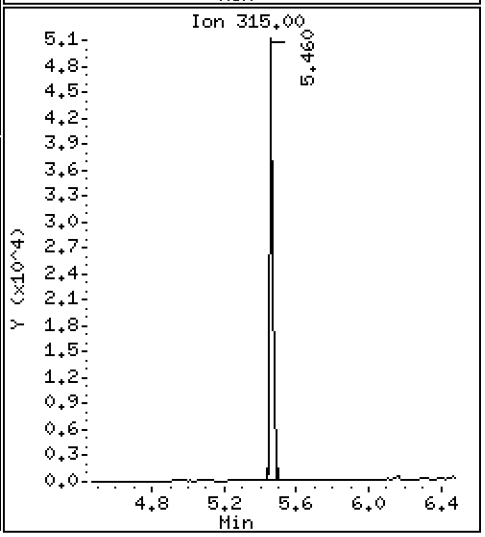


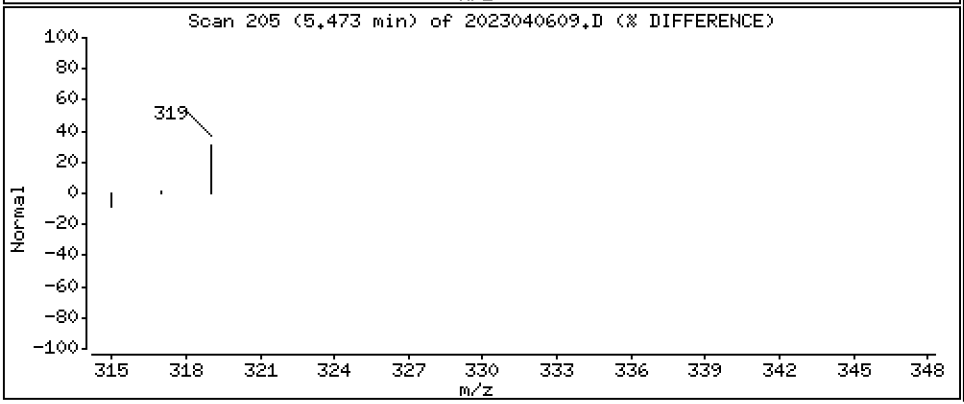












Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

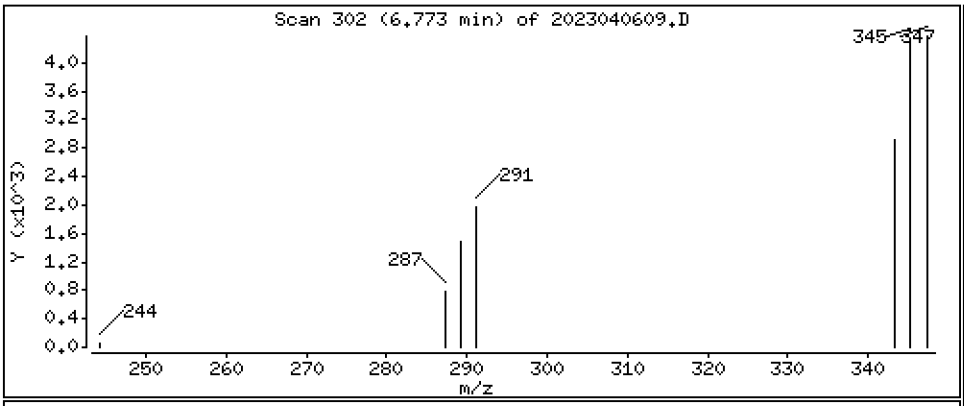
Operator: JZ

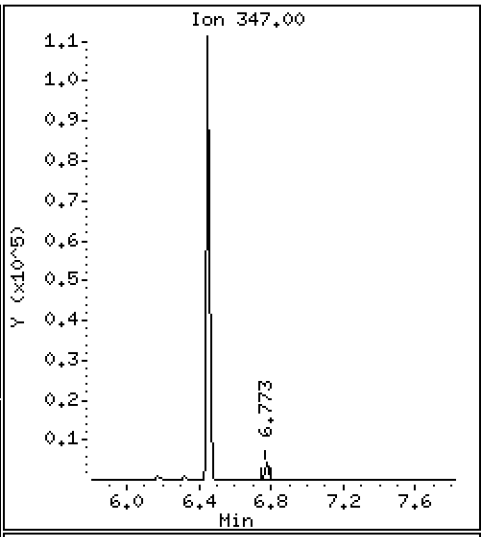
Column phase: ZB-5msi

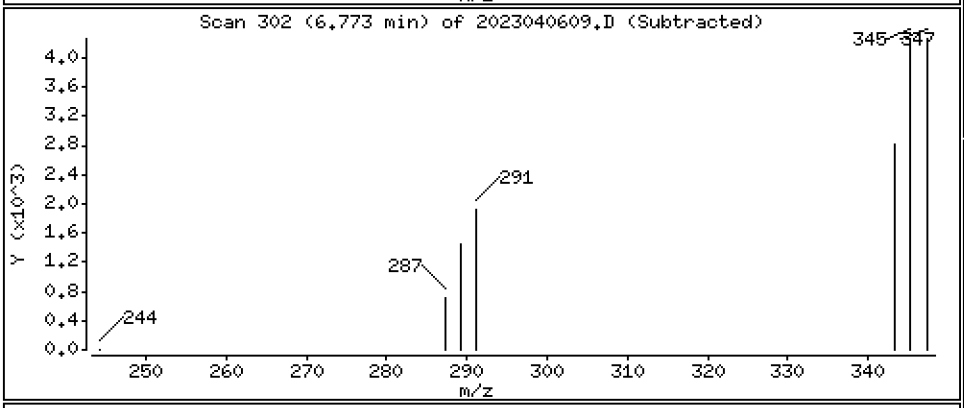
Column diameter: 0.25

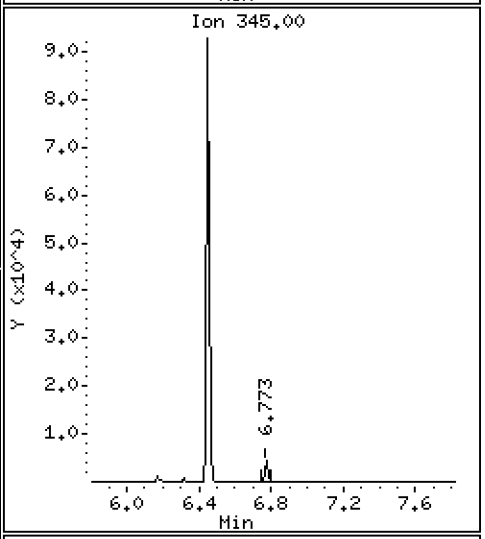
7 Butyl Tin (Hexyl)

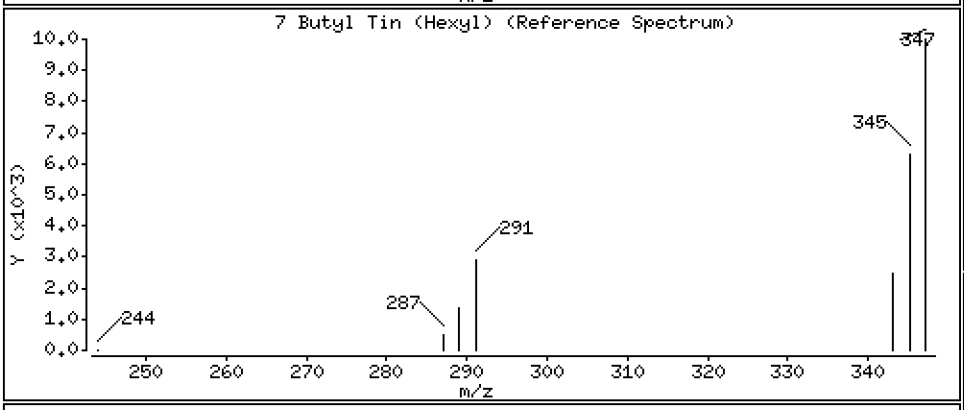
Concentration: 0.07833 ug/mL

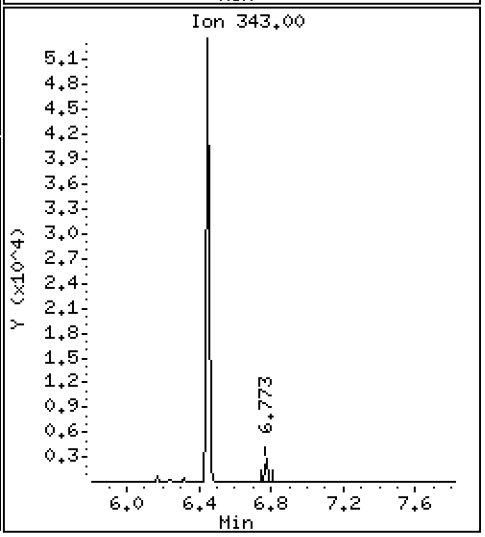


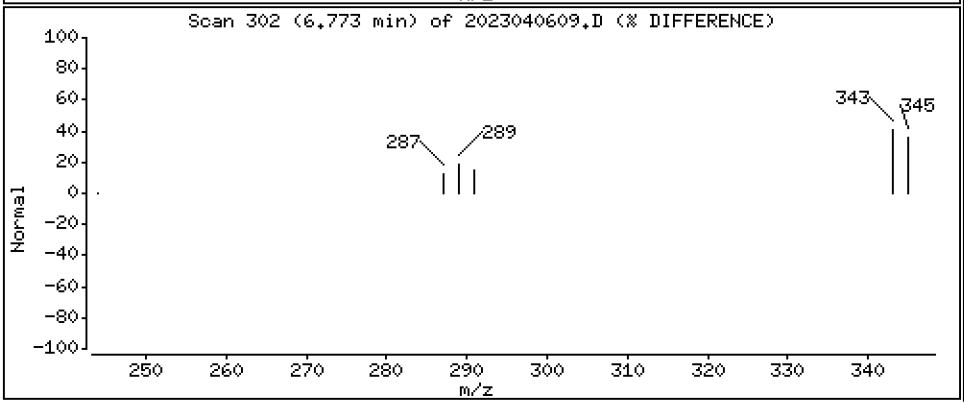












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040609.D
Lab Smp Id: SLD0101-SCV1
Inj Date : 06-APR-2023 17:18
Operator : JZ Inst ID: nt12.i
Smp Info : SCV230406
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:55 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 9
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	CONCENTRATIONS FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	Compound Not Detected.					
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	428	0.00582	0.005817
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	136359	2.30946	2.309
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	178329	2.00000	
	5 Dibutyl Tin (Hexyl)	347	Compound Not Detected.					
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	107876	1.58791	1.588
	7 Butyl Tin (Hexyl)	347	6.773	6.813	(0.779)	5821	0.07833	0.07833
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	27505	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040609.D
Lab Smp Id: SLD0101-SCV1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	178329	8.62
8 p-Terphenyl-d14	22611	11306	45222	27505	21.64

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040609.D

Lab ID: SLD0101-SCV1
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 17:18

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

** FIRST SURROGATE NOT FOUND. ICAL Check not performed **

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

SECOND-SOURCE CALIBRATION VERIFICATION

EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG: 23C0619
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Calibration: GD00019
Laboratory ID: SLD0101-SCV2
Sequence: SLD0101
Standard ID: L003829

ANALYTE	EXPECTED (ug/mL)	FOUND (ug/mL)	% DRIFT	QC LIMIT
Tributyltin Ion	1.5460	1.75	13.2	20.00
Tripentyltin	1.5918	1.37	-14.0	20.00

* Values outside of QC limits

Analytical Resources, LLC
Analytical Chemists and Consultants

INITIAL CALIBRATION CHECK
EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Instrument ID:	NT12	Calibration:	GD00019
Lab File ID:	2023040606A.D	Calibration Date:	04/06/2023
Sequence:	SLD0107	Injection Date:	04/06/23
Lab Sample ID:	SLD0107-ICV1	Injection Time:	16:28
Sequence Name:	Initial Cal Check		

		CONC. (ug/mL)		RESPONSE FACTOR			% DRIFT/DIFF	
COMPOUND	TYPE	STD	ICV	ICAL	ICV	MIN	ICV	LIMIT
Tributyltin Ion	A	0.77300	0.747	0.6621886	0.6396744	0.01	-3.4	+/-20
Dibutyltin Ion	A	1.1560	1.14	0.3357743	0.3304631	0.01	-1.6	+/-20
Butyltin Ion	A	0.81600	0.794	0.5403357	0.5258811	0.01	-2.7	+/-20
Tetrabutyltin	A	1.0000	0.956	0.8251907	0.7892381	0.01	-4.4	+/-20
Tripentyltin	A	1.5918	1.60	0.4939876	0.4954624	0.01	0.3	+/-20
Tripropyltin	A	0.74430	0.703	0.8456179	0.7985333	0.01	-5.6	+/-20
Tetrapentyltin	A	2.0000	2.00	86289.6700	1.0000		0.0	
p-Terphenyl-d14	A	0.20000	0.200	117726.7000	1.0000		0.0	

* Values outside of QC limits

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040606A.D

Date : 06-APR-2023 16:28

Client ID:

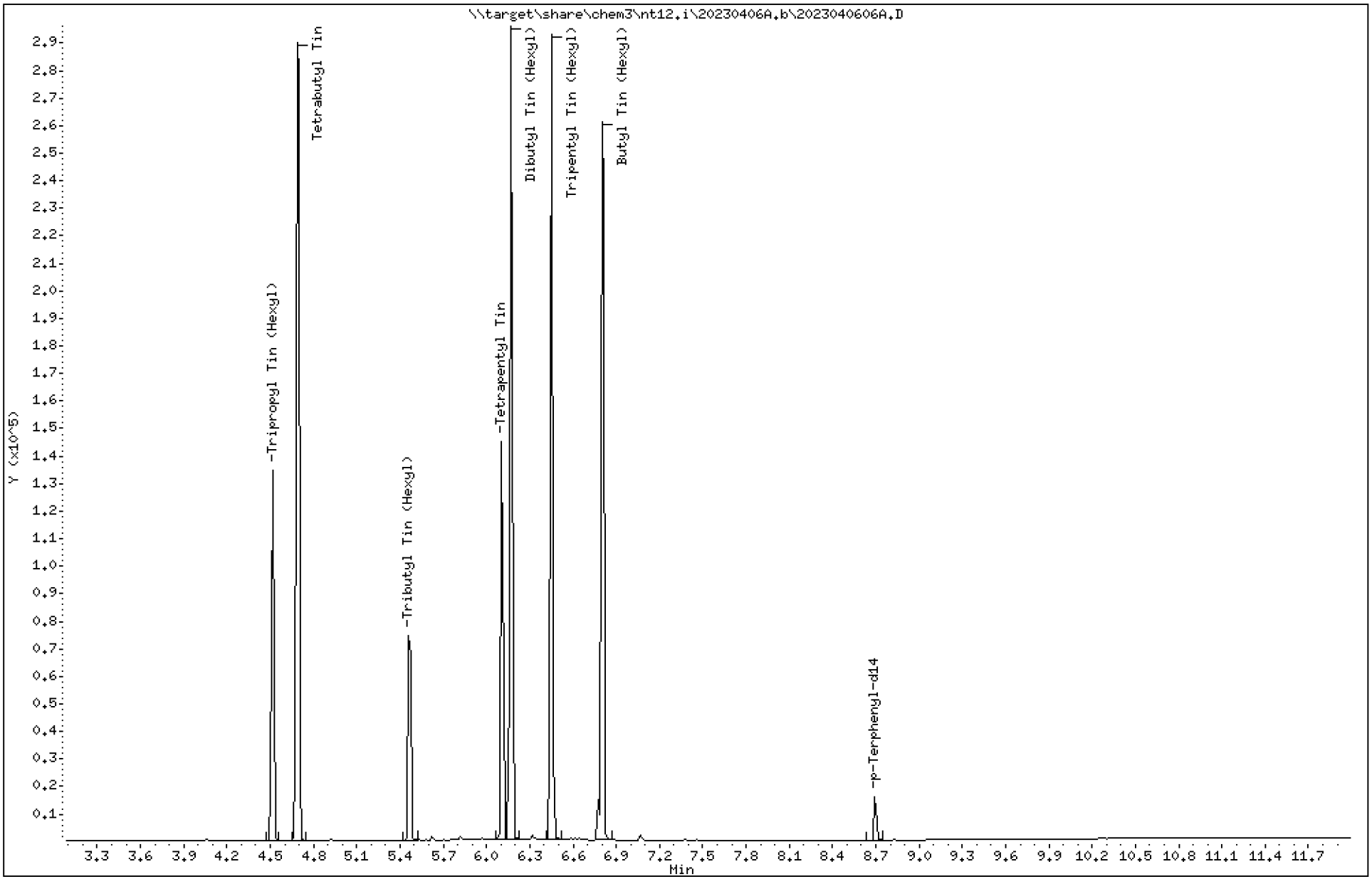
Instrument: nt12.i

Sample Info: IC1230406,

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0619 CLPLIKE (Rev0) - Page 246 of 1484

ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040606A.D
Lab Smp Id: SLD0107-ICV1
Inj Date : 06-APR-2023 16:28
Operator : JZ Inst ID: nt12.i
Smp Info : IC1230406,
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 09:43 nt12.i Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 6 Continuing Calibration Sample
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/mL)	ON-COL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.514	4.514	(0.740)	65548	1.00000	0.9443
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	64785	1.00000	0.9564
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	52508	1.00000	0.9660
*	4 Tetrapentyl Tin	333	6.102	6.102	(1.000)	164171	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.169	6.169	(0.710)	74721	2.00000	1.968
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	112029	2.00000	2.006
	7 Butyl Tin (Hexyl)	347	6.813	6.813	(0.784)	118907	2.00000	1.946
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	22611	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040606A.D
Lab Smp Id: SLD0107-ICV1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Initial Calibration Level 4.

COMPOUND	STANDARD	AREA LIMIT LOWER	AREA LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	164171	0.00
8 p-Terphenyl-d14	22611	11306	45222	22611	0.00

COMPOUND	STANDARD	RT LIMIT LOWER	RT LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040606A.D

Lab ID: SLD0107-ICV1
nt12.i, 20230406A.b\TBT20230406.m,   06-APR-2023 16:28

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

Quant Method: ICAL

No RRT check. Ccal file.

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Q-FLAG SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406A.b

Instrument: nt12.i Date: 06-APR-2023 Method: 20230406A.b\TBT20230406.m

INITIAL CAL: 06-APR-2023

Compound	%RSD or R^2
NO Q-FLAGS	

ICV CAL: 2023040606A.D 06-APR-2023 16:28

Compound	%D
NO Q-FLAGS	

Analytical Resources, LLC
Analytical Chemists and Consultants

SECOND-SOURCE
CONTINUING CALIBRATION CHECK
EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Instrument ID:	NT12	Calibration:	GD00019
Lab File ID:	2023040609.D	Calibration Date:	04/06/2023
Sequence:	SLD0101	Injection Date:	04/06/23
Lab Sample ID:	SLD0101-SCV1	Injection Time:	17:18
Sequence Name:	Secondary Cal Check		

		CONC. (ug/mL)		RESPONSE FACTOR (RRF)			% DRIFT/DIFF		
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN	CCV	LIMIT	
Tributyltin Ion	A	1.5460	1.79	0.6621886	0.7646484	0.01	15.5	+/-20	
Tripentyltin	A	1.5918	1.26	0.4939876	0.3922051	0.01	-20.6	+/-20	*

* Values outside of QC limits

* Values outside of QC limits

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

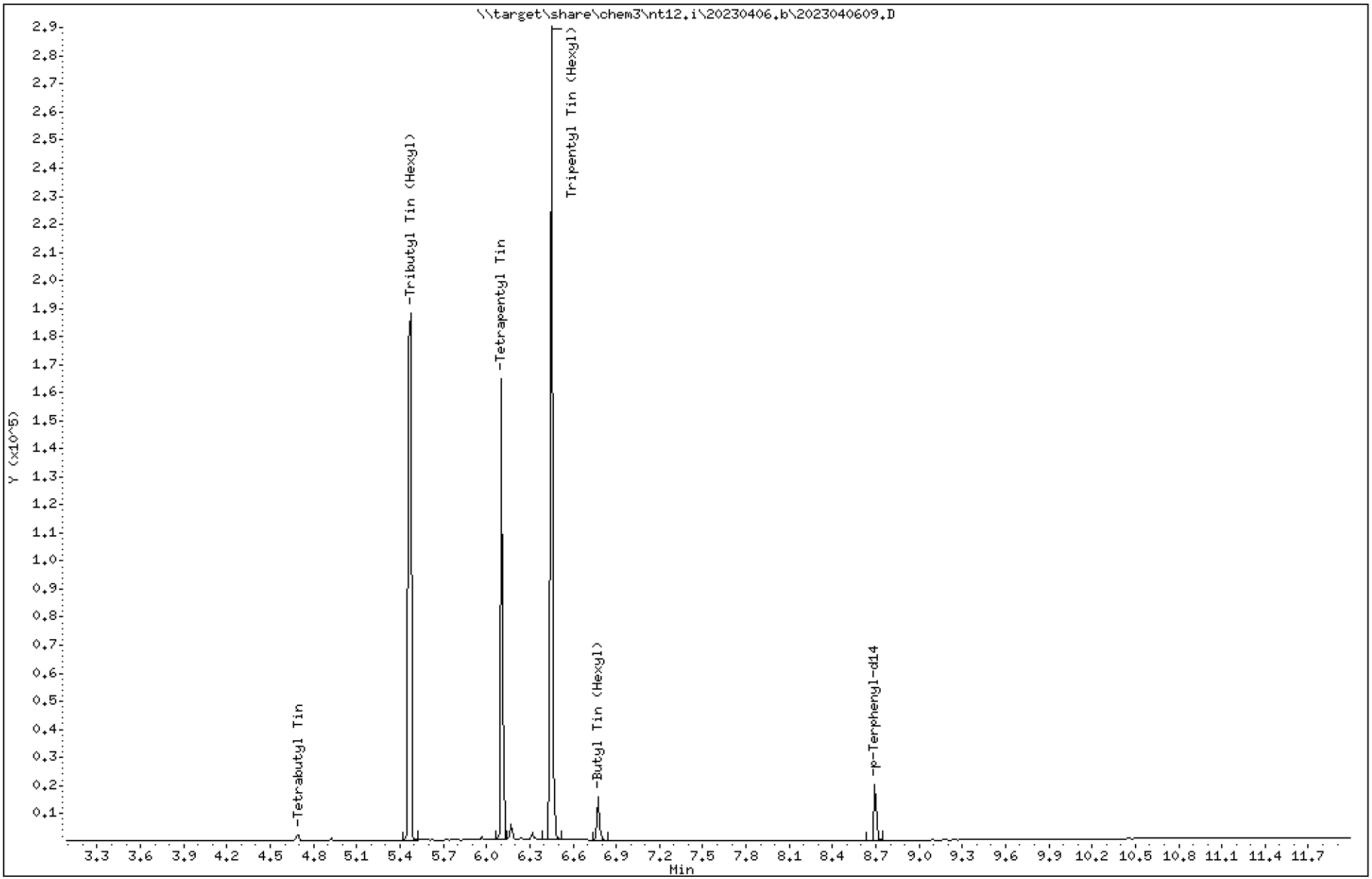
Instrument: nt12.i

Sample Info: SCV230406

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0619 CLPLIKE (Rev0) - Page 252 of 1484

Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

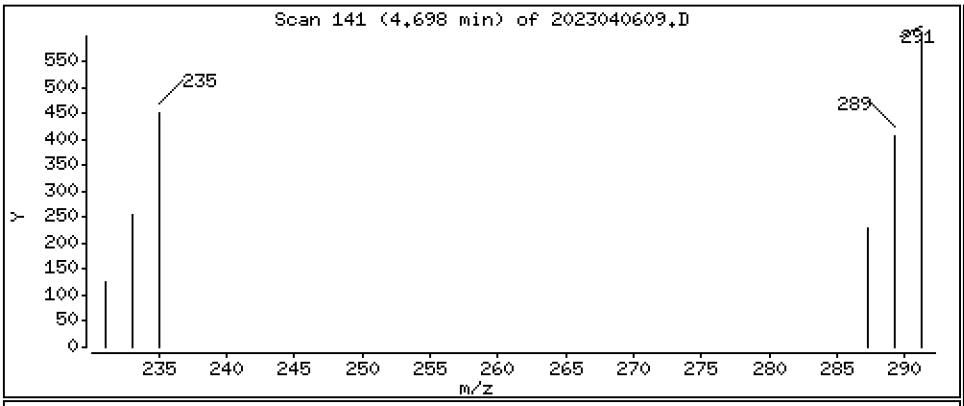
Operator: JZ

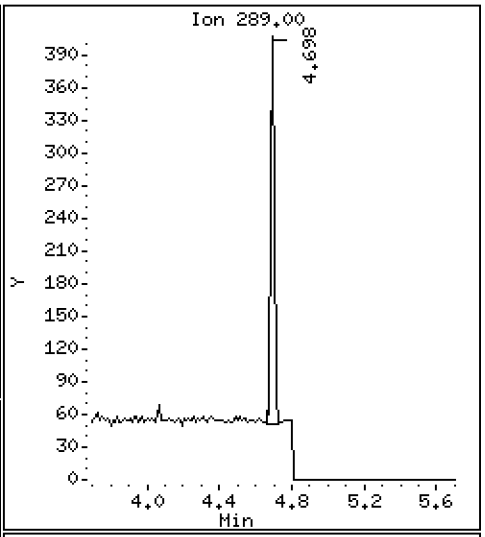
Column phase: ZB-5msi

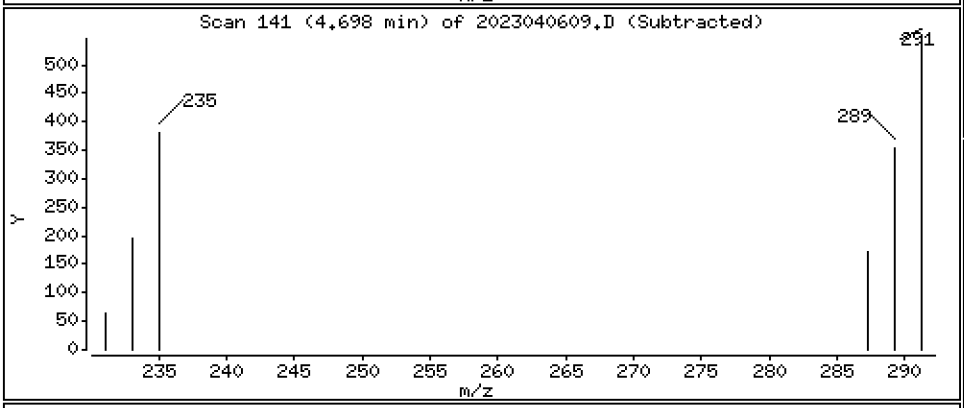
Column diameter: 0.25

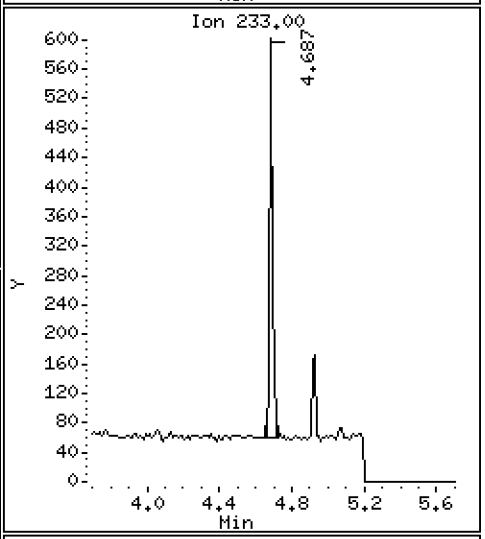
2 Tetrabutyl Tin

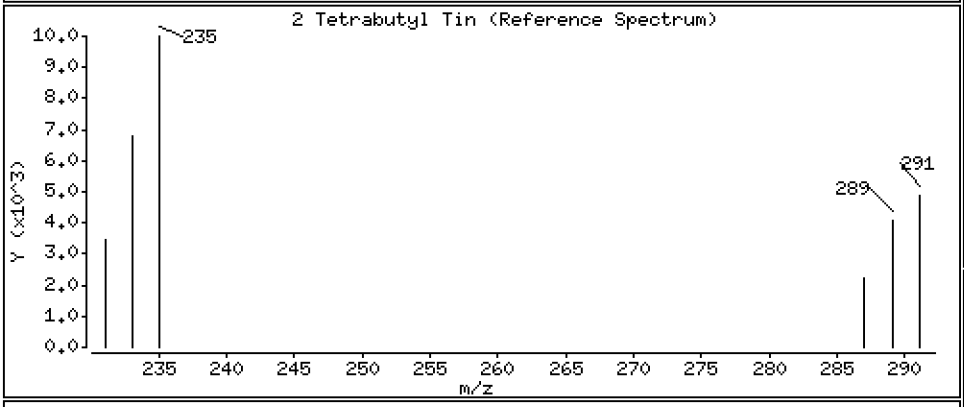
Concentration: 0.005817 ug/mL

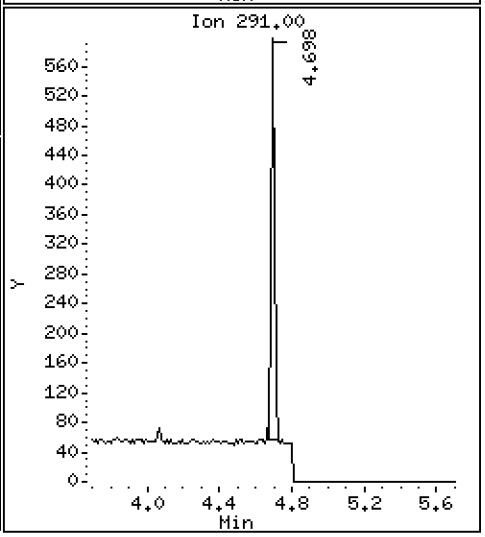


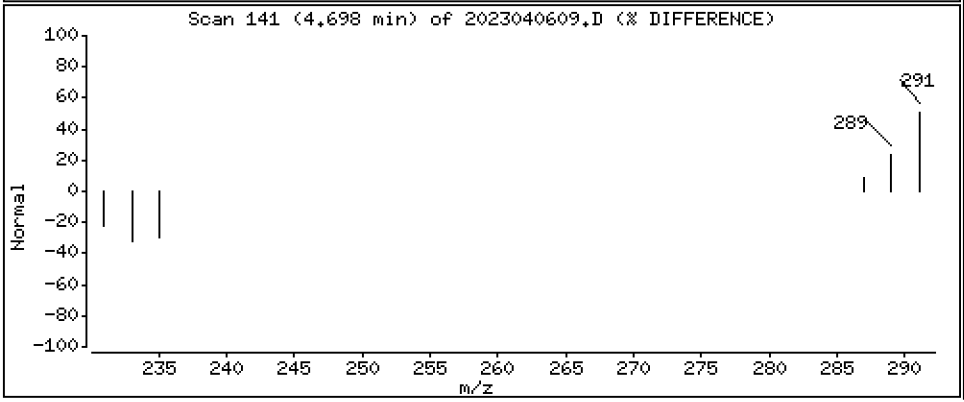












Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

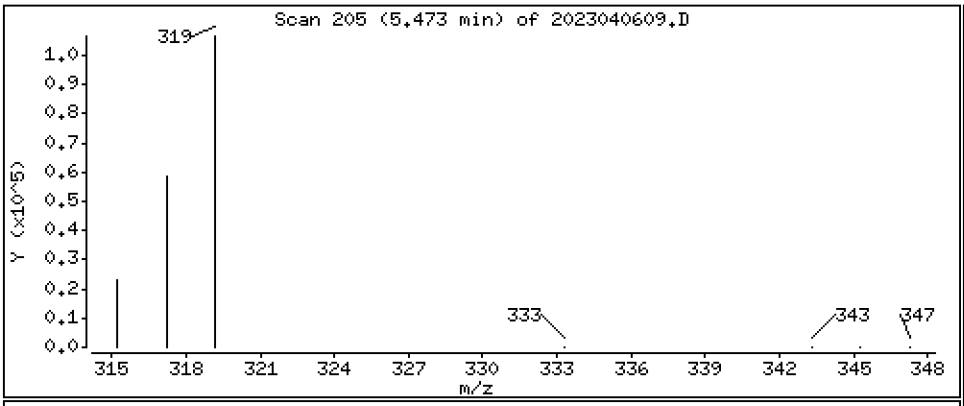
Operator: JZ

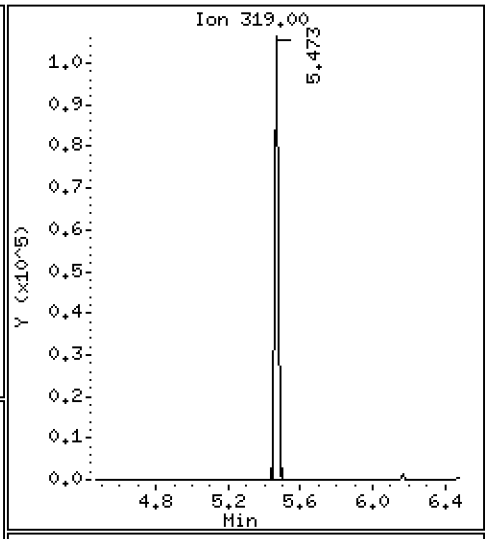
Column phase: ZB-5msi

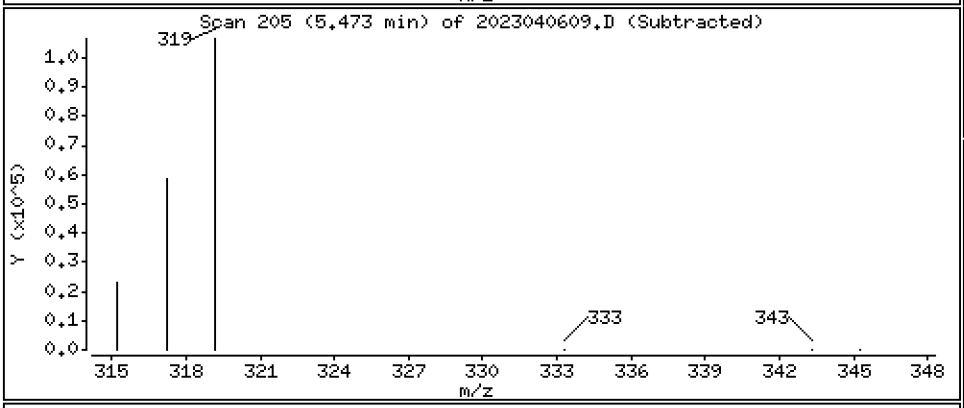
Column diameter: 0.25

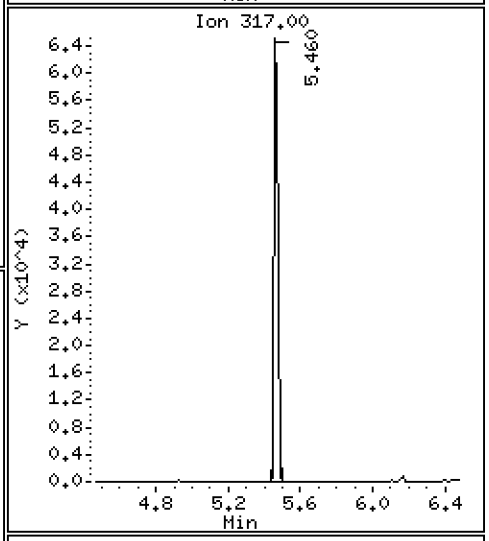
3 Tributyl Tin (Hexyl)

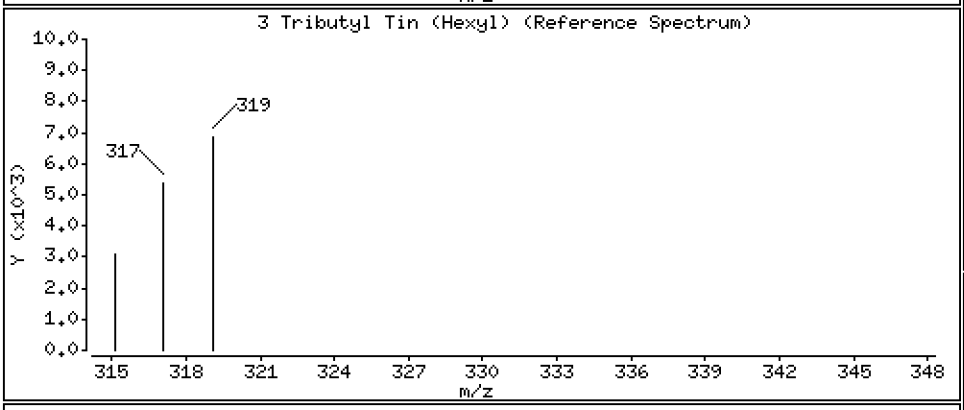
Concentration: 2.309 ug/mL

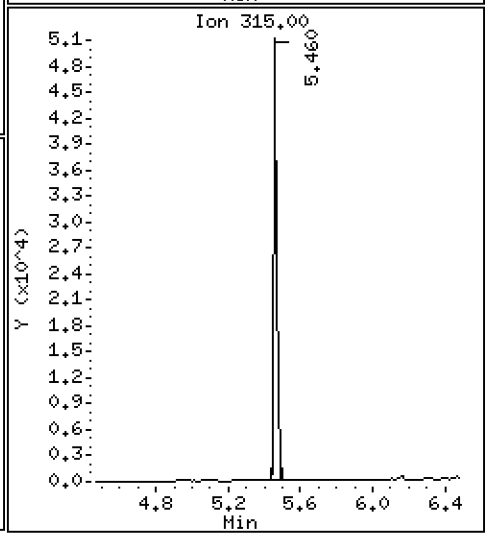


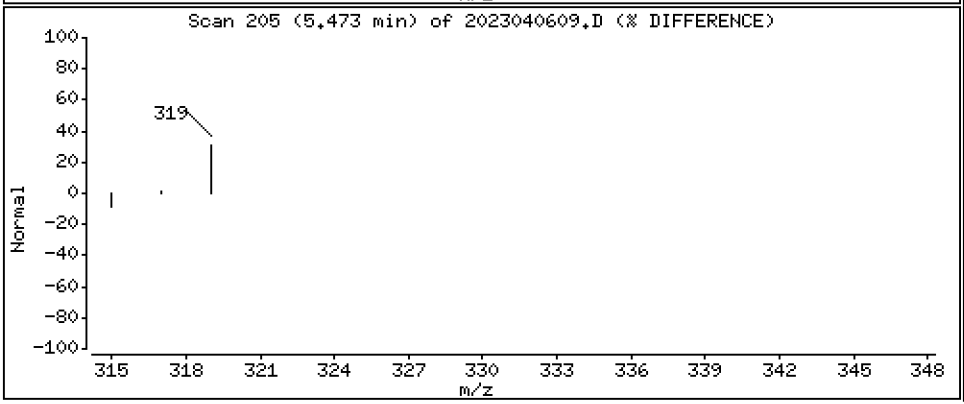












Data File: \\target\share\chem3\nt12.i\20230406.b\2023040609.D

Date : 06-APR-2023 17:18

Client ID:

Instrument: nt12.i

Sample Info: SCV230406

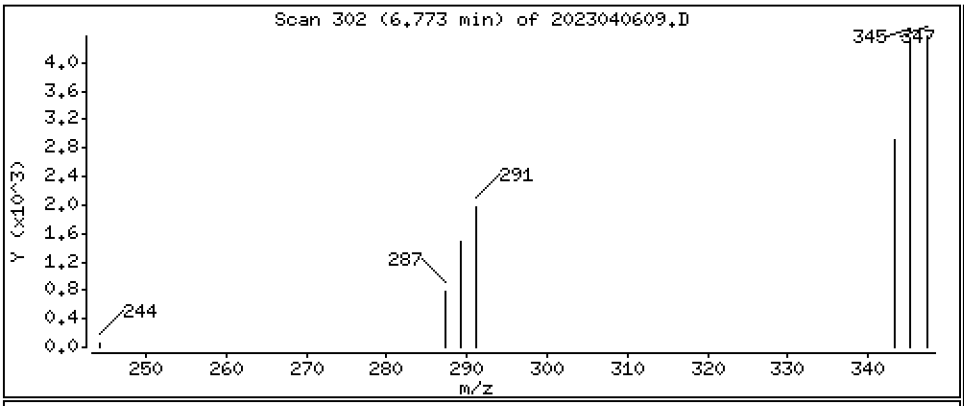
Operator: JZ

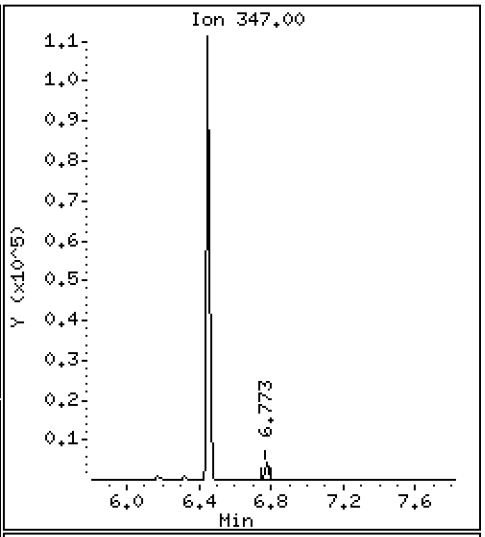
Column phase: ZB-5msi

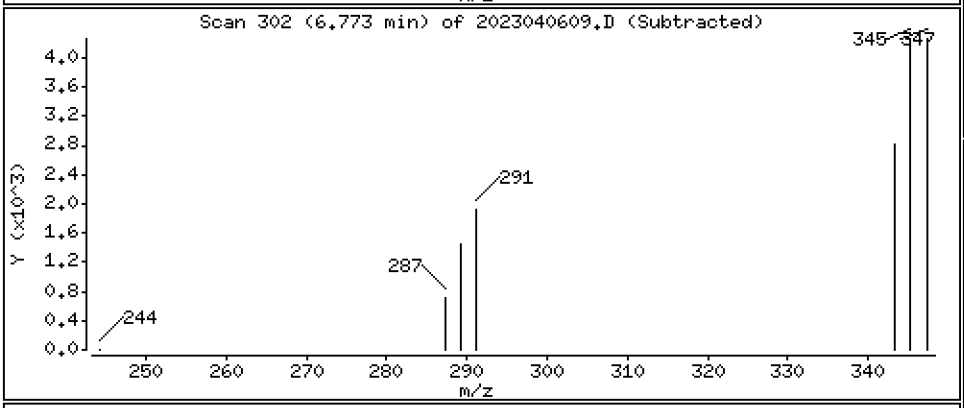
Column diameter: 0.25

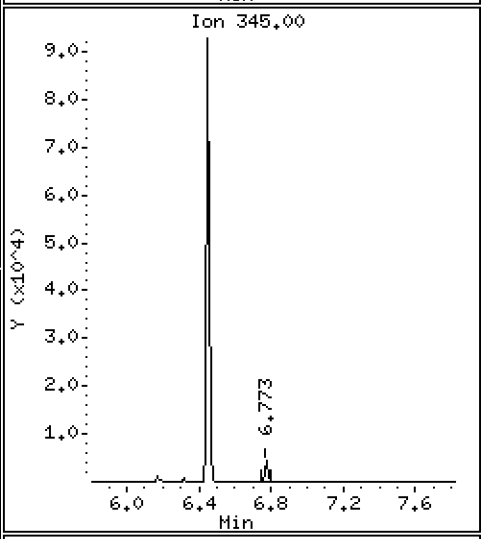
7 Butyl Tin (Hexyl)

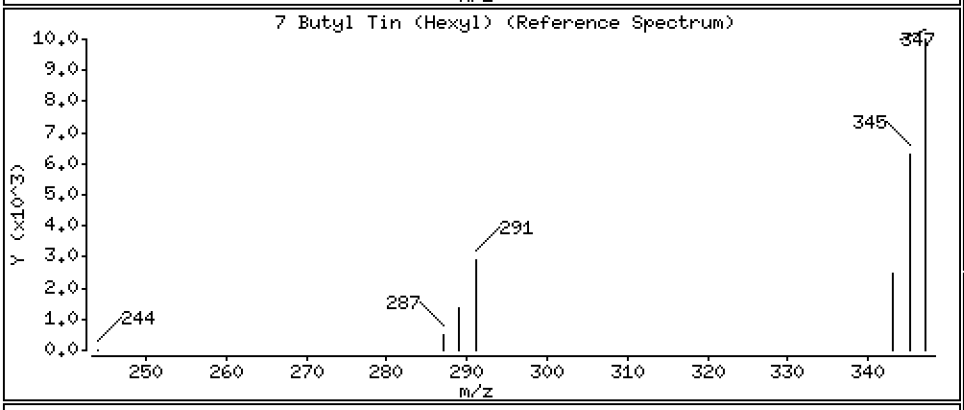
Concentration: 0.07833 ug/mL

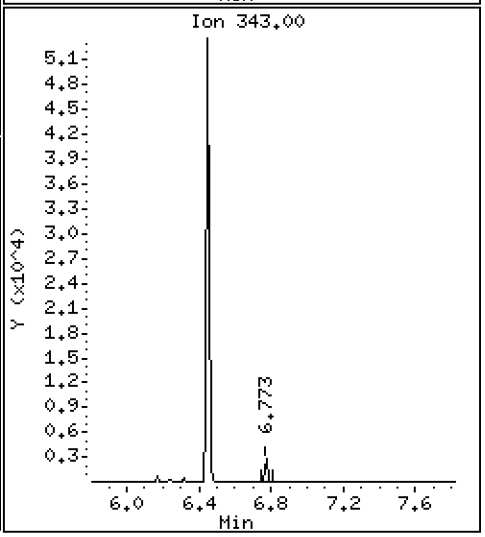


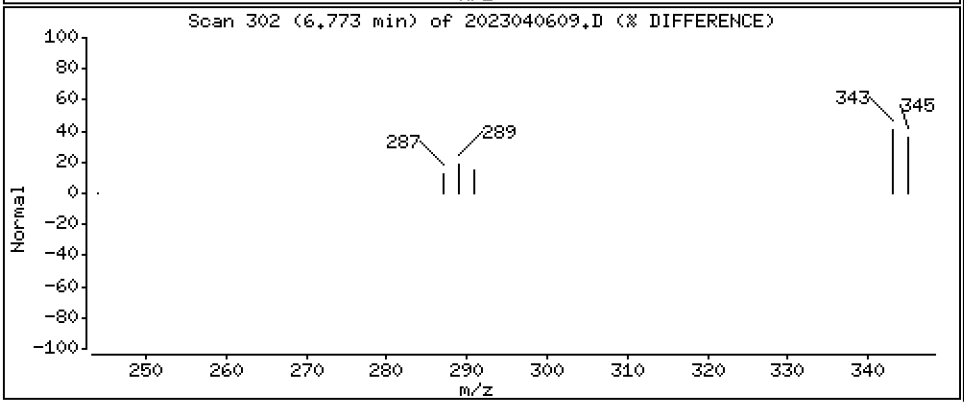












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406.b\2023040609.D
Lab Smp Id: SLD0101-SCV1
Inj Date : 06-APR-2023 17:18
Operator : JZ Inst ID: nt12.i
Smp Info : SCV230406
Misc Info : 23-
Comment : 2 ul Injection
Method : \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Meth Date : 06-Apr-2023 20:55 jianqing Quant Type: ISTD
Cal Date : 06-APR-2023 15:39 Cal File: 2023040603.D
Als bottle: 9
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	CONCENTRATIONS FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	Compound Not Detected.					
	2 Tetrabutyl Tin	289	4.698	4.698	(0.770)	428	0.00582	0.005817
	3 Tributyl Tin (Hexyl)	319	5.472	5.472	(0.897)	136359	2.30946	2.309
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	178329	2.00000	
	5 Dibutyl Tin (Hexyl)	347	Compound Not Detected.					
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	107876	1.58791	1.588
	7 Butyl Tin (Hexyl)	347	6.773	6.813	(0.779)	5821	0.07833	0.07833
*	8 p-Terphenyl-d14	244	8.690	8.690	(1.000)	27505	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040609.D
Lab Smp Id: SLD0101-SCV1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

		AREA LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	178329	8.62
8 p-Terphenyl-d14	22611	11306	45222	27505	21.64

		RT LIMIT			
COMPOUND	STANDARD	LOWER	UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040609.D

Lab ID: SLD0101-SCV1
nt12.i, 20230406.b\TBT20230406.m,   06-APR-2023 17:18

RT	CO-ELUTION COMPOUNDS

NO CO-ELUTIONS

** FIRST SURROGATE NOT FOUND. ICAL Check not performed **

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND

NONE

RRT check based on Ccal File: 2023040606.D

On Column LOD for nt12.i, 20230406.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

Analytical Resources, LLC
Analytical Chemists and Consultants

SECOND-SOURCE
CONTINUING CALIBRATION CHECK
EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Instrument ID:	NT12	Calibration:	GD00019
Lab File ID:	2023041204.D	Calibration Date:	04/06/2023
Sequence:	SLD0101	Injection Date:	04/12/23
Lab Sample ID:	SLD0101-SCV2	Injection Time:	14:30
Sequence Name:	Secondary Cal Check		

		CONC. (ug/mL)		RESPONSE FACTOR (RRF)			% DRIFT/DIFF	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN	CCV	LIMIT
Tributyltin Ion	A	1.5460	1.75	0.6621886	0.7493400	0.01	13.2	+/-20
Tripentyltin	A	1.5918	1.37	0.4939876	0.4249420	0.01	-14.0	+/-20

* Values outside of QC limits

Analytical Resources, LLC
Analytical Chemists and Consultants

CONTINUING CALIBRATION CHECK

EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Instrument ID:	NT12	Calibration:	GD00019
Lab File ID:	2023040638.D	Calibration Date:	04/06/2023
Sequence:	SLD0107	Injection Date:	04/07/23
Lab Sample ID:	SLD0107-CCV1	Injection Time:	01:57
Sequence Name:	Calibration Check		

		CONC. (ug/mL)		RESPONSE FACTOR (RRF)			% DRIFT/DIFF	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN	CCV	LIMIT
Tributyltin Ion	A	0.77300	0.777	0.6621886	0.6660435	0.01	0.6	+/-50
Dibutyltin Ion	A	1.1560	0.935	0.3357743	0.2714646	0.01	-19.2	+/-50
Butyltin Ion	A	0.81600	0.600	0.5403357	0.3972474	0.01	-26.5	+/-50
Tetrabutyltin	A	1.0000	0.982	0.8251907	0.8105419	0.01	-1.8	+/-50
Tripentyltin	A	1.5918	1.23	0.4939876	0.3830592	0.01	-22.5	+/-50
Tripropyltin	A	0.74430	0.722	0.8456179	0.8197690	0.01	-3.1	+/-50

* Values outside of QC limits

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040638.D

Page 1

Date : 07-APR-2023 01:57

Client ID:

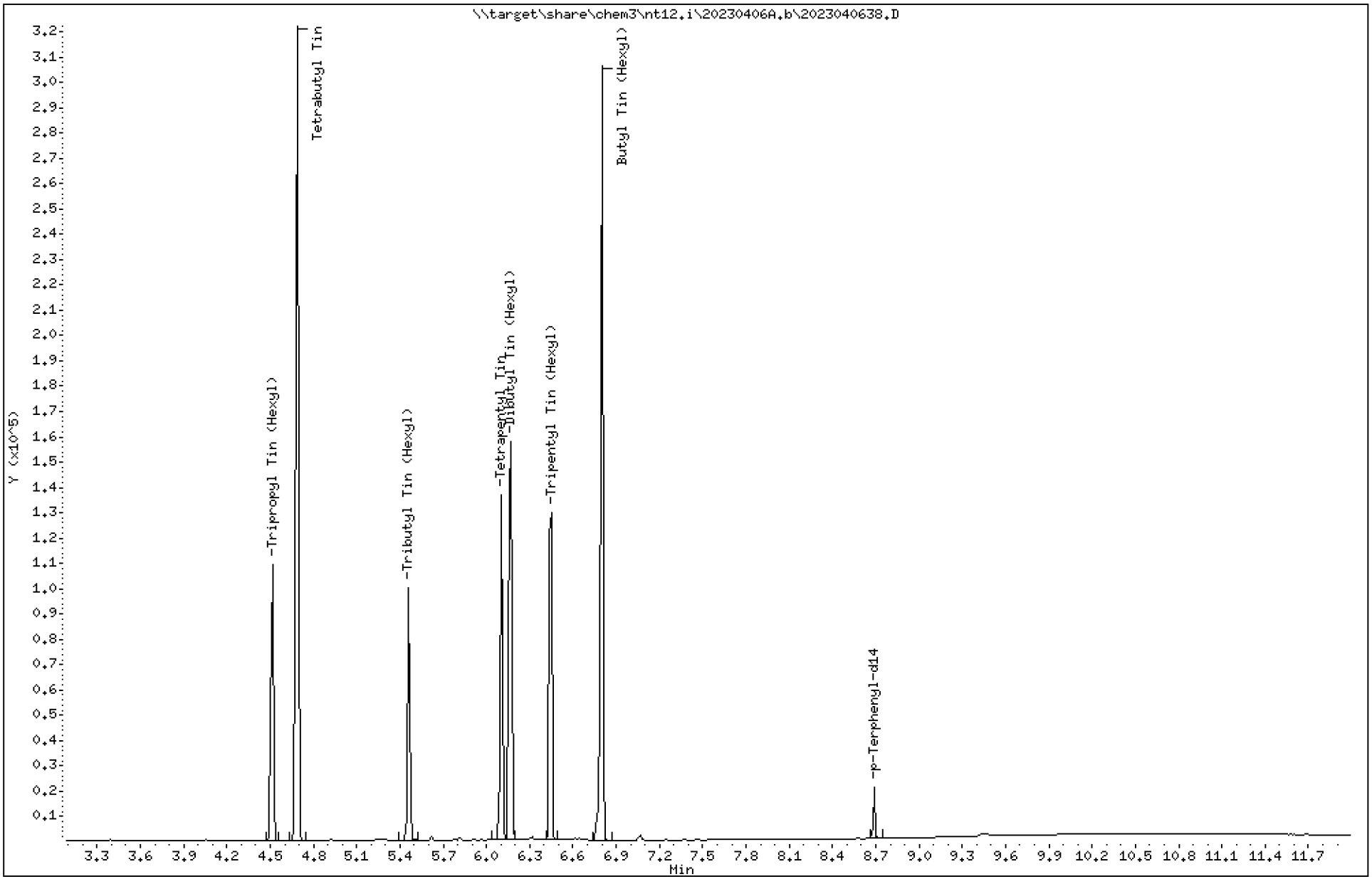
Instrument: nt12.i

Sample Info: CCV230406

Operator: JZ

Column phase: ZB-5msi

Column diameter: 0.25



23C0619 CLPLIKE (Rev0) - Page 261 of 1484

Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040638.D

Date : 07-APR-2023 01:57

Client ID:

Instrument: nt12.i

Sample Info: CCV230406

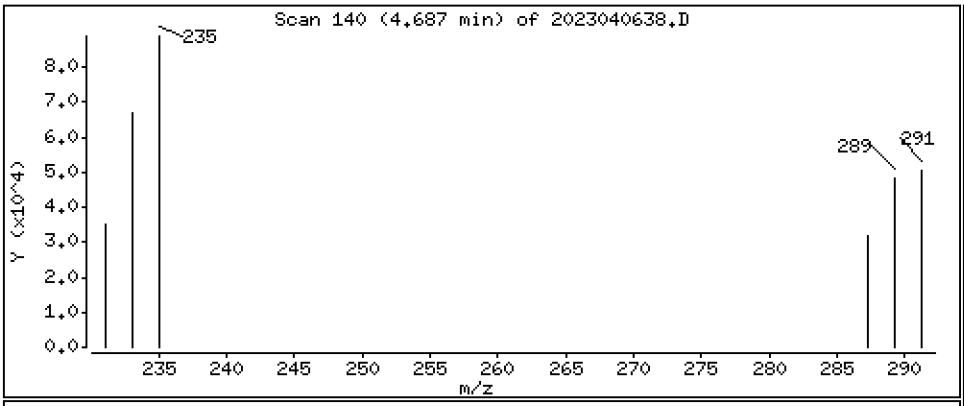
Operator: JZ

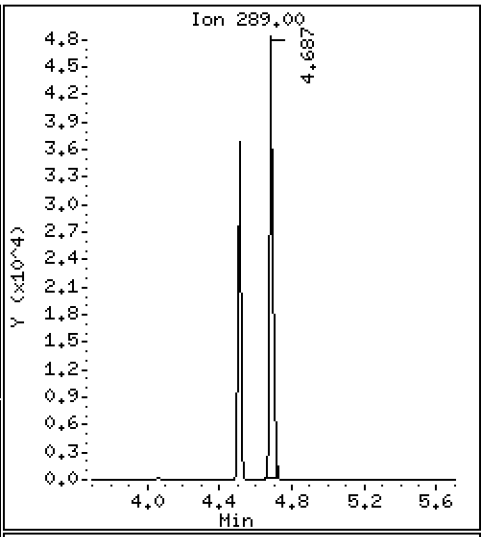
Column phase: ZB-5msi

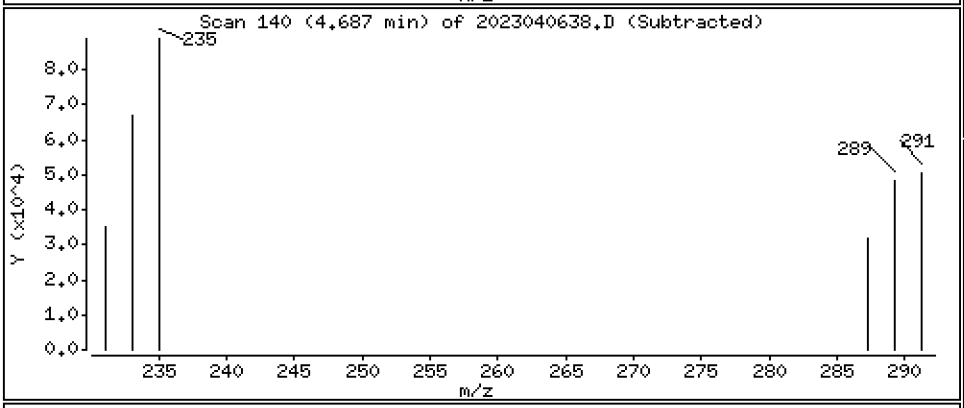
Column diameter: 0.25

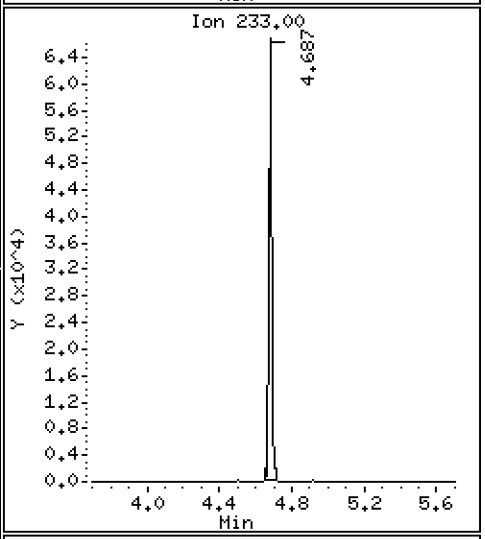
2 Tetrabutyl Tin

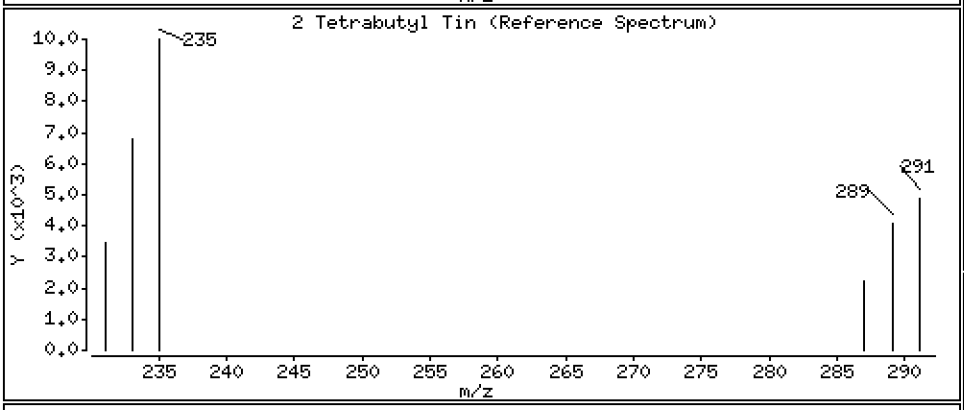
Concentration: 0.9822 ug/mL

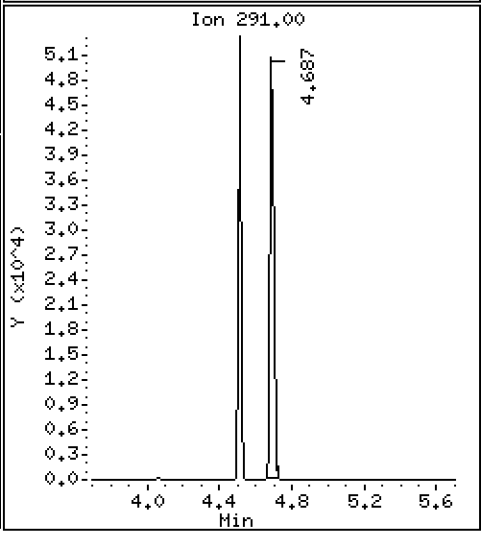


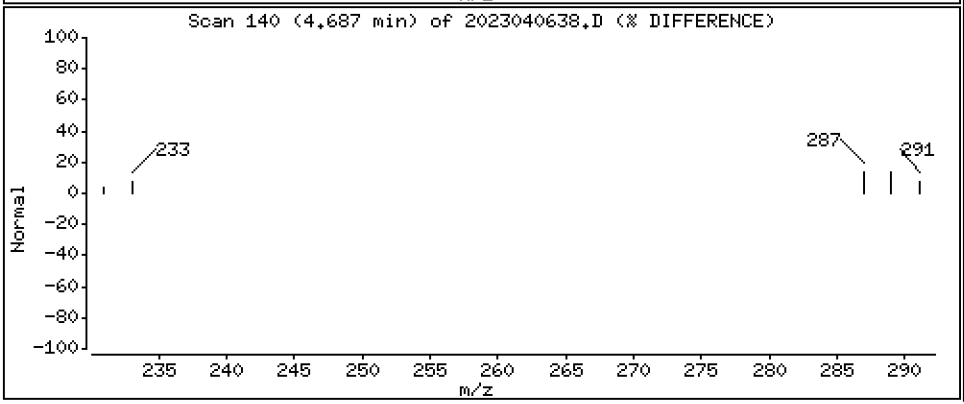












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040638.D

Date : 07-APR-2023 01:57

Client ID:

Instrument: nt12.i

Sample Info: CCV230406

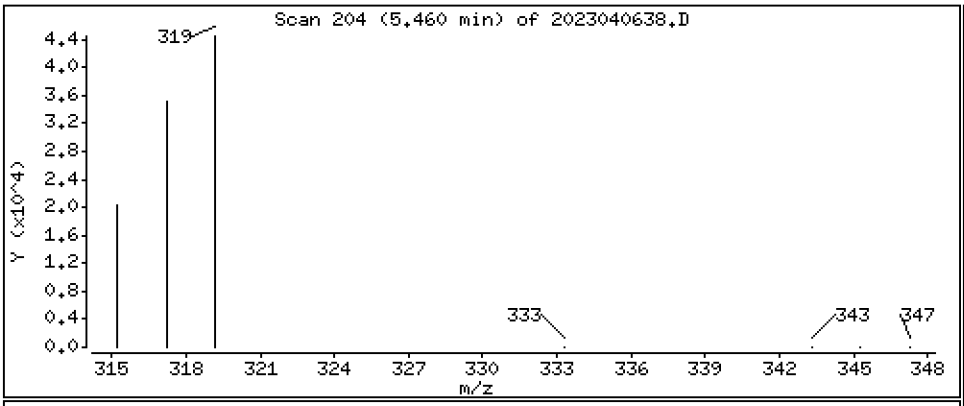
Operator: JZ

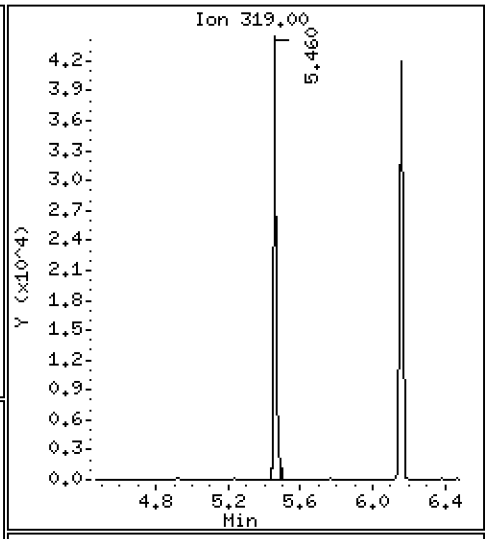
Column phase: ZB-5msi

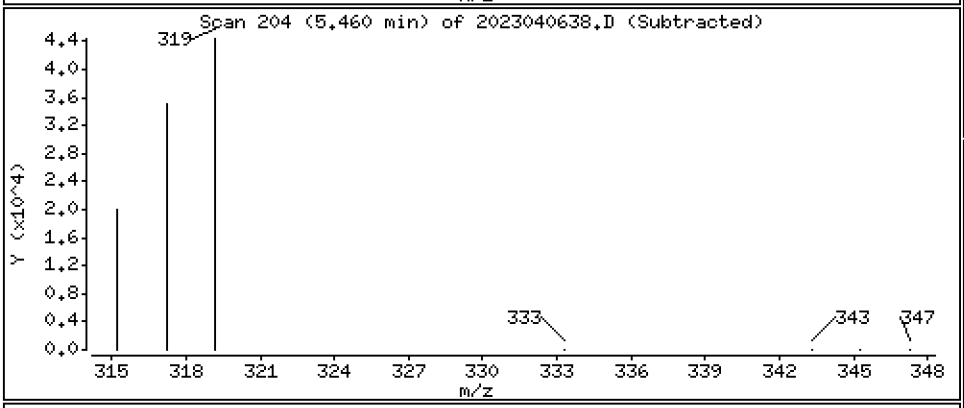
Column diameter: 0.25

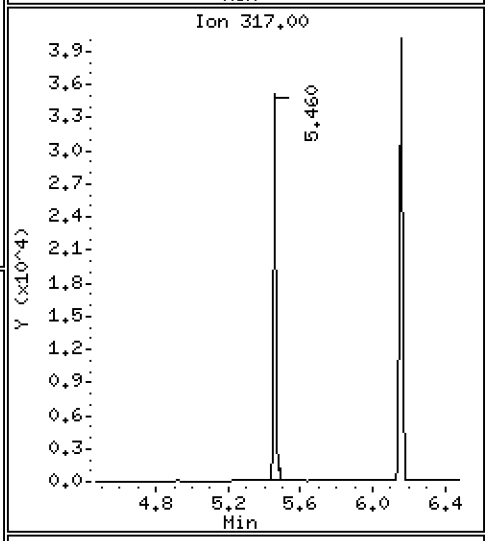
3 Tributyl Tin (Hexyl)

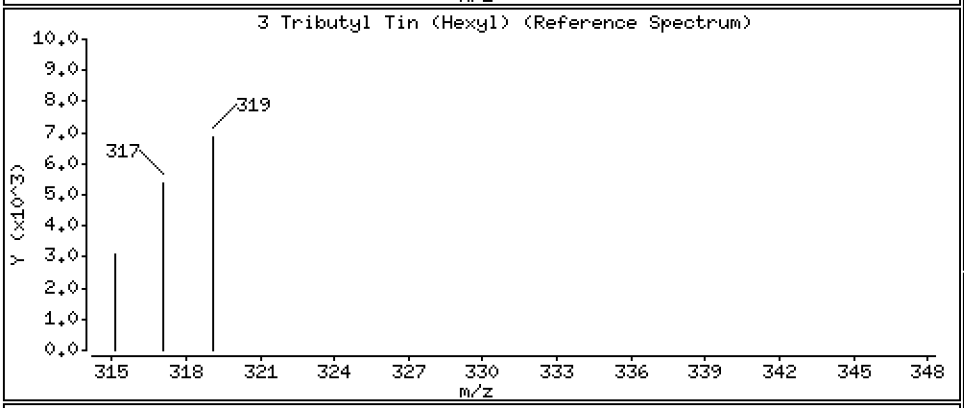
Concentration: 1.006 ug/mL

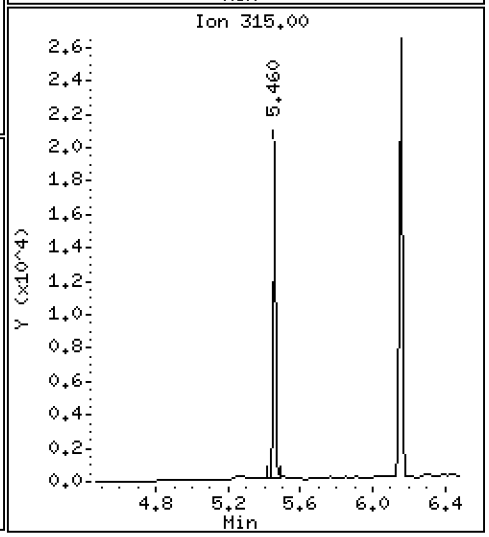


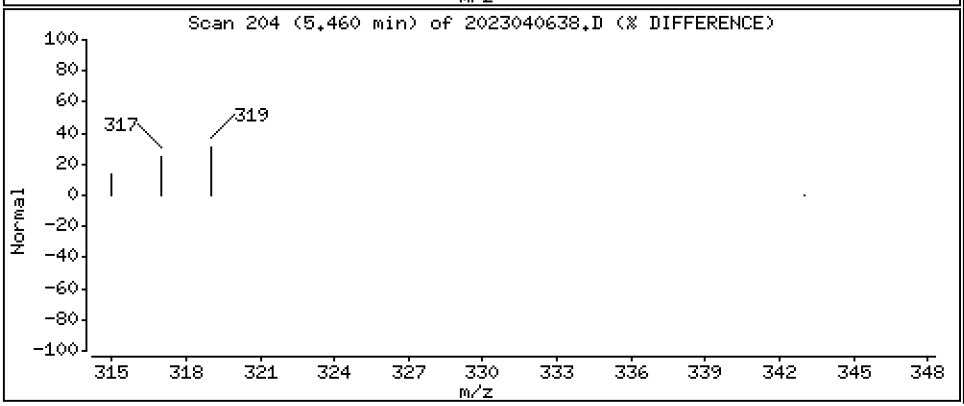












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040638.D

Date : 07-APR-2023 01:57

Client ID:

Instrument: nt12.i

Sample Info: CCV230406

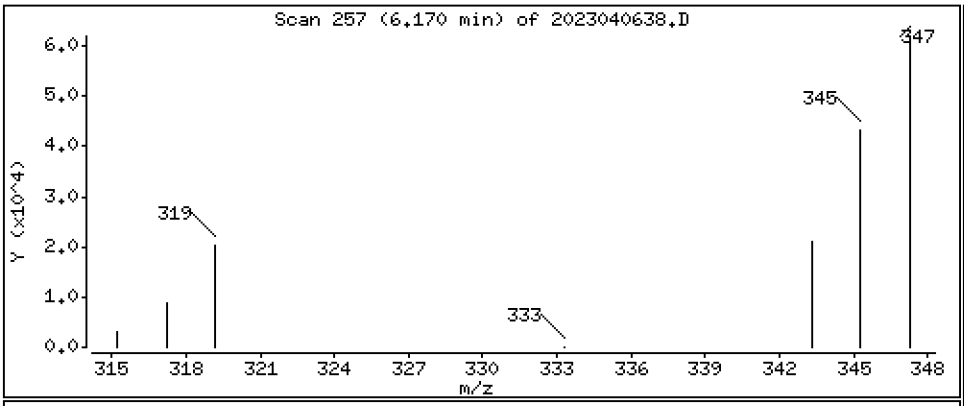
Operator: JZ

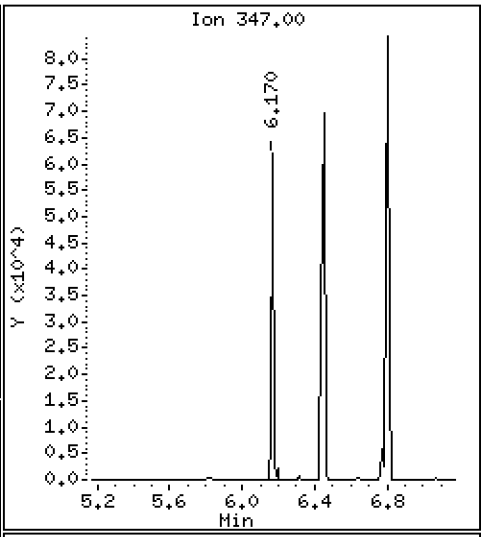
Column phase: ZB-5msi

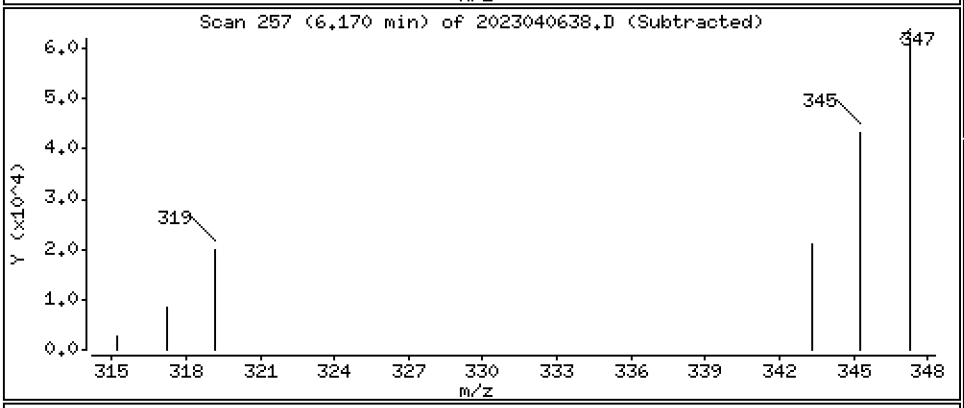
Column diameter: 0.25

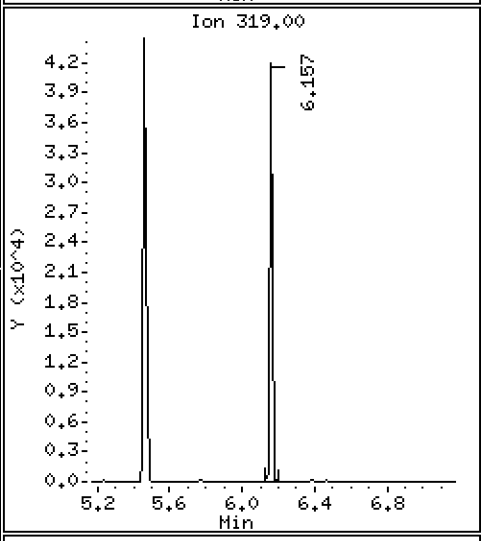
5 Dibutyl Tin (Hexyl)

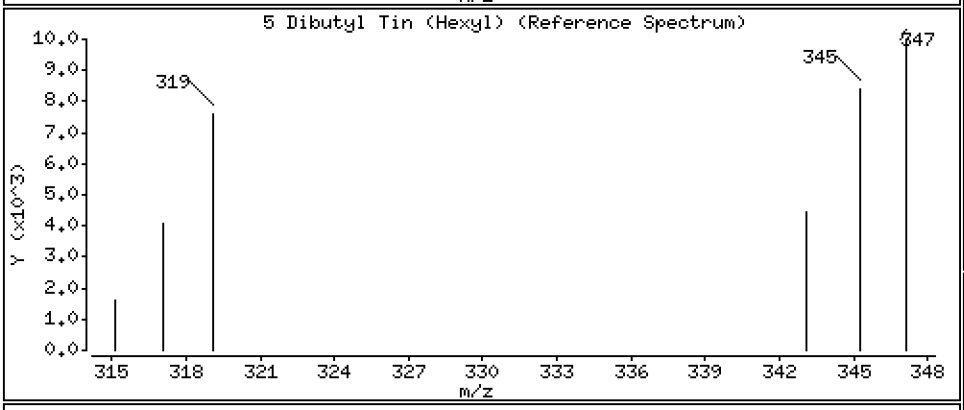
Concentration: 1.617 ug/mL

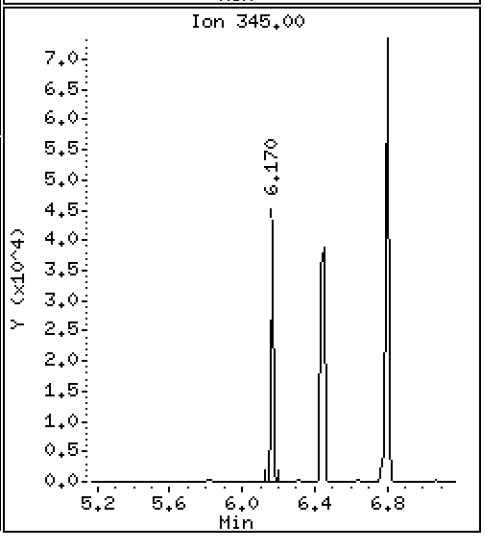


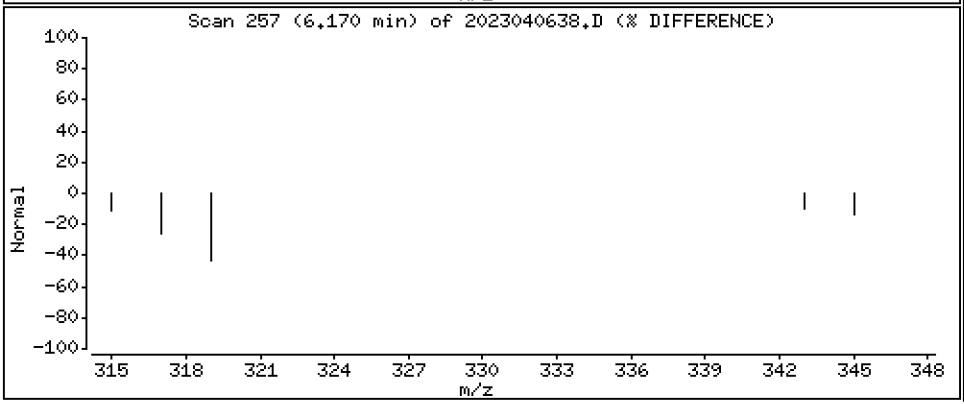












Data File: \\target\share\chem3\nt12.i\20230406A.b\2023040638.D

Date : 07-APR-2023 01:57

Client ID:

Instrument: nt12.i

Sample Info: CCV230406

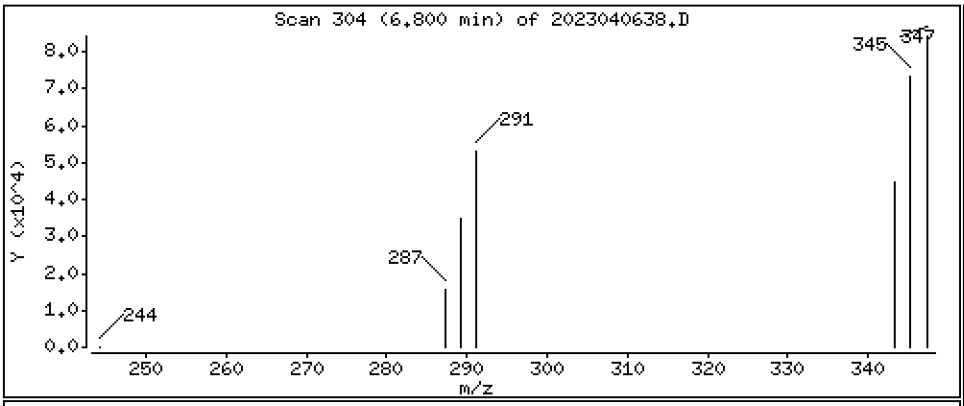
Operator: JZ

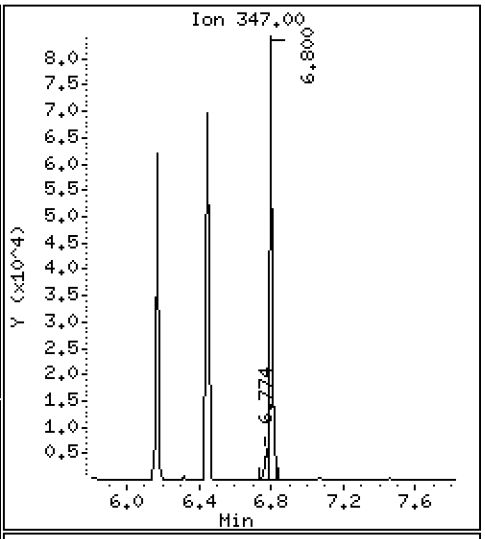
Column phase: ZB-5msi

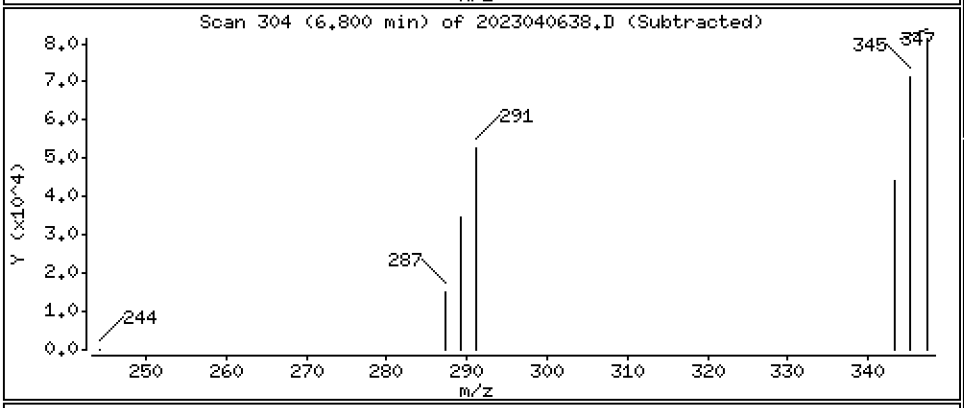
Column diameter: 0.25

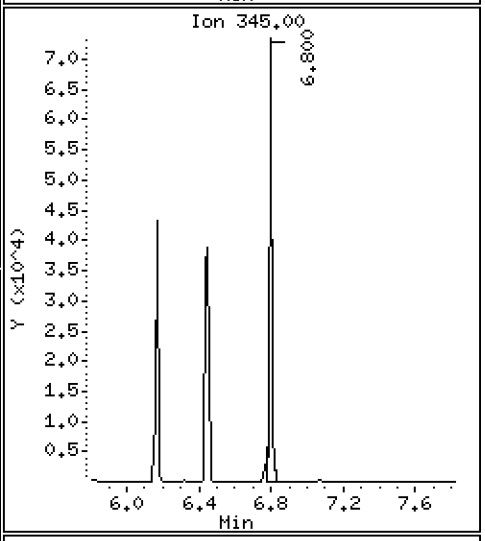
7 Butyl Tin (Hexyl)

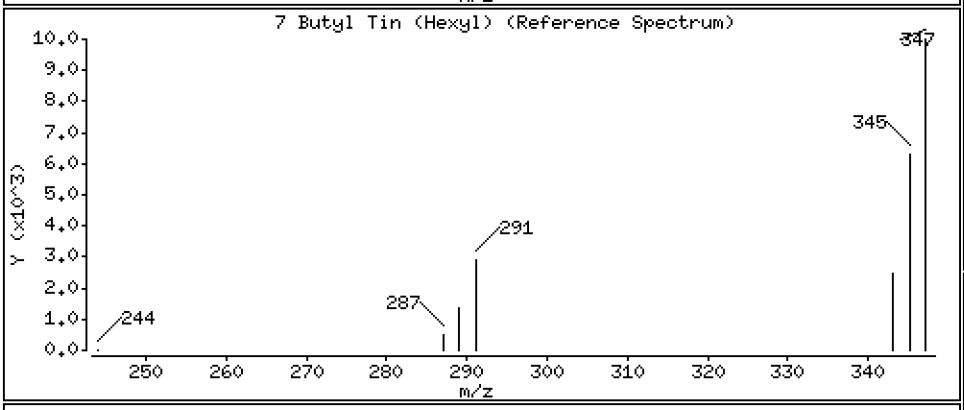
Concentration: 1.470 ug/mL

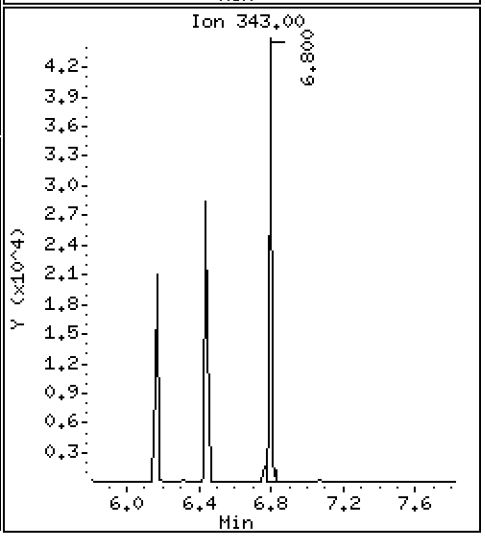


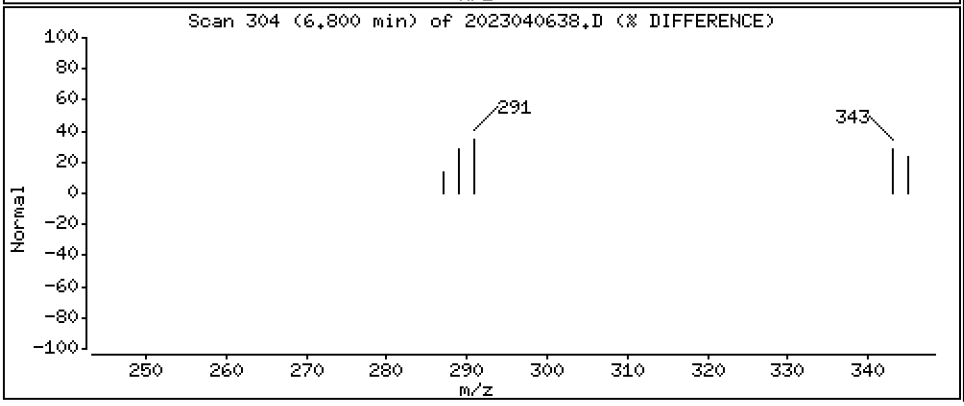












ARI Labs, Inc.

Krone1989/8270D-SIM

Data file : \\target\share\chem3\nt12.i\20230406A.b\2023040638.D
Lab Smp Id: SLD0107-CCV1
Inj Date : 07-APR-2023 01:57
Operator : JZ   Inst ID: nt12.i
Smp Info : CCV230406
Misc Info : 23-
Comment   : 2 ul Injection
Method   : \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Meth Date : 07-Apr-2023 09:53 jianqing   Quant Type: ISTD
Cal Date : 06-APR-2023 15:39   Cal File: 2023040603.D
Als bottle: 38
Dil Factor: 1.00000
Integrator: HP RTE   Compound Sublist: sedmdl.sub
Target Version: 4.14
Processing Host: JIANQING-202105

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/mL)	CONCENTRATIONS FINAL (ug/mL)
$	1 Tripropyl Tin (Hexyl)	291	4.514	4.514	(0.740)	54372	0.96943	0.9694
	2 Tetrabutyl Tin	289	4.687	4.698	(0.768)	53760	0.98225	0.9822
	3 Tributyl Tin (Hexyl)	319	5.459	5.472	(0.895)	44176	1.00582	1.006
*	4 Tetrapentyl Tin	333	6.103	6.102	(1.000)	132652	2.00000	
	5 Dibutyl Tin (Hexyl)	347	6.170	6.169	(0.710)	58088	1.61695	1.617
$	6 Tripentyl Tin (Hexyl)	347	6.451	6.451	(0.742)	81967	1.55089	1.551
	7 Butyl Tin (Hexyl)	347	6.800	6.813	(0.782)	85003	1.47037	1.470
*	8 p-Terphenyl-d14	244	8.691	8.690	(1.000)	21398	0.20000	

ARI Labs, Inc.

INTERNAL STANDARD COMPOUNDS
AREA AND RT SUMMARY

Instrument ID: nt12.i
Lab File ID: 2023040638.D
Lab Smp Id: SLD0107-CCV1
Analysis Type: SV
Quant Type: ISTD
Operator: JZ
Method File: \\target\share\chem3\nt12.i\20230406A.b\TBT20230406.m
Misc Info: 23-

Calibration Date: 06-APR-2023
Calibration Time: 16:28
Level:
Sample Type:

Test Mode:
Use Last Continuing Calibrator.

COMPOUND	STANDARD	AREA LIMIT LOWER	AREA LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	164171	82086	328342	132652	-19.20
8 p-Terphenyl-d14	22611	11306	45222	21398	-5.36

COMPOUND	STANDARD	RT LIMIT LOWER	RT LIMIT UPPER	SAMPLE	%DIFF
4 Tetrapentyl Tin	6.10	5.60	6.60	6.10	0.00
8 p-Terphenyl-d14	8.69	8.19	9.19	8.69	0.00

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = - 50% of internal standard area.
RT UPPER LIMIT = + 0.50 minutes of internal standard RT.
RT LOWER LIMIT = - 0.50 minutes of internal standard RT.

REVIEW SUMMARY FOR FILE - 2023040638.D

Lab ID: SLD0107-CCV1
nt12.i, 20230406A.b\TBT20230406.m,   07-APR-2023 01:57

RT	CO-ELUTION COMPOUNDS
NO CO-ELUTIONS	

Quant Method: ICAL

RRT CHECK

RRT	CCV RRT	DELTA	COMPOUND
NONE			

RRT check based on Ccal File: 2023040606A.D

On Column LOD for nt12.i, 20230406A.b\TBT20230406.m, sedmdl.sub = 0.0000

Exception: Tripropyl Tin (Hexyl) (Surr) 0.0010

* Only compounds listed in the work order have been verified by the analyst *

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Sequence:	SLD0101	Instrument:	NT12
		Calibration:	GD00019

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
MS Tune	SLD0101-TUN1	2023040601.D	NA	04/06/23 15:06
Initial Cal Blank	SLD0101-ICB1	2023040602.D	NA	04/06/23 15:22
TBT Cal Standard	SLD0101-CAL1	2023040603.D	NA	04/06/23 15:39
TBT Cal Standard	SLD0101-CAL2	2023040604.D	NA	04/06/23 15:55
TBT Cal Standard	SLD0101-CAL3	2023040605.D	NA	04/06/23 16:12
TBT Cal Standard	SLD0101-CAL4	2023040606.D	NA	04/06/23 16:28
TBT Cal Standard	SLD0101-CAL5	2023040607.D	NA	04/06/23 16:45
TBT Cal Standard	SLD0101-CAL6	2023040608.D	NA	04/06/23 17:01
Secondary Cal Check	SLD0101-SCV1	2023040609.D	NA	04/06/23 17:18
Secondary Cal Check	SLD0101-SCV2	2023041204.D	NA	04/12/23 14:30

Analytical Resources, LLC
Analytical Chemists and Consultants

ANALYSIS SEQUENCE

SLD0101

Instrument: NT12
Calibration ID: GD00019

Printed: 4/6/2023 9:24:49PM

Lab Number	Analysis	Container	Order	Position	STD ID	ISTD ID	Client	Comments
SLD0101-TUN1	QC		1		K004775			
SLD0101-ICB1	QC		2			L003438		
SLD0101-CAL1	QC		3		L002070	L003438		
SLD0101-CAL2	QC		4		L002071	L003438		
SLD0101-CAL3	QC		5		L002072	L003438		
SLD0101-CAL4	QC		6		L002073	L003438		
SLD0101-CAL5	QC		7		L002074	L003438		
SLD0101-CAL6	QC		8		L002075	L003438		
SLD0101-SCV1	QC		9		L002076	L003438		

Samples Loaded By Date

Data Processed By Date

INTERNAL STANDARD SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406.b

	Time	Filename	LabID	ClientId	DF					
1	1506	2023040601.D	SLD0101-TUN1		1	NO ISTDS FOUND				
2	1522	2023040602.D	SLD0101-ICB1		1	6.12	161159	8.70	23719	
3	1539	2023040603.D	SLD0101-CAL1		1	6.10	157169	8.69	22292	
4	1555	2023040604.D	SLD0101-CAL2		1	6.10	164881	8.69	23279	
5	1612	2023040605.D	SLD0101-CAL3		1	6.10	167613	8.69	23227	
6	1628	2023040606.D	SLD0101-CAL4		1	6.10	164171	8.69	22611	
7	1645	2023040607.D	SLD0101-CAL5		1	6.10	182529	8.69	24468	
8	1701	2023040608.D	SLD0101-CAL6		1	6.10	199113	8.69	25395	
9	1718	2023040609.D	SLD0101-SCV1		1	6.10	178329	8.69	27505	

MANUAL INTEGRATION SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406.b

ARI Job No.: SLD0 Method: TBT20230406.m Instrument: nt12.i Date: 06-APR-2023

Time	Filename	LabID	ClientId	DF	Manually Integrated Compounds
1522	2023040602.D	SLD0101-ICB1		1	NO MANUAL INTEGRATION
1539	2023040603.D	SLD0101-CAL1		1	NO MANUAL INTEGRATION
1555	2023040604.D	SLD0101-CAL2		1	NO MANUAL INTEGRATION
1612	2023040605.D	SLD0101-CAL3		1	NO MANUAL INTEGRATION
1628	2023040606.D	SLD0101-CAL4		1	NO MANUAL INTEGRATION
1645	2023040607.D	SLD0101-CAL5		1	NO MANUAL INTEGRATION
1701	2023040608.D	SLD0101-CAL6		1	NO MANUAL INTEGRATION
1718	2023040609.D	SLD0101-SCV1		1	NO MANUAL INTEGRATION

Security Status Report

Date: 06-Apr-2023 21:28

2023040601.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040602.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040603.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040604.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040605.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040606.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040607.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040608.D	Data Locked	jianqing, 06-Apr-2023 21:28
2023040609.D	Data Locked	jianqing, 06-Apr-2023 21:28

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Sequence:	SLD0107	Instrument:	NT12
		Calibration:	GD00019

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
MS Tune	SLD0107-TUN1	2023040601A.D	NA	04/06/23 15:06
Initial Cal Check	SLD0107-ICV1	2023040606A.D	NA	04/06/23 16:28
Blank	BLC0727-BLK1	2023040610.D	Solid	04/06/23 18:16
LCS	BLC0727-BS1	2023040611.D	Solid	04/06/23 18:33
LCS Dup	BLC0727-BSD1	2023040612.D	Solid	04/06/23 18:49
ZZZZZ	23C0385-01RE1	2023040613.D	Solid	04/06/23 19:06
ZZZZZ	BLC0496-DUP2	2023040614.D	Solid	04/06/23 19:22
ZZZZZ	23C0618-01	2023040617.D	Solid	04/06/23 20:12
ZZZZZ	23C0618-03	2023040618.D	Solid	04/06/23 20:28
ZZZZZ	23C0618-04	2023040619.D	Solid	04/06/23 20:45
ZZZZZ	23C0618-11	2023040620.D	Solid	04/06/23 21:01
ZZZZZ	23C0618-12	2023040621.D	Solid	04/06/23 21:18
ZZZZZ	23C0618-13	2023040622.D	Solid	04/06/23 21:34
SED-07C:0-1	23C0619-01	2023040623.D	Solid	04/06/23 21:51
SED-07C:0-1	BLC0727-DUP1	2023040624.D	Solid	04/06/23 22:07
SED-07C:0-1	BLC0727-MS1	2023040625.D	Solid	04/06/23 22:23
SED-07C:0-1	BLC0727-MSD1	2023040626.D	Solid	04/06/23 22:40
SED-07C:1-3	23C0619-02	2023040627.D	Solid	04/06/23 22:56
SED-08C:0-1	23C0619-03	2023040628.D	Solid	04/06/23 23:13
SED-08C:1-3	23C0619-04	2023040629.D	Solid	04/06/23 23:29
SED-09C:0-1	23C0619-05	2023040630.D	Solid	04/06/23 23:46
SED-09C:1-3	23C0619-06	2023040631.D	Solid	04/07/23 00:02
SED-26C:0-1	23C0619-08	2023040632.D	Solid	04/07/23 00:18
SED-26C:1-3	23C0619-09	2023040633.D	Solid	04/07/23 00:35
SED-25C:0-1	23C0619-10	2023040634.D	Solid	04/07/23 00:51
SED-25C:1-3	23C0619-11	2023040635.D	Solid	04/07/23 01:08
SED-10C:0-1	23C0619-12	2023040636.D	Solid	04/07/23 01:24
SED-10C:1-3	23C0619-13	2023040637.D	Solid	04/07/23 01:41
Calibration Check	SLD0107-CCV1	2023040638.D	NA	04/07/23 01:57

Analytical Resources, LLC
Analytical Chemists and Consultants

ANALYSIS SEQUENCE

SLD0107

Instrument: NT12
Calibration ID: GD00019

Printed: 4/11/2023 12:22:55PM

Lab Number	Analysis	Container	Order	Position	STD ID	ISTD ID	Client	Comments
SLD0107-TUN1	QC		1		K004775			
SLD0107-ICV1	QC		2		L002073	L003438		
BLC0727-BLK1	QC		3			L003438		
BLC0727-BS1	QC		4			L003438		
BLC0727-BSD1	QC		5			L003438		
23C0385-01RE1	8270E-SIM Butyl Tins	A 01	6			L003438	Maryland Spectral Services, Inc.	Added 4/7/2023 by JZ
BLC0496-DUP2	QC		7			L003438		
23C0618-01	8270E-SIM Butyl Tins	B 01	8			L003438	Friedman & Bruya Inc.	
23C0618-03	8270E-SIM Butyl Tins	B 01	9			L003438	Friedman & Bruya Inc.	
23C0618-04	8270E-SIM Butyl Tins	B 01	10			L003438	Friedman & Bruya Inc.	
23C0618-11	8270E-SIM Butyl Tins	A 01	11			L003438	Friedman & Bruya Inc.	
23C0618-12	8270E-SIM Butyl Tins	A 01	12			L003438	Friedman & Bruya Inc.	
23C0618-13	8270E-SIM Butyl Tins	A 01	13			L003438	Friedman & Bruya Inc.	
23C0619-01	8270E-SIM Butyl Tins	A 01	14			L003438	Friedman & Bruya Inc.	
BLC0727-DUP1	QC		15			L003438		
BLC0727-MS1	QC		16			L003438		
BLC0727-MSD1	QC		17			L003438		
23C0619-02	8270E-SIM Butyl Tins	A 01	18			L003438	Friedman & Bruya Inc.	
23C0619-03	8270E-SIM Butyl Tins	A 01	19			L003438	Friedman & Bruya Inc.	
23C0619-04	8270E-SIM Butyl Tins	A 01	20			L003438	Friedman & Bruya Inc.	
23C0619-05	8270E-SIM Butyl Tins	A 01	21			L003438	Friedman & Bruya Inc.	

Samples Loaded By Date

Data Processed By Date

Analytical Resources, LLC
Analytical Chemists and Consultants

ANALYSIS SEQUENCE

SLD0107

Instrument: NT12
Calibration ID: GD00019

Printed: 4/11/2023 12:22:55PM

Lab Number	Analysis	Container	Order	Position	STD ID	ISTD ID	Client	Comments
23C0619-06	8270E-SIM Butyl Tins	A 01	22			L003438	Friedman & Bruya Inc.	
23C0619-08	8270E-SIM Butyl Tins	A 01	23			L003438	Friedman & Bruya Inc.	
23C0619-09	8270E-SIM Butyl Tins	A 01	24			L003438	Friedman & Bruya Inc.	
23C0619-10	8270E-SIM Butyl Tins	A 01	25			L003438	Friedman & Bruya Inc.	
23C0619-11	8270E-SIM Butyl Tins	A 01	26			L003438	Friedman & Bruya Inc.	
23C0619-12	8270E-SIM Butyl Tins	A 01	27			L003438	Friedman & Bruya Inc.	
23C0619-13	8270E-SIM Butyl Tins	A 01	28			L003438	Friedman & Bruya Inc.	
SLD0107-CCV1	QC		29		L002073	L003438		

Samples Loaded By Date

Data Processed By Date

INTERNAL STANDARD SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406A.b

	Time	Filename	LabID	ClientId	DF							
1	1506	2023040601A.D	SLD0107-TUN1		1	NO ISTDS FOUND						
2	1628	2023040606A.D	SLD0107-ICV1		1	6.10	164171	8.69	22611			
3	1816	2023040610.D	BLC0727-BLK1		1	6.10	159063	8.69	23289			
4	1833	2023040611.D	BLC0727-BS1		1	6.10	160316	8.69	23214			
5	1849	2023040612.D	BLC0727-BSD1		1	6.12	154875	8.70	23051			
6	1906	2023040613.D	23C0385-01RE1		5	6.12	146669	8.69	20867			
7	1922	2023040614.D	BLC0496-DUP2		5	6.12	150394	8.70	21860			
8	1939	2023040615.D	BLC0496-MS1	no needed, NR		6.12	130913	8.69	18825			
9	1955	2023040616.D	BLC0496-MSD1	no needed, NR		6.10	204636	8.69	29045			
10	2012	2023040617.D	23C0618-01		1	6.12	149677	8.69	21193			
11	2028	2023040618.D	23C0618-03		1	6.12	139560	8.69	20284			
12	2045	2023040619.D	23C0618-04		1	6.12	137203	8.69	20427			
13	2101	2023040620.D	23C0618-11		1	6.12	148442	8.69	21999			
14	2118	2023040621.D	23C0618-12		1	6.10	134169	8.69	21756			
15	2134	2023040622.D	23C0618-13		1	6.12	145759	8.69	24040			
16	2151	2023040623.D	23C0619-01		1	6.12	143179	8.69	22833			
17	2207	2023040624.D	BLC0727-DUP1		1	6.12	128887	8.69	20346			
18	2223	2023040625.D	BLC0727-MS1		1	6.10	131952	8.69	20824			
19	2240	2023040626.D	BLC0727-MSD1		1	6.12	136624	8.69	21768			
20	2256	2023040627.D	23C0619-02		1	6.10	129737	8.69	20861			

JZ 04/11/23

INTERNAL STANDARD SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406A.b

	Time	Filename	LabID	ClientId	DF					
21	2313	2023040628.D	23C0619-03		1	6.12	132262	8.69	21513	
22	2329	2023040629.D	23C0619-04		1	6.10	120970	8.69	19466	
23	2346	2023040630.D	23C0619-05		1	6.12	122530	8.69	20530	
24	0002	2023040631.D	23C0619-06		1	6.10	128533	8.69	20676	
25	0018	2023040632.D	23C0619-08		1	6.12	128426	8.69	21977	
26	0035	2023040633.D	23C0619-09		1	6.10	123693	8.69	20165	
27	0051	2023040634.D	23C0619-10		1	6.10	120694	8.69	20141	
28	0108	2023040635.D	23C0619-11		1	6.10	128737	8.69	20567	
29	0124	2023040636.D	23C0619-12		1	6.12	124983	8.69	21688	
30	0141	2023040637.D	23C0619-13		1	6.10	127809	8.69	20874	
31	0157	2023040638.D	SLD0107-CCV1		1	6.10	132652	8.69	21398	

MANUAL INTEGRATION SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406A.b

ARI Job No.: SLD0 Method: TBT20230406.m Instrument: nt12.i Date: 06-APR-2023

Time	Filename	LabID	ClientId	DF	Manually Integrated Compounds
1628	2023040606A.D	SLD0107-ICV1		1	NO MANUAL INTEGRATION
1816	2023040610.D	BLC0727-BLK1		1	NO MANUAL INTEGRATION
1833	2023040611.D	BLC0727-BS1		1	NO MANUAL INTEGRATION
1849	2023040612.D	BLC0727-BSD1		1	NO MANUAL INTEGRATION
1906	2023040613.D	23C0385-01RE1		5	Butyl Tin (Hexyl),
1922	2023040614.D	BLC0496-DUP2		5	Butyl Tin (Hexyl),
1939	2023040615.D	BLC0496-MS1		5	NO MANUAL INTEGRATION
1955	2023040616.D	BLC0496-MSD1		5	Butyl Tin (Hexyl),
2012	2023040617.D	23C0618-01		1	NO MANUAL INTEGRATION
2028	2023040618.D	23C0618-03		1	NO MANUAL INTEGRATION
2045	2023040619.D	23C0618-04		1	NO MANUAL INTEGRATION
2101	2023040620.D	23C0618-11		1	NO MANUAL INTEGRATION
2118	2023040621.D	23C0618-12		1	NO MANUAL INTEGRATION
2134	2023040622.D	23C0618-13		1	NO MANUAL INTEGRATION
2151	2023040623.D	23C0619-01		1	Dibutyl Tin (Hexyl),
2207	2023040624.D	BLC0727-DUP1		1	Dibutyl Tin (Hexyl),
2223	2023040625.D	BLC0727-MS1		1	NO MANUAL INTEGRATION

MANUAL INTEGRATION SUMMARY FOR DATABATCH - \\target\share\chem3\nt12.i\20230406A.b

Time	Filename	LabID	ClientId	DF	Manually Integrated Compounds
2240	2023040626.D	BLC0727-MSD1		1	NO MANUAL INTEGRATION
2256	2023040627.D	23C0619-02		1	Dibutyl Tin (Hexyl),
2313	2023040628.D	23C0619-03		1	Butyl Tin (Hexyl),
2329	2023040629.D	23C0619-04		1	NO MANUAL INTEGRATION
2346	2023040630.D	23C0619-05		1	Butyl Tin (Hexyl),
0002	2023040631.D	23C0619-06		1	Tributyl Tin (Hexyl), Butyl Tin (Hexyl),
0018	2023040632.D	23C0619-08		1	Butyl Tin (Hexyl), p-Terphenyl-d14,
0035	2023040633.D	23C0619-09		1	p-Terphenyl-d14,
0051	2023040634.D	23C0619-10		1	Butyl Tin (Hexyl),
0108	2023040635.D	23C0619-11		1	Butyl Tin (Hexyl),
0124	2023040636.D	23C0619-12		1	Butyl Tin (Hexyl),
0141	2023040637.D	23C0619-13		1	NO MANUAL INTEGRATION
0157	2023040638.D	SLD0107-CCV1		1	NO MANUAL INTEGRATION

Security Status Report

Date: 11-Apr-2023 12:20

2023040601A.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040606A.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040610.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040611.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040612.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040613.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040614.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040615.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040616.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040617.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040618.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040619.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040620.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040621.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040622.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040623.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040624.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040625.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040626.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040627.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040628.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040629.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040630.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040631.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040632.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040633.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040634.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040635.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040636.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040637.D	Data Locked	jianqing, 11-Apr-2023 12:20
2023040638.D	Data Locked	jianqing, 11-Apr-2023 12:20

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Extract Dilution Bench Sheet

Sequence: SLD0107
Analyst: JZ Date: 230406

Sample ID	Primary Dilution				Secondary Dilution			
	Extract Volume (uL)	Diluent ID	Diluent Volume (uL)	Dilution Factor	Extract Volume (uL)	Diluent ID	Diluent Volume (uL)	Dilution Factor
23C0385-01RE1	60	L001957	240	5				
BLC0496-DOP2	60		240	5				

Form 12010F Version 002 03/01/2018

SURROGATE RECOVERY AND RT SUMMARY
EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG/WO:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Sequence:	SLD0101	Instrument:	NT12
Calibration:	GD00019	Calibration Date:	04/06/2023

Surrogate Compound	Spike Level ug/mL	% Recovery	Recovery Limits	RT	Calibration Mean RT	RT Diff	RT Diff Limit	Q
SLD0101-ICB1 (Water)			Lab File ID: 2023040602.D			Analyzed: 04/06/23 15:22		
Tripentyltin			30 - 160		6.451	-6.4510	N/A	
Tripropyltin			30 - 160		4.514	-4.5140	N/A	
SLD0101-SCV1 (Water)			Lab File ID: 2023040609.D			Analyzed: 04/06/23 17:18		
Tripentyltin	1.5918	79.4	80 - 120	6.451	6.451	0.0000	N/A	*
SLD0101-SCV2 (Water)			Lab File ID: 2023041204.D			Analyzed: 04/12/23 14:30		
Tripentyltin	1.5918	86.0	80 - 120	6.451	6.451	0.0000	N/A	

SURROGATE RECOVERY AND RT SUMMARY
EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG/WO:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Sequence:	SLD0107	Instrument:	NT12
Calibration:	GD00019	Calibration Date:	04/06/2023

Surrogate Compound	Spike Level ug/mL	% Recovery	Recovery Limits	RT	Calibration Mean RT	RT Diff	RT Diff Limit	Q
SLD0107-ICV1 (Solid)				Lab File ID: 2023040606A.D			Analyzed: 04/06/23 16:28	
Tripentyltin	1.5918	100	80 - 120	6.451	6.451	0.0000	N/A	
Tripropyltin	0.74430	94.4	80 - 120	4.514	4.514	0.0000	N/A	
BLC0727-BLK1 (Solid)				Lab File ID: 2023040610.D			Analyzed: 04/06/23 18:16	
Tripentyltin	45.178	100	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.746	89.6	30 - 160	4.548	4.514	0.0340	N/A	
BLC0727-BS1 (Solid)				Lab File ID: 2023040611.D			Analyzed: 04/06/23 18:33	
Tripentyltin	45.178	97.3	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.746	85.1	30 - 160	4.548	4.514	0.0340	N/A	
BLC0727-BSD1 (Solid)				Lab File ID: 2023040612.D			Analyzed: 04/06/23 18:49	
Tripentyltin	45.178	95.3	30 - 160	6.464	6.451	0.0130	N/A	
Tripropyltin	43.746	87.4	30 - 160	4.548	4.514	0.0340	N/A	
23C0619-01 (Solid)				Lab File ID: 2023040623.D			Analyzed: 04/06/23 21:51	
Tripentyltin	44.921	80.1	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.497	77.0	30 - 160	4.56	4.514	0.0460	N/A	
BLC0727-DUP1 (Solid)				Lab File ID: 2023040624.D			Analyzed: 04/06/23 22:07	
Tripentyltin	45.148	90.2	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.717	82.5	30 - 160	4.56	4.514	0.0460	N/A	
BLC0727-MS1 (Solid)				Lab File ID: 2023040625.D			Analyzed: 04/06/23 22:23	
Tripentyltin	45.148	92.5	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.717	83.7	30 - 160	4.56	4.514	0.0460	N/A	
BLC0727-MSD1 (Solid)				Lab File ID: 2023040626.D			Analyzed: 04/06/23 22:40	
Tripentyltin	45.148	86.4	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.717	83.4	30 - 160	4.56	4.514	0.0460	N/A	
23C0619-02 (Solid)				Lab File ID: 2023040627.D			Analyzed: 04/06/23 22:56	
Tripentyltin	45.025	81.4	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.598	83.4	30 - 160	4.571	4.514	0.0570	N/A	

SURROGATE RECOVERY AND RT SUMMARY
EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG/WO: 23C0619
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Sequence: SLD0107
Instrument: NT12
Calibration: GD00019
Calibration Date: 04/06/2023

Surrogate Compound	Spike Level ug/kg dry	% Recovery	Recovery Limits	RT	Calibration Mean RT	RT Diff	RT Diff Limit	Q
23C0619-03 (Solid)				Lab File ID: 2023040628.D			Analyzed: 04/06/23 23:13	
Tripentyltin	44.866	81.8	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.444	80.0	30 - 160	4.56	4.514	0.0460	N/A	
23C0619-04 (Solid)				Lab File ID: 2023040629.D			Analyzed: 04/06/23 23:29	
Tripentyltin	45.035	88.3	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.607	90.6	30 - 160	4.56	4.514	0.0460	N/A	
23C0619-05 (Solid)				Lab File ID: 2023040630.D			Analyzed: 04/06/23 23:46	
Tripentyltin	45.173	72.5	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.741	69.7	30 - 160	4.548	4.514	0.0340	N/A	
23C0619-06 (Solid)				Lab File ID: 2023040631.D			Analyzed: 04/07/23 00:02	
Tripentyltin	44.969	75.1	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.543	79.7	30 - 160	4.548	4.514	0.0340	N/A	
23C0619-08 (Solid)				Lab File ID: 2023040632.D			Analyzed: 04/07/23 00:18	
Tripentyltin	45.117	79.8	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.687	84.3	30 - 160	4.571	4.514	0.0570	N/A	
23C0619-09 (Solid)				Lab File ID: 2023040633.D			Analyzed: 04/07/23 00:35	
Tripentyltin	45.120	80.9	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.690	84.4	30 - 160	4.548	4.514	0.0340	N/A	
23C0619-10 (Solid)				Lab File ID: 2023040634.D			Analyzed: 04/07/23 00:51	
Tripentyltin	45.155	70.4	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.724	75.4	30 - 160	4.548	4.514	0.0340	N/A	
23C0619-11 (Solid)				Lab File ID: 2023040635.D			Analyzed: 04/07/23 01:08	
Tripentyltin	45.109	81.1	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.679	85.8	30 - 160	4.548	4.514	0.0340	N/A	
23C0619-12 (Solid)				Lab File ID: 2023040636.D			Analyzed: 04/07/23 01:24	
Tripentyltin	44.435	76.0	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.027	82.9	30 - 160	4.56	4.514	0.0460	N/A	
23C0619-13 (Solid)				Lab File ID: 2023040637.D			Analyzed: 04/07/23 01:41	
Tripentyltin	45.120	80.0	30 - 160	6.451	6.451	0.0000	N/A	
Tripropyltin	43.690	85.2	30 - 160	4.56	4.514	0.0460	N/A	

SURROGATE RECOVERY AND RT SUMMARY
EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG/WO:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Sequence:	SLD0107	Instrument:	NT12
Calibration:	GD00019	Calibration Date:	04/06/2023

Surrogate Compound	Spike Level ug/mL	% Recovery	Recovery Limits	RT	Calibration Mean RT	RT Diff	RT Diff Limit	Q
SLD0107-CCV1 (Solid)			Lab File ID: 2023040638.D			Analyzed: 04/07/23 01:57		
Tripentyltin	1.5918	77.5	50 - 150	6.451	6.451	0.0000	N/A	
Tripropyltin	0.74430	96.9	50 - 150	4.514	4.514	0.0000	N/A	

Analytical Resources, LLC
Analytical Chemists and Consultants

INTERNAL STANDARD AREA AND RT SUMMARY

EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Sequence:	SLD0101	Instrument:	NT12
		Calibration:	GD00019

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Initial Cal Blank (SLD0101-ICB1)		(Water)		Lab File ID: 2023040602.D				Analyzed: 04/06/23 15:22	
Tetrapentyltin	161159	6.116	164171	6.102	98	50 - 200	0.014	+/-0.50	
p-Terphenyl-d14	23719	8.704	22611	8.69	105	50 - 200	0.014	+/-0.50	
Secondary Cal Check (SLD0101-SCV1)		(Water)		Lab File ID: 2023040609.D				Analyzed: 04/06/23 17:18	
Tetrapentyltin	178329	6.103	164171	6.102	109	50 - 200	0.001	+/-0.50	
p-Terphenyl-d14	27505	8.69	22611	8.69	122	50 - 200	0.000	+/-0.50	
Secondary Cal Check (SLD0101-SCV2)		(Water)		Lab File ID: 2023041204.D				Analyzed: 04/12/23 14:30	
Tetrapentyltin	97722	6.102	164171	6.102	60	50 - 200	0.000	+/-0.50	
p-Terphenyl-d14	13371	8.69	22611	8.69	59	50 - 200	0.000	+/-0.50	

Analytical Resources, LLC
Analytical Chemists and Consultants

INTERNAL STANDARD AREA AND RT SUMMARY

EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Sequence:	SLD0107	Instrument:	NT12
		Calibration:	GD00019

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Initial Cal Check (SLD0107-ICV1)		(Solid)		Lab File ID: 2023040606A.D			Analyzed: 04/06/23 16:28		
Tetrapentyltin	164171	6.102	164171	6.102	100	50 - 200	0.000	+/-0.50	
p-Terphenyl-d14	22611	8.69	22611	8.69	100	50 - 200	0.000	+/-0.50	
Blank (BLC0727-BLK1)		(Solid)		Lab File ID: 2023040610.D			Analyzed: 04/06/23 18:16		
Tetrapentyltin	159063	6.103	164171	6.102	97	50 - 200	0.001	+/-0.50	
p-Terphenyl-d14	23289	8.69	22611	8.69	103	50 - 200	0.000	+/-0.50	
LCS (BLC0727-BS1)		(Solid)		Lab File ID: 2023040611.D			Analyzed: 04/06/23 18:33		
Tetrapentyltin	160316	6.102	164171	6.102	98	50 - 200	0.000	+/-0.50	
p-Terphenyl-d14	23214	8.69	22611	8.69	103	50 - 200	0.000	+/-0.50	
LCS Dup (BLC0727-BSD1)		(Solid)		Lab File ID: 2023040612.D			Analyzed: 04/06/23 18:49		
Tetrapentyltin	154875	6.116	164171	6.102	94	50 - 200	0.014	+/-0.50	
p-Terphenyl-d14	23051	8.704	22611	8.69	102	50 - 200	0.014	+/-0.50	
SED-07C:0-1 (23C0619-01)		(Solid)		Lab File ID: 2023040623.D			Analyzed: 04/06/23 21:51		
Tetrapentyltin	143179	6.116	164171	6.102	87	50 - 200	0.014	+/-0.50	
p-Terphenyl-d14	22833	8.69	22611	8.69	101	50 - 200	0.000	+/-0.50	
Duplicate (BLC0727-DUP1)		(Solid)		Lab File ID: 2023040624.D			Analyzed: 04/06/23 22:07		
Tetrapentyltin	128887	6.116	164171	6.102	79	50 - 200	0.014	+/-0.50	
p-Terphenyl-d14	20346	8.691	22611	8.69	90	50 - 200	0.001	+/-0.50	
Matrix Spike (BLC0727-MS1)		(Solid)		Lab File ID: 2023040625.D			Analyzed: 04/06/23 22:23		
Tetrapentyltin	131952	6.102	164171	6.102	80	50 - 200	0.000	+/-0.50	
p-Terphenyl-d14	20824	8.69	22611	8.69	92	50 - 200	0.000	+/-0.50	
Matrix Spike Dup (BLC0727-MSD1)		(Solid)		Lab File ID: 2023040626.D			Analyzed: 04/06/23 22:40		
Tetrapentyltin	136624	6.116	164171	6.102	83	50 - 200	0.014	+/-0.50	
p-Terphenyl-d14	21768	8.69	22611	8.69	96	50 - 200	0.000	+/-0.50	
SED-07C:1-3 (23C0619-02)		(Solid)		Lab File ID: 2023040627.D			Analyzed: 04/06/23 22:56		
Tetrapentyltin	129737	6.103	164171	6.102	79	50 - 200	0.001	+/-0.50	
p-Terphenyl-d14	20861	8.69	22611	8.69	92	50 - 200	0.000	+/-0.50	
SED-08C:0-1 (23C0619-03)		(Solid)		Lab File ID: 2023040628.D			Analyzed: 04/06/23 23:13		
Tetrapentyltin	132262	6.116	164171	6.102	81	50 - 200	0.014	+/-0.50	
p-Terphenyl-d14	21513	8.69	22611	8.69	95	50 - 200	0.000	+/-0.50	
SED-08C:1-3 (23C0619-04)		(Solid)		Lab File ID: 2023040629.D			Analyzed: 04/06/23 23:29		
Tetrapentyltin	120970	6.102	164171	6.102	74	50 - 200	0.000	+/-0.50	
p-Terphenyl-d14	19466	8.69	22611	8.69	86	50 - 200	0.000	+/-0.50	

Analytical Resources, LLC
Analytical Chemists and Consultants

INTERNAL STANDARD AREA AND RT SUMMARY

EPA 8270E-SIM

Laboratory:	Analytical Resources, LLC	SDG:	23C0619
Client:	Friedman & Bruya Inc.	Project:	Port of Friday Harbor
Sequence:	SLD0107	Instrument:	NT12
		Calibration:	GD00019

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
SED-09C:0-1 (23C0619-05)		(Solid)		Lab File ID: 2023040630.D				Analyzed: 04/06/23 23:46	
Tetrapentyltin	122530	6.116	164171	6.102	75	50 - 200	0.014	+/-0.50	
p-Terphenyl-d14	20530	8.69	22611	8.69	91	50 - 200	0.000	+/-0.50	
SED-09C:1-3 (23C0619-06)		(Solid)		Lab File ID: 2023040631.D				Analyzed: 04/07/23 00:02	
Tetrapentyltin	128533	6.103	164171	6.102	78	50 - 200	0.001	+/-0.50	
p-Terphenyl-d14	20676	8.69	22611	8.69	91	50 - 200	0.000	+/-0.50	
SED-26C:0-1 (23C0619-08)		(Solid)		Lab File ID: 2023040632.D				Analyzed: 04/07/23 00:18	
Tetrapentyltin	128426	6.116	164171	6.102	78	50 - 200	0.014	+/-0.50	
p-Terphenyl-d14	21977	8.69	22611	8.69	97	50 - 200	0.000	+/-0.50	
SED-26C:1-3 (23C0619-09)		(Solid)		Lab File ID: 2023040633.D				Analyzed: 04/07/23 00:35	
Tetrapentyltin	123693	6.103	164171	6.102	75	50 - 200	0.001	+/-0.50	
p-Terphenyl-d14	20165	8.69	22611	8.69	89	50 - 200	0.000	+/-0.50	
SED-25C:0-1 (23C0619-10)		(Solid)		Lab File ID: 2023040634.D				Analyzed: 04/07/23 00:51	
Tetrapentyltin	120694	6.103	164171	6.102	74	50 - 200	0.001	+/-0.50	
p-Terphenyl-d14	20141	8.691	22611	8.69	89	50 - 200	0.001	+/-0.50	
SED-25C:1-3 (23C0619-11)		(Solid)		Lab File ID: 2023040635.D				Analyzed: 04/07/23 01:08	
Tetrapentyltin	128737	6.102	164171	6.102	78	50 - 200	0.000	+/-0.50	
p-Terphenyl-d14	20567	8.69	22611	8.69	91	50 - 200	0.000	+/-0.50	
SED-10C:0-1 (23C0619-12)		(Solid)		Lab File ID: 2023040636.D				Analyzed: 04/07/23 01:24	
Tetrapentyltin	124983	6.116	164171	6.102	76	50 - 200	0.014	+/-0.50	
p-Terphenyl-d14	21688	8.69	22611	8.69	96	50 - 200	0.000	+/-0.50	
SED-10C:1-3 (23C0619-13)		(Solid)		Lab File ID: 2023040637.D				Analyzed: 04/07/23 01:41	
Tetrapentyltin	127809	6.102	164171	6.102	78	50 - 200	0.000	+/-0.50	
p-Terphenyl-d14	20874	8.69	22611	8.69	92	50 - 200	0.000	+/-0.50	
Calibration Check (SLD0107-CCV1)		(Water)		Lab File ID: 2023040638.D				Analyzed: 04/07/23 01:57	
Tetrapentyltin	132652	6.103	164171	6.102	81	50 - 200	0.001	+/-0.50	
p-Terphenyl-d14	21398	8.691	22611	8.69	95	50 - 200	0.001	+/-0.50	

HOLDING TIME SUMMARY

Analysis: EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG: 23C0619
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SED-07C:0-1 23C0619-01	03/22/23 07:29	03/24/23 16:25	03/28/23 12:28	6	14	04/06/23 21:51	9	40	
SED-07C:1-3 23C0619-02	03/22/23 07:29	03/24/23 16:25	03/28/23 12:28	6	14	04/06/23 22:56	9	40	
SED-08C:0-1 23C0619-03	03/22/23 08:07	03/24/23 16:25	03/28/23 12:28	6	14	04/06/23 23:13	9	40	
SED-08C:1-3 23C0619-04	03/22/23 08:07	03/24/23 16:25	03/28/23 12:28	6	14	04/06/23 23:29	9	40	
SED-09C:0-1 23C0619-05	03/22/23 08:33	03/24/23 16:25	03/28/23 12:28	6	14	04/06/23 23:46	9	40	
SED-09C:1-3 23C0619-06	03/22/23 08:33	03/24/23 16:25	03/28/23 12:28	6	14	04/07/23 00:02	9	40	
SED-26C:0-1 23C0619-08	03/22/23 10:38	03/24/23 16:25	03/28/23 12:28	6	14	04/07/23 00:18	9	40	
SED-26C:1-3 23C0619-09	03/22/23 10:38	03/24/23 16:25	03/28/23 12:28	6	14	04/07/23 00:35	10	40	
SED-25C:0-1 23C0619-10	03/22/23 11:19	03/24/23 16:25	03/28/23 12:28	6	14	04/07/23 00:51	10	40	
SED-25C:1-3 23C0619-11	03/22/23 11:19	03/24/23 16:25	03/28/23 12:28	6	14	04/07/23 01:08	10	40	
SED-10C:0-1 23C0619-12	03/23/23 08:17	03/24/23 16:25	03/28/23 12:28	5	14	04/07/23 01:24	10	40	
SED-10C:1-3 23C0619-13	03/23/23 08:17	03/24/23 16:25	03/28/23 12:28	5	14	04/07/23 01:41	10	40	
Duplicate BLC0727-DUP1	03/22/23 07:29	03/24/23 16:25	03/28/23 12:28	6	14	04/06/23 22:07	9	40	
Matrix Spike BLC0727-MS1	03/22/23 07:29	03/24/23 16:25	03/28/23 12:28	6	14	04/06/23 22:23	9	40	
Matrix Spike Dup BLC0727-MSD1	03/22/23 07:29	03/24/23 16:25	03/28/23 12:28	6	14	04/06/23 22:40	9	40	

* Indicates hold time exceedance.

METHOD DETECTION AND REPORTING LIMITS

EPA 8270E-SIM

Laboratory: Analytical Resources, LLC
SDG: 23C0619
Client: Friedman & Bruya Inc.
Project: Port of Friday Harbor
Matrix: Solid
Instrument: NT12

Analyte	MDL	RL	Units
Tributyltin Ion	1.93	3.86	ug/kg
Dibutyltin Ion	4.33	5.78	ug/kg
Butyltin Ion	3.06	4.08	ug/kg
Tetrabutyltin	5.00	5.00	ug/kg

Alfa Aesar

Certificate of analysis

Tri-n-propyltin chloride, 95%

Stock Number: 41459
Lot Number: K21Q046

Analysis

Appearance	Clear oil
Purity (based on Sn analysis)	≥ 97 %
Sn_{Th}	41.88 %
Sn_{Ex}	40.75 %

Certified by:

Quality Control

B001537
Tripropyltin (Chloride)-NEAT
Expires 2/19/2029
Prepared By Van Spohn 11/20/2012

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Appendix 20.1

ALTERNATE CERTIFICATE OF ANALYSIS

The manufacturer of the below chemical was unable to provide a Certificate of Analysis at the time of request by ARI.

Date Requested from Manufacturer: NA

Chemical: N-Butyltin-Chloride

Manufacturer: Alfa

Product #: C22E-on label

Lot #: NA

Purity: 95%

Analyst: VB

B001538
N-Butyltin Chloride-NEAT
Solvent / Lot: na
Prep: 11/20/2012 by VS
Exp. 2/19/2029
Location:

Certificate of Analysis

Product Name:	Dibutyltin dichloride
Product Description:	96%
Product Brand:	Sigma-Aldrich
Product Number:	205494
Molecular Weight:	303.84
Molecular Formula:	$(CH_3CH_2CH_2CH_2)_2SnCl_2$
CAS Number:	683-18-1

TEST	SPECIFICATION	LOT 09116AN RESULTS
APPEARANCE	MOIST WHITE TO OFF-WHITE CRYSTALS	MOIST OFF-WHITE CRYSTALS
INFRARED SPECTRUM	CONFORMS TO STRUCTURE AND STANDARD AS	CONFORMS TO STRUCTURE AND STANDARD AS
** **	ILLUSTRATED ON PAGE 1145D OF EDITION I,	ILLUSTRATED ON PAGE 1145D OF EDITION I,
** **	VOLUME 2 OF "THE ALDRICH LIBRARY OF FT-IR	VOLUME 2 OF "THE ALDRICH LIBRARY OF FT-IR
** **	SPECTRA".	SPECTRA".
TITRATION	95.5%-104.5%(WITH AGNO3 AFTER O2 COMBUSTION)	100.8 % (WITH AGNO3 AFTER OXYGEN COMBUSTION)
GAS LIQUID	95.5% (MINIMUM)	98.5 %

Barbara Rajzer, Supervisor
Quality Control
Milwaukee, Wisconsin USA

B001539
Dibutyltin (Dichloride)-NEAT
Expires 2/19/2029
Prepared By Van Spohn 11/20/2012

Appendix 20.1

ALTERNATE CERTIFICATE OF ANALYSIS

The manufacturer of the below chemical was unable to provide a Certificate of Analysis at the time of request by ARI.

Date Requested from Manufacturer: NA

Chemical: Tributyltin - Chloride

Manufacturer: Strem

Product #: 93-5056

Lot #: B1054021

Purity: 8/27/13 - 96%

Analyst: VP

B001540
Tributyltin Chloride-NEAT
Solvent / Lot: na
Prep: 11/20/2012 by VS
Exp: 2/19/2029
Location:

Certificate of Analysis

SIGMA-ALDRICH

Product Name	Tetrabutyltin, technical grade, 93%
Product Number	T6008
Product Brand	ALDRICH
CAS Number	1461-25-2
Molecular Formula	$(CH_3CH_2CH_2CH_2)_4Sn$
Molecular Weight	347.17

TEST	SPECIFICATION	LOT 00729TW RESULTS
APPEARANCE		COLORLESS LIQUID
REFRACTIVE INDEX AT		1.4740
INFRARED SPECTRUM		CONFORMS TO STRUCTURE AND STANDARD AS ILLUSTRATED ON PAGE 1144B OF EDITION I, VOLUME 2 OF "THE ALDRICH LIBRARY OF FT-IR SPECTRA".
GAS LIQUID		96.0 %

Barbara Rajzer, Supervisor
Quality Control
Milwaukee, Wisconsin USA

Certificate of Analysis

SIGMA-ALDRICH

Product Name	Butyltin trichloride, 95%
Product Number	201057
Product Brand	ALDRICH
CAS Number	1118-46-3
Molecular Formula	$CH_3(CH_2)_3SnCl_3$
Molecular Weight	282.18

TEST	SPECIFICATION	LOT 05509DF RESULTS
APPEARANCE	COLORLESS TO BROWN LIQUID	COLORLESS LIQUID
REFRACTIVE INDEX AT		1.5227
INFRARED SPECTRUM	CONFORMS TO STRUCTURE.	CONFORMS TO STRUCTURE AND STANDARD AS ILLUSTRATED ON PAGE 1145C OF EDITION I, VOLUME 2 OF "THE ALDRICH LIBRARY OF FT-IR SPECTRA".
TITRATION	94.0-106.0% (WITH AGNO3 AFTER O2 COMBUSTION)	98.1 % (WITH AGNO3 AFTER OXYGEN COMBUSTION)
GAS LIQUID	94.0% (MINIMUM)	99.9 %

Barbara Rajzer, Supervisor
Quality Control
Milwaukee, Wisconsin USA

Analytical Standard Record

Standard ID: B001688 **Printed: 12/2/2020 10:31:13AM**

Description:	Hexyltributyl Tin-Neat	Expires:	04-Mar-2029
Standard Type:	Calibration Standa	Prepared:	19-Mar-2013
Solvent:	NA	Prepared By:	Van Spohn
Final Volume (mls):	1	Department:	Organics
Vials:	1	Last Edit:	23-Nov-2013 14:53 by VTS
Vendor:	Aldrich	Lot #:	11421E4
Vendor Catalog #:			

Comments

NO I NUMBER-mass conversion to Tributyltin ion set at .773

Analyte	CAS Number	Concentration	Units
Tributyltin Ion	36643-28-4	773000	ug/mL

Reviewed By Date

Analytical Standard Record

Standard ID: B001689 **Printed: 12/2/2020 10:32:44AM**

Description:	Hexyltripropyl Tin-Neat	Expires:	04-Mar-2029
Standard Type:	Calibration Standa	Prepared:	19-Mar-2013
Solvent:	NA	Prepared By:	Van Spohn
Final Volume (mls):	1	Department:	Organics
Vials:	1	Last Edit:	23-Nov-2013 14:56 by VTS
Vendor:	NA	Lot #:	NA
Vendor Catalog #:			

Comments

I2702-mass conversion to Tripropyl tin set at .7443

Analyte	CAS Number	Concentration	Units
Tripropyltin	761-44-4	744300	ug/mL

Reviewed By Date

Analytical Standard Record

Standard ID: B001690 **Printed: 12/2/2020 10:34:10AM**

Description:	Hexyltripentyl Tin-Neat	Expires:	04-Mar-2029
Standard Type:	Calibration Standa	Prepared:	19-Mar-2013
Solvent:	NA	Prepared By:	Van Spohn
Final Volume (mls):	1	Department:	Organics
Vials:	1	Last Edit:	23-Nov-2013 15:04 by VTS
Vendor:	Aldrich	Lot #:	01601CF
Vendor Catalog #:			

Comments

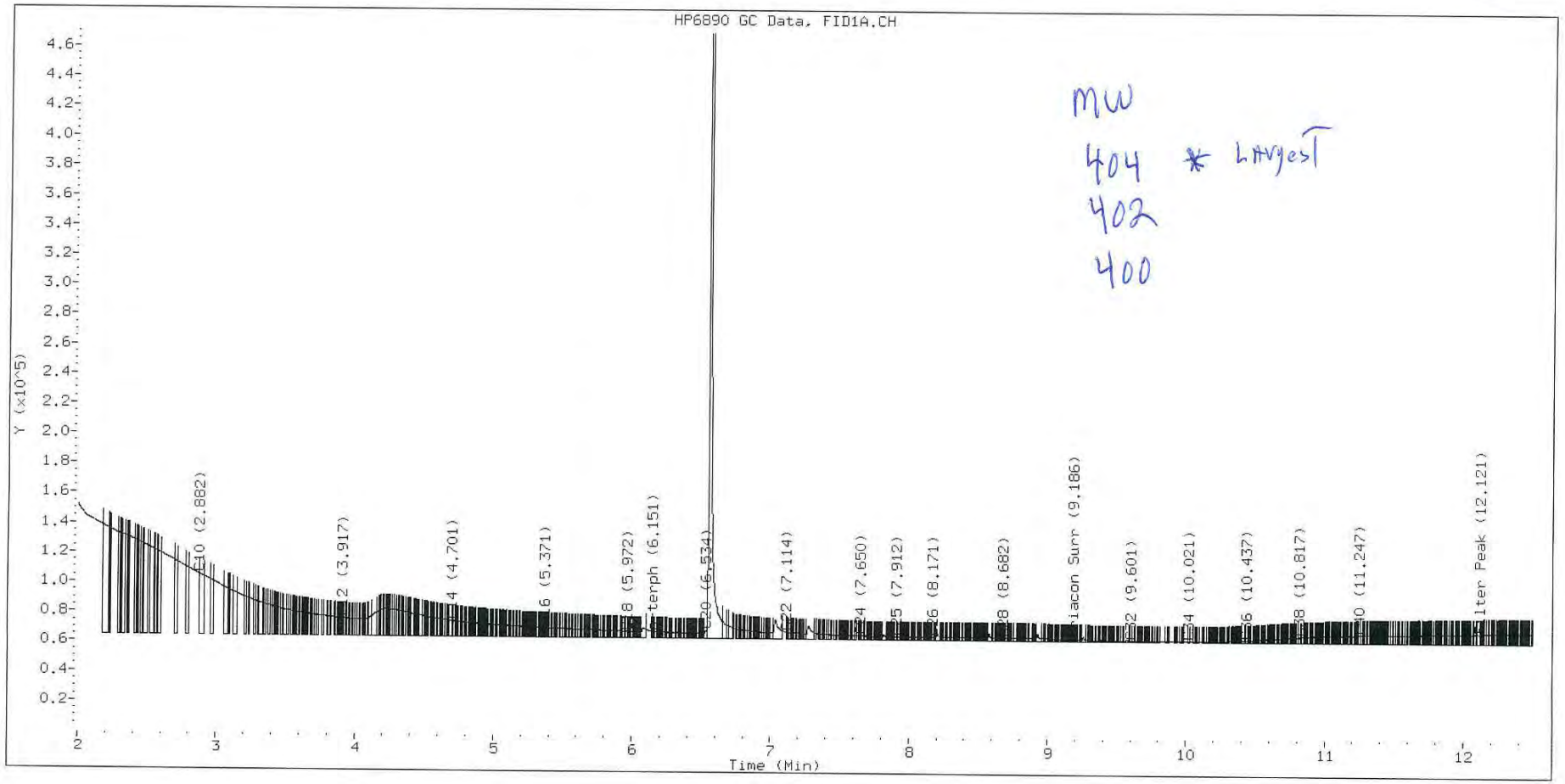
NO I NUMBER-mass conversion set at .7959

Analyte	CAS Number	Concentration	Units
Tripentyltin	41784-41-2	795900	ug/mL

Reviewed By Date

ALDRICH Dibutyl dichloride
LOT 09116AN 96%

Datafile: FID4A, 20210104.b/421A0409.D Dibutyl



MW
404 * Largest
402
400

J 000051
(Dibutyltin neat)

23C0619 CLPLIKE (Rev0) - Page 301 of 1484

Certificate of Analysis

Phenova Certified Reference Materials are sold by Phenomenex.
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Certified Reference Material

This product is included in Phenova's ISO/IEC 17025 and ISO Guide 34 Scopes of Accreditation

Catalog No.:	AL0-101291	**Lot Number:**	CL11000
Description:	GC/MS Tuning Mix	**Certification Date:**	May 9, 2014
Storage:	4 °C	**Expiration Date:**	December 31, 2023
Provided As:	1 mL in 2 mL Ampoule in Methylene chloride	**Revision Date:**	August 5, 2015

Andrea L Gill

Andrea Gill, Certified Reference Materials Manager

Component	CAS #	Certified Value µg/mL	Expanded Uncertainty (%)
Benzidine	92-87-5	1000	± 0.208%
Decafluorotriphenylphosphine (DFTPP)	5074-71-5	1000	± 0.057%
4,4'-DDT	50-29-3	1000	± 0.056%
Pentachlorophenol	87-86-5	1000	± 0.061%

K003891
GC/MS Tune solution-1000ug/ml
Solvent / Lot: CL11000
Prep: 4/22/2022 by VS
Exp: 12/31/2023
Location:

ACCREDITED
Reference Material Producer
Certificate No. 2427.02

phenova® Certified Reference Materials

Manufactured by Phenova, Inc.

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Chemical Testing Laboratory
Certificate No. 2427.03

IL111106/3_us

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ACCREDITED

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Cert. No. 3031.01

Date Received: _____

Certificate of Analysis

Catalog No.:	Lot No.:	Storage:	Solvent:	Exp. Date:	Description:
110760-01	469898	≤ -10 °C	Hexane	12-Dec-2024	Hexyl Derivatives of Tributyltin & Tripentyltin Solution, 1,000 mg/L, 1 ml

Compound	CAS No.	Purity (%)	Neat Material Lot No.	Concentration	
tripentyltin (as hexyl derivative)	3342-67-4	95	1988.237.1P	998.1 ± 27.92	mg/L
tributyltin (as hexyl derivative)	1461-22-9	97	934.29.1P	1017 ± 16.32	mg/L

K004354
TBTSCV MIX-1000ug/ml
Solvent / Lot: HEXANE
Prep: 5/6/2022 by JZ
Exp: 12/12/2024
Location:

Certified By: _____

Kerry Robinson
Manufacture Date 8-Dec-2021

Follow all storage requirements, keep tightly closed when not in use, and use good laboratory practices when handling.
This Reference Material was manufactured, produced, and/or certified under a quality management system that is accredited to ISO 17034 and ISO/IEC 17025.

All weights are traceable through N. I. S. T. Test No. 822/264157-00.
Concentration (correct for purity) and uncertainty (95% confidence) values listed are determined gravimetricly.

The stated uncertainty is the expanded uncertainty with a coverage factor of two to give a 95% confidence level.

110 Benner Circle
Bellefonte, PA 16823-8812
Tel: 1-814-353-1300
Fax: 1-814-353-1309

www.restek.com

Certificate of Analysis

chromatographic plus

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 31477 **Lot No.:** A0191853

Description : Tripentyltin Chloride Mixture

Tripentyltin Chloride Std 2000µg/mL, Methylene Chloride, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : November 30, 2025 **Storage:** 10°C or colder

Ship: Ambient

Elution Order	Compound	CAS #	Percent Purity	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)
1	Tripentyltin chloride	3342-67-4	94%	2,015.4 µg/mL	+/- 18.7418 µg/mL
Solvent:	Methylene chloride	75-09-2	99%		

Specific Reference Material Notes:

Derivatization in the sample preparation of this standard is required for internal acceptance testing as a result the acceptance criteria is ±15%.

L002508
Tripentyltin chloride mix
Solvent / Lot: Methylene chloride
Prep: 3/7/2023 by JZ
Exp: 11/30/2025
Location:

3/8/23

General Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the RM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Uncertainty Value Notes:

- Uncertainties are determined using data from balances and glassware, raw material purity, and, when significant, equipment tolerances or calibration results.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Stability of the unopened product, when stored in compliance with the recommended conditions, is guaranteed through the expiration displayed on the product label and certificate. Contact Restek for additional opened product stability information, with the knowledge/understanding that open product stability is subject to the specific handling and environmental conditions to which the product is exposed. For your convenience Restek supplies deactivated vials with most standards packed in 2mL ampules. Larger volume deactivated vials are available through Restek as a custom ordered item. Additionally, Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions.

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Cert. No. 3031.01

Date Received: _____

Certificate of Analysis

Catalog No.:	Lot No.:	Storage:	Solvent:	Exp. Date:	Description:
110760-01	469898	≤ -10 °C	Hexane	12-Dec-2024	Hexyl Derivatives of Tributyltin & Tripentyltin Solution, 1,000 mg/L, 1 ml

Compound	CAS No.	Purity (%)	Neat Material Lot No.	Concentration	
tripentyltin (as hexyl derivative)	3342-67-4	95	1988.237.1P	998.1 ± 28.8	mg/L
tributyltin (as hexyl derivative)	1461-22-9	97	934.29.1P	1017 ± 17.83	mg/L

L 3412

Certified By: _____
Kerry Robinson
Manufacture Date 8-Dec-2021

Follow all storage requirements, keep tightly closed when not in use, and use good laboratory practices when handling.
This Reference Material was manufactured, produced, and/or certified under a quality management system that is accredited to ISO 9001:2015.

All weights are traceable through N. I. S. T. Test No. 822/264157-00.
Concentration (correct for purity) and uncertainty (95% confidence) values listed are determined gravimetricly.

The stated uncertainty is the expanded uncertainty with a coverage factor of two to give a 95% confidence level.

Analytical Resources, LLC
Analytical Chemists and Consultants

SED-08C:0-1

Form 1
ORGANIC ANALYSIS DATA SHEET
EPA 1613B
Dioxins/Furans by HRGC/HRMS

Laboratory:	Analytical Resources, LLC			SDG:	23C0619
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0619-03 C	File ID:	23042408
Sampled:	03/22/23 08:07	Prepared:	04/06/23 13:16	Analyzed:	04/24/23 20:08
% Solids:	66.22	Preparation:	EPA 1613	Initial/Final:	15.12 g Wet / 20 uL
Result Basis:	Dry	Sequence:	SLD0330	Calibration:	GC00015
Batch:	BLD0089	Instrument:	AUTOSPEC01	Column:	RTX-Dioxin2

CAS NO.	COMPOUND	DF/Split	Ion Ratio	Ratio Limits	EDL	RL	Result	Units	Q
51207-31-9	2,3,7,8-TCDF	1	0.820	0.655-0.886	0.367	0.999	2.85	ng/kg	X
1746-01-6	2,3,7,8-TCDD	1	0.508	0.655-0.886	0.147	0.999	0.323	ng/kg	EMPC, J
57117-41-6	1,2,3,7,8-PeCDF	1	1.810	1.318-1.783	0.466	0.999	3.06	ng/kg	EMPC
57117-31-4	2,3,4,7,8-PeCDF	1	1.781	1.318-1.783	0.418	0.999	2.83	ng/kg	
40321-76-4	1,2,3,7,8-PeCDD	1	1.528	1.318-1.783	0.245	0.999	3.29	ng/kg	
70648-26-9	1,2,3,4,7,8-HxCDF	1	1.442	1.054-1.426	0.166	0.999	3.98	ng/kg	EMPC
57117-44-9	1,2,3,6,7,8-HxCDF	1	1.544	1.054-1.426	0.177	0.999	2.70	ng/kg	EMPC
60851-34-5	2,3,4,6,7,8-HxCDF	1	1.386	1.054-1.426	0.183	0.999	4.17	ng/kg	
72918-21-9	1,2,3,7,8,9-HxCDF	1	1.036	1.054-1.426	0.238	0.999	1.61	ng/kg	EMPC
39227-28-6	1,2,3,4,7,8-HxCDD	1	1.244	1.054-1.426	0.446	0.999	5.04	ng/kg	
57653-85-7	1,2,3,6,7,8-HxCDD	1	1.260	1.054-1.426	0.453	0.999	21.5	ng/kg	
19408-74-3	1,2,3,7,8,9-HxCDD	1	1.116	1.054-1.426	0.495	0.999	8.83	ng/kg	
67562-39-4	1,2,3,4,6,7,8-HpCDF	1	1.026	0.893-1.208	0.228	0.999	60.4	ng/kg	
55673-89-7	1,2,3,4,7,8,9-HpCDF	1	0.850	0.893-1.208	0.350	0.999	3.22	ng/kg	EMPC
35822-46-9	1,2,3,4,6,7,8-HpCDD	1	1.022	0.893-1.208	1.24	2.50	1080	ng/kg	B
39001-02-0	OCDF	1	0.827	0.757-1.024	0.426	2.50	147	ng/kg	
3268-87-9	OCDD	1	0.856	0.757-1.024	0.886	9.99	7300	ng/kg	E, B

Homologue Groups

55722-27-5	Total TCDF	1	0.000			0.999	27.6	ng/kg	
41903-57-5	Total TCDD	1	0.000			0.999	4.73	ng/kg	
30402-15-4	Total PeCDF	1	0.000			0.999	36.3	ng/kg	
36088-22-9	Total PeCDD	1	0.000			0.999	20.4	ng/kg	
55684-94-1	Total HxCDF	1	0.000			0.999	95.5	ng/kg	
34465-46-8	Total HxCDD	1	0.000			0.999	447	ng/kg	
38998-75-3	Total HpCDF	1	0.000			0.999	180	ng/kg	
37871-00-4	Total HpCDD	1	0.000			0.999	4540	ng/kg	

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC): 23.29
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC): 23.29

SED-08C:0-1

Form 2
ORGANIC ANALYSIS DATA SHEET
EPA 1613B
Dioxins/Furans by HRGC/HRMS

Laboratory:	Analytical Resources, LLC			SDG:	23C0619
Client:	Friedman & Bruya Inc.			Project:	Port of Friday Harbor
Matrix:	Sediment	Laboratory ID:	23C0619-03	File ID:	23042408
Sampled:	03/22/23 08:07	Prepared:	04/06/23 13:16	Analyzed:	04/24/23 20:08
Solids Wt%:	66.22	Preparation:	EPA 1613	Initial/Final:	15.12 g / 20 uL
Result Basis:	Dry	Sequence:	SLD0330	Calibration:	GC00015
Batch:	BLD0089	Instrument:	AUTOSPEC01	Column:	RTX-Dioxin2

Labels	DF/Split	Ion Ratio	Ratio Limits	EDL	% REC	QC LIMITS	Q
13C12-2,3,7,8-TCDF		0.761	0.655-0.886	0.084	52.0	24 - 169 %	
13C12-2,3,7,8-TCDD		0.802	0.655-0.886	0.168	61.8	25 - 164 %	
13C12-1,2,3,7,8-PeCDF		1.524	1.318-1.783	0.167	82.7	24 - 185 %	
13C12-2,3,4,7,8-PeCDF		1.540	1.318-1.783	0.185	88.5	21 - 178 %	
13C12-1,2,3,7,8-PeCDD		1.753	1.318-1.783	0.124	69.9	25 - 181 %	
13C12-1,2,3,4,7,8-HxCDF		0.513	0.434-0.587	0.303	78.0	26 - 152 %	
13C12-1,2,3,6,7,8-HxCDF		0.511	0.434-0.587	0.255	71.2	26 - 123 %	
13C12-2,3,4,6,7,8-HxCDF		0.516	0.434-0.587	0.313	81.4	28 - 136 %	
13C12-1,2,3,7,8,9-HxCDF		0.514	0.434-0.587	0.379	40.2	29 - 147 %	
13C12-1,2,3,4,7,8-HxCDD		1.262	1.054-1.426	0.192	84.2	32 - 141 %	
13C12-1,2,3,6,7,8-HxCDD		1.230	1.054-1.426	0.165	73.9	28 - 130 %	
13C12-1,2,3,4,6,7,8-HpCDF		0.462	0.374-0.506	0.263	93.9	28 - 143 %	
13C12-1,2,3,4,7,8,9-HpCDF		0.445	0.374-0.506	0.306	86.1	26 - 138 %	
13C12-1,2,3,4,6,7,8-HpCDD		1.120	0.893-1.208	0.228	78.4	23 - 140 %	
13C12-OCDD		0.897	0.757-1.024	0.352	76.1	17 - 157 %	
37Cl4-2,3,7,8-TCDD		328.000		0.050	58.3	35 - 197 %	

* Values outside of QC limits

Dataset: T:\Autospec\Processed Data Batch\230424D1.qld
Last Altered: Tuesday, April 25, 2023 10:49:58 Pacific Daylight Time
Printed: Tuesday, April 25, 2023 11:19:53 Pacific Daylight Time

Method: T:\Autospec\Methods\Dioxin230424.mdb 25 Apr 2023 07:59:40
Calibration: T:\Autospec\Curves\230303ICIH.cdb 06 Mar 2023 11:57:27

ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

Compound	RT	RRT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	Noise 1	Noise 2	Height 1	Height 2	S/N 1	S/N 2	EMPC	Int.1	Int.2	pg
2378-TCDF	25.718	1.001	2.451e3	2.988e3	0.702	0.820	0.770	1770	1603	3.79e4	4.27e4	21.4	26.6	NO	bd	bd	1.429
12378-PeCDF	29.867	1.001	4.422e3	2.443e3	0.679	1.810	1.550	2731	2345	6.80e4	4.11e4	24.9	17.5	YES	bd	bb	1.530
23478-PeCDF	31.204	1.000	4.542e3	2.550e3	0.786	1.781	1.550	2731	2345	6.95e4	4.02e4	25.4	17.1	NO	db	bb	1.417
123478-HxCDF	34.858	1.000	6.921e3	4.799e3	1.166	1.442	1.240	1376	1081	9.15e4	7.22e4	66.5	66.8	YES	dd	dd	1.995
234678-HxCDF	35.905	1.000	7.017e3	5.063e3	1.140	1.386	1.240	1376	1081	7.18e4	6.03e4	52.2	55.8	NO	bb	bb	2.087
123678-HxCDF	35.003	1.001	4.873e3	3.157e3	1.091	1.544	1.240	1376	1081	8.11e4	4.77e4	58.9	44.1	YES	MM	db	1.349
123789-HxCDF	36.874	1.000	9.685e2	9.346e2	1.137	1.036	1.240	1376	1081	2.27e4	2.14e4	16.5	19.8	YES	bb	bb	0.807
1234678-HpCDF	38.690	1.000	7.141e4	6.957e4	1.003	1.026	1.050	1624	1115	1.16e6	1.13e6	713.8	1014.4	NO	bb	bb	30.256
1234789-HpCDF	40.918	1.000	2.587e3	3.045e3	0.953	0.850	1.050	1624	1115	3.90e4	4.13e4	24.0	37.1	YES	bb	bb	1.614
OCDF	45.125	1.005	8.357e4	1.010e5	0.778	0.827	0.890	1053	1070	1.02e6	1.18e6	964.0	1102.0	NO	bb	bd	73.532
2378-TCDD	26.354	1.000	2.872e2	5.648e2	1.149	0.508	0.770	1134	693	4.08e3	1.03e4	3.6	14.9	YES	MM	bd	0.162
12378-PeCDD	31.449	1.000	3.795e3	2.484e3	1.022	1.528	1.550	1202	994	4.70e4	3.24e4	39.1	32.6	NO	bb	bb	1.646
123478-HxCDD	36.028	1.000	6.443e3	5.180e3	0.996	1.244	1.240	2040	3204	9.56e4	7.81e4	46.9	24.4	NO	bd	bd	2.521
123678-HxCDD	36.150	1.000	2.844e4	2.257e4	1.001	1.260	1.240	2040	3204	4.22e5	3.47e5	207.0	108.2	NO	dd	dd	10.785
123789-HxCDD	36.540	1.011	9.892e3	8.863e3	0.907	1.116	1.240	2040	3204	1.59e5	1.28e5	77.7	39.8	NO	bb	bb	4.420
1234678-HpCDD	40.183	1.000	1.034e6	1.012e6	1.039	1.022	1.050	4860	6784	1.62e7	1.58e7	3341.4	2330.5	NO	bb	bb	540.866
OCDD	44.896	1.000	5.003e6	5.843e6	0.920	0.856	0.890	2159	3066	6.30e7	7.37e7	29189.5	24056.5	NO	bb	bb	3653.551
13C-2378-TCDF	25.690	1.007	2.345e5	3.082e5	1.620	0.761	0.770	1210	1063	3.39e6	4.54e6	2803.3	4276.0	NO	bb	bb	52.005
13C-12378-PeCDF	29.844	1.169	3.988e5	2.617e5	1.240	1.524	1.550	1694	1742	5.81e6	3.89e6	3428.6	2231.5	NO	bb	bb	82.671
13C-23478-PeCDF	31.192	1.222	3.861e5	2.507e5	1.118	1.540	1.550	1694	1742	5.61e6	3.62e6	3312.0	2076.4	NO	bb	bb	88.453
13C-123478-HxCDF	34.847	0.954	1.708e5	3.330e5	1.168	0.513	0.510	1566	3256	2.57e6	4.91e6	1643.1	1507.8	NO	bd	bd	78.012
13C-123678-HxCDF	34.980	0.958	1.845e5	3.612e5	1.386	0.511	0.510	1566	3256	2.58e6	4.99e6	1649.3	1534.1	NO	db	db	71.194
13C-234678-HxCDF	35.894	0.983	1.729e5	3.350e5	1.129	0.516	0.510	1566	3256	2.41e6	4.72e6	1536.9	1451.0	NO	bb	bb	81.353
13C-123789-HxCDF	36.886	1.010	7.038e4	1.369e5	0.932	0.514	0.510	1566	3256	1.85e6	3.50e6	1180.5	1075.3	NO	bb	bb	40.246
13C-1234678-HpCDF	38.679	1.059	1.468e5	3.178e5	0.895	0.462	0.440	1337	1872	2.27e6	5.03e6	1694.1	2685.9	NO	bd	bb	93.881
13C-1234789-HpCDF	40.907	1.120	1.128e5	2.534e5	0.770	0.445	0.440	1337	1872	1.52e6	3.42e6	1133.5	1827.1	NO	bb	bd	86.058
13C-1234-TCDD	25.520	0.000	2.830e5	3.611e5	1.000	0.784	0.770	1941	1280	4.38e6	5.54e6	2256.1	4324.5	NO	bb	bb	100.000
13C-2378-TCDD	26.339	1.032	2.040e5	2.544e5	1.152	0.802	0.770	1941	1280	2.88e6	3.59e6	1483.3	2807.8	NO	bb	bb	61.762
13C-12378-PeCDD	31.449	1.232	2.377e5	1.356e5	0.829	1.753	1.550	927	788	3.34e6	1.92e6	3604.7	2434.2	NO	bd	bd	69.920
13C-123478-HxCDD	36.016	0.986	2.583e5	2.047e5	0.995	1.262	1.240	1419	1189	3.95e6	3.02e6	2783.1	2536.9	NO	bd	bd	84.176
13C-123678-HxCDD	36.139	0.989	2.606e5	2.118e5	1.157	1.230	1.240	1419	1189	3.82e6	3.14e6	2693.1	2640.4	NO	db	db	73.893
13C-1234678-HpCDD	40.172	1.100	1.924e5	1.717e5	0.840	1.120	1.050	1136	1477	2.86e6	2.54e6	2518.8	1717.3	NO	bb	bb	78.400
13C-OCDD	44.878	1.229	3.053e5	3.401e5	0.767	0.897	0.890	1732	1949	3.63e6	4.03e6	2098.3	2070.0	NO	bb	bd	152.126
13C-123789-HxCDD	36.529	0.000	3.081e5	2.447e5	1.000	1.259	1.240	1419	1189	4.56e6	3.67e6	3210.1	3085.4	NO	bb	bb	100.000
37CL-2378-TCDD	26.354	1.033	1.935e5		1.288			1081		2.81e6		2599.3			bb		23.324

Dataset: T:\Autospec\Processed Data Batch\230424D1.qld
Last Altered: Tuesday, April 25, 2023 10:49:58 Pacific Daylight Time
Printed: Tuesday, April 25, 2023 11:19:53 Pacific Daylight Time

ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

Compound	RT	RRT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	Noise 1	Noise 2	Height 1	Height 2	S/N 1	S/N 2	EMPC	Int.1	Int.2	pg
1368-TCDF	22.215	0.865	7.091e2	9.314e2	0.802	0.761	0.770	1770	1603	1.25e4	1.52e4	7.1	9.5	NO	bb	bb	0.377
1289-TCDF					0.678		0.770	1770	1603								
13468-PECDF					1.246		1.550	830	1145								
12389-PECDF					0.496		1.550	2731	2345								
123468-HXCDF	33.175	0.952	2.008e4	1.594e4	1.169	1.260	1.240	1376	1081	3.03e5	2.41e5	220.5	223.3	NO	bb	bd	6.116
1368-TCDD	23.486	0.892	1.755e3	2.223e3	1.015	0.789	0.770	1134	693	2.84e4	3.45e4	25.0	49.8	NO	bb	bb	0.855
1289-TCDD					0.909		0.770	1134	693								
12479-PECDD					2.301		1.550	1202	994								
12389-PECDD	31.872	1.013	1.228e3	9.239e2	1.184	1.329	1.550	1202	994	1.54e4	1.24e4	12.8	12.5	NO	bb	bb	0.487
124679-HXCDD	33.956	0.943	2.678e5	2.121e5	1.115	1.263	1.240	2040	3204	3.97e6	3.09e6	1944.2	965.3	NO	bb	bb	92.931
1234679-HPCDD	39.147	0.975	3.668e6	3.500e6	1.137	1.048	1.050	4860	6784	5.96e7	5.78e7	12270.7	8526.8	NO	bb	bb	1731.750
Total-tetrafurans			2.376e4		0.727			1770		3.50e5							13.838
Total-penta1			3.259e4					830		4.61e5							8.818
Total-pentafurans			2.486e4		0.654			2731		3.62e5							9.378
Total-hexafurans			1.365e5		1.141			1376		1.97e6							47.791
Total-heptafurans			1.941e5		0.978			1624		3.15e6							89.911
Total-Furans			4.954e5		0.922			1770		7.30e6							243.268
Total-tetradioxins			4.803e3		1.024			1134		7.45e4							2.370
Total-pentadioxins			3.289e4		1.502			1202		4.65e5							10.196
Total-hexadioxins			6.044e5		1.005			2040		8.14e6							223.557
Total-heptadioxins			4.702e6		1.088			4860		7.59e7							2272.616
Total-Dioxins			1.035e7		1.130			1134		1.48e8							6162.289
Total-TEQ			1.084e7					1134		1.55e8							6405.557
FUNCTION1 PFK			2.086e7					460207		1.07e8							
FUNCTION2 PFK			9.100e6					225457		1.74e7							0.000
FUNCTION3 PFK			1.412e8					250299		4.35e8							0.000
FUNCTION4 PFK			0.000e0					272809		0.00e0							
FUNCTION5 PFK			0.000e0					156355		0.00e0							
FUNCTION1 HXCD...			4.344e2					650		7.12e3							0.000
FUNCTION1 HPCD...																	
FUNCTION2 HPCD...			4.683e2					899		1.02e4							0.000
FUNCTION3 OCDPE			1.265e2					630		2.82e3							0.000
FUNCTION4 NCDPE			6.735e2					782		1.21e4							0.000
FUNCTION5 DCDPE			1.378e3					408		1.42e4							0.000

Method: T:\Autospec\Methods\Dioxin230424.mdb 25 Apr 2023 07:59:40
Calibration: T:\Autospec\Curves\230303ICIH.cdb 06 Mar 2023 11:57:27

ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

TF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-tetrafurans	23.95	1.209e3	1.382e3	0.727	0.87	0.77	8.7	YES	NO	db	db	0.657
2	Total-tetrafurans	23.81	1.443e3	2.080e3	0.727	0.69	0.77	12.5	YES	NO	dd	dd	0.893
3	Total-tetrafurans	23.70	1.268e3	1.850e3	0.727	0.69	0.77	11.9	YES	NO	bd	bd	0.790
4	Total-tetrafurans	23.54	8.494e2	1.153e3	0.727	0.74	0.77	8.1	YES	NO	db	db	0.508
5	Total-tetrafurans	23.46	7.721e2	9.104e2	0.727	0.85	0.77	6.8	YES	NO	dd	dd	0.426
6	Total-tetrafurans	23.05	3.354e3	4.282e3	0.727	0.78	0.77	21.0	YES	NO	bd	bd	1.936
7	Total-tetrafurans	22.47	1.274e3	1.913e3	0.727	0.67	0.77	10.6	YES	NO	bb	bb	0.808
8	1368-TCDF	22.21	7.091e2	9.314e2	0.802	0.76	0.77	7.1	YES	NO	bb	bb	0.377
9	Total-tetrafurans	25.94	3.875e3	4.802e3	0.727	0.81	0.77	33.4	YES	NO	db	dd	2.199
10	2378-TCDF	25.72	2.451e3	2.988e3	0.702	0.82	0.77	21.4	YES	NO	bd	bd	1.429
11	Total-tetrafurans	25.21	2.057e3	2.659e3	0.727	0.77	0.77	18.3	YES	NO	bd	bd	1.195
12	Total-tetrafurans	24.80	2.023e3	3.004e3	0.727	0.67	0.77	18.5	YES	NO	bb	bb	1.274
13	Total-tetrafurans	24.62	2.474e3	2.837e3	0.727	0.87	0.77	19.5	YES	NO	db	db	1.346

PP

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-penta1	27.16	3.259e4	2.081e4		1.57	1.55	555.0	YES	NO	bb	bb	8.818

PF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	23478-PeCDF	31.20	4.542e3	2.550e3	0.786	1.78	1.55	25.4	YES	NO	db	bb	1.417
2	Total-pentafurans	31.06	2.218e3	1.309e3	0.654	1.69	1.55	10.8	YES	NO	dd	db	0.832
3	Total-pentafurans	30.94	5.440e3	3.274e3	0.654	1.66	1.55	30.0	YES	NO	bd	bd	2.054
4	Total-pentafurans	30.18	2.179e3	1.489e3	0.654	1.46	1.55	11.8	YES	NO	db	db	0.865
5	Total-pentafurans	30.07	3.648e3	2.347e3	0.654	1.55	1.55	21.6	YES	NO	dd	bd	1.413
6	Total-pentafurans	28.89	6.831e3	5.033e3	0.654	1.36	1.55	32.9	YES	NO	db	db	2.797

ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

HF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	123468-HXCDF	33.18	2.008e4	1.594e4	1.169	1.26	1.24	220.5	YES	NO	bb	bd	6.116
2	234678-HxCDF	35.90	7.017e3	5.063e3	1.140	1.39	1.24	52.2	YES	NO	bb	bb	2.087
3	Total-hexafurans	35.34	6.772e2	5.165e2	1.141	1.31	1.24	6.8	YES	NO	db	bb	0.237
4	Total-hexafurans	34.70	3.865e3	2.769e3	1.141	1.40	1.24	41.9	YES	NO	bd	bd	1.318
5	Total-hexafurans	34.23	5.636e4	4.658e4	1.141	1.21	1.24	604.2	YES	NO	bb	bb	20.459
6	Total-hexafurans	33.92	1.442e3	1.111e3	1.141	1.30	1.24	14.7	YES	NO	bb	bb	0.507
7	Total-hexafurans	33.39	4.708e4	3.879e4	1.141	1.21	1.24	490.4	YES	NO	bb	db	17.065

HPF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-heptafurans	39.35	1.227e5	1.197e5	0.978	1.02	1.05	1225.0	YES	NO	bb	bb	59.655
2	1234678-HpCDF	38.69	7.141e4	6.957e4	1.003	1.03	1.05	713.8	YES	NO	bb	bb	30.256

Dataset: T:\Autospec\Processed Data Batch\230424D1.qld
Last Altered: Tuesday, April 25, 2023 10:49:58 Pacific Daylight Time
Printed: Tuesday, April 25, 2023 11:19:53 Pacific Daylight Time

ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

Furans,TF,PP,PF,HF,HPF,OF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-tetrafurans	23.95	1.209e3	1.382e3	0.727	0.87	0.77	8.7	YES	NO	db	db	0.657
2	Total-tetrafurans	23.81	1.443e3	2.080e3	0.727	0.69	0.77	12.5	YES	NO	dd	dd	0.893
3	Total-tetrafurans	23.70	1.268e3	1.850e3	0.727	0.69	0.77	11.9	YES	NO	bd	bd	0.790
4	Total-tetrafurans	23.54	8.494e2	1.153e3	0.727	0.74	0.77	8.1	YES	NO	db	db	0.508
5	Total-tetrafurans	23.46	7.721e2	9.104e2	0.727	0.85	0.77	6.8	YES	NO	dd	dd	0.426
6	Total-tetrafurans	23.05	3.354e3	4.282e3	0.727	0.78	0.77	21.0	YES	NO	bd	bd	1.936
7	Total-tetrafurans	22.47	1.274e3	1.913e3	0.727	0.67	0.77	10.6	YES	NO	bb	bb	0.808
8	1368-TCDF	22.21	7.091e2	9.314e2	0.802	0.76	0.77	7.1	YES	NO	bb	bb	0.377
9	Total-tetrafurans	25.94	3.875e3	4.802e3	0.727	0.81	0.77	33.4	YES	NO	db	dd	2.199
10	2378-TCDF	25.72	2.451e3	2.988e3	0.702	0.82	0.77	21.4	YES	NO	bd	bd	1.429
11	Total-tetrafurans	25.21	2.057e3	2.659e3	0.727	0.77	0.77	18.3	YES	NO	bd	bd	1.195
12	Total-tetrafurans	24.80	2.023e3	3.004e3	0.727	0.67	0.77	18.5	YES	NO	bb	bb	1.274
13	Total-tetrafurans	24.62	2.474e3	2.837e3	0.727	0.87	0.77	19.5	YES	NO	db	db	1.346
14	23478-PeCDF	31.20	4.542e3	2.550e3	0.786	1.78	1.55	25.4	YES	NO	db	bb	1.417
15	Total-pentafurans	31.06	2.218e3	1.309e3	0.654	1.69	1.55	10.8	YES	NO	dd	db	0.832
16	Total-pentafurans	30.94	5.440e3	3.274e3	0.654	1.66	1.55	30.0	YES	NO	bd	bd	2.054
17	Total-pentafurans	30.18	2.179e3	1.489e3	0.654	1.46	1.55	11.8	YES	NO	db	db	0.865
18	Total-pentafurans	30.07	3.648e3	2.347e3	0.654	1.55	1.55	21.6	YES	NO	dd	bd	1.413
19	Total-pentafurans	28.89	6.831e3	5.033e3	0.654	1.36	1.55	32.9	YES	NO	db	db	2.797
20	123468-HXCDF	33.18	2.008e4	1.594e4	1.169	1.26	1.24	220.5	YES	NO	bb	bd	6.116
21	234678-HxCDF	35.90	7.017e3	5.063e3	1.140	1.39	1.24	52.2	YES	NO	bb	bb	2.087
22	Total-hexafurans	35.34	6.772e2	5.165e2	1.141	1.31	1.24	6.8	YES	NO	db	bb	0.237
23	Total-hexafurans	34.70	3.865e3	2.769e3	1.141	1.40	1.24	41.9	YES	NO	bd	bd	1.318
24	Total-hexafurans	34.23	5.636e4	4.658e4	1.141	1.21	1.24	604.2	YES	NO	bb	bb	20.459
25	Total-hexafurans	33.92	1.442e3	1.111e3	1.141	1.30	1.24	14.7	YES	NO	bb	bb	0.507
26	Total-hexafurans	33.39	4.708e4	3.879e4	1.141	1.21	1.24	490.4	YES	NO	bb	db	17.065
27	Total-heptafurans	39.35	1.227e5	1.197e5	0.978	1.02	1.05	1225.0	YES	NO	bb	bb	59.655
28	1234678-HpCDF	38.69	7.141e4	6.957e4	1.003	1.03	1.05	713.8	YES	NO	bb	bb	30.256
29	OCDF	45.13	8.357e4	1.010e5	0.778	0.83	0.89	964.0	YES	NO	bb	bd	73.532
30	Total-penta1	27.16	3.259e4	2.081e4		1.57	1.55	555.0	YES	NO	bb	bb	8.818

ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

TD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-tetradioxins	24.66	8.250e2	1.205e3	1.024	0.68	0.77	9.3	YES	NO	bb	bb	0.432
2	Total-tetradioxins	23.97	5.134e2	6.666e2	1.024	0.77	0.77	7.3	YES	NO	bb	db	0.251
3	Total-tetradioxins	23.75	1.710e3	2.193e3	1.024	0.78	0.77	24.1	YES	NO	bb	bd	0.831
4	1368-TCDD	23.49	1.755e3	2.223e3	1.015	0.79	0.77	25.0	YES	NO	bb	bb	0.855

PD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	12389-PECDD	31.87	1.228e3	9.239e2	1.184	1.33	1.55	12.8	YES	NO	bb	bb	0.487
2	12378-PeCDD	31.45	3.795e3	2.484e3	1.022	1.53	1.55	39.1	YES	NO	bb	bb	1.646
3	Total-pentadioxins	30.39	5.537e3	3.837e3	1.502	1.44	1.55	58.7	YES	NO	bb	db	1.672
4	Total-pentadioxins	30.08	2.671e3	1.883e3	1.502	1.42	1.55	39.9	YES	NO	bb	bd	0.812
5	Total-pentadioxins	29.87	3.512e3	2.169e3	1.502	1.62	1.55	46.2	YES	NO	bb	bb	1.013
6	Total-pentadioxins	29.29	6.528e3	3.691e3	1.502	1.77	1.55	99.8	YES	NO	bb	bb	1.823
7	Total-pentadioxins	28.85	9.616e3	5.762e3	1.502	1.67	1.55	90.2	YES	NO	bb	bb	2.743

HD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	123678-HxCDD	36.15	2.844e4	2.257e4	1.001	1.26	1.24	207.0	YES	NO	dd	dd	10.785
2	123478-HxCDD	36.03	6.443e3	5.180e3	0.996	1.24	1.24	46.9	YES	NO	bd	bd	2.521
3	Total-hexadioxins	35.23	6.803e4	5.689e4	1.005	1.20	1.24	495.5	YES	NO	db	dd	26.578
4	Total-hexadioxins	35.11	1.582e5	1.283e5	1.005	1.23	1.24	744.5	YES	NO	bd	bd	60.971
5	Total-hexadioxins	34.75	4.545e4	3.668e4	1.005	1.24	1.24	337.4	YES	NO	bb	bb	17.476
6	124679-HXCDD	33.96	2.678e5	2.121e5	1.115	1.26	1.24	1944.2	YES	NO	bb	bb	92.931
7	123789-HxCDD	36.54	9.892e3	8.863e3	0.907	1.12	1.24	77.7	YES	NO	bb	bb	4.420
8	Total-hexadioxins	36.32	2.005e4	1.695e4	1.005	1.18	1.24	137.1	YES	NO	db	db	7.874

HPD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	1234678-HpCDD	40.18	1.034e6	1.012e6	1.039	1.02	1.05	3341.4	YES	NO	bb	bb	540.866
2	1234679-HPCDD	39.15	3.668e6	3.500e6	1.137	1.05	1.05	12270.7	YES	NO	bb	bb	1731.7...

ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

Dioxins,TD,PD,HD,HPD,OD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-tetradioxins	24.66	8.250e2	1.205e3	1.024	0.68	0.77	9.3	YES	NO	bb	bb	0.432
2	Total-tetradioxins	23.97	5.134e2	6.666e2	1.024	0.77	0.77	7.3	YES	NO	bb	db	0.251
3	Total-tetradioxins	23.75	1.710e3	2.193e3	1.024	0.78	0.77	24.1	YES	NO	bb	bd	0.831
4	1368-TCDD	23.49	1.755e3	2.223e3	1.015	0.79	0.77	25.0	YES	NO	bb	bb	0.855
5	12389-PECDD	31.87	1.228e3	9.239e2	1.184	1.33	1.55	12.8	YES	NO	bb	bb	0.487
6	12378-PeCDD	31.45	3.795e3	2.484e3	1.022	1.53	1.55	39.1	YES	NO	bb	bb	1.646
7	Total-pentadioxins	30.39	5.537e3	3.837e3	1.502	1.44	1.55	58.7	YES	NO	bb	db	1.672
8	Total-pentadioxins	30.08	2.671e3	1.883e3	1.502	1.42	1.55	39.9	YES	NO	bb	bd	0.812
9	Total-pentadioxins	29.87	3.512e3	2.169e3	1.502	1.62	1.55	46.2	YES	NO	bb	bb	1.013
10	Total-pentadioxins	29.29	6.528e3	3.691e3	1.502	1.77	1.55	99.8	YES	NO	bb	bb	1.823
11	Total-pentadioxins	28.85	9.616e3	5.762e3	1.502	1.67	1.55	90.2	YES	NO	bb	bb	2.743
12	123678-HxCDD	36.15	2.844e4	2.257e4	1.001	1.26	1.24	207.0	YES	NO	dd	dd	10.785
13	123478-HxCDD	36.03	6.443e3	5.180e3	0.996	1.24	1.24	46.9	YES	NO	bd	bd	2.521
14	Total-hexadioxins	35.23	6.803e4	5.689e4	1.005	1.20	1.24	495.5	YES	NO	db	dd	26.578
15	Total-hexadioxins	35.11	1.582e5	1.283e5	1.005	1.23	1.24	744.5	YES	NO	bd	bd	60.971
16	Total-hexadioxins	34.75	4.545e4	3.668e4	1.005	1.24	1.24	337.4	YES	NO	bb	bb	17.476
17	124679-HXCDD	33.96	2.678e5	2.121e5	1.115	1.26	1.24	1944.2	YES	NO	bb	bb	92.931
18	123789-HxCDD	36.54	9.892e3	8.863e3	0.907	1.12	1.24	77.7	YES	NO	bb	bb	4.420
19	Total-hexadioxins	36.32	2.005e4	1.695e4	1.005	1.18	1.24	137.1	YES	NO	db	db	7.874
20	1234678-HpCDD	40.18	1.034e6	1.012e6	1.039	1.02	1.05	3341.4	YES	NO	bb	bb	540.866
21	1234679-HPCDD	39.15	3.668e6	3.500e6	1.137	1.05	1.05	12270.7	YES	NO	bb	bb	1731.7...
22	OCDD	44.90	5.003e6	5.843e6	0.920	0.86	0.89	29189.5	YES	NO	bb	bb	3653.5...

ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

TotalTEQ,Furans,Dioxins

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-tetrafurans	23.95	1.209e3	1.382e3	0.727	0.87	0.77	8.7	YES	NO	db	db	0.657
2	Total-tetrafurans	23.81	1.443e3	2.080e3	0.727	0.69	0.77	12.5	YES	NO	dd	dd	0.893
3	Total-tetrafurans	23.70	1.268e3	1.850e3	0.727	0.69	0.77	11.9	YES	NO	bd	bd	0.790
4	Total-tetrafurans	23.54	8.494e2	1.153e3	0.727	0.74	0.77	8.1	YES	NO	db	db	0.508
5	Total-tetrafurans	23.46	7.721e2	9.104e2	0.727	0.85	0.77	6.8	YES	NO	dd	dd	0.426
6	Total-tetrafurans	23.05	3.354e3	4.282e3	0.727	0.78	0.77	21.0	YES	NO	bd	bd	1.936
7	Total-tetrafurans	22.47	1.274e3	1.913e3	0.727	0.67	0.77	10.6	YES	NO	bb	bb	0.808
8	1368-TCDF	22.21	7.091e2	9.314e2	0.802	0.76	0.77	7.1	YES	NO	bb	bb	0.377
9	Total-tetrafurans	25.94	3.875e3	4.802e3	0.727	0.81	0.77	33.4	YES	NO	db	dd	2.199
10	2378-TCDF	25.72	2.451e3	2.988e3	0.702	0.82	0.77	21.4	YES	NO	bd	bd	1.429
11	Total-tetrafurans	25.21	2.057e3	2.659e3	0.727	0.77	0.77	18.3	YES	NO	bd	bd	1.195
12	Total-tetrafurans	24.80	2.023e3	3.004e3	0.727	0.67	0.77	18.5	YES	NO	bb	bb	1.274
13	Total-tetrafurans	24.62	2.474e3	2.837e3	0.727	0.87	0.77	19.5	YES	NO	db	db	1.346
14	23478-PeCDF	31.20	4.542e3	2.550e3	0.786	1.78	1.55	25.4	YES	NO	db	bb	1.417
15	Total-pentafurans	31.06	2.218e3	1.309e3	0.654	1.69	1.55	10.8	YES	NO	dd	db	0.832
16	Total-pentafurans	30.94	5.440e3	3.274e3	0.654	1.66	1.55	30.0	YES	NO	bd	bd	2.054
17	Total-pentafurans	30.18	2.179e3	1.489e3	0.654	1.46	1.55	11.8	YES	NO	db	db	0.865
18	Total-pentafurans	30.07	3.648e3	2.347e3	0.654	1.55	1.55	21.6	YES	NO	dd	bd	1.413
19	Total-pentafurans	28.89	6.831e3	5.033e3	0.654	1.36	1.55	32.9	YES	NO	db	db	2.797
20	123468-HXCDF	33.18	2.008e4	1.594e4	1.169	1.26	1.24	220.5	YES	NO	bb	bd	6.116
21	234678-HxCDF	35.90	7.017e3	5.063e3	1.140	1.39	1.24	52.2	YES	NO	bb	bb	2.087
22	Total-hexafurans	35.34	6.772e2	5.165e2	1.141	1.31	1.24	6.8	YES	NO	db	bb	0.237
23	Total-hexafurans	34.70	3.865e3	2.769e3	1.141	1.40	1.24	41.9	YES	NO	bd	bd	1.318
24	Total-hexafurans	34.23	5.636e4	4.658e4	1.141	1.21	1.24	604.2	YES	NO	bb	bb	20.459
25	Total-hexafurans	33.92	1.442e3	1.111e3	1.141	1.30	1.24	14.7	YES	NO	bb	bb	0.507
26	Total-hexafurans	33.39	4.708e4	3.879e4	1.141	1.21	1.24	490.4	YES	NO	bb	db	17.065
27	Total-heptafurans	39.35	1.227e5	1.197e5	0.978	1.02	1.05	1225.0	YES	NO	bb	bb	59.655
28	1234678-HpCDF	38.69	7.141e4	6.957e4	1.003	1.03	1.05	713.8	YES	NO	bb	bb	30.256
29	OCDF	45.13	8.357e4	1.010e5	0.778	0.83	0.89	964.0	YES	NO	bb	bd	73.532
30	Total-penta1	27.16	3.259e4	2.081e4		1.57	1.55	555.0	YES	NO	bb	bb	8.818
31	Total-tetradioxins	24.66	8.250e2	1.205e3	1.024	0.68	0.77	9.3	YES	NO	bb	bb	0.432
32	Total-tetradioxins	23.97	5.134e2	6.666e2	1.024	0.77	0.77	7.3	YES	NO	bb	db	0.251
33	Total-tetradioxins	23.75	1.710e3	2.193e3	1.024	0.78	0.77	24.1	YES	NO	bb	bd	0.831
34	1368-TCDD	23.49	1.755e3	2.223e3	1.015	0.79	0.77	25.0	YES	NO	bb	bb	0.855
35	12389-PECDD	31.87	1.228e3	9.239e2	1.184	1.33	1.55	12.8	YES	NO	bb	bb	0.487
36	12378-PeCDD	31.45	3.795e3	2.484e3	1.022	1.53	1.55	39.1	YES	NO	bb	bb	1.646
37	Total-pentadioxins	30.39	5.537e3	3.837e3	1.502	1.44	1.55	58.7	YES	NO	bb	db	1.672

ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

TotalTEQ,Furans,Dioxins

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
38	Total-pentadioxins	30.08	2.671e3	1.883e3	1.502	1.42	1.55	39.9	YES	NO	bb	bd	0.812
39	Total-pentadioxins	29.87	3.512e3	2.169e3	1.502	1.62	1.55	46.2	YES	NO	bb	bb	1.013
40	Total-pentadioxins	29.29	6.528e3	3.691e3	1.502	1.77	1.55	99.8	YES	NO	bb	bb	1.823
41	Total-pentadioxins	28.85	9.616e3	5.762e3	1.502	1.67	1.55	90.2	YES	NO	bb	bb	2.743
42	123678-HxCDD	36.15	2.844e4	2.257e4	1.001	1.26	1.24	207.0	YES	NO	dd	dd	10.785
43	123478-HxCDD	36.03	6.443e3	5.180e3	0.996	1.24	1.24	46.9	YES	NO	bd	bd	2.521
44	Total-hexadioxins	35.23	6.803e4	5.689e4	1.005	1.20	1.24	495.5	YES	NO	db	dd	26.578
45	Total-hexadioxins	35.11	1.582e5	1.283e5	1.005	1.23	1.24	744.5	YES	NO	bd	bd	60.971
46	Total-hexadioxins	34.75	4.545e4	3.668e4	1.005	1.24	1.24	337.4	YES	NO	bb	bb	17.476
47	124679-HXCDD	33.96	2.678e5	2.121e5	1.115	1.26	1.24	1944.2	YES	NO	bb	bb	92.931
48	123789-HxCDD	36.54	9.892e3	8.863e3	0.907	1.12	1.24	77.7	YES	NO	bb	bb	4.420
49	Total-hexadioxins	36.32	2.005e4	1.695e4	1.005	1.18	1.24	137.1	YES	NO	db	db	7.874
50	1234678-HpCDD	40.18	1.034e6	1.012e6	1.039	1.02	1.05	3341.4	YES	NO	bb	bb	540.866
51	1234679-HPCDD	39.15	3.668e6	3.500e6	1.137	1.05	1.05	12270.7	YES	NO	bb	bb	1731.7...
52	OCDD	44.90	5.003e6	5.843e6	0.920	0.86	0.89	29189.5	YES	NO	bb	bb	3653.5...

PFK1

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION1 PFK	27.22	1.344e6					21.1	YES		db		
2	FUNCTION1 PFK	26.99	1.596e6					14.8	YES		bd		
3	FUNCTION1 PFK	25.11	1.648e6					8.9	YES		bb		
4	FUNCTION1 PFK	24.16	3.288e5					7.1	YES		bb		
5	FUNCTION1 PFK	23.51	3.513e5					6.5	YES		bb		
6	FUNCTION1 PFK	23.03	2.684e6					24.2	YES		db		
7	FUNCTION1 PFK	22.78	1.141e6					20.9	YES		bd		
8	FUNCTION1 PFK	22.61	4.087e5					14.8	YES		bb		
9	FUNCTION1 PFK	22.50	1.790e5					8.9	YES		bb		
10	FUNCTION1 PFK	22.23	1.632e6					13.5	YES		db		
11	FUNCTION1 PFK	21.96	9.796e5					17.6	YES		dd		
12	FUNCTION1 PFK	21.57	6.557e6					30.0	YES		bd		
13	FUNCTION1 PFK	21.21	3.223e5					13.6	YES		bb		
14	FUNCTION1 PFK	27.62	1.024e6					11.5	YES		bb		
15	FUNCTION1 PFK	27.37	6.631e5					18.1	YES		bb		

ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

PFK2

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION2 PFK	32.75	5.585e5					7.6	YES		bb		0.000
2	FUNCTION2 PFK	32.30	1.047e6					15.4	YES		bb		0.000
3	FUNCTION2 PFK	31.77	9.073e5					9.7	YES		bb		0.000
4	FUNCTION2 PFK	29.90	2.958e6					13.5	YES		bb		0.000
5	FUNCTION2 PFK	29.38	2.621e4					3.4	YES		bb		0.000
6	FUNCTION2 PFK	28.95	3.603e6					27.7	YES		bb		0.000

PFK3

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION3 PFK	33.71	8.713e6					130.5	YES		dd		0.000
2	FUNCTION3 PFK	33.50	4.101e6					127.8	YES		dd		0.000
3	FUNCTION3 PFK	33.29	3.042e6					127.9	YES		dd		0.000
4	FUNCTION3 PFK	33.25	3.437e6					127.9	YES		dd		0.000
5	FUNCTION3 PFK	33.02	6.803e6					127.5	YES		dd		0.000
6	FUNCTION3 PFK	32.93	3.176e6					124.1	YES		bd		0.000
7	FUNCTION3 PFK	37.72	4.225e6					20.4	YES		db		0.000
8	FUNCTION3 PFK	37.26	4.963e6					80.5	YES		dd		0.000
9	FUNCTION3 PFK	37.06	2.918e6					96.9	YES		dd		0.000
10	FUNCTION3 PFK	36.95	1.889e6					106.9	YES		bd		0.000
11	FUNCTION3 PFK	36.50	1.810e7					136.0	YES		db		0.000
12	FUNCTION3 PFK	35.97	1.321e7					135.0	YES		dd		0.000
13	FUNCTION3 PFK	35.60	2.641e7					135.1	YES		dd		0.000
14	FUNCTION3 PFK	34.91	3.278e7					133.6	YES		dd		0.000
15	FUNCTION3 PFK	33.97	7.464e6					129.4	YES		dd		0.000

PFK4

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

PFK5

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

ETHERS1

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION1 HXCD...	25.70	1.510e2					4.0	YES		bb		0.000
2	FUNCTION1 HXCD...	25.51	1.075e2					2.9	NO		bb		0.000
3	FUNCTION1 HXCD...	23.19	7.200e1					2.8	NO		bb		0.000
4	FUNCTION1 HXCD...	23.01	1.039e2					1.2	NO		bb		0.000

ETHERS2

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

ETHERS3

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION2 HPCD...	32.26	1.225e2					2.6	NO		bb		0.000
2	FUNCTION2 HPCD...	30.57	7.394e1					2.0	NO		bb		0.000
3	FUNCTION2 HPCD...	30.11	8.361e1					2.2	NO		bb		0.000
4	FUNCTION2 HPCD...	29.59	7.942e1					2.1	NO		bb		0.000
5	FUNCTION2 HPCD...	28.66	1.089e2					2.4	NO		bb		0.000

ETHERS4

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION3 OCDPE	33.01	1.265e2					4.5	YES		bb		0.000

ETHERS5

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION4 NCDPE	38.36	6.735e2					15.5	YES		bb		0.000

ETHERS6

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION5 DCDPE	44.91	1.302e3					25.6	YES		bb		0.000
2	FUNCTION5 DCDPE	43.77	7.594e1					9.1	YES		bb		0.000

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ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

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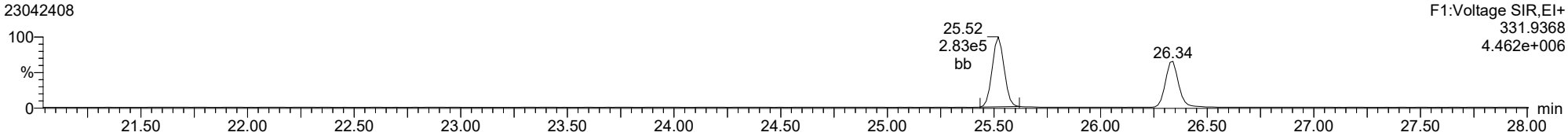

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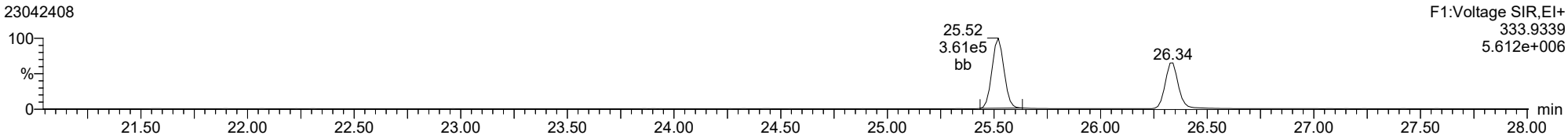

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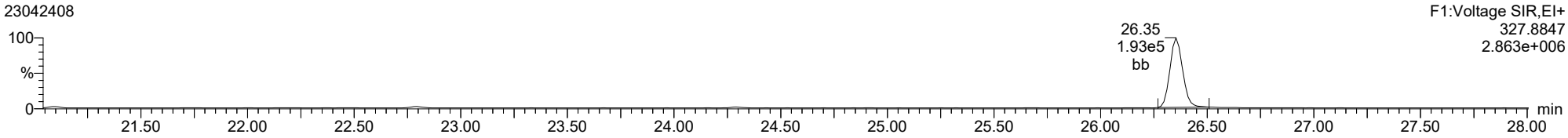

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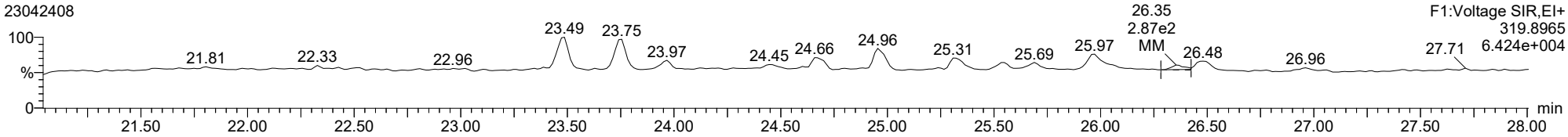
2378-TCDD



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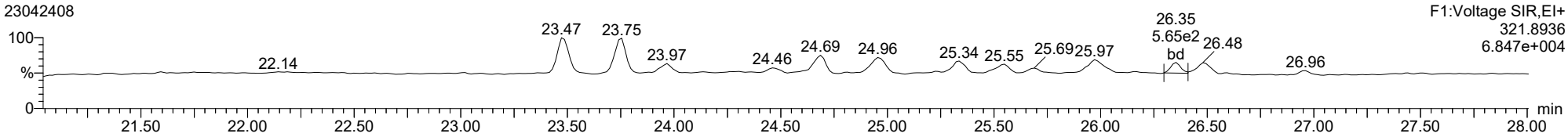

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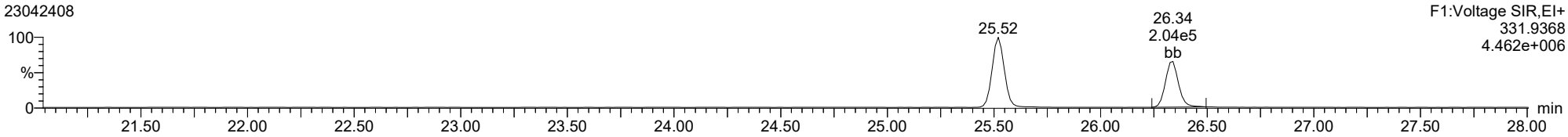

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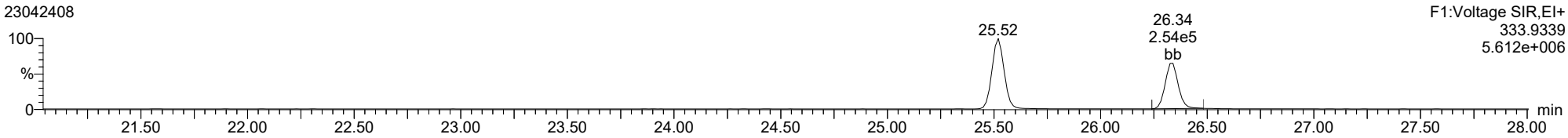
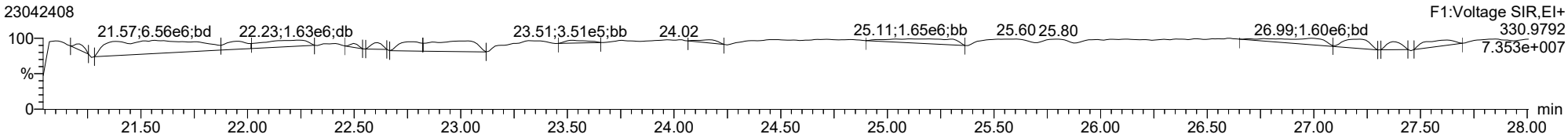


FUNCTION1 PFK



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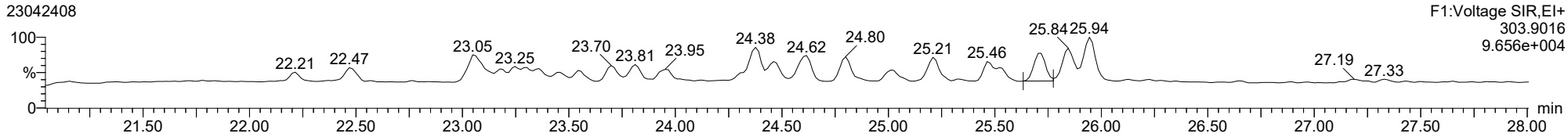
2378-TCDF



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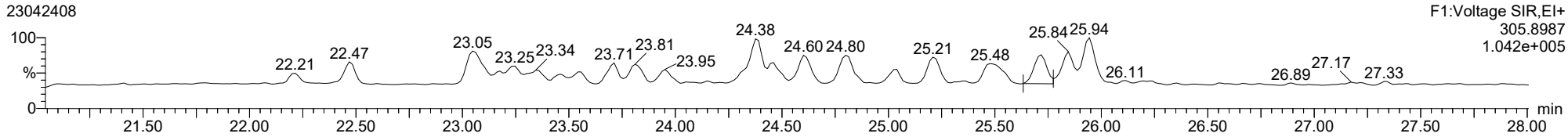

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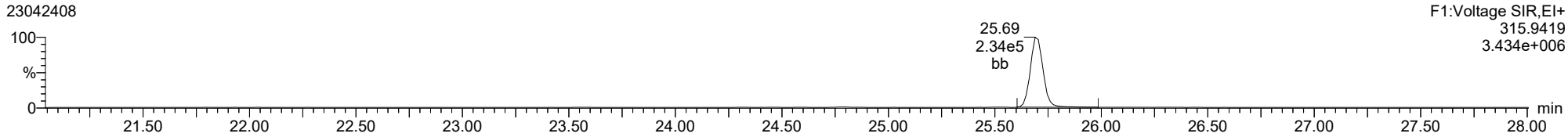

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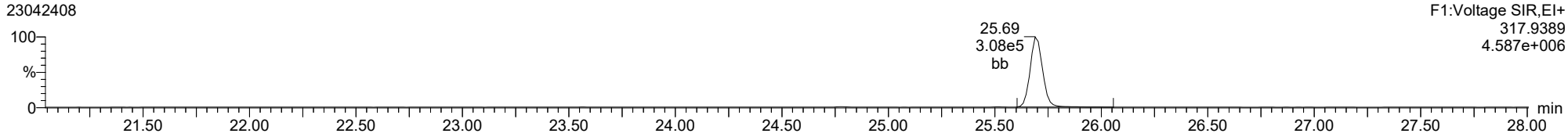
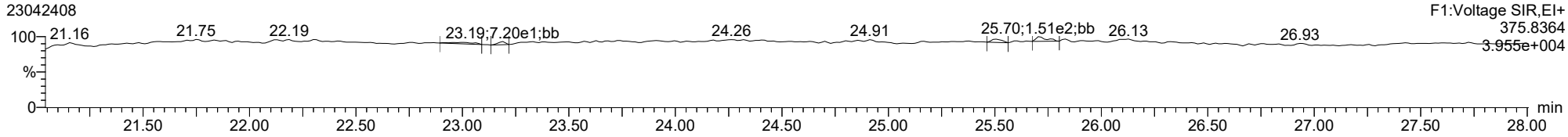


FUNCTION1 HXCDPE



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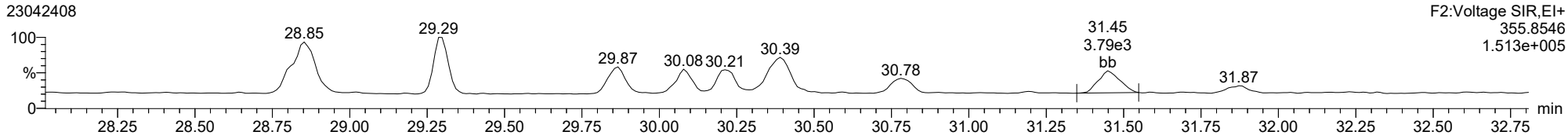
12378-PeCDD



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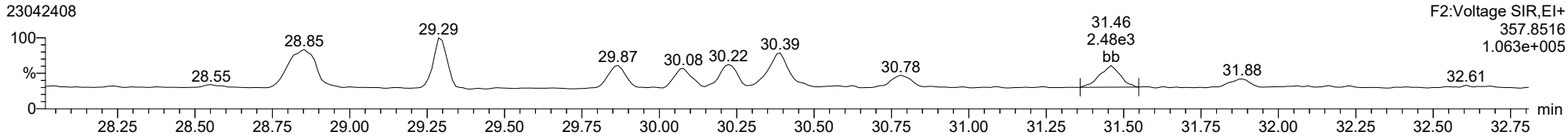

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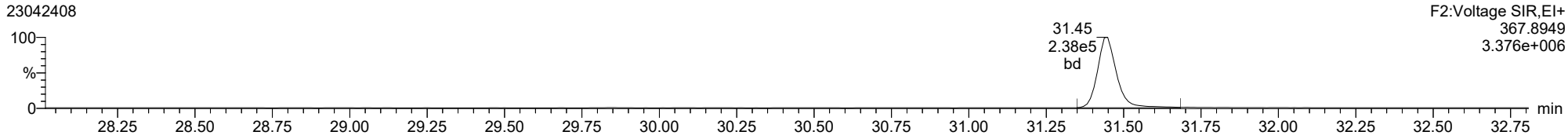

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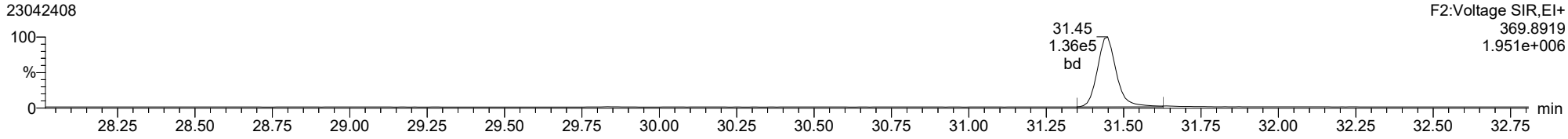
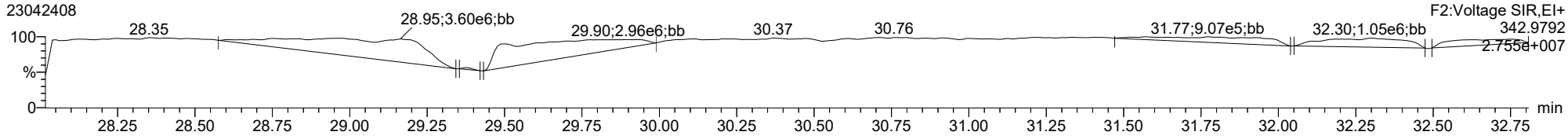


FUNCTION2 PFK



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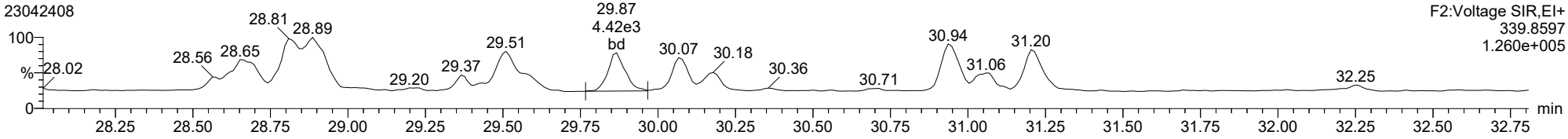
12378-PeCDF



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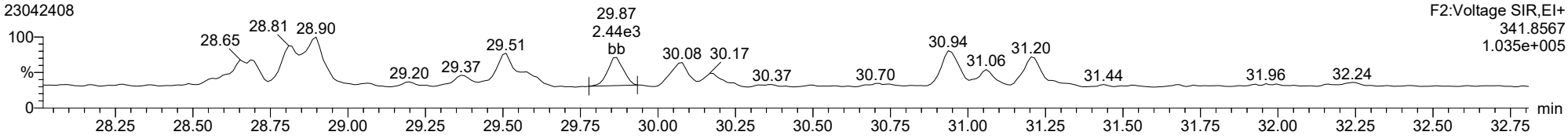

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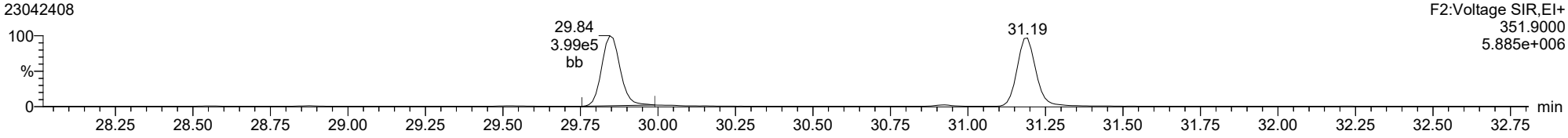

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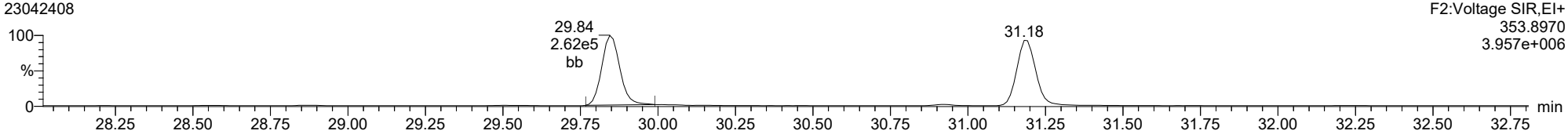
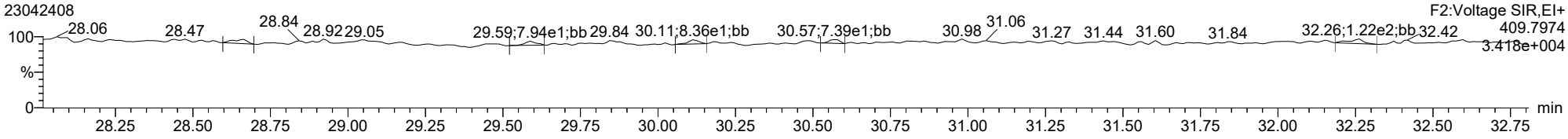


FUNCTION2 HPCDPE



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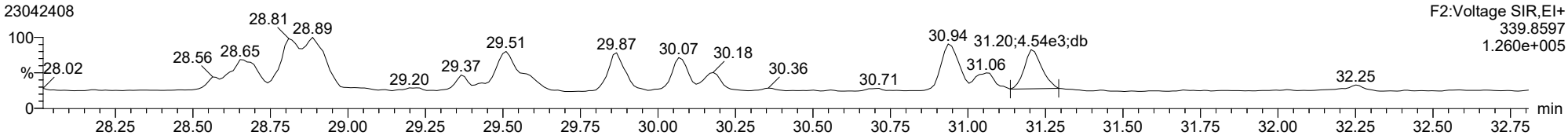
23478-PeCDF



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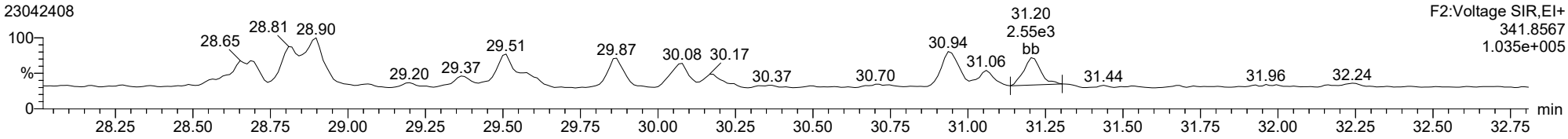

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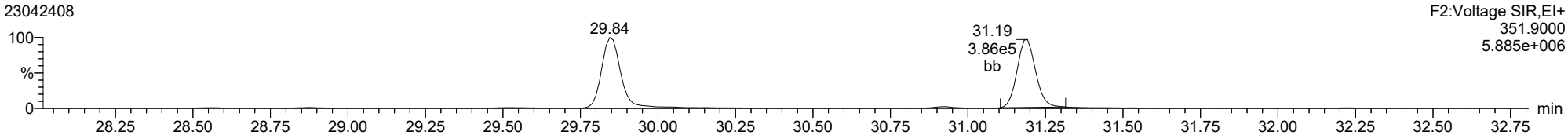

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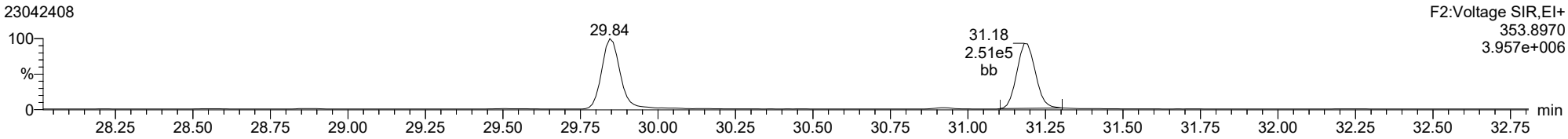

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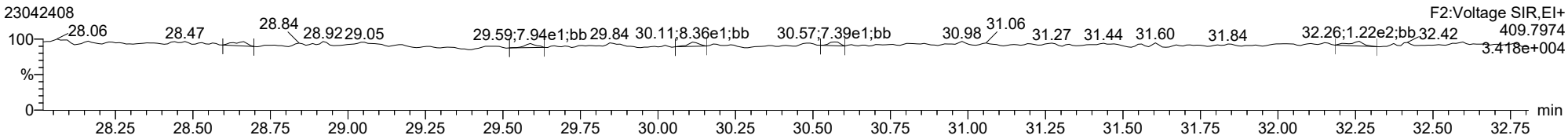

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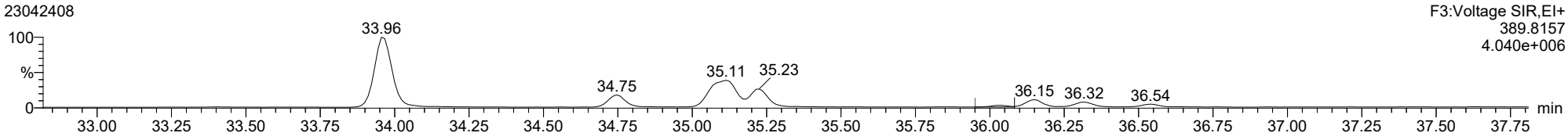

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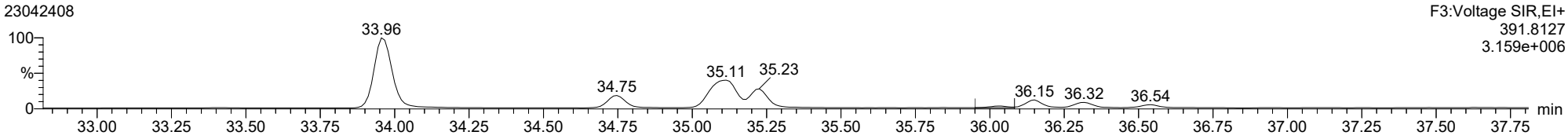

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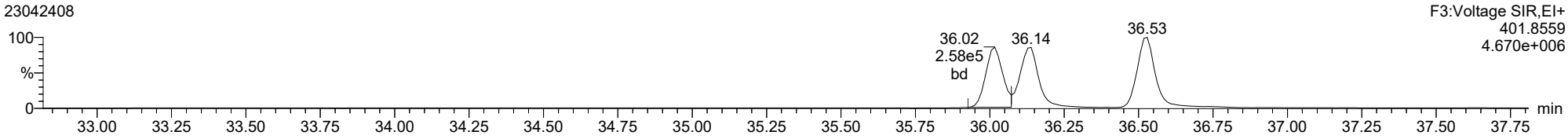

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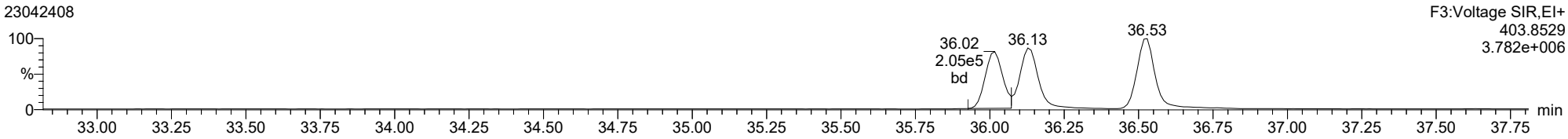
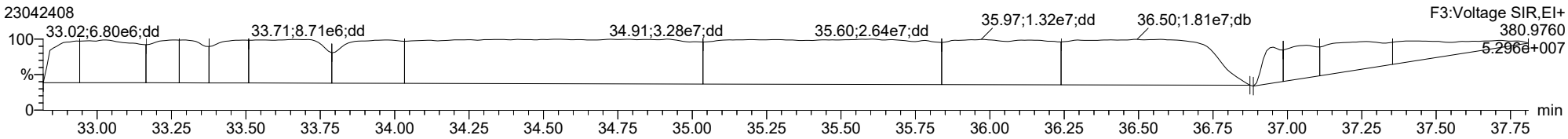


FUNCTION3 PFK



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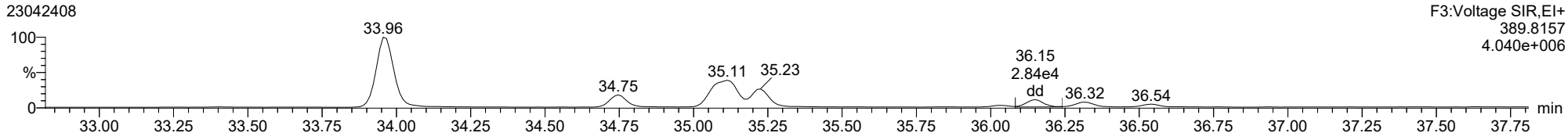

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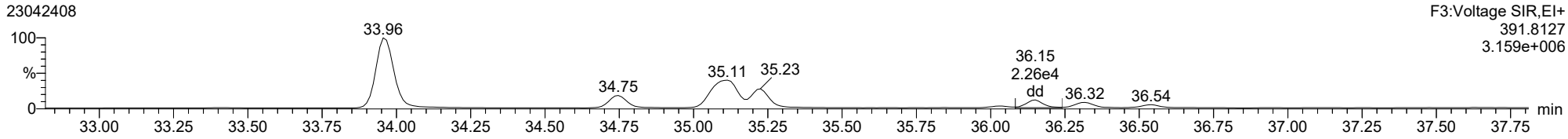

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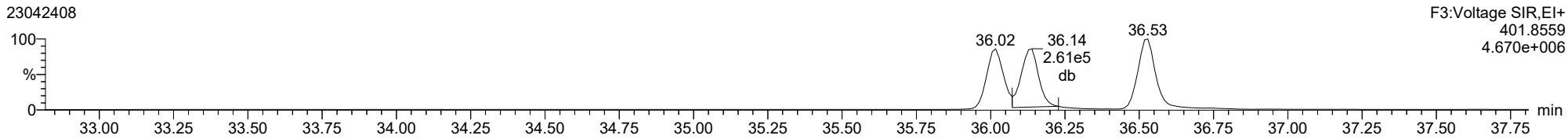

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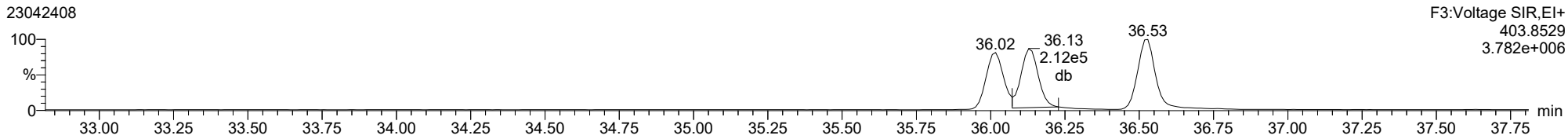

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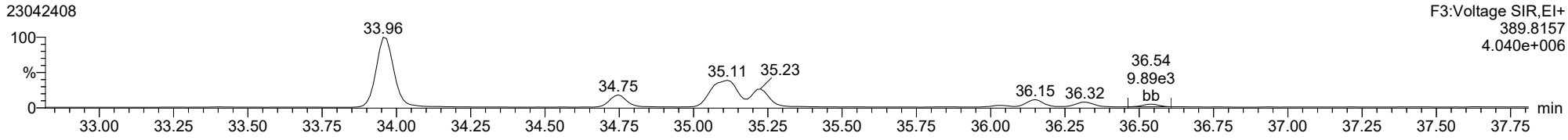

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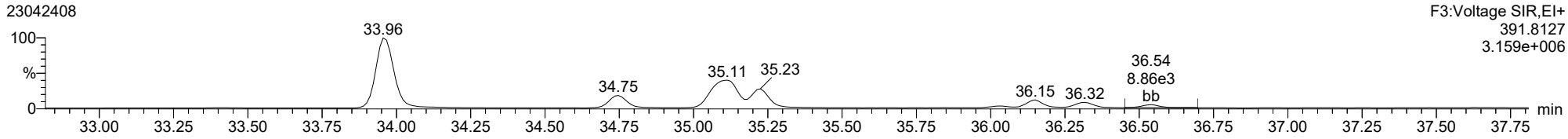

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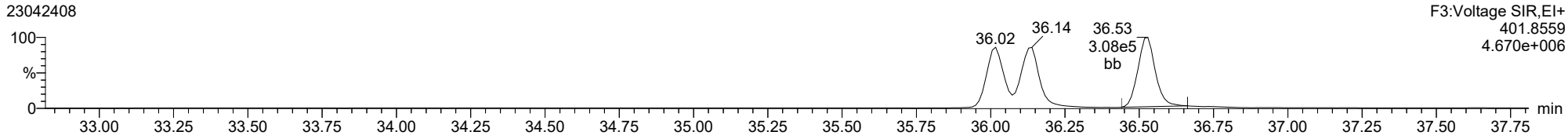

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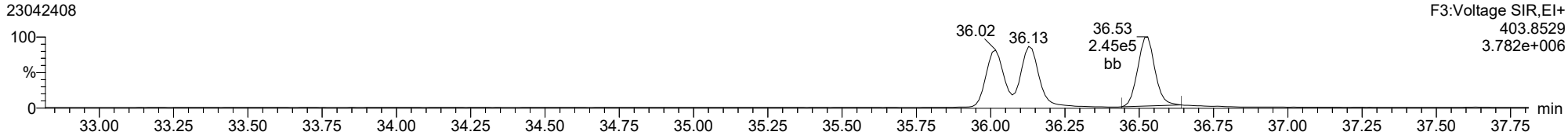

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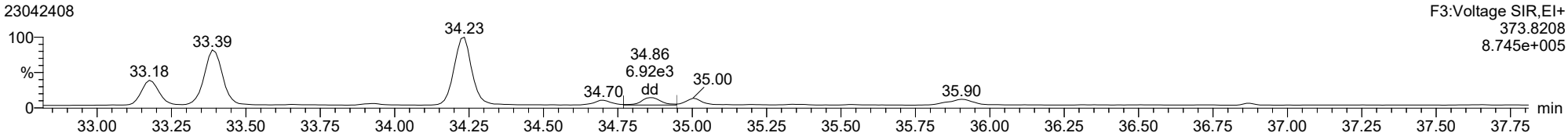

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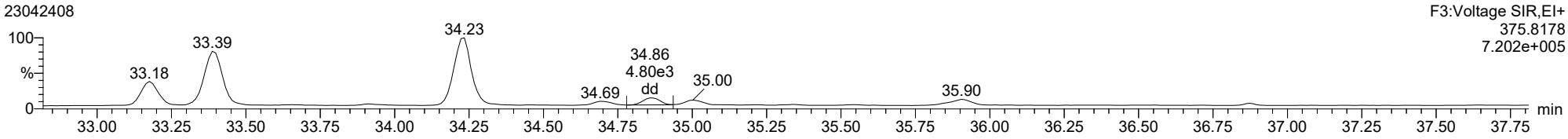

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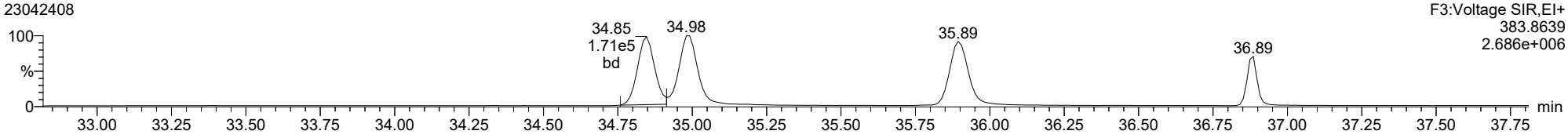

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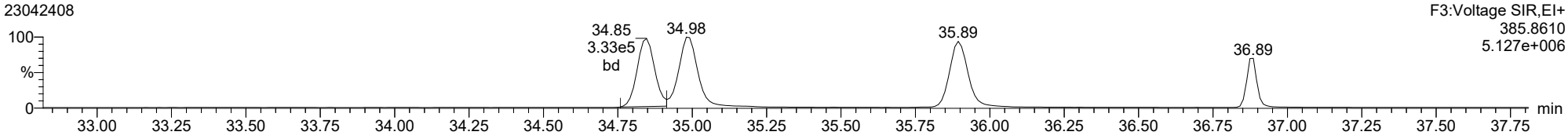
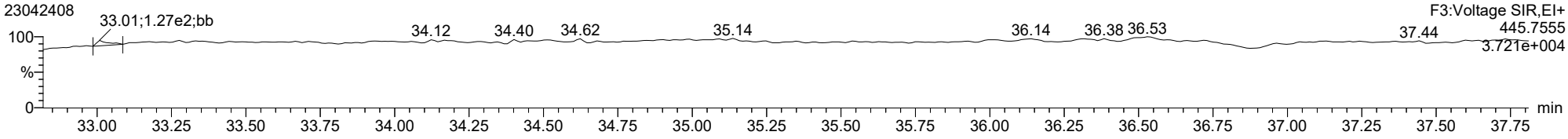


FUNCTION3 OCDPE



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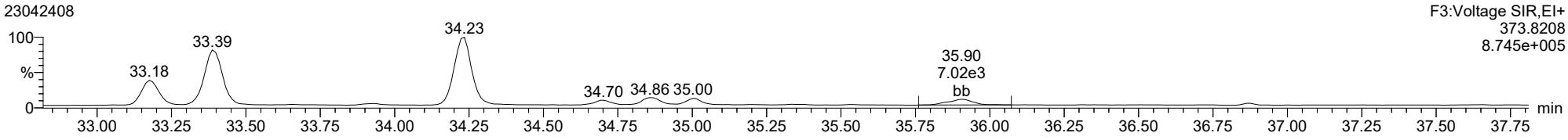
234678-HxCDF



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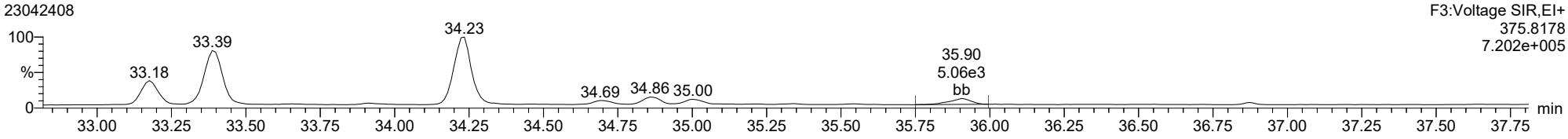

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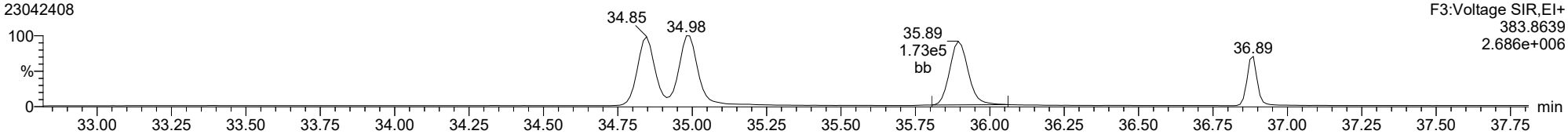

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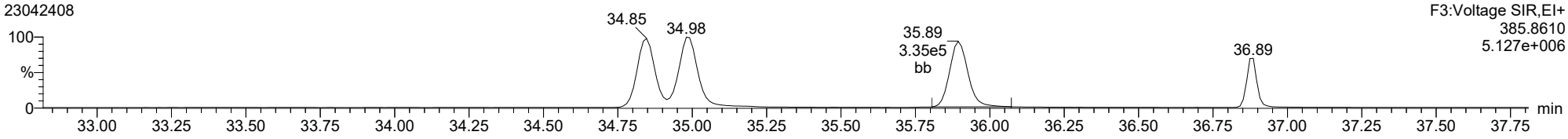
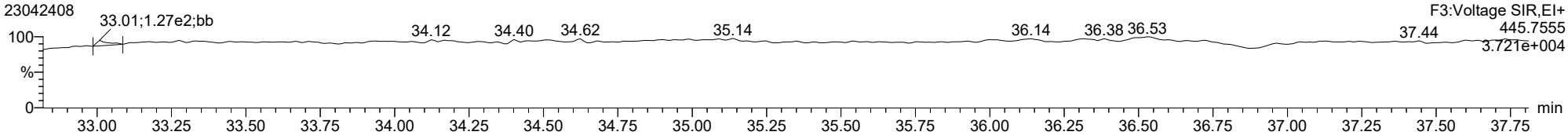


FUNCTION3 OCDPE



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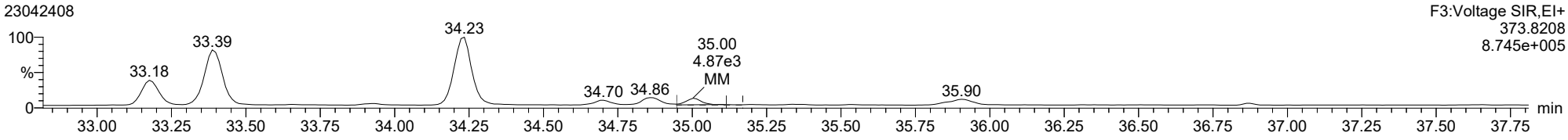
123678-HxCDF



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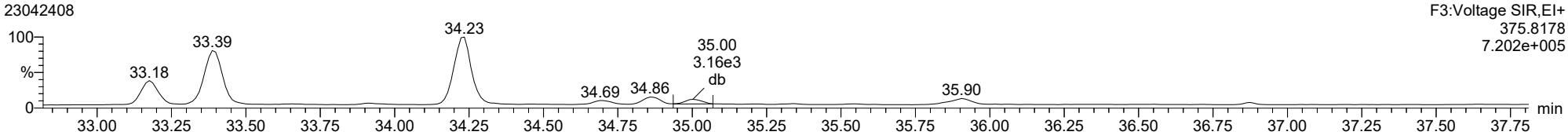

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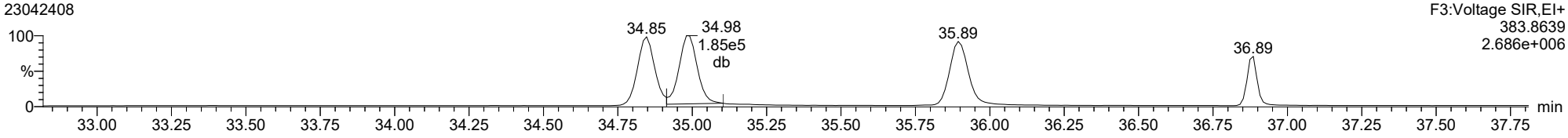

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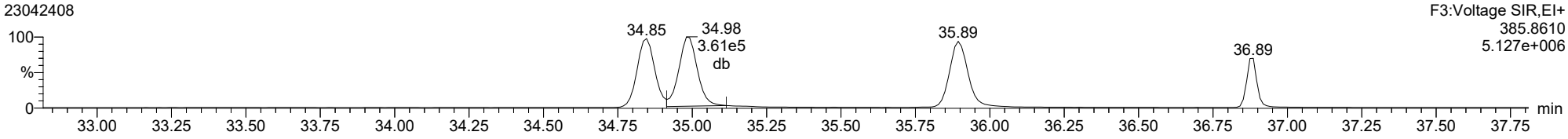
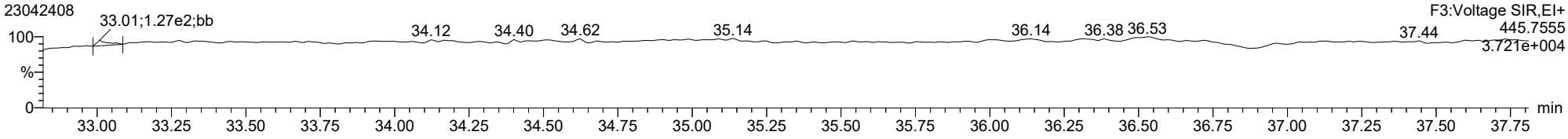


FUNCTION3 OCDPE



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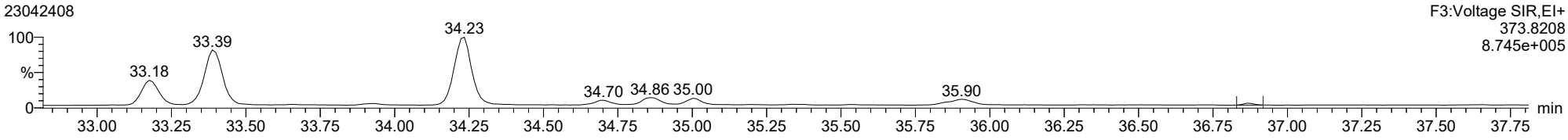

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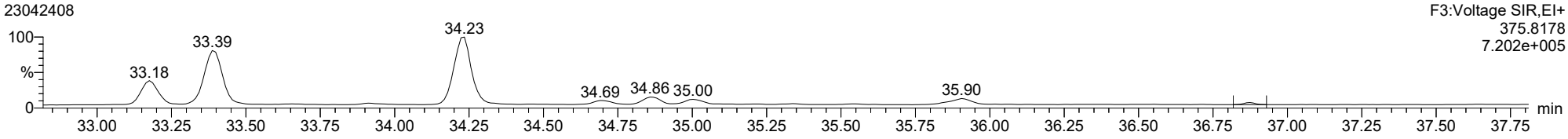

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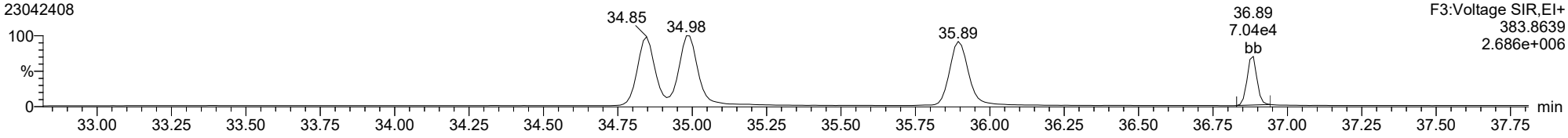

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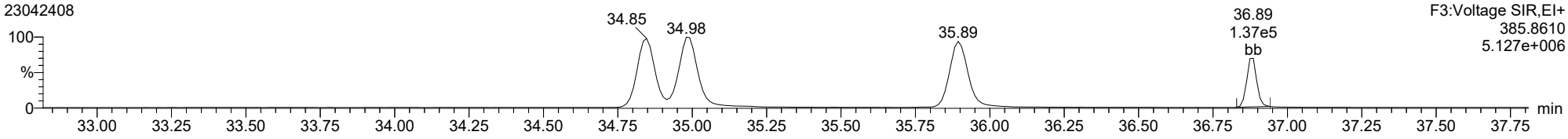
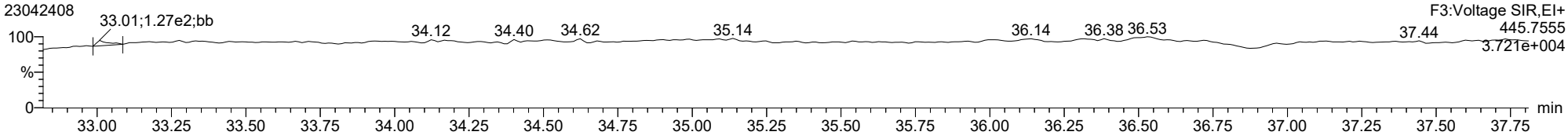


FUNCTION3 OCDPE



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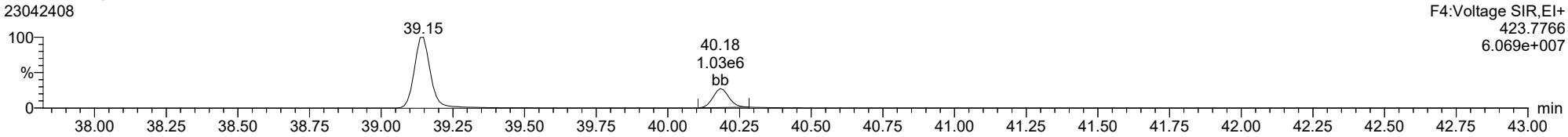
1234678-HpCDD



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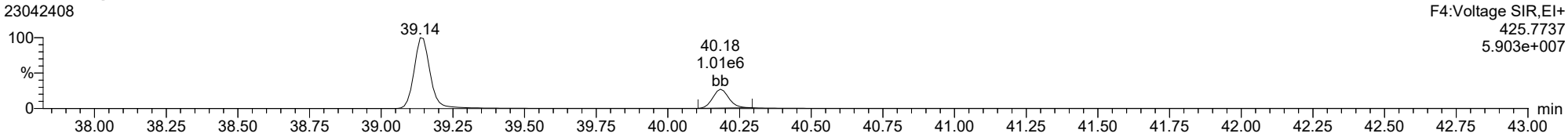

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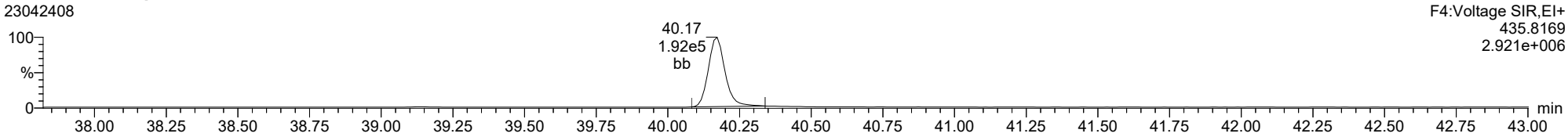

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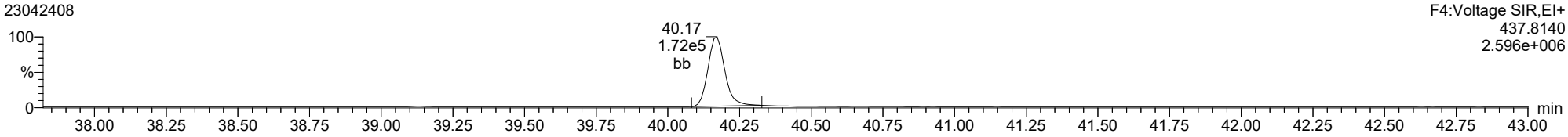
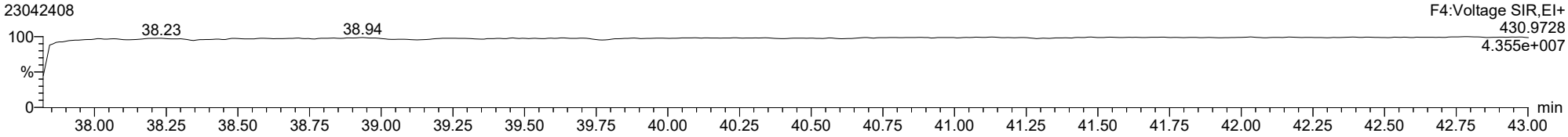


FUNCTION4 PFK



ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

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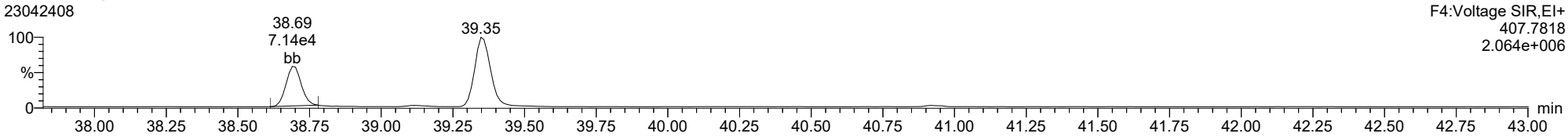

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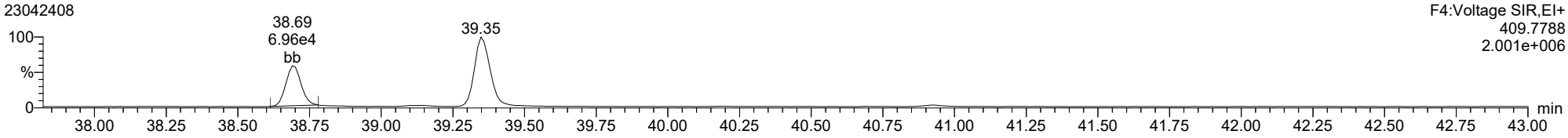

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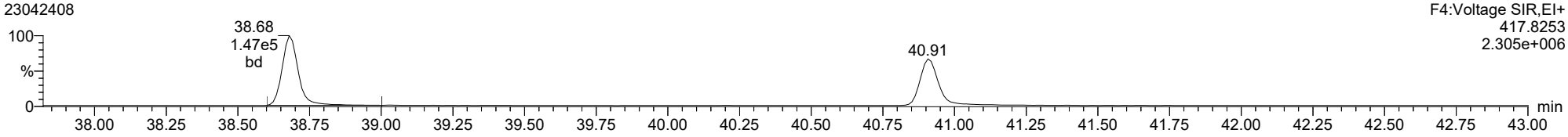

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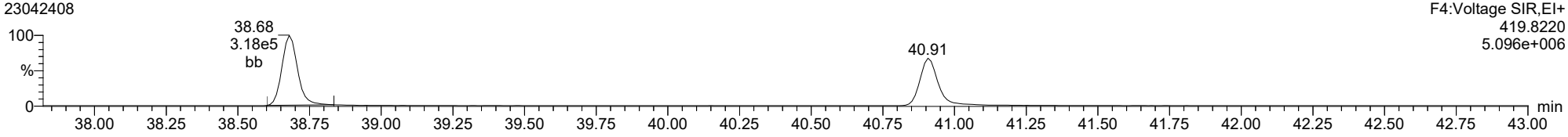
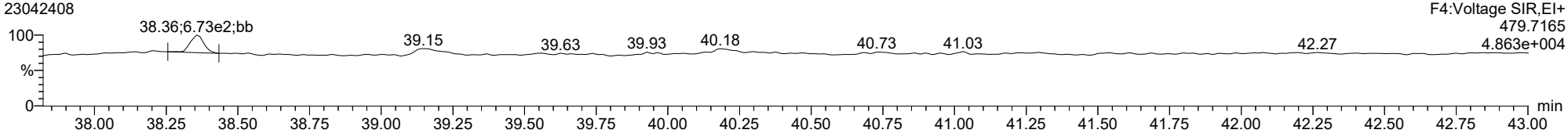


FUNCTION4 NCDPE



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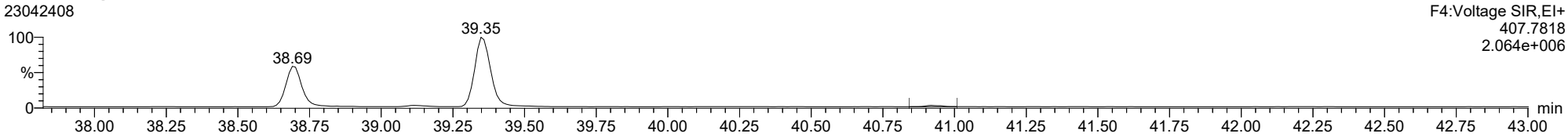

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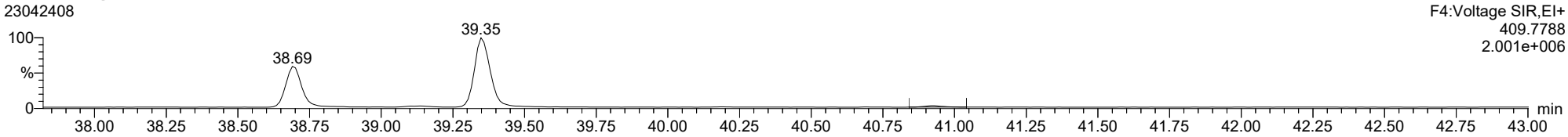

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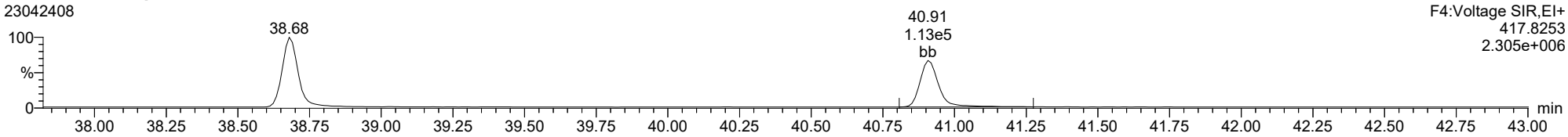

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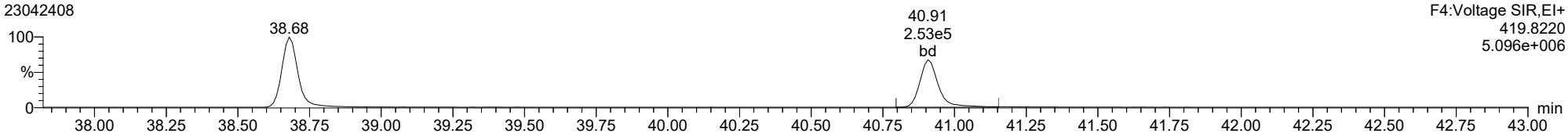
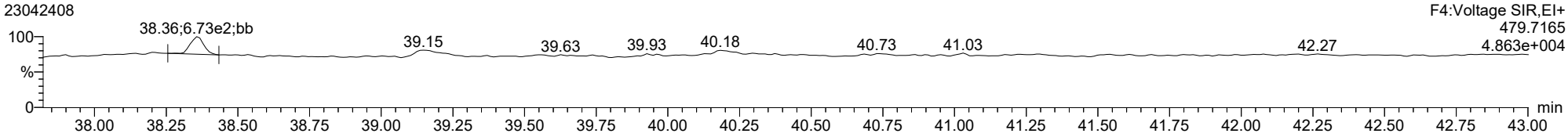
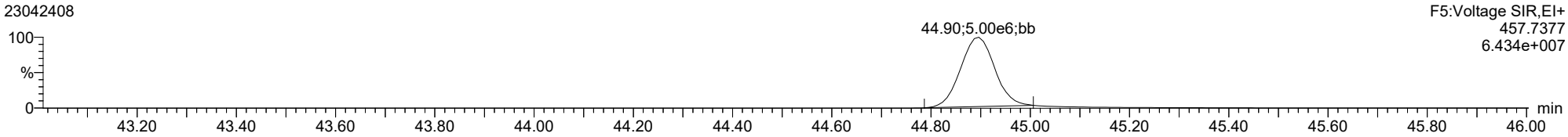


FUNCTION4 NCDPE

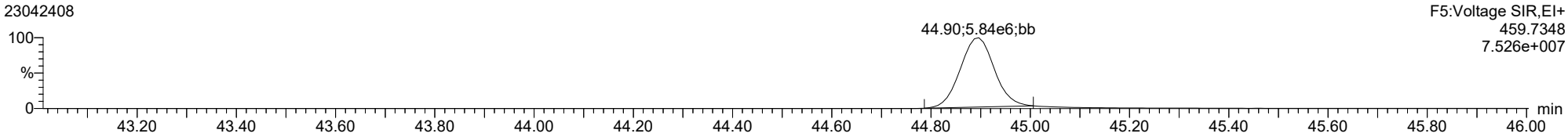


ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

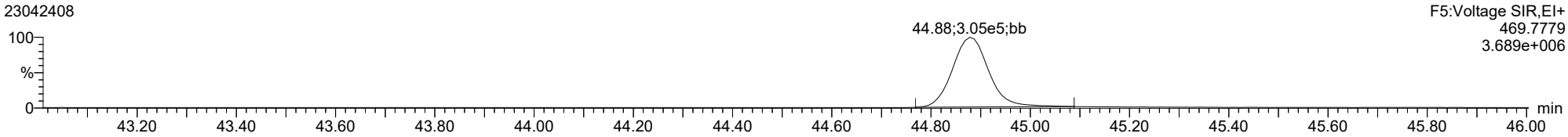
OCDD



OCDD



13C-OCDD



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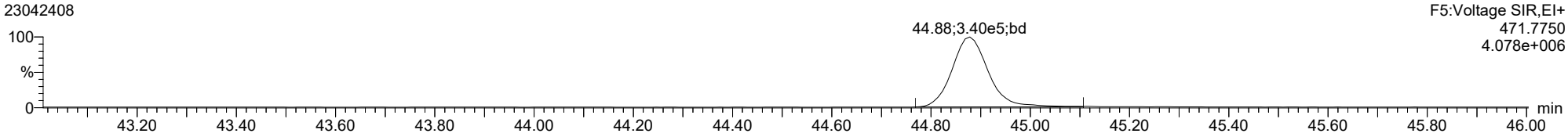
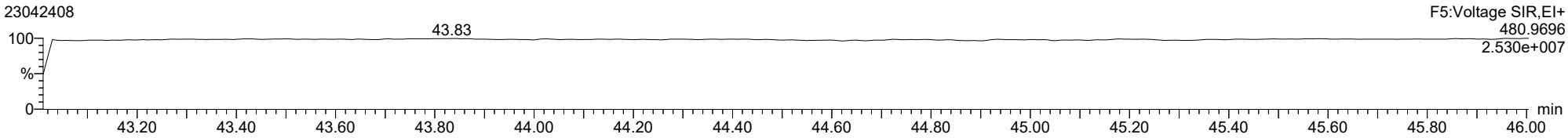
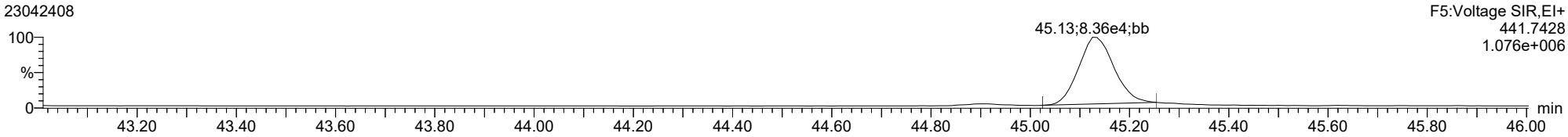


FUNCTION5 PFK

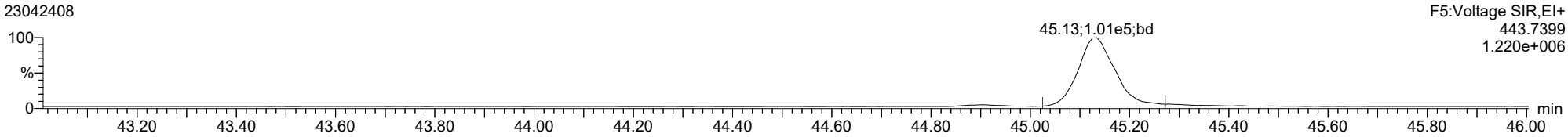


ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

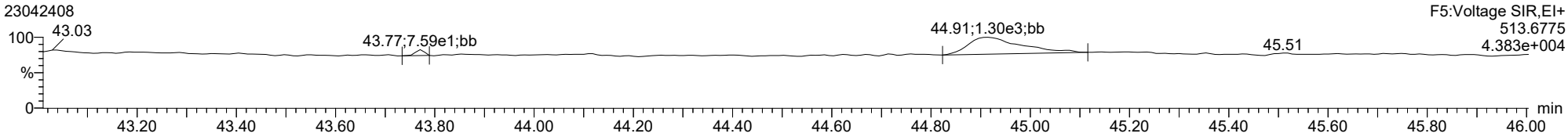
OCDF



OCDF

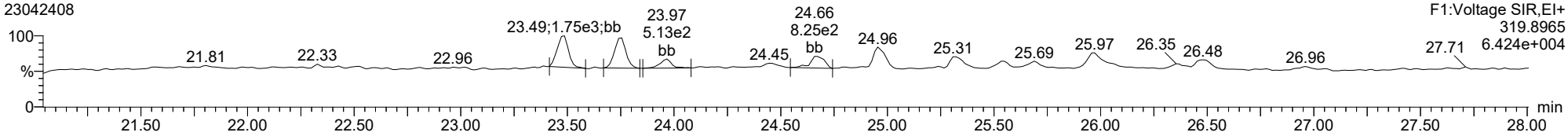


FUNCTION5 DCDPE

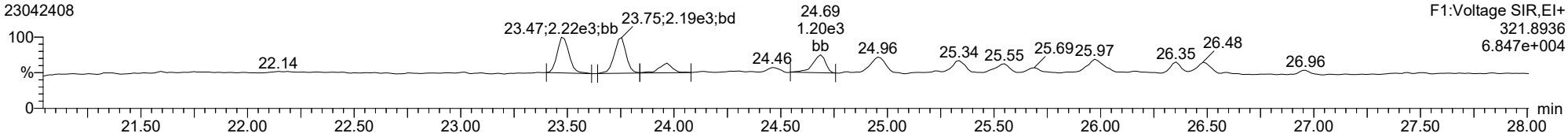


ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

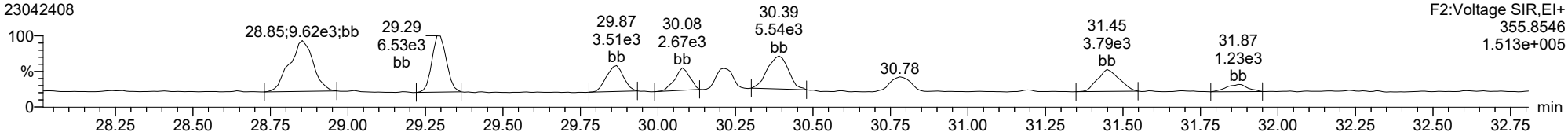
Total-tetradioxins



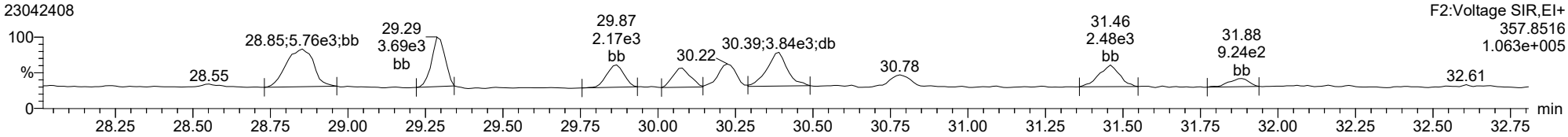
Total-tetradioxins



Total-pentadioxins

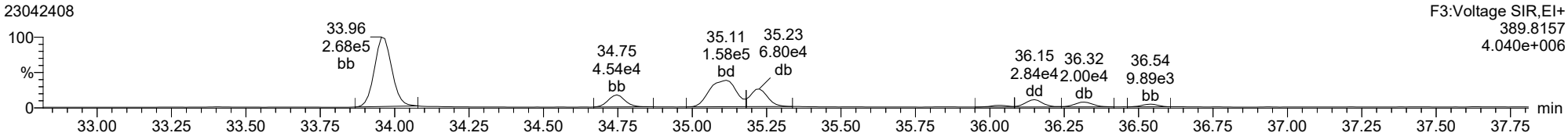


Total-pentadioxins

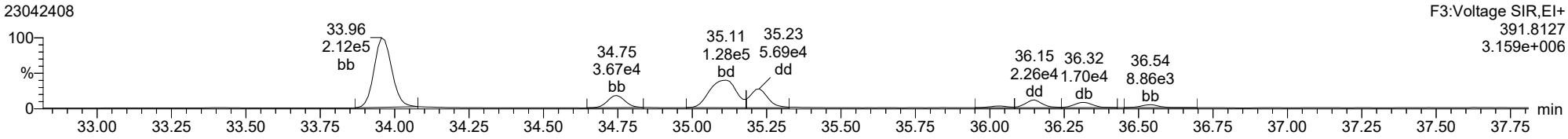


ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

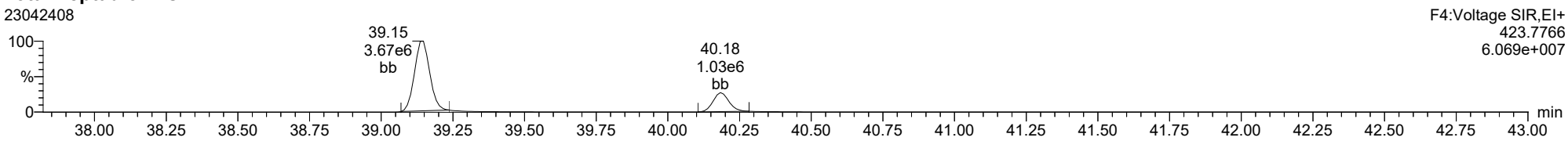
Total-hexadioxins



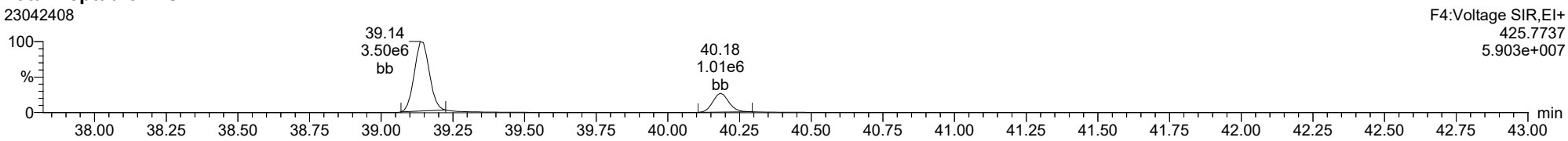
Total-hexadioxins



Total-heptadioxins

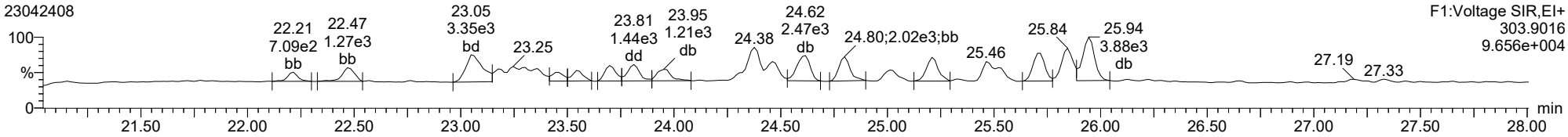


Total-heptadioxins

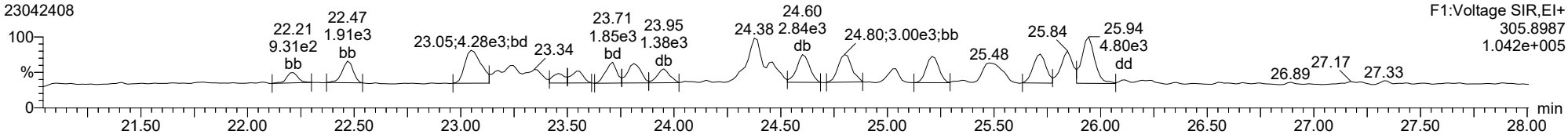


ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

Total-tetrafurans



Total-tetrafurans



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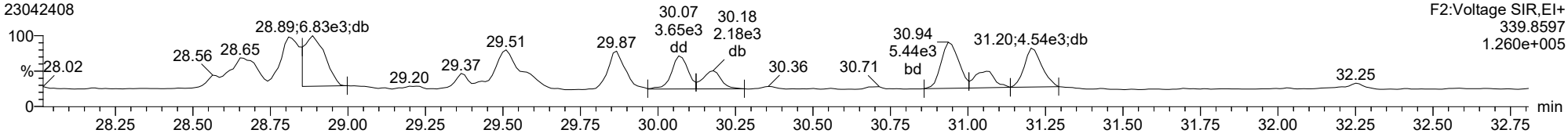
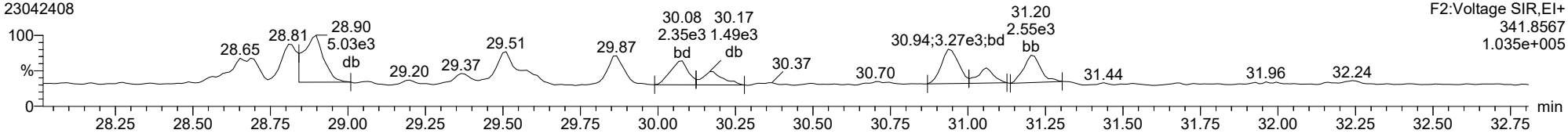
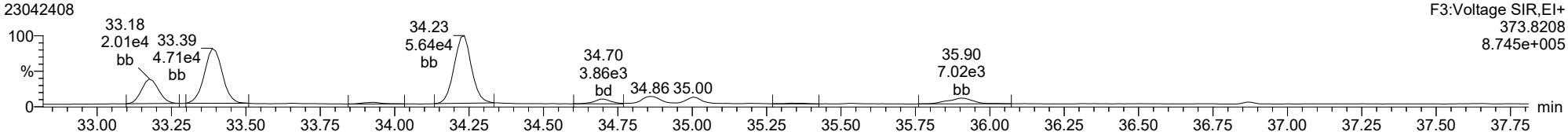


Total-pentafurans

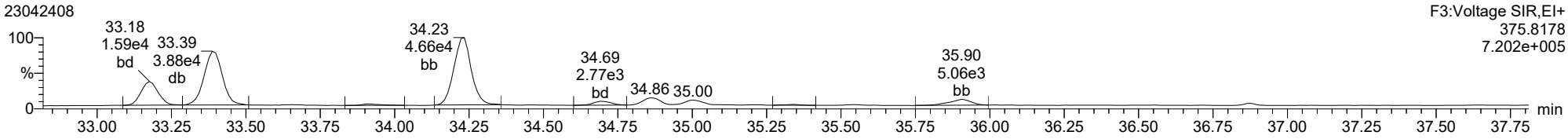


ID: 23C0619-03, Name: 23042408, Date: 24-Apr-2023, Time: 20:08:16, Conditions: AUTOSPEC01, User: pk

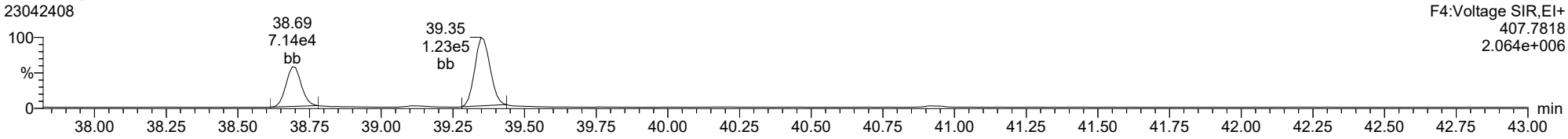
Total-hexafurans



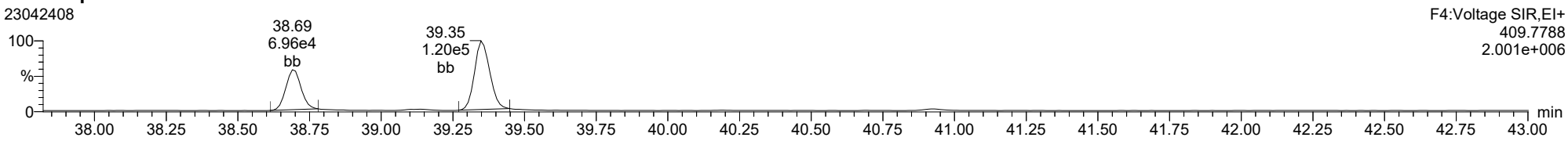
Total-hexafurans



Total-heptafurans



Total-heptafurans



Analytical Resources, LLC
Analytical Chemists and Consultants

SED-09C:0-1

Form 1
ORGANIC ANALYSIS DATA SHEET
EPA 1613B
Dioxins/Furans by HRGC/HRMS

Laboratory:	Analytical Resources, LLC			SDG:	23C0619
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0619-05 C	File ID:	23042409
Sampled:	03/22/23 08:33	Prepared:	04/06/23 13:16	Analyzed:	04/24/23 20:57
% Solids:	71.65	Preparation:	EPA 1613	Initial/Final:	13.97 g Wet / 20 uL
Result Basis:	Dry	Sequence:	SLD0330	Calibration:	GC00015
Batch:	BLD0089	Instrument:	AUTOSPEC01	Column:	RTX-Dioxin2

CAS NO.	COMPOUND	DF/Split	Ion Ratio	Ratio Limits	EDL	RL	Result	Units	Q
51207-31-9	2,3,7,8-TCDF	1	0.794	0.655-0.886	0.164	0.999	0.933	ng/kg	X, J
1746-01-6	2,3,7,8-TCDD	1	0.494	0.655-0.886	0.096	0.999	0.239	ng/kg	EMPC, J
57117-41-6	1,2,3,7,8-PeCDF	1	1.539	1.318-1.783	0.217	0.999	2.10	ng/kg	
57117-31-4	2,3,4,7,8-PeCDF	1	1.963	1.318-1.783	0.195	0.999	1.58	ng/kg	EMPC
40321-76-4	1,2,3,7,8-PeCDD	1	1.538	1.318-1.783	0.275	0.999	1.30	ng/kg	
70648-26-9	1,2,3,4,7,8-HxCDF	1	1.248	1.054-1.426	0.134	0.999	2.70	ng/kg	
57117-44-9	1,2,3,6,7,8-HxCDF	1	1.331	1.054-1.426	0.141	0.999	1.59	ng/kg	
60851-34-5	2,3,4,6,7,8-HxCDF	1	1.139	1.054-1.426	0.148	0.999	1.94	ng/kg	
72918-21-9	1,2,3,7,8,9-HxCDF	1	1.185	1.054-1.426	0.171	0.999	1.78	ng/kg	
39227-28-6	1,2,3,4,7,8-HxCDD	1	1.323	1.054-1.426	0.310	0.999	1.73	ng/kg	
57653-85-7	1,2,3,6,7,8-HxCDD	1	1.308	1.054-1.426	0.317	0.999	13.4	ng/kg	
19408-74-3	1,2,3,7,8,9-HxCDD	1	1.257	1.054-1.426	0.345	0.999	4.88	ng/kg	
67562-39-4	1,2,3,4,6,7,8-HpCDF	1	1.059	0.893-1.208	0.235	0.999	36.2	ng/kg	
55673-89-7	1,2,3,4,7,8,9-HpCDF	1	1.125	0.893-1.208	0.407	0.999	1.73	ng/kg	
35822-46-9	1,2,3,4,6,7,8-HpCDD	1	1.025	0.893-1.208	0.878	2.50	556	ng/kg	B
39001-02-0	OCDF	1	0.943	0.757-1.024	0.475	2.50	61.1	ng/kg	
3268-87-9	OCDD	1	0.862	0.757-1.024	0.692	9.99	3810	ng/kg	B

Homologue Groups

55722-27-5	Total TCDF	1	0.000			0.999	3.66	ng/kg	
41903-57-5	Total TCDD	1	0.000			0.999	0.377	ng/kg	
30402-15-4	Total PeCDF	1	0.000			0.999	23.5	ng/kg	
36088-22-9	Total PeCDD	1	0.000			0.999	4.89	ng/kg	
55684-94-1	Total HxCDF	1	0.000			0.999	90.7	ng/kg	
34465-46-8	Total HxCDD	1	0.000			0.999	180	ng/kg	
38998-75-3	Total HpCDF	1	0.000			0.999	124	ng/kg	
37871-00-4	Total HpCDD	1	0.000			0.999	3210	ng/kg	

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC): 12.07

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC): 12.07

Analytical Resources, Incorporated
Analytical Chemists and Consultants

SED-09C:0-1

Form 2
ORGANIC ANALYSIS DATA SHEET
EPA 1613B
Dioxins/Furans by HRGC/HRMS

Laboratory:	Analytical Resources, LLC			SDG:	23C0619
Client:	Friedman & Bruya Inc.			Project:	Port of Friday Harbor
Matrix:	Sediment	Laboratory ID:	23C0619-05	File ID:	23042409
Sampled:	03/22/23 08:33	Prepared:	04/06/23 13:16	Analyzed:	04/24/23 20:57
Solids Wt%:	71.65	Preparation:	EPA 1613	Initial/Final:	13.97 g / 20 uL
Result Basis:	Dry	Sequence:	SLD0330	Calibration:	GC00015
Batch:	BLD0089	Instrument:	AUTOSPEC01	Column:	RTX-Dioxin2

Labels	DF/Split	Ion Ratio	Ratio Limits	EDL	% REC	QC LIMITS	Q
13C12-2,3,7,8-TCDF		0.734	0.655-0.886	0.084	86.4	24 - 169 %	
13C12-2,3,7,8-TCDD		0.797	0.655-0.886	0.151	89.0	25 - 164 %	
13C12-1,2,3,7,8-PeCDF		1.587	1.318-1.783	0.158	93.5	24 - 185 %	
13C12-2,3,4,7,8-PeCDF		1.511	1.318-1.783	0.175	94.2	21 - 178 %	
13C12-1,2,3,7,8-PeCDD		1.726	1.318-1.783	0.133	74.1	25 - 181 %	
13C12-1,2,3,4,7,8-HxCDF		0.511	0.434-0.587	0.219	84.5	26 - 152 %	
13C12-1,2,3,6,7,8-HxCDF		0.510	0.434-0.587	0.184	74.7	26 - 123 %	
13C12-2,3,4,6,7,8-HxCDF		0.513	0.434-0.587	0.226	82.4	28 - 136 %	
13C12-1,2,3,7,8,9-HxCDF		0.521	0.434-0.587	0.274	79.1	29 - 147 %	
13C12-1,2,3,4,7,8-HxCDD		1.286	1.054-1.426	0.166	88.2	32 - 141 %	
13C12-1,2,3,6,7,8-HxCDD		1.246	1.054-1.426	0.143	74.4	28 - 130 %	
13C12-1,2,3,4,6,7,8-HpCDF		0.444	0.374-0.506	0.251	94.7	28 - 143 %	
13C12-1,2,3,4,7,8,9-HpCDF		0.445	0.374-0.506	0.292	83.0	26 - 138 %	
13C12-1,2,3,4,6,7,8-HpCDD		1.098	0.893-1.208	0.216	77.6	23 - 140 %	
13C12-OCDD		0.888	0.757-1.024	0.338	79.0	17 - 157 %	
37Cl4-2,3,7,8-TCDD		328.000		0.068	85.2	35 - 197 %	

* Values outside of QC limits

Dataset: T:\Autospec\Processed Data Batch\230424D1.qld
Last Altered: Tuesday, April 25, 2023 10:49:58 Pacific Daylight Time
Printed: Tuesday, April 25, 2023 11:20:07 Pacific Daylight Time

Method: T:\Autospec\Methods\Dioxin230424.mdb 25 Apr 2023 07:59:40
Calibration: T:\Autospec\Curves\230303ICIH.cdb 06 Mar 2023 11:57:27

ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

Compound	RT	RRT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	Noise 1	Noise 2	Height 1	Height 2	S/N 1	S/N 2	EMPC	Int.1	Int.2	pg
2378-TCDF	25.704	1.001	1.364e3	1.718e3	0.702	0.794	0.770	1571	1080	2.14e4	3.00e4	13.6	27.8	NO	bd	dd	0.467
12378-PeCDF	29.855	1.000	3.374e3	2.192e3	0.679	1.539	1.550	1235	1506	5.38e4	3.23e4	43.6	21.4	NO	bb	bb	1.051
23478-PeCDF	31.192	1.001	2.907e3	1.481e3	0.786	1.963	1.550	1235	1506	4.15e4	2.30e4	33.6	15.3	YES	db	MM	0.789
123478-HxCDF	34.813	1.000	4.906e3	3.932e3	1.166	1.248	1.240	1148	1122	7.37e4	5.56e4	64.2	49.5	NO	bd	bd	1.353
234678-HxCDF	35.827	1.000	3.106e3	2.727e3	1.140	1.139	1.240	1148	1122	3.56e4	3.07e4	31.0	27.3	NO	bb	bb	0.969
123678-HxCDF	34.958	1.001	2.921e3	2.195e3	1.091	1.331	1.240	1148	1122	4.02e4	3.24e4	35.0	28.9	NO	db	db	0.797
123789-HxCDF	36.819	1.000	2.304e3	1.945e3	1.137	1.185	1.240	1148	1122	3.53e4	2.68e4	30.8	23.8	NO	bb	bb	0.893
1234678-HpCDF	38.679	1.000	4.492e4	4.241e4	1.003	1.059	1.050	1555	1490	7.58e5	6.94e5	487.3	465.9	NO	bb	bb	18.093
1234789-HpCDF	40.919	1.000	1.581e3	1.406e3	0.953	1.125	1.050	1555	1490	2.21e4	2.18e4	14.2	14.6	NO	bb	bb	0.864
OCDF	45.125	1.006	3.976e4	4.216e4	0.778	0.943	0.890	1466	1076	4.74e5	5.14e5	323.2	477.4	NO	bb	bb	30.603
2378-TCDD	26.339	1.000	3.139e2	6.359e2	1.149	0.494	0.770	1117	760	4.12e3	9.58e3	3.7	12.6	YES	bd	bd	0.120
12378-PeCDD	31.438	1.000	1.669e3	1.085e3	1.022	1.538	1.550	1915	853	2.16e4	1.15e4	11.3	13.5	NO	bd	bb	0.652
123478-HxCDD	35.950	1.000	2.447e3	1.850e3	0.996	1.323	1.240	2015	1984	4.51e4	3.33e4	22.4	16.8	NO	bd	bd	0.867
123678-HxCDD	36.072	1.000	1.854e4	1.417e4	1.001	1.308	1.240	2015	1984	2.87e5	2.18e5	142.5	109.9	NO	dd	dd	6.688
123789-HxCDD	36.451	1.011	6.089e3	4.844e3	0.907	1.257	1.240	2015	1984	1.02e5	6.61e4	50.8	33.3	NO	bb	bd	2.443
1234678-HpCDD	40.172	1.000	5.418e5	5.284e5	1.039	1.025	1.050	4485	4212	8.41e6	8.30e6	1874.8	1970.5	NO	bb	bb	278.184
OCDD	44.878	1.000	2.794e6	3.244e6	0.920	0.862	0.890	1605	2774	3.57e7	4.07e7	22254.0	14657.6	NO	bb	bb	1907.100
13C-2378-TCDF	25.690	1.007	3.983e5	5.428e5	1.620	0.734	0.770	1161	1232	5.85e6	7.96e6	5038.2	6465.2	NO	bb	db	86.365
13C-12378-PeCDF	29.844	1.169	4.785e5	3.015e5	1.240	1.587	1.550	1723	1713	6.84e6	4.43e6	3968.1	2586.8	NO	bd	bb	93.487
13C-23478-PeCDF	31.170	1.221	4.259e5	2.819e5	1.118	1.511	1.550	1723	1713	6.45e6	4.27e6	3740.6	2493.2	NO	bb	bb	94.151
13C-123478-HxCDF	34.802	0.955	1.895e5	3.707e5	1.168	0.511	0.510	1595	2394	2.95e6	5.78e6	1851.3	2415.2	NO	bd	bd	84.462
13C-123678-HxCDF	34.936	0.959	1.986e5	3.895e5	1.386	0.510	0.510	1595	2394	2.99e6	5.88e6	1874.0	2455.4	NO	db	db	74.721
13C-234678-HxCDF	35.816	0.983	1.790e5	3.491e5	1.129	0.513	0.510	1595	2394	2.73e6	5.26e6	1714.1	2196.7	NO	bb	bb	82.372
13C-123789-HxCDF	36.830	1.011	1.434e5	2.751e5	0.932	0.521	0.510	1595	2394	2.40e6	4.70e6	1505.3	1962.0	NO	bb	bb	79.101
13C-1234678-HpCDF	38.668	1.061	1.479e5	3.333e5	0.895	0.444	0.440	1370	2140	2.38e6	5.36e6	1741.0	2502.4	NO	bb	bb	94.681
13C-1234789-HpCDF	40.896	1.122	1.117e5	2.510e5	0.770	0.445	0.440	1370	2140	1.45e6	3.32e6	1057.2	1550.8	NO	bb	bb	82.979
13C-1234-TCDD	25.520	0.000	3.000e5	3.726e5	1.000	0.805	0.770	1797	1267	4.70e6	5.80e6	2616.1	4576.9	NO	bb	bb	100.000
13C-2378-TCDD	26.325	1.032	3.059e5	3.841e5	1.152	0.797	0.770	1797	1267	4.52e6	5.68e6	2515.9	4483.3	NO	bb	bb	89.021
13C-12378-PeCDD	31.426	1.231	2.617e5	1.516e5	0.829	1.726	1.550	1096	846	3.75e6	2.25e6	3417.7	2659.7	NO	bb	bb	74.136
13C-123478-HxCDD	35.938	0.986	2.802e5	2.179e5	0.995	1.286	1.240	1373	1206	4.36e6	3.31e6	3179.3	2744.4	NO	bd	bd	88.161
13C-123678-HxCDD	36.061	0.990	2.711e5	2.176e5	1.157	1.246	1.240	1373	1206	4.19e6	3.41e6	3054.9	2822.7	NO	db	db	74.402
13C-1234678-HpCDD	40.161	1.102	1.938e5	1.765e5	0.840	1.098	1.050	1452	1375	2.99e6	2.74e6	2060.0	1992.2	NO	bb	bb	77.624
13C-OCDD	44.860	1.231	3.238e5	3.645e5	0.767	0.888	0.890	1781	2261	3.88e6	4.28e6	2176.9	1891.9	NO	bb	bd	157.959
13C-123789-HxCDD	36.440	0.000	3.125e5	2.553e5	1.000	1.224	1.240	1373	1206	5.15e6	4.12e6	3750.7	3410.9	NO	bb	bb	100.000
37CL-2378-TCDD	26.339	1.032	2.952e5		1.288			1537		4.26e6		2770.5			bb		34.077

Dataset: T:\Autospec\Processed Data Batch\230424D1.qld
Last Altered: Tuesday, April 25, 2023 10:49:58 Pacific Daylight Time
Printed: Tuesday, April 25, 2023 11:20:07 Pacific Daylight Time

ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

Compound	RT	RRT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	Noise 1	Noise 2	Height 1	Height 2	S/N 1	S/N 2	EMPC	Int.1	Int.2	pg
1368-TCDF					0.802		0.770	1571	1080								
1289-TCDF					0.678		0.770	1571	1080								
13468-PECDF					1.246		1.550	574	1086								
12389-PECDF	32.240	1.080	3.556e2	1.989e2	0.496	1.788	1.550	1235	1506	6.55e3	5.29e3	5.3	3.5	YES	bb	bb	0.143
123468-HXCDF	33.153	0.953	2.296e4	1.884e4	1.169	1.218	1.240	1148	1122	3.42e5	2.73e5	298.0	243.6	NO	bb	bd	6.381
1368-TCDD	23.472	0.892	8.681e2	9.009e2	1.015	0.964	0.770	1117	760	1.27e4	1.52e4	11.4	20.0	YES	bb	bb	0.252
1289-TCDD					0.909		0.770	1117	760								
12479-PECDD					2.301		1.550	1915	853								
12389-PECDD	31.838	1.013	5.207e2	2.795e2	1.184	1.863	1.550	1915	853	6.93e3	4.63e3	3.6	5.4	YES	bb	bb	0.164
124679-HXCDD	33.922	0.944	1.693e5	1.391e5	1.115	1.217	1.240	2015	1984	2.72e6	2.18e6	1350.9	1096.9	NO	bb	bb	55.521
1234679-HPCDD	39.136	0.975	2.845e6	2.756e6	1.137	1.032	1.050	4485	4212	4.71e7	4.54e7	10512.2	10785.1	NO	bb	bb	1330.628
Total-tetrafurans			5.288e3		0.727			1571		8.45e4							1.830
Total-penta1			3.460e4					574		5.24e5							8.098
Total-pentafurans			1.104e4		0.654			1235		1.48e5							3.681
Total-hexafurans			1.521e5		1.141			1148		2.28e6							45.389
Total-heptafurans			1.374e5		0.978			1555		2.26e6							62.036
Total-Furans			3.802e5		0.922			1571		5.77e6							151.637
Total-tetradioxins			5.501e2		1.024			1117		1.10e4							0.189
Total-pentadioxins			8.272e3		1.502			1915		1.33e5							2.449
Total-hexadioxins			2.628e5		1.005			2015		4.18e6							90.037
Total-heptadioxins			3.387e6		1.088			4485		5.56e7							1608.812
Total-Dioxins			6.453e6		1.130			1117		9.56e7							3608.586
Total-TEQ			6.833e6					1117		1.01e8							3760.223
FUNCTION1 PFK			1.981e7					495872		1.73e8							
FUNCTION2 PFK			8.400e6					222001		2.38e7							0.000
FUNCTION3 PFK			1.679e7					260686		3.71e7							0.000
FUNCTION4 PFK			1.064e6					250747		1.96e7							
FUNCTION5 PFK			1.361e5					186642		4.13e6							
FUNCTION1 HXCD...			1.690e3					519		2.09e4							0.000
FUNCTION1 HPCD...																	
FUNCTION2 HPCD...			6.097e2					1105		1.60e4							0.000
FUNCTION3 OCDPE			5.380e2					499		7.18e3							0.000
FUNCTION4 NCDPE			1.221e3					732		1.88e4							0.000
FUNCTION5 DCDPE			4.439e2					594		5.25e3							0.000

Method: T:\Autospec\Methods\Dioxin230424.mdb 25 Apr 2023 07:59:40
Calibration: T:\Autospec\Curves\230303ICIH.cdb 06 Mar 2023 11:57:27

ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

TF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-tetrafurans	24.60	9.174e2	1.342e3	0.727	0.68	0.77	7.9	YES	NO	db	db	0.330
2	Total-tetrafurans	23.95	4.758e2	6.695e2	0.727	0.71	0.77	4.8	YES	NO	dd	bb	0.167
3	Total-tetrafurans	23.70	6.878e2	1.007e3	0.727	0.68	0.77	8.3	YES	NO	bd	dd	0.248
4	Total-tetrafurans	23.56	3.088e2	4.567e2	0.727	0.68	0.77	3.6	YES	NO	db	dd	0.112
5	Total-tetrafurans	23.36	5.694e2	8.153e2	0.727	0.70	0.77	6.1	YES	NO	dd	dd	0.202
6	Total-tetrafurans	25.94	9.649e2	1.114e3	0.727	0.87	0.77	9.4	YES	NO	db	db	0.304
7	2378-TCDF	25.70	1.364e3	1.718e3	0.702	0.79	0.77	13.6	YES	NO	bd	dd	0.467

PP

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-penta1	27.14	3.460e4	2.331e4		1.48	1.55	913.0	YES	NO	bb	bb	8.098

PF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-pentafurans	30.06	1.840e3	1.383e3	0.654	1.33	1.55	27.9	YES	NO	bb	bb	0.663
2	12378-PeCDF	29.86	3.374e3	2.192e3	0.679	1.54	1.55	43.6	YES	NO	bb	bb	1.051
3	Total-pentafurans	28.86	5.826e3	3.745e3	0.654	1.56	1.55	48.5	YES	NO	MM	MM	1.967

HF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	123789-HxCDF	36.82	2.304e3	1.945e3	1.137	1.18	1.24	30.8	YES	NO	bb	bb	0.893
2	234678-HxCDF	35.83	3.106e3	2.727e3	1.140	1.14	1.24	31.0	YES	NO	bb	bb	0.969
3	123678-HxCDF	34.96	2.921e3	2.195e3	1.091	1.33	1.24	35.0	YES	NO	db	db	0.797
4	123478-HxCDF	34.81	4.906e3	3.932e3	1.166	1.25	1.24	64.2	YES	NO	bd	bd	1.353
5	Total-hexafurans	34.66	8.041e2	5.825e2	1.141	1.38	1.24	10.9	YES	NO	bb	bb	0.232
6	Total-hexafurans	34.20	7.427e4	5.849e4	1.141	1.27	1.24	962.5	YES	NO	bb	bb	22.224
7	Total-hexafurans	33.37	4.084e4	3.406e4	1.141	1.20	1.24	556.1	YES	NO	bb	db	12.540
8	123468-HXCDF	33.15	2.296e4	1.884e4	1.169	1.22	1.24	298.0	YES	NO	bb	bd	6.381

ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

HPF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	1234678-HpCDF	38.68	4.492e4	4.241e4	1.003	1.06	1.05	487.3	YES	NO	bb	bb	18.093
2	1234789-HpCDF	40.92	1.581e3	1.406e3	0.953	1.12	1.05	14.2	YES	NO	bb	bb	0.864
3	Total-heptafurans	39.35	9.088e4	8.690e4	0.978	1.05	1.05	950.5	YES	NO	bb	bb	43.079

Furans,TF,PP,PF,HF,HPF,OF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-tetrafurans	24.60	9.174e2	1.342e3	0.727	0.68	0.77	7.9	YES	NO	db	db	0.330
2	Total-tetrafurans	23.95	4.758e2	6.695e2	0.727	0.71	0.77	4.8	YES	NO	dd	bb	0.167
3	Total-tetrafurans	23.70	6.878e2	1.007e3	0.727	0.68	0.77	8.3	YES	NO	bd	dd	0.248
4	Total-tetrafurans	23.56	3.088e2	4.567e2	0.727	0.68	0.77	3.6	YES	NO	db	dd	0.112
5	Total-tetrafurans	23.36	5.694e2	8.153e2	0.727	0.70	0.77	6.1	YES	NO	dd	dd	0.202
6	Total-tetrafurans	25.94	9.649e2	1.114e3	0.727	0.87	0.77	9.4	YES	NO	db	db	0.304
7	2378-TCDF	25.70	1.364e3	1.718e3	0.702	0.79	0.77	13.6	YES	NO	bd	dd	0.467
8	Total-pentafurans	30.06	1.840e3	1.383e3	0.654	1.33	1.55	27.9	YES	NO	bb	bb	0.663
9	12378-PeCDF	29.86	3.374e3	2.192e3	0.679	1.54	1.55	43.6	YES	NO	bb	bb	1.051
10	Total-pentafurans	28.86	5.826e3	3.745e3	0.654	1.56	1.55	48.5	YES	NO	MM	MM	1.967
11	123789-HxCDF	36.82	2.304e3	1.945e3	1.137	1.18	1.24	30.8	YES	NO	bb	bb	0.893
12	234678-HxCDF	35.83	3.106e3	2.727e3	1.140	1.14	1.24	31.0	YES	NO	bb	bb	0.969
13	123678-HxCDF	34.96	2.921e3	2.195e3	1.091	1.33	1.24	35.0	YES	NO	db	db	0.797
14	123478-HxCDF	34.81	4.906e3	3.932e3	1.166	1.25	1.24	64.2	YES	NO	bd	bd	1.353
15	Total-hexafurans	34.66	8.041e2	5.825e2	1.141	1.38	1.24	10.9	YES	NO	bb	bb	0.232
16	Total-hexafurans	34.20	7.427e4	5.849e4	1.141	1.27	1.24	962.5	YES	NO	bb	bb	22.224
17	Total-hexafurans	33.37	4.084e4	3.406e4	1.141	1.20	1.24	556.1	YES	NO	bb	db	12.540
18	123468-HXCDF	33.15	2.296e4	1.884e4	1.169	1.22	1.24	298.0	YES	NO	bb	bd	6.381
19	1234678-HpCDF	38.68	4.492e4	4.241e4	1.003	1.06	1.05	487.3	YES	NO	bb	bb	18.093
20	1234789-HpCDF	40.92	1.581e3	1.406e3	0.953	1.12	1.05	14.2	YES	NO	bb	bb	0.864
21	Total-heptafurans	39.35	9.088e4	8.690e4	0.978	1.05	1.05	950.5	YES	NO	bb	bb	43.079
22	OCDF	45.13	3.976e4	4.216e4	0.778	0.94	0.89	323.2	YES	NO	bb	bb	30.603
23	Total-penta1	27.14	3.460e4	2.331e4		1.48	1.55	913.0	YES	NO	bb	bb	8.098

TD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-tetradioxins	24.95	3.856e2	5.773e2	1.024	0.67	0.77	6.7	YES	NO	bd	bb	0.136
2	Total-tetradioxins	25.34	1.644e2	2.064e2	1.024	0.80	0.77	3.2	YES	NO	bb	db	0.052

ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

PD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-pentadioxins	30.38	2.483e3	1.795e3	1.502	1.38	1.55	17.4	YES	NO	bb	bb	0.689
2	Total-pentadioxins	30.06	9.284e2	6.943e2	1.502	1.34	1.55	9.3	YES	NO	bb	bb	0.261
3	Total-pentadioxins	29.26	3.192e3	2.065e3	1.502	1.55	1.55	31.6	YES	NO	bb	bb	0.847
4	12378-PeCDD	31.44	1.669e3	1.085e3	1.022	1.54	1.55	11.3	YES	NO	bd	bb	0.652

HD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	123789-HxCDD	36.45	6.089e3	4.844e3	0.907	1.26	1.24	50.8	YES	NO	bb	bd	2.443
2	Total-hexadioxins	36.24	7.692e3	6.394e3	1.005	1.20	1.24	56.7	YES	NO	db	db	2.842
3	123678-HxCDD	36.07	1.854e4	1.417e4	1.001	1.31	1.24	142.5	YES	NO	dd	dd	6.688
4	123478-HxCDD	35.95	2.447e3	1.850e3	0.996	1.32	1.24	22.4	YES	NO	bd	bd	0.867
5	Total-hexadioxins	35.17	4.067e4	3.445e4	1.005	1.18	1.24	312.6	YES	NO	db	dd	15.154
6	Total-hexadioxins	34.70	1.799e4	1.434e4	1.005	1.25	1.24	137.0	YES	NO	bb	bb	6.522
7	124679-HXCDD	33.92	1.693e5	1.391e5	1.115	1.22	1.24	1350.9	YES	NO	bb	bb	55.521

HPD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	1234678-HpCDD	40.17	5.418e5	5.284e5	1.039	1.03	1.05	1874.8	YES	NO	bb	bb	278.184
2	1234679-HPCDD	39.14	2.845e6	2.756e6	1.137	1.03	1.05	10512.2	YES	NO	bb	bb	1330.6...

Dataset: T:\Autospec\Processed Data Batch\230424D1.qld
Last Altered: Tuesday, April 25, 2023 10:49:58 Pacific Daylight Time
Printed: Tuesday, April 25, 2023 11:20:07 Pacific Daylight Time

ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

Dioxins,TD,PD,HD,HPD,OD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-tetradioxins	24.95	3.856e2	5.773e2	1.024	0.67	0.77	6.7	YES	NO	bd	bb	0.136
2	Total-tetradioxins	25.34	1.644e2	2.064e2	1.024	0.80	0.77	3.2	YES	NO	bb	db	0.052
3	Total-pentadioxins	30.38	2.483e3	1.795e3	1.502	1.38	1.55	17.4	YES	NO	bb	bb	0.689
4	Total-pentadioxins	30.06	9.284e2	6.943e2	1.502	1.34	1.55	9.3	YES	NO	bb	bb	0.261
5	Total-pentadioxins	29.26	3.192e3	2.065e3	1.502	1.55	1.55	31.6	YES	NO	bb	bb	0.847
6	12378-PeCDD	31.44	1.669e3	1.085e3	1.022	1.54	1.55	11.3	YES	NO	bd	bb	0.652
7	123789-HxCDD	36.45	6.089e3	4.844e3	0.907	1.26	1.24	50.8	YES	NO	bb	bd	2.443
8	Total-hexadioxins	36.24	7.692e3	6.394e3	1.005	1.20	1.24	56.7	YES	NO	db	db	2.842
9	123678-HxCDD	36.07	1.854e4	1.417e4	1.001	1.31	1.24	142.5	YES	NO	dd	dd	6.688
10	123478-HxCDD	35.95	2.447e3	1.850e3	0.996	1.32	1.24	22.4	YES	NO	bd	bd	0.867
11	Total-hexadioxins	35.17	4.067e4	3.445e4	1.005	1.18	1.24	312.6	YES	NO	db	dd	15.154
12	Total-hexadioxins	34.70	1.799e4	1.434e4	1.005	1.25	1.24	137.0	YES	NO	bb	bb	6.522
13	124679-HXCDD	33.92	1.693e5	1.391e5	1.115	1.22	1.24	1350.9	YES	NO	bb	bb	55.521
14	1234678-HpCDD	40.17	5.418e5	5.284e5	1.039	1.03	1.05	1874.8	YES	NO	bb	bb	278.184
15	1234679-HPCDD	39.14	2.845e6	2.756e6	1.137	1.03	1.05	10512.2	YES	NO	bb	bb	1330.6...
16	OCDD	44.88	2.794e6	3.244e6	0.920	0.86	0.89	22254.0	YES	NO	bb	bb	1907.1...

ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

TotalTEQ,Furans,Dioxins

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-tetrafurans	24.60	9.174e2	1.342e3	0.727	0.68	0.77	7.9	YES	NO	db	db	0.330
2	Total-tetrafurans	23.95	4.758e2	6.695e2	0.727	0.71	0.77	4.8	YES	NO	dd	bb	0.167
3	Total-tetrafurans	23.70	6.878e2	1.007e3	0.727	0.68	0.77	8.3	YES	NO	bd	dd	0.248
4	Total-tetrafurans	23.56	3.088e2	4.567e2	0.727	0.68	0.77	3.6	YES	NO	db	dd	0.112
5	Total-tetrafurans	23.36	5.694e2	8.153e2	0.727	0.70	0.77	6.1	YES	NO	dd	dd	0.202
6	Total-tetrafurans	25.94	9.649e2	1.114e3	0.727	0.87	0.77	9.4	YES	NO	db	db	0.304
7	2378-TCDF	25.70	1.364e3	1.718e3	0.702	0.79	0.77	13.6	YES	NO	bd	dd	0.467
8	Total-pentafurans	30.06	1.840e3	1.383e3	0.654	1.33	1.55	27.9	YES	NO	bb	bb	0.663
9	12378-PeCDF	29.86	3.374e3	2.192e3	0.679	1.54	1.55	43.6	YES	NO	bb	bb	1.051
10	Total-pentafurans	28.86	5.826e3	3.745e3	0.654	1.56	1.55	48.5	YES	NO	MM	MM	1.967
11	123789-HxCDF	36.82	2.304e3	1.945e3	1.137	1.18	1.24	30.8	YES	NO	bb	bb	0.893
12	234678-HxCDF	35.83	3.106e3	2.727e3	1.140	1.14	1.24	31.0	YES	NO	bb	bb	0.969
13	123678-HxCDF	34.96	2.921e3	2.195e3	1.091	1.33	1.24	35.0	YES	NO	db	db	0.797
14	123478-HxCDF	34.81	4.906e3	3.932e3	1.166	1.25	1.24	64.2	YES	NO	bd	bd	1.353
15	Total-hexafurans	34.66	8.041e2	5.825e2	1.141	1.38	1.24	10.9	YES	NO	bb	bb	0.232
16	Total-hexafurans	34.20	7.427e4	5.849e4	1.141	1.27	1.24	962.5	YES	NO	bb	bb	22.224
17	Total-hexafurans	33.37	4.084e4	3.406e4	1.141	1.20	1.24	556.1	YES	NO	bb	db	12.540
18	123468-HXCDF	33.15	2.296e4	1.884e4	1.169	1.22	1.24	298.0	YES	NO	bb	bd	6.381
19	1234678-HpCDF	38.68	4.492e4	4.241e4	1.003	1.06	1.05	487.3	YES	NO	bb	bb	18.093
20	1234789-HpCDF	40.92	1.581e3	1.406e3	0.953	1.12	1.05	14.2	YES	NO	bb	bb	0.864
21	Total-heptafurans	39.35	9.088e4	8.690e4	0.978	1.05	1.05	950.5	YES	NO	bb	bb	43.079
22	OCDF	45.13	3.976e4	4.216e4	0.778	0.94	0.89	323.2	YES	NO	bb	bb	30.603
23	Total-penta1	27.14	3.460e4	2.331e4		1.48	1.55	913.0	YES	NO	bb	bb	8.098
24	Total-tetradioxins	24.95	3.856e2	5.773e2	1.024	0.67	0.77	6.7	YES	NO	bd	bb	0.136
25	Total-tetradioxins	25.34	1.644e2	2.064e2	1.024	0.80	0.77	3.2	YES	NO	bb	db	0.052
26	Total-pentadioxins	30.38	2.483e3	1.795e3	1.502	1.38	1.55	17.4	YES	NO	bb	bb	0.689
27	Total-pentadioxins	30.06	9.284e2	6.943e2	1.502	1.34	1.55	9.3	YES	NO	bb	bb	0.261
28	Total-pentadioxins	29.26	3.192e3	2.065e3	1.502	1.55	1.55	31.6	YES	NO	bb	bb	0.847
29	12378-PeCDD	31.44	1.669e3	1.085e3	1.022	1.54	1.55	11.3	YES	NO	bd	bb	0.652
30	123789-HxCDD	36.45	6.089e3	4.844e3	0.907	1.26	1.24	50.8	YES	NO	bb	bd	2.443
31	Total-hexadioxins	36.24	7.692e3	6.394e3	1.005	1.20	1.24	56.7	YES	NO	db	db	2.842
32	123678-HxCDD	36.07	1.854e4	1.417e4	1.001	1.31	1.24	142.5	YES	NO	dd	dd	6.688
33	123478-HxCDD	35.95	2.447e3	1.850e3	0.996	1.32	1.24	22.4	YES	NO	bd	bd	0.867
34	Total-hexadioxins	35.17	4.067e4	3.445e4	1.005	1.18	1.24	312.6	YES	NO	db	dd	15.154
35	Total-hexadioxins	34.70	1.799e4	1.434e4	1.005	1.25	1.24	137.0	YES	NO	bb	bb	6.522
36	124679-HXCDD	33.92	1.693e5	1.391e5	1.115	1.22	1.24	1350.9	YES	NO	bb	bb	55.521
37	1234678-HpCDD	40.17	5.418e5	5.284e5	1.039	1.03	1.05	1874.8	YES	NO	bb	bb	278.184

ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

TotalTEQ,Furans,Dioxins

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
38	1234679-HPCDD	39.14	2.845e6	2.756e6	1.137	1.03	1.05	10512.2	YES	NO	bb	bb	1330.6...
39	OCDD	44.88	2.794e6	3.244e6	0.920	0.86	0.89	22254.0	YES	NO	bb	bb	1907.1...

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ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

PFK1

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION1 PFK	21.11	2.411e4					1.8	NO		bd		
2	FUNCTION1 PFK	23.29	2.953e5					5.3	YES		db		
3	FUNCTION1 PFK	23.15	2.763e5					5.8	YES		dd		
4	FUNCTION1 PFK	22.96	4.949e5					7.4	YES		dd		
5	FUNCTION1 PFK	22.95	3.456e5					7.4	YES		bd		
6	FUNCTION1 PFK	22.75	2.223e5					7.9	YES		db		
7	FUNCTION1 PFK	22.71	2.162e5					7.1	YES		dd		
8	FUNCTION1 PFK	22.61	2.339e5					6.6	YES		bd		
9	FUNCTION1 PFK	22.45	1.721e5					4.2	YES		db		
10	FUNCTION1 PFK	22.34	2.019e5					4.9	YES		dd		
11	FUNCTION1 PFK	22.33	1.291e5					5.2	YES		dd		
12	FUNCTION1 PFK	22.23	2.543e5					4.5	YES		dd		
13	FUNCTION1 PFK	22.10	1.307e4					0.9	NO		bd		
14	FUNCTION1 PFK	21.58	4.433e5					5.8	YES		bb		
15	FUNCTION1 PFK	21.38	3.972e5					8.4	YES		db		
16	FUNCTION1 PFK	21.23	8.337e4					3.0	YES		dd		
17	FUNCTION1 PFK	21.17	4.952e4					2.6	NO		dd		
18	FUNCTION1 PFK	25.79	4.265e5					11.5	YES		db		
19	FUNCTION1 PFK	25.75	4.718e5					11.9	YES		dd		
20	FUNCTION1 PFK	25.60	7.329e5					14.8	YES		dd		
21	FUNCTION1 PFK	25.53	4.181e5					15.3	YES		dd		
22	FUNCTION1 PFK	25.51	7.722e5					15.1	YES		bd		
23	FUNCTION1 PFK	25.28	8.980e5					18.3	YES		db		
24	FUNCTION1 PFK	25.11	1.644e6					17.4	YES		dd		
25	FUNCTION1 PFK	25.01	3.381e5					16.4	YES		dd		
26	FUNCTION1 PFK	24.97	4.387e5					16.0	YES		dd		
27	FUNCTION1 PFK	24.74	3.121e6					15.1	YES		dd		
28	FUNCTION1 PFK	24.45	1.003e6					12.9	YES		dd		
29	FUNCTION1 PFK	24.32	3.157e5					10.9	YES		bd		
30	FUNCTION1 PFK	24.16	6.478e5					10.8	YES		db		
31	FUNCTION1 PFK	23.95	9.100e5					7.8	YES		dd		
32	FUNCTION1 PFK	23.80	1.267e5					4.3	YES		bd		
33	FUNCTION1 PFK	23.53	3.650e4					1.4	NO		bb		
34	FUNCTION1 PFK	27.86	6.189e5					5.6	YES		bb		
35	FUNCTION1 PFK	27.62	6.252e5					11.2	YES		db		
36	FUNCTION1 PFK	27.50	3.556e5					9.3	YES		dd		
37	FUNCTION1 PFK	27.37	4.433e5					9.5	YES		bd		

ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

PFK1

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
38	FUNCTION1 PFK	27.20	5.588e5					8.3	YES		db		
39	FUNCTION1 PFK	26.99	6.361e5					6.0	YES		dd		
40	FUNCTION1 PFK	26.72	2.605e4					1.4	NO		bd		
41	FUNCTION1 PFK	26.49	4.425e4					1.7	NO		bb		
42	FUNCTION1 PFK	26.40	4.916e4					0.9	NO		bb		
43	FUNCTION1 PFK	26.08	7.031e4					2.2	NO		db		
44	FUNCTION1 PFK	25.96	2.284e5					5.1	YES		bd		

PFK2

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION2 PFK	29.92	1.196e5					10.7	YES		db		0.000
2	FUNCTION2 PFK	29.87	1.855e6					13.6	YES		dd		0.000
3	FUNCTION2 PFK	29.49	1.120e6					34.8	YES		bd		0.000
4	FUNCTION2 PFK	28.95	4.566e6					34.2	YES		bb		0.000
5	FUNCTION2 PFK	32.64	1.258e5					2.6	NO		bb		0.000
6	FUNCTION2 PFK	32.36	5.843e5					8.3	YES		bb		0.000
7	FUNCTION2 PFK	30.57	2.868e4					2.7	NO		bb		0.000

PFK3

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION3 PFK	37.75	6.459e6					8.3	YES		db		0.000
2	FUNCTION3 PFK	37.00	2.370e6					55.6	YES		bd		0.000
3	FUNCTION3 PFK	36.57	6.599e6					53.9	YES		bb		0.000
4	FUNCTION3 PFK	33.94	4.953e5					8.0	YES		bb		0.000
5	FUNCTION3 PFK	33.70	8.407e5					13.5	YES		bb		0.000
6	FUNCTION3 PFK	33.32	3.000e4					2.9	NO		bb		0.000

ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

PFK4

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION4 PFK	38.18	1.346e4					1.3	NO		db		
2	FUNCTION4 PFK	38.13	1.122e4					1.6	NO		dd		
3	FUNCTION4 PFK	38.04	4.094e4					2.5	NO		bd		
4	FUNCTION4 PFK	37.94	3.024e3					0.9	NO		db		
5	FUNCTION4 PFK	37.91	1.608e4					2.7	NO		bd		
6	FUNCTION4 PFK	40.77	3.888e4					3.1	YES		dd		
7	FUNCTION4 PFK	40.71	4.937e4					2.6	NO		bd		
8	FUNCTION4 PFK	40.21	6.740e3					1.1	NO		bb		
9	FUNCTION4 PFK	40.08	4.104e4					2.1	NO		db		
10	FUNCTION4 PFK	40.01	3.847e4					2.9	NO		dd		
11	FUNCTION4 PFK	39.88	7.904e4					4.1	YES		dd		
12	FUNCTION4 PFK	39.85	5.664e4					4.3	YES		bd		
13	FUNCTION4 PFK	39.72	1.101e5					4.3	YES		db		
14	FUNCTION4 PFK	39.59	3.194e4					2.9	NO		bd		
15	FUNCTION4 PFK	39.39	1.198e4					1.8	NO		bb		
16	FUNCTION4 PFK	39.30	6.083e3					1.1	NO		bb		
17	FUNCTION4 PFK	39.07	4.081e4					2.4	NO		bb		
18	FUNCTION4 PFK	38.89	1.602e5					4.0	YES		bb		
19	FUNCTION4 PFK	38.77	4.160e3					1.0	NO		bb		
20	FUNCTION4 PFK	38.61	3.586e3					0.7	NO		bb		
21	FUNCTION4 PFK	38.38	4.390e3					0.5	NO		bb		
22	FUNCTION4 PFK	42.57	4.442e3					0.7	NO		bb		
23	FUNCTION4 PFK	42.07	1.324e4					1.5	NO		bb		
24	FUNCTION4 PFK	42.00	4.102e3					0.8	NO		bb		
25	FUNCTION4 PFK	41.83	6.339e3					0.8	NO		bb		
26	FUNCTION4 PFK	41.72	2.603e3					0.5	NO		db		
27	FUNCTION4 PFK	41.68	1.249e4					1.4	NO		dd		
28	FUNCTION4 PFK	41.58	1.596e4					1.1	NO		bd		
29	FUNCTION4 PFK	41.36	3.055e3					0.7	NO		bb		
30	FUNCTION4 PFK	41.25	1.548e4					2.0	NO		db		
31	FUNCTION4 PFK	41.22	6.588e3					1.2	NO		dd		
32	FUNCTION4 PFK	41.16	1.408e4					1.6	NO		dd		
33	FUNCTION4 PFK	41.12	2.355e4					2.1	NO		dd		
34	FUNCTION4 PFK	41.06	3.165e4					2.6	NO		dd		
35	FUNCTION4 PFK	40.94	5.947e4					2.8	NO		dd		
36	FUNCTION4 PFK	40.86	2.509e4					2.4	NO		dd		
37	FUNCTION4 PFK	40.82	1.593e4					2.3	NO		dd		

ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

PFK4

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
38	FUNCTION4 PFK	42.88	3.469e3					0.7	NO		bb		
39	FUNCTION4 PFK	42.83	5.105e3					0.9	NO		bb		
40	FUNCTION4 PFK	42.71	2.060e4					1.8	NO		db		
41	FUNCTION4 PFK	42.68	9.874e3					1.8	NO		bd		
42	FUNCTION4 PFK	42.63	2.950e3					0.6	NO		bb		

PFK5

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION5 PFK	44.64	1.285e4					1.2	NO		bd		
2	FUNCTION5 PFK	44.43	1.617e4					1.6	NO		bb		
3	FUNCTION5 PFK	44.35	1.233e4					2.1	NO		db		
4	FUNCTION5 PFK	44.30	9.758e3					1.5	NO		dd		
5	FUNCTION5 PFK	44.25	6.852e3					1.3	NO		bd		
6	FUNCTION5 PFK	43.99	1.480e4					1.7	NO		bb		
7	FUNCTION5 PFK	43.73	4.295e3					0.7	NO		bb		
8	FUNCTION5 PFK	43.65	1.562e3					0.6	NO		bb		
9	FUNCTION5 PFK	43.41	2.379e3					0.7	NO		bb		
10	FUNCTION5 PFK	43.08	1.090e4					1.9	NO		bb		
11	FUNCTION5 PFK	45.81	5.608e3					1.0	NO		bb		
12	FUNCTION5 PFK	45.45	2.379e3					0.9	NO		bb		
13	FUNCTION5 PFK	45.40	9.961e3					1.0	NO		db		
14	FUNCTION5 PFK	45.32	3.915e3					1.1	NO		dd		
15	FUNCTION5 PFK	45.29	4.468e3					1.1	NO		bd		
16	FUNCTION5 PFK	45.18	3.837e3					1.0	NO		bb		
17	FUNCTION5 PFK	45.09	3.460e3					0.6	NO		bb		
18	FUNCTION5 PFK	45.00	6.824e3					1.1	NO		bb		
19	FUNCTION5 PFK	44.69	3.705e3					1.1	NO		db		

ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

ETHERS1

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION1 HXCD...	25.66	8.152e1					3.3	YES		bb		0.000
2	FUNCTION1 HXCD...	25.49	1.768e2					3.3	YES		bb		0.000
3	FUNCTION1 HXCD...	23.46	8.230e1					2.0	NO		bb		0.000
4	FUNCTION1 HXCD...	21.34	3.734e2					4.6	YES		db		0.000
5	FUNCTION1 HXCD...	21.21	1.326e2					3.8	YES		dd		0.000
6	FUNCTION1 HXCD...	21.10	2.269e2					5.2	YES		bd		0.000
7	FUNCTION1 HXCD...	27.54	8.590e1					2.7	NO		bb		0.000
8	FUNCTION1 HXCD...	27.23	7.422e1					1.9	NO		db		0.000
9	FUNCTION1 HXCD...	27.16	1.292e2					3.7	YES		bd		0.000
10	FUNCTION1 HXCD...	26.82	9.023e1					2.5	NO		bb		0.000
11	FUNCTION1 HXCD...	26.33	9.779e1					2.5	NO		bb		0.000
12	FUNCTION1 HXCD...	25.87	1.394e2					4.7	YES		bb		0.000

ETHERS2

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

ETHERS3

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION2 HPCD...	32.40	7.447e1					1.6	NO		bb		0.000
2	FUNCTION2 HPCD...	32.08	9.223e1					1.8	NO		bb		0.000
3	FUNCTION2 HPCD...	30.75	8.352e1					2.7	NO		bb		0.000
4	FUNCTION2 HPCD...	30.35	9.671e1					1.4	NO		bb		0.000
5	FUNCTION2 HPCD...	30.12	8.439e1					3.0	YES		bb		0.000
6	FUNCTION2 HPCD...	29.51	7.251e1					1.7	NO		bb		0.000
7	FUNCTION2 HPCD...	29.21	1.058e2					2.2	NO		bb		0.000

ETHERS4

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION3 OCDPE	33.64	1.110e2					2.6	NO		bb		0.000
2	FUNCTION3 OCDPE	36.42	1.125e2					3.2	YES		bb		0.000
3	FUNCTION3 OCDPE	35.73	8.126e1					2.3	NO		bb		0.000
4	FUNCTION3 OCDPE	34.49	1.075e2					3.0	NO		db		0.000
5	FUNCTION3 OCDPE	34.35	1.257e2					3.3	YES		bd		0.000

ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

ETHERS5

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION4 NCDPE	40.18	1.257e2					2.9	NO		bb		0.000
2	FUNCTION4 NCDPE	39.16	2.664e2					4.9	YES		bb		0.000
3	FUNCTION4 NCDPE	38.35	8.292e2					17.9	YES		bb		0.000

ETHERS6

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION5 DCDPE	44.91	4.439e2					8.8	YES		bb		0.000

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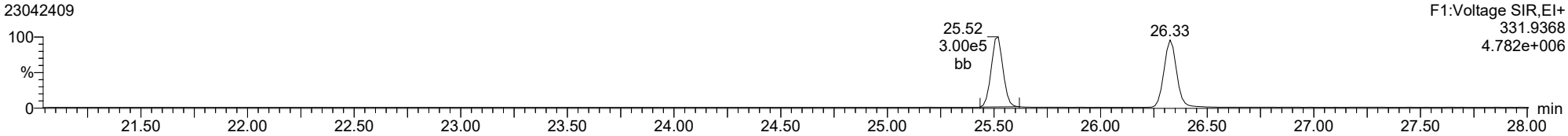
ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

13C-1234-TCDD



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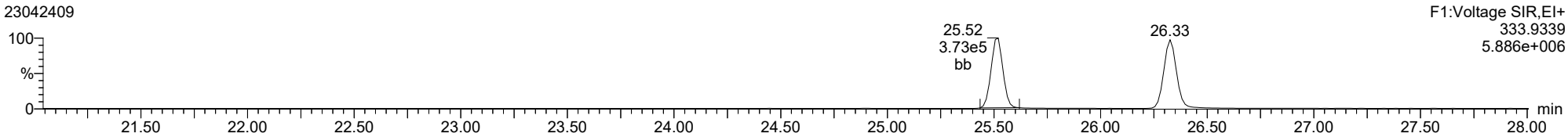
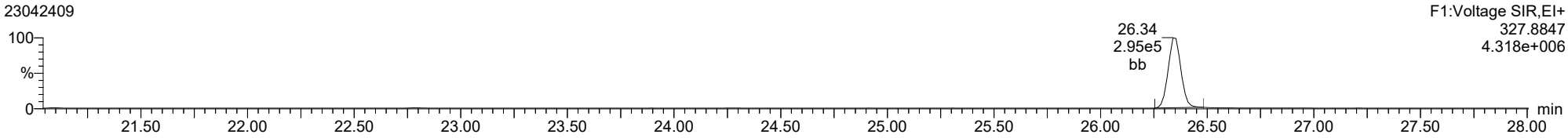


37CL-2378-TCDD



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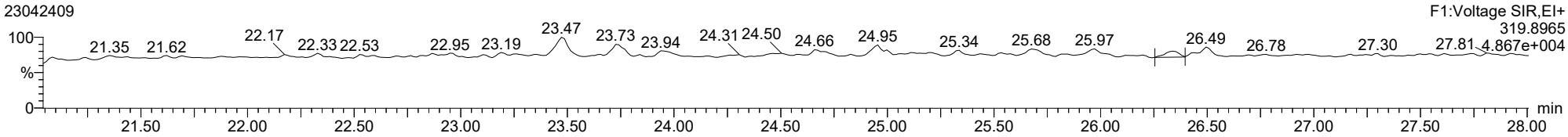

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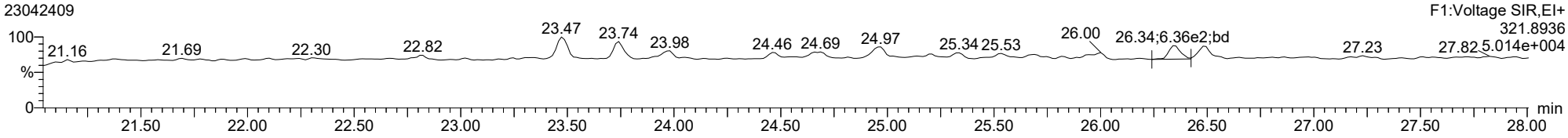

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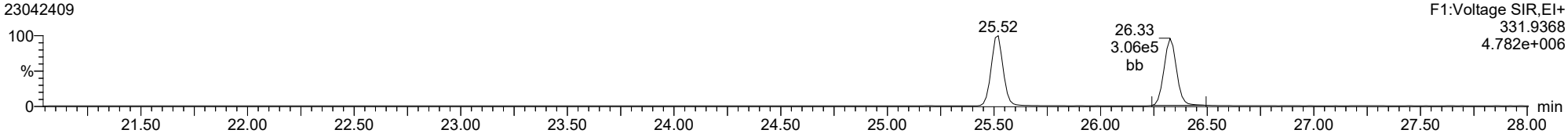

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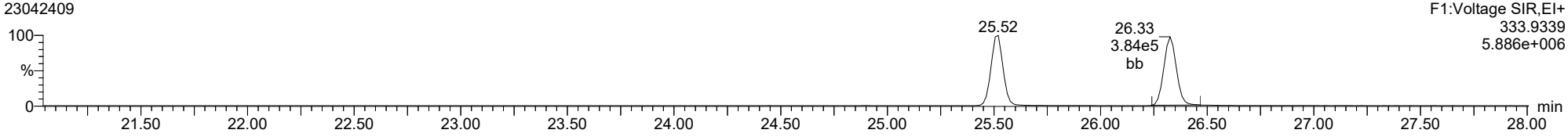

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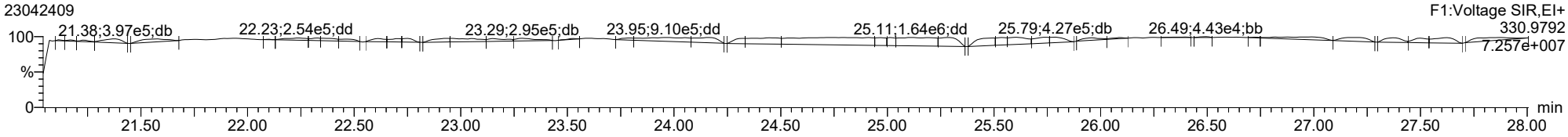

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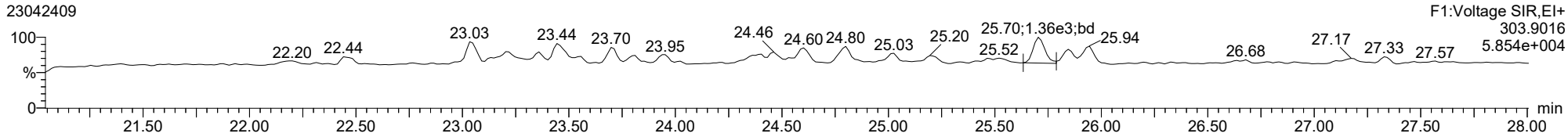
2378-TCDF



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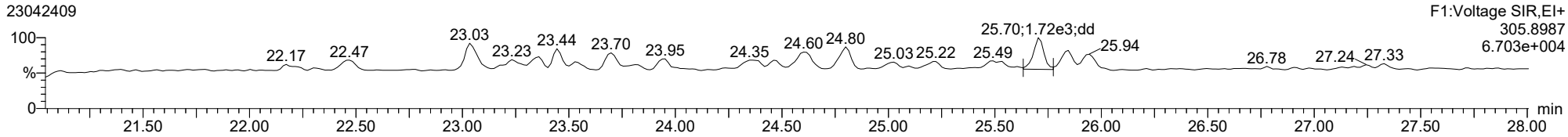

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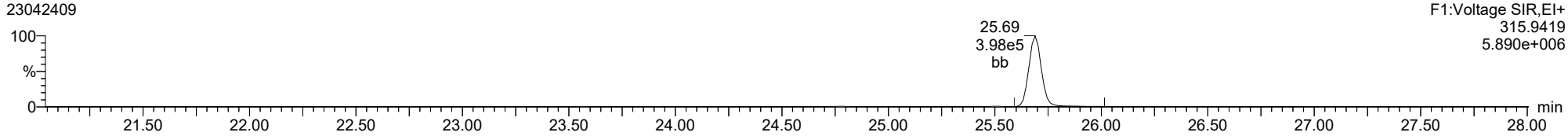

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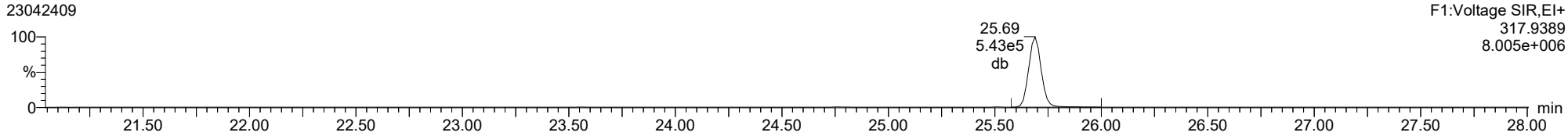

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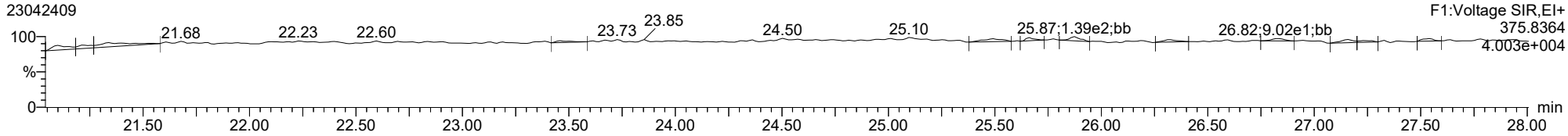

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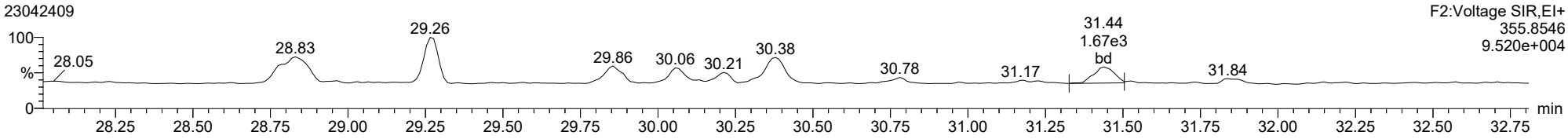
12378-PeCDD



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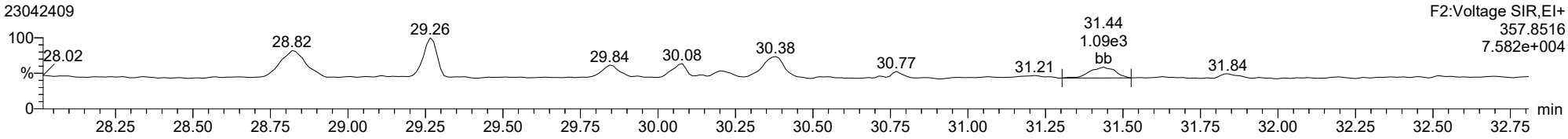

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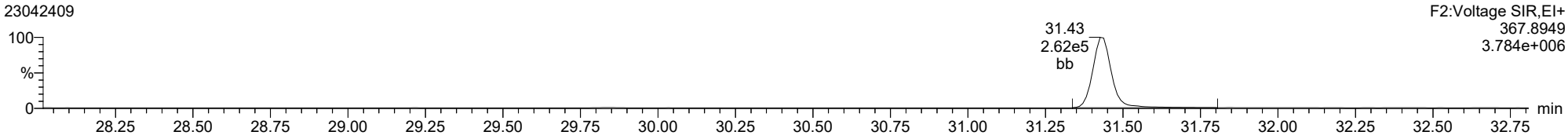

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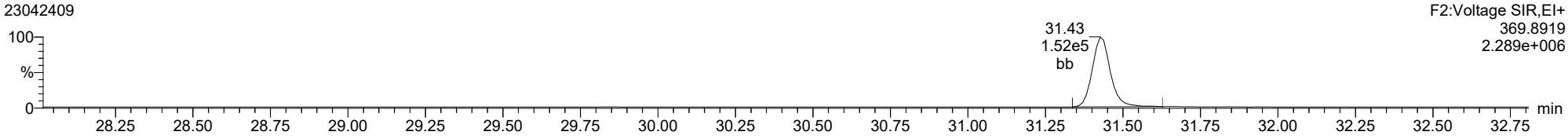
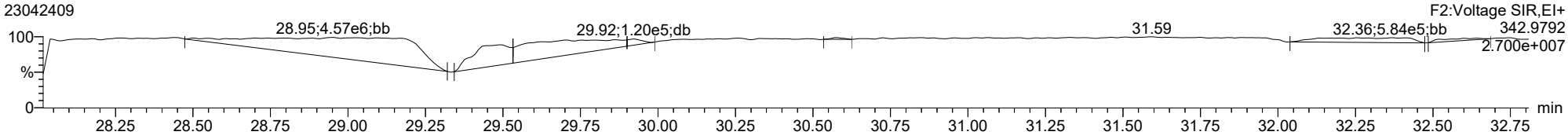


FUNCTION2 PFK



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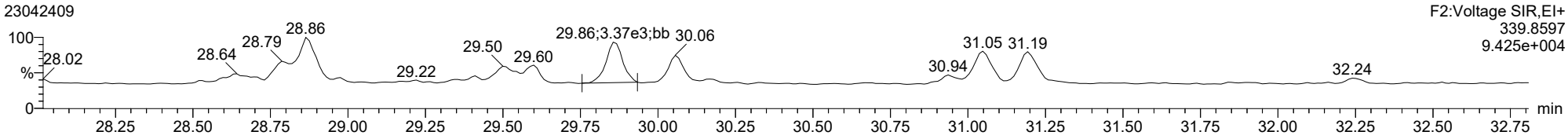

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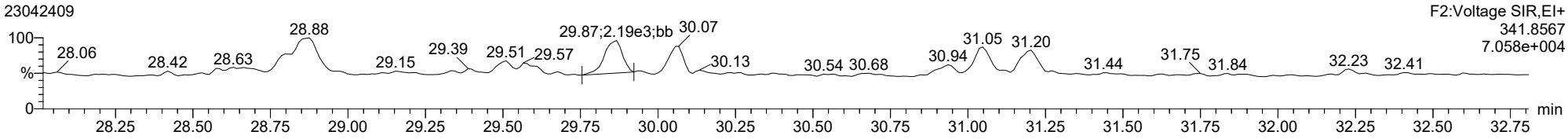

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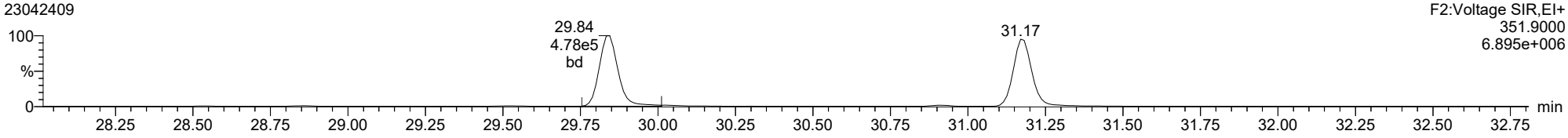

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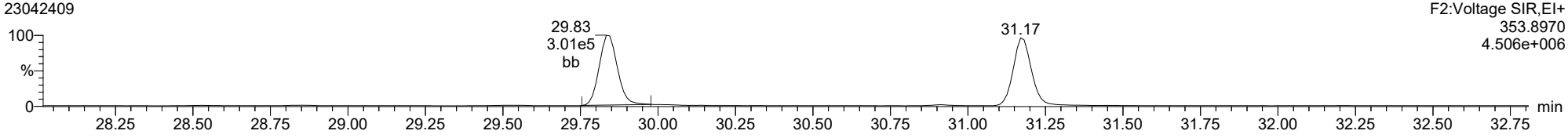
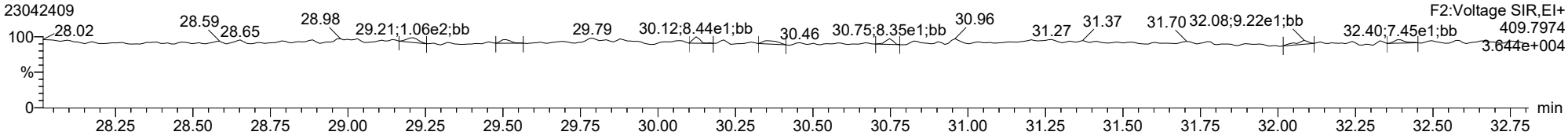


FUNCTION2 HPCDPE



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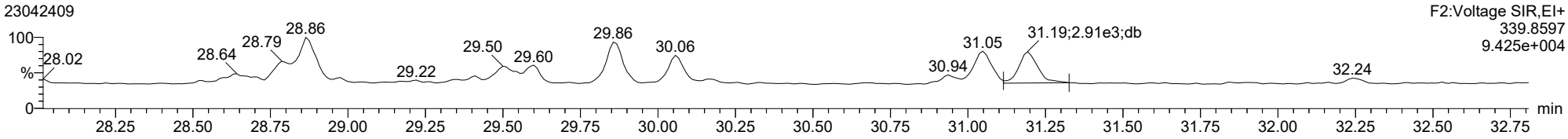
23478-PeCDF



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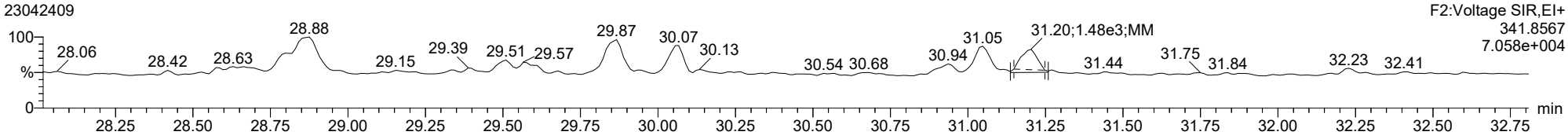

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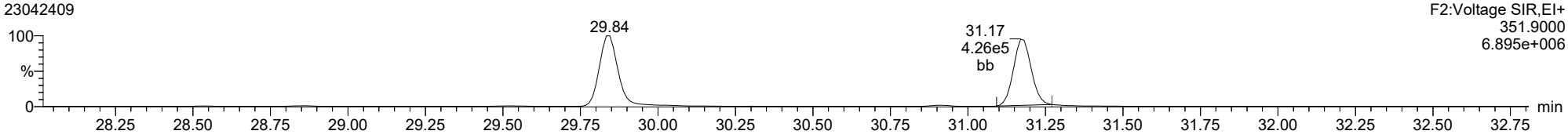

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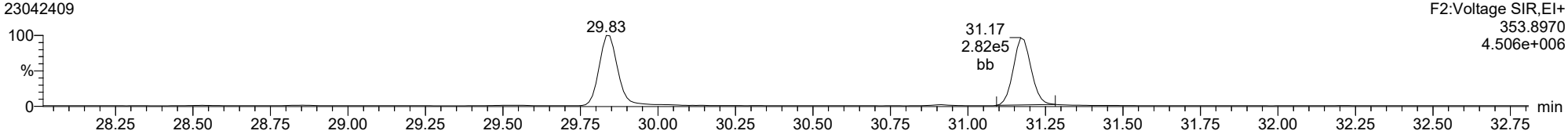

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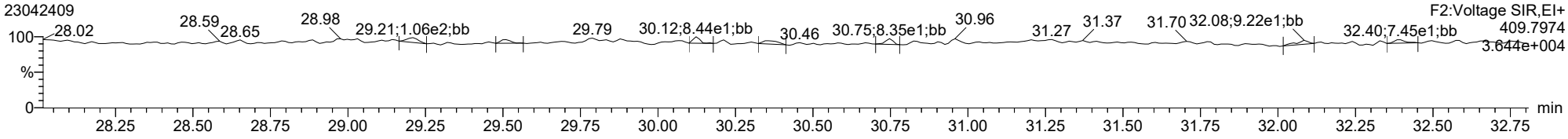

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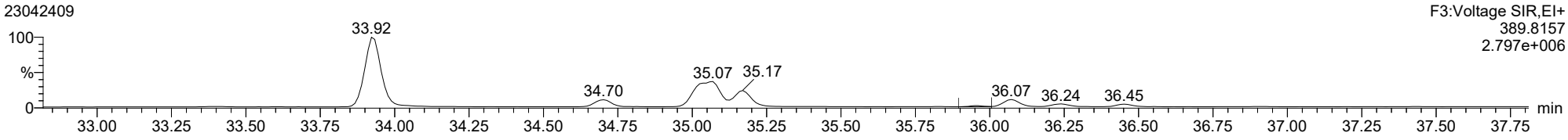

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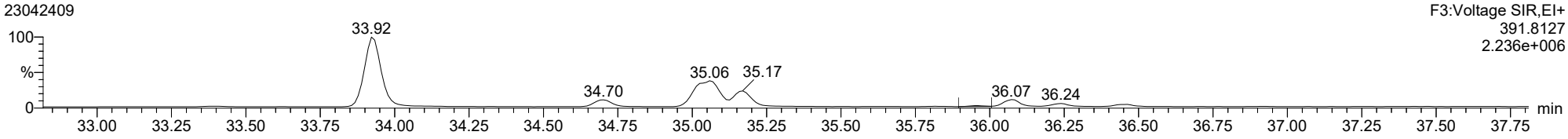

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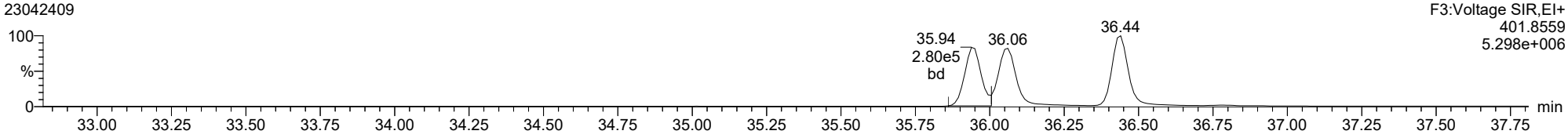

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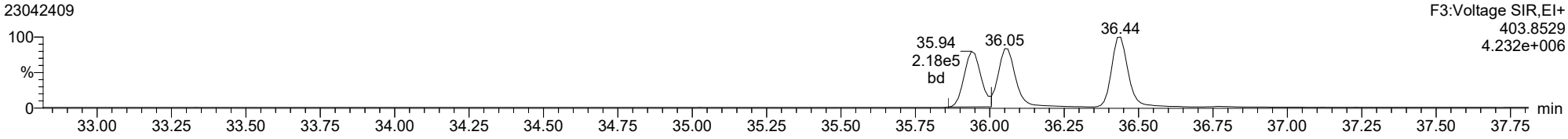

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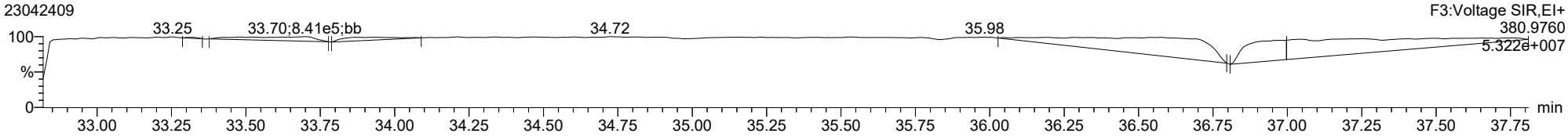

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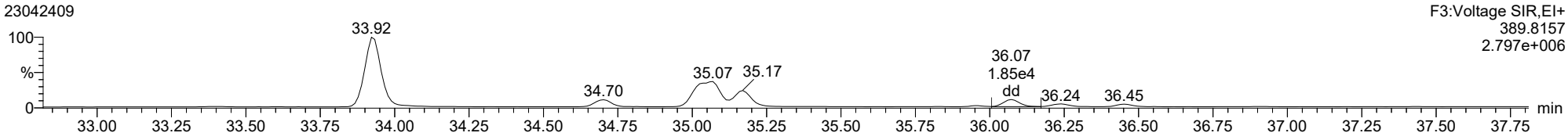
Printed: Tuesday, April 25, 2023 11:20:07 Pacific Daylight Time

ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

123678-HxCDD



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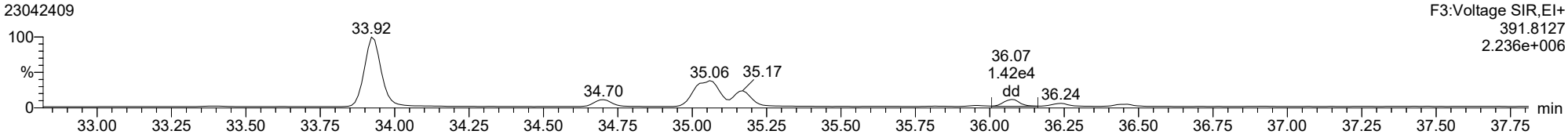

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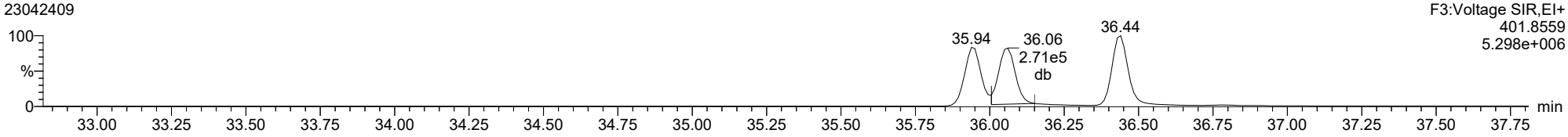

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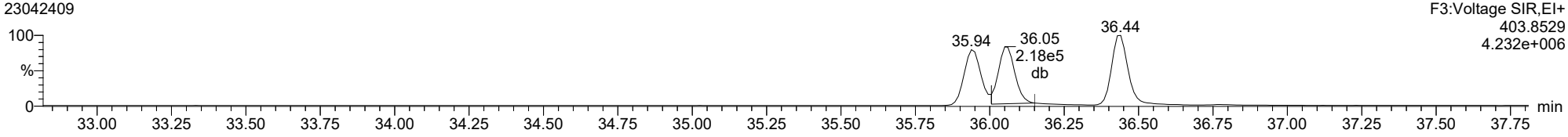

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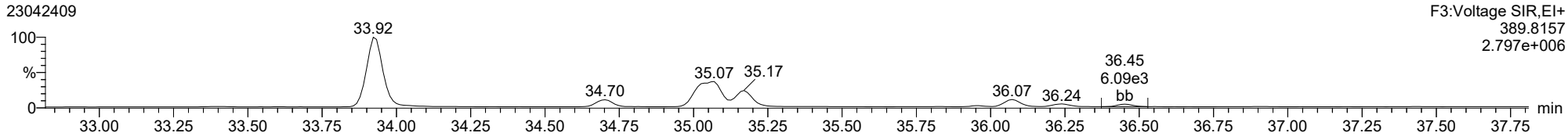
ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

123789-HxCDD



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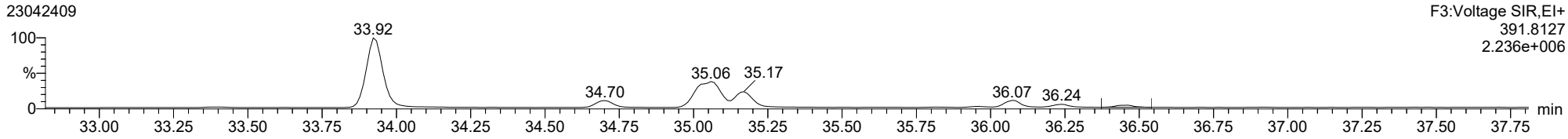

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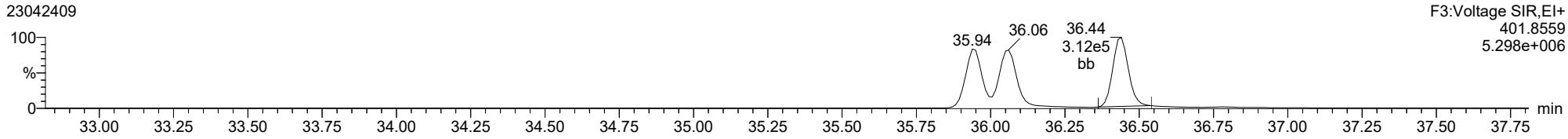

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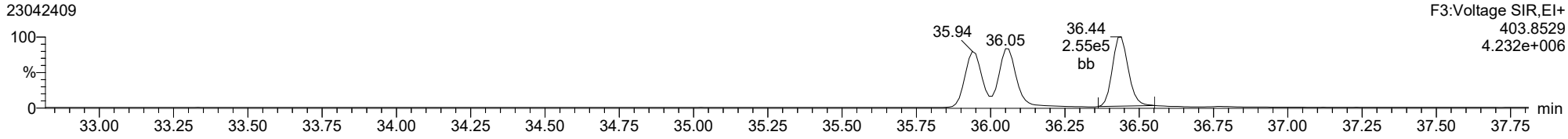

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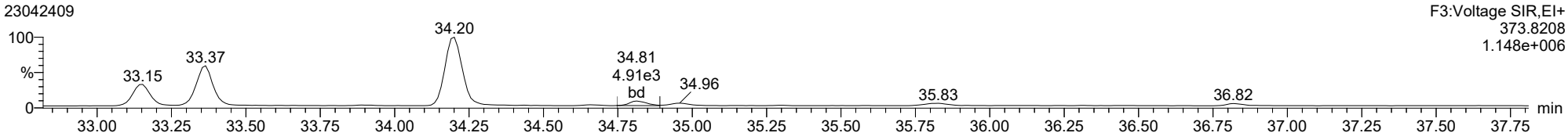

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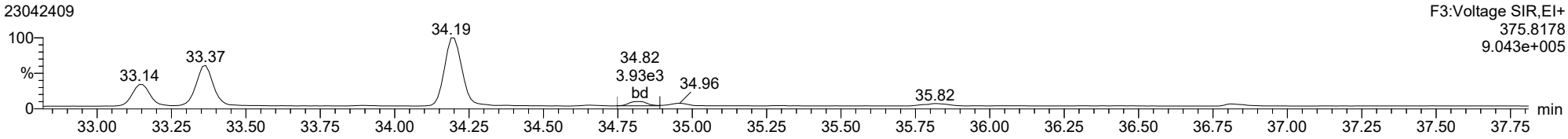

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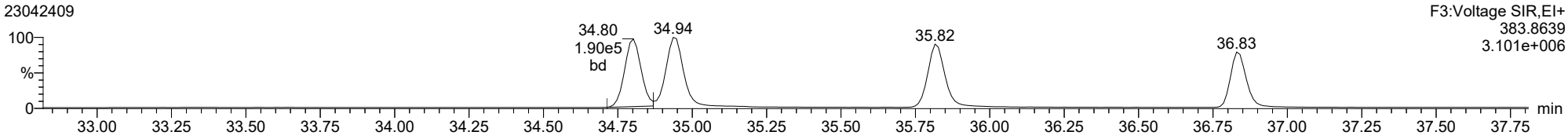

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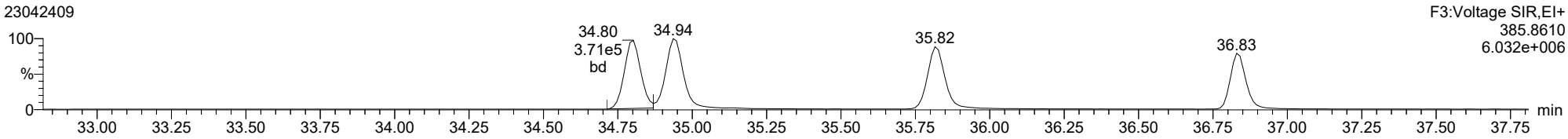

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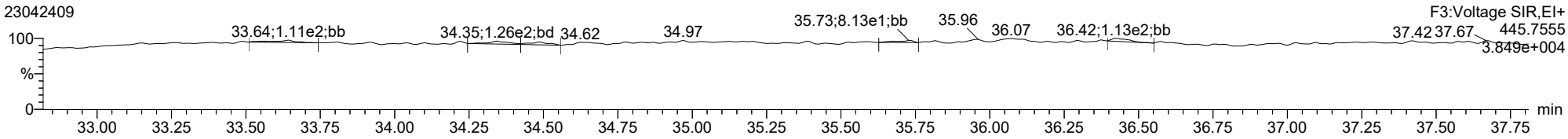

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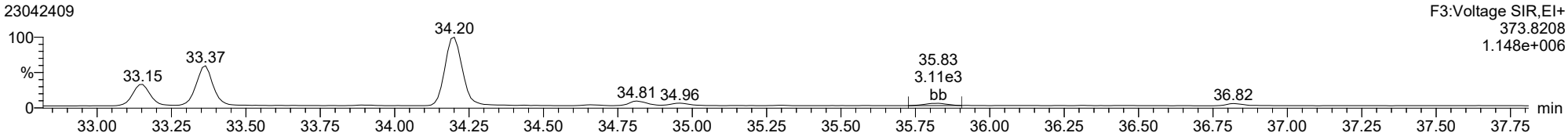

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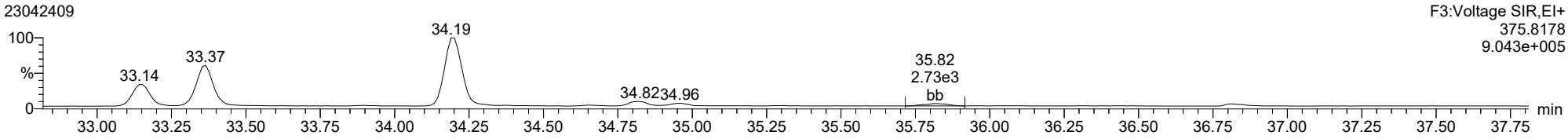

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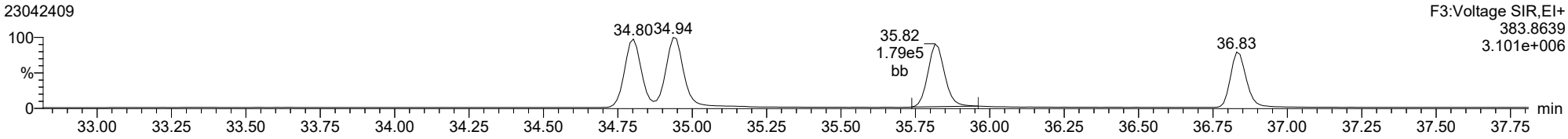

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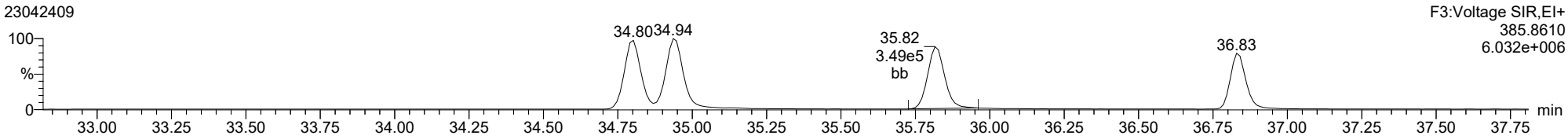

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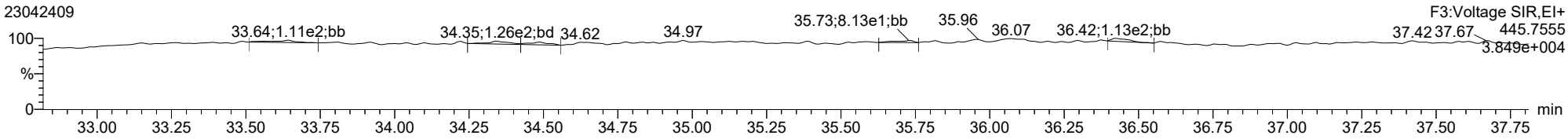

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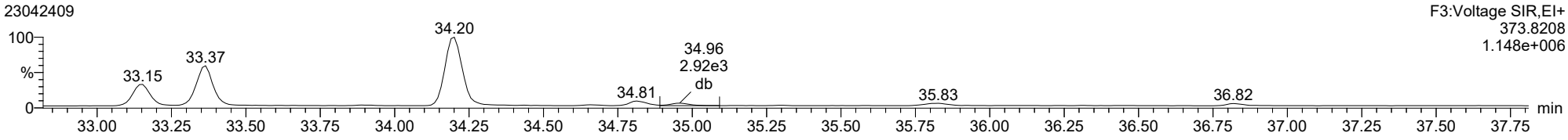

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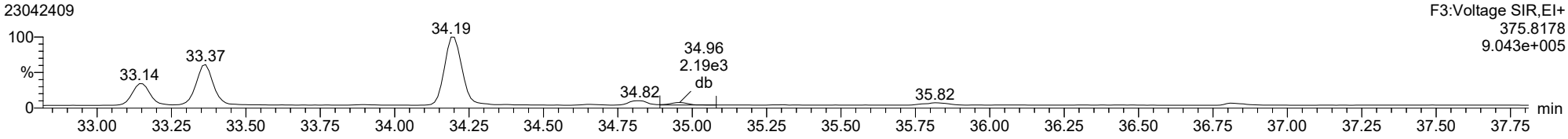

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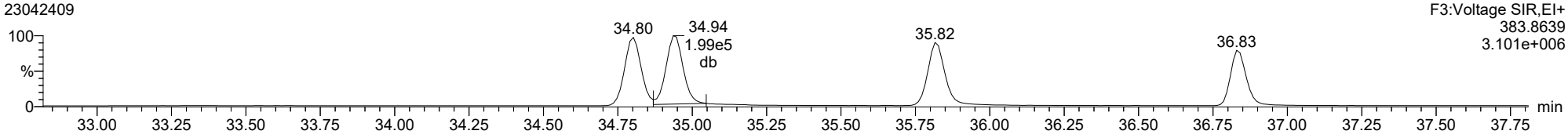

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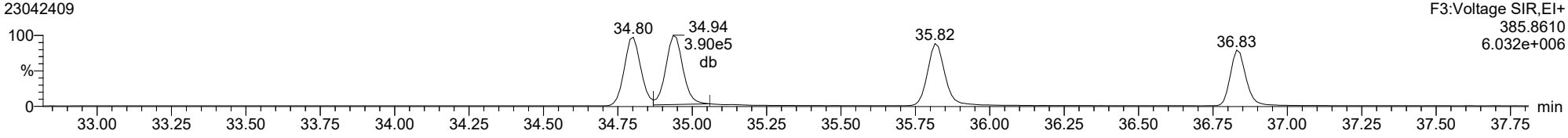

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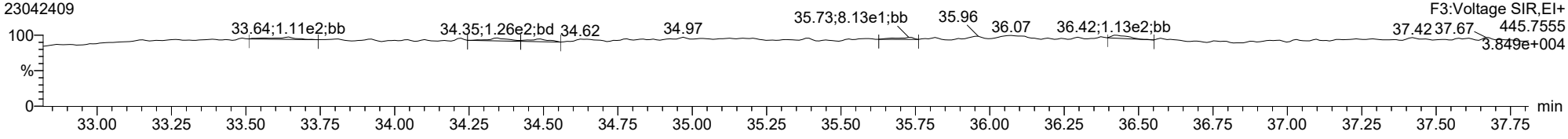

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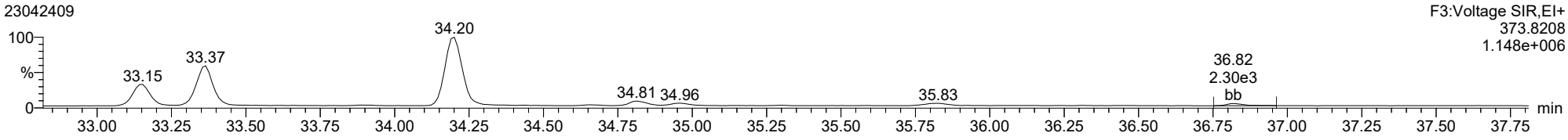

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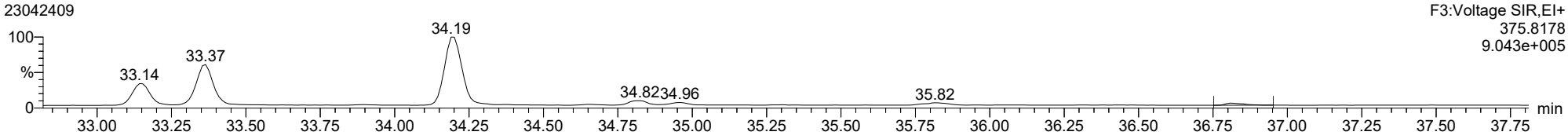

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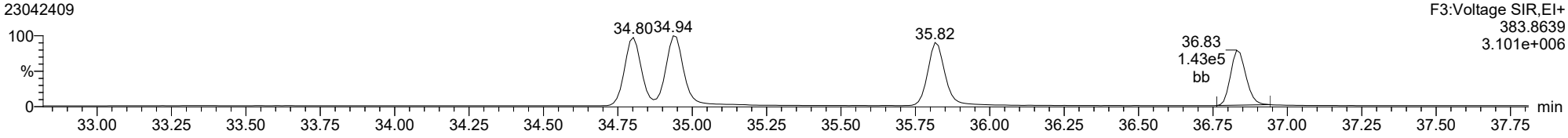

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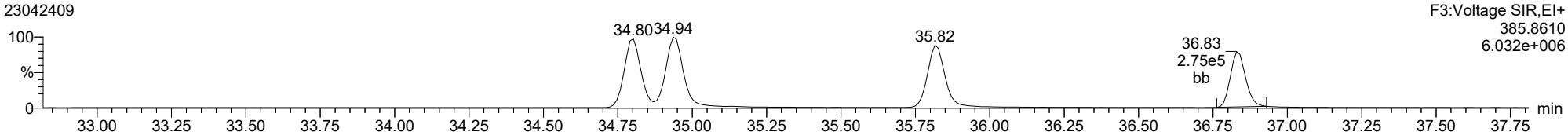

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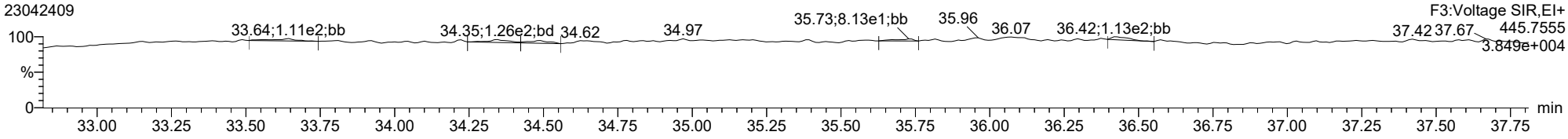

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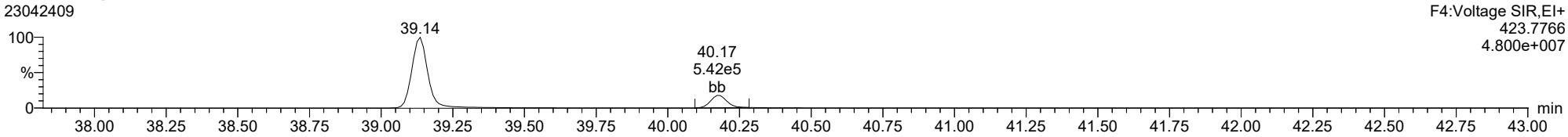

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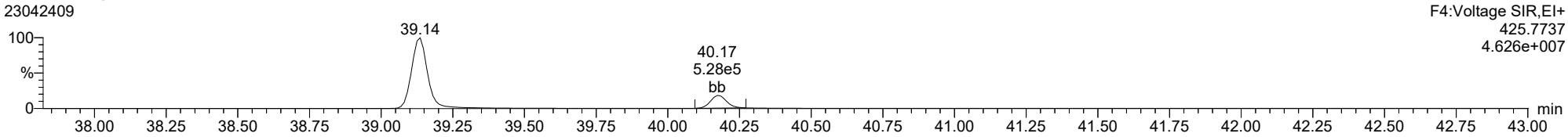

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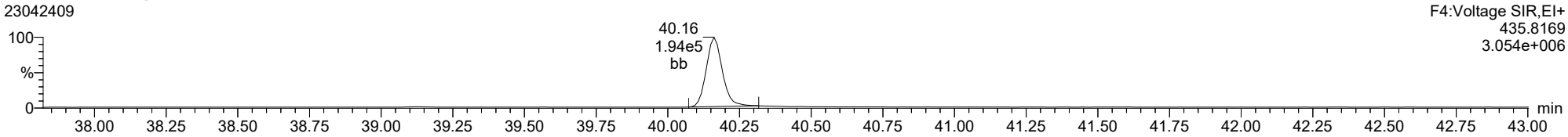

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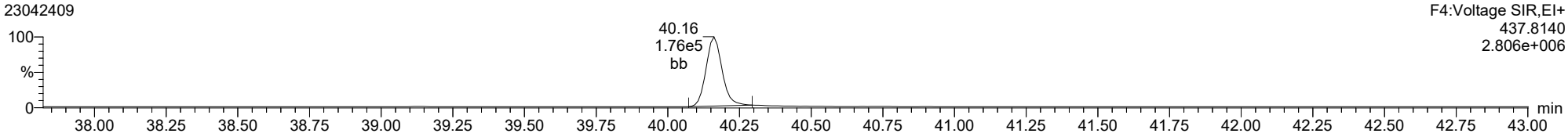

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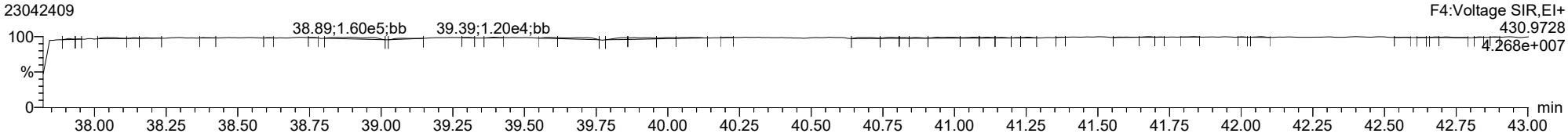

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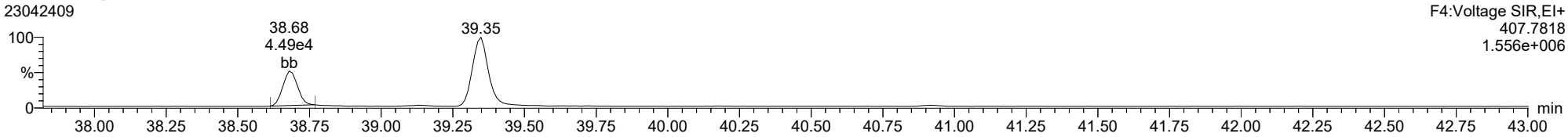

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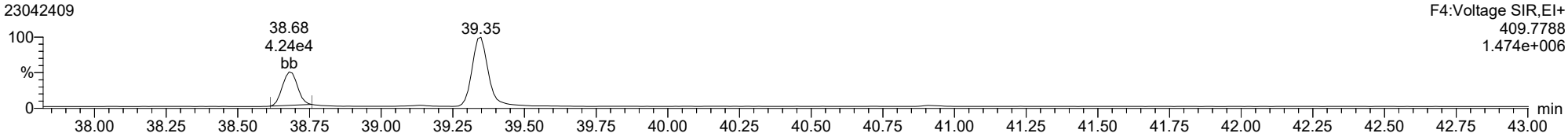

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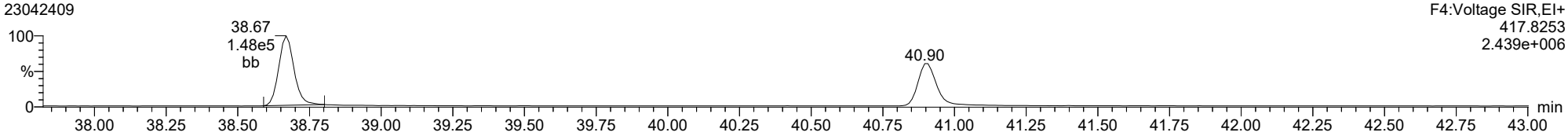

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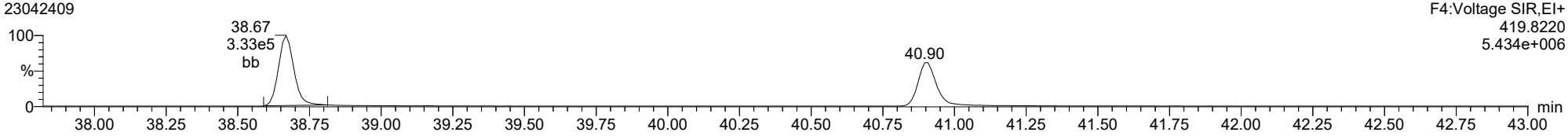

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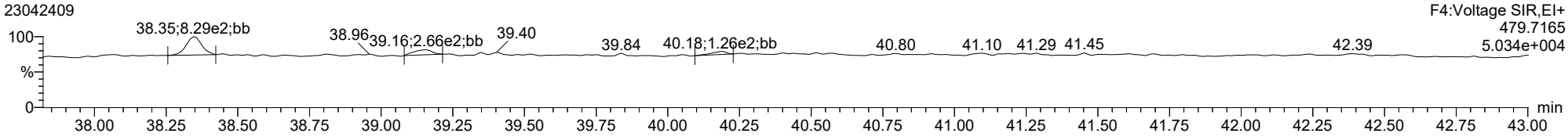

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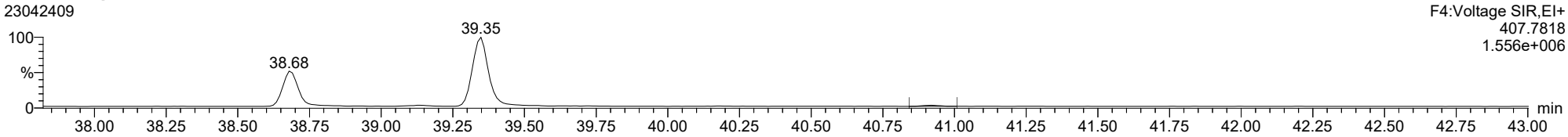

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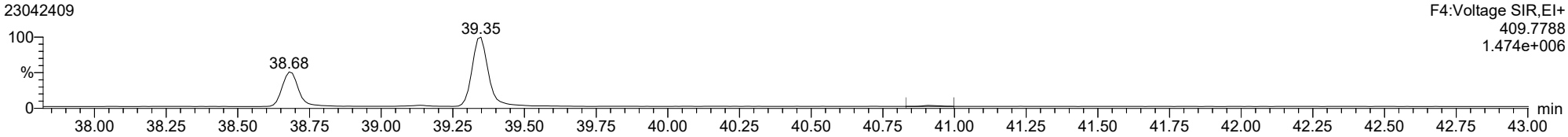

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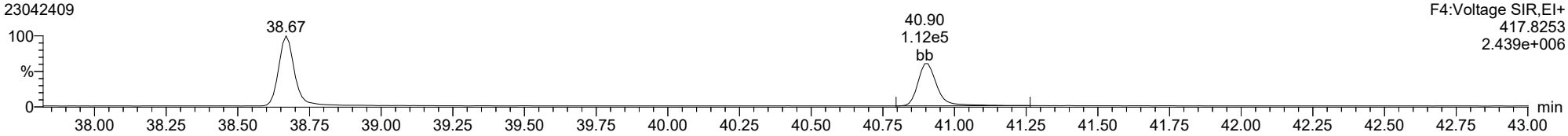

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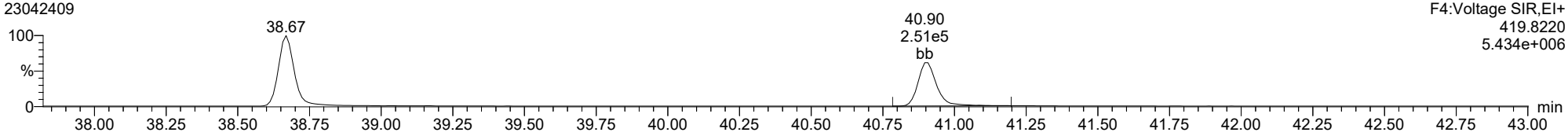

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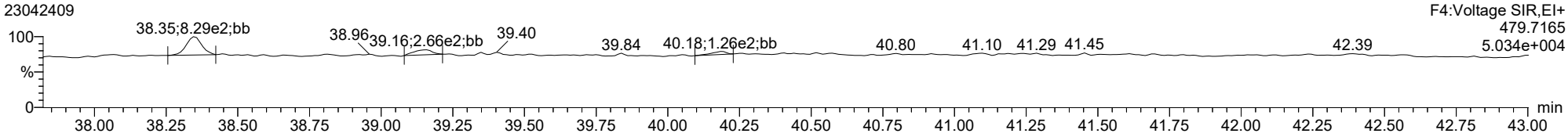

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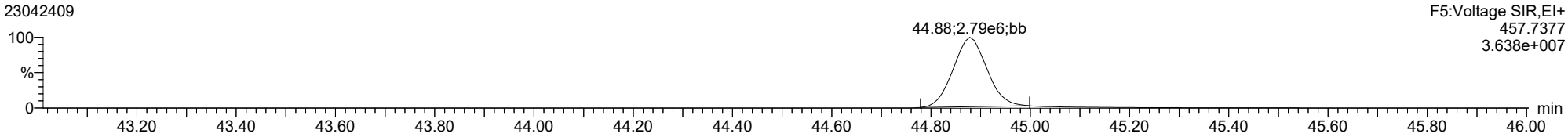

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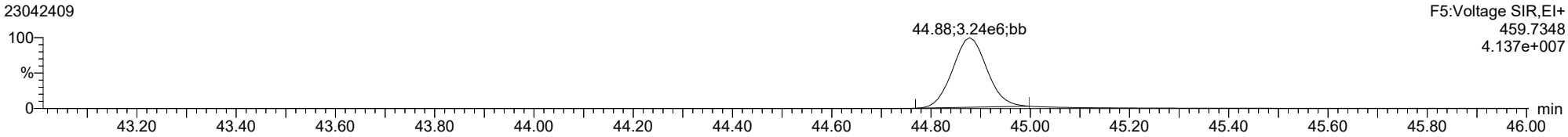

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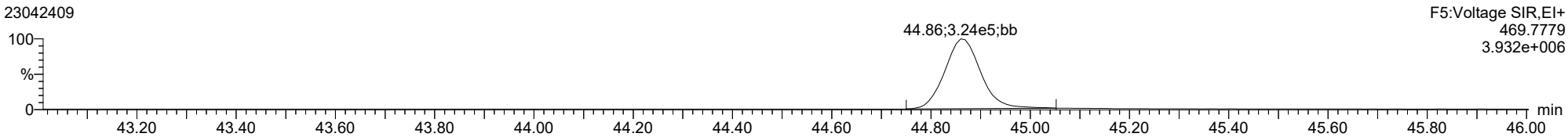

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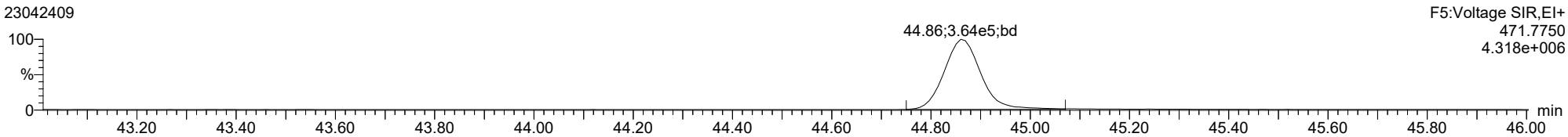
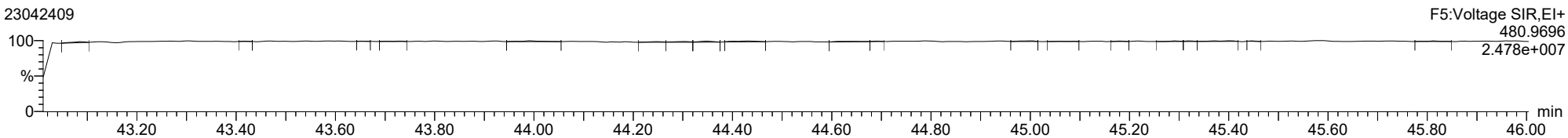


FUNCTION5 PFK



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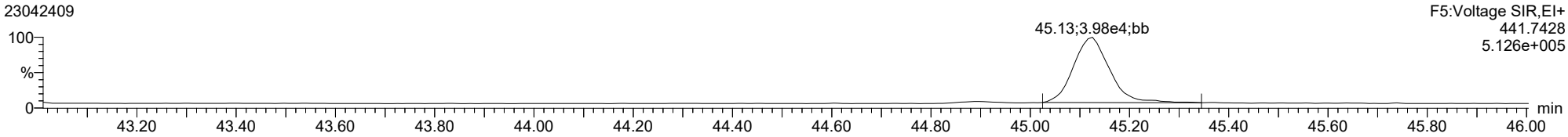

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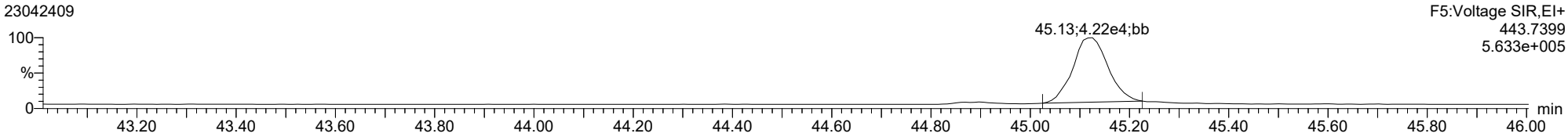

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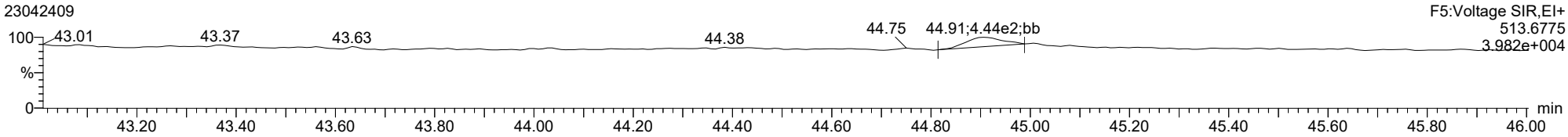

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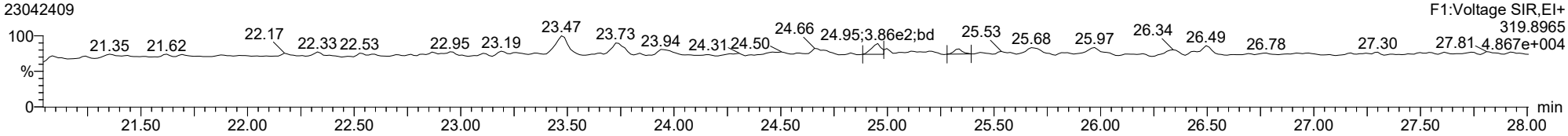
ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

Total-tetradioxins



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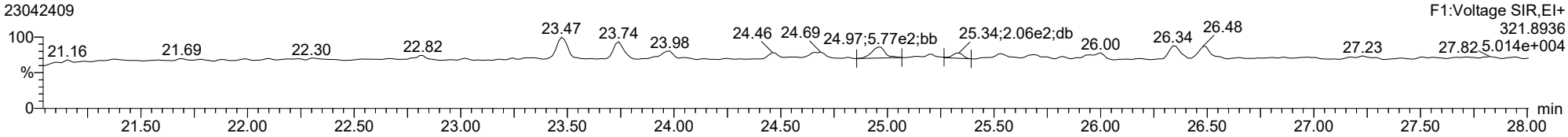

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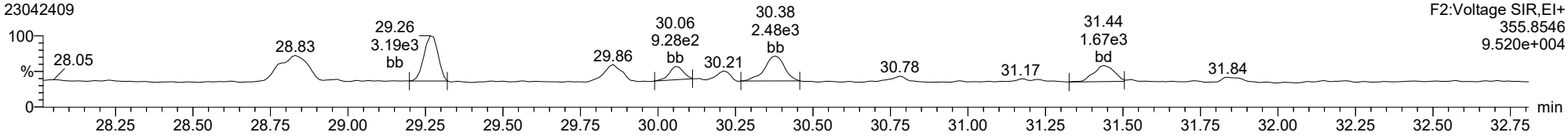

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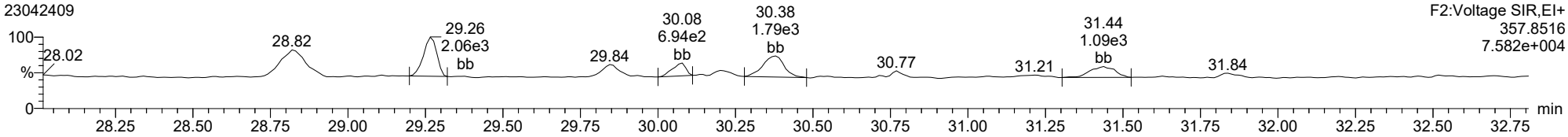
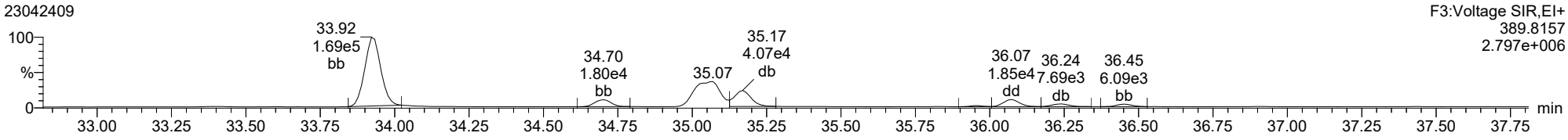


ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

Total-hexadioxins



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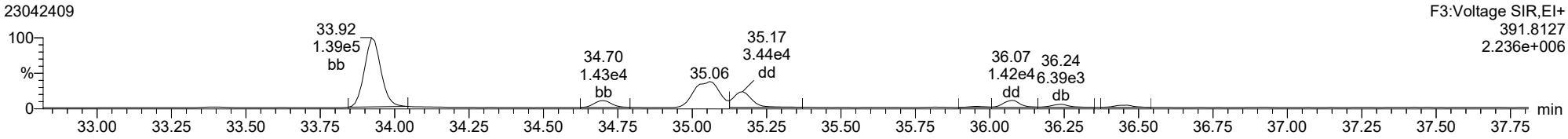
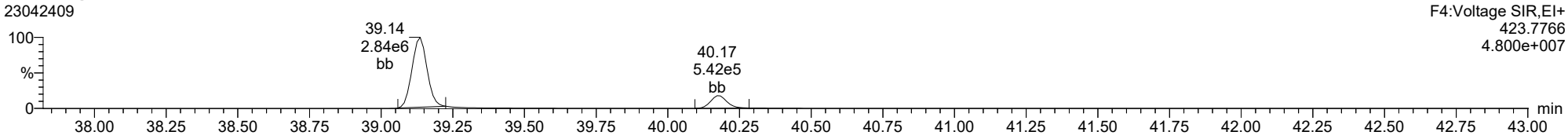


Total-heptadioxins



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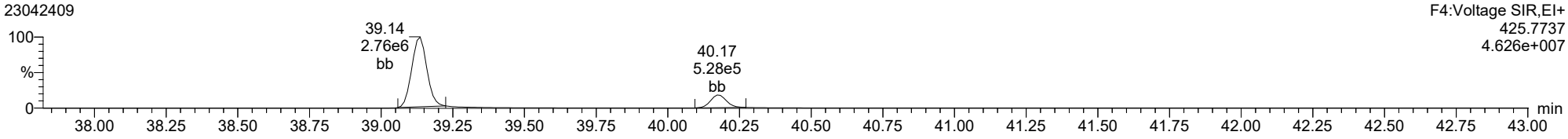
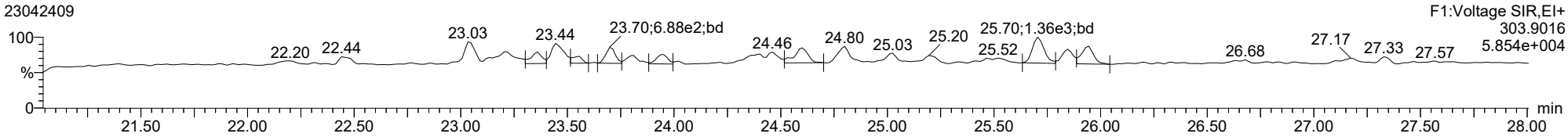
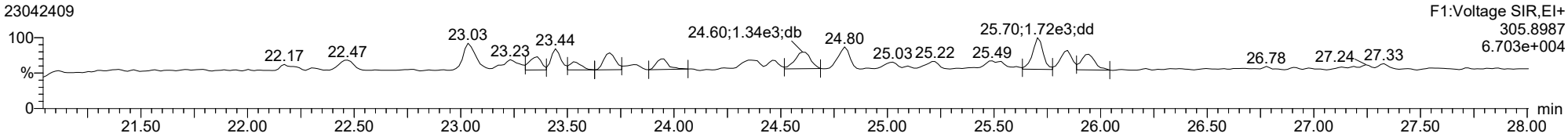


ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

Total-tetrafurans



Total-tetrafurans



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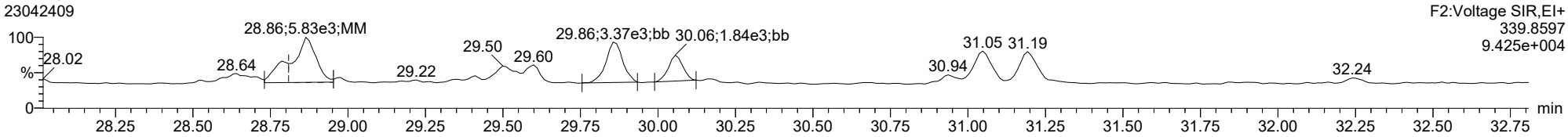

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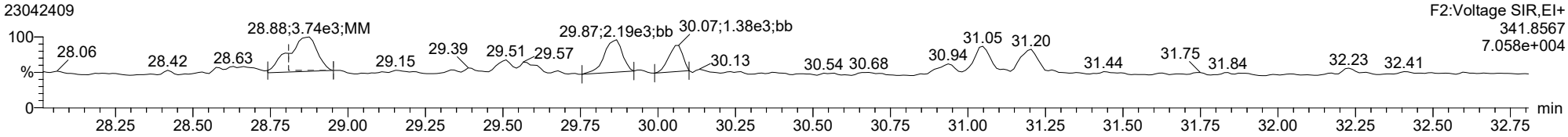
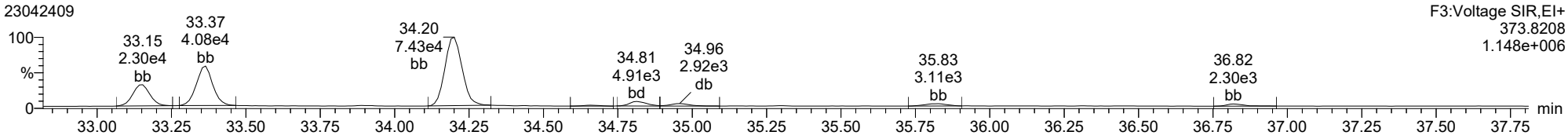
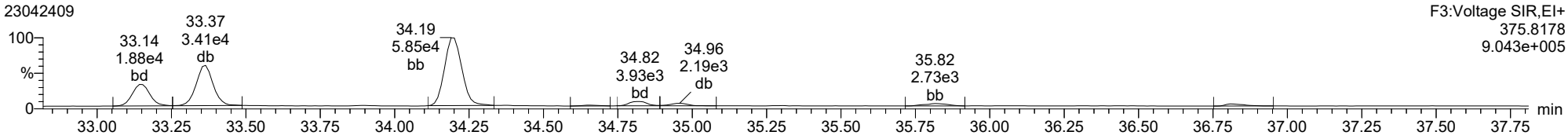


ID: 23C0619-05, Name: 23042409, Date: 24-Apr-2023, Time: 20:57:21, Conditions: AUTOSPEC01, User: pk

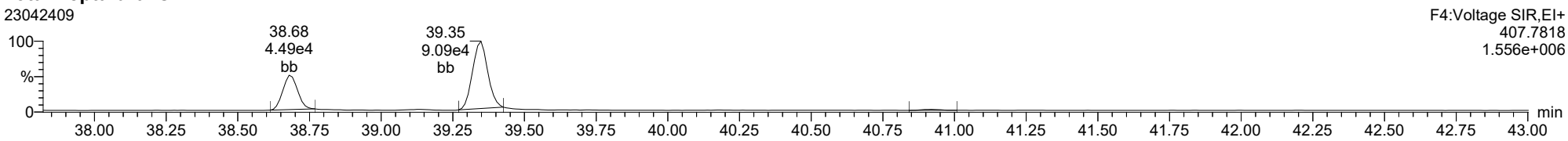
Total-hexafurans



Total-hexafurans



Total-heptafurans



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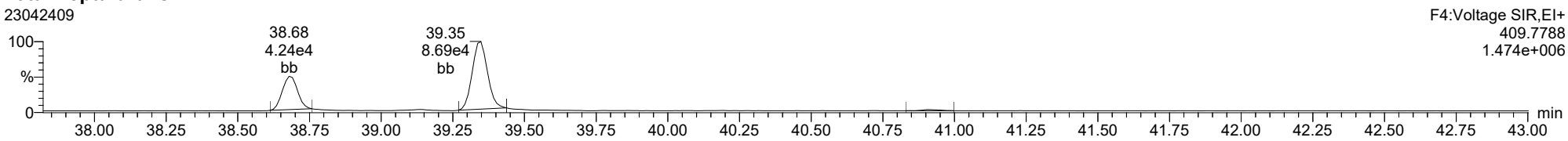

Analytical Resources, LLC
Analytical Chemists and Consultants

SED-09C:1-3

Form 1
ORGANIC ANALYSIS DATA SHEET
EPA 1613B
Dioxins/Furans by HRGC/HRMS

Laboratory:	Analytical Resources, LLC			SDG:	23C0619
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0619-06 C	File ID:	23042410
Sampled:	03/22/23 08:33	Prepared:	04/06/23 13:16	Analyzed:	04/24/23 21:46
% Solids:	78.03	Preparation:	EPA 1613	Initial/Final:	12.82 g Wet / 20 uL
Result Basis:	Dry	Sequence:	SLD0330	Calibration:	GC00015
Batch:	BLD0089	Instrument:	AUTOSPEC01	Column:	RTX-Dioxin2

CAS NO.	COMPOUND	DF/Split	Ion Ratio	Ratio Limits	EDL	RL	Result	Units	Q
51207-31-9	2,3,7,8-TCDF	1		0.655-0.886	0.183	1.00	ND	ng/kg	U
1746-01-6	2,3,7,8-TCDD	1		0.655-0.886	0.110	1.00	ND	ng/kg	U
57117-41-6	1,2,3,7,8-PeCDF	1		1.318-1.783	0.208	1.00	ND	ng/kg	U
57117-31-4	2,3,4,7,8-PeCDF	1		1.318-1.783	0.192	1.00	ND	ng/kg	U
40321-76-4	1,2,3,7,8-PeCDD	1		1.318-1.783	0.152	1.00	ND	ng/kg	U
70648-26-9	1,2,3,4,7,8-HxCDF	1		1.054-1.426	0.089	1.00	ND	ng/kg	U
57117-44-9	1,2,3,6,7,8-HxCDF	1		1.054-1.426	0.091	1.00	ND	ng/kg	U
60851-34-5	2,3,4,6,7,8-HxCDF	1		1.054-1.426	0.092	1.00	ND	ng/kg	U
72918-21-9	1,2,3,7,8,9-HxCDF	1		1.054-1.426	0.123	1.00	ND	ng/kg	U
39227-28-6	1,2,3,4,7,8-HxCDD	1		1.054-1.426	0.120	1.00	ND	ng/kg	U
57653-85-7	1,2,3,6,7,8-HxCDD	1		1.054-1.426	0.120	1.00	ND	ng/kg	U
19408-74-3	1,2,3,7,8,9-HxCDD	1		1.054-1.426	0.132	1.00	ND	ng/kg	U
67562-39-4	1,2,3,4,6,7,8-HpCDF	1	1.422	0.893-1.208	0.106	1.00	0.178	ng/kg	EMPC, J
55673-89-7	1,2,3,4,7,8,9-HpCDF	1		0.893-1.208	0.193	1.00	ND	ng/kg	U
35822-46-9	1,2,3,4,6,7,8-HpCDD	1	0.836	0.893-1.208	0.185	2.50	2.31	ng/kg	EMPC, J, B
39001-02-0	OCDF	1	1.013	0.757-1.024	0.302	2.50	0.145	ng/kg	J
3268-87-9	OCDD	1	0.821	0.757-1.024	0.327	10.0	15.0	ng/kg	B

Homologue Groups

55722-27-5	Total TCDF	1	0.000			1.00	ND	ng/kg	
41903-57-5	Total TCDD	1	0.000			1.00	ND	ng/kg	
30402-15-4	Total PeCDF	1	0.000			1.00	ND	ng/kg	
36088-22-9	Total PeCDD	1	0.000			1.00	ND	ng/kg	
55684-94-1	Total HxCDF	1	0.000			1.00	ND	ng/kg	
34465-46-8	Total HxCDD	1	0.000			1.00	ND	ng/kg	
38998-75-3	Total HpCDF	1	0.000			1.00	ND	ng/kg	
37871-00-4	Total HpCDD	1	0.000			1.00	5.60	ng/kg	

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC): 0.029
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC): 0.241

SED-09C:1-3

Form 2
ORGANIC ANALYSIS DATA SHEET
EPA 1613B
Dioxins/Furans by HRGC/HRMS

Laboratory:	Analytical Resources, LLC			SDG:	23C0619
Client:	Friedman & Bruya Inc.			Project:	Port of Friday Harbor
Matrix:	Sediment	Laboratory ID:	23C0619-06	File ID:	23042410
Sampled:	03/22/23 08:33	Prepared:	04/06/23 13:16	Analyzed:	04/24/23 21:46
Solids Wt%:	78.03	Preparation:	EPA 1613	Initial/Final:	12.82 g / 20 uL
Result Basis:	Dry	Sequence:	SLD0330	Calibration:	GC00015
Batch:	BLD0089	Instrument:	AUTOSPEC01	Column:	RTX-Dioxin2

Labels	DF/Split	Ion Ratio	Ratio Limits	EDL	% REC	QC LIMITS	Q
13C12-2,3,7,8-TCDF		0.755	0.655-0.886	0.133	68.3	24 - 169 %	
13C12-2,3,7,8-TCDD		0.769	0.655-0.886	0.164	77.5	25 - 164 %	
13C12-1,2,3,7,8-PeCDF		1.579	1.318-1.783	0.218	94.4	24 - 185 %	
13C12-2,3,4,7,8-PeCDF		1.536	1.318-1.783	0.242	94.6	21 - 178 %	
13C12-1,2,3,7,8-PeCDD		1.724	1.318-1.783	0.207	73.7	25 - 181 %	
13C12-1,2,3,4,7,8-HxCDF		0.530	0.434-0.587	0.220	83.3	26 - 152 %	
13C12-1,2,3,6,7,8-HxCDF		0.510	0.434-0.587	0.185	77.4	26 - 123 %	
13C12-2,3,4,6,7,8-HxCDF		0.510	0.434-0.587	0.227	84.7	28 - 136 %	
13C12-1,2,3,7,8,9-HxCDF		0.514	0.434-0.587	0.275	78.8	29 - 147 %	
13C12-1,2,3,4,7,8-HxCDD		1.238	1.054-1.426	0.295	87.6	32 - 141 %	
13C12-1,2,3,6,7,8-HxCDD		1.307	1.054-1.426	0.254	77.7	28 - 130 %	
13C12-1,2,3,4,6,7,8-HpCDF		0.427	0.374-0.506	0.329	102	28 - 143 %	
13C12-1,2,3,4,7,8,9-HpCDF		0.444	0.374-0.506	0.382	83.7	26 - 138 %	
13C12-1,2,3,4,6,7,8-HpCDD		1.114	0.893-1.208	0.295	81.6	23 - 140 %	
13C12-OCDD		0.907	0.757-1.024	0.384	81.9	17 - 157 %	
37Cl4-2,3,7,8-TCDD		328.000		0.100	72.2	35 - 197 %	

* Values outside of QC limits

Dataset: T:\Autospec\Processed Data Batch\230424D1.qld
Last Altered: Tuesday, April 25, 2023 10:49:58 Pacific Daylight Time
Printed: Tuesday, April 25, 2023 11:20:22 Pacific Daylight Time

Method: T:\Autospec\Methods\Dioxin230424.mdb 25 Apr 2023 07:59:40
Calibration: T:\Autospec\Curves\230303ICIH.cdb 06 Mar 2023 11:57:27

ID: 23C0619-06, Name: 23042410, Date: 24-Apr-2023, Time: 21:46:14, Conditions: AUTOSPEC01, User: pk

Compound	RT	RRT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	Noise 1	Noise 2	Height 1	Height 2	S/N 1	S/N 2	EMPC	Int.1	Int.2	pg
2378-TCDF					0.702		0.770	962	1085								
12378-PeCDF					0.679		1.550	1003	1357								
23478-PeCDF					0.786		1.550	1003	1357								
123478-HxCDF					1.166		1.240	719	591								
234678-HxCDF					1.140		1.240	719	591								
123678-HxCDF					1.091		1.240	719	591								
123789-HxCDF					1.137		1.240	719	591								
1234678-HpCDF	38.690	1.001	2.460e2	1.730e2	1.003	1.422	1.050	686	652	4.21e3	3.16e3	6.1	4.8	YES	bb	bb	0.089
1234789-HpCDF					0.953		1.050	686	652								
OCDF	45.125	1.006	9.192e1	9.075e1	0.778	1.013	0.890	547	849	1.66e3	3.26e3	3.0	3.8	NO	bb	bb	0.072
2378-TCDD					1.149		0.770	989	666								
12378-PeCDD					1.022		1.550	861	499								
123478-HxCDD					0.996		1.240	660	787								
123678-HxCDD					1.001		1.240	660	787								
123789-HxCDD					0.907		1.240	660	787								
1234678-HpCDD	40.172	1.000	1.938e3	2.320e3	1.039	0.836	1.050	729	842	2.93e4	3.36e4	40.2	39.8	YES	bb	bb	1.157
OCDD	44.878	1.000	1.008e4	1.229e4	0.920	0.821	0.890	648	1137	1.18e5	1.41e5	181.8	123.7	NO	bb	bb	7.488
13C-2378-TCDF	25.675	1.007	2.859e5	3.789e5	1.620	0.755	0.770	1569	1726	4.12e6	5.56e6	2627.4	3222.7	NO	bb	bb	68.325
13C-12378-PeCDF	29.833	1.170	4.304e5	2.727e5	1.240	1.579	1.550	2518	1626	6.13e6	3.92e6	2434.2	2411.4	NO	bd	bb	94.378
13C-23478-PeCDF	31.170	1.222	3.845e5	2.504e5	1.118	1.536	1.550	2518	1626	5.68e6	3.66e6	2254.6	2251.4	NO	bb	bb	94.574
13C-123478-HxCDF	34.791	0.955	1.742e5	3.286e5	1.168	0.530	0.510	1767	1637	2.64e6	5.10e6	1491.7	3115.5	NO	bd	bd	83.272
13C-123678-HxCDF	34.936	0.959	1.872e5	3.672e5	1.386	0.510	0.510	1767	1637	2.67e6	5.33e6	1509.8	3257.4	NO	db	db	77.370
13C-234678-HxCDF	35.793	0.983	1.668e5	3.274e5	1.129	0.510	0.510	1767	1637	2.52e6	4.95e6	1426.6	3023.3	NO	bb	bb	84.677
13C-123789-HxCDF	36.830	1.011	1.287e5	2.505e5	0.932	0.514	0.510	1767	1637	1.91e6	3.75e6	1080.5	2287.7	NO	bb	bb	78.753
13C-1234678-HpCDF	38.668	1.062	1.407e5	3.296e5	0.895	0.427	0.440	1683	2221	2.25e6	5.04e6	1335.3	2268.3	NO	bb	bd	101.650
13C-1234789-HpCDF	40.907	1.123	1.024e5	2.307e5	0.770	0.444	0.440	1683	2221	1.34e6	3.05e6	795.6	1371.7	NO	bb	bb	83.746
13C-1234-TCDD	25.506	0.000	2.662e5	3.343e5	1.000	0.796	0.770	1807	1097	4.07e6	5.16e6	2255.5	4705.3	NO	bb	bb	100.000
13C-2378-TCDD	26.311	1.032	2.332e5	3.033e5	1.152	0.769	0.770	1807	1097	3.40e6	4.43e6	1883.2	4042.0	NO	bb	bb	77.520
13C-12378-PeCDD	31.426	1.232	2.321e5	1.347e5	0.829	1.724	1.550	1004	1622	3.33e6	1.88e6	3322.5	1160.8	NO	bb	bd	73.691
13C-123478-HxCDD	35.916	0.986	2.493e5	2.014e5	0.995	1.238	1.240	2464	1428	4.03e6	3.25e6	1634.8	2279.4	NO	bd	bd	87.634
13C-123678-HxCDD	36.028	0.989	2.630e5	2.013e5	1.157	1.307	1.240	2464	1428	4.09e6	3.14e6	1659.6	2200.0	NO	db	db	77.674
13C-1234678-HpCDD	40.161	1.103	1.866e5	1.676e5	0.840	1.114	1.050	1610	1675	2.58e6	2.35e6	1602.8	1403.6	NO	bd	bb	81.563
13C-OCDD	44.860	1.232	3.090e5	3.406e5	0.767	0.907	0.890	1735	2179	3.39e6	3.70e6	1951.7	1696.4	NO	bd	bd	163.762
13C-123789-HxCDD	36.417	0.000	2.878e5	2.290e5	1.000	1.257	1.240	2464	1428	4.43e6	3.56e6	1798.1	2494.5	NO	bb	bb	100.000
37CL-2378-TCDD	26.339	1.033	2.234e5		1.288			1965		3.32e6		1687.9			bb		28.891

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Last Altered: Tuesday, April 25, 2023 10:49:58 Pacific Daylight Time
Printed: Tuesday, April 25, 2023 11:20:22 Pacific Daylight Time

ID: 23C0619-06, Name: 23042410, Date: 24-Apr-2023, Time: 21:46:14, Conditions: AUTOSPEC01, User: pk

Compound	RT	RRT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	Noise 1	Noise 2	Height 1	Height 2	S/N 1	S/N 2	EMPC	Int.1	Int.2	pg
1368-TCDF					0.802		0.770	962	1085								
1289-TCDF					0.678		0.770	962	1085								
13468-PECDF					1.246		1.550	737	1027								
12389-PECDF					0.496		1.550	1003	1357								
123468-HXCDF					1.169		1.240	719	591								
1368-TCDD	23.486	0.893	1.780e2	1.974e2	1.015	0.902	0.770	989	666	2.09e3	3.34e3	2.1	5.0	YES	bb	bb	0.069
1289-TCDD					0.909		0.770	989	666								
12479-PECDD					2.301		1.550	861	499								
12389-PECDD					1.184		1.550	861	499								
124679-HXCDD	33.922	0.945	6.831e2	4.541e2	1.115	1.504	1.240	660	787	1.02e4	8.41e3	15.5	10.7	YES	bb	bb	0.226
1234679-HPCDD	39.125	0.974	6.103e3	5.167e3	1.137	1.181	1.050	729	842	9.77e4	7.78e4	134.0	92.4	NO	bb	bb	2.799
Total-tetrafurans			0.000e0		0.727			962		0.00e0							
Total-penta1			0.000e0					737		0.00e0							
Total-pentafurans			0.000e0		0.654			1003		0.00e0							
Total-hexafurans			0.000e0		1.141			719		0.00e0							
Total-heptafurans			0.000e0		0.978			686		0.00e0							
Total-Furans			9.192e1		0.922			962		1.66e3							0.072
Total-tetradioxins			0.000e0		1.024			989		0.00e0							
Total-pentadioxins			0.000e0		1.502			861		0.00e0							
Total-hexadioxins			0.000e0		1.005			660		0.00e0							
Total-heptadioxins			6.103e3		1.088			729		9.77e4							2.799
Total-Dioxins			1.631e4		1.130			989		2.18e5							10.337
Total-TEQ			1.641e4					989		2.19e5							10.410
FUNCTION1 PFK			3.126e6					366319		2.27e7							
FUNCTION2 PFK			2.568e5					249758		7.61e6							0.000
FUNCTION3 PFK			1.713e6					254058		1.99e6							0.000
FUNCTION4 PFK			5.451e5					249662		1.52e7							
FUNCTION5 PFK			0.000e0					160024		0.00e0							
FUNCTION1 HXCD...			2.270e3					572		3.32e4							0.000
FUNCTION1 HPCD...																	
FUNCTION2 HPCD...			2.464e2					1148		5.59e3							0.000
FUNCTION3 OCDPE			0.000e0					539		0.00e0							
FUNCTION4 NCDPE			4.108e2					534		7.54e3							0.000
FUNCTION5 DCDPE			8.086e1					489		1.16e3							0.000

Method: T:\Autospec\Methods\Dioxin230424.mdb 25 Apr 2023 07:59:40
Calibration: T:\Autospec\Curves\230303ICIH.cdb 06 Mar 2023 11:57:27

ID: 23C0619-06, Name: 23042410, Date: 24-Apr-2023, Time: 21:46:14, Conditions: AUTOSPEC01, User: pk

TF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

PP

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

PF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

HF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

HPF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

Furans,TF,PP,PF,HF,HPF,OF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	OCDF	45.13	9.192e1	9.075e1	0.778	1.01	0.89	3.0	YES	NO	bb	bb	0.072

TD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

PD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

ID: 23C0619-06, Name: 23042410, Date: 24-Apr-2023, Time: 21:46:14, Conditions: AUTOSPEC01, User: pk

HD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

HPD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	1234679-HPCDD	39.12	6.103e3	5.167e3	1.137	1.18	1.05	134.0	YES	NO	bb	bb	2.799

Dioxins,TD,PD,HD,HPD,OD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-Dioxins	21.86	1.269e2	1.795e2	1.130	0.71	0.77	2.2	NO	NO	bb	bb	0.051
2	OCDD	44.88	1.008e4	1.229e4	0.920	0.82	0.89	181.8	YES	NO	bb	bb	7.488
3	1234679-HPCDD	39.12	6.103e3	5.167e3	1.137	1.18	1.05	134.0	YES	NO	bb	bb	2.799

TotalTEQ,Furans,Dioxins

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	OCDF	45.13	9.192e1	9.075e1	0.778	1.01	0.89	3.0	YES	NO	bb	bb	0.072
2	Total-Dioxins	21.86	1.269e2	1.795e2	1.130	0.71	0.77	2.2	NO	NO	bb	bb	0.051
3	OCDD	44.88	1.008e4	1.229e4	0.920	0.82	0.89	181.8	YES	NO	bb	bb	7.488
4	1234679-HPCDD	39.12	6.103e3	5.167e3	1.137	1.18	1.05	134.0	YES	NO	bb	bb	2.799

ID: 23C0619-06, Name: 23042410, Date: 24-Apr-2023, Time: 21:46:14, Conditions: AUTOSPEC01, User: pk

PFK1

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION1 PFK	22.23	1.887e5					6.7	YES		bd		
2	FUNCTION1 PFK	21.95	1.141e5					3.7	YES		db		
3	FUNCTION1 PFK	21.82	1.247e5					4.9	YES		dd		
4	FUNCTION1 PFK	21.61	1.703e6					9.9	YES		bd		
5	FUNCTION1 PFK	21.17	2.666e5					7.4	YES		bb		
6	FUNCTION1 PFK	27.92	2.926e3					0.6	NO		bb		
7	FUNCTION1 PFK	26.47	2.344e3					0.5	NO		bb		
8	FUNCTION1 PFK	26.25	2.884e3					0.6	NO		bb		
9	FUNCTION1 PFK	25.92	1.502e4					1.1	NO		bb		
10	FUNCTION1 PFK	25.55	2.761e4					1.8	NO		bb		
11	FUNCTION1 PFK	25.07	7.771e3					0.8	NO		bb		
12	FUNCTION1 PFK	25.01	1.403e4					1.3	NO		bb		
13	FUNCTION1 PFK	24.47	2.060e4					1.3	NO		bb		
14	FUNCTION1 PFK	24.07	1.707e5					2.8	NO		bb		
15	FUNCTION1 PFK	23.32	1.268e4					1.1	NO		bb		
16	FUNCTION1 PFK	23.09	2.798e4					1.2	NO		bb		
17	FUNCTION1 PFK	22.48	2.900e5					6.4	YES		db		
18	FUNCTION1 PFK	22.38	7.769e4					5.0	YES		bd		
19	FUNCTION1 PFK	22.26	5.649e4					5.1	YES		db		

ID: 23C0619-06, Name: 23042410, Date: 24-Apr-2023, Time: 21:46:14, Conditions: AUTOSPEC01, User: pk

PFK2

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION2 PFK	28.15	9.497e3					1.1	NO		bb		0.000
2	FUNCTION2 PFK	31.63	6.606e3					1.0	NO		bb		0.000
3	FUNCTION2 PFK	31.57	1.797e3					0.6	NO		bb		0.000
4	FUNCTION2 PFK	31.43	5.744e3					0.9	NO		bb		0.000
5	FUNCTION2 PFK	31.34	7.119e3					1.0	NO		bb		0.000
6	FUNCTION2 PFK	30.77	1.027e3					0.4	NO		bb		0.000
7	FUNCTION2 PFK	30.11	5.481e3					0.9	NO		bb		0.000
8	FUNCTION2 PFK	29.77	1.008e4					1.4	NO		bb		0.000
9	FUNCTION2 PFK	29.61	1.164e3					0.4	NO		bb		0.000
10	FUNCTION2 PFK	29.34	3.341e3					0.7	NO		bb		0.000
11	FUNCTION2 PFK	29.16	2.035e4					1.6	NO		bb		0.000
12	FUNCTION2 PFK	29.06	1.686e4					1.6	NO		db		0.000
13	FUNCTION2 PFK	29.00	3.510e4					2.6	NO		bd		0.000
14	FUNCTION2 PFK	28.77	1.268e3					0.5	NO		bb		0.000
15	FUNCTION2 PFK	28.62	6.301e3					0.9	NO		bb		0.000
16	FUNCTION2 PFK	28.44	1.392e3					0.5	NO		bb		0.000
17	FUNCTION2 PFK	28.34	8.139e3					1.5	NO		bb		0.000
18	FUNCTION2 PFK	32.76	8.368e3					1.5	NO		bb		0.000
19	FUNCTION2 PFK	32.54	5.962e3					0.8	NO		db		0.000
20	FUNCTION2 PFK	32.51	1.085e4					1.1	NO		bd		0.000
21	FUNCTION2 PFK	32.31	1.772e4					2.1	NO		db		0.000
22	FUNCTION2 PFK	32.25	7.606e3					1.1	NO		dd		0.000
23	FUNCTION2 PFK	32.22	5.619e3					1.1	NO		dd		0.000
24	FUNCTION2 PFK	32.11	3.751e4					2.1	NO		bd		0.000
25	FUNCTION2 PFK	31.85	4.903e3					0.8	NO		bb		0.000
26	FUNCTION2 PFK	31.78	1.007e3					0.4	NO		bb		0.000
27	FUNCTION2 PFK	31.73	1.601e4					1.8	NO		bb		0.000

PFK3

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION3 PFK	36.37	1.713e6					7.8	YES		bb		0.000

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ID: 23C0619-06, Name: 23042410, Date: 24-Apr-2023, Time: 21:46:14, Conditions: AUTOSPEC01, User: pk

PFK4

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION4 PFK	38.01	5.846e3					1.3	NO		bb		
2	FUNCTION4 PFK	37.93	2.911e3					1.0	NO		bb		
3	FUNCTION4 PFK	37.88	1.937e3					0.5	NO		bb		
4	FUNCTION4 PFK	39.89	1.967e4					2.0	NO		dd		
5	FUNCTION4 PFK	39.80	2.188e4					1.8	NO		bd		
6	FUNCTION4 PFK	39.65	6.075e3					0.7	NO		bb		
7	FUNCTION4 PFK	39.54	2.174e4					2.1	NO		bb		
8	FUNCTION4 PFK	39.47	6.619e3					1.3	NO		bb		
9	FUNCTION4 PFK	39.40	1.180e4					1.4	NO		db		
10	FUNCTION4 PFK	39.38	1.392e4					1.6	NO		bd		
11	FUNCTION4 PFK	39.18	1.461e4					1.6	NO		db		
12	FUNCTION4 PFK	39.12	6.322e3					0.7	NO		bd		
13	FUNCTION4 PFK	38.86	8.851e3					1.3	NO		bb		
14	FUNCTION4 PFK	38.71	8.338e3					1.5	NO		bb		
15	FUNCTION4 PFK	38.50	4.417e3					0.7	NO		bb		
16	FUNCTION4 PFK	38.41	2.095e4					1.7	NO		db		
17	FUNCTION4 PFK	38.31	1.551e4					1.3	NO		dd		
18	FUNCTION4 PFK	38.23	7.289e3					1.1	NO		bd		
19	FUNCTION4 PFK	38.14	1.078e4					1.3	NO		bb		
20	FUNCTION4 PFK	41.61	1.177e4					1.5	NO		db		
21	FUNCTION4 PFK	41.59	1.005e4					1.5	NO		dd		
22	FUNCTION4 PFK	41.53	1.594e4					2.0	NO		dd		
23	FUNCTION4 PFK	41.44	4.373e4					2.1	NO		bd		
24	FUNCTION4 PFK	41.21	1.419e3					0.5	NO		bb		
25	FUNCTION4 PFK	40.95	8.826e3					1.4	NO		bb		
26	FUNCTION4 PFK	40.81	7.264e3					1.2	NO		bb		
27	FUNCTION4 PFK	40.68	6.477e3					1.0	NO		db		
28	FUNCTION4 PFK	40.55	3.321e4					1.5	NO		bd		
29	FUNCTION4 PFK	40.50	2.551e3					0.9	NO		bb		
30	FUNCTION4 PFK	40.43	1.818e4					2.0	NO		bb		
31	FUNCTION4 PFK	40.37	1.906e4					2.6	NO		bb		
32	FUNCTION4 PFK	40.12	4.614e3					0.9	NO		bb		
33	FUNCTION4 PFK	40.03	6.666e3					1.0	NO		bb		
34	FUNCTION4 PFK	39.97	1.854e4					2.0	NO		db		
35	FUNCTION4 PFK	39.94	1.120e4					1.7	NO		dd		
36	FUNCTION4 PFK	42.87	8.797e3					1.4	NO		db		
37	FUNCTION4 PFK	42.83	9.495e3					1.2	NO		bd		

ID: 23C0619-06, Name: 23042410, Date: 24-Apr-2023, Time: 21:46:14, Conditions: AUTOSPEC01, User: pk

PFK4

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
38	FUNCTION4 PFK	42.66	7.686e3					1.0	NO		bb		
39	FUNCTION4 PFK	42.22	5.536e3					0.9	NO		db		
40	FUNCTION4 PFK	42.14	1.883e4					1.3	NO		dd		
41	FUNCTION4 PFK	42.07	1.680e4					1.5	NO		dd		
42	FUNCTION4 PFK	42.02	1.669e4					2.0	NO		bd		
43	FUNCTION4 PFK	41.78	3.740e3					1.0	NO		db		
44	FUNCTION4 PFK	41.73	2.856e4					1.9	NO		bd		

PFK5

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

ETHERS1

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION1 HXCD...	21.41	2.507e2					6.0	YES		dd		0.000
2	FUNCTION1 HXCD...	21.31	1.515e2					4.4	YES		dd		0.000
3	FUNCTION1 HXCD...	21.23	2.248e2					5.1	YES		dd		0.000
4	FUNCTION1 HXCD...	21.18	2.003e2					5.5	YES		dd		0.000
5	FUNCTION1 HXCD...	21.10	2.057e2					5.6	YES		bd		0.000
6	FUNCTION1 HXCD...	26.30	1.019e2					1.8	NO		bb		0.000
7	FUNCTION1 HXCD...	25.48	7.314e1					1.6	NO		bb		0.000
8	FUNCTION1 HXCD...	24.08	7.381e1					2.8	NO		db		0.000
9	FUNCTION1 HXCD...	24.02	1.024e2					2.7	NO		bd		0.000
10	FUNCTION1 HXCD...	21.93	9.677e1					3.1	YES		db		0.000
11	FUNCTION1 HXCD...	21.85	2.825e2					3.6	YES		dd		0.000
12	FUNCTION1 HXCD...	21.71	1.895e2					4.5	YES		dd		0.000
13	FUNCTION1 HXCD...	21.59	1.270e2					4.3	YES		dd		0.000
14	FUNCTION1 HXCD...	21.55	7.368e1					3.3	YES		dd		0.000
15	FUNCTION1 HXCD...	21.49	1.160e2					3.8	YES		dd		0.000

ETHERS2

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

ID: 23C0619-06, Name: 23042410, Date: 24-Apr-2023, Time: 21:46:14, Conditions: AUTOSPEC01, User: pk

ETHERS3

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION2 HPCD...	29.21	8.873e1					1.8	NO		bb		0.000
2	FUNCTION2 HPCD...	29.11	7.304e1					1.5	NO		bb		0.000
3	FUNCTION2 HPCD...	28.11	8.466e1					1.6	NO		bb		0.000

ETHERS4

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

ETHERS5

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION4 NCDPE	42.56	7.811e1					3.1	YES		bb		0.000
2	FUNCTION4 NCDPE	41.11	9.628e1					4.1	YES		bb		0.000
3	FUNCTION4 NCDPE	38.34	2.364e2					7.0	YES		bb		0.000

ETHERS6

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION5 DCDPE	44.99	8.086e1					2.4	NO		bb		0.000

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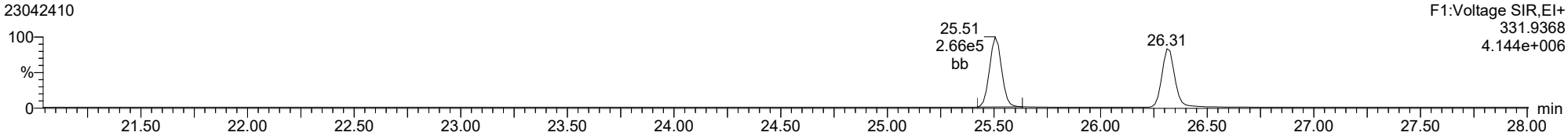
ID: 23C0619-06, Name: 23042410, Date: 24-Apr-2023, Time: 21:46:14, Conditions: AUTOSPEC01, User: pk

13C-1234-TCDD



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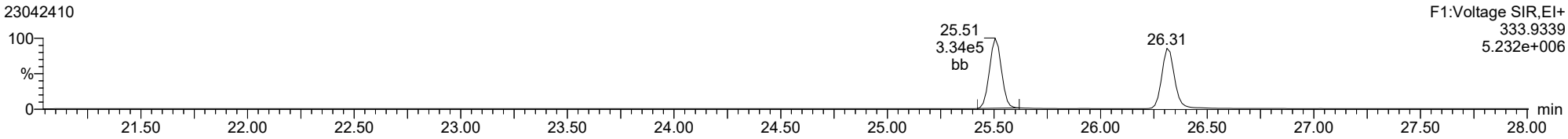

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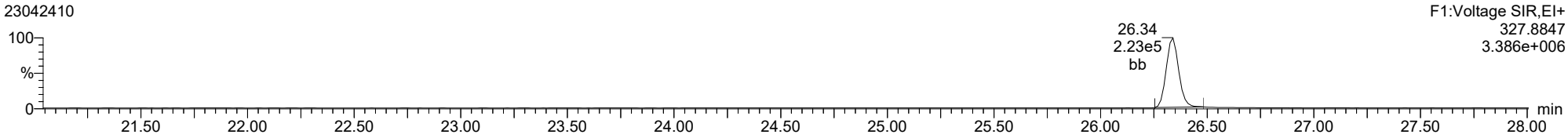

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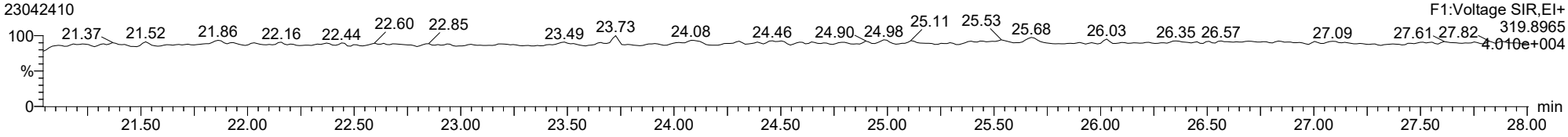
2378-TCDD



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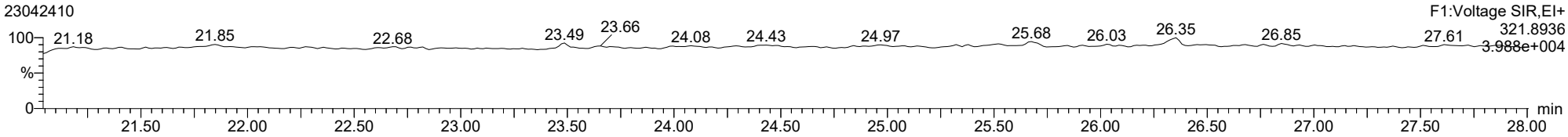

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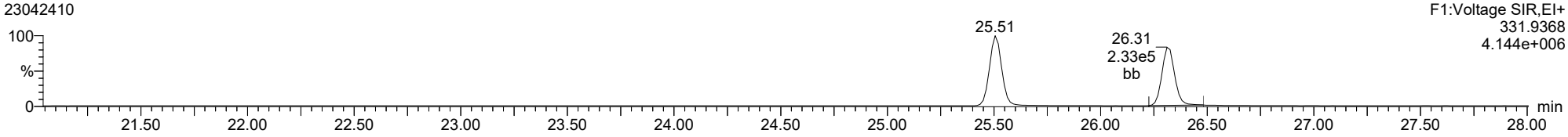

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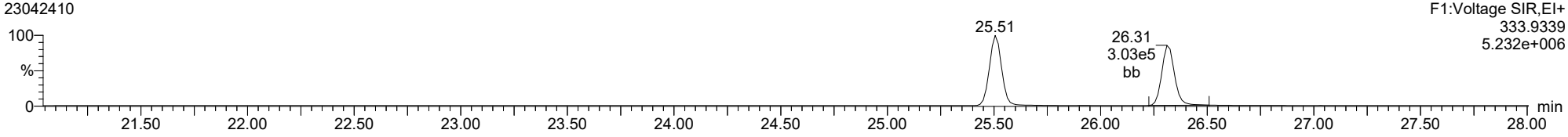

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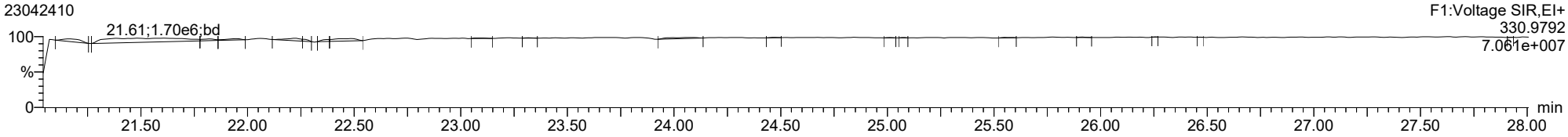

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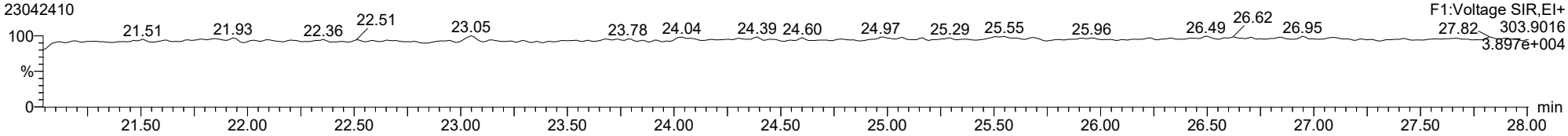
2378-TCDF



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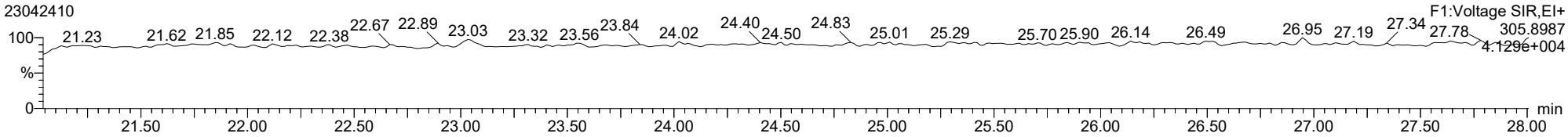

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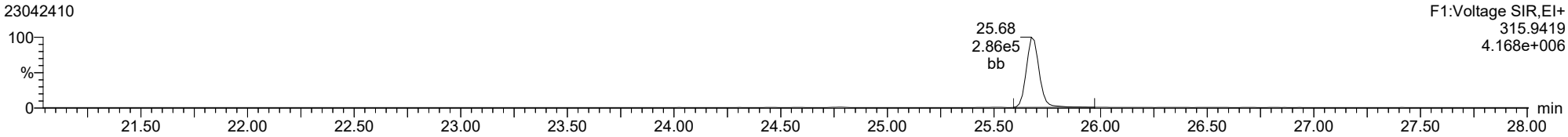

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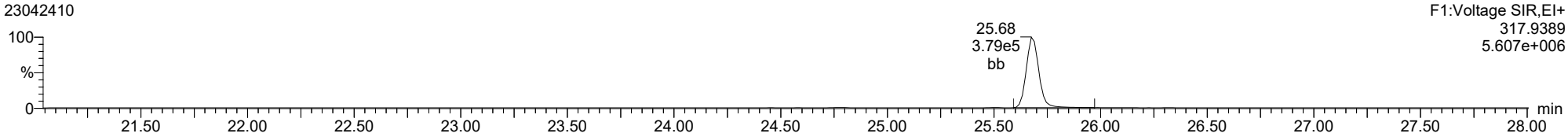

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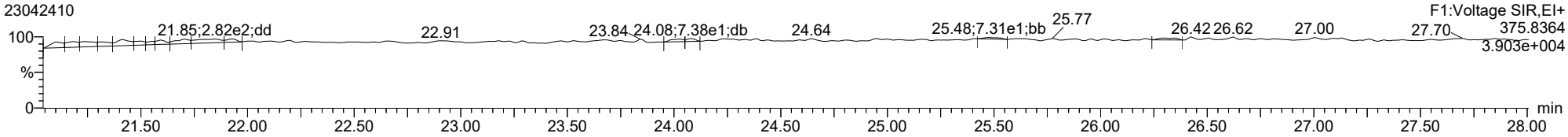

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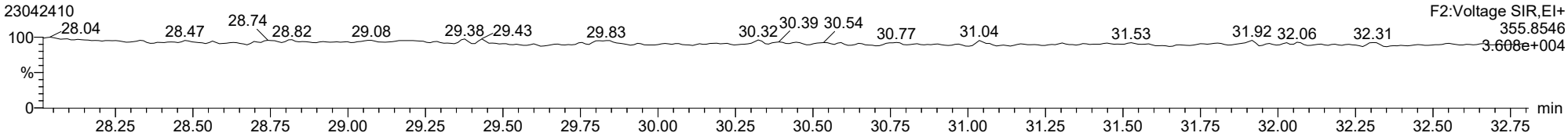
12378-PeCDD



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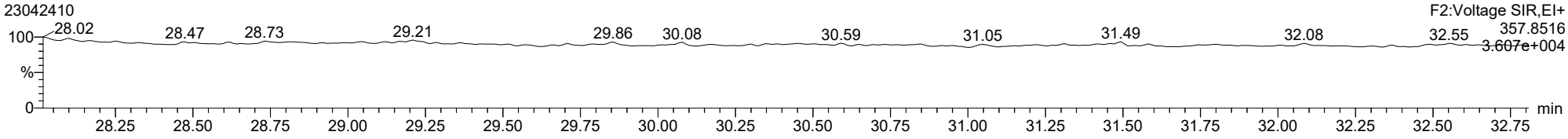
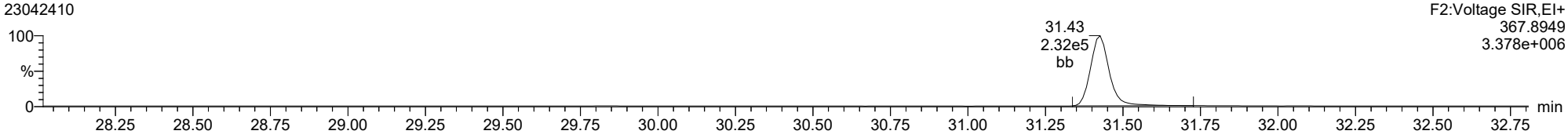


13C-12378-PeCDD



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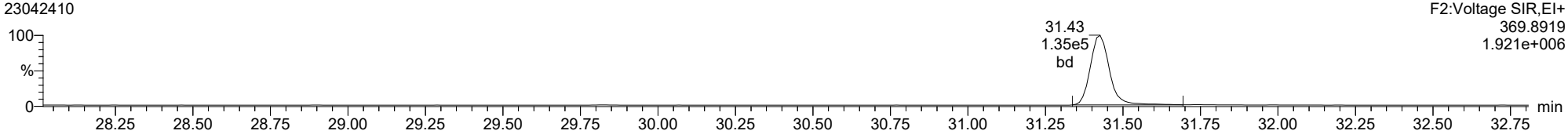
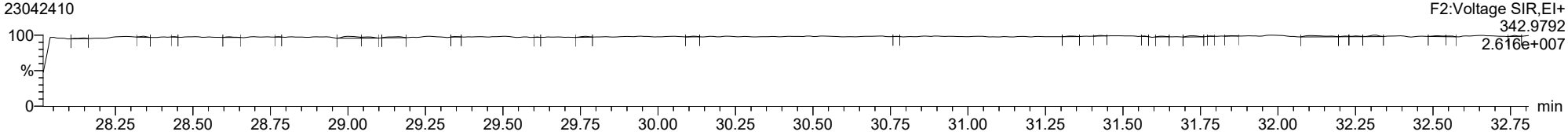


FUNCTION2 PFK



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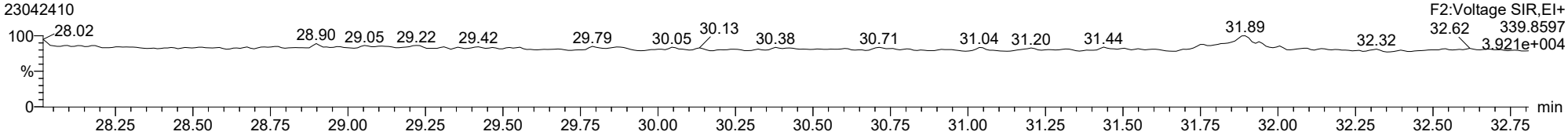
12378-PeCDF



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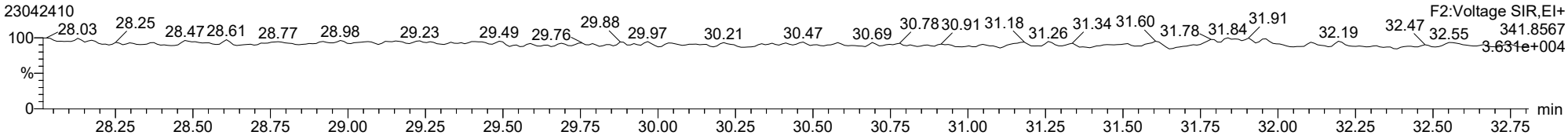

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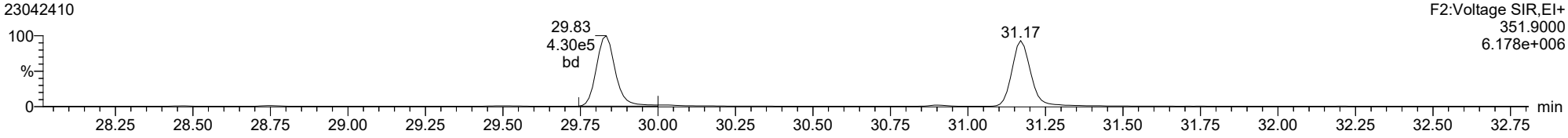

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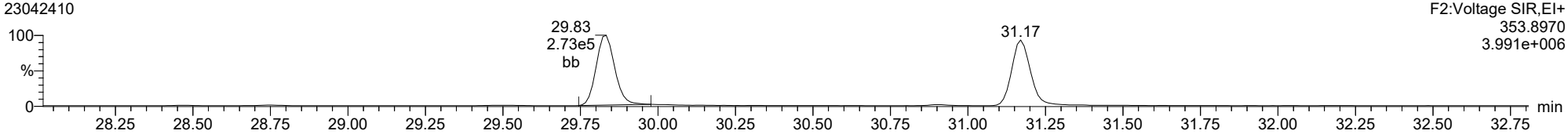
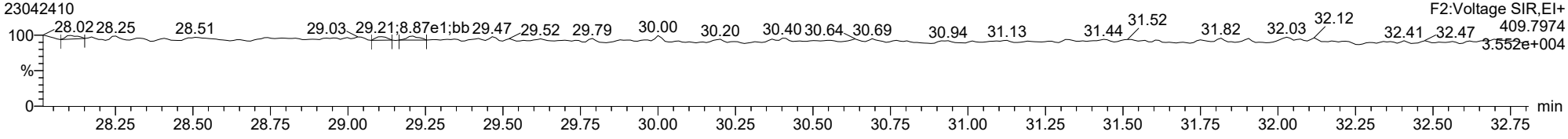


FUNCTION2 HPCDPE



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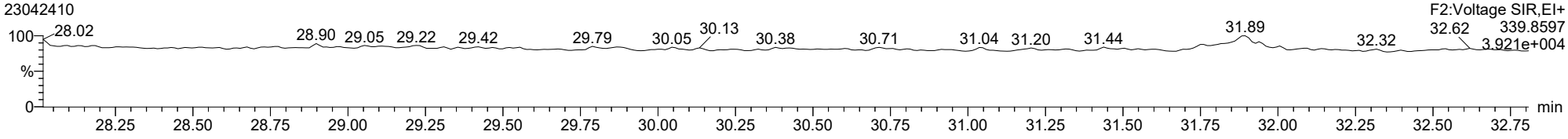
23478-PeCDF



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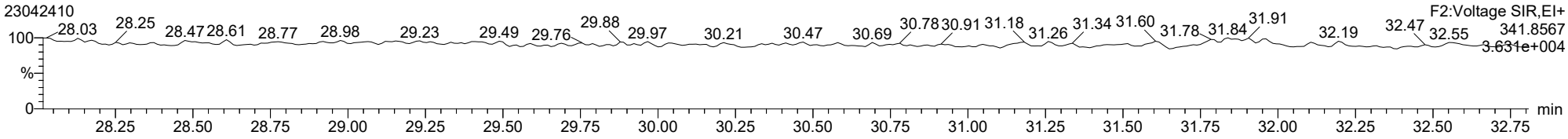

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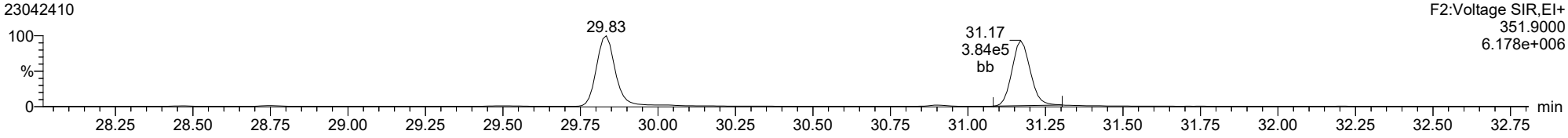

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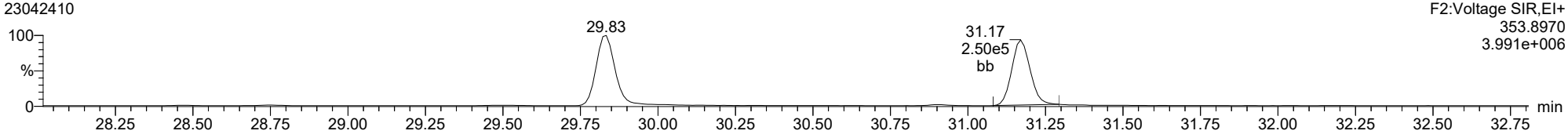

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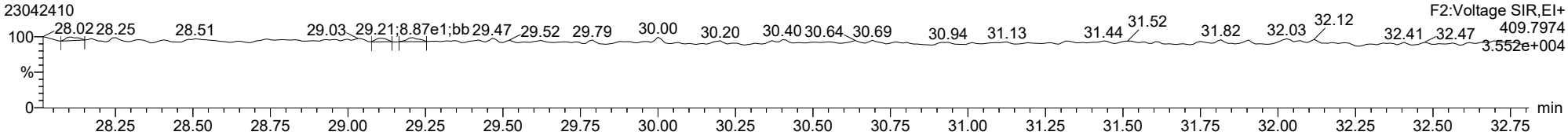

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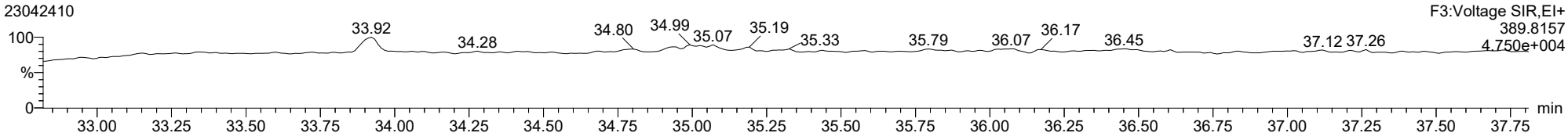
123478-HxCDD



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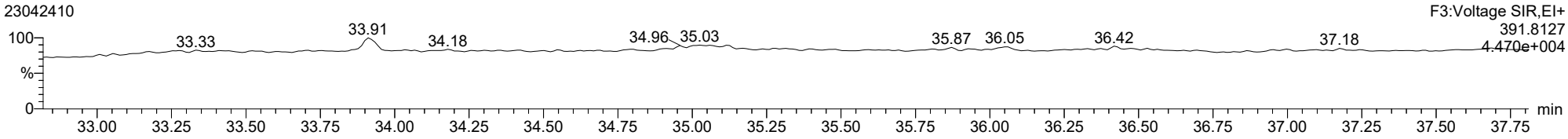

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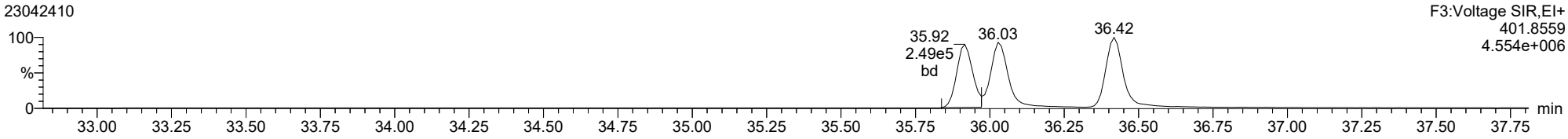

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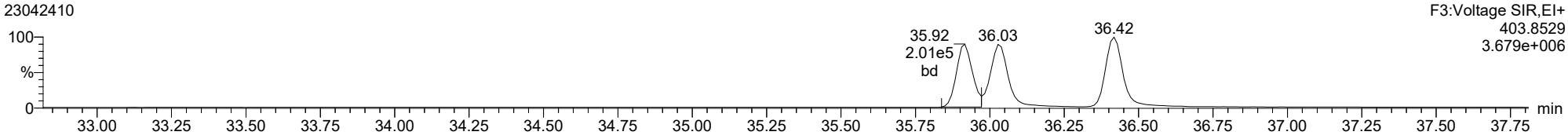
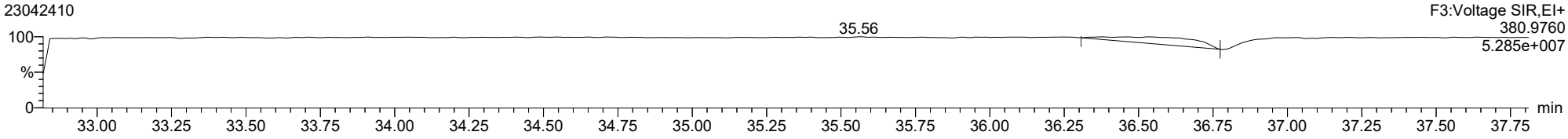


FUNCTION3 PFK



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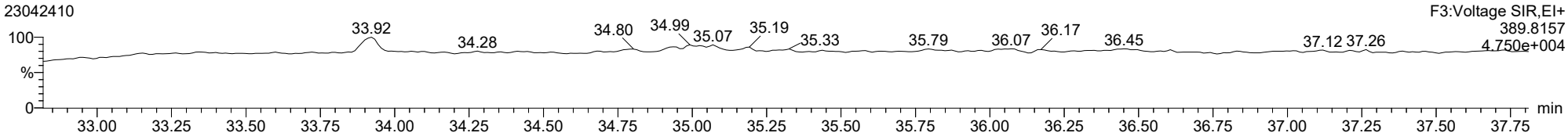

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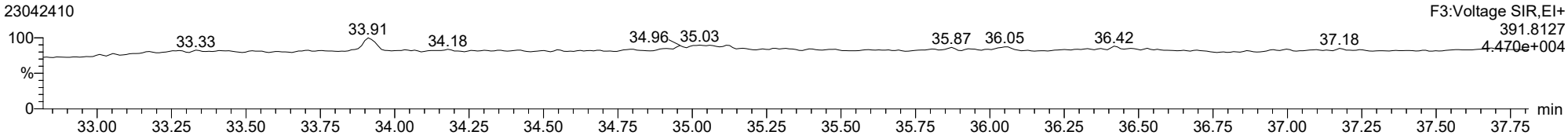

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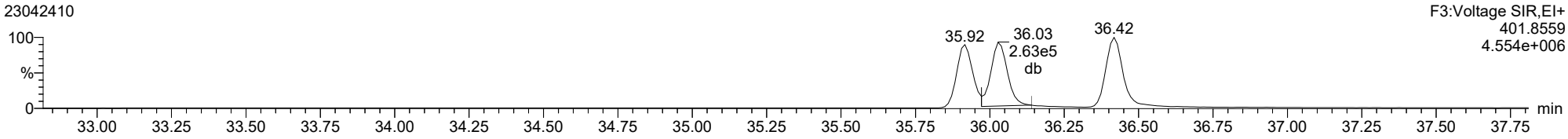

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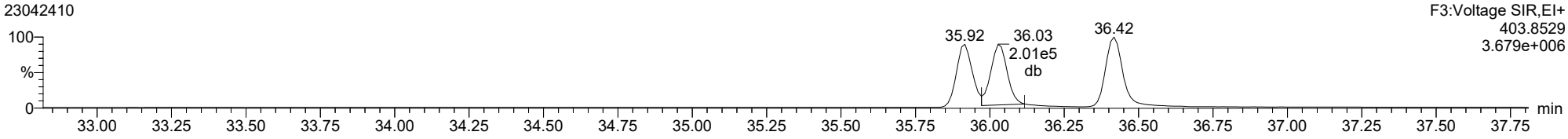

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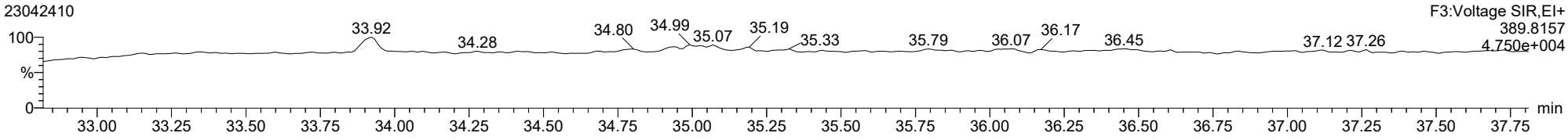

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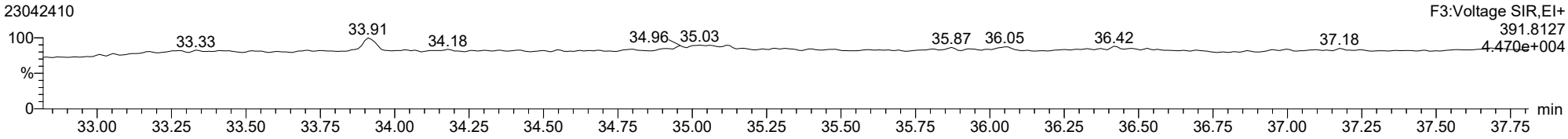

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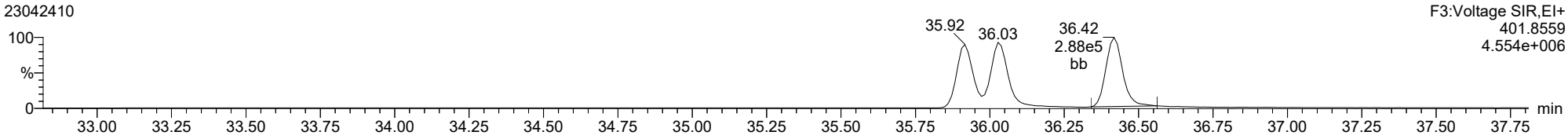

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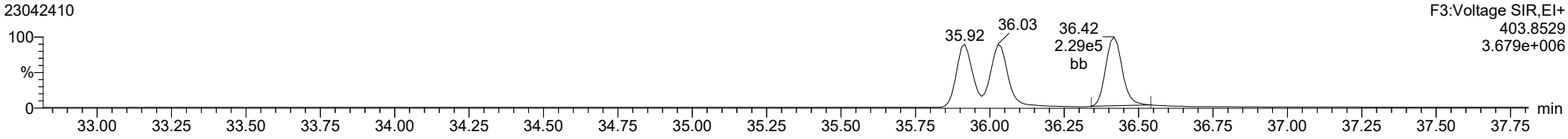

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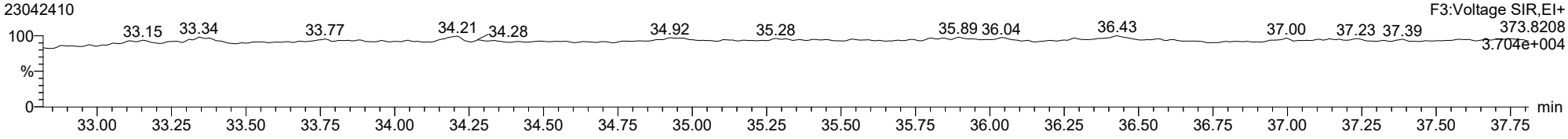

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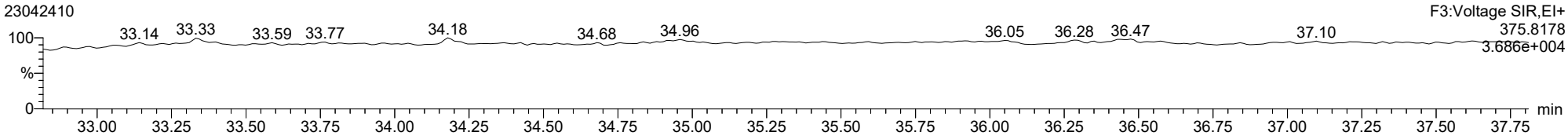

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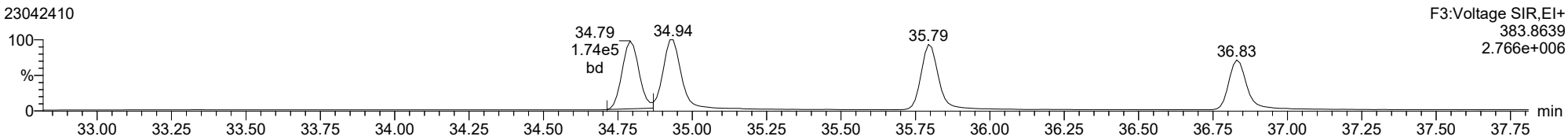

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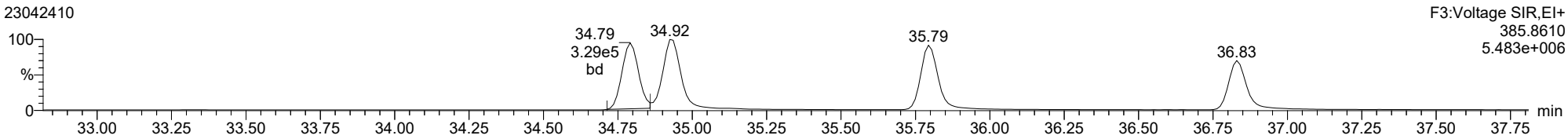
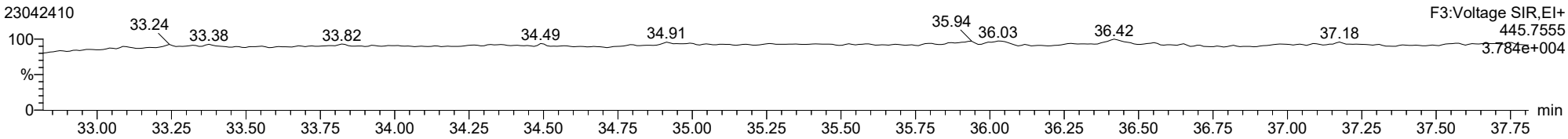


FUNCTION3 OCDPE



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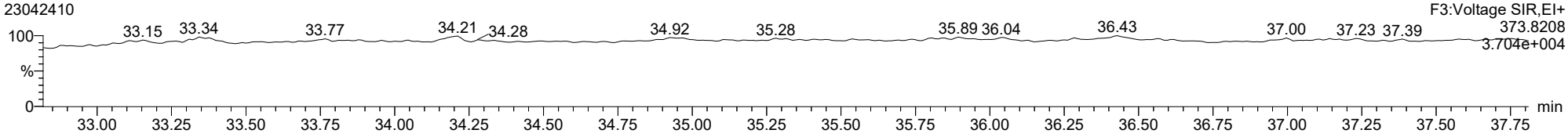

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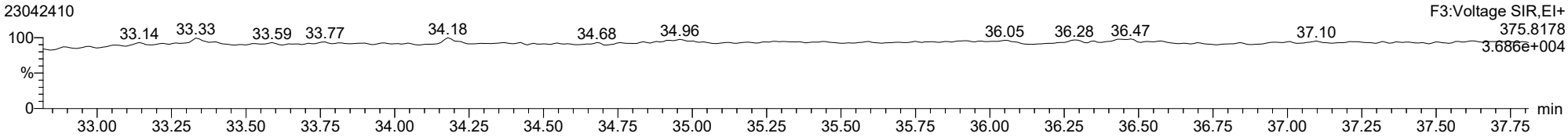

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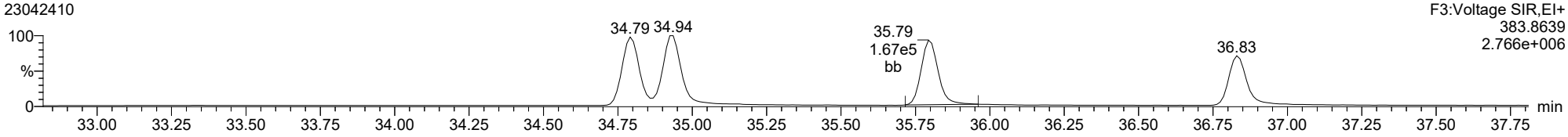

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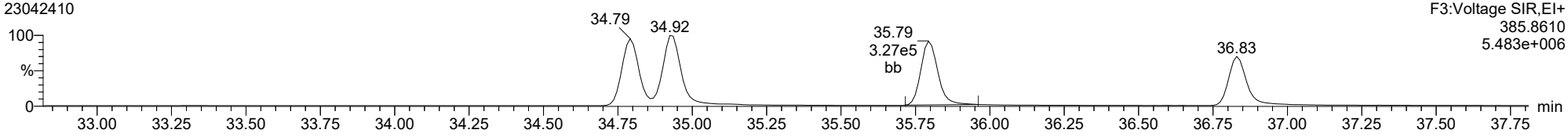

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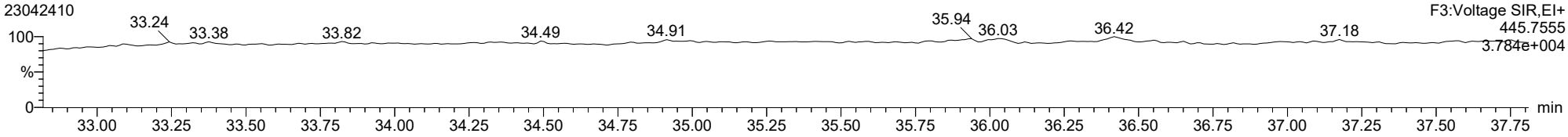

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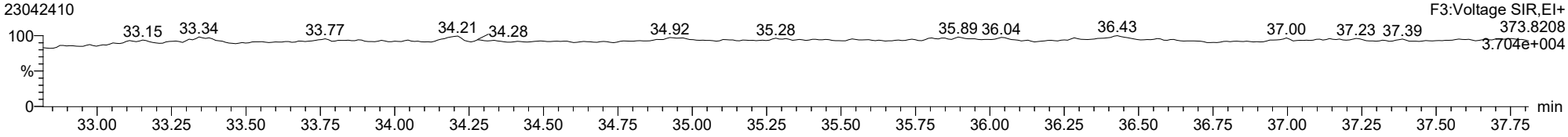

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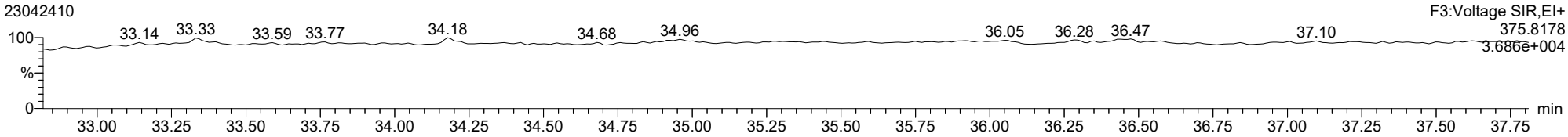

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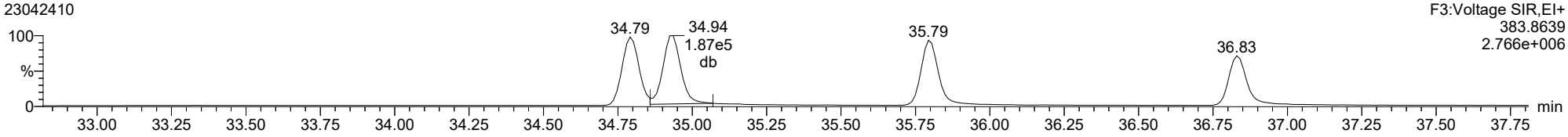

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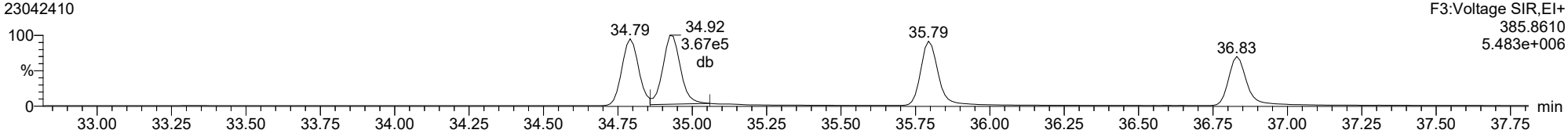

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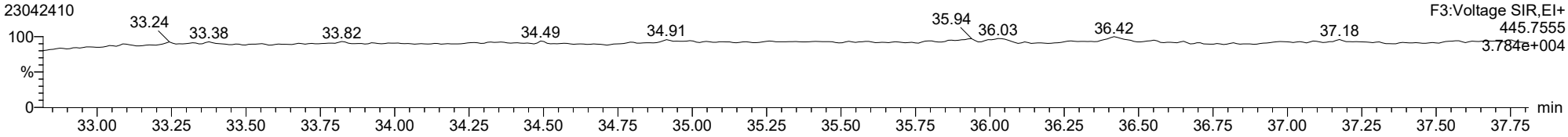

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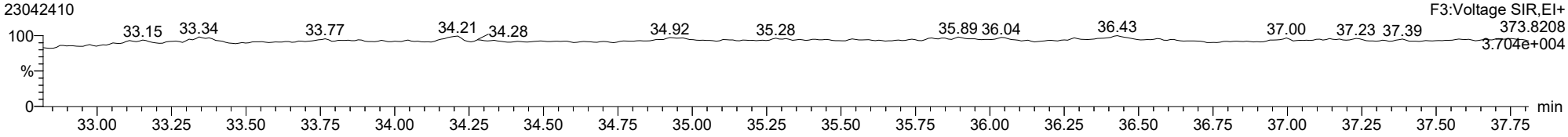

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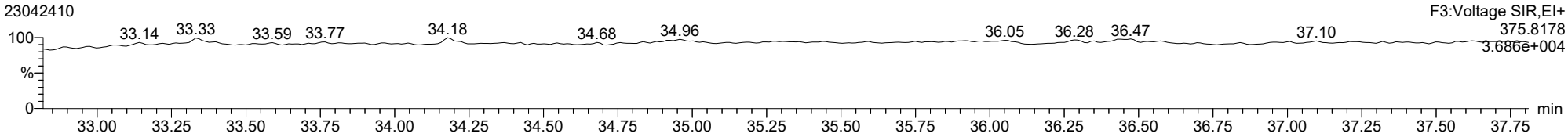

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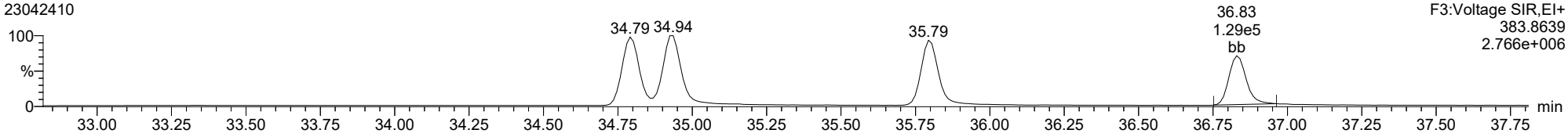

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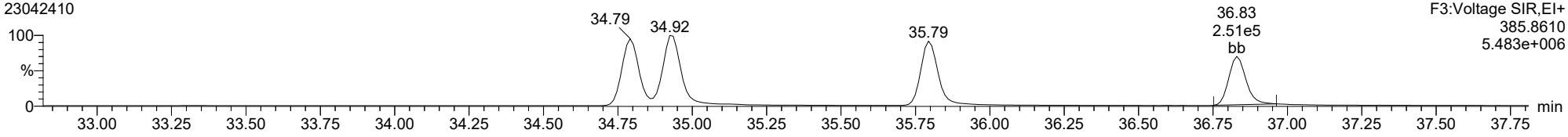
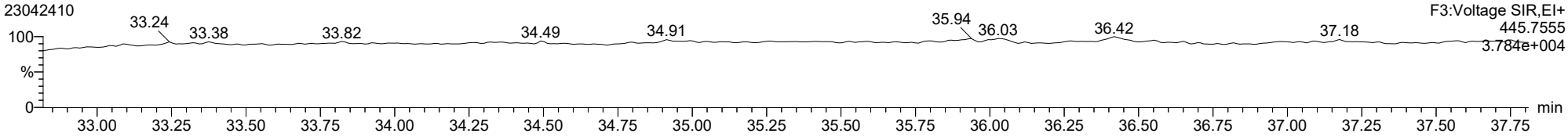


FUNCTION3 OCDPE



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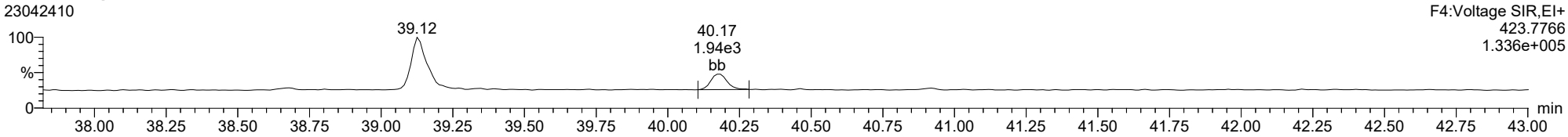
1234678-HpCDD



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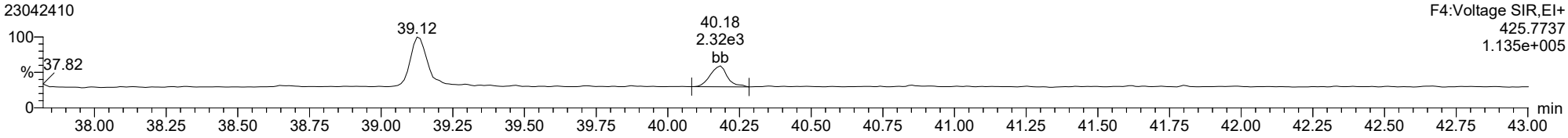

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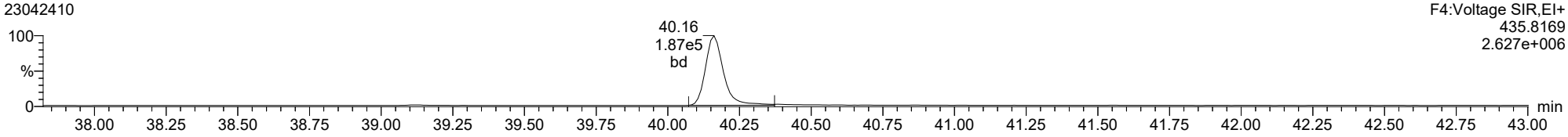

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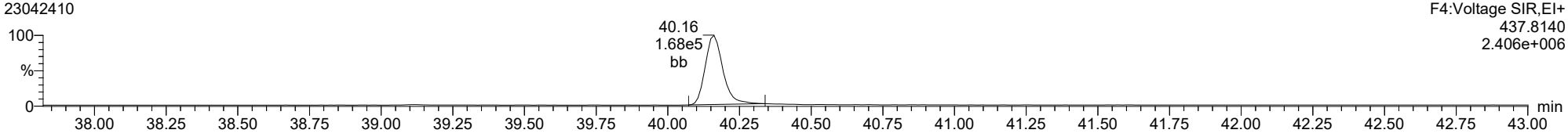
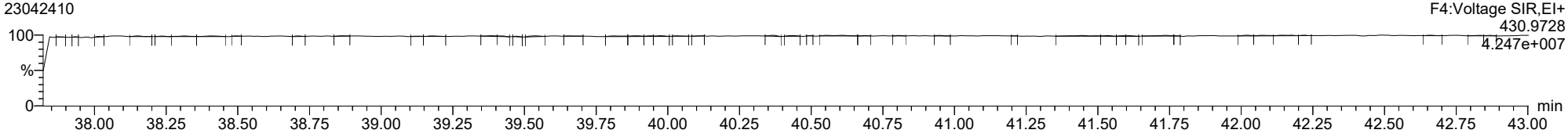


FUNCTION4 PFK



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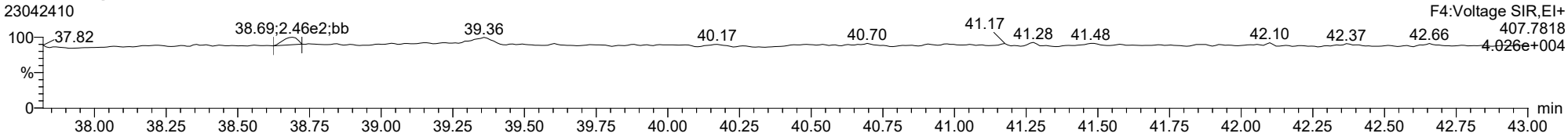
1234678-HpCDF



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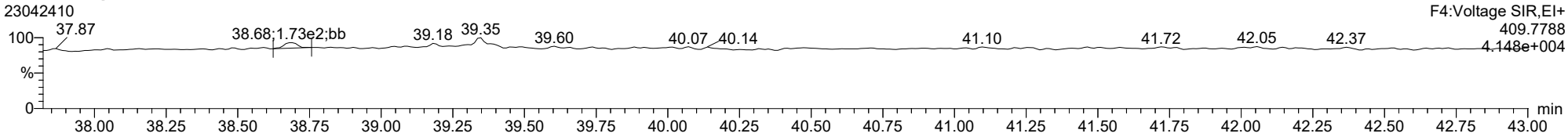

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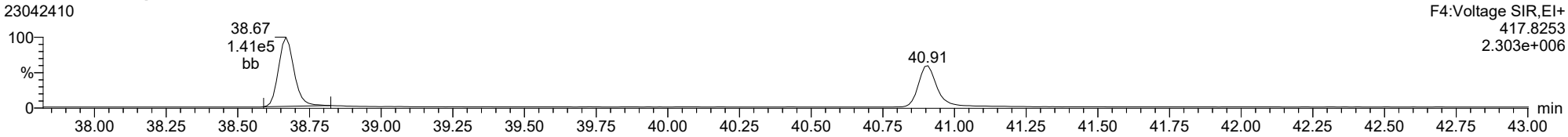

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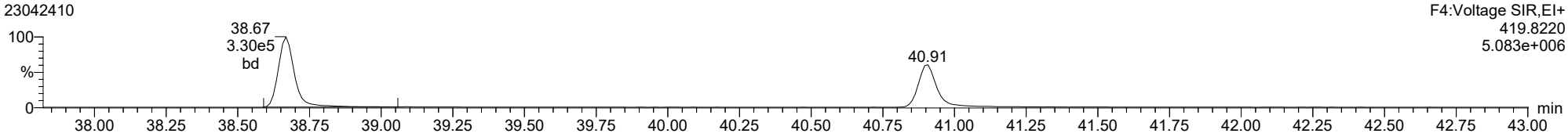

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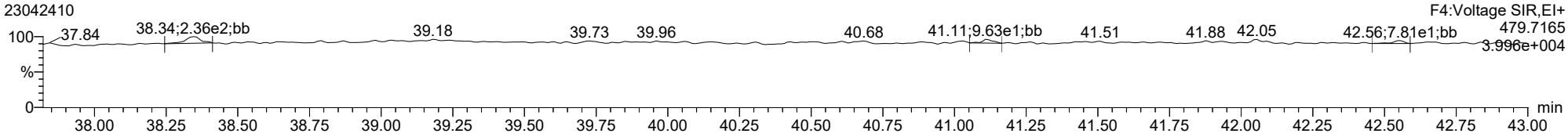

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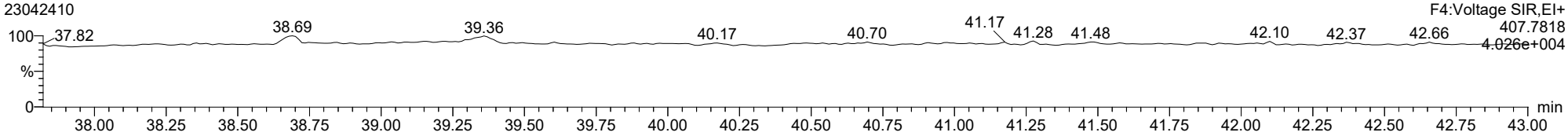

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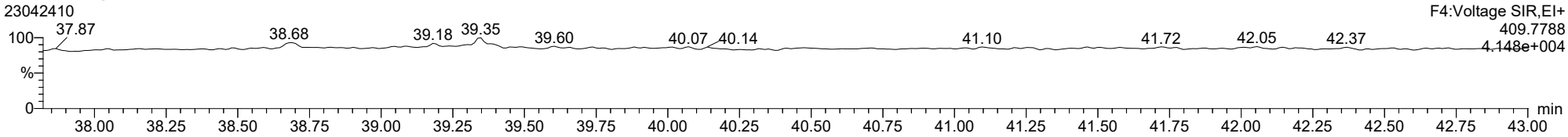

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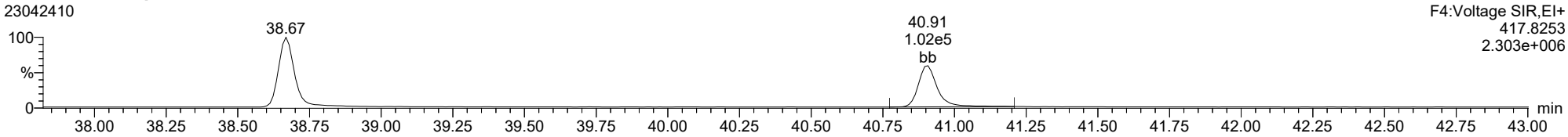

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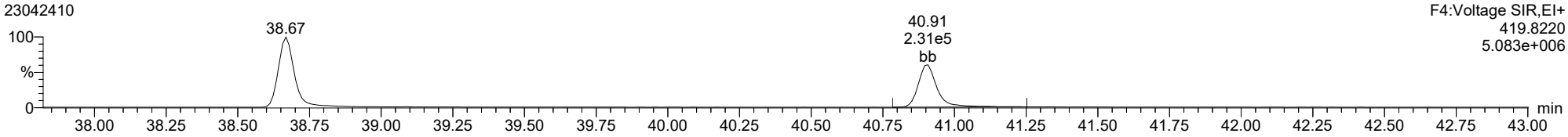
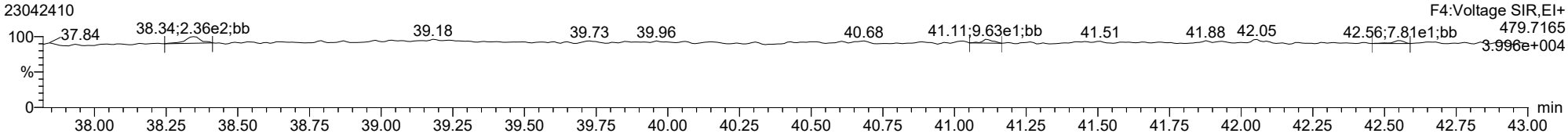
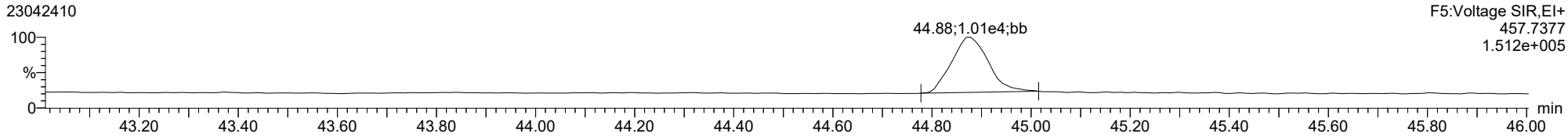


FUNCTION4 NCDPE



ID: 23C0619-06, Name: 23042410, Date: 24-Apr-2023, Time: 21:46:14, Conditions: AUTOSPEC01, User: pk

OCDD



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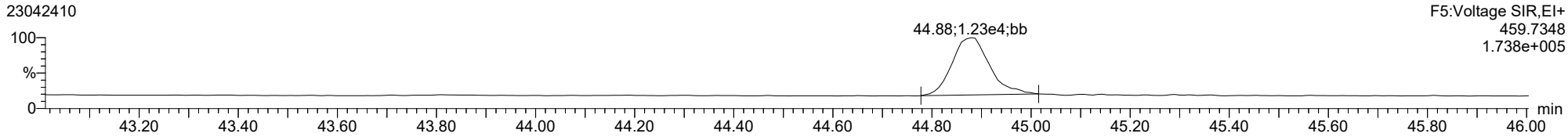

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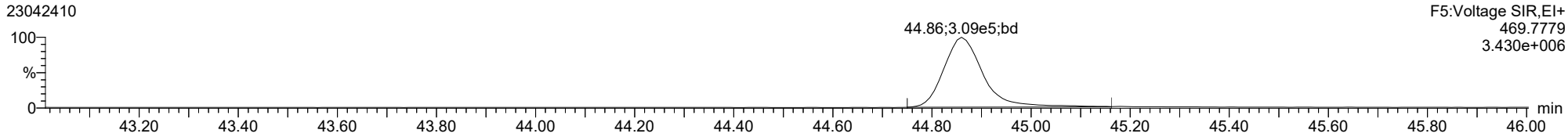

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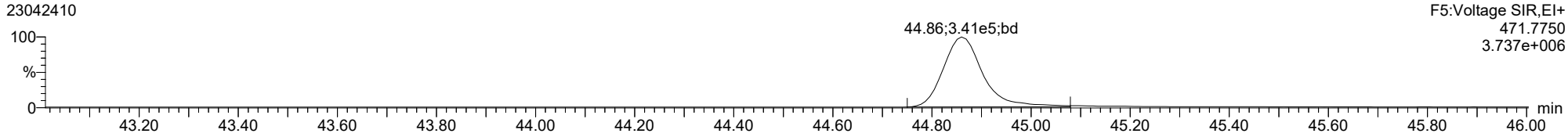
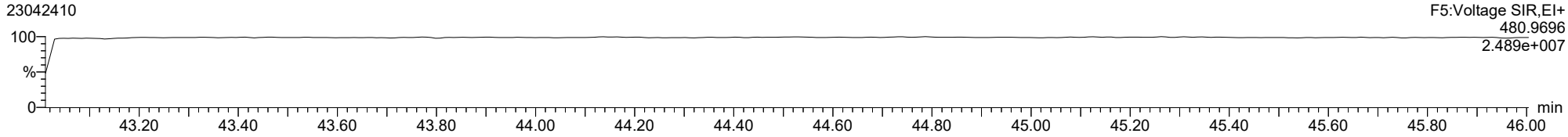


FUNCTION5 PFK



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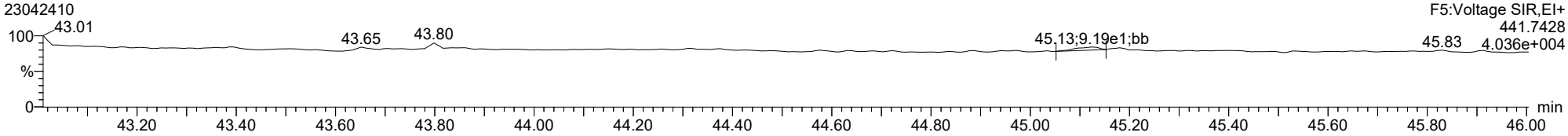
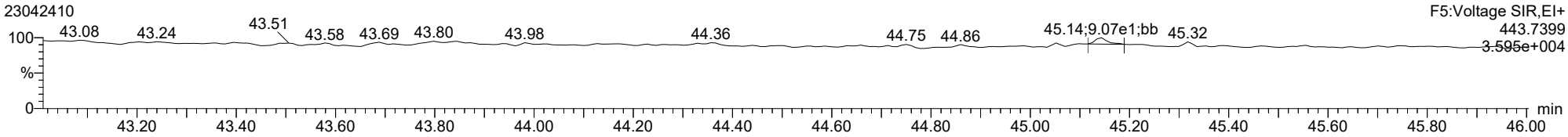
Printed: Tuesday, April 25, 2023 11:20:22 Pacific Daylight Time

ID: 23C0619-06, Name: 23042410, Date: 24-Apr-2023, Time: 21:46:14, Conditions: AUTOSPEC01, User: pk

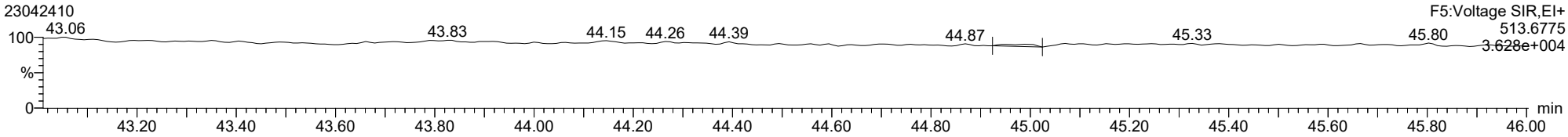
OCDF



OCDF

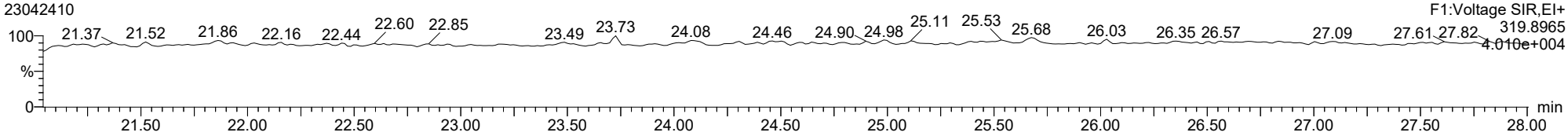


FUNCTION5 DCDPE

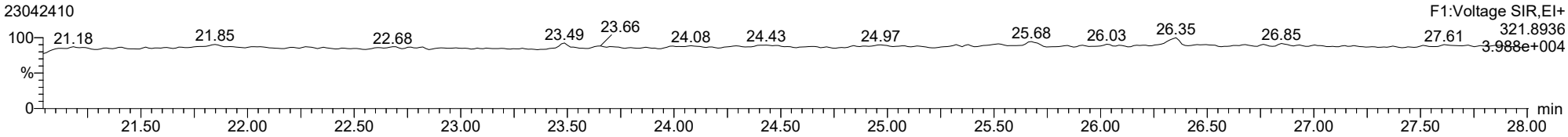


ID: 23C0619-06, Name: 23042410, Date: 24-Apr-2023, Time: 21:46:14, Conditions: AUTOSPEC01, User: pk

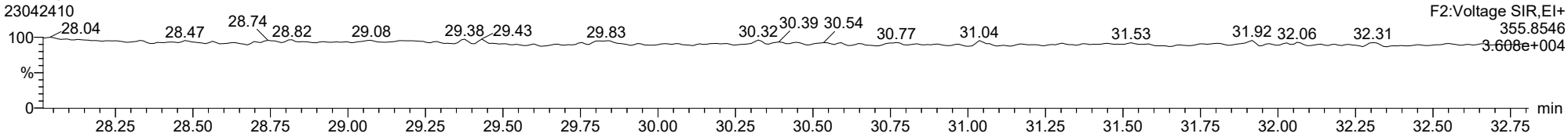
Total-tetradioxins



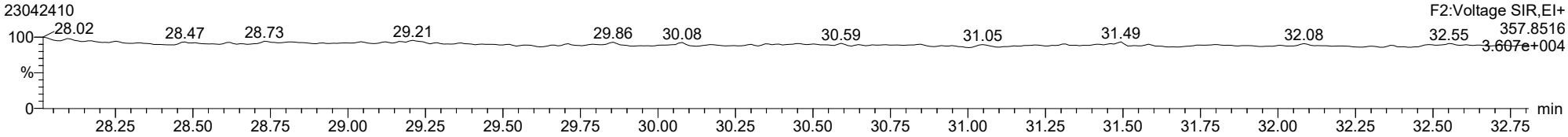
Total-tetradioxins



Total-pentadioxins



Total-pentadioxins



ID: 23C0619-06, Name: 23042410, Date: 24-Apr-2023, Time: 21:46:14, Conditions: AUTOSPEC01, User: pk

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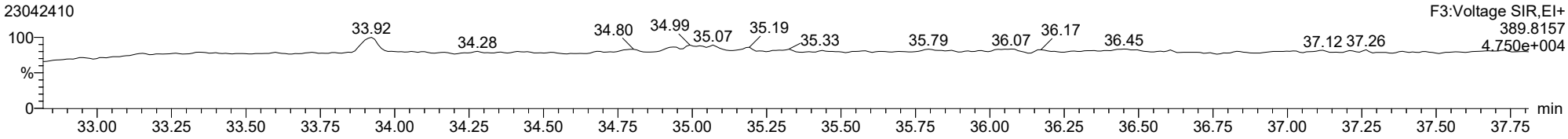
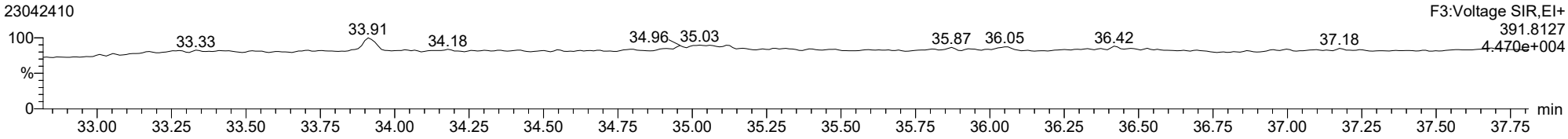


Total-hexadioxins



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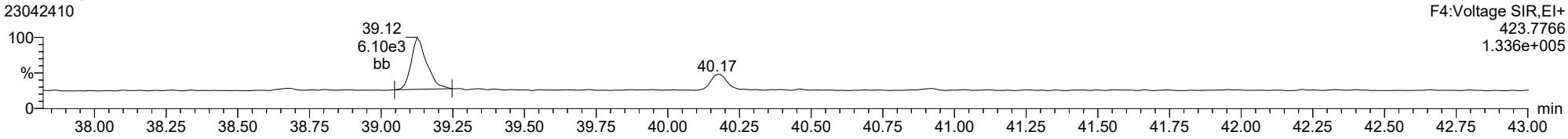
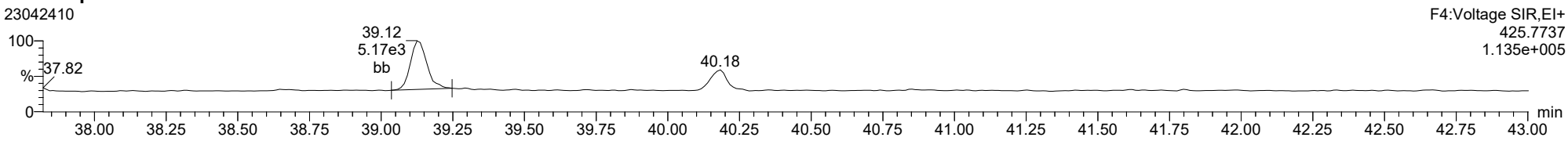


Total-heptadioxins



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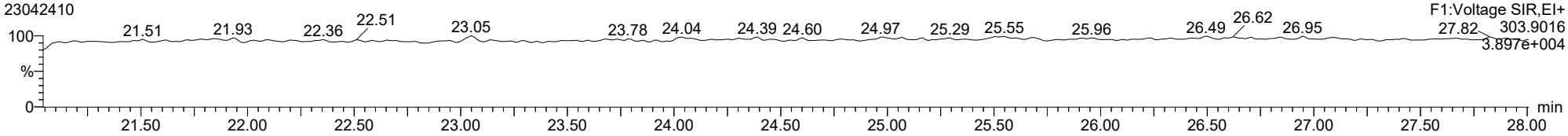
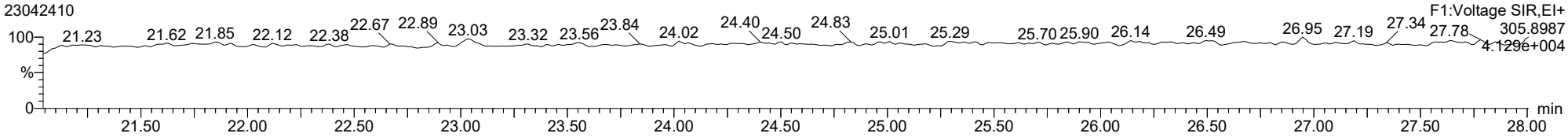
Total-tetrafurans



Total-tetrafurans



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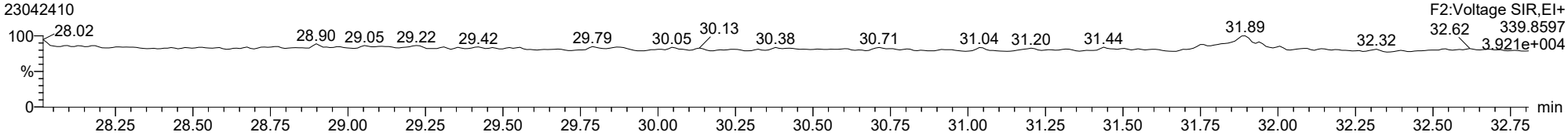

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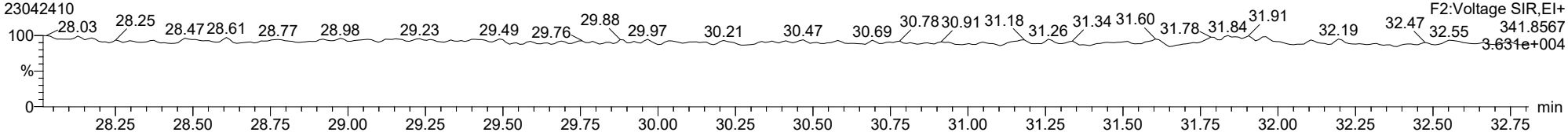
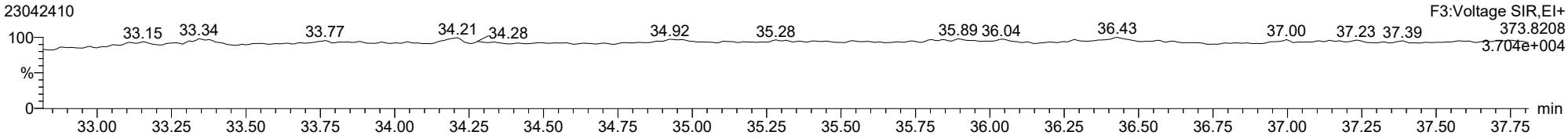
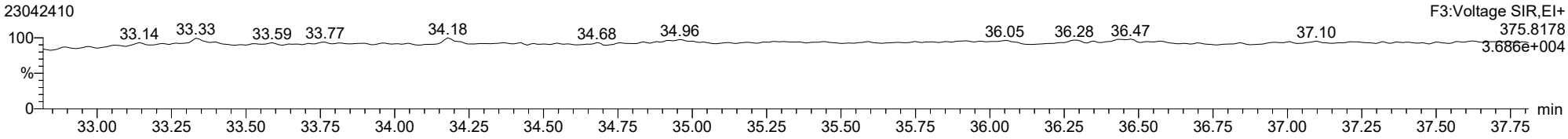


ID: 23C0619-06, Name: 23042410, Date: 24-Apr-2023, Time: 21:46:14, Conditions: AUTOSPEC01, User: pk

Total-hexafurans



Total-hexafurans



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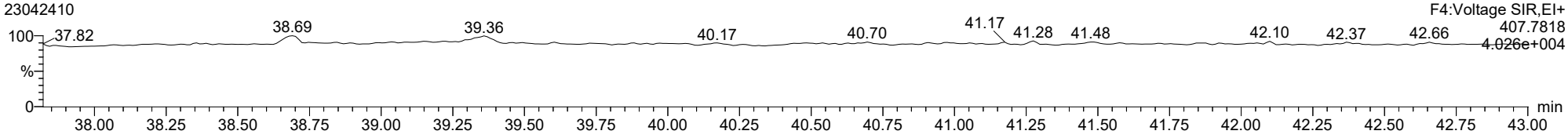

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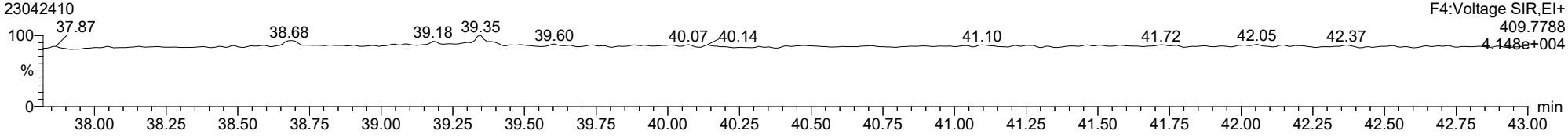


Analytical Resources, LLC
Analytical Chemists and Consultants

SED-12C:0-1

Form 1
ORGANIC ANALYSIS DATA SHEET
EPA 1613B
Dioxins/Furans by HRGC/HRMS

Laboratory:	Analytical Resources, LLC			SDG:	23C0619
Client:	Friedman & Bruya Inc.				
Project:	Port of Friday Harbor				
Matrix:	Sediment	Laboratory ID:	23C0619-07 A	File ID:	23042411
Sampled:	03/22/23 09:25	Prepared:	04/06/23 13:16	Analyzed:	04/24/23 22:35
% Solids:	80.27	Preparation:	EPA 1613	Initial/Final:	12.47 g Wet / 20 uL
Result Basis:	Dry	Sequence:	SLD0330	Calibration:	GC00015
Batch:	BLD0089	Instrument:	AUTOSPEC01	Column:	RTX-Dioxin2

CAS NO.	COMPOUND	DF/Split	Ion Ratio	Ratio Limits	EDL	RL	Result	Units	Q
51207-31-9	2,3,7,8-TCDF	1		0.655-0.886	0.186	0.999	ND	ng/kg	U
1746-01-6	2,3,7,8-TCDD	1		0.655-0.886	0.097	0.999	ND	ng/kg	U
57117-41-6	1,2,3,7,8-PeCDF	1		1.318-1.783	0.191	0.999	ND	ng/kg	U
57117-31-4	2,3,4,7,8-PeCDF	1		1.318-1.783	0.181	0.999	ND	ng/kg	U
40321-76-4	1,2,3,7,8-PeCDD	1		1.318-1.783	0.189	0.999	ND	ng/kg	U
70648-26-9	1,2,3,4,7,8-HxCDF	1		1.054-1.426	0.097	0.999	ND	ng/kg	U
57117-44-9	1,2,3,6,7,8-HxCDF	1		1.054-1.426	0.103	0.999	ND	ng/kg	U
60851-34-5	2,3,4,6,7,8-HxCDF	1		1.054-1.426	0.106	0.999	ND	ng/kg	U
72918-21-9	1,2,3,7,8,9-HxCDF	1		1.054-1.426	0.132	0.999	ND	ng/kg	U
39227-28-6	1,2,3,4,7,8-HxCDD	1		1.054-1.426	0.158	0.999	ND	ng/kg	U
57653-85-7	1,2,3,6,7,8-HxCDD	1	1.169	1.054-1.426	0.156	0.999	0.325	ng/kg	J
19408-74-3	1,2,3,7,8,9-HxCDD	1	1.656	1.054-1.426	0.173	0.999	0.107	ng/kg	EMPC, J
67562-39-4	1,2,3,4,6,7,8-HpCDF	1	0.967	0.893-1.208	0.100	0.999	1.28	ng/kg	
55673-89-7	1,2,3,4,7,8,9-HpCDF	1		0.893-1.208	0.169	0.999	ND	ng/kg	U
35822-46-9	1,2,3,4,6,7,8-HpCDD	1	1.017	0.893-1.208	0.259	2.50	8.94	ng/kg	B
39001-02-0	OCDF	1	0.948	0.757-1.024	0.353	2.50	2.92	ng/kg	
3268-87-9	OCDD	1	0.818	0.757-1.024	0.362	9.99	59.3	ng/kg	B

Homologue Groups

55722-27-5	Total TCDF	1	0.000			0.999	ND	ng/kg	
41903-57-5	Total TCDD	1	0.000			0.999	ND	ng/kg	
30402-15-4	Total PeCDF	1	0.000			0.999	0.510	ng/kg	
36088-22-9	Total PeCDD	1	0.000			0.999	ND	ng/kg	
55684-94-1	Total HxCDF	1	0.000			0.999	1.52	ng/kg	
34465-46-8	Total HxCDD	1	0.000			0.999	2.09	ng/kg	
38998-75-3	Total HpCDF	1	0.000			0.999	3.63	ng/kg	
37871-00-4	Total HpCDD	1	0.000			0.999	28.3	ng/kg	

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC): 0.164
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC): 0.377

Analytical Resources, Incorporated
Analytical Chemists and Consultants

SED-12C:0-1

Form 2

ORGANIC ANALYSIS DATA SHEET

EPA 1613B

Dioxins/Furans by HRGC/HRMS

Laboratory:	Analytical Resources, LLC			SDG:	23C0619
Client:	Friedman & Bruya Inc.			Project:	Port of Friday Harbor
Matrix:	Sediment	Laboratory ID:	23C0619-07	File ID:	23042411
Sampled:	03/22/23 09:25	Prepared:	04/06/23 13:16	Analyzed:	04/24/23 22:35
Solids Wt%:	80.27	Preparation:	EPA 1613	Initial/Final:	12.47 g / 20 uL
Result Basis:	Dry	Sequence:	SLD0330	Calibration:	GC00015
Batch:	BLD0089	Instrument:	AUTOSPEC01	Column:	RTX-Dioxin2

Labels	DF/Split	Ion Ratio	Ratio Limits	EDL	% REC	QC LIMITS	Q
13C12-2,3,7,8-TCDF		0.756	0.655-0.886	0.106	77.2	24 - 169 %	
13C12-2,3,7,8-TCDD		0.785	0.655-0.886	0.169	84.9	25 - 164 %	
13C12-1,2,3,7,8-PeCDF		1.586	1.318-1.783	0.320	90.1	24 - 185 %	
13C12-2,3,4,7,8-PeCDF		1.524	1.318-1.783	0.355	88.3	21 - 178 %	
13C12-1,2,3,7,8-PeCDD		1.611	1.318-1.783	0.167	70.5	25 - 181 %	
13C12-1,2,3,4,7,8-HxCDF		0.513	0.434-0.587	0.321	80.2	26 - 152 %	
13C12-1,2,3,6,7,8-HxCDF		0.517	0.434-0.587	0.271	73.4	26 - 123 %	
13C12-2,3,4,6,7,8-HxCDF		0.517	0.434-0.587	0.332	83.0	28 - 136 %	
13C12-1,2,3,7,8,9-HxCDF		0.500	0.434-0.587	0.403	76.3	29 - 147 %	
13C12-1,2,3,4,7,8-HxCDD		1.257	1.054-1.426	0.299	85.6	32 - 141 %	
13C12-1,2,3,6,7,8-HxCDD		1.208	1.054-1.426	0.257	76.9	28 - 130 %	
13C12-1,2,3,4,6,7,8-HpCDF		0.435	0.374-0.506	0.381	91.0	28 - 143 %	
13C12-1,2,3,4,7,8,9-HpCDF		0.423	0.374-0.506	0.443	79.0	26 - 138 %	
13C12-1,2,3,4,6,7,8-HpCDD		1.086	0.893-1.208	0.337	77.5	23 - 140 %	
13C12-OCDD		0.895	0.757-1.024	0.414	79.0	17 - 157 %	
37Cl4-2,3,7,8-TCDD		328.000		0.097	80.6	35 - 197 %	

* Values outside of QC limits

Dataset: T:\Autospec\Processed Data Batch\230424D1.qld
Last Altered: Tuesday, April 25, 2023 10:49:58 Pacific Daylight Time
Printed: Tuesday, April 25, 2023 11:20:34 Pacific Daylight Time

Method: T:\Autospec\Methods\Dioxin230424.mdb 25 Apr 2023 07:59:40
Calibration: T:\Autospec\Curves\230303ICIH.cdb 06 Mar 2023 11:57:27

ID: 23C0619-07, Name: 23042411, Date: 24-Apr-2023, Time: 22:35:20, Conditions: AUTOSPEC01, User: pk

Compound	RT	RRT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	Noise 1	Noise 2	Height 1	Height 2	S/N 1	S/N 2	EMPC	Int.1	Int.2	pg
2378-TCDF					0.702		0.770	1078	1276								
12378-PeCDF					0.679		1.550	783	1339								
23478-PeCDF					0.786		1.550	783	1339								
123478-HxCDF					1.166		1.240	704	690								
234678-HxCDF					1.140		1.240	704	690								
123678-HxCDF					1.091		1.240	704	690								
123789-HxCDF					1.137		1.240	704	690								
1234678-HpCDF	38.690	1.001	1.304e3	1.349e3	1.003	0.967	1.050	638	466	2.16e4	2.07e4	33.8	44.4	NO	bb	bb	0.640
1234789-HpCDF					0.953		1.050	638	466								
OCDF	45.107	1.005	1.701e3	1.794e3	0.778	0.948	0.890	672	858	2.06e4	2.27e4	30.6	26.4	NO	bb	bb	1.462
2378-TCDD					1.149		0.770	937	636								
12378-PeCDD					1.022		1.550	792	854								
123478-HxCDD					0.996		1.240	1062	773								
123678-HxCDD	36.050	1.001	3.965e2	3.391e2	1.001	1.169	1.240	1062	773	6.85e3	5.34e3	6.5	6.9	NO	bb	bb	0.163
123789-HxCDD	36.440	1.011	1.337e2	8.077e1	0.907	1.656	1.240	1062	773	3.17e3	2.52e3	3.0	3.3	YES	MM	MM	0.054
1234678-HpCDD	40.183	1.001	7.740e3	7.608e3	1.039	1.017	1.050	869	1217	1.09e5	1.15e5	125.4	94.2	NO	bb	bb	4.473
OCDD	44.878	1.000	3.778e4	4.620e4	0.920	0.818	0.890	812	1048	4.40e5	5.31e5	541.2	507.1	NO	bb	bb	29.698
13C-2378-TCDF	25.690	1.007	3.297e5	4.361e5	1.620	0.756	0.770	1001	1688	4.65e6	6.16e6	4642.7	3648.8	NO	bb	bb	77.227
13C-12378-PeCDF	29.833	1.170	4.197e5	2.647e5	1.240	1.586	1.550	3717	2509	6.01e6	3.88e6	1617.3	1547.5	NO	bd	bb	90.146
13C-23478-PeCDF	31.170	1.222	3.648e5	2.393e5	1.118	1.524	1.550	3717	2509	5.41e6	3.63e6	1455.8	1445.3	NO	bb	bb	88.320
13C-123478-HxCDF	34.791	0.955	1.612e5	3.140e5	1.168	0.513	0.510	2431	2232	2.52e6	4.85e6	1035.1	2172.9	NO	bd	bd	80.209
13C-123678-HxCDF	34.936	0.959	1.758e5	3.401e5	1.386	0.517	0.510	2431	2232	2.53e6	4.94e6	1041.2	2213.8	NO	db	db	73.370
13C-234678-HxCDF	35.794	0.983	1.621e5	3.132e5	1.129	0.517	0.510	2431	2232	2.36e6	4.58e6	969.0	2050.9	NO	bb	bb	82.993
13C-123789-HxCDF	36.830	1.011	1.202e5	2.403e5	0.932	0.500	0.510	2431	2232	1.86e6	3.62e6	763.7	1620.3	NO	bb	bb	76.297
13C-1234678-HpCDF	38.668	1.062	1.253e5	2.878e5	0.895	0.435	0.440	1997	2244	1.99e6	4.58e6	998.5	2042.4	NO	bb	bb	90.999
13C-1234789-HpCDF	40.908	1.123	9.161e4	2.167e5	0.770	0.423	0.440	1997	2244	1.22e6	2.76e6	610.3	1229.4	NO	bb	bd	78.978
13C-1234-TCDD	25.506	0.000	2.691e5	3.429e5	1.000	0.785	0.770	1912	1143	4.13e6	5.29e6	2161.5	4625.1	NO	bb	bb	100.000
13C-2378-TCDD	26.311	1.032	2.633e5	3.353e5	1.152	0.785	0.770	1912	1143	3.73e6	4.79e6	1951.5	4186.5	NO	bb	bb	84.874
13C-12378-PeCDD	31.427	1.232	2.207e5	1.370e5	0.829	1.611	1.550	1098	1069	3.15e6	1.94e6	2870.2	1812.4	NO	bd	bb	70.521
13C-123478-HxCDD	35.916	0.986	2.406e5	1.914e5	0.995	1.257	1.240	2165	1531	3.90e6	3.05e6	1799.4	1989.4	NO	bd	bd	85.613
13C-123678-HxCDD	36.028	0.989	2.468e5	2.043e5	1.157	1.208	1.240	2165	1531	3.85e6	3.13e6	1779.0	2044.0	NO	db	db	76.910
13C-1234678-HpCDD	40.161	1.103	1.720e5	1.583e5	0.840	1.086	1.050	1851	1672	2.42e6	2.23e6	1306.2	1332.2	NO	bb	bb	77.528
13C-OCDD	44.860	1.232	2.904e5	3.244e5	0.767	0.895	0.890	1794	2160	3.16e6	3.48e6	1760.8	1609.6	NO	bb	bd	157.969
13C-123789-HxCDD	36.417	0.000	2.822e5	2.249e5	1.000	1.255	1.240	2165	1531	4.15e6	3.47e6	1915.4	2269.5	NO	bb	bb	100.000
37CL-2378-TCDD	26.339	1.033	2.540e5		1.288			1960		3.79e6		1934.1			bb		32.222

Dataset: T:\Autospec\Processed Data Batch\230424D1.qld
Last Altered: Tuesday, April 25, 2023 10:49:58 Pacific Daylight Time
Printed: Tuesday, April 25, 2023 11:20:34 Pacific Daylight Time

ID: 23C0619-07, Name: 23042411, Date: 24-Apr-2023, Time: 22:35:20, Conditions: AUTOSPEC01, User: pk

Compound	RT	RRT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	Noise 1	Noise 2	Height 1	Height 2	S/N 1	S/N 2	EMPC	Int.1	Int.2	pg
1368-TCDF					0.802		0.770	1078	1276								
1289-TCDF					0.678		0.770	1078	1276								
13468-PECDF					1.246		1.550	647	1100								
12389-PECDF					0.496		1.550	783	1339								
123468-HXCDF	33.142	0.953	5.946e2	2.392e2	1.169	2.486	1.240	704	690	8.01e3	4.84e3	11.4	7.0	YES	bd	bd	0.150
1368-TCDD					1.015		0.770	937	636								
1289-TCDD					0.909		0.770	937	636								
12479-PECDD					2.301		1.550	792	854								
12389-PECDD					1.184		1.550	792	854								
124679-HXCDD	33.922	0.945	2.375e3	1.878e3	1.115	1.264	1.240	1062	773	3.73e4	2.60e4	35.2	33.7	NO	bb	bb	0.883
1234679-HPCDD	39.136	0.975	1.905e4	1.740e4	1.137	1.095	1.050	869	1217	2.89e5	2.73e5	332.0	224.0	NO	bd	bb	9.708
Total-tetrafurans			0.000e0		0.727			1078		0.00e0							
Total-penta1			9.604e2					647		1.36e4							0.255
Total-pentafurans			0.000e0		0.654			783		0.00e0							
Total-hexafurans			2.206e3		1.141			704		3.16e4							0.761
Total-heptafurans			3.544e3		0.978			638		5.31e4							1.817
Total-Furans			8.411e3		0.922			1078		1.19e5							4.295
Total-tetradioxins			0.000e0		1.024			937		0.00e0							
Total-pentadioxins			0.000e0		1.502			792		0.00e0							
Total-hexadioxins			2.771e3		1.005			1062		4.42e4							1.045
Total-heptadioxins			2.679e4		1.088			869		3.98e5							14.180
Total-Dioxins			6.734e4		1.130			937		8.81e5							44.923
Total-TEQ			7.575e4					937		1.00e6							49.218
FUNCTION1 PFK			1.381e5					410038		3.84e6							
FUNCTION2 PFK			1.792e5					215210		5.95e6							0.000
FUNCTION3 PFK			1.190e7					312132		9.79e6							0.000
FUNCTION4 PFK			0.000e0					258036		0.00e0							
FUNCTION5 PFK			6.373e6					161338		6.07e7							
FUNCTION1 HXCD...			8.949e2					567		1.24e4							0.000
FUNCTION1 HPCD...																	
FUNCTION2 HPCD...			3.742e2					1039		7.16e3							0.000
FUNCTION3 OCDPE			2.820e2					669		5.48e3							0.000
FUNCTION4 NCDPE			4.754e2					752		8.54e3							0.000
FUNCTION5 DCDPE			0.000e0					535		0.00e0							

Method: T:\Autospec\Methods\Dioxin230424.mdb 25 Apr 2023 07:59:40
Calibration: T:\Autospec\Curves\230303ICIH.cdb 06 Mar 2023 11:57:27

ID: 23C0619-07, Name: 23042411, Date: 24-Apr-2023, Time: 22:35:20, Conditions: AUTOSPEC01, User: pk

TF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

PP

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-penta1	27.12	9.604e2	6.410e2		1.50	1.55	21.0	YES	NO	bb	bb	0.255

PF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

HF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-hexafurans	33.35	1.099e3	8.368e2	1.141	1.31	1.24	21.7	YES	NO	db	bb	0.372
2	Total-hexafurans	34.19	1.107e3	9.213e2	1.141	1.20	1.24	23.2	YES	NO	bb	bb	0.389

HPF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-heptafurans	39.34	2.240e3	1.910e3	0.978	1.17	1.05	49.3	YES	NO	bb	bb	1.176
2	1234678-HpCDF	38.69	1.304e3	1.349e3	1.003	0.97	1.05	33.8	YES	NO	bb	bb	0.640

Furans,TF,PP,PF,HF,HPF,OF

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-hexafurans	33.35	1.099e3	8.368e2	1.141	1.31	1.24	21.7	YES	NO	db	bb	0.372
2	Total-hexafurans	34.19	1.107e3	9.213e2	1.141	1.20	1.24	23.2	YES	NO	bb	bb	0.389
3	OCDF	45.11	1.701e3	1.794e3	0.778	0.95	0.89	30.6	YES	NO	bb	bb	1.462
4	Total-heptafurans	39.34	2.240e3	1.910e3	0.978	1.17	1.05	49.3	YES	NO	bb	bb	1.176
5	1234678-HpCDF	38.69	1.304e3	1.349e3	1.003	0.97	1.05	33.8	YES	NO	bb	bb	0.640
6	Total-penta1	27.12	9.604e2	6.410e2		1.50	1.55	21.0	YES	NO	bb	bb	0.255

ID: 23C0619-07, Name: 23042411, Date: 24-Apr-2023, Time: 22:35:20, Conditions: AUTOSPEC01, User: pk

TD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

PD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

HD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	123678-HxCDD	36.05	3.965e2	3.391e2	1.001	1.17	1.24	6.5	YES	NO	bb	bb	0.163
2	124679-HXCDD	33.92	2.375e3	1.878e3	1.115	1.26	1.24	35.2	YES	NO	bb	bb	0.883

HPD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	1234678-HpCDD	40.18	7.740e3	7.608e3	1.039	1.02	1.05	125.4	YES	NO	bb	bb	4.473
2	1234679-HPCDD	39.14	1.905e4	1.740e4	1.137	1.09	1.05	332.0	YES	NO	bd	bb	9.708

Dioxins,TD,PD,HD,HPD,OD

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	123678-HxCDD	36.05	3.965e2	3.391e2	1.001	1.17	1.24	6.5	YES	NO	bb	bb	0.163
2	124679-HXCDD	33.92	2.375e3	1.878e3	1.115	1.26	1.24	35.2	YES	NO	bb	bb	0.883
3	OCDD	44.88	3.778e4	4.620e4	0.920	0.82	0.89	541.2	YES	NO	bb	bb	29.698
4	1234678-HpCDD	40.18	7.740e3	7.608e3	1.039	1.02	1.05	125.4	YES	NO	bb	bb	4.473
5	1234679-HPCDD	39.14	1.905e4	1.740e4	1.137	1.09	1.05	332.0	YES	NO	bd	bb	9.708

ID: 23C0619-07, Name: 23042411, Date: 24-Apr-2023, Time: 22:35:20, Conditions: AUTOSPEC01, User: pk

TotalTEQ,Furans,Dioxins

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	Total-hexafurans	33.35	1.099e3	8.368e2	1.141	1.31	1.24	21.7	YES	NO	db	bb	0.372
2	Total-hexafurans	34.19	1.107e3	9.213e2	1.141	1.20	1.24	23.2	YES	NO	bb	bb	0.389
3	OCDF	45.11	1.701e3	1.794e3	0.778	0.95	0.89	30.6	YES	NO	bb	bb	1.462
4	Total-heptafurans	39.34	2.240e3	1.910e3	0.978	1.17	1.05	49.3	YES	NO	bb	bb	1.176
5	1234678-HpCDF	38.69	1.304e3	1.349e3	1.003	0.97	1.05	33.8	YES	NO	bb	bb	0.640
6	Total-penta1	27.12	9.604e2	6.410e2		1.50	1.55	21.0	YES	NO	bb	bb	0.255
7	123678-HxCDD	36.05	3.965e2	3.391e2	1.001	1.17	1.24	6.5	YES	NO	bb	bb	0.163
8	124679-HXCDD	33.92	2.375e3	1.878e3	1.115	1.26	1.24	35.2	YES	NO	bb	bb	0.883
9	OCDD	44.88	3.778e4	4.620e4	0.920	0.82	0.89	541.2	YES	NO	bb	bb	29.698
10	1234678-HpCDD	40.18	7.740e3	7.608e3	1.039	1.02	1.05	125.4	YES	NO	bb	bb	4.473
11	1234679-HPCDD	39.14	1.905e4	1.740e4	1.137	1.09	1.05	332.0	YES	NO	bd	bb	9.708

PFK1

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION1 PFK	25.31	2.637e4					1.8	NO		bb		
2	FUNCTION1 PFK	22.24	1.139e4					1.3	NO		bb		
3	FUNCTION1 PFK	21.23	6.036e4					3.9	YES		db		
4	FUNCTION1 PFK	21.14	3.996e4					2.4	NO		bd		

ID: 23C0619-07, Name: 23042411, Date: 24-Apr-2023, Time: 22:35:20, Conditions: AUTOSPEC01, User: pk

PFK2

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION2 PFK	30.88	1.253e4					1.6	NO		bb		0.000
2	FUNCTION2 PFK	29.97	1.624e4					1.9	NO		bb		0.000
3	FUNCTION2 PFK	29.81	1.402e3					0.6	NO		bb		0.000
4	FUNCTION2 PFK	29.63	2.808e4					2.3	NO		bb		0.000
5	FUNCTION2 PFK	29.57	6.378e3					1.2	NO		bb		0.000
6	FUNCTION2 PFK	29.34	1.611e4					2.5	NO		db		0.000
7	FUNCTION2 PFK	29.30	1.622e4					2.4	NO		bd		0.000
8	FUNCTION2 PFK	28.56	3.467e3					0.8	NO		bb		0.000
9	FUNCTION2 PFK	28.27	3.474e3					0.9	NO		bb		0.000
10	FUNCTION2 PFK	28.23	2.972e3					0.8	NO		bb		0.000
11	FUNCTION2 PFK	32.74	5.575e3					1.3	NO		bb		0.000
12	FUNCTION2 PFK	32.50	2.820e3					0.7	NO		bb		0.000
13	FUNCTION2 PFK	32.27	4.129e3					0.9	NO		bb		0.000
14	FUNCTION2 PFK	31.75	1.043e4					1.6	NO		bb		0.000
15	FUNCTION2 PFK	31.63	4.259e3					1.0	NO		bb		0.000
16	FUNCTION2 PFK	31.46	8.885e3					1.3	NO		bb		0.000
17	FUNCTION2 PFK	31.39	2.685e3					0.8	NO		bb		0.000
18	FUNCTION2 PFK	31.32	1.612e4					1.7	NO		db		0.000
19	FUNCTION2 PFK	31.25	6.055e3					1.1	NO		bd		0.000
20	FUNCTION2 PFK	31.20	1.954e3					0.6	NO		bb		0.000
21	FUNCTION2 PFK	31.08	3.165e3					0.8	NO		db		0.000
22	FUNCTION2 PFK	31.05	6.299e3					1.1	NO		bd		0.000

PFK3

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION3 PFK	36.51	1.321e6					10.9	YES		bb		0.000
2	FUNCTION3 PFK	35.76	2.610e5					6.2	YES		bb		0.000
3	FUNCTION3 PFK	33.57	1.006e7					7.3	YES		bb		0.000
4	FUNCTION3 PFK	36.92	2.577e5					6.9	YES		bb		0.000

PFK4

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

ID: 23C0619-07, Name: 23042411, Date: 24-Apr-2023, Time: 22:35:20, Conditions: AUTOSPEC01, User: pk

PFK5

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION5 PFK	45.28	5.508e3					1.6	NO		bb		
2	FUNCTION5 PFK	45.01	6.121e3					1.6	NO		bb		
3	FUNCTION5 PFK	44.73	1.209e3					0.6	NO		bb		
4	FUNCTION5 PFK	44.28	2.988e3					1.0	NO		bb		
5	FUNCTION5 PFK	44.18	4.498e3					1.4	NO		bb		
6	FUNCTION5 PFK	44.04	2.109e5					4.5	YES		db		
7	FUNCTION5 PFK	43.83	1.853e5					18.6	YES		dd		
8	FUNCTION5 PFK	43.62	1.347e6					34.1	YES		dd		
9	FUNCTION5 PFK	43.42	1.969e6					47.1	YES		dd		
10	FUNCTION5 PFK	43.19	9.673e5					62.5	YES		dd		
11	FUNCTION5 PFK	43.15	4.665e5					64.0	YES		dd		
12	FUNCTION5 PFK	43.09	5.882e5					67.5	YES		dd		
13	FUNCTION5 PFK	43.06	6.098e5					69.3	YES		bd		
14	FUNCTION5 PFK	45.87	3.119e3					1.1	NO		bb		
15	FUNCTION5 PFK	45.49	5.538e3					1.6	NO		bb		

ETHERS1

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION1 HXCD...	27.14	1.502e2					3.7	YES		bb		0.000
2	FUNCTION1 HXCD...	25.86	3.378e2					9.9	YES		bb		0.000
3	FUNCTION1 HXCD...	22.44	2.306e2					3.5	YES		bb		0.000
4	FUNCTION1 HXCD...	21.90	9.487e1					2.2	NO		bb		0.000
5	FUNCTION1 HXCD...	21.64	8.137e1					2.6	NO		bb		0.000

ETHERS2

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

ETHERS3

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION2 HPCD...	30.56	7.880e1					2.5	NO		bb		0.000
2	FUNCTION2 HPCD...	29.30	2.172e2					2.9	NO		bb		0.000
3	FUNCTION2 HPCD...	28.70	7.816e1					1.5	NO		bb		0.000

ID: 23C0619-07, Name: 23042411, Date: 24-Apr-2023, Time: 22:35:20, Conditions: AUTOSPEC01, User: pk

ETHERS4

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION3 OCDPE	36.71	7.011e1					2.6	NO		bb		0.000
2	FUNCTION3 OCDPE	36.44	1.394e2					3.2	YES		bb		0.000
3	FUNCTION3 OCDPE	36.03	7.250e1					2.4	NO		bb		0.000

ETHERS5

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1	FUNCTION4 NCDPE	39.99	1.206e2					3.0	NO		db		0.000
2	FUNCTION4 NCDPE	39.92	8.195e1					2.0	NO		bd		0.000
3	FUNCTION4 NCDPE	39.54	8.780e1					2.5	NO		bb		0.000
4	FUNCTION4 NCDPE	39.17	7.254e1					1.7	NO		bb		0.000
5	FUNCTION4 NCDPE	38.32	1.125e2					2.2	NO		bb		0.000

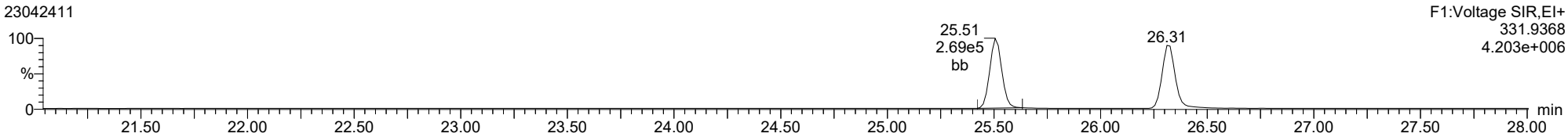
ETHERS6

	Compound	RT	Ion1Area	Ion2Area	RRF	Ratio	Pred R	S/N 1	SNFlag	EMPC	Int.1	Int.2	pg
1													

Method: T:\Autospec\Methods\Dioxin230424.mdb 25 Apr 2023 07:59:40
Calibration: T:\Autospec\Curves\230303ICIH.cdb 06 Mar 2023 11:57:27

ID: 23C0619-07, Name: 23042411, Date: 24-Apr-2023, Time: 22:35:20, Conditions: AUTOSPEC01, User: pk

13C-1234-TCDD



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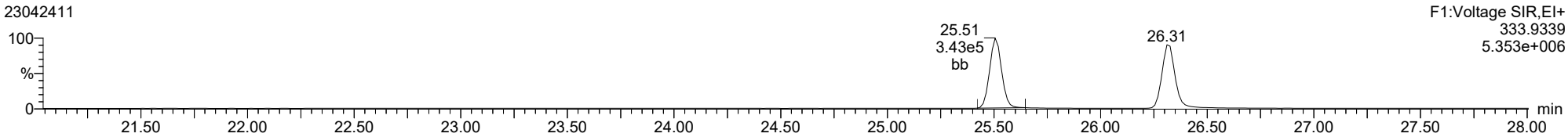
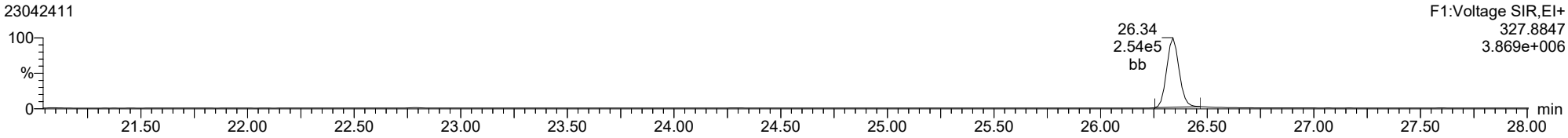


37CL-2378-TCDD



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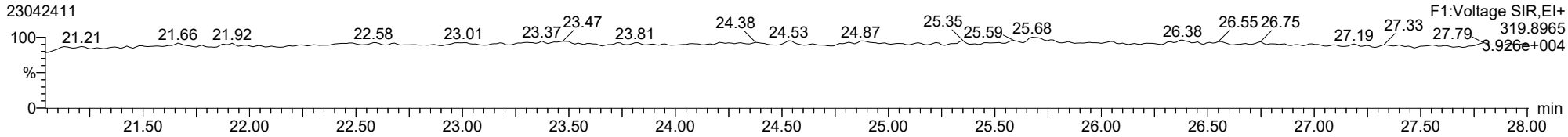
2378-TCDD



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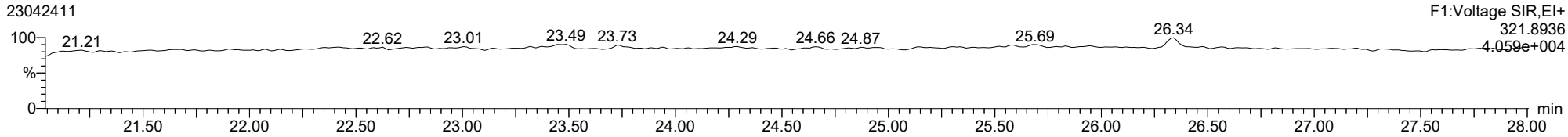

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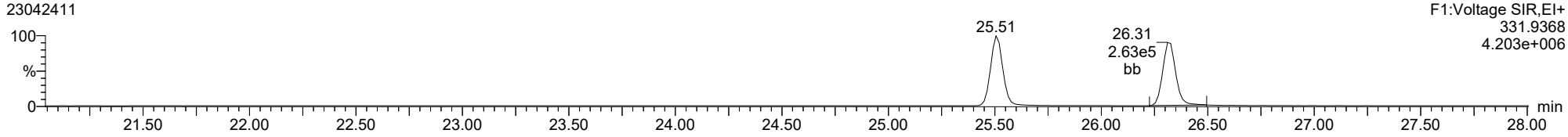

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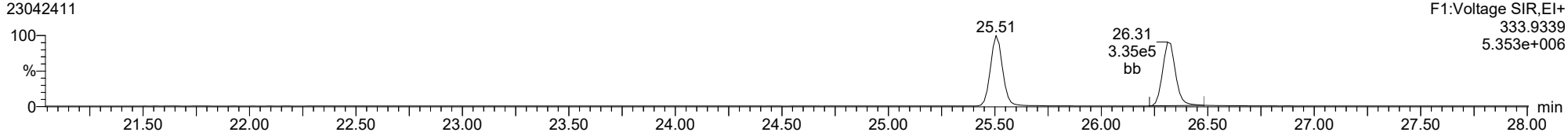

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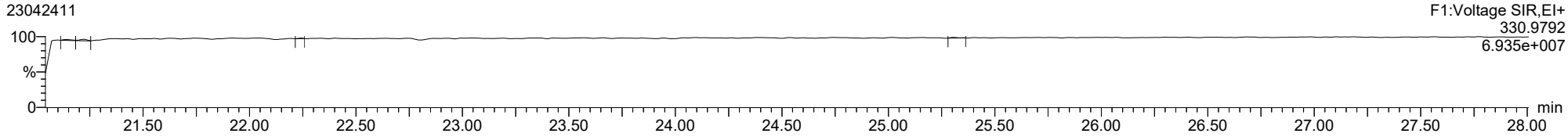

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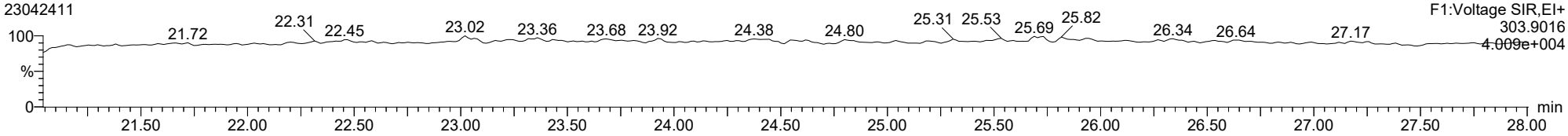
2378-TCDF



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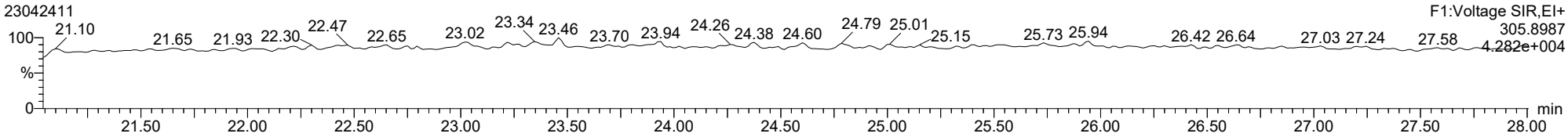

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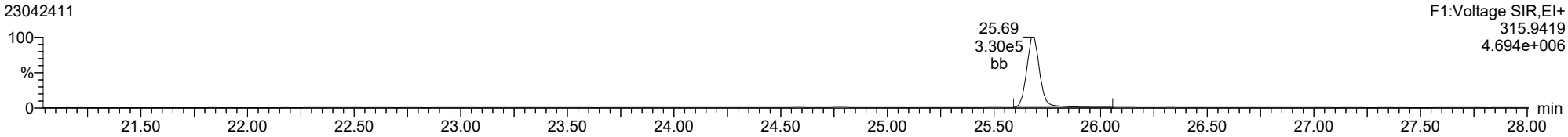

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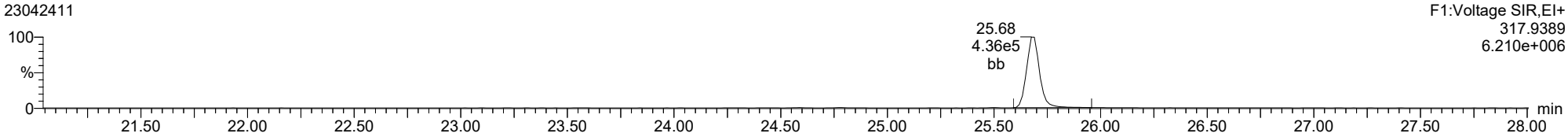
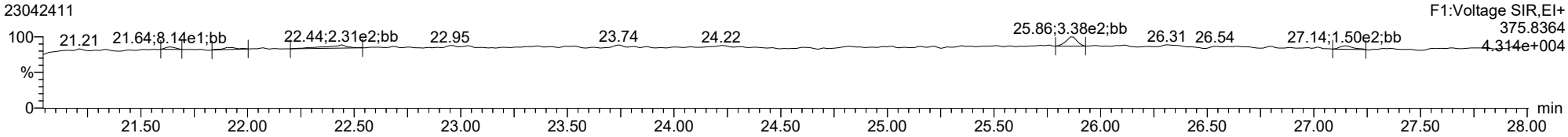


FUNCTION1 HXCDPE



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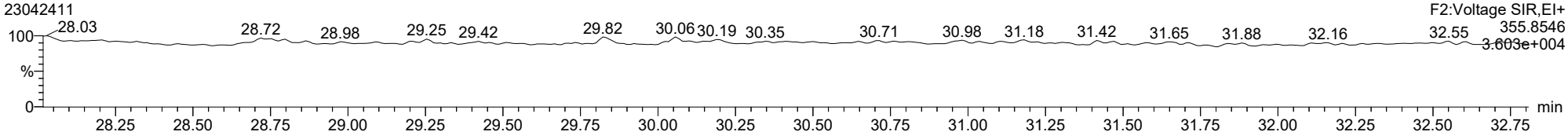
12378-PeCDD



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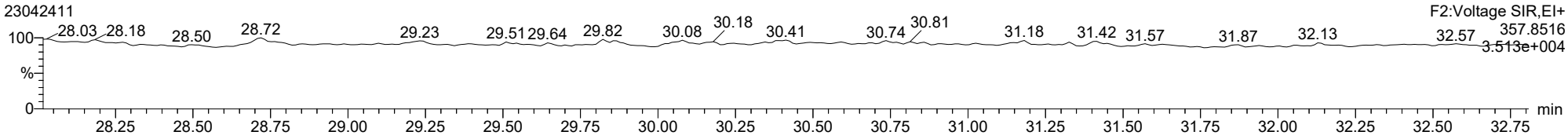

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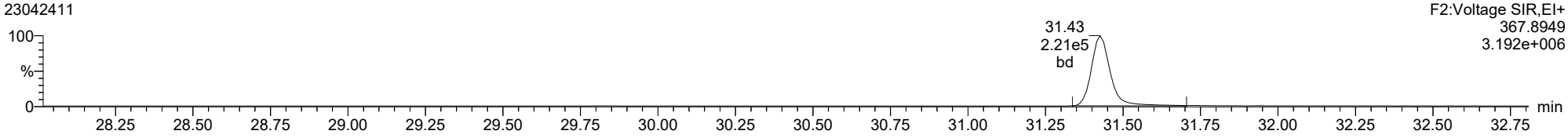

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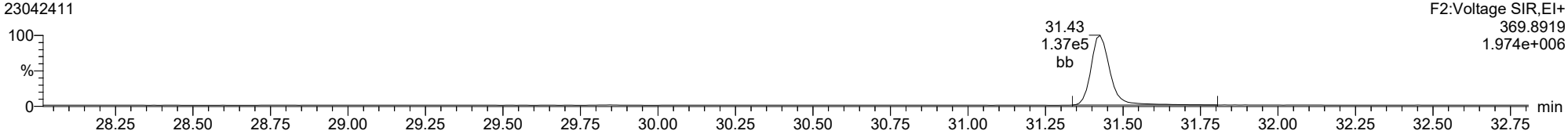
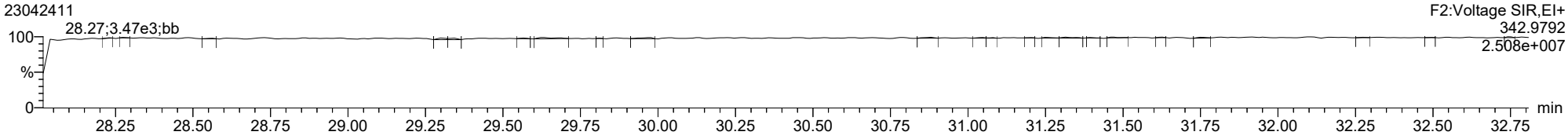


FUNCTION2 PFK



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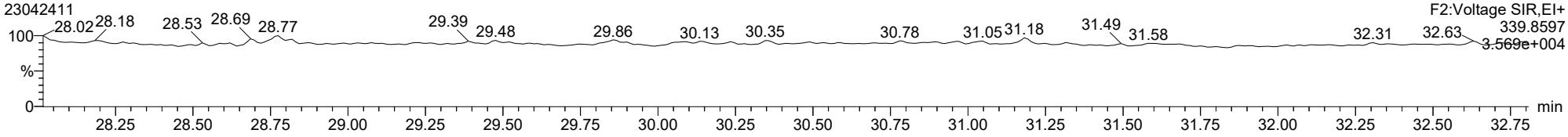
12378-PeCDF



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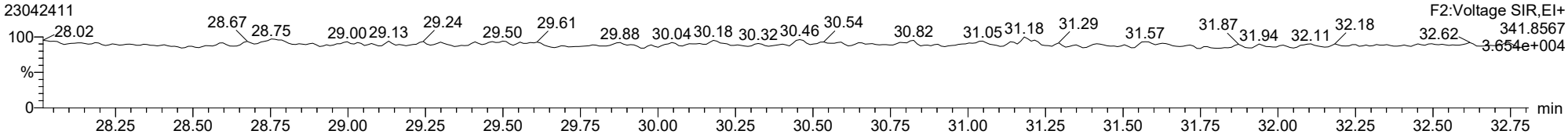

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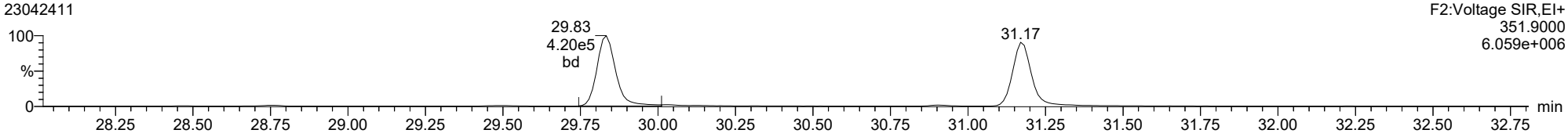

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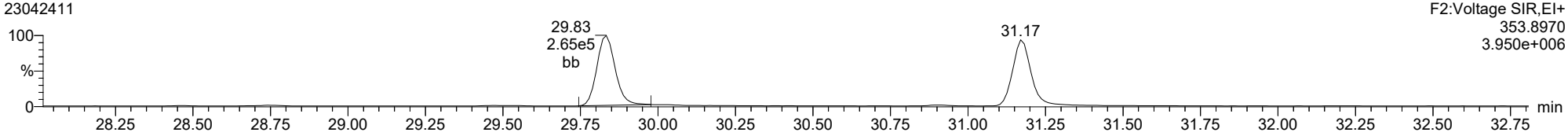
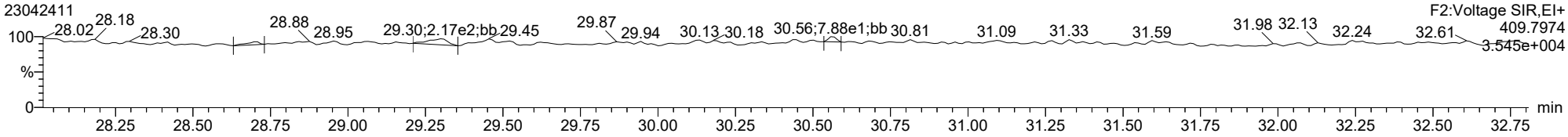


FUNCTION2 HPCDPE



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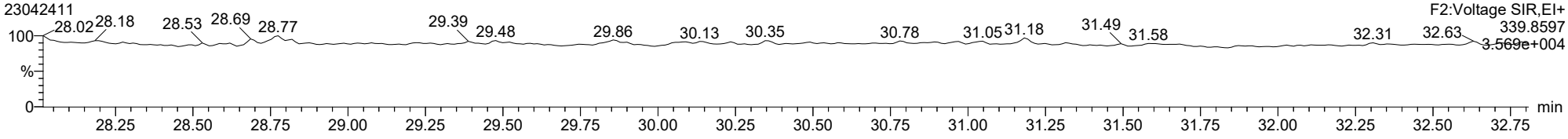
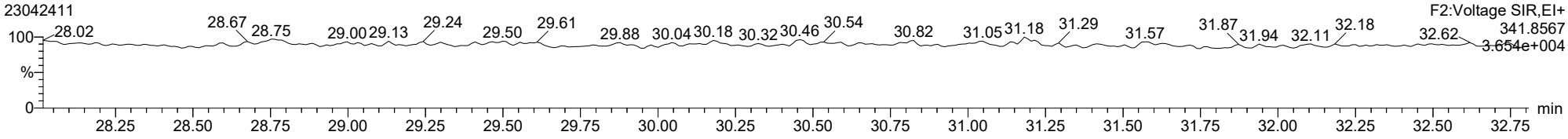
23478-PeCDF



23478-PeCDF



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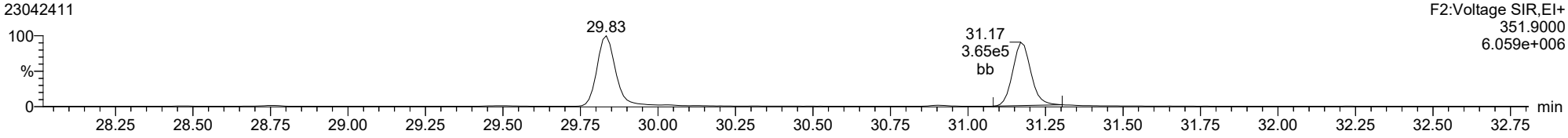

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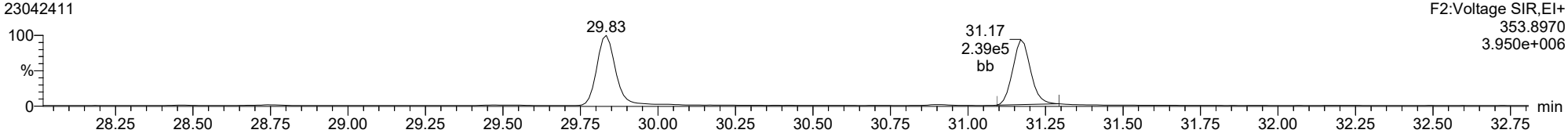
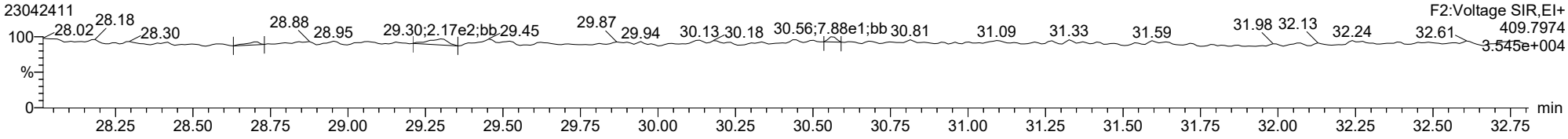


FUNCTION2 HPCDPE



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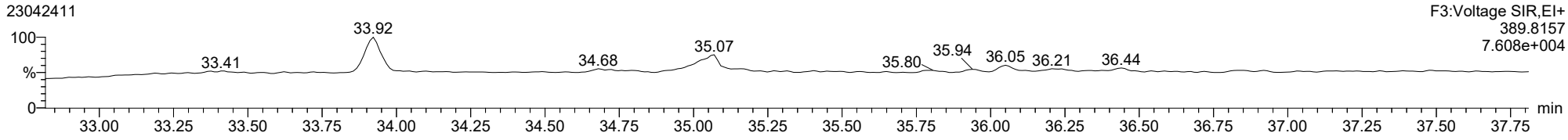
123478-HxCDD



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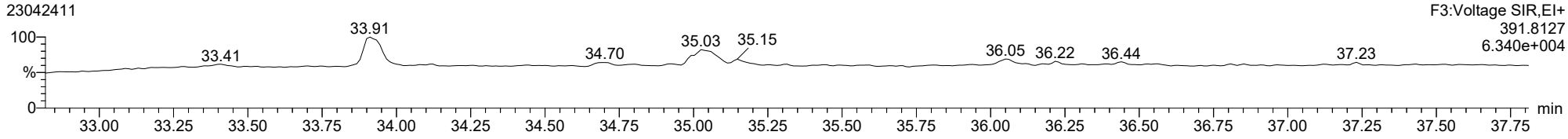

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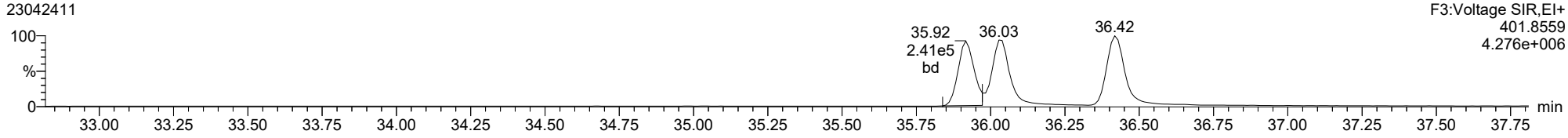

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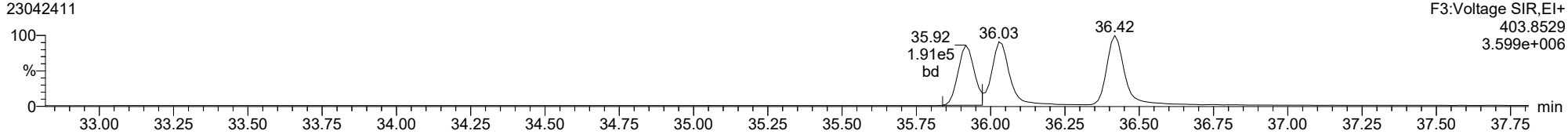

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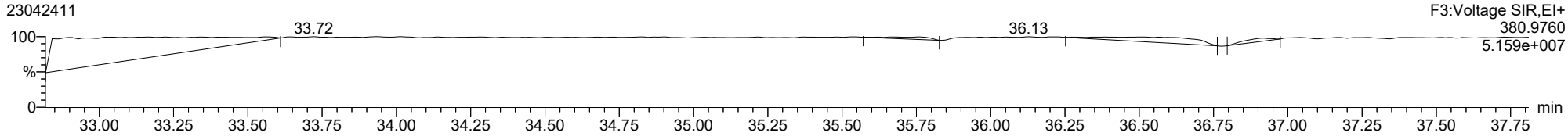

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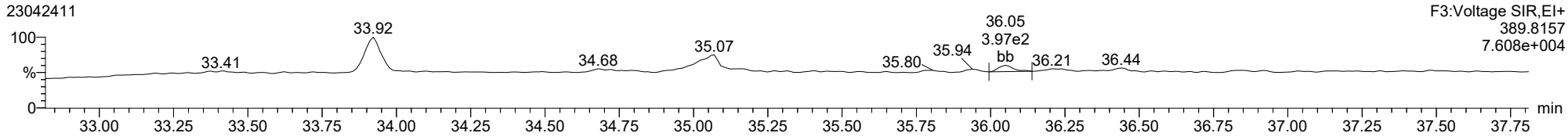

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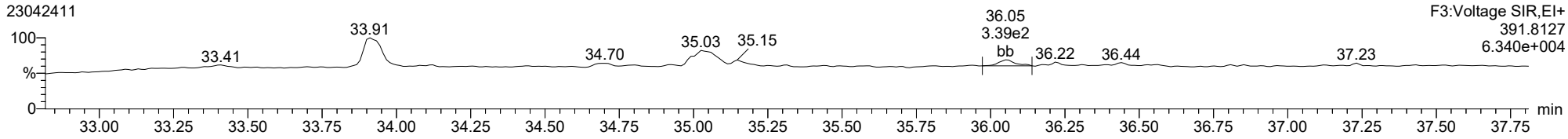

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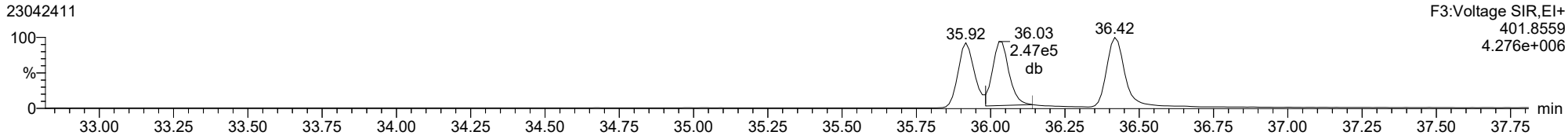

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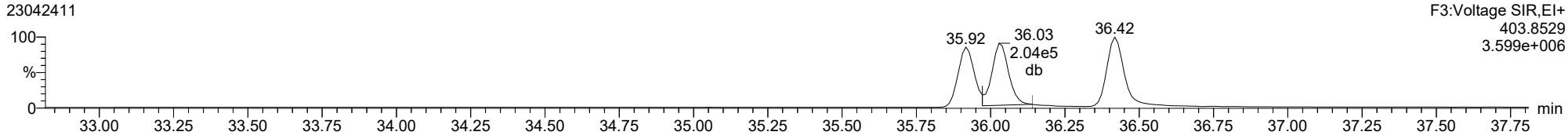

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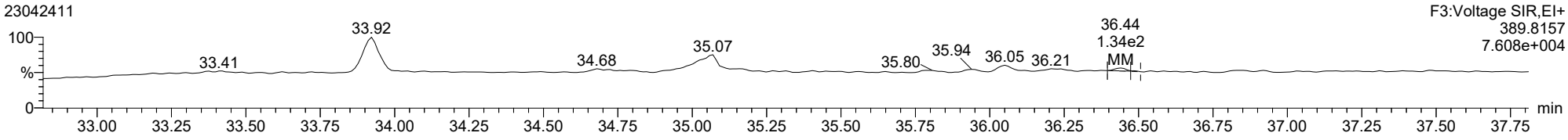

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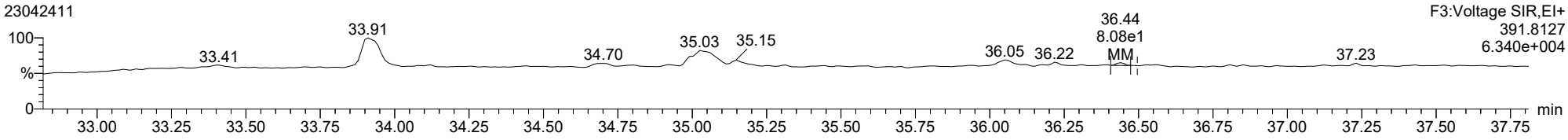

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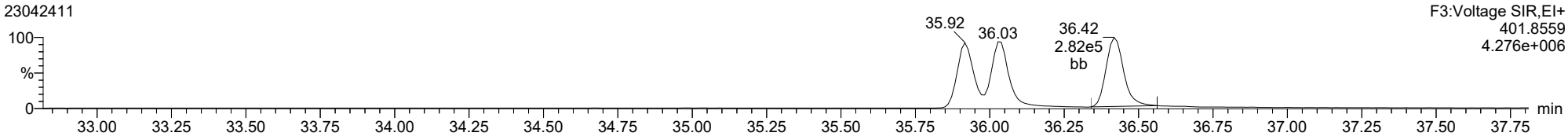

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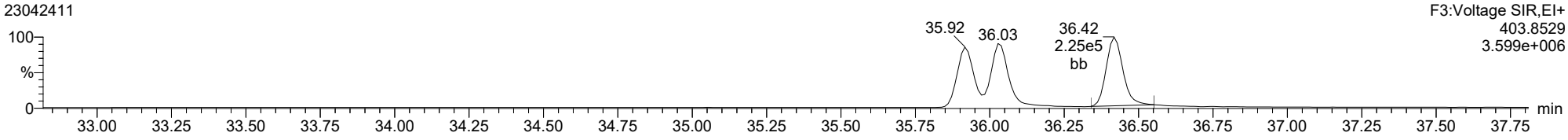

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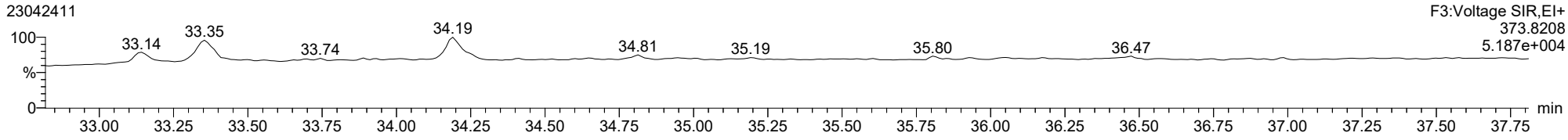

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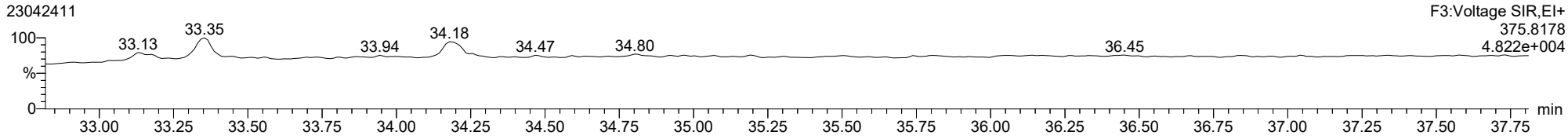

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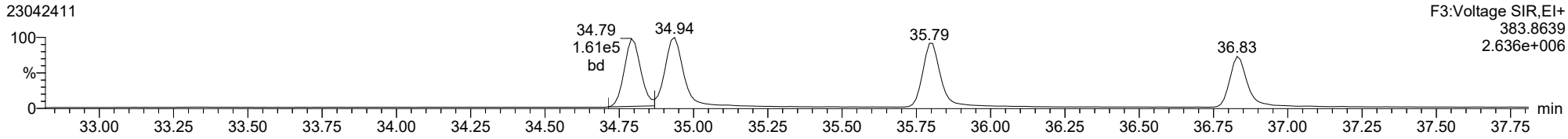

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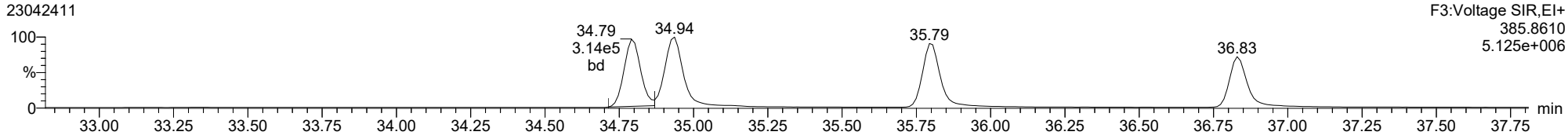

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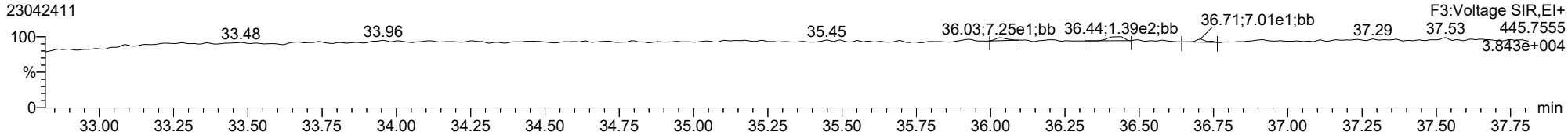

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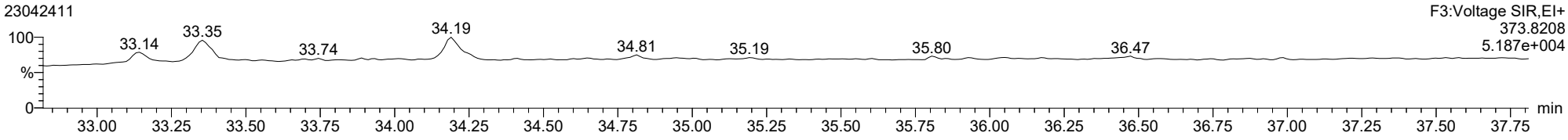

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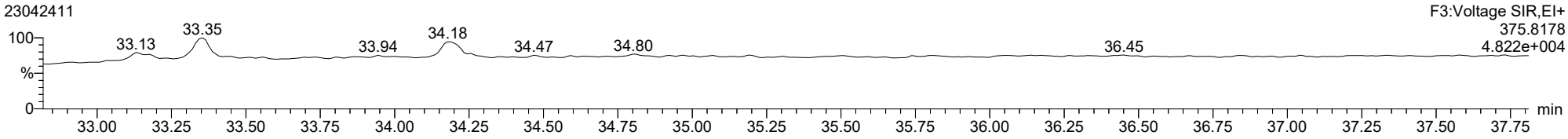

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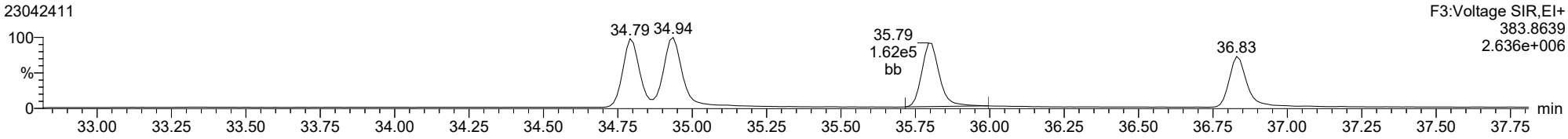

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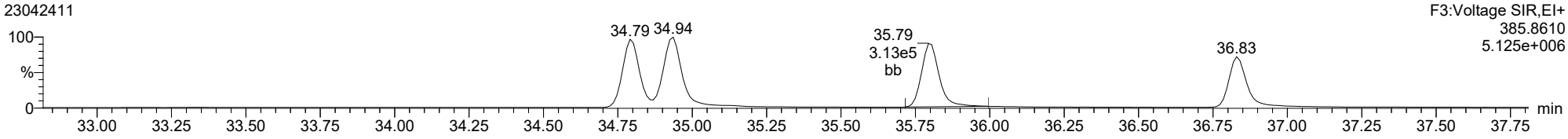

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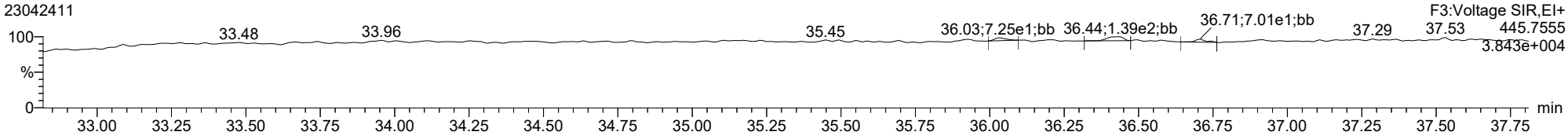

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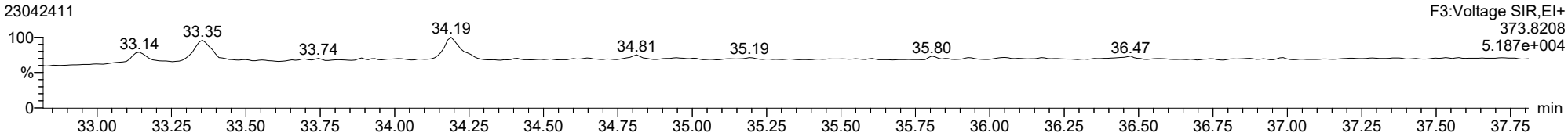

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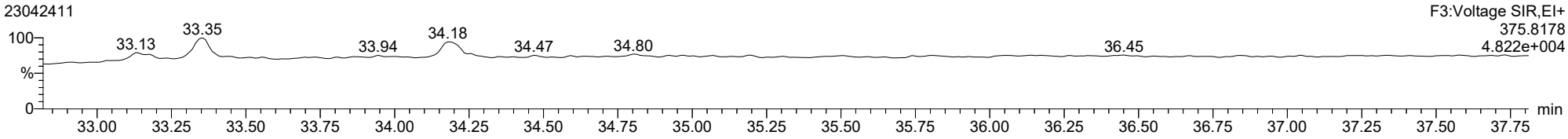

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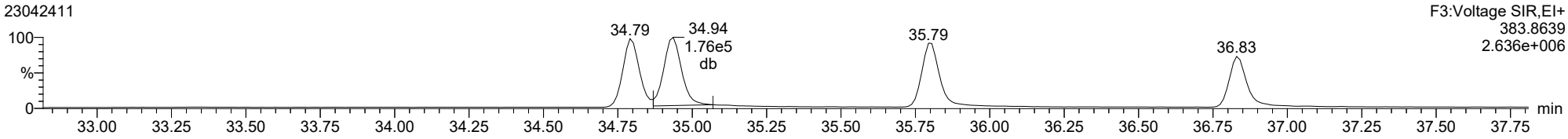

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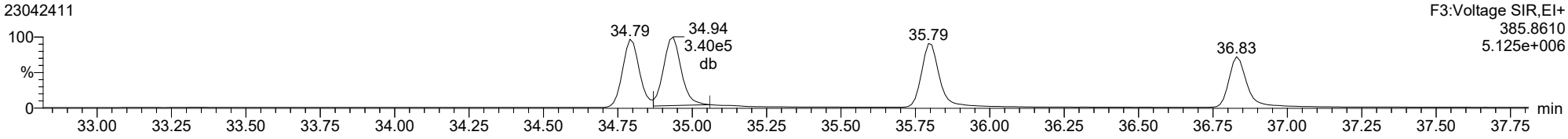

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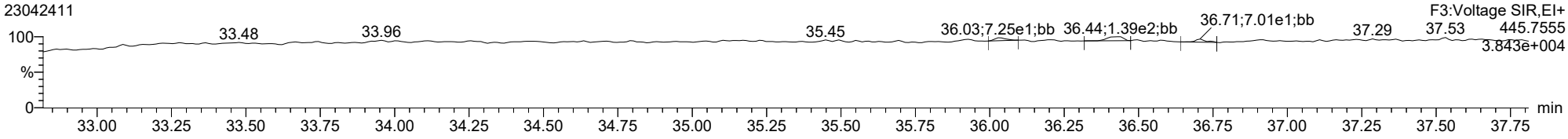

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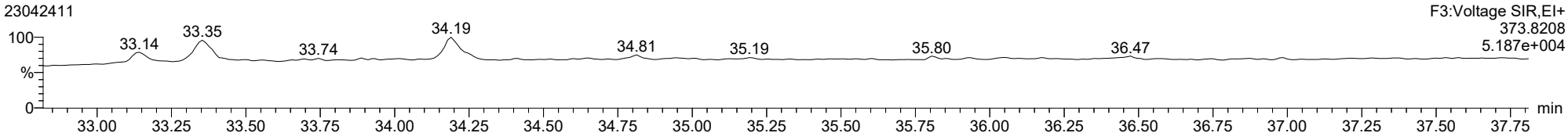

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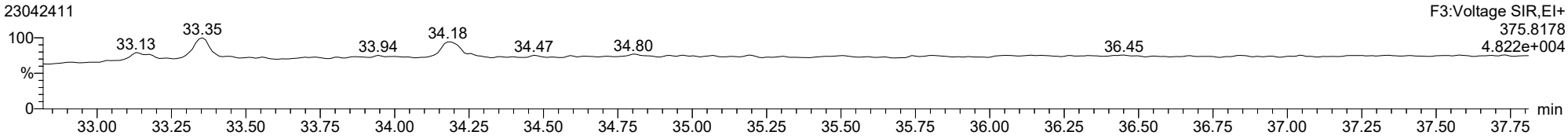

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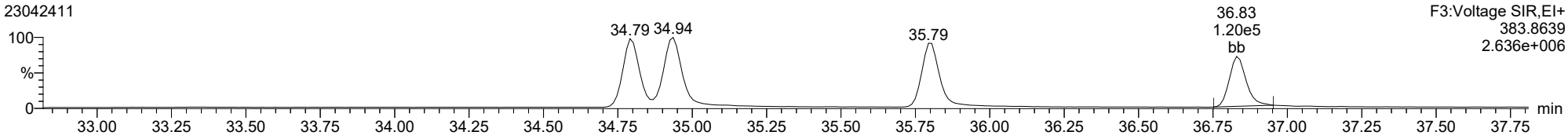

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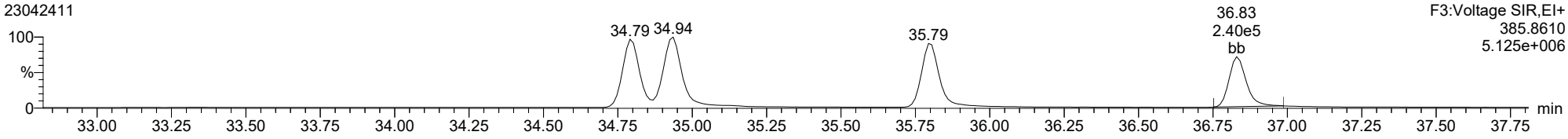
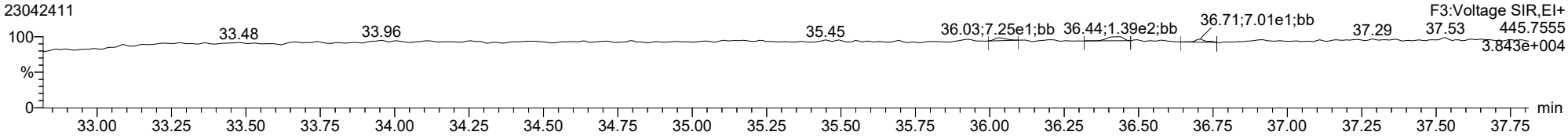


FUNCTION3 OCDPE



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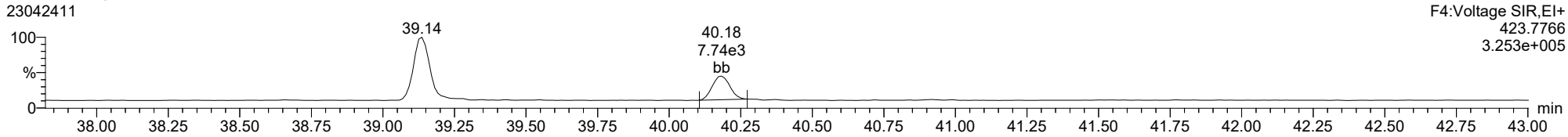

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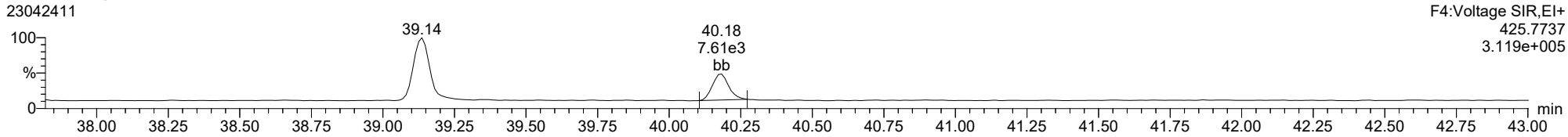

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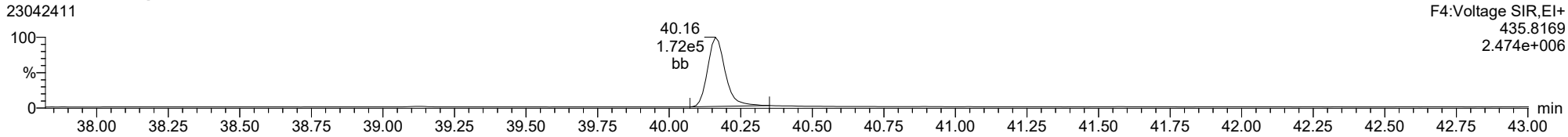

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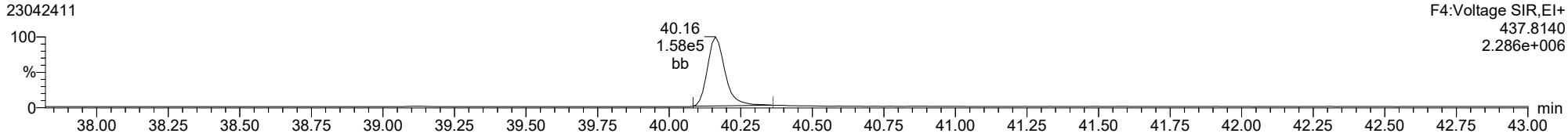
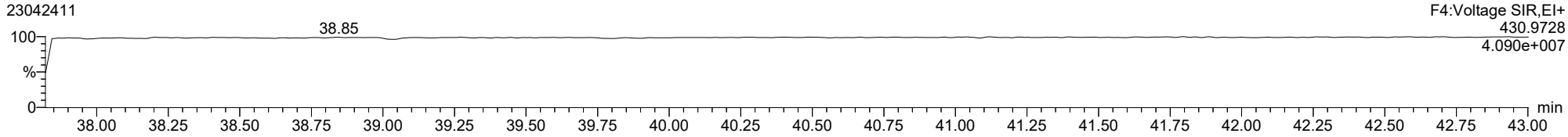


FUNCTION4 PFK



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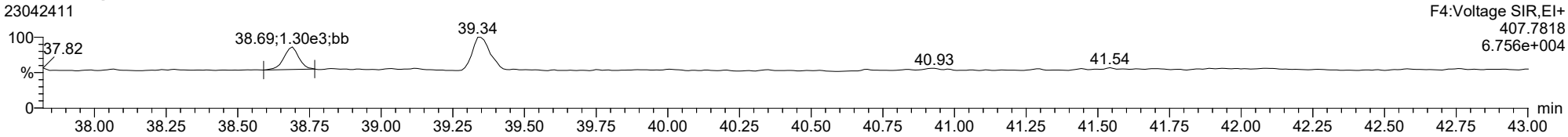

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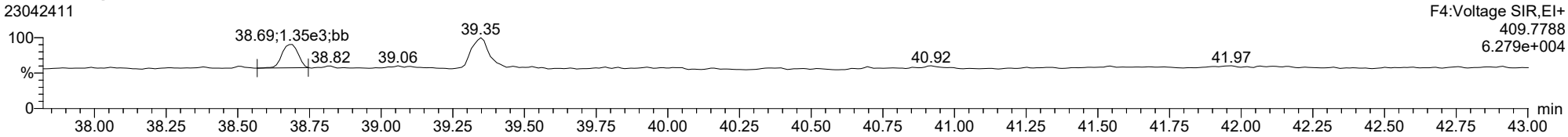

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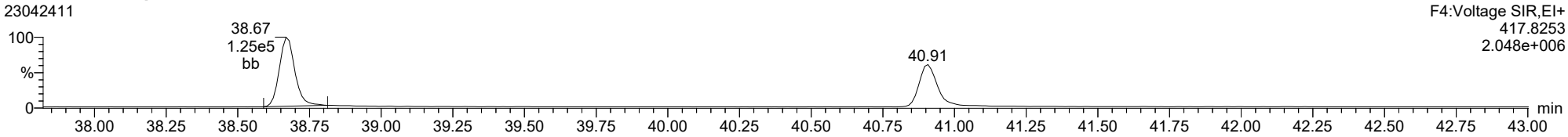

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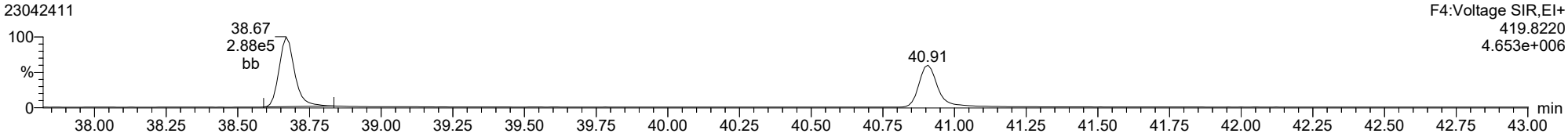
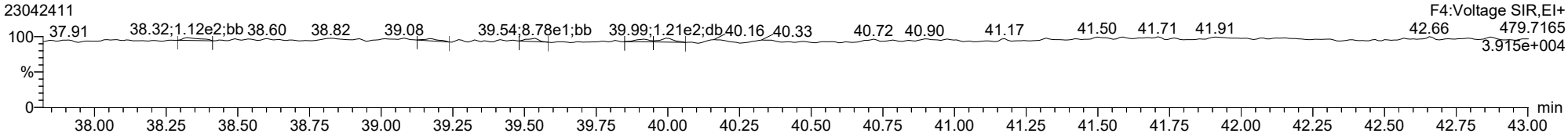


FUNCTION4 NCDPE



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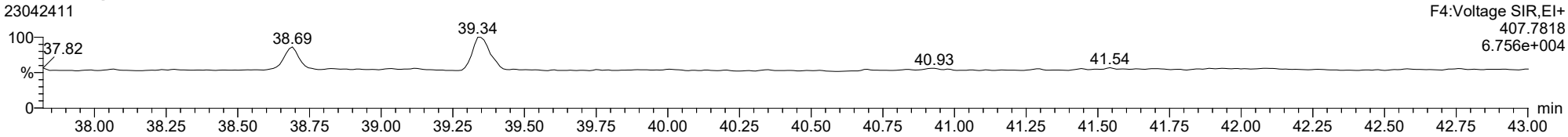

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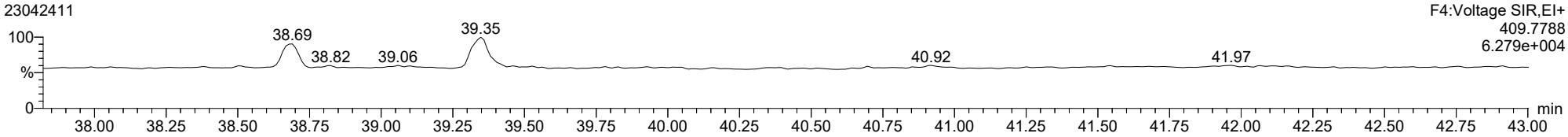

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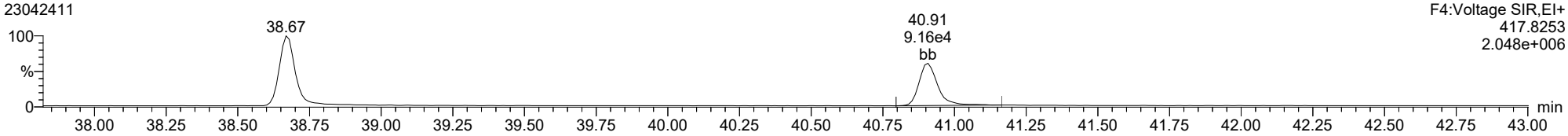

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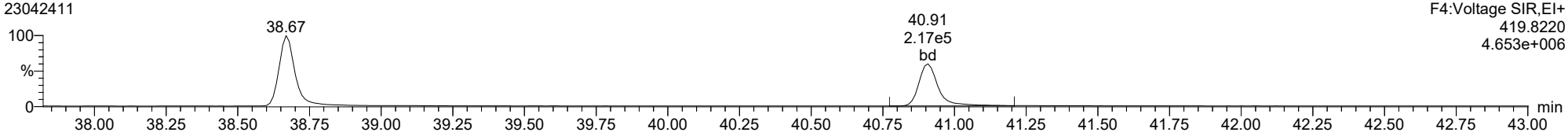

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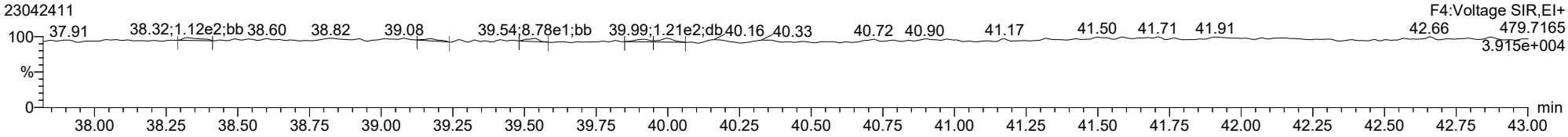

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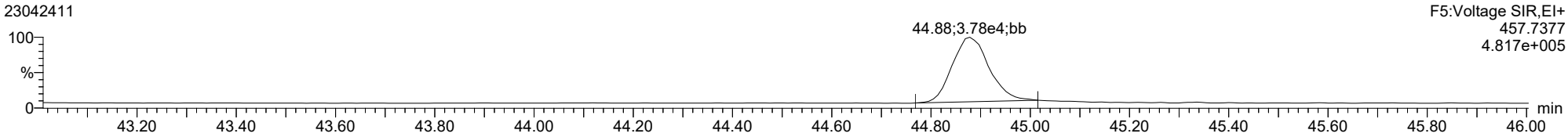
OCDD



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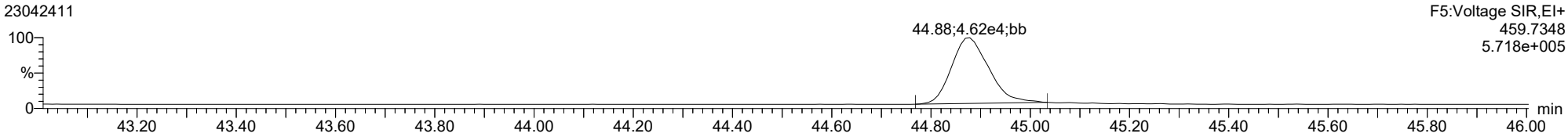

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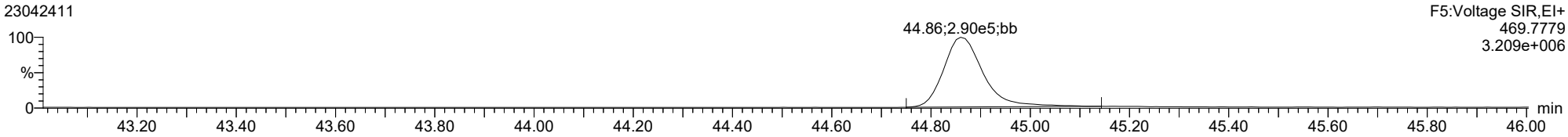

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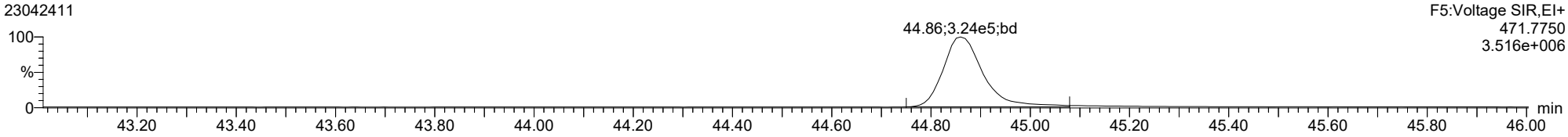
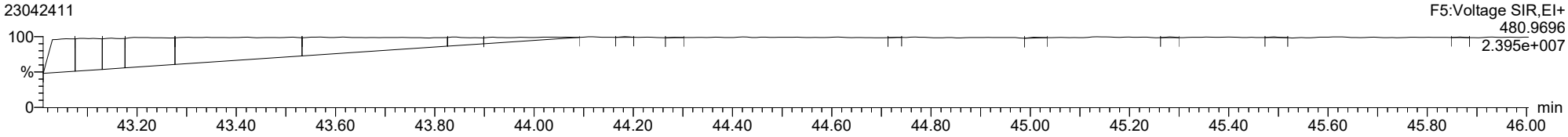


FUNCTION5 PFK



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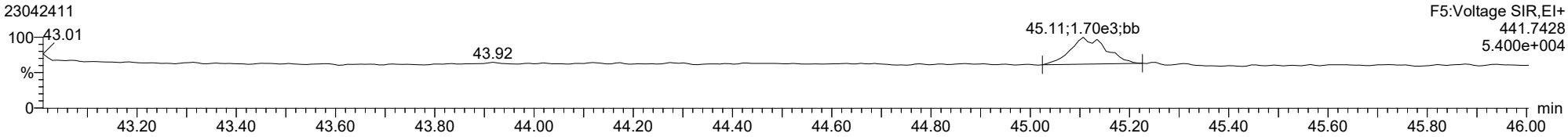

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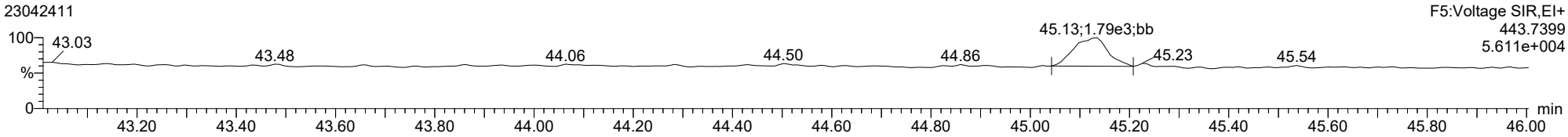
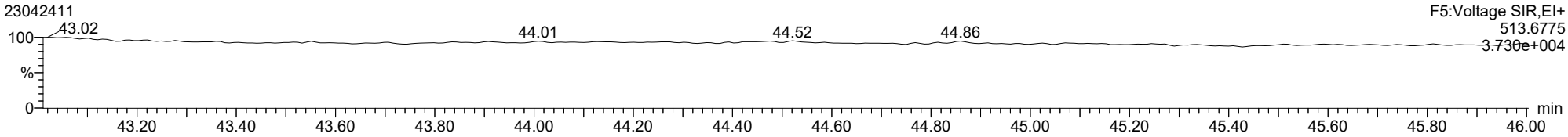


FUNCTION5 DCDPE



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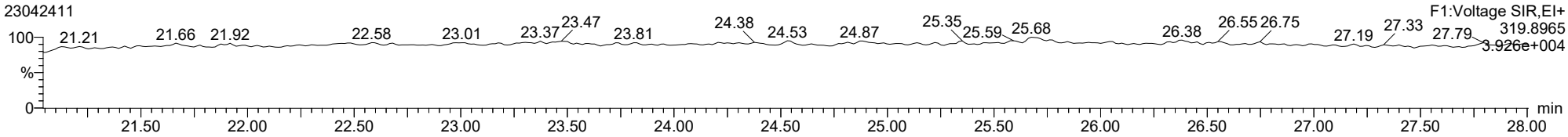
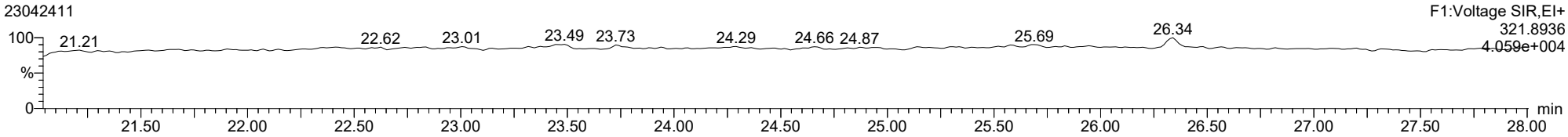
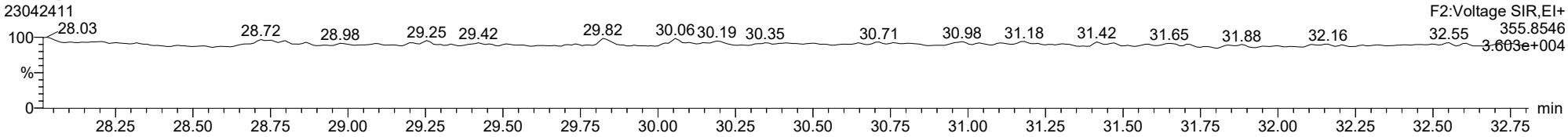
Total-tetradioxins



Total-tetradioxins



Total-pentadioxins



Total-pentadioxins