



# ANALYTICAL REPORT

## PREPARED FOR

Attn: Roger Brewer  
Hawaii Department of Health  
919 Ala Moana Blvd  
Room 206  
Honolulu, Hawaii 96814

Generated 11/27/2023 2:05:12 PM

## JOB DESCRIPTION

Kahalui Fire Training Pit Study

## JOB NUMBER

320-104757-2

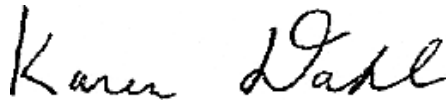
# Eurofins Sacramento

## Job Notes

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The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing Northern California, LLC Project Manager.

## Authorization



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Authorized for release by  
Karen Dahl, Senior Project Manager  
[Karen.Dahl@et.eurofinsus.com](mailto:Karen.Dahl@et.eurofinsus.com)  
(916)374-4384

November 20, 2023

Hawaii Department of Health  
919 Ala Moana Blvd  
Room 206  
Honolulu, HI 96814

Attn: Roger Brewer

RE: PFAS by NTA Results for Eurofins Job 320-104757

Dear Mr. Brewer,

Enclosed are the Non-Target Analysis (NTA) results for potential PFAS parameters in the one solid sample and associated SPLP leachate submitted to Eurofins in Job 320-104757-1. Client and laboratory sample IDs are as follows: KFTA-DU5A (320-104757-1) and KFTA- SPLP LEACHATE (320-104757-6). Analysis was requested via LC-QTOF MS (liquid chromatography quadrupole time-of-flight mass spectrometry) for identification of potential PFAS analytes not determined in the routine targeted analyses that are typically applied to aqueous samples. The NTA determination inherently incurs an increased level of uncertainty and certified reference standards are not used to confirm reported results.

There were several non-target analytes that were identified as potential PFAS parameters in these samples; **Perfluorobutanesulfonamide (FBSA)**, **Perfluorohexanesulfonamide (FHxSA)** and **Perfluoropropanesulfonic acid (PFPrS)** were present in greatest apparent abundance. **Perfluoropropanoic acid (PFPrA)** was potentially present in sample KFTA-DU5A (320-104757-1) but has relatively poor response under the conditions of the NTA acquisition and its identification is less reliable.

Note that no additional analytes were observed in the positive SWATH analysis of either sample, as described below. Thus, all reported results reflect the negative SWATH acquisition.

### Sample Preparation

For sample KFTA- SPLP LEACHATE (320-104757-6), a 10 ml aliquot of leachate previously prepared was subsampled and the pH of the aliquot was measured. The sample aliquot was neutralized, 2.5 ml of the neutralized sample was diluted to 5 ml at final composition of 50:50 MeOH/Water, and a 300 ul aliquot of the 1:1 diluted sample was filtered into an LC/MS injection vial for analysis by LC-QTOF MS. For sample KFTA-DU5A (320-104757-1), a 10 g aliquot of the solid sample was extracted using the laboratory work instruction for solid samples from Hawaii DOH. A 5 ml subsample of the resulting extract (1g sample equivalent) was neutralized, diluted to 10 ml at final composition of 50:50 MeOH/Water, and a 300 ul aliquot of the diluted sample (1 g -> 10 ml) was filtered into an LC/MS injection vial for analysis by LC-QTOF MS.

## Sample Analysis

The sample extracts were introduced into the LC system utilizing an optimized gradient to enhance the identification of early eluting compounds. The gradient ramps slowly over a period of 20 minutes where the compounds are separated on a 3x50mm Phenomenex Gemini C18 analytical column using 20mM ammonium acetate in water and methanol as mobile phases. The SCIEX X500r quadrupole time-of-flight mass spectrometer (QTOF MS) was set to run in sequential Electrospray Ionization (ESI) techniques in both positive and negative polarities utilizing the same gradient and mobile phases.

## Results

Data were processed with SCIEX MarkerView deconvolution software. This software extracts the raw chromatograms across a defined mass range from 0-1500 amu and examines peaks of interest utilizing exact mass and MS/MS fragmentation. The peaks are compared to comprehensive fluorinated compound libraries where the software algorithm assigns possible matches to each peak, or feature. The observed features were then evaluated by a Eurofins analyst to confirm ample signal-to-noise as well as confirming the compound fit to the library match. The reported results include only peaks with a signal-to-noise greater than 10:1 and an absolute intensity greater than 1000 counts.

One limitation the software cannot account for are multiple isomers of the same compound. While the skeletal backbone and molecular formula will be the same, the match might represent a structural isomer of the identified compound.

Please find the results for the negative SWATH analyses in the attached Tables.

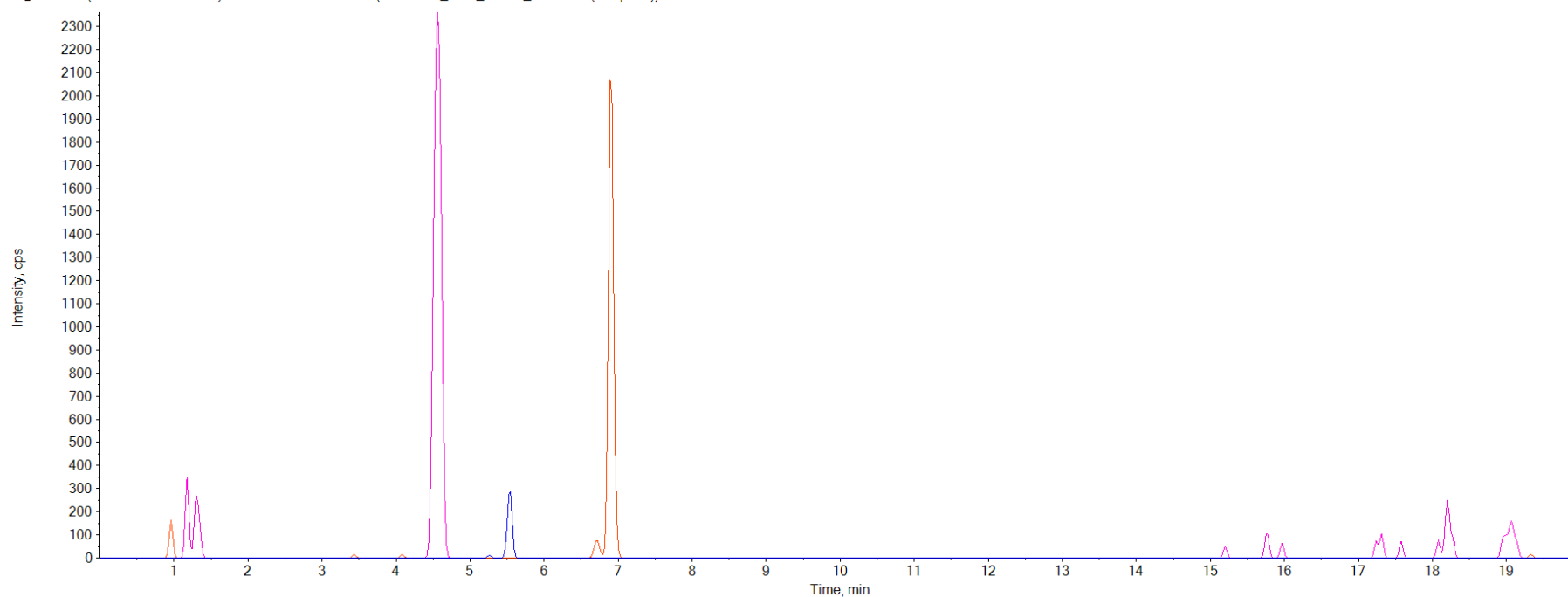
Please do not hesitate to let us know if there are any questions.

## 2023.11.8\_NTA\_SNEG\_013.wiff2 - 320-104757-A-6-D

Data File	2023.11.8_NTA_SNEG_013.wiff2	Result Table	2023.11.10_NEG_SWATH
Acquisition Date	11/8/2023 11:54:09 AM	Algorithm Used	MQ4
Acquisition Method	N/A	Instrument Name	X500 QTOF
Project	PFAS_A11	Processing Method	SWATH_PFAS_Neg_1659_List.qmethod

### Extracted Ion Chromatogram

- perfluorobutane sulfonamide (297.9490 - 297.9690) from 320-104757-A-6-D (2023.11.8\_NTA\_SNEG\_013.wiff2 (sample 1))
- PFPrS (248.9362 - 248.9562) from 320-104757-A-6-D (2023.11.8\_NTA\_SNEG\_013.wiff2 (sample 1))
- FHxSA (397.9426 - 397.9626) from 320-104757-A-6-D (2023.11.8\_NTA\_SNEG\_013.wiff2 (sample 1))



## Summary

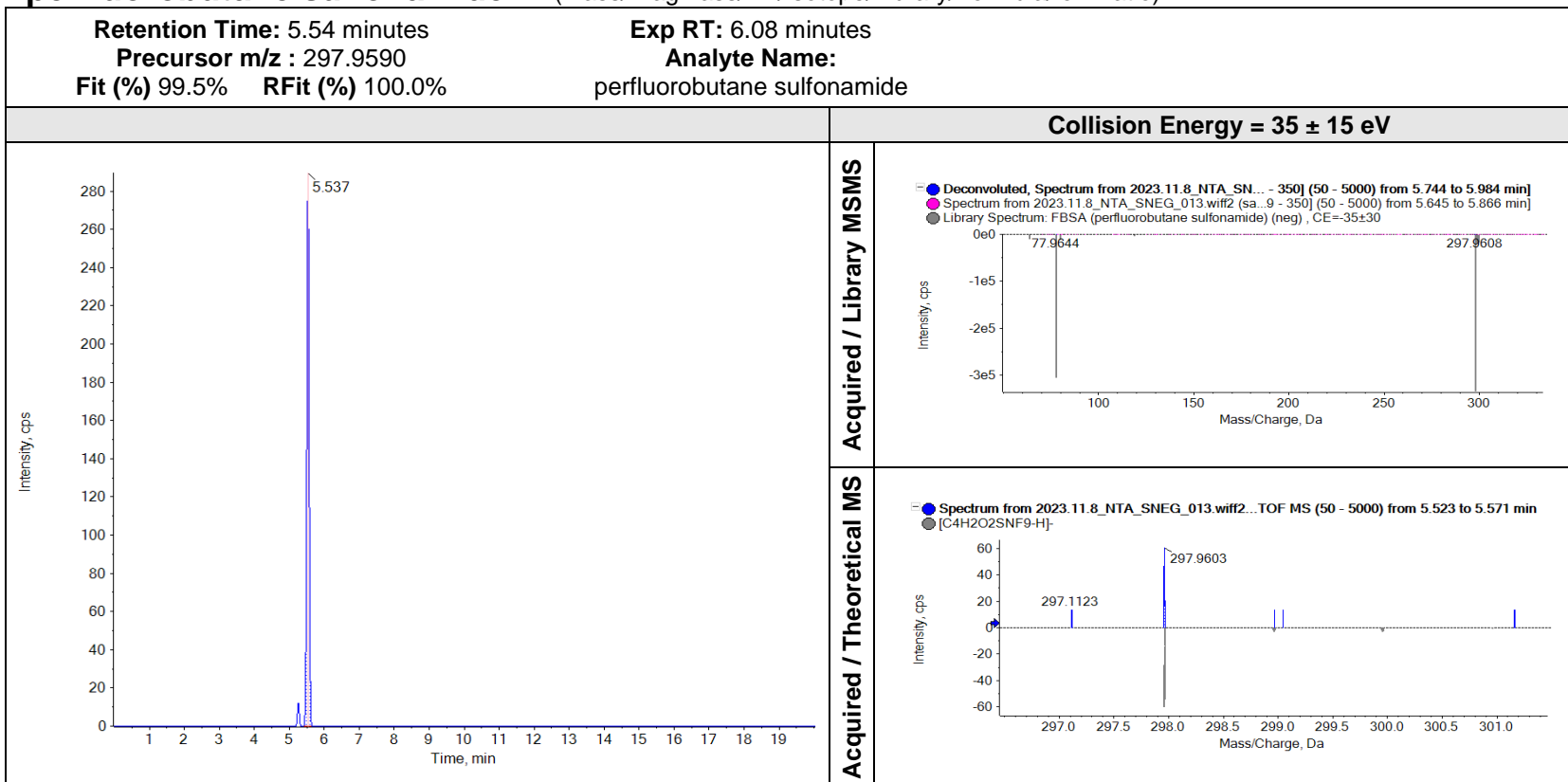
#	Analyte Peak Name	Mass Error Confidence	Fragment Mass Error Confidence	RT Confidence	Isotope Confidence	Library Confidence	Formula Confidence	Ion Ratio Confidence	Sample Name
354	perfluorobutane sulfonamide	✓	●	●	▲	✓	●	●	320-104757-A-6-D
1670	PFPrS	✓	●	●	▲	✓	●	●	320-104757-A-6-D
1701	FHxSA	✓	●	●	▲	✓	●	●	320-104757-A-6-D

#	Analyte Peak Name	Sample Type	Component Name	Area	Calculated Concentration	Formula	Precursor Mass	Found At Mass	Mass Error (ppm)	Library Hit
354	perfluorobutane sulfonamide	Unknown	perfluorobutane sulfonamide	1.375e+03	<2 points	C4H2O2SNF9	297.959	297.9603	4.3	FBSA (perfluorobutane sulfonamide) (neg) Smart Confirmation
1670	PFPrS	Unknown	PFPrS	1.777e+04	<2 points	C3HF7O3S	248.946	248.9470	3.3	PFPrS (perfluoropropane sulfonate) (neg)
1701	FHxSA	Unknown	FHxSA	1.045e+04	<2 points	C6H2F13NO2S	397.953	397.9528	0.5	FHxSA (perfluorohexane sulfonamide) (neg)

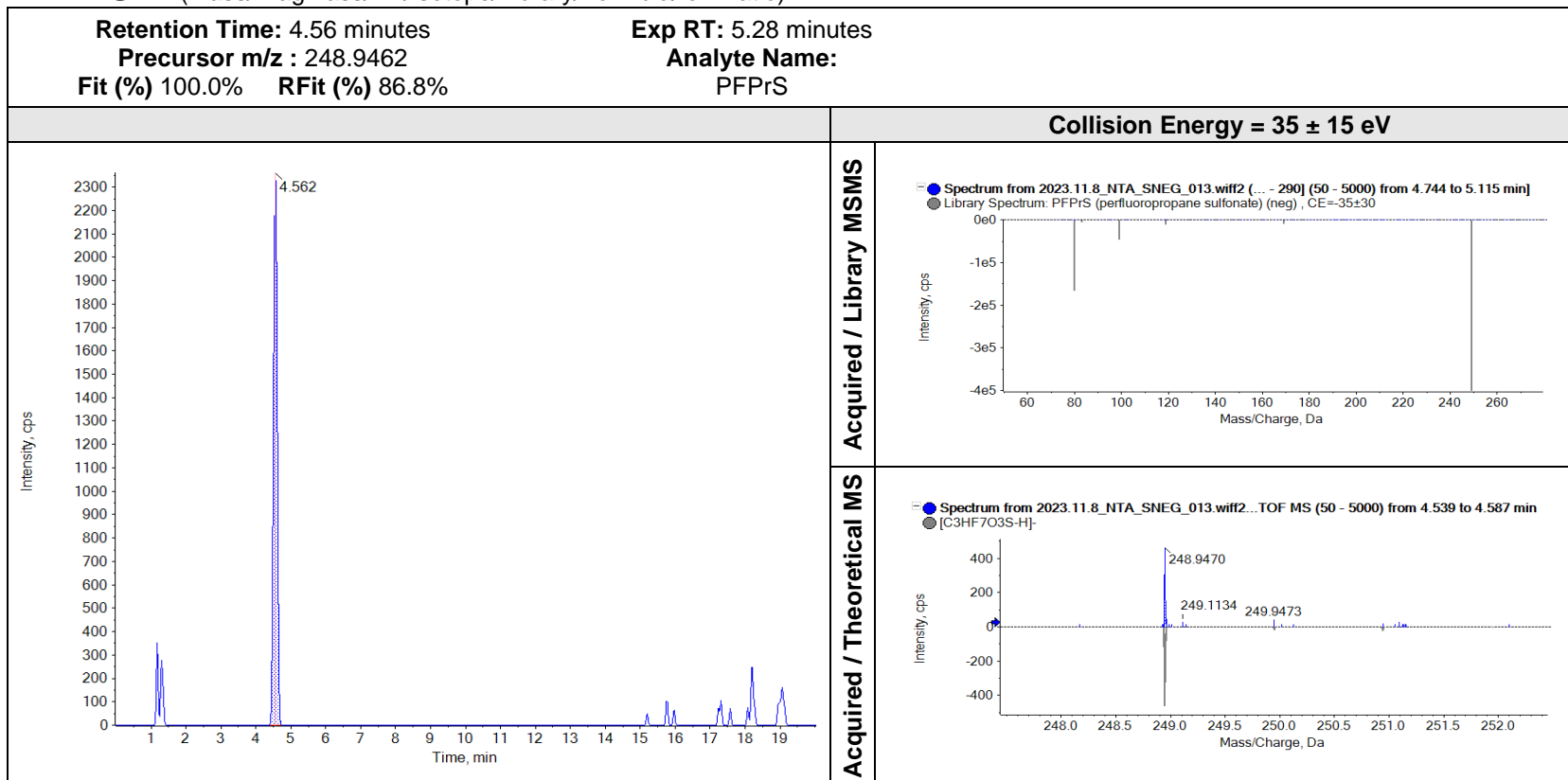
#	Analyte Peak Name	Library Score	Isotope Ratio Difference
354	perfluorobutane sulfonamide	99.5	5.6
1670	PFPrS	100.0	5.2
1701	FHxSA	100.0	6.0

End of Table

**perfluorobutane sulfonamide** (Mass/FragMass/RT/Isotope/Library/Formula/Ion Ratio)



**PFPPrS** (Mass/FragMass/RT/Isotope/Library/Formula/Ion Ratio) ✓ ● ● ▲ ✓ ● ●







**FHxSA** (Mass/FragMass/RT/Isotope/Library/Formula/Ion Ratio)

<div>Retention Time: 6.90 minutes Precursor m/z : 397.9526 Fit (%) 100.0%    RFit (%) 100.0%</div>		<div>Exp RT: 7.00 minutes Analyte Name: FHxSA</div>	
<div><p>Intensity, cps</p><p>Time, min</p></div>		Collision Energy = 35 ± 15 eV	
		<div>Acquired / Library MSMS</div> <div><p>● Deconvoluted, Spectrum from 2023.11.8_NTA_SN... - 410] (50 - 5000) from 7.138 to 7.354 min] ● Spectrum from 2023.11.8_NTA_SNEG_013.wiff2 (sa...9 - 410] (50 - 5000) from 7.024 to 7.252 min] ● Library Spectrum: FHxSA (perfluorohexane sulfonamide) (neg) , CE=-35±30</p></div>	
		<div>Acquired / Theoretical MS</div> <div><p>● Spectrum from 2023.11.8_NTA_SNEG_013.wiff2...TOF MS (50 - 5000) from 6.868 to 6.916 min ● [C6H2F13NO2S-H]-</p></div>	



### 2023.10.18\_NTA\_SNEG\_008.wiff2 - 104757-1

<b>Data File</b>	2023.10.18_NTA_SNEG_008.wiff2	<b>Result Table</b>	2023.10.18_NEG_SWATH.B
<b>Acquisition Date</b>	10/18/2023 1:07:56 PM	<b>Algorithm Used</b>	MQ4
<b>Acquisition Method</b>	N/A	<b>Instrument Name</b>	X500 QTOF
<b>Project</b>	PFAS_A11	<b>Processing Method</b>	SWATH_PFAS_Neg_1659_List.11.10.2023.qmethod

## Summary

#	Analyte Peak Name	Mass Error Confidence	Fragment Mass Error Confidence	RT Confidence	Isotope Confidence	Library Confidence	Formula Confidence	Ion Ratio Confidence	Sample Name
354	perfluorobutane sulfonamide	✓	●	●	▲	✓	●	●	104757-1
1663	PFPrA	✓	●	●	✓	●	●	●	104757-1
1670	PFPrS	✓	●	●	✓	✓	●	●	104757-1
1701	FHxSA	✓	●	●	▲	✓	●	●	104757-1

#	Analyte Peak Name	Sample Type	Component Name	Area	Calculated Concentration	Formula	Precursor Mass	Found At Mass	Mass Error (ppm)	Library Hit
354	perfluorobutane sulfonamide	Unknown	perfluorobutane sulfonamide	1.605e+03	<2 points	C4H2O2SNF9	297.959	297.9591	0.5	FBSA (perfluorobutane sulfonamide) (neg) Smart Confirmation
1663	PFPrA	Unknown	PFPrA	1.601e+03	<2 points	C3HF5O2	162.982	162.9830	3.8	No Match
1670	PFPrS	Unknown	PFPrS	2.189e+04	<2 points	C3HF7O3S	248.946	248.9459	-1.0	PFPrS (perfluoropropane sulfonate) (neg)
1701	FHxSA	Unknown	FHxSA	1.935e+04	<2 points	C6H2F13NO2S	397.953	397.9533	1.9	FHxSA (perfluorohexane sulfonamide) (neg)

#	Analyte Peak Name	Library Score	Isotope Ratio Difference
354	perfluorobutane sulfonamide	99.7	5.6
1663	PFPrA	0.0	3.3
1670	PFPrS	99.9	4.0
1701	FHxSA	100.0	5.2

End of Table

# perfluorobutane sulfonamide (Mass/FragMass/RT/Isotope/Library/Formula/Ion Ratio)



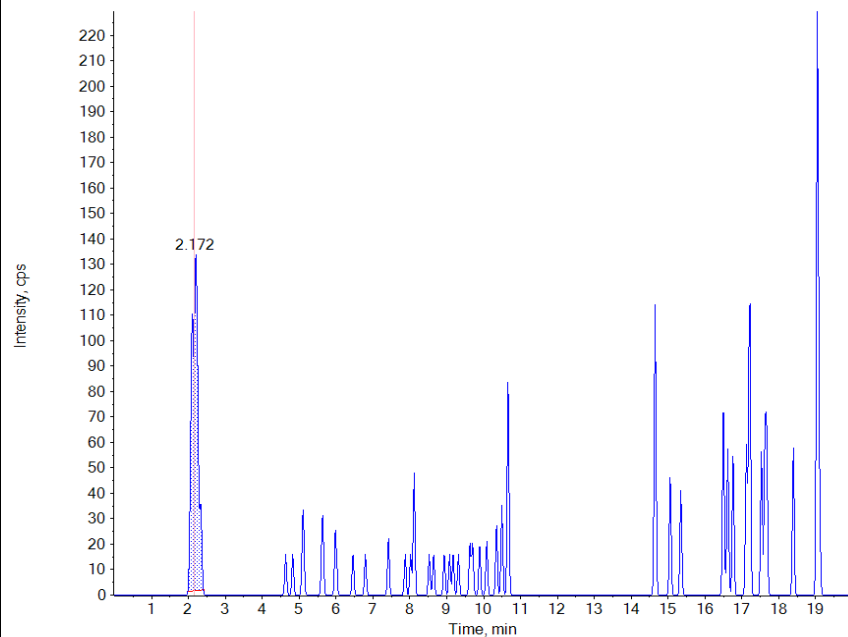
<p><b>Retention Time:</b> 5.39 minutes <b>Precursor m/z :</b> 297.9590 <b>Fit (%)</b> 99.7% <b>RFit (%)</b> 100.0%</p>		<p><b>Exp RT:</b> 6.08 minutes <b>Analyte Name:</b> perfluorobutane sulfonamide</p>	
		<b>Collision Energy = 35 ± 15 eV</b>	
<p>Intensity, cps</p> <p>Time, min</p>	Acquired / Library MSMS	<p>● Deconvoluted, Spectrum from 2023.10.18_NTA_S... - 350] (50 - 5000) from 5.600 to 5.816 min] ● Spectrum from 2023.10.18_NTA_SNEG_008.wiff2 (s...9 - 350] (50 - 5000) from 5.500 to 5.718 min] ● Library Spectrum: FBSA (perfluorobutane sulfonamide) (neg) , CE=-35±30</p> <p>Intensity, cps</p> <p>Mass/Charge, Da</p>	
		<p>● Spectrum from 2023.10.18_NTA_SNEG_008.wiff...TOF MS (50 - 5000) from 5.355 to 5.403 min ● [C4H2O2SNF9-H]<sup>-</sup></p> <p>Intensity, cps</p> <p>Mass/Charge, Da</p>	

**PFPPrA** (Mass/FragMass/RT/Isotope/Library/Formula/Ion Ratio) ✓ ● ● ✓ ● ●

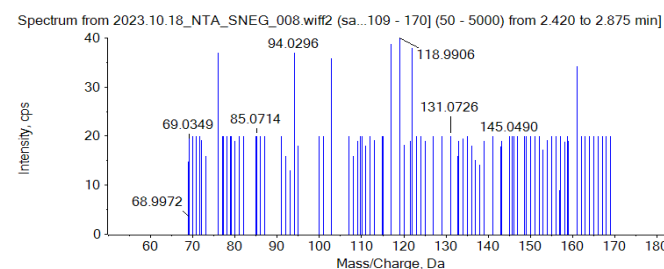
**Retention Time:** 2.17 minutes  
**Precursor m/z :** 162.9824  
**Fit (%)** N/A **RFit (%)** N/A

**Exp RT:** 3.06 minutes  
**Analyte Name:**  
PFPPrA

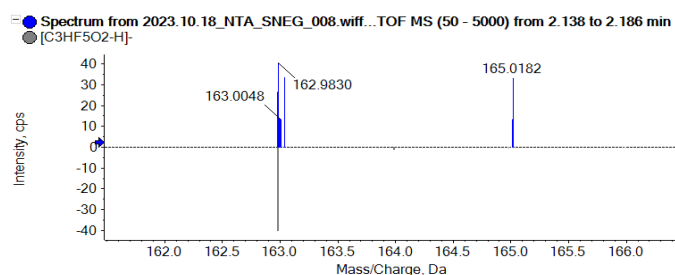
**Collision Energy = 35 ± 15 eV**



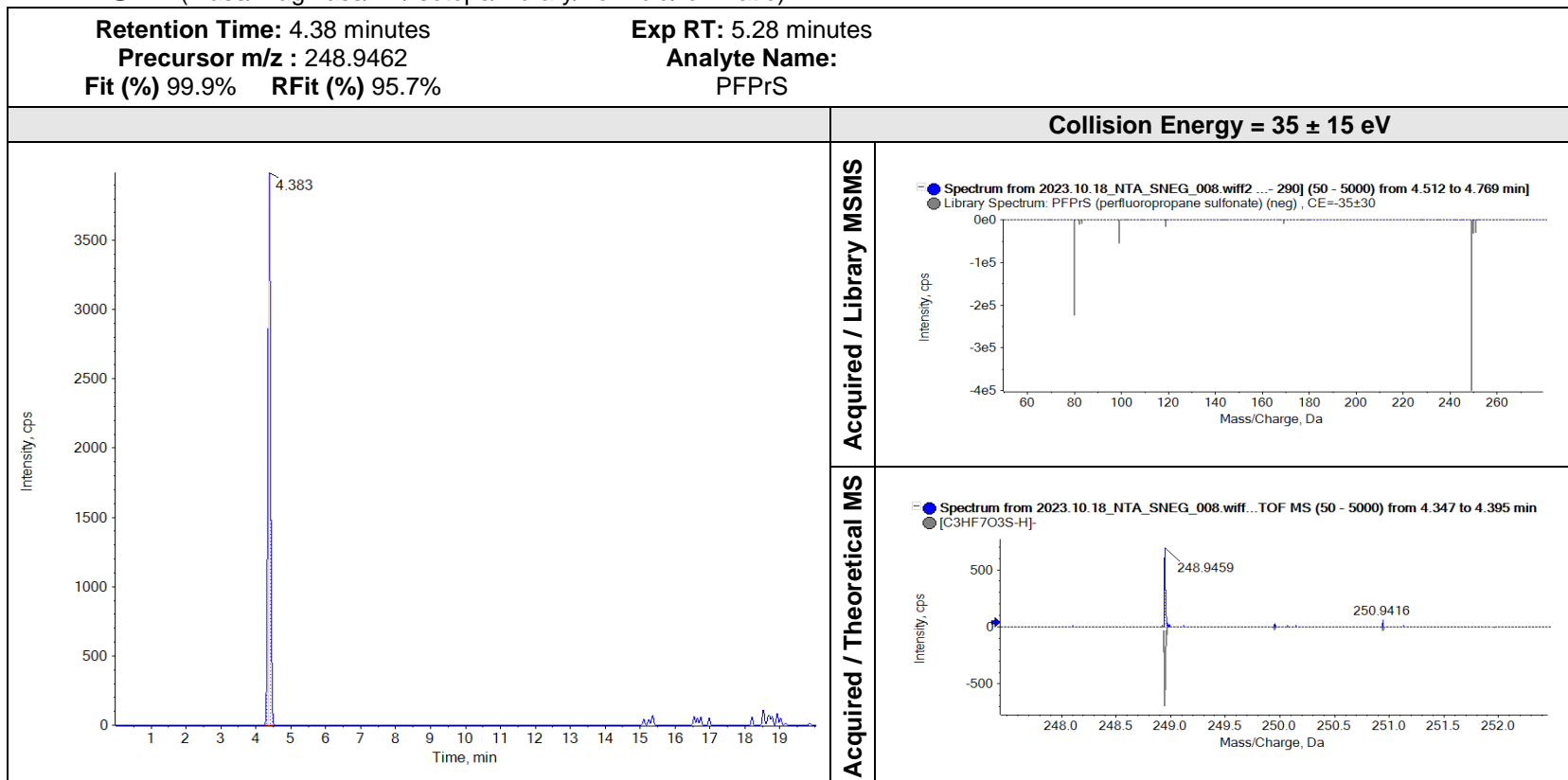
Acquired / Library MSMS



Acquired / Theoretical MS

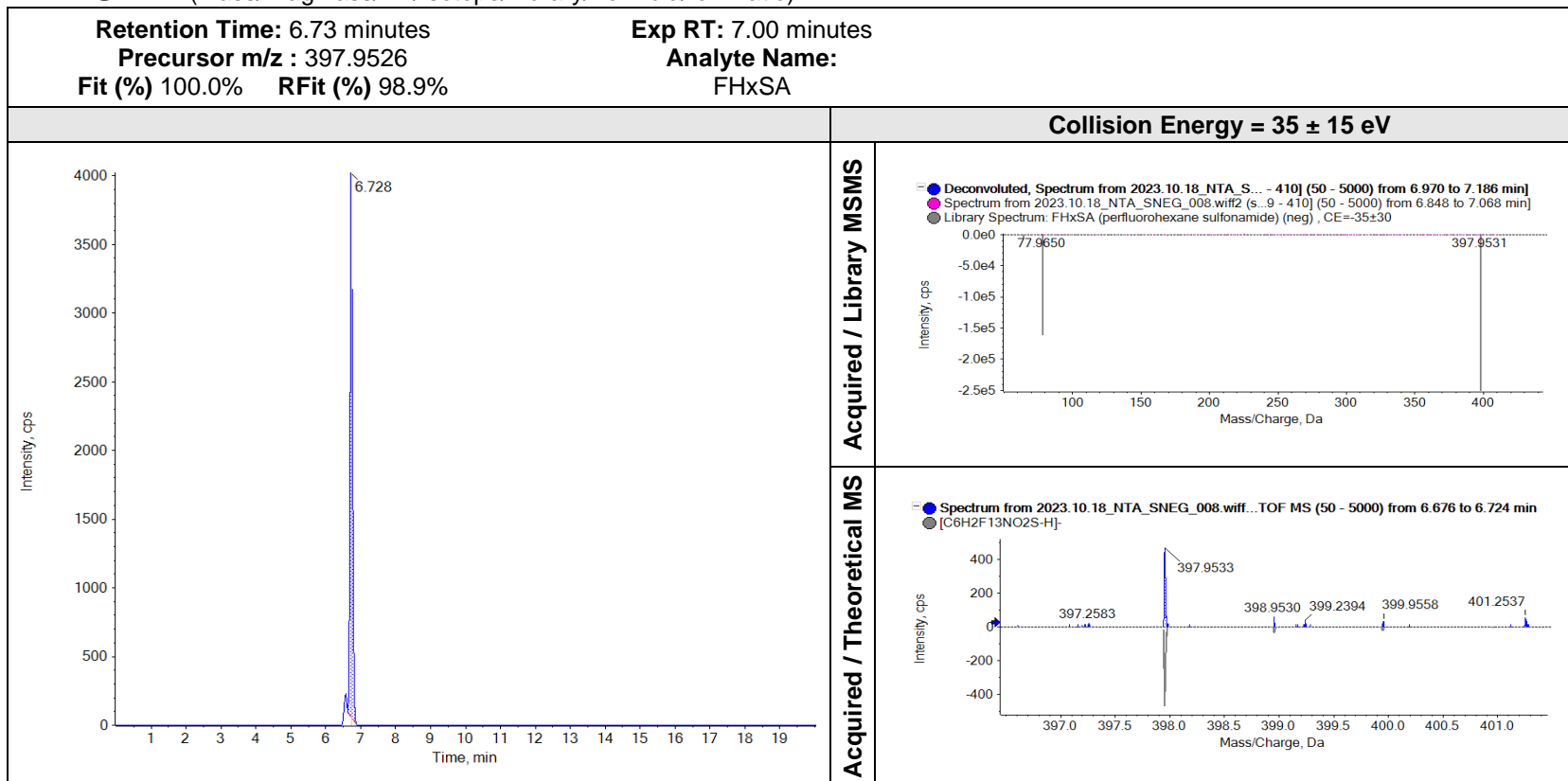


**PFPPrS** (Mass/FragMass/RT/Isotope/Library/Formula/Ion Ratio) ✓ ● ● ✓ ✓ ● ●






**FHxSA** (Mass/FragMass/RT/Isotope/Library/Formula/Ion Ratio)



808-225-7084  
eric.jensen@tetratech.com

TAL-8210

<b>Client Contact</b> Company Name: <u>Hawaii Dept of Health</u> Address: <u>2385 Waimanalo Home Rd, Waimanalo, HI 96872</u> City/State/Zip: <u>Pearl City, HI 96872</u> Phone: <u>808-586-4349</u> Fax: _____ Project Name: <u>Kahului Fire Training Area</u> Site: _____ P O # _____		<b>Project Manager: Roger Brewer</b> Tell/Email: <u>see above</u> <b>Analysis Turnaround Time</b> <input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS TAT if different from Below _____ <input type="checkbox"/> 2 weeks <input type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day		<b>Site Contact:</b> Lab Contact: <u>Karen Dahl</u> Date: _____ Carrier: _____		COC No: _____ of _____ COCs Sampler: _____ For Lab Use Only: Walk-in Client: _____ Lab Sampling: _____ Job / SDG No.: _____											
<b>Sample Identification</b> KETA-DU5A KETA-DU5B KETA-DU5C		Sample Date 9/6/23 " " " "		Sample Time 11:30am " " " "		Sample Type (C=Comp, G=Grab) Incr " " " "		Matrix Soil " " " "		# of Cont. 1 1 1		Filtered Sample (Y/N) X X X		Perform MS/MSD (Y/N) X X X		Sample Specific Notes:   	
 320-104757 Chain of Custody																	
Preservation: 1=H <sub>2</sub> O; 2=HCl; 3=H <sub>2</sub> SO <sub>4</sub> ; 4=HNO <sub>3</sub> ; 5=H <sub>2</sub> O <sub>2</sub> ; 6=H <sub>2</sub> O <sub>2</sub> /HNO <sub>3</sub>																	
<b>Possible Hazard Identification:</b> Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample. <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown																	
<b>Special Instructions/QC Requirements &amp; Comments:</b> -MI (ISA) process: air dry, sieve < 2mm, minimum 10 gram subsamples for testing * samples from AFFF impacted site possible high PFAS concentration -Test laboratory subsample triplicate on KETA-DU5A Relinquished by: <u>Progen B</u> Date/Time: <u>9/11/23 9:00</u> Company: <u>HD6H</u> Relinquished by: _____ Date/Time: _____ Company: _____ Relinquished by: _____ Date/Time: _____ Company: _____																	
Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return to Client <input type="checkbox"/> Disposal by Lab <input type="checkbox"/> Archive for _____ Months																	
Cooler Temp. (°C): Obs'd: <u>5.7</u> Cor'd: <u>5.7</u> Therm ID No.: <u>60</u> Date/Time: <u>9/12/23 0930</u> Company: <u>Ger Sae</u> Date/Time: _____ Company: _____ Date/Time: _____ Company: _____																	





## Environment Testing

Sacramento  
Sample Receiving NotesTracking # 9836 2131 5160

Loc 320

104757

Job \_\_\_\_\_

SO / PO / FO / SAT 2-Day / Ground / UPS / CDO / Courier  
GSL / OnTrac / Goldstreak / USPS / Other \_\_\_\_\_Use this form to record Sample Custody Seal Cooler Custody Seal Temperature & corrected Temperature & other observations.  
File in the job folder with the COCTherm ID 602 Corr Factor ( + / ) \_\_\_\_\_ °CIce \_\_\_\_\_ Wet \_\_\_\_\_ Gel ☒ Other \_\_\_\_\_Cooler Custody Seal 2100599

Cooler ID \_\_\_\_\_

Temp Observed 5.7 °C Corrected 5.7 °CFrom Temp Blank ☐ Sample ☒

## Opening/Processing The Shipment

Yes No NA

Cooler compromised/tampered with? ☐ ☒ ☐Cooler Temperature is acceptable? ☒ ☐ ☐Frozen samples show signs of thaw? ☐ ☐ ☒Initials dm Date 9/12/23

## Unpacking/Labeling The Samples

Yes No NA

Containers are not broken or leaking? ☒ ☐ ☐Samples compromised/tampered with? ☐ ☒ ☐COC is complete w/o discrepancies ☒ ☐ ☐Sample custody seal? ☐ ☐ ☒Sample containers have legible labels? ☒ ☐ ☐Sample date/times are provided? ☒ ☐ ☐Appropriate containers are used? ☒ ☐ ☐Sample bottles are completely filled? ☒ ☐ ☐Sample preservatives verified? ☐ ☐ ☒Is the Field Sampler's name on COC? ☐ ☒ ☐Samples w/o discrepancies? ☐ ☒ ☐Zero headspace?\* ☐ ☐ ☒Alkalinity has no headspace? ☐ ☐ ☒Perchlorate has headspace? ☐ ☐ ☒

(Methods 314, 331 6850)

Multiphasic samples are not present? ☒ ☐ ☐

\*Containers requiring zero headspace have no headspace, or bubble &lt; 6 mm (1/4")

Initials dm Date 9/12/23

Notes \_\_\_\_\_

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Trizma Lot #(s) \_\_\_\_\_

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Ammonium

Acetate Lot #(s) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Login Completion

Yes No NA

Receipt Temperature on COC? ☒ ☐ ☐NCM Filed? ☒ ☐ ☐Samples received within hold time? ☒ ☐ ☐Log Release checked in TALS? ☒ ☐ ☐Initials dm Date 9/12/23

## Login Sample Receipt Checklist

Client: Hawaii Department of Health

Job Number: 320-104757-2

Login Number: 104757

List Source: Eurofins Sacramento

List Number: 1

Creator: Medeiros, Ryan M

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.	True	REFER TO SSRN
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	N/A	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	N/A	
Cooler Temperature is recorded.	N/A	
COC is present.	N/A	
COC is filled out in ink and legible.	N/A	
COC is filled out with all pertinent information.	N/A	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	N/A	
Samples are received within Holding Time (excluding tests with immediate HTs)	N/A	
Sample containers have legible labels.	N/A	
Containers are not broken or leaking.	N/A	
Sample collection date/times are provided.	N/A	
Appropriate sample containers are used.	N/A	
Sample bottles are completely filled.	N/A	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	N/A	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	N/A	
Residual Chlorine Checked.	N/A	