Australian Government
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National Measurement Institute

Proficiency Test Final Report AQA 25-09 PFAS in Water

February 2026

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I would like to thank the management and staff of the participating laboratories for supporting the study. It is only through widespread participation that we can provide an effective service to laboratories.

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Raluca Iavetz

Manager, Chemical Reference Values

105 Delhi Road, North Ryde, NSW 2113, Australia

Phone: +61 2 9449 0234

Email: proficiency@measurement.gov.au

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SUMMARY

This report presents the results of the proficiency test AQA 25-09 PFAS in Water. This study was designed based on USEPA Method 1633A requirements and participant requests, and is focused on the measurement of 42 per- and poly-fluoroalkyl substances (PFAS) in water: PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFNA, PFDA, PFUdA, PFDoA, PFTrDA, PFTeDA, PFHxDA, PFODA, FOUEA, PFBS, PFPeS, PFHxS, PFHpS, PFOS, PFNS, PFDS, PFUdS, PFDoS, PFTrDS, PFOSA, 4:2FTS, 6:2FTS, 8:2FTS, 10:2FTS, 6:2diPAP, 8:2diPAP, 6:2FTOH, 3:3FTCA, 5:3FTCA, GenX, ADONA, PFMPA, PFEESA, 9Cl-PF3ONS, and 11Cl-PF3OUdS. Participants were also asked to report linear: PFHxS and PFOS. This study also included a pilot sample which was focused on the measurement of short-chain PFAS (PFPrA and TFMS), adsorbable organic fluorine (AOF), extractable organic fluorine (EOF), and total fluorine (TF). This sample was designed to enable laboratories to assess their capabilities in measuring these tests.

Forty laboratories participated and all submitted results.

The sample set consisted of:

- Sample S1: Potable water spiked with 28 PFAS contaminants at low level.
- Sample S2: River water spiked with 28 PFAS contaminants at standard level.
- Sample S3: Reagent grade water spiked with 8 PFAS contaminants at trace level.
- Sample S4 (pilot sample): Reagent grade water spiked with 2 short-chain PFAS, PFOA and inorganic fluoride.

The assigned values were the robust averages of participants' results. The associated uncertainties were evaluated from the robust standard deviations of the participants' results.

The consensus of participants' results is not traceable to any external reference, so although assigned values have been expressed in SI units, metrological traceability has not been established.

The outcomes of the study were assessed against the aims as follows, to:

- *Compare the performances of participant laboratories and to assess their capabilities in the measurement of PFAS in water matrices.*

Laboratory performance was assessed using both z-scores and E_n-scores.

Of 1613 z-scores, 1459 (90%) returned $|z| \leq 2.0$, indicating an acceptable performance.

Of 1610 E_n-scores, 1239 (77%) returned $|E_n| < 1.0$, indicating agreement of the participant's result with the assigned value within their respective expanded uncertainties.

Out of a total of 65 scored analytes, Laboratory **27** returned the highest number of acceptable z-scores (62 out of 62 reported results) and acceptable E_n-scores (60).

Twenty-two participants did not report numeric results for at least one analyte that they tested for and was present in the test samples.

Thirteen participants reported at least one additional analyte for Samples S1, S2, and/or S3. For the pilot Sample S4, seven participants reported at least one additional analyte.

Most results reported for the short-chain PFAS analytes (PFPrA and TFMS) in Sample S4 were in excellent agreement with each other and the spike value.

Three participants (Laboratories **7**, **11**, and **29**) reported numeric results for AOF. Participants achieved between 67% and 107% recovery relative to the expected value for this test.

Laboratory **11** was the only participant to report a result for EOF in Sample S4. They recovered 99% of the expected value.

Laboratory **11** also was the only one participant who reported a numeric result for TF. The result was in reasonable agreement with the spike value (result to spike value ratio of 77%).

- *Evaluate the participants' test methods for PFAS in water.*

Generally, performances across the potable and river water matrices were similar.

The majority of results from participants who did not add the isotopically labelled standard directly into the bottle were biased either low or high.

Most of the low *z*-scores for the long-chain carboxylic acids and sulfonates were from laboratories who did not use the entire sample and/or did not rinse the bottle.

Several analytes were introduced for the first time in water in the present study based on participants' feedback: PFHxDA, FOUEA, 3:3FTCA, 6:2FTOH, and PFMPA. Other than 6:2FTOH, most results were in reasonable agreement with each other and the spiked value. Only two participants reported numeric results for 6:2FTOH. The results were significantly different from each other and from the spike value. Measurement of fluorotelomer alcohols is an area in which laboratories can further develop their capabilities.

The most popular method used for measurement of PFAS in water Samples S1 and S2 was a SPE extraction which involved taking for analysis the entire sample, methanol base as elution solvent, and no carbon cleanup step.

Most participants used the same methodology when analysing the trace level Sample S3 as compared to Samples S1 and S2. Generally, measurements of PFAS at trace level did not challenge participants' analytical techniques. However, the consensus of participants' results for some analytes (PFOA, PFHxS_L, PFOS, PFOS_L, and 6:2FTS) were higher than the spiked value, possibly indicating PFAS contamination in the laboratories.

A similar pilot sample as Sample S4 will be included again in NMIA's next PT study for PFAS in water, to continue supporting laboratories in developing their methods for the analyses of short-chain PFAS, AOF, EOF, and TF.

- *Compare the performance of participants with their past performance;*

Over the last 11 years, participants have developed methods for the analysis of a wide spectrum of PFAS, and in general, the reported results have been compatible with each other.

AQA 15-03 was conducted in 2015 and included six tests. AQA 25-09 is the 11th NMIA proficiency test of PFAS analytes in water, and participants had the choice of reporting up to 74 tests across four water samples.

Participants improved their capabilities in measuring PFODA, PFUdS and 10:2FTS in water.

In general, the number of reported results has increased as compared to previous NMIA PT studies, reflecting ongoing improvement in the breadth of PFAS analytes included participants' routine testing.

While many analytes' levels were lower than in previous studies, overall, participants performed similarly.

- *Develop the practical application of measurement uncertainty and provide participants with information that will be useful in assessing their uncertainty evaluations.*

Of 1669 numerical results for analytes of interest in this study, 1541 (92%) were reported with an expanded measurement uncertainty.

Several participants are still reporting unrealistically small, or large, not fit-for-purpose, relative uncertainties for routine PFAS. The magnitude of the reported expanded uncertainties was within the range 0.4% to 956% of the reported value. Additionally, some laboratories are still reporting numeric evaluations of uncertainties for non-numeric results.

- *Produce materials that can be used in method validation and as control samples.*

Surplus test samples from the present study are available for sale. The samples are homogeneous and well characterised, both by in-house testing and from the results of the proficiency round.

1 INTRODUCTION

1.1 NMIA Proficiency Testing Program

The National Measurement Institute Australia (NMIA) is responsible for Australia's national measurement infrastructure, providing a range of services including a chemical proficiency testing program.

Proficiency testing (PT) is the: 'evaluation of participant performance against pre-established criteria by means of interlaboratory comparisons'.[1] NMIA PT studies target chemical testing in areas of high public significance such as trade, environment, law enforcement and food safety. NMIA offers studies in:

- per- and polyfluoroalkyl substances (PFAS) in soil, biosolid, water, biota, food and consumer goods;
- hydrocarbons, phenols and other organic compounds in soil and water;
- pesticide residues in soil, water, fruit, vegetables and herbs;
- metals in soil, water, food, filters and paint;
- nutrients, anions and physical tests in water and soil;
- chlorophyll a in water; and
- controlled drug assay, drugs in wipes and clandestine laboratory.

1.2 Study Aims

The aims of the study were to:

- compare the performances of participants and assess their capabilities in the measurement of PFAS in water matrices;
- evaluate the participants' test methods for PFAS in water;
- compare the performance of participants with their past performance;
- develop the practical application of measurement uncertainty and provide participants with information that will be useful in assessing their uncertainty evaluations; and
- produce materials that can be used in method validation and as control samples.

1.3 Study Conduct

The conduct of NMIA proficiency tests is described in the NMIA Study Protocol for Proficiency Testing.[2] The statistical methods used are described in the NMIA Chemical Proficiency Testing Statistical Manual.[3] These documents have been prepared with reference to ISO/IEC 17043 and The International Harmonized Protocol for the Proficiency Testing of Analytical Chemistry Laboratories.[1,4]

NMIA is accredited by the National Association of Testing Authorities, Australia (NATA) to ISO/IEC 17043 as a provider of proficiency testing schemes.[1] This study falls within the scope of NMIA's accreditation.

2 STUDY INFORMATION

2.1 Study Timetable

The timetable of the study was:

Invitation Issued	10 June 2025
Samples Dispatched	11 August 2025
Results Due	19 September 2025
Interim Report	26 September 2025
Preliminary Report	1 October 2025

2.2 Test Material

Four test samples were provided for analysis.

- Sample S1 consisted of 2 x 120 mL of potable water spiked with 28 PFAS compounds.
- Sample S2 consisted of 2 x 55 mL of river water spiked with 28 PFAS compounds.
- Sample S3 consisted of 2 x 120 mL of reagent grade water spiked with 8 PFAS compounds.
- Sample S4 (pilot sample) consisted of 2 x 55 mL of reagent grade water spiked with 2 short-chain PFAS compounds (PFPrA and TFMS), PFOA, and inorganic fluoride. Participants were asked to report on short-chain PFAS compounds (PFAS that contain fewer than four fully fluorinated carbon atoms in their perfluoroalkyl chain) as well as adsorbable organic fluorine (AOF), extractable organic fluorine (EOF), and total fluorine (TF) for this sample. AOF refers to the total organic fluorine measured after adsorption onto an activated carbon column, whereas EOF is determined using solid-phase extraction. Total fluorine (TF) is the sum of organic fluorine and inorganic fluorine present in the water samples.

Details of spiked analytes and levels are presented in Tables 1 and 2.

Table 1 Formulated Concentrations of Samples S1, S2, and S3

Analyte	S1 Potable Water Spiked Value (µg/L)	S2 River Water Spiked Value (µg/L)	S3 Reagent Grade Water Spiked Value (µg/L)
PFBA	0.00999	0.0595**	0.00500
PFPeA	0.0119	Not spiked	Not spiked
PFHxA	0.00291	0.0250**	Not spiked
PFHpA	Not spiked	0.0139**	Not spiked
PFOA	0.00618	0.0196**	0.000745
PFNA	0.00199	Not spiked	Not spiked
PFDA	Not spiked	0.0457**	Not spiked
PFUdA	Not spiked	0.0499	Not spiked
PFDoA	0.0499	Not spiked	Not spiked
PFTrDA	Not spiked	0.0953	Not spiked
PFTeDA	0.0499	0.0953	Not spiked
PFHxDA	0.0999	Not spiked	Not spiked
PFODA	Not spiked	0.0699	Not spiked
FOUEA	0.0499	Not spiked	Not spiked

Analyte	S1 Potable Water Spiked Value (µg/L)	S2 River Water Spiked Value (µg/L)	S3 Reagent Grade Water Spiked Value (µg/L)
PFBS*	0.00754	Not spiked	Not spiked
PFPeS*	Not spiked	0.00511	Not spiked
PFHxS*	0.00795	0.0243**	0.00199
PFHxS_L*	0.00645	0.0199**	0.00161
PFHpS*	0.00396	Not spiked	Not spiked
PFOS*	0.00309	0.0164**	0.00101
PFOS_L*	0.00244	0.0116**	0.000799
PFNS*	Not spiked	0.0300	Not spiked
PFDS*	0.0301	0.0752	Not spiked
PFUdS*	0.0995	Not spiked	Not spiked
PFDoS*	Not spiked	0.100	Not spiked
PFTrDS*	Not spiked	0.100	Not spiked
PFOSA	0.0121	0.0349	0.00302
4:2FTS*	0.0198	Not spiked	Not spiked
6:2FTS*	0.0150	Not spiked	0.00197
8:2FTS*	Not spiked	0.0495	Not spiked
10:2FTS*	Not spiked	0.0700	Not spiked
6:2diPAP	Not spiked	0.0506**	Not spiked
8:2diPAP	0.0499	0.0499	Not spiked
6:2FTOH	0.0499	Not spiked	Not spiked
3:3FTCA	Not spiked	0.0993	Not spiked
5:3FTCA	0.0499	Not spiked	Not spiked
GenX	0.0150	Not spiked	Not spiked
ADONA*	Not spiked	0.199	Not spiked
PFMPA	0.0699	Not spiked	Not spiked
9Cl-PF3ONS*	0.0805	0.100	Not spiked
11Cl-PF3OUDS*	0.100	0.150	Not spiked
PFEESA*	0.0100	0.0400	Not spiked

*Values for these analytes are the anion concentration. **The spiked value includes the incurred value.

Table 2 Formulated Concentrations of Pilot Sample S4

Analyte	S4 Reagent Water Spiked Value (µg/L)
PFPrA	4.99
TFMS*	0.502
PFOA	19.9
Inorganic Fluoride	79.8
AOF**	16.8
EOF**	16.8
TF**	96.6

*Value for this analyte is the anion concentration. **The spiked values for AOF and EOF are the expected values for the sum of fluorine from all analytes spiked into sample, except inorganic fluoride. TF is expected value for the sum of fluorine from all analytes spiked into the sample.

2.3 Participation and Laboratory Code

Forty laboratories registered to participate in this study, and all submitted results. All participants were assigned a confidential laboratory code number for this study.

2.4 Test Material Homogeneity and Stability Testing

The preparation of the study samples is described in Appendix 1. No homogeneity or stability testing was conducted on the water samples. These samples were prepared, stored and packaged using a process that has been demonstrated to produce sufficiently homogeneous and stable samples in previous NMIA PFAS PT studies. Participants' results gave no reason to question the homogeneity and stability of the samples.

The stability of the samples was also assessed by comparing the results returned by participants with the spiked values. Assigned values for scored analytes were within 72% to 120% of the spiked values. These values are similar to those observed in previous NMIA PFAS in Water PT studies and provides support for the stability of these analytes. Assigned values have only been set where there was also a reasonable consensus between participants' results.

2.5 Sample Storage, Dispatch and Receipt

Before dispatch, the water samples were refrigerated at 4ºC. The samples were packed in a foam box with cooler bricks and sent by courier on 11 August 2025. The following items were packaged with the samples:

- a covering letter which included a description of the test samples and instructions for participants; and
- a form for participants to confirm the receipt and condition of the samples.

An Excel spreadsheet for the electronic reporting of results was emailed to all participants.

2.6 Instructions to Participants

Participants were instructed as follows:

- Quantitatively analyse the samples using your routine test method.
- Report results in units of µg/L.
- Use the entire content of the bottle for analysis. The second bottle is provided for repeat analysis.
- If analyses cannot be commenced on the day of receipt, please store the samples chilled.
- The PFAS analytes that may be present in the samples are given in the table below.

AQA 25-09 (S1, S2, S3)					**AQA 25-09 (S4)**
PFBA	PFHxDA	PFDS*	4:2FTS*	7:3FTCA	TFA
PFPeA	PFODA	PFUdS*	6:2FTS*	GenX	PFPrA
PFHxA	FOUEA	PFDoS*	8:2FTS*	ADONA*	PFBA
PFHpA	PFBS*	PFTrDS*	10:2FTS*	PFMPA	TFMS*
PFOA	PFPeS*	PFOSA	6:2diPAP	PFMBA	PFEtS*
PFNA	PFHxS (total)*	N-MeFOSA	8:2diPAP	NFDHA	PFPrS*
PFDA	PFHxS (linear)*	N-EtFOSA	6:2FTOH	9Cl-PF3ONS*	PFBS*

AQA 25-09 (S1, S2, S3)					AQA 25-09 (S4)
PFUdA	PFHpS*	N-MeFOSAA	8:2FTOH	11Cl-PF3OUdS*	AOF
PFDoA	PFOS (total)*	N-EtFOSAA	10:2FTOH	PFEESA*	EOF
PFTrDA	PFOS (linear)*	N-MeFOSE	3:3FTCA	PFECHS*	TF
PFTeDA	PFNS*	N-EtFOSE	5:3FTCA		

*Submit data calculated on the anion-basis, not calculated on the salt basis (e.g. 8:2 FTS anion + counter ion).

- Participants may elect not to test for all listed analytes, and not all analytes will be present in all samples.
- For PFAS analytes that contain linear and branched isomers, report TOTAL – the sum of linear and branched.
- For PFOS and PFHxS you are asked to report TOTAL (the sum of linear and branched isomers) and LINEAR (the linear isomers only).
- Report results using the electronic results sheet emailed to you.
- For each analyte, report a single result expressed as if reporting to a client (i.e. corrected for recovery or not, according to your standard procedure, but state if results are corrected on the result sheet). This figure will be used in all statistical analysis in the study report.
- For each analyte report the associated expanded measurement uncertainty as µg/L e.g. 0.532 ± 0.021 µg/L, if determined.
- No limit of reporting has been set for this study. Report results as you would to a client, applying the limit of reporting of the method used for analysis.
- Report any listed analyte not tested as NT.
- Please complete the method details and report the basis of your uncertainty evaluations as required by the results sheet.
- If determined, report your internal standard percentage recovery. This will be presented in the report for information only.
- Please return the completed results sheet by email (proficiency@measurement.gov.au) by 5 September 2025.

The results due date was later extended to 19 September 2025 due to delays with sample delivery to some participants.

2.7 Interim Report and Preliminary Report

An Interim Report was emailed to all participants on 26 September 2025.

A Preliminary Report was emailed to all participants on 1 October 2025. This report included: a summary of results reported by all laboratories, assigned values, performance coefficients of variation, z-scores and E_n-scores for each analyte tested by participants.

Laboratory **19** submitted a result for Sample S4 PFPrA after the release of the Preliminary Report. This result has been included in this Final Report for information only, as it was part of the unscored pilot sample; statistics for this analyte have been updated accordingly. Additionally, the spiked values for Sample S4 AOF, EOF and TF have been updated. No other data from the Preliminary Report, including all scoring, has been changed in the present Final Report.

3 PARTICIPANT LABORATORY INFORMATION

3.1 Test Methods Reported by Participants

Participants were requested to provide methodology information. Responses are presented in Appendix 6. The study coordinator thanks participants for completing the questionnaire.

3.2 Basis of Participants' Measurement Uncertainty Evaluations

Participants were requested to provide information about their basis of measurement uncertainty (MU). Responses are presented in Tables 3 and 4. Some responses may be modified so that the participant cannot be identified.

Table 3 Basis of Participants' Uncertainty Evaluation

Lab. Code	Approach to Evaluating MU	Information Sources for MU Evaluation*		Guide Document for Evaluating MU
		Precision	Method Bias	
1	Top Down - precision and evaluations of the method and laboratory bias k = 2	Control samples - CRM Duplicate analysis Instrument calibration	CRM Instrument calibration	Eurachem/CITAC Guide
2	Top Down - precision and evaluations of the method and laboratory bias k = 2	Control samples - SS	Recoveries of SS	ISO/GUM
3	Coverage factor not reported	Control samples - SS Instrument calibration	Instrument calibration Recoveries of SS	
4	Coverage factor not reported			
5	Standard deviation of replicate analyses multiplied by 2 or 3 k = 2	Control samples - SS Duplicate analysis	Recoveries of SS Standard purity	Nordtest Report TR537
6	Top Down - precision and evaluations of the method and laboratory bias Coverage factor not reported	Duplicate analysis	Instrument calibration Laboratory bias from PT studies Recoveries of SS Standard purity	
7	Top Down - precision and evaluations of the method and laboratory bias Coverage factor not reported	Instrument calibration	Instrument calibration Recoveries of SS Standard purity	ISO/GUM
8	Top Down - precision and evaluations of the method and laboratory bias k = 2	Control samples - SS Duplicate analysis	Instrument calibration Recoveries of SS Standard purity	ISO/GUM
9	Coverage factor not reported	Control samples - SS		Other guide document
10	Top Down - precision and evaluations of the method and laboratory bias k = 2	Duplicate analysis	Recoveries of SS Standard purity	Eurachem/CITAC Guide
11	ISO 11352 Coverage factor not reported	Control samples - SS		ISO/GUM

Lab. Code	Approach to Evaluating MU	Information Sources for MU Evaluation*		Guide Document for Evaluating MU
		Precision	Method Bias	
12	Top Down - precision and evaluations of the method and laboratory bias Coverage factor not reported	Control samples - SS	Recoveries of SS	NATA - Estimating and reporting MU of chemical test results.
13	Bottom Up (ISO/GUM, fish bone/cause and effect diagram) k = 2			ISO/GUM
14	Top Down - precision and evaluations of the method and laboratory bias Coverage factor not reported	Control samples - SS	Recoveries of SS	ISO/GUM
15	Standard deviation of replicate analyses multiplied by 2 or 3 k = 2	Duplicate analysis Instrument calibration	CRM Instrument calibration	ISO/GUM
16	Top Down - precision and evaluations of the method and laboratory bias Coverage factor not reported	Control samples - SS Duplicate analysis Instrument calibration	CRM	NMIA Uncertainty Course
17	Standard deviation of replicate analyses multiplied by 2 or 3 k = 2	Control samples - SS Duplicate analysis	Recoveries of SS Standard purity	Nordtest Report TR537
18	Standard deviation of replicate analyses multiplied by 2 or 3 Coverage factor not reported	Control samples - SS	Recoveries of SS	
19	Standard deviation of replicate analyses multiplied by 2 or 3 Coverage factor not reported	Control samples - SS Duplicate analysis Instrument calibration	Recoveries of SS	Eurachem/CITAC Guide
20	Standard deviation of replicate analyses multiplied by 2 or 3 Coverage factor not reported	Duplicate analysis	Recoveries of SS	
21	Top Down - precision and evaluations of the method and laboratory bias Coverage factor not reported	Control samples - CRM Duplicate analysis Instrument calibration		Eurolab Technical Report No1/2007
22	Coverage factor not reported	Standard deviation from PT studies only		
		Duplicate analysis	Instrument calibration Laboratory bias from PT studies Recoveries of SS Standard purity	

Lab. Code	Approach to Evaluating MU	Information Sources for MU Evaluation*		Guide Document for Evaluating MU
		Precision	Method Bias	
23	Bottom Up (ISO/GUM, fish bone/cause and effect diagram) Coverage factor not reported	Control samples Duplicate analysis	CRM Instrument calibration Laboratory bias from PT studies Recoveries of SS	
24	Standard deviation of replicate analyses multiplied by 2 or 3 k = 2	Control samples - SS Duplicate analysis Instrument calibration	CRM Instrument calibration Standard purity	NATA GAG Estimating and Reporting MU
25	Coverage factor not reported			
26**	Standard deviation of replicate analyses multiplied by 2 or 3 k = 2	Control samples - SS Duplicate analysis	Recoveries of SS	Statistics and Chemometrics for Analytical Chemistry, Miller and Miller, 5th Edition
27	Top Down - precision and evaluations of the method and laboratory bias k = 2	Control samples - RM / Ex PT Sample	Recoveries of SS	Nordtest Report TR537
28	Top Down - precision and evaluations of the method and laboratory bias k = 2	Control samples Instrument calibration	Instrument calibration Recoveries of SS Standard purity	Eurachem/CITAC Guide
29	Coverage factor not reported			
30	Top Down - precision and evaluations of the method and laboratory bias k = 2	Control samples Duplicate analysis Instrument calibration	CRM Instrument calibration Laboratory bias from PT studies	Eurachem/CITAC Guide
31	Top Down - precision and evaluations of the method and laboratory bias Coverage factor not reported	Control samples - CRM	CRM Recoveries of SS	Eurachem/CITAC Guide
32	Top Down - precision and evaluations of the method and laboratory bias k = 2	Control samples - SS Duplicate analysis	Recoveries of SS	ISO/GUM
33	Top Down - precision and evaluations of the method and laboratory bias k = 2	Control samples - CRM Duplicate analysis Instrument calibration	CRM Instrument calibration Recoveries of SS Standard purity	NMIA Uncertainty Course
34	Standard deviation of replicate analyses multiplied by 2 or 3 Coverage factor not reported	Duplicate analysis	CRM	

Lab. Code	Approach to Evaluating MU	Information Sources for MU Evaluation*		Guide Document for Evaluating MU
		Precision	Method Bias	
35	Top Down - precision and evaluations of the method and laboratory bias Coverage factor not reported	Control samples - SS	Recoveries of SS	NATA - Estimating and reporting MU of chemical test results
36	Standard deviation of replicate analyses multiplied by 2 or 3 k = 2	Duplicate analysis	Instrument calibration Standard purity	Eurachem/CITAC Guide
37	Top Down - precision and evaluations of the method and laboratory bias Coverage factor not reported	Duplicate analysis	CRM	ISO/GUM
38	Top Down - reproducibility (standard deviation) from PT studies used directly k = 2	Standard deviation from PT studies only		ISO/GUM
			Instrument calibration Recoveries of SS	
39	ISO11352 k = 2	Control samples - SS	Laboratory bias from PT studies	ISO/GUM
40	Professional judgment k = 2	Control samples - SS Instrument calibration	Instrument calibration Recoveries of SS Standard purity	

*SS = Spiked Samples, CRM = Certified Reference Material, RM = Reference Material.

**Additional information provided in Table 4.

Table 4 Uncertainty Evaluation Additional Information

Lab. Code	Comments for Approach to Evaluating MU
26	Measurement Uncertainty (U) estimated from the standard deviation (u) of replicate recovery samples using the expression U = 2 x u.

3.3 Participants' Comments

Participants were invited to make comments for this PT study. Such feedback allows for the improvement of future studies. Participants' comments are presented in Table 5, along with the study coordinator's response where appropriate. Some responses may be modified so that the participant cannot be identified.

Table 5 Participants' Comments

Lab. Code	Sample	Participant's Comments	Study Coordinator's Response
5	All	All PT samples are recommended to be at the same volume.	Thank you for your feedback regarding sample volumes. In previous PT studies, all samples had a volume of 55 mL per bottle, however after feedback from participants, the volume for the low and trace levels samples were increased to 120 mL per bottle. As laboratories have different sample volume requirements, we aim to select sample volumes that will be able to cater to most participants. We will take your comments into consideration when planning the next PFAS in Water PT study.
17	All	Suggest all PT samples at the same volume	
29	S4	Not enough sample sent to perform test to reporting limit 2ug/L.	
39	All	The volumes were low so we needed to dilute the samples.	
40	All	It is a problem that samples arrive in bottles that are different from the ones, that we usually use. PFAS adsorbs to the walls of the bottles, therefore it is a problem when it is necessary to decant the sample. I realize of course that different labs use different bottles.	
39	All	The shipment was stuck at the TNT customs for a week even we have tried to fix the problem.	We request that all international participants provide us with required import documentation before the sample dispatch date, to assist with the customs clearance process. Unfortunately, customs delays are beyond our control. We dispatch all samples with ice bricks in insulated polystyrene foam boxes so that samples are more likely to arrive in a suitable condition for analysis. We also review results returned by participants; if there are any concerns of degradation for an analyte, it is not scored, and no assessment of participant performance is made.
11	S4	My only comment would be the name of TF which could be confused with Total Fluorine and not Total Fluoride.	For this study, participants have been requested to report Total Fluorine. This was specified in the dispatch letter provided with the samples.

4 PRESENTATION OF RESULTS AND STATISTICAL ANALYSIS

4.1 Results Summary

Participant results are listed in Tables 6 to 76 with summary statistics, along with other estimates of analyte concentration. Bar charts of results and performance scores are presented in Figures 2 to 72. An example chart with interpretation guide is shown in Figure 1.

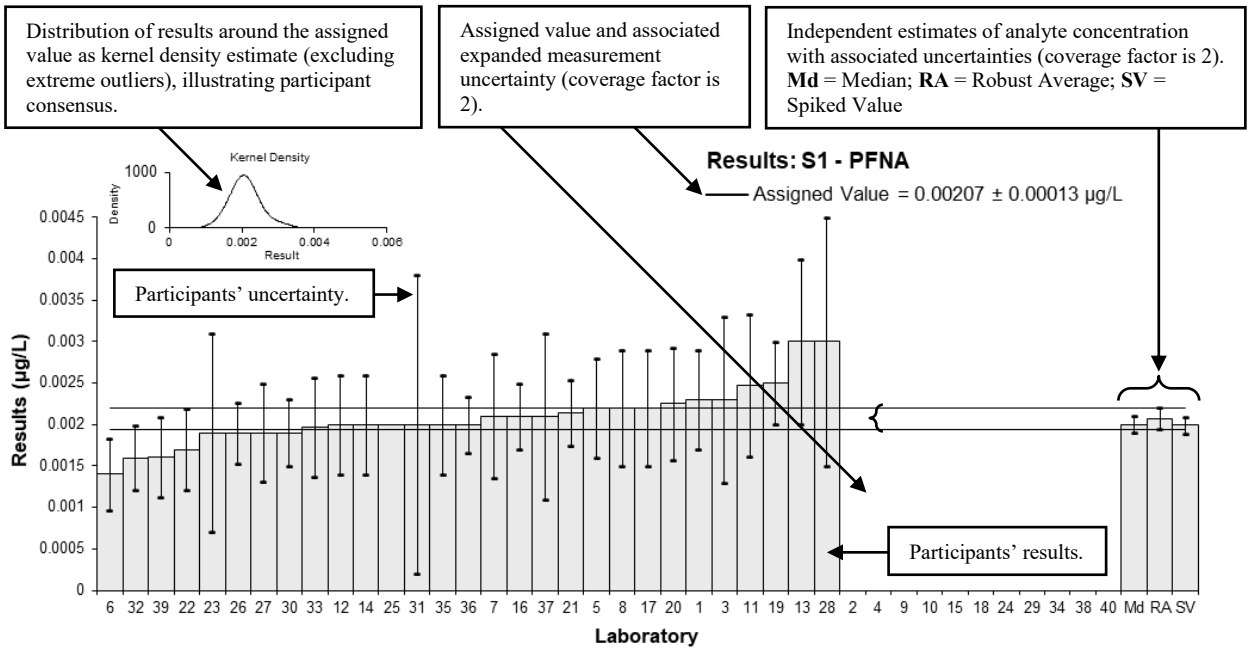


Figure 1 Guide to Presentation of Results

4.2 Outliers and Extreme Outliers

Outliers were results less than 50% and greater than 150% of the robust average and were removed before the calculation of the assigned value. Extreme outliers (gross errors) were obvious blunders, such as those with incorrect units, decimal placement errors, or results from a different PT item, and were removed before the calculation of summary statistics.[3,4]

4.3 Assigned Value

The assigned value is defined as the 'value attributed to a particular property or characteristic of a proficiency testing item'.[1] In this study, the property is the concentration of the analyte. Assigned values were the robust average of participants' results, and the expanded uncertainties were evaluated from the associated robust standard deviations.[3,5] An example of the assigned value calculation using data from the present study is given in Appendix 2.

4.4 Robust Average and Robust Between-Laboratory Coefficient of Variation

The robust averages and associated expanded uncertainties, and robust CVs (a measure of the variability of participants' results) were calculated as described in ISO 13528.[5]

Robust CV as presented in the Section 5 (Statistics table) is the robust between-laboratory CV including outliers but excluding extreme outliers. Everywhere else in the report, the robust between-laboratory CV refers to the robust CV calculated with both outliers and extreme outliers removed.

4.5 Standard Deviation for Proficiency Assessment

The standard deviation for proficiency assessment (SDPA, σ) is the product of the assigned value (X) and the performance coefficient of variation (PCV). This value is used for

calculation of participant *z*-score and provides scaling for participant deviation from the assigned value.

$$\sigma = X \times \text{PCV} \qquad \text{Equation 1}$$

It is important to note that the PCV is a set value and is not the standard deviation of participants' results. The value set for PCV is based on the existing regulation, the acceptance criteria indicated by the methods, the matrix, the concentration level of analyte and/or on experience from previous studies. It is backed up by mathematical models such as Thompson-Horwitz equation.[6]

4.6 z-Score

An example of *z*-score calculation using data from the present study is given in Appendix 2. For each participant's result, a *z*-score is calculated according to Equation 2 below:

$$z = \frac{(\chi - X)}{\sigma} \qquad \text{Equation 2}$$

where:

z is *z*-score

χ is a participant's result

X is the assigned value

σ is the SDPA from Equation 1

For a *z*-score with absolute value ($|z|$): $|z| \leq 2.0$ is acceptable; $2.0 < |z| < 3.0$ is questionable; and $|z| \geq 3.0$ is unacceptable.

To account for potential low bias in consensus value due to inefficient methodologies, *z*-scores may be adjusted for a 'maximum acceptable result' (see Section 6.3 for more information).

4.7 E_n-Score

An example of E_n-score calculation using data from the present study is given in Appendix 2. The E_n-score is complementary to the *z*-score in assessment of laboratory performance. E_n-score includes measurement uncertainty and is calculated according to Equation 3 below:

$$E_n = \frac{(\chi - X)}{\sqrt{U_\chi{}^2 + U_X{}^2}} \qquad \text{Equation 3}$$

where:

E_n is E_n-score

χ is a participant's result

X is the assigned value

U_χ is the expanded uncertainty of the participant's result;

U_X is the expanded uncertainty of the assigned value.

For an E_n-score with absolute value ($|E_n|$): $|E_n| < 1.0$ is acceptable; and $|E_n| \geq 1.0$ is unacceptable.

4.8 Traceability and Measurement Uncertainty

Laboratories accredited to ISO/IEC 17025 must establish and demonstrate the traceability and measurement uncertainty associated with their test results.[7] Guidelines for quantifying uncertainty in analytical measurement are described in the Eurachem/CITAC Guide.[8]

5 TABLES AND FIGURES

Table 6

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	PFBA
Unit	µg/L

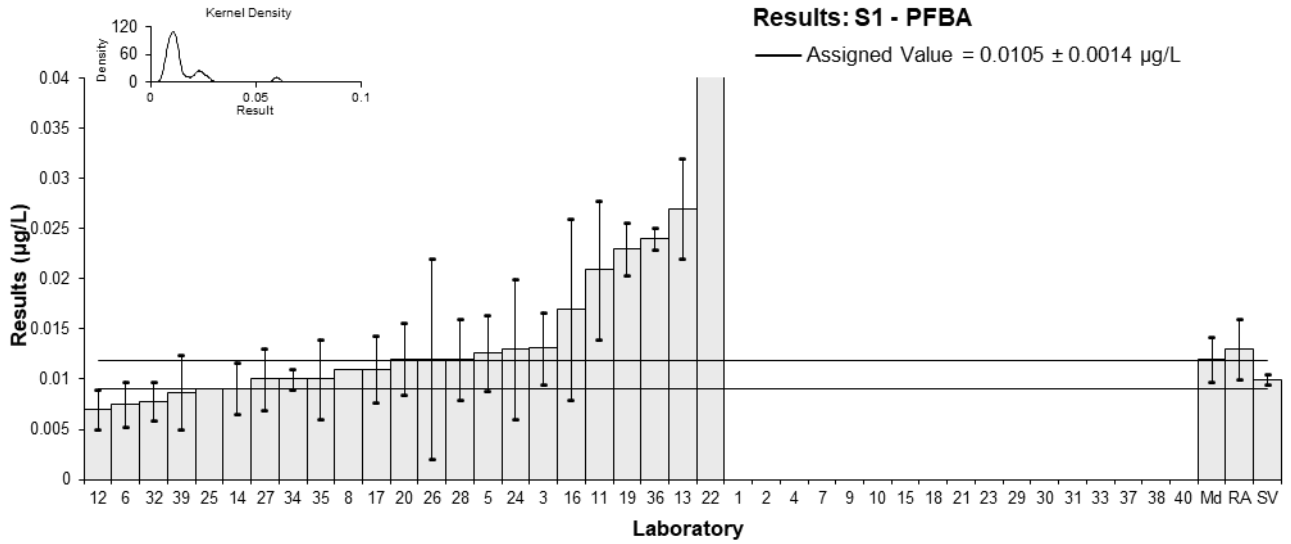
Participant Results

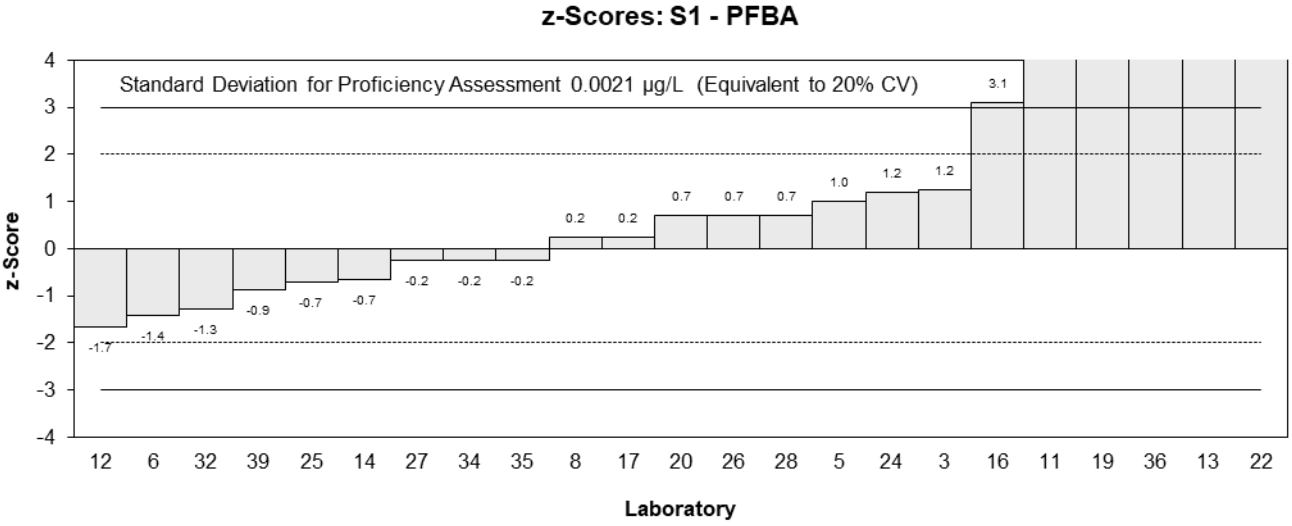
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	<0.0182	NR	102.19		
2	NS	NS	NS		
3	0.0131	0.0036	NR	1.24	0.67
4	NS	NS	NS		
5	0.0126	0.0038	85.3	1.00	0.52
6	0.0075	0.0022575	110	-1.43	-1.13
7	<0.01	NR	85		
8	0.011	NR	98	0.24	0.36
9	NS	NS	NS		
10	NR	NR	NR		
11*	0.0209	0.00693	NR	4.95	1.47
12	0.007	0.002	57	-1.67	-1.43
13*	0.027	0.005	80	7.86	3.18
14	0.0091	0.0026	99	-0.67	-0.47
15	NT	NT	NT		
16	0.017	0.009	103	3.10	0.71
17	0.011	0.0033	117.0	0.24	0.14
18	<0.05	NR	NR		
19*	0.023	0.0026	15	5.95	4.23
20	0.012	0.0036	85	0.71	0.39
21	<0.002	NR	27		
22*	0.0600	0.018	100	23.57	2.74
23	<0.015	0.0189	NR		
24	0.013	0.007	103	1.19	0.35
25	0.009	NR	NR	-0.71	-1.07
26	0.012	0.010	91	0.71	0.15
27	0.010	0.0031	NR	-0.24	-0.15
28	0.012	0.004	88	0.71	0.35
29	<0.5	NR	NR		
30	<0.002	NR	NR		
31	<0.0020	NR	12.06		
32	0.0078	0.0019129	99.4195	-1.29	-1.14
33	< 0.02	NR	69		
34	0.010	0.001	79	-0.24	-0.29
35	0.01	0.004	102	-0.24	-0.12
36*	0.024	0.0011	80	6.43	7.58
37	< 0.005	NR	108		
38	NS	NS	NS		
39	0.00868	0.00373	76	-0.87	-0.46
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0105	0.0014
Spike Value	0.00999	0.00050
Robust Average	0.0130	0.0030
Median	0.0120	0.0022
Mean	0.0151	
N	23	
Max	0.06	
Min	0.007	
Robust SD	0.0057	
Robust CV	44%	


Kernel Density
Density
Result
Results: S1 - PFBA
Assigned Value = 0.0105 ± 0.0014 µg/L
Results (µg/L)
Laboratory
12 6 32 39 25 14 27 34 35 8 17 20 26 28 5 24 3 16 11 19 36 13 22 1 2 4 7 9 10 15 18 21 23 29 30 31 33 37 38 40 Md RA SV


z-Scores: S1 - PFBA
Standard Deviation for Proficiency Assessment 0.0021 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
12 6 32 39 25 14 27 34 35 8 17 20 26 28 5 24 3 16 11 19 36 13 22

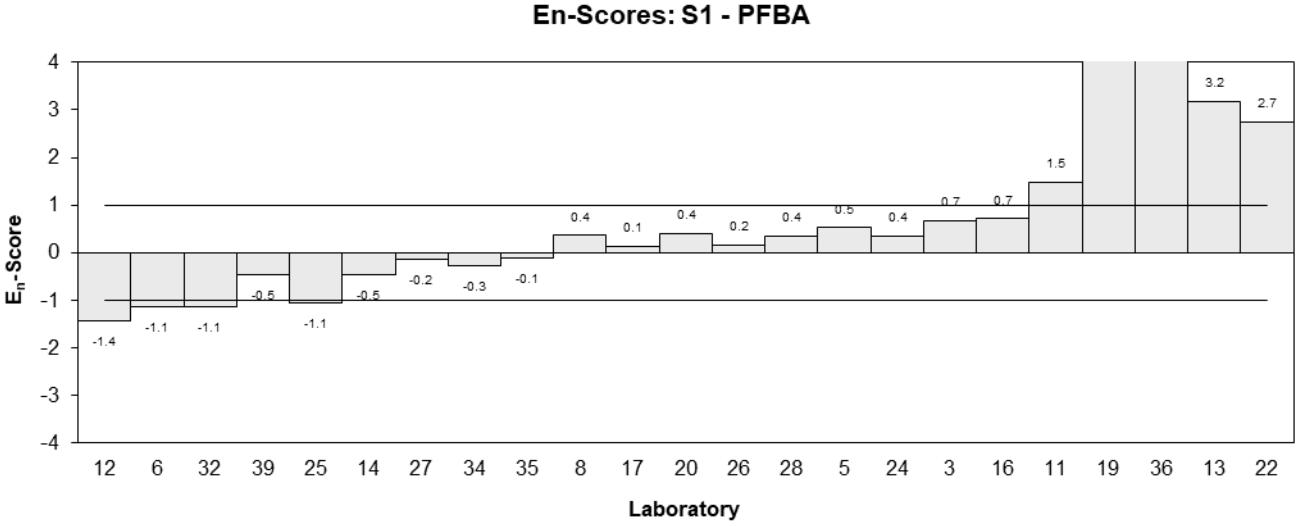

En-Scores: S1 - PFBA
En-Score
Laboratory
12 6 32 39 25 14 27 34 35 8 17 20 26 28 5 24 3 16 11 19 36 13 22

Figure 2

Table 7

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	PFPeA
Unit	µg/L

Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0162	0.0041	59.52	0.74	0.48
2	NS	NS	NS		
3	0.0116	0.0029	NR	-0.89	-0.77
4	NS	NS	NS		
5	0.0137	0.0041	86.4	-0.14	-0.09
6*	0.0036	0.0010875	95	-3.72	-5.67
7	0.012	0.0038	98	-0.74	-0.51
8	0.013	NR	92	-0.39	-0.73
9	NS	NS	NS		
10	NR	NR	NR		
11	0.0185	0.00552	NR	1.56	0.77
12	0.015	0.003	69	0.32	0.27
13	0.014	0.003	80	-0.04	-0.03
14	0.012	0.0034	101	-0.74	-0.57
15	NT	NT	NT		
16	0.0092	0.0018	145	-1.74	-2.09
17	0.0122	0.0037	97.5	-0.67	-0.48
18	<0.01	NR	NR		
19	0.0114	0.0002	98	-0.96	-1.78
20	0.0135	0.00405	115	-0.21	-0.14
21	0.0194	0.0037	48	1.88	1.33
22*	0.0035	0.00105	95	-3.76	-5.79
23	0.017	0.0067	NR	1.03	0.42
24	0.013	0.007	113	-0.39	-0.15
25	0.018	NR	NR	1.38	2.60
26	0.012	0.0013	101	-0.74	-1.06
27	0.012	0.0037	NR	-0.74	-0.53
28	0.012	0.004	91	-0.74	-0.49
29	<0.025	NR	NR		
30	0.011	0.002	90	-1.10	-1.24
31	0.0177	0.0036	49.49	1.28	0.92
32	0.014	0.0031813	115.982	-0.04	-0.03
33	0.01649	0.0049	58	0.85	0.47
34	0.016	0.004	77	0.67	0.44
35	0.02	0.006	69	2.09	0.95
36	0.0136	0.00077	84	-0.18	-0.30
37	0.016	0.005	114	0.67	0.36
38	NS	NS	NS		
39	0.00686	0.00281	94	-2.57	-2.27
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0141	0.0015
Spike Value	0.0119	0.0006
Robust Average	0.0137	0.0016
Median	0.0135	0.0014
Mean	0.0134	
N	31	
Max	0.02	
Min	0.0035	
Robust SD	0.0035	
Robust CV	26%	

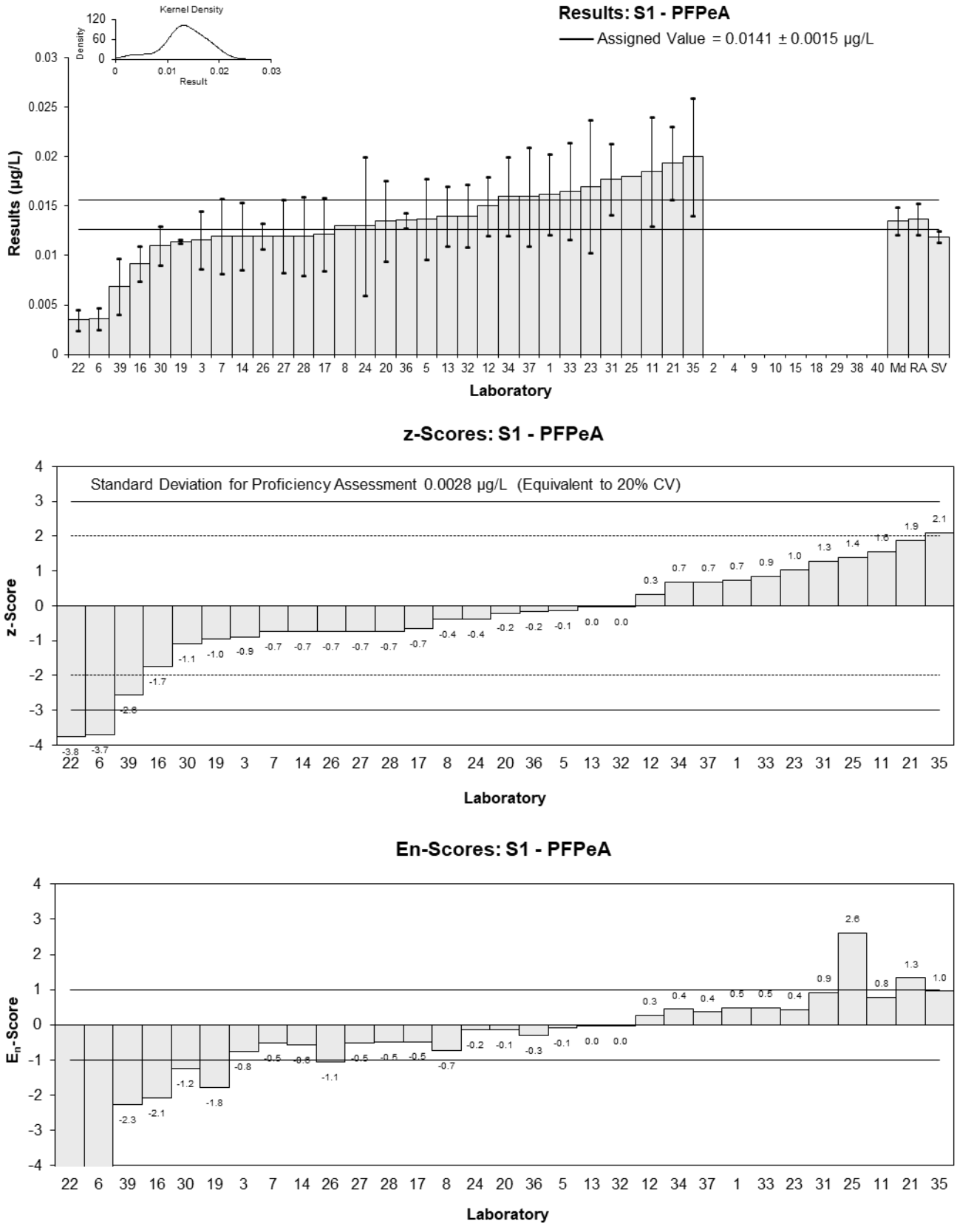

Kernel Density
Density
Result
Results: S1 - PFPeA
Assigned Value = 0.0141 ± 0.0015 µg/L
Results (µg/L)
Laboratory
z-Scores: S1 - PFPeA
Standard Deviation for Proficiency Assessment 0.0028 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
En-Scores: S1 - PFPeA
En-Score
Laboratory

Figure 3

Table 8

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	PFHxA
Unit	µg/L

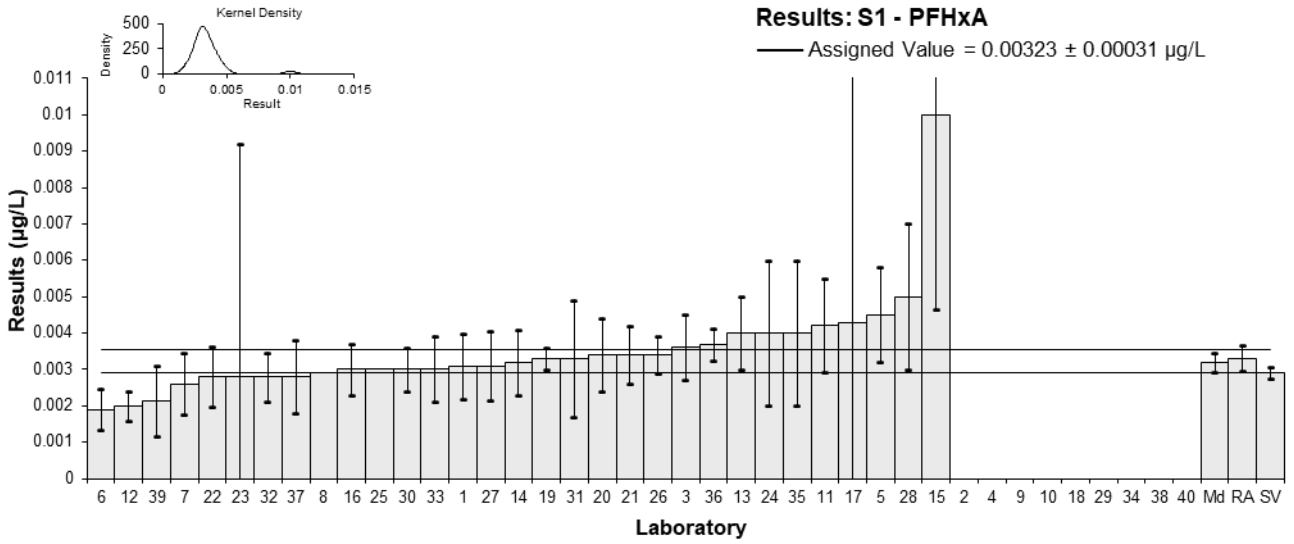
Participant Results

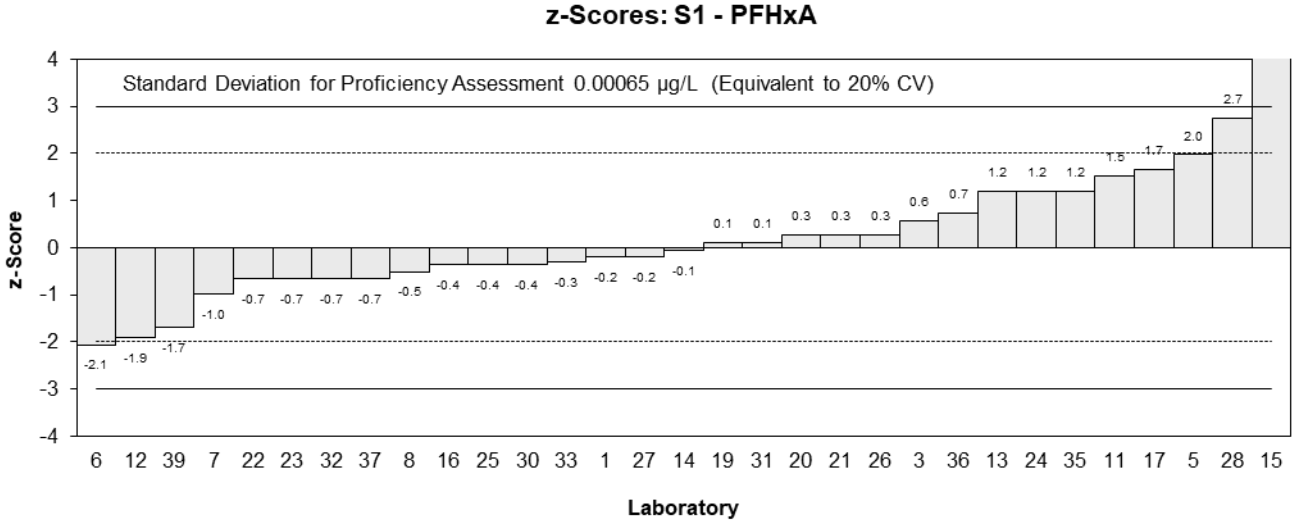
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0031	0.0009	73.42	-0.20	-0.14
2	NS	NS	NS		
3	0.0036	0.0009	NR	0.57	0.39
4	NS	NS	NS		
5	0.0045	0.0013	83.3	1.97	0.95
6	0.0019	0.00057	100	-2.06	-2.05
7	0.0026	0.00084	116	-0.98	-0.70
8	0.0029	NR	97	-0.51	-1.06
9	NS	NS	NS		
10	NR	NR	NR		
11	0.00421	0.001288	NR	1.52	0.74
12	0.002	0.0004	89	-1.90	-2.43
13	0.004	0.001	85	1.19	0.74
14	0.0032	0.0009	85	-0.05	-0.03
15*	0.009989	0.005333	NR	10.46	1.27
16	0.0030	0.0007	95	-0.36	-0.30
17	0.0043	0.0300	103.3	1.66	0.04
18	<0.01	NR	NR		
19	0.0033	0.0003	96	0.11	0.16
20	0.0034	0.00102	120	0.26	0.16
21	0.0034	0.0008	93	0.26	0.20
22	0.0028	0.000825	90	-0.67	-0.49
23	0.0028	0.0064	NR	-0.67	-0.07
24	0.004	0.002	118	1.19	0.38
25	0.003	NR	NR	-0.36	-0.74
26	0.0034	0.00051	101	0.26	0.28
27	0.0031	0.00096	NR	-0.20	-0.13
28*	0.005	0.002	94	2.74	0.87
29	<0.025	NR	NR		
30	0.003	0.0006	83	-0.36	-0.34
31	0.0033	0.0016	71.98	0.11	0.04
32	0.0028	0.0006707	130.238	-0.67	-0.58
33	0.00303	0.0009	58	-0.31	-0.21
34	<0.005	0.005	95		
35	0.004	0.002	89	1.19	0.38
36	0.0037	0.00044	79	0.73	0.87
37	0.0028	0.001	102	-0.67	-0.41
38	NS	NS	NS		
39	0.00213	0.00096	94	-1.70	-1.09
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.00323	0.00031
Spike Value	0.00291	0.00015
Robust Average	0.00331	0.00034
Median	0.00320	0.00027
Mean	0.00349	
N	31	
Max	0.009989	
Min	0.0019	
Robust SD	0.00075	
Robust CV	23%	


Kernel Density
Density
Result
Results: S1 - PFHxA
Assigned Value = 0.00323 ± 0.00031 µg/L
Results (µg/L)
Laboratory


z-Scores: S1 - PFHxA
Standard Deviation for Proficiency Assessment 0.00065 µg/L (Equivalent to 20% CV)
z-Score
Laboratory

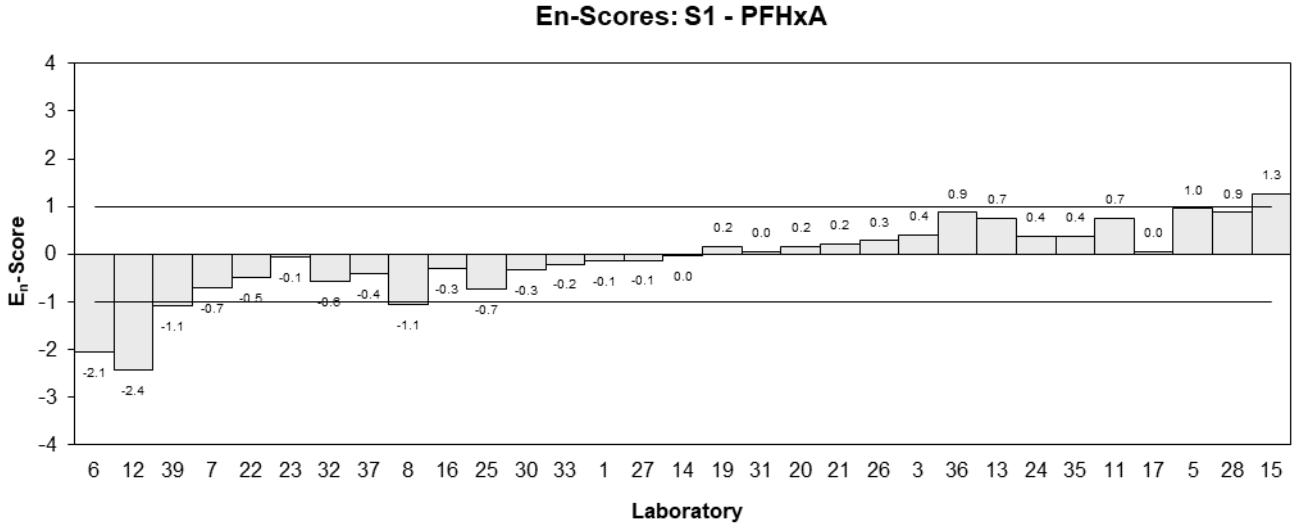

En-Scores: S1 - PFHxA
En-Score
Laboratory

Figure 4

Table 9

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	PFOA
Unit	µg/L

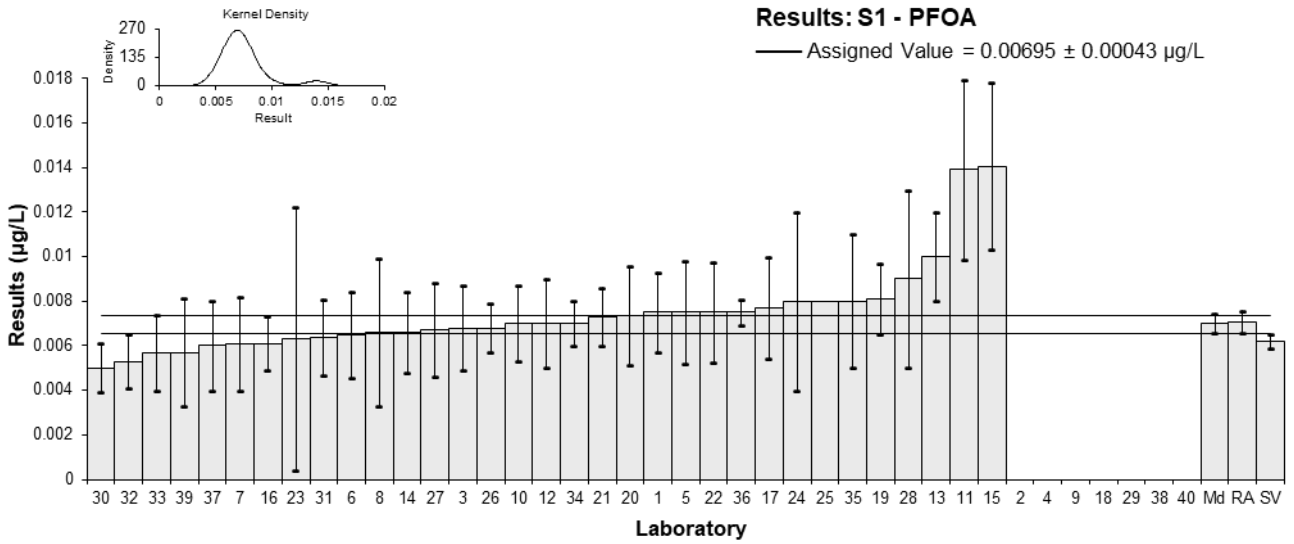
Participant Results

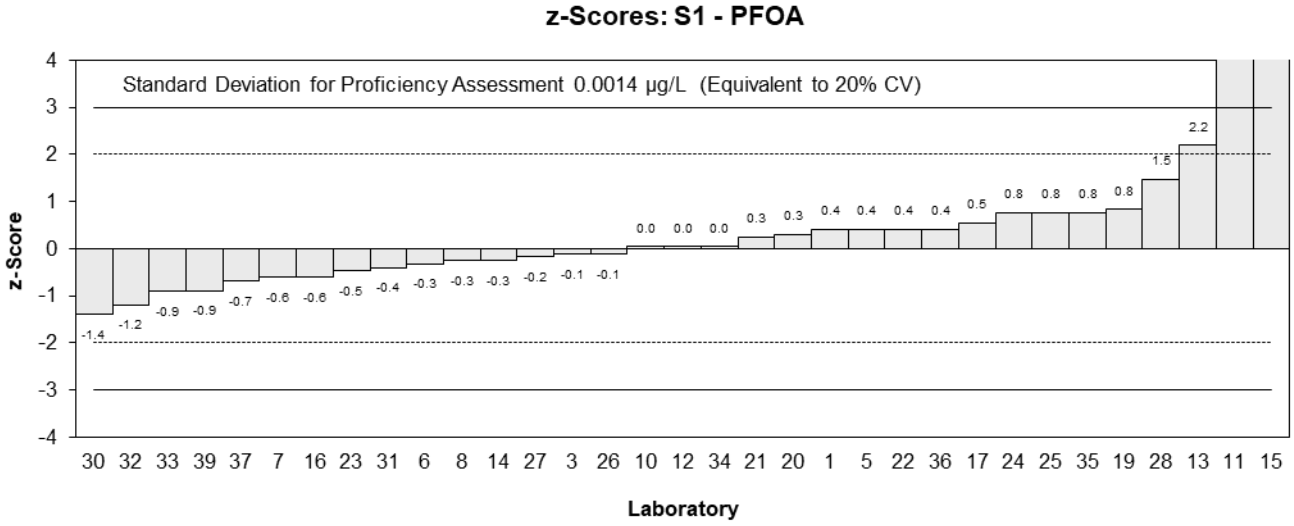
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0075	0.0018	99.23	0.40	0.30
2	NS	NS	NS		
3	0.0068	0.0019	NR	-0.11	-0.08
4	NS	NS	NS		
5	0.0075	0.0023	97.9	0.40	0.24
6	0.0065	0.0019425	110	-0.32	-0.23
7	0.0061	0.0021	91	-0.61	-0.40
8	0.0066	0.0033	96	-0.25	-0.11
9	NS	NS	NS		
10	0.007	0.0017	NR	0.04	0.03
11*	0.0139	0.00401	NR	5.00	1.72
12	0.007	0.002	88	0.04	0.02
13	0.01	0.002	87	2.19	1.49
14	0.0066	0.0018	111	-0.25	-0.19
15*	0.014066	0.003737	NR	5.12	1.89
16	0.0061	0.0012	105	-0.61	-0.67
17	0.0077	0.0023	109.6	0.54	0.32
18	<0.01	NR	NR		
19	0.0081	0.0016	86	0.83	0.69
20	0.00735	0.002205	130	0.29	0.18
21	0.0073	0.0013	125	0.25	0.26
22	0.0075	0.00225	90	0.40	0.24
23	0.0063	0.0059	NR	-0.47	-0.11
24	0.008	0.004	130	0.76	0.26
25	0.008	NR	NR	0.76	2.44
26	0.0068	0.0011	111	-0.11	-0.13
27	0.0067	0.0021	NR	-0.18	-0.12
28	0.009	0.004	95	1.47	0.51
29	<0.025	NR	NR		
30	0.0050	0.0011	106	-1.40	-1.65
31	0.0064	0.0017	90.27	-0.40	-0.31
32	0.0053	0.0012120	147.219	-1.19	-1.28
33	0.00569	0.0017	90	-0.91	-0.72
34	0.007	0.001	92	0.04	0.05
35	0.008	0.003	90	0.76	0.35
36	0.0075	0.00057	90	0.40	0.77
37	0.006	0.002	100	-0.68	-0.46
38	NS	NS	NS		
39	0.00571	0.00240	104	-0.89	-0.51
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.00695	0.00043
Spike Value	0.00618	0.00031
Robust Average	0.00708	0.00048
Median	0.00700	0.00045
Mean	0.00742	
N	33	
Max	0.014066	
Min	0.005	
Robust SD	0.0011	
Robust CV	16%	


Kernel Density
Density
Result
Results: S1 - PFOA
Assigned Value = 0.00695 ± 0.00043 µg/L
Results (µg/L)
Laboratory


z-Scores: S1 - PFOA
Standard Deviation for Proficiency Assessment 0.0014 µg/L (Equivalent to 20% CV)
z-Score
Laboratory

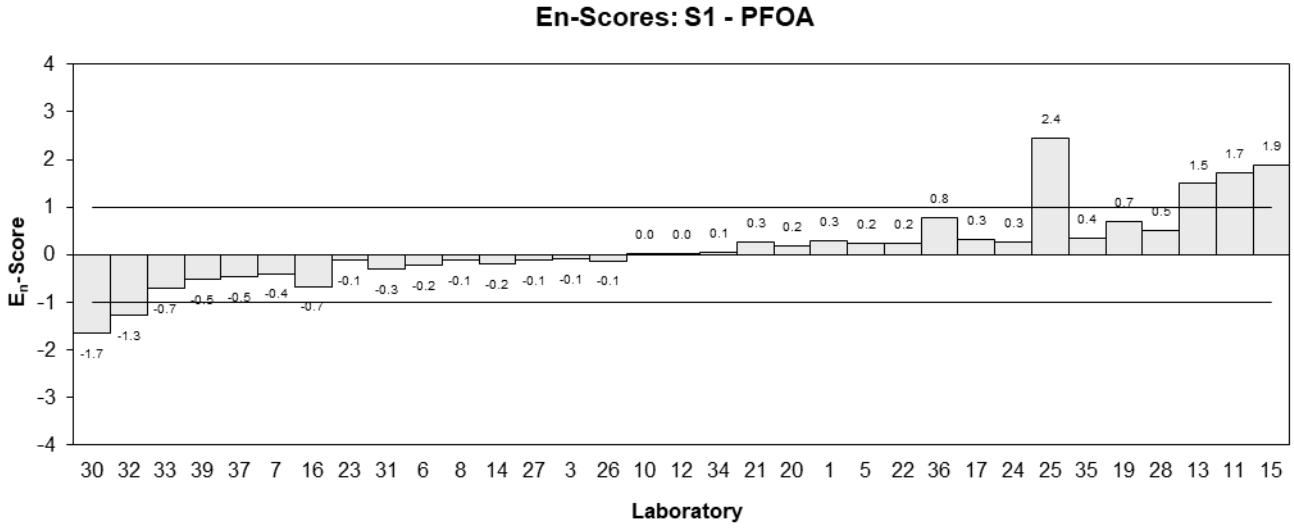

En-Scores: S1 - PFOA
En-Score
Laboratory

Figure 5

Table 10

Sample Details

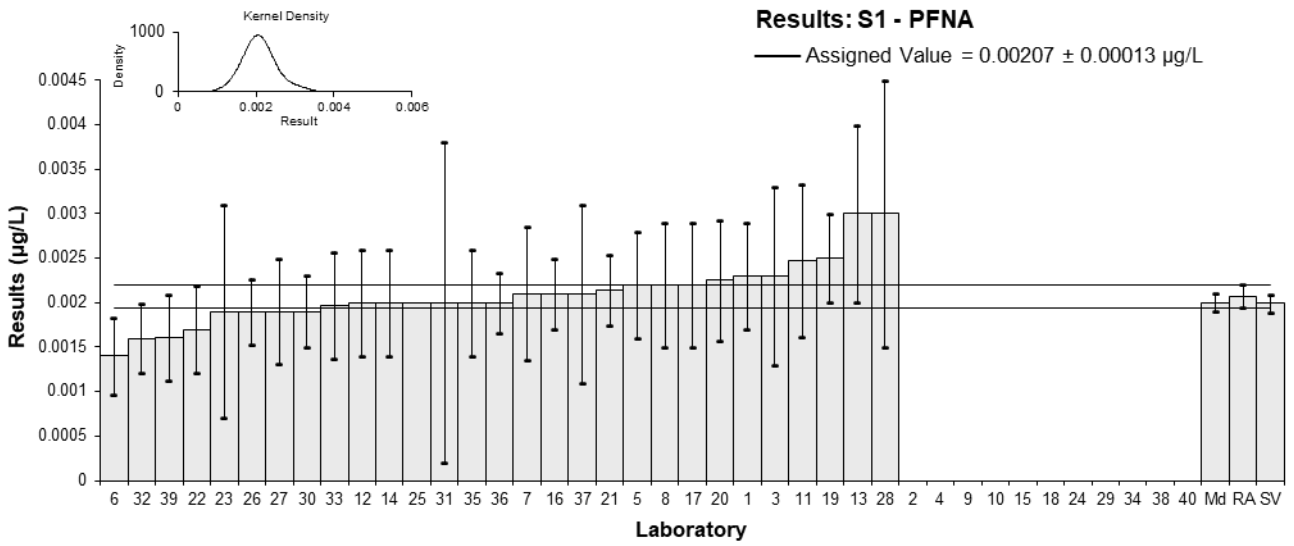
Sample No.	S1
Matrix	Potable Water
Analyte	PFNA
Unit	µg/L

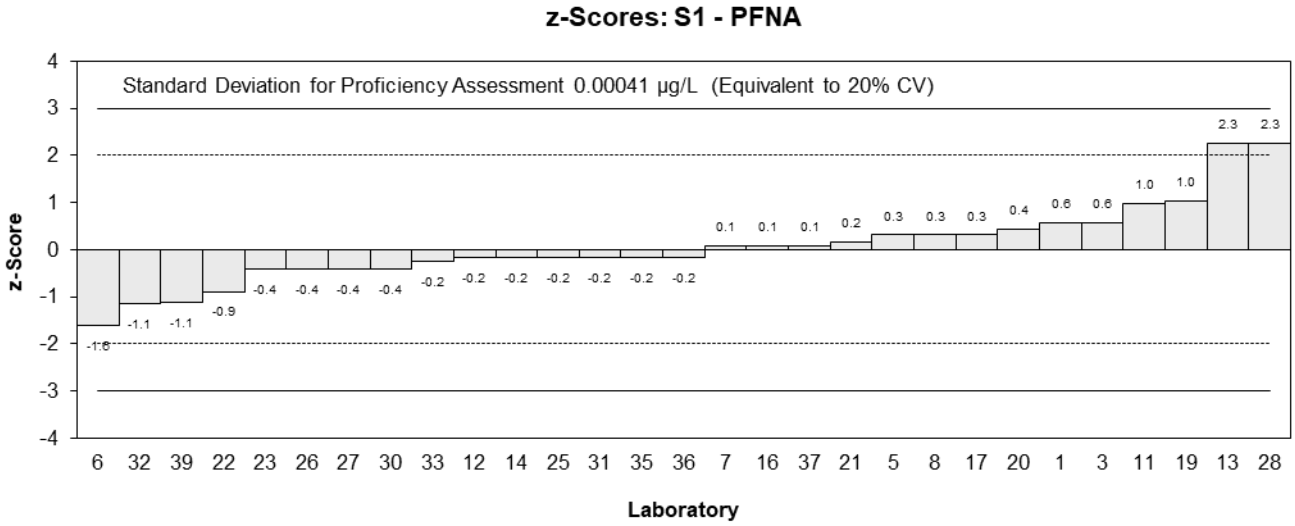
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0023	0.0006	96.45	0.56	0.37
2	NS	NS	NS		
3	0.0023	0.001	NR	0.56	0.23
4	NS	NS	NS		
5	0.0022	0.0006	94.7	0.31	0.21
6	0.0014	0.0004275	95	-1.62	-1.50
7	0.0021	0.00075	76	0.07	0.04
8	0.0022	0.0007	92	0.31	0.18
9	NS	NS	NS		
10	NR	NR	NR		
11	0.00247	0.000861	NR	0.97	0.46
12	0.002	0.0006	83	-0.17	-0.11
13	0.003	0.001	80	2.25	0.92
14	0.002	0.0006	121	-0.17	-0.11
15	NT	NT	NT		
16	0.0021	0.0004	97	0.07	0.07
17	0.0022	0.0007	103.9	0.31	0.18
18	<0.01	NR	NR		
19	0.0025	0.0005	96	1.04	0.83
20	0.00225	0.000675	125	0.43	0.26
21	0.00214	0.0004	193	0.17	0.17
22	0.0017	0.000495	105	-0.89	-0.72
23	0.0019	0.0012	NR	-0.41	-0.14
24	< 0.004	0.002	142		
25	0.002	NR	NR	-0.17	-0.54
26	0.0019	0.00037	111	-0.41	-0.43
27	0.0019	0.00059	NR	-0.41	-0.28
28	0.003	0.0015	93	2.25	0.62
29	<0.005	NR	NR		
30	0.0019	0.0004	105	-0.41	-0.40
31	0.002	0.0018	97.89	-0.17	-0.04
32	0.0016	0.0003854	135.357	-1.14	-1.16
33	0.00197	0.0006	67	-0.24	-0.16
34	<0.005	0.005	97		
35	0.002	0.0006	91	-0.17	-0.11
36	0.002	0.00034	83	-0.17	-0.19
37	0.0021	0.001	112	0.07	0.03
38	NS	NS	NS		
39	0.00161	0.00048	101	-1.11	-0.93
40	NS	NS	NS		

Statistics

Assigned Value	0.00207	0.00013
Spike Value	0.00199	0.00010
Robust Average	0.00207	0.00013
Median	0.00200	0.00010
Mean	0.00209	
N	29	
Max	0.003	
Min	0.0014	
Robust SD	0.00027	
Robust CV	13%	


Kernel Density
Density
Result
Results: S1 - PFNA
Assigned Value = 0.00207 ± 0.00013 µg/L
Results (µg/L)
Laboratory
6 32 39 22 23 26 27 30 33 12 14 25 31 35 36 7 16 37 21 5 8 17 20 1 3 11 19 13 28 2 4 9 10 15 18 24 29 34 38 40 Md RA SV


z-Scores: S1 - PFNA
Standard Deviation for Proficiency Assessment 0.00041 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
6 32 39 22 23 26 27 30 33 12 14 25 31 35 36 7 16 37 21 5 8 17 20 1 3 11 19 13 28

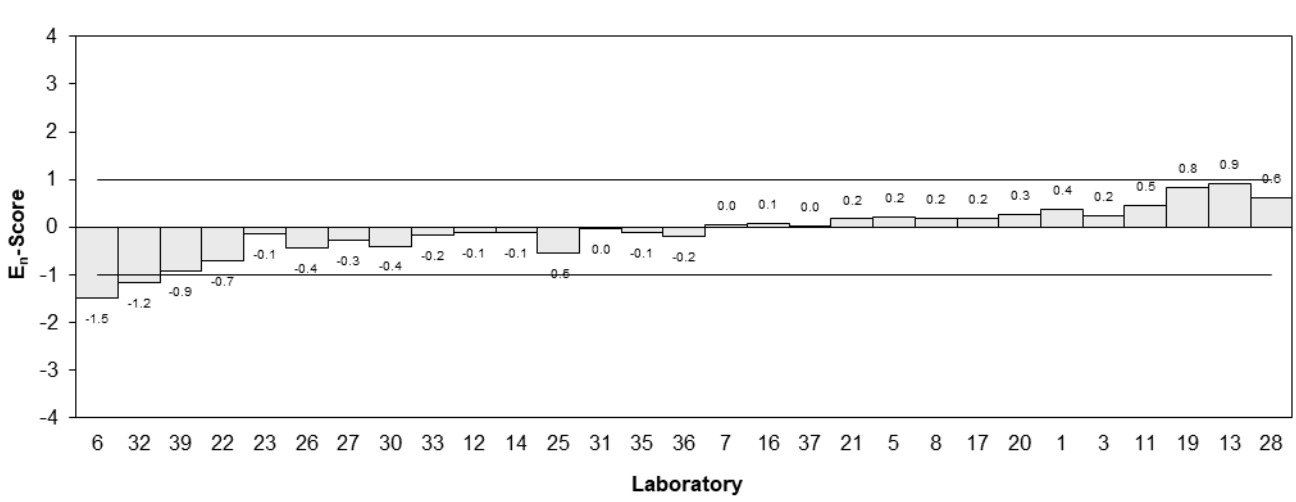

En-Scores: S1 - PFNA
En-Score
Laboratory
6 32 39 22 23 26 27 30 33 12 14 25 31 35 36 7 16 37 21 5 8 17 20 1 3 11 19 13 28

Figure 6

Table 11

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	PFDoA
Unit	µg/L

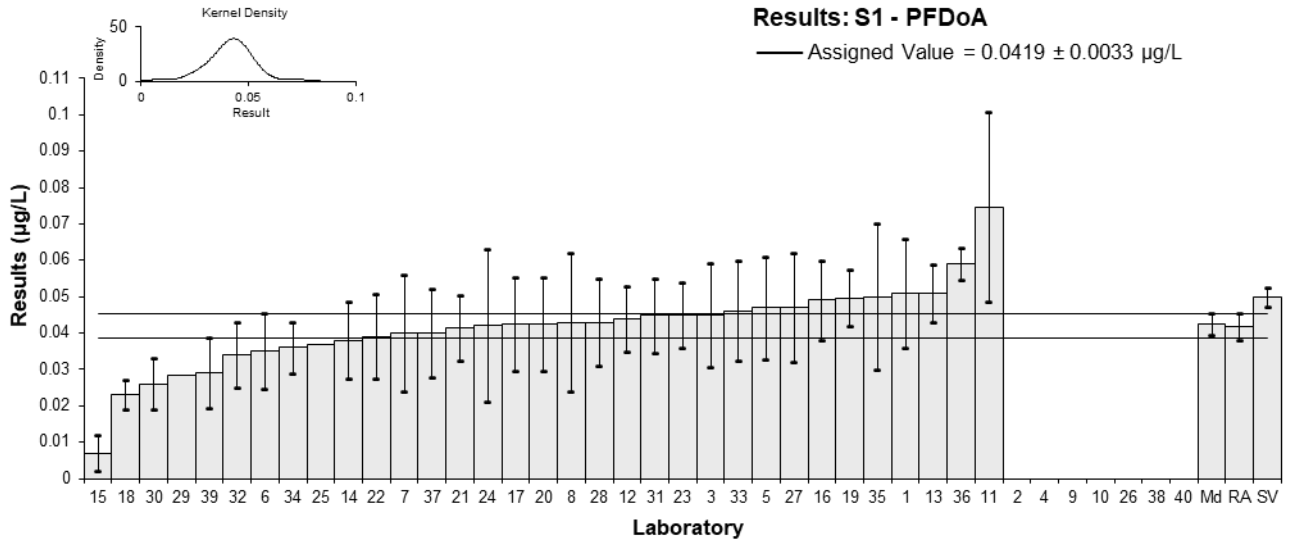
Participant Results

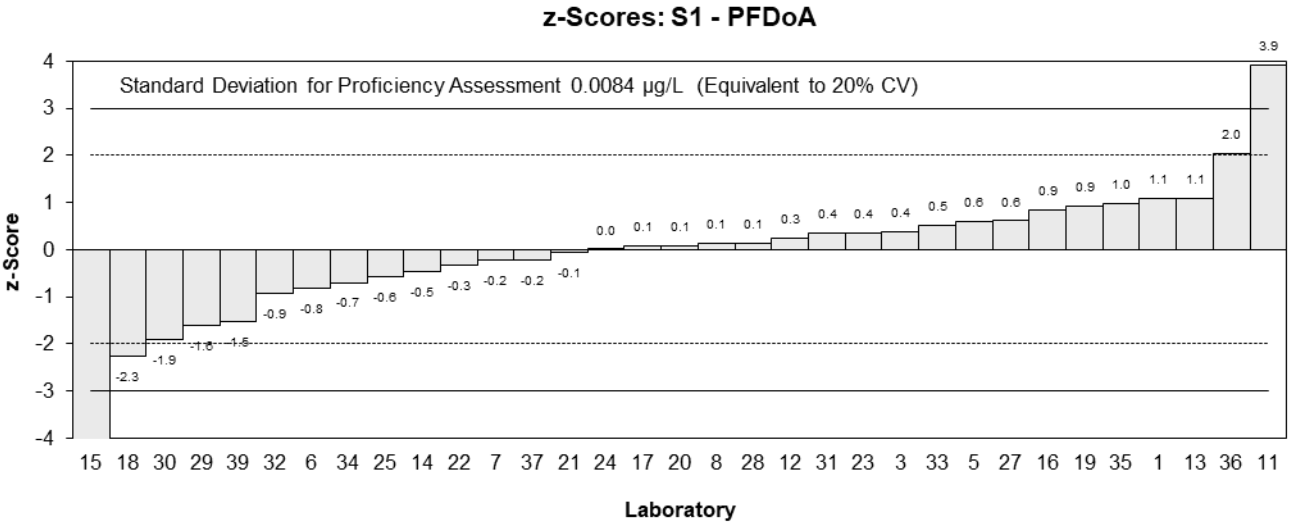
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0510	0.0149	81.73	1.09	0.60
2	NS	NS	NS		
3	0.045	0.0143	NR	0.37	0.21
4	NS	NS	NS		
5	0.0469	0.0141	102.7	0.60	0.35
6	0.035	0.0104025	100	-0.82	-0.63
7	0.04	0.016	86	-0.23	-0.12
8	0.043	0.019	102	0.13	0.06
9	NS	NS	NS		
10	NR	NR	NR		
11*	0.0747	0.02597	NR	3.91	1.25
12	0.044	0.009	78	0.25	0.22
13	0.051	0.008	75	1.09	1.05
14	0.038	0.0106	98	-0.47	-0.35
15*	0.006949	0.004998	NR	-4.17	-5.84
16	0.049	0.011	79	0.85	0.62
17	0.0425	0.0128	118.6	0.07	0.05
18	0.023	0.004	69	-2.26	-3.64
19	0.0496	0.0077	51	0.92	0.92
20	0.0425	0.01275	115	0.07	0.05
21	0.0413	0.009	150	-0.07	-0.06
22	0.0391	0.01173	100	-0.33	-0.23
23	0.0449	0.0091	NR	0.36	0.31
24	0.042	0.021	138	0.01	0.00
25	0.037	NR	NR	-0.58	-1.48
26	NR	NR	NR		
27	0.047	0.015	NR	0.61	0.33
28	0.043	0.012	105	0.13	0.09
29	0.0284	NR	NR	-1.61	-4.09
30	0.026	0.007	93	-1.90	-2.05
31	0.0448	0.0102	108.31	0.35	0.27
32	0.034	0.0088523	112.387	-0.94	-0.84
33	0.04614	0.0138	76	0.51	0.30
34	0.036	0.007	79	-0.70	-0.76
35	0.05	0.02	74	0.97	0.40
36	0.059	0.0043	69	2.04	3.15
37	0.04	0.012	110	-0.23	-0.15
38	NS	NS	NS		
39	0.02918	0.00963	65	-1.52	-1.25
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0419	0.0033
Spike Value	0.0499	0.0025
Robust Average	0.0417	0.0037
Median	0.0425	0.0029
Mean	0.0415	
N	33	
Max	0.0747	
Min	0.006949	
Robust SD	0.0084	
Robust CV	20%	


Kernel Density
Density
Result
Results: S1 - PFDoA
Assigned Value = 0.0419 ± 0.0033 µg/L
Results (µg/L)
Laboratory
15 18 30 29 39 32 6 34 25 14 22 7 37 21 24 17 20 8 28 12 31 23 3 33 5 27 16 19 35 1 13 36 11 2 4 9 10 26 38 40 Md RA SV


z-Scores: S1 - PFDoA
Standard Deviation for Proficiency Assessment 0.0084 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
15 18 30 29 39 32 6 34 25 14 22 7 37 21 24 17 20 8 28 12 31 23 3 33 5 27 16 19 35 1 13 36 11

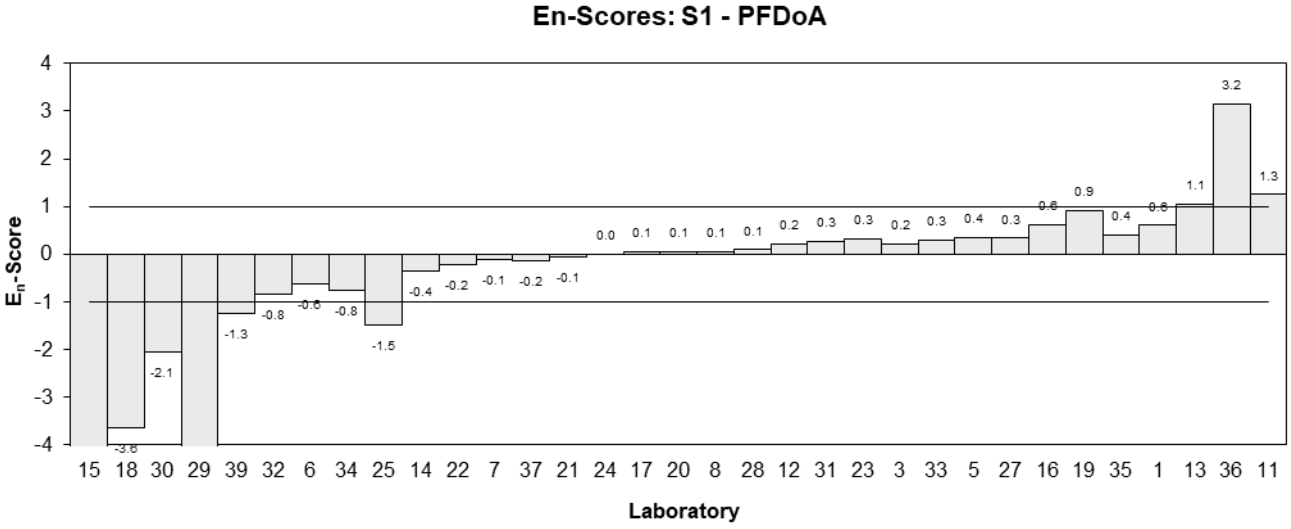

En-Scores: S1 - PFDoA
En-Score
Laboratory
15 18 30 29 39 32 6 34 25 14 22 7 37 21 24 17 20 8 28 12 31 23 3 33 5 27 16 19 35 1 13 36 11

Figure 7

Table 12

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	PFTeDA
Unit	µg/L

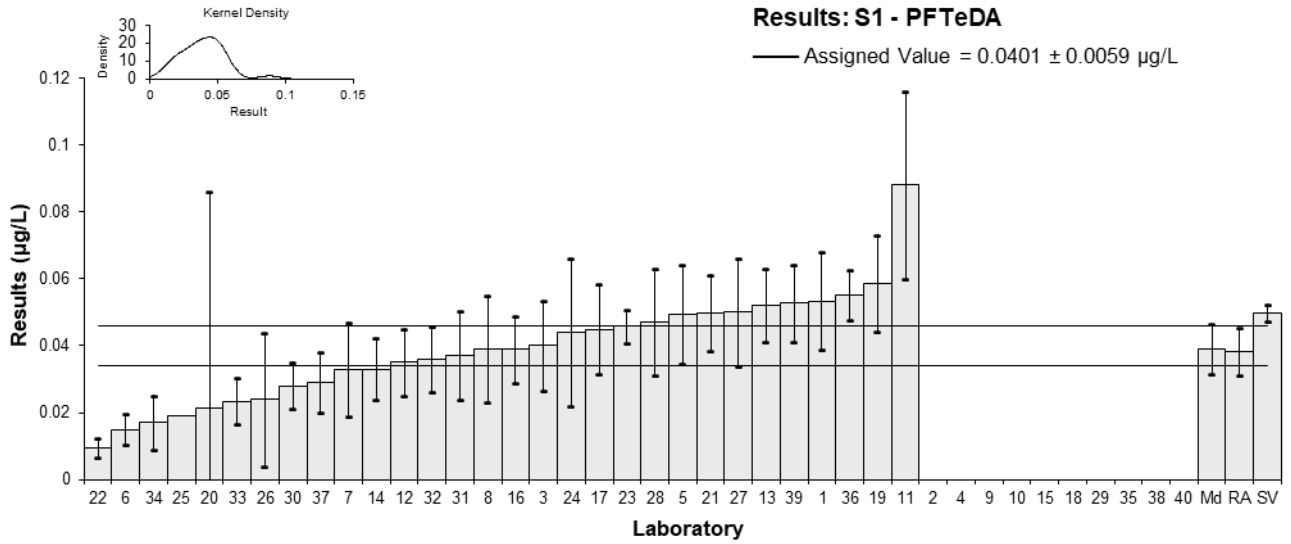
Participant Results

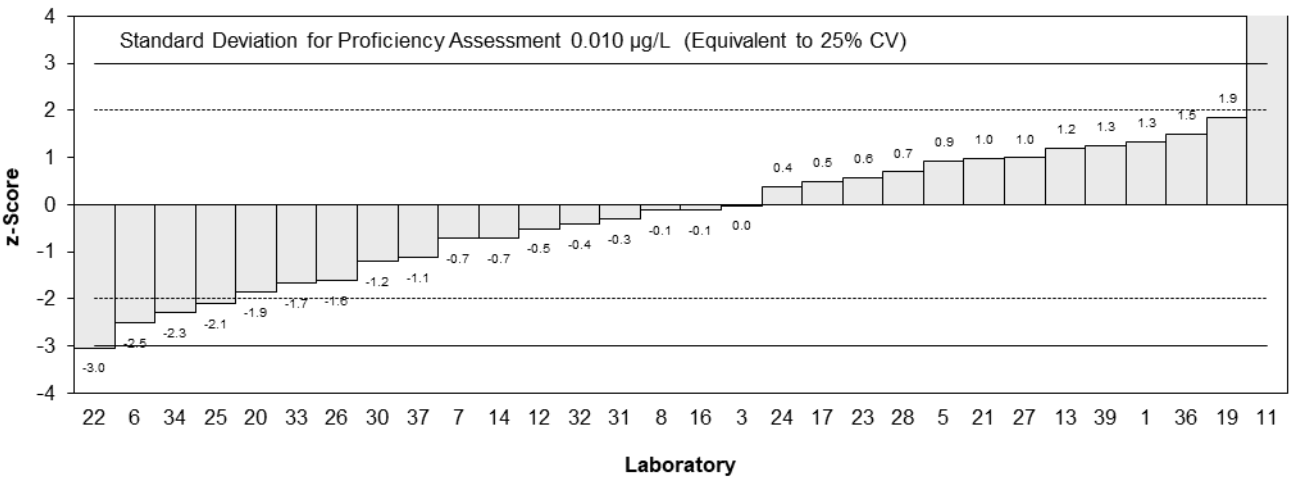
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0534	0.0146	96.79	1.33	0.84
2	NS	NS	NS		
3	0.04	0.0136	NR	-0.01	-0.01
4	NS	NS	NS		
5	0.0494	0.0148	98.8	0.93	0.58
6*	0.015	0.004605	105	-2.50	-3.35
7	0.033	0.014	62	-0.71	-0.47
8	0.039	0.016	103	-0.11	-0.06
9	NS	NS	NS		
10	NR	NR	NR		
11*	0.0882	0.02804	NR	4.80	1.68
12	0.035	0.01	96	-0.51	-0.44
13	0.052	0.011	30	1.19	0.95
14	0.033	0.0092	87	-0.71	-0.65
15	NR	NR	NR		
16	0.039	0.010	85	-0.11	-0.09
17	0.0449	0.0135	100.7	0.48	0.33
18	<0.01	NR	NR		
19*	0.0586	0.0145	28	1.85	1.18
20	0.0215	0.0645	105	-1.86	-0.29
21	0.0499	0.0114	77	0.98	0.76
22*	0.0096	0.002865	85	-3.04	-4.65
23	0.0458	0.0049	NR	0.57	0.74
24	0.044	0.022	116	0.39	0.17
25*	0.019	NR	NR	-2.10	-3.58
26	0.024	0.020	163	-1.61	-0.77
27	0.050	0.016	NR	0.99	0.58
28	0.047	0.016	NR	0.69	0.40
29	<0.025	NR	NR		
30	0.028	0.007	55	-1.21	-1.32
31	0.037	0.0133	138.43	-0.31	-0.21
32	0.036	0.0097695	82.0983	-0.41	-0.36
33	0.02344	0.0070	60	-1.66	-1.82
34*	0.017	0.008	79	-2.30	-2.32
35	<0.05	NR	NR		
36	0.055	0.0075	69	1.49	1.56
37	0.029	0.009	118	-1.11	-1.03
38	NS	NS	NS		
39	0.05269	0.01159	70	1.26	0.97
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0401	0.0059
Spike Value	0.0499	0.0025
Robust Average	0.0383	0.0070
Median	0.0390	0.0074
Mean	0.0390	
N	30	
Max	0.0882	
Min	0.0096	
Robust SD	0.015	
Robust CV	40%	


Kernel Density
Density
Result
Results: S1 - PFTeDA
Assigned Value = 0.0401 ± 0.0059 µg/L
Results (µg/L)
Laboratory
22 6 34 25 20 33 26 30 37 7 14 12 32 31 8 16 3 24 17 23 28 5 21 27 13 39 1 36 19 11 2 4 9 10 15 18 29 35 38 40 Md RA SV


z-Scores: S1 - PFTeDA
Standard Deviation for Proficiency Assessment 0.010 µg/L (Equivalent to 25% CV)
z-Score
Laboratory
22 6 34 25 20 33 26 30 37 7 14 12 32 31 8 16 3 24 17 23 28 5 21 27 13 39 1 36 19 11

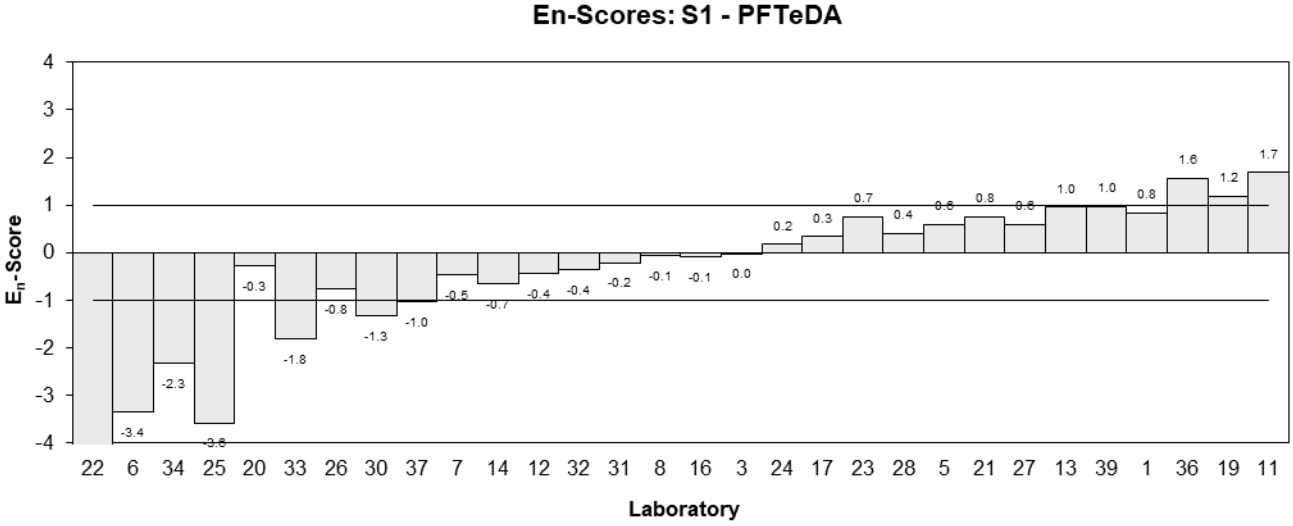

En-Scores: S1 - PFTeDA
En-Score
Laboratory
22 6 34 25 20 33 26 30 37 7 14 12 32 31 8 16 3 24 17 23 28 5 21 27 13 39 1 36 19 11

Figure 8

Table 13

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	PFHxDA
Unit	µg/L

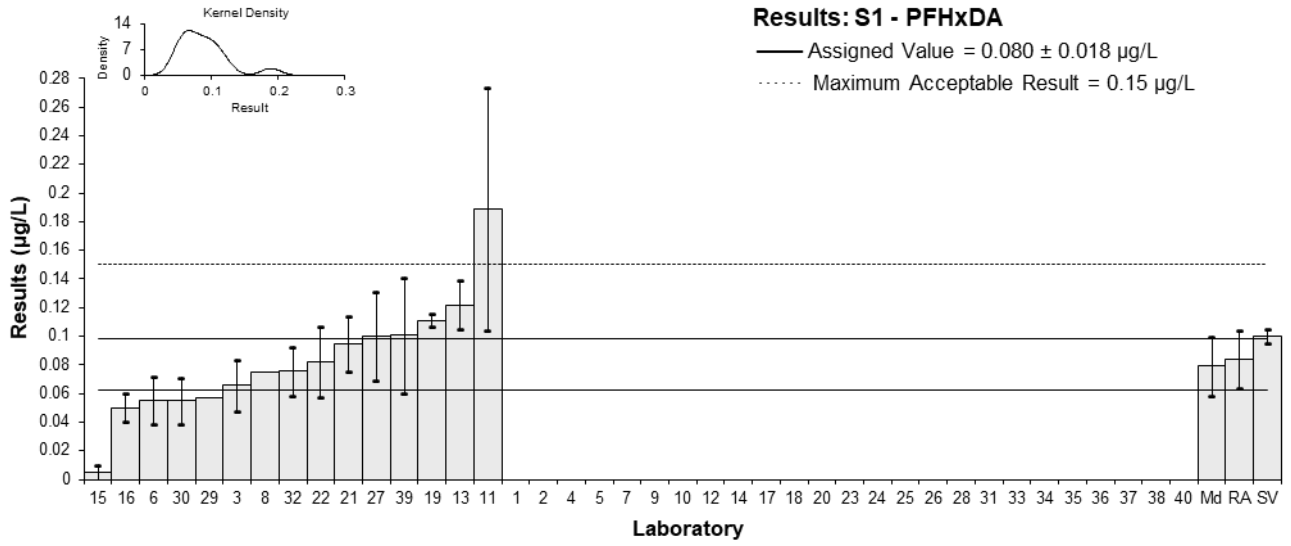
Participant Results

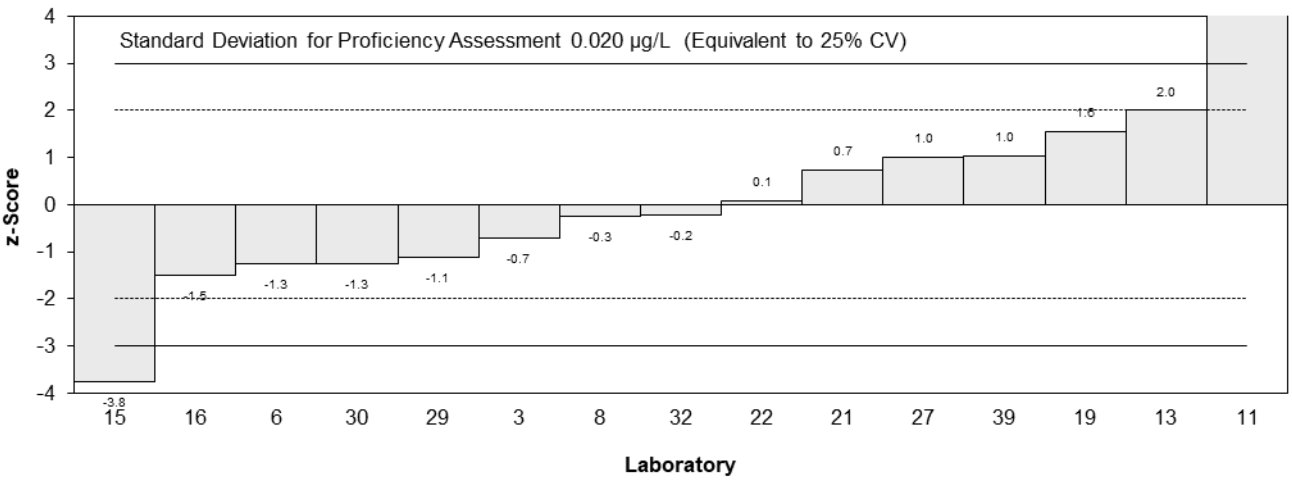
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	50.47		
2	NS	NS	NS		
3	0.0656	0.0181	NR	-0.72	-0.56
4	NS	NS	NS		
5	NT	NT	NT		
6	0.055	0.01642	110	-1.25	-1.03
7	NT	NT	NT		
8	0.075	NR	139	-0.25	-0.28
9	NS	NS	NS		
10	NR	NR	NR		
11*	0.189	0.085	NR	5.45	1.25
12	NT	NT	NT		
13	0.122	0.017	37	2.00▼	
14	NT	NT	NT		
15**	0.004984	0.005086	NR	-3.75	-4.01
16	0.050	0.010	80	-1.50	-1.46
17	NT	NT	NT		
18	NT	NT	NT		
19	0.1112	0.0042	68	1.56	1.69
20	NT	NT	NT		
21	0.0946	0.019	18	0.73	0.56
22	0.0819	0.02457	65	0.09	0.06
23	NT	NT	NT		
24	NT	NT	NT		
25	NT	NT	NT		
26	NT	NT	NT		
27	0.10	0.031	NR	1.00	0.56
28	NT	NT	NT		
29	0.0574	NR	NR	-1.13	-1.26
30	0.055	0.016	20	-1.25	-1.04
31	NT	NT	NT		
32	0.0755	0.0170409	37.5787	-0.23	-0.18
33	NT	NT	NT		
34	NT	NT	NT		
35	NT	NT	NT		
36	NT	NT	NT		
37	NT	NT	NT		
38	NS	NS	NS		
39	0.10071	0.04028	61	1.04	0.47
40	NS	NS	NS		

* Outlier, ** Extreme Outlier, see Section 4.2; ▼ Adjusted Score, see Section 6.3

Statistics

Assigned Value	0.080	0.018
Spike Value	0.0999	0.0050
Robust Average	0.084	0.020
Max Acceptable Result	0.150	
Median	0.079	0.021
Mean	0.088	
N	14	
Max	0.189	
Min	0.05	
Robust SD	0.030	
Robust CV	35%	


Kernel Density
Density
Result
Results: S1 - PFHxDA
Assigned Value = 0.080 ± 0.018 µg/L
Maximum Acceptable Result = 0.15 µg/L
Results (µg/L)
Laboratory
15 16 6 30 29 3 8 32 22 21 27 39 19 13 11 1 2 4 5 7 9 10 12 14 17 18 20 23 24 25 26 28 31 33 34 35 36 37 38 40 Md RA SV


z-Scores: S1 - PFHxDA
Standard Deviation for Proficiency Assessment 0.020 µg/L (Equivalent to 25% CV)
z-Score
Laboratory
15 16 6 30 29 3 8 32 22 21 27 39 19 13 11
-3.8 -1.5 -1.3 -1.3 -1.1 -0.7 -0.3 -0.2 0.1 0.7 1.0 1.0 1.5 2.0

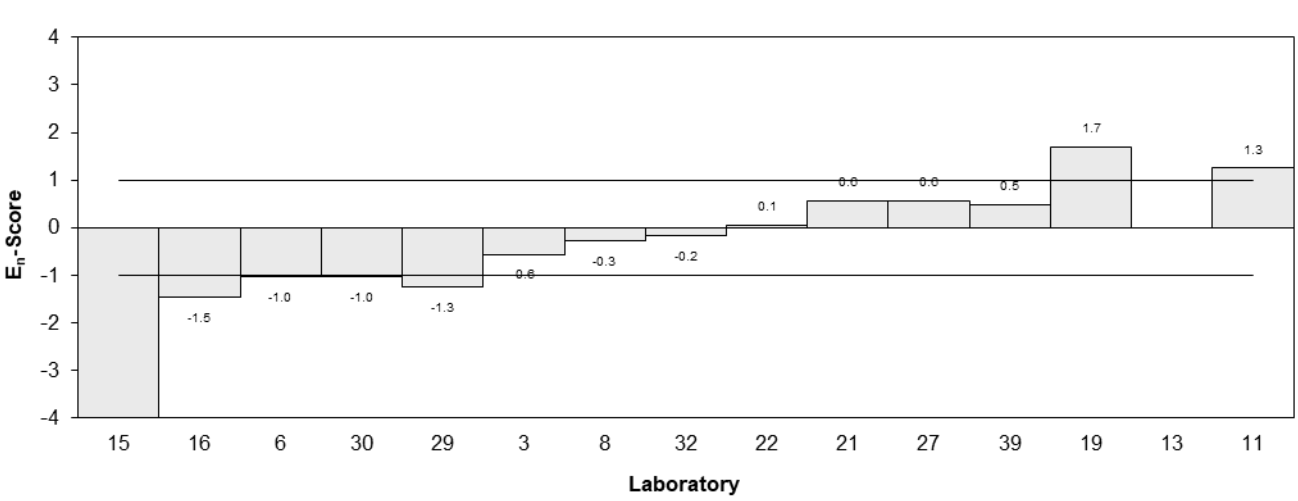

En-Scores: S1 - PFHxDA
En-Score
Laboratory
15 16 6 30 29 3 8 32 22 21 27 39 19 13 11
-1.5 -1.0 -1.0 -1.3 -0.6 -0.3 -0.2 0.1 0.6 0.6 0.5 1.7 1.3

Figure 9

Table 14

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	FOUEA
Unit	µg/L

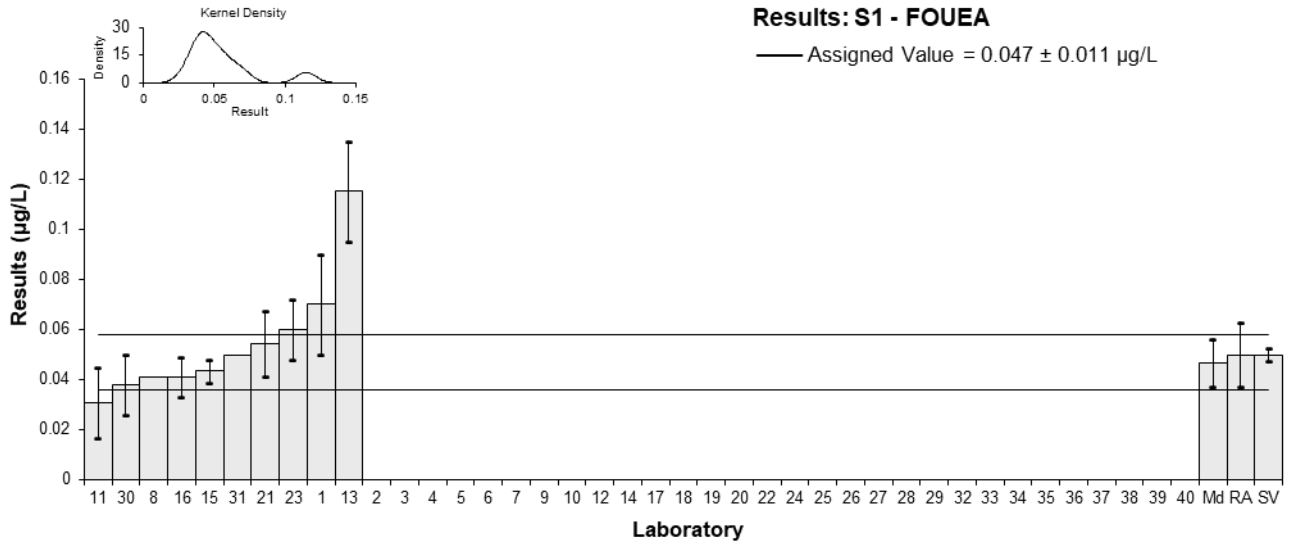
Participant Results

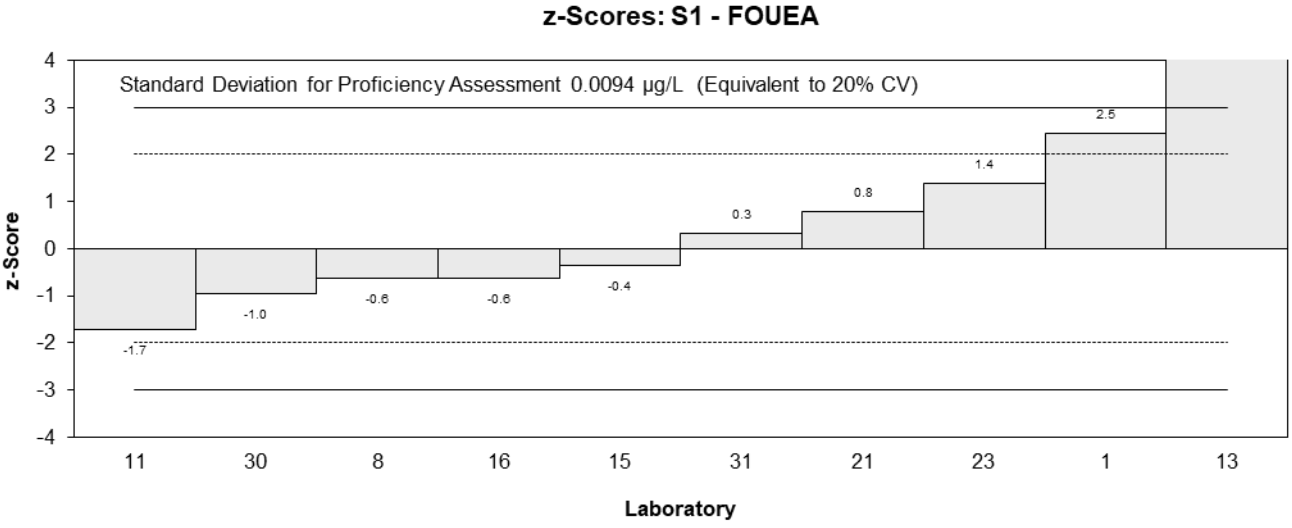
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.07	0.02	94.31	2.45	1.01
2	NS	NS	NS		
3	NT	NT	NT		
4	NS	NS	NS		
5	NT	NT	NT		
6	NT	NT	NT		
7	NT	NT	NT		
8	0.041	NR	91	-0.64	-0.55
9	NS	NS	NS		
10	NR	NR	NR		
11	0.0308	0.01386	NR	-1.72	-0.92
12	NT	NT	NT		
13*	0.115	0.02	80	7.23	2.98
14	NT	NT	NT		
15	0.043543	0.004589	NR	-0.37	-0.29
16	0.041	0.008	101	-0.64	-0.44
17	NT	NT	NT		
18	NT	NT	NT		
19	NT	NT	NT		
20	NT	NT	NT		
21	0.0543	0.013	143	0.78	0.43
22	NT	NT	NT		
23	0.06	0.0120	NR	1.38	0.80
24	NT	NT	NT		
25	NT	NT	NT		
26	NT	NT	NT		
27	NT	NT	NT		
28	NT	NT	NT		
29	NR	NR	NR		
30	0.038	0.012	110	-0.96	-0.55
31	0.05	NR	104.5	0.32	0.27
32	NR	NR	NR		
33	NT	NT	NT		
34	NT	NT	NT		
35	NT	NT	NT		
36	NT	NT	NT		
37	NT	NT	NT		
38	NS	NS	NS		
39	NT	NT	NT		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.047	0.011
Spike Value	0.0499	0.0025
Robust Average	0.050	0.013
Median	0.0468	0.0096
Mean	0.054	
N	10	
Max	0.115	
Min	0.0308	
Robust SD	0.016	
Robust CV	32%	


Kernel Density
Density
Result
Results: S1 - FOUEA
Assigned Value = 0.047 ± 0.011 µg/L
Results (µg/L)
Laboratory
11 30 8 16 15 31 21 23 1 13 2 3 4 5 6 7 9 10 12 14 17 18 19 20 22 24 25 26 27 28 29 32 33 34 35 36 37 38 39 40 Md RA SV


z-Scores: S1 - FOUEA
Standard Deviation for Proficiency Assessment 0.0094 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
11 30 8 16 15 31 21 23 1 13
-1.7
-1.0
-0.6
-0.6
-0.4
0.3
0.8
1.4
2.5

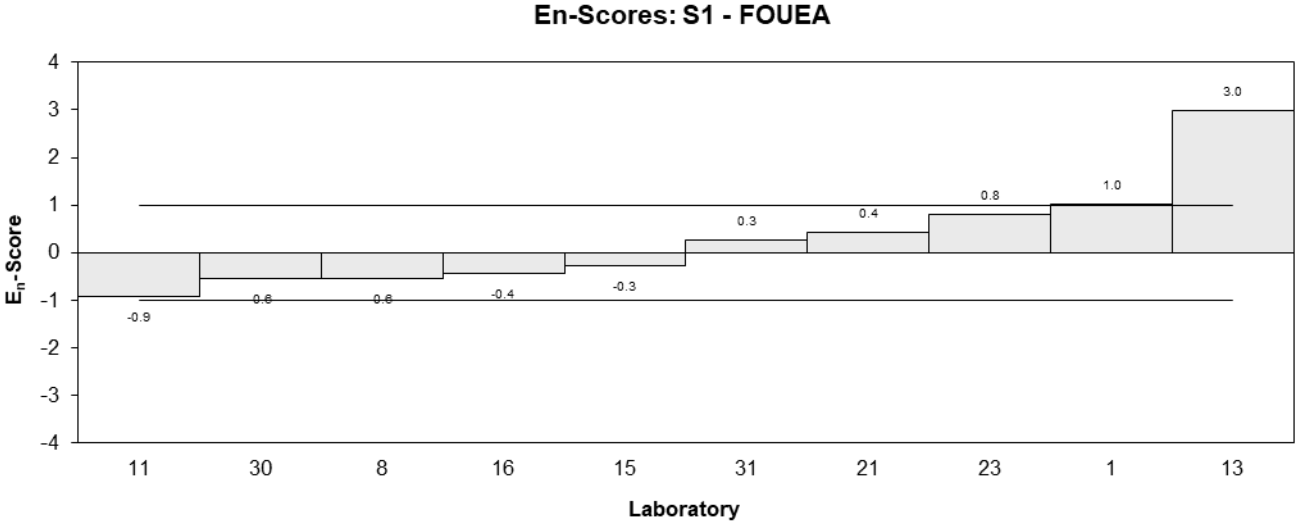

En-Scores: S1 - FOUEA
En-Score
Laboratory
11 30 8 16 15 31 21 23 1 13
-0.9
-0.6
-0.6
-0.4
-0.3
0.3
0.4
0.8
1.0
3.0

Figure 10

Table 15

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	PFBS
Unit	µg/L

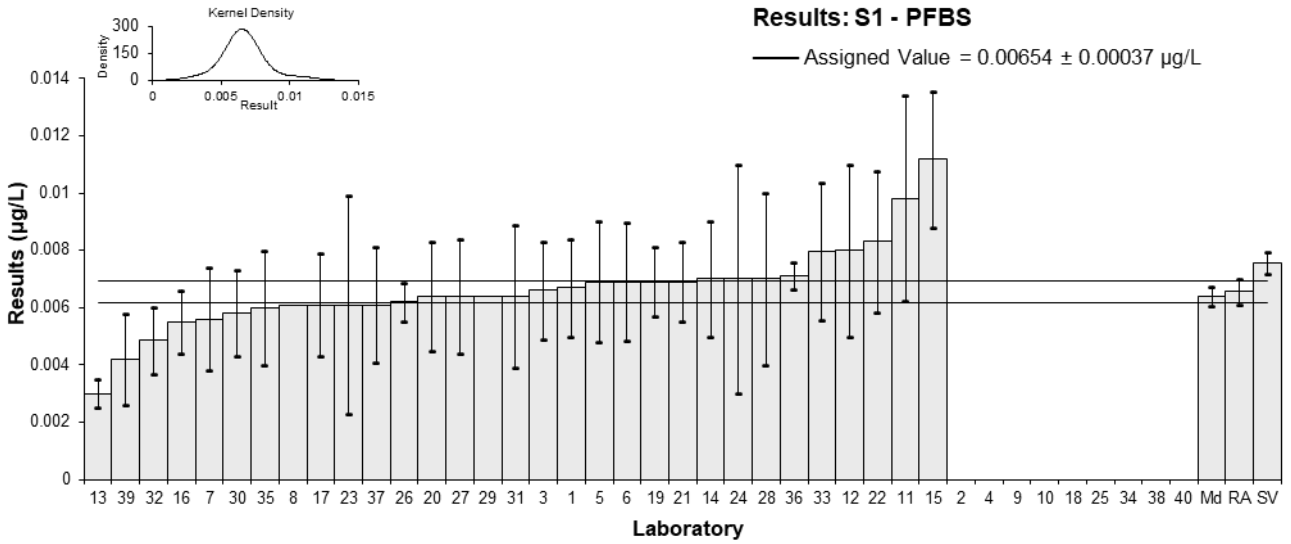
Participant Results

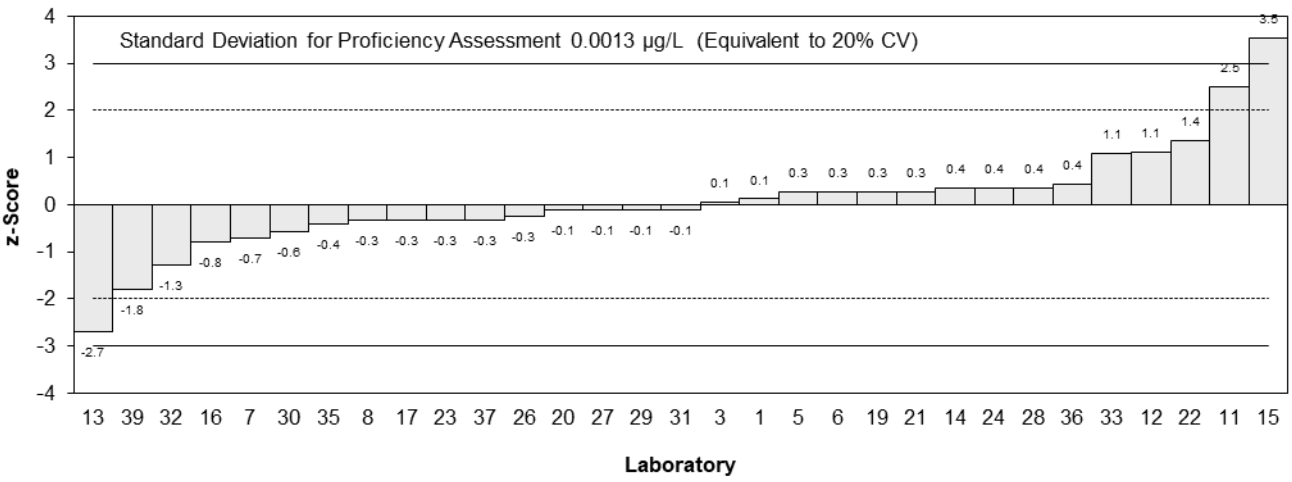
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0067	0.0017	91	0.12	0.09
2	NS	NS	NS		
3	0.0066	0.0017	NR	0.05	0.03
4	NS	NS	NS		
5	0.0069	0.0021	81.8	0.28	0.17
6	0.0069	0.002055	100	0.28	0.17
7	0.0056	0.0018	97	-0.72	-0.51
8	0.0061	NR	95	-0.34	-1.19
9	NS	NS	NS		
10	NR	NR	NR		
11	0.00981	0.003594	NR	2.50	0.91
12	0.008	0.003	75	1.12	0.48
13*	0.003	0.0005	106	-2.71	-5.69
14	0.007	0.0020	111	0.35	0.23
15*	0.011176	0.002390	NR	3.54	1.92
16	0.0055	0.0011	103	-0.80	-0.90
17	0.0061	0.0018	99.8	-0.34	-0.24
18	<0.01	NR	NR		
19	0.0069	0.0012	91	0.28	0.29
20	0.0064	0.00192	115	-0.11	-0.07
21	0.0069	0.0014	108	0.28	0.25
22	0.0083	0.002475	140	1.35	0.70
23	0.0061	0.0038	NR	-0.34	-0.12
24	0.007	0.004	132	0.35	0.11
25	NT	NT	NT		
26	0.0062	0.00067	107	-0.26	-0.44
27	0.0064	0.0020	NR	-0.11	-0.07
28	0.007	0.003	93	0.35	0.15
29	0.0064	NR	NR	-0.11	-0.38
30	0.0058	0.0015	102	-0.57	-0.48
31	0.0064	0.0025	87.2	-0.11	-0.06
32	0.00485	0.0011745	124.063	-1.29	-1.37
33	0.00796	0.0024	66	1.09	0.58
34	<0.01	0.01	90		
35	0.006	0.002	86	-0.41	-0.27
36	0.0071	0.00048	80	0.43	0.92
37	0.0061	0.002	106	-0.34	-0.22
38	NS	NS	NS		
39	0.00419	0.00159	100	-1.80	-1.44
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.00654	0.00037
Spike Value	0.00754	0.00038
Robust Average	0.00656	0.00044
Median	0.00640	0.00033
Mean	0.00663	
N	31	
Max	0.011176	
Min	0.003	
Robust SD	0.00097	
Robust CV	15%	


Kernel Density
Density
300
150
0
0
0.005
0.01
0.015
Result
Results: S1 - PFBS
Assigned Value = 0.00654 ± 0.00037 µg/L
Results (µg/L)
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
13 39 32 16 7 30 35 8 17 23 37 26 20 27 29 31 3 1 5 6 19 21 14 24 28 36 33 12 22 11 15 2 4 9 10 18 25 34 38 40 Md RA SV
Laboratory


z-Scores: S1 - PFBS
Standard Deviation for Proficiency Assessment 0.0013 µg/L (Equivalent to 20% CV)
z-Score
4
3
2
1
0
-1
-2
-3
-4
-2.7 -1.8 -1.3 -0.8 -0.7 -0.6 -0.4 -0.3 -0.3 -0.3 -0.3 -0.3 -0.1 -0.1 -0.1 -0.1 0.1 0.1 0.3 0.3 0.3 0.3 0.4 0.4 0.4 0.4 1.1 1.1 1.4 2.5 3.6
13 39 32 16 7 30 35 8 17 23 37 26 20 27 29 31 3 1 5 6 19 21 14 24 28 36 33 12 22 11 15
Laboratory

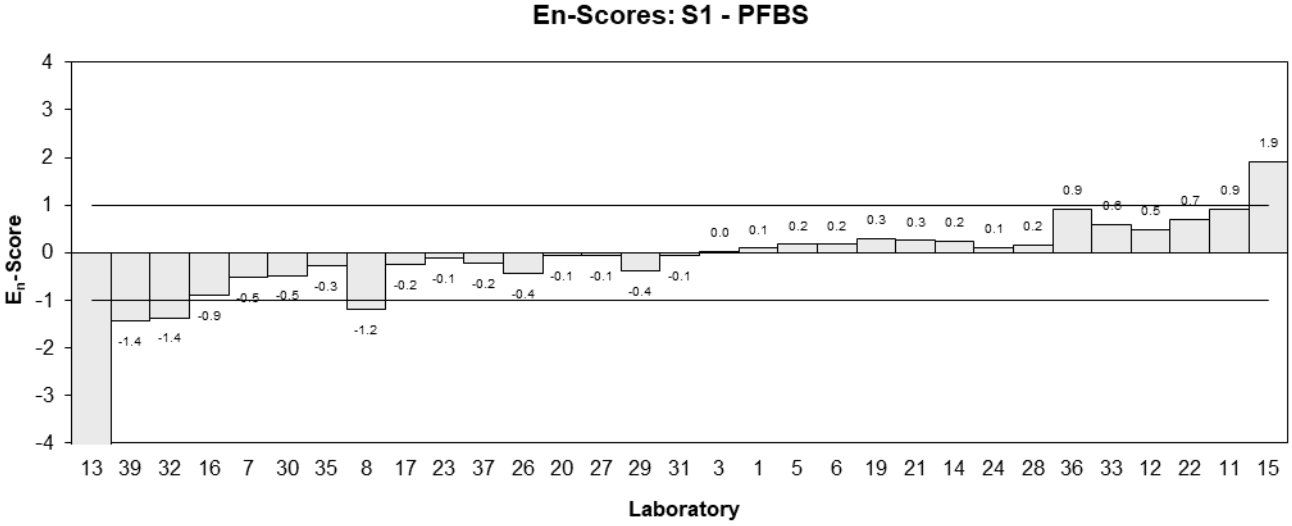

En-Scores: S1 - PFBS
En-Score
4
3
2
1
0
-1
-2
-3
-4
-1.4 -1.4 -0.9 -0.5 -0.5 -0.3 -1.2 -0.2 -0.1 -0.2 -0.4 -0.1 -0.1 -0.4 -0.1 0.0 0.1 0.2 0.2 0.3 0.3 0.2 0.1 0.2 0.9 0.6 0.5 0.7 0.9 1.9
13 39 32 16 7 30 35 8 17 23 37 26 20 27 29 31 3 1 5 6 19 21 14 24 28 36 33 12 22 11 15
Laboratory

Figure 11

Table 16

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	PFHxS
Unit	µg/L

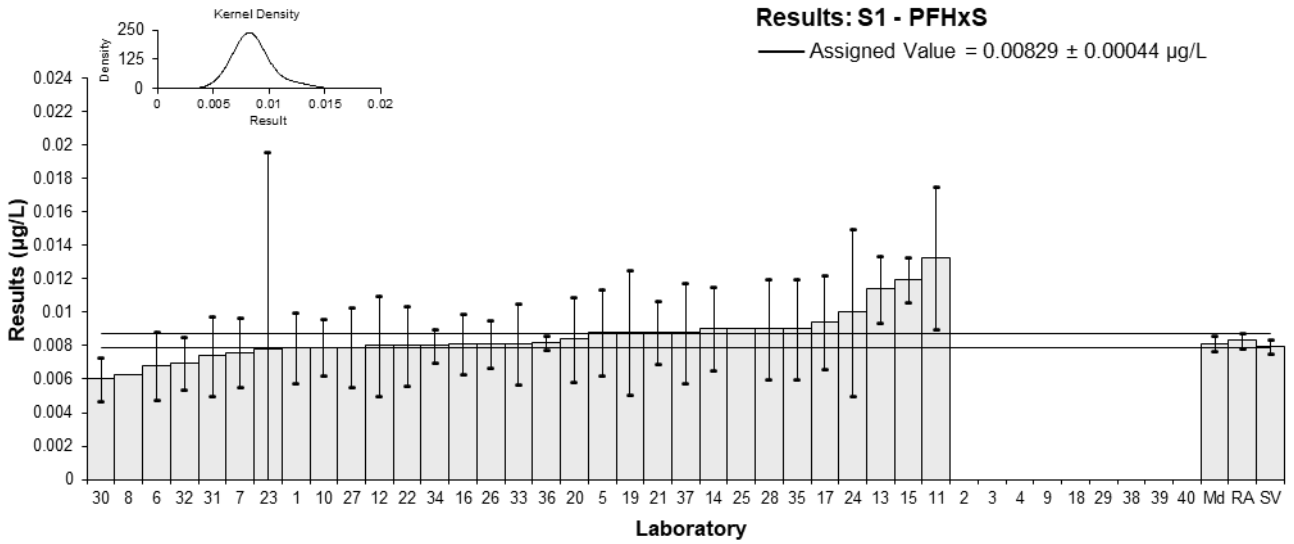
Participant Results

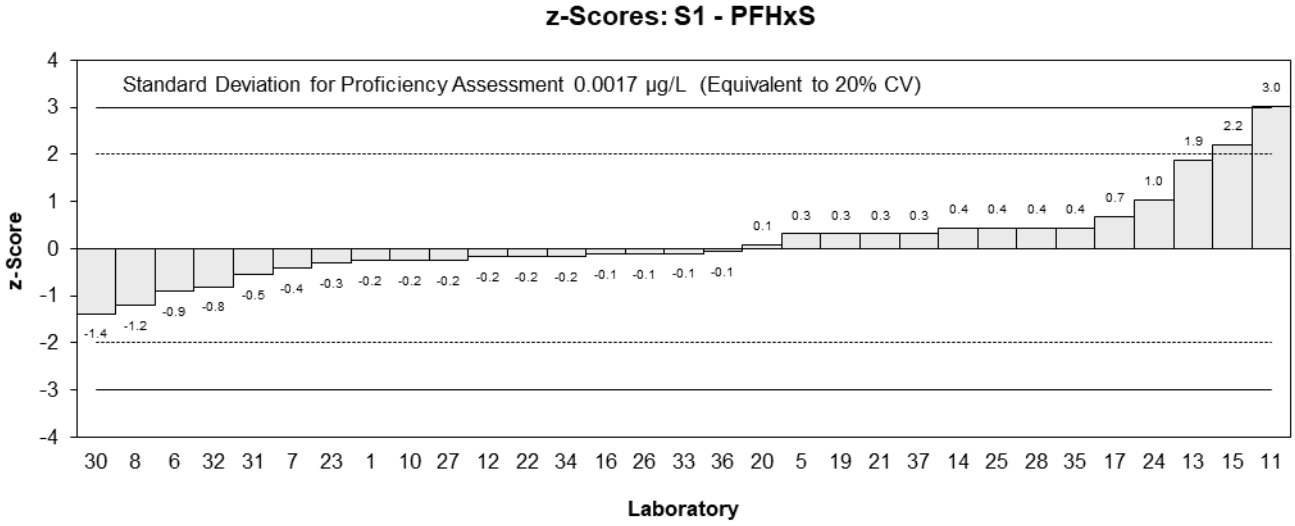
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0079	0.0021	94.2	-0.24	-0.18
2	NS	NS	NS		
3	NT	NT	NT		
4	NS	NS	NS		
5	0.0088	0.0026	87.9	0.31	0.19
6	0.0068	0.0020475	90	-0.90	-0.71
7	0.0076	0.0021	108	-0.42	-0.32
8	0.0063	NR	105	-1.20	-4.52
9	NS	NS	NS		
10	0.0079	0.0017	NR	-0.24	-0.22
11*	0.0133	0.00427	NR	3.02	1.17
12	0.008	0.003	83	-0.17	-0.10
13	0.0114	0.002	80	1.88	1.52
14	0.009	0.0025	104	0.43	0.28
15	0.011942	0.001347	NR	2.20	2.58
16	0.0081	0.0018	103	-0.11	-0.10
17	0.0094	0.0028	113.2	0.67	0.39
18	<0.01	NR	NR		
19	0.0088	0.0037	85	0.31	0.14
20	0.0084	0.00252	125	0.07	0.04
21	0.0088	0.0019	130	0.31	0.26
22	0.0080	0.002385	90	-0.17	-0.12
23	0.0078	0.0118	NR	-0.30	-0.04
24	0.010	0.005	132	1.03	0.34
25	0.009	NR	NR	0.43	1.61
26	0.0081	0.0014	112	-0.11	-0.13
27	0.0079	0.0024	NR	-0.24	-0.16
28	0.009	0.003	93	0.43	0.23
29	<0.005	NR	NR		
30	0.0060	0.0013	109	-1.38	-1.67
31	0.0074	0.0024	76.8	-0.54	-0.36
32	0.00695	0.0015973	123.696	-0.81	-0.81
33	0.00813	0.0024	86	-0.10	-0.07
34	0.008	0.001	90	-0.17	-0.27
35	0.009	0.003	85	0.43	0.23
36	0.0082	0.00041	82	-0.05	-0.15
37	0.0088	0.003	106	0.31	0.17
38	NS	NS	NS		
39	NT	NT	NT		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.00829	0.00044
Spike Value	0.00795	0.00040
Robust Average	0.00831	0.00045
Median	0.00813	0.00045
Mean	0.00854	
N	31	
Max	0.0133	
Min	0.006	
Robust SD	0.00100	
Robust CV	12%	


Kernel Density
Density
Result
Results: S1 - PFHxS
Assigned Value = 0.00829 ± 0.00044 µg/L
Results (µg/L)
Laboratory
30 8 6 32 31 7 23 1 10 27 12 22 34 16 26 33 36 20 5 19 21 37 14 25 28 35 17 24 13 15 11 2 3 4 9 18 29 38 39 40 Md RA SV


z-Scores: S1 - PFHxS
Standard Deviation for Proficiency Assessment 0.0017 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
30 8 6 32 31 7 23 1 10 27 12 22 34 16 26 33 36 20 5 19 21 37 14 25 28 35 17 24 13 15 11

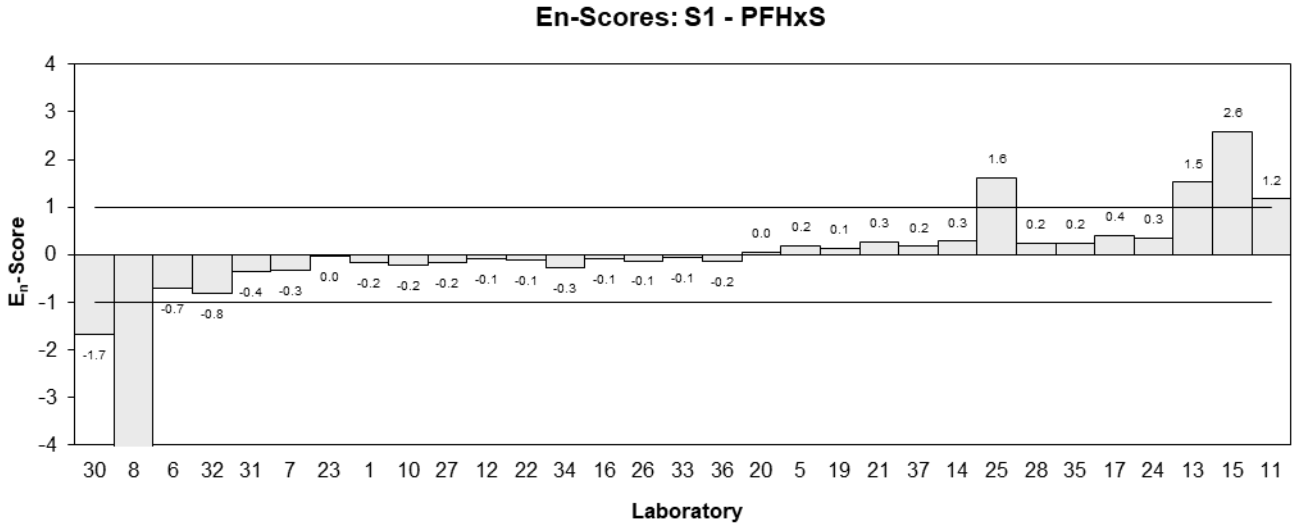

En-Scores: S1 - PFHxS
En-Score
Laboratory
30 8 6 32 31 7 23 1 10 27 12 22 34 16 26 33 36 20 5 19 21 37 14 25 28 35 17 24 13 15 11

Figure 12

Table 17

Sample Details

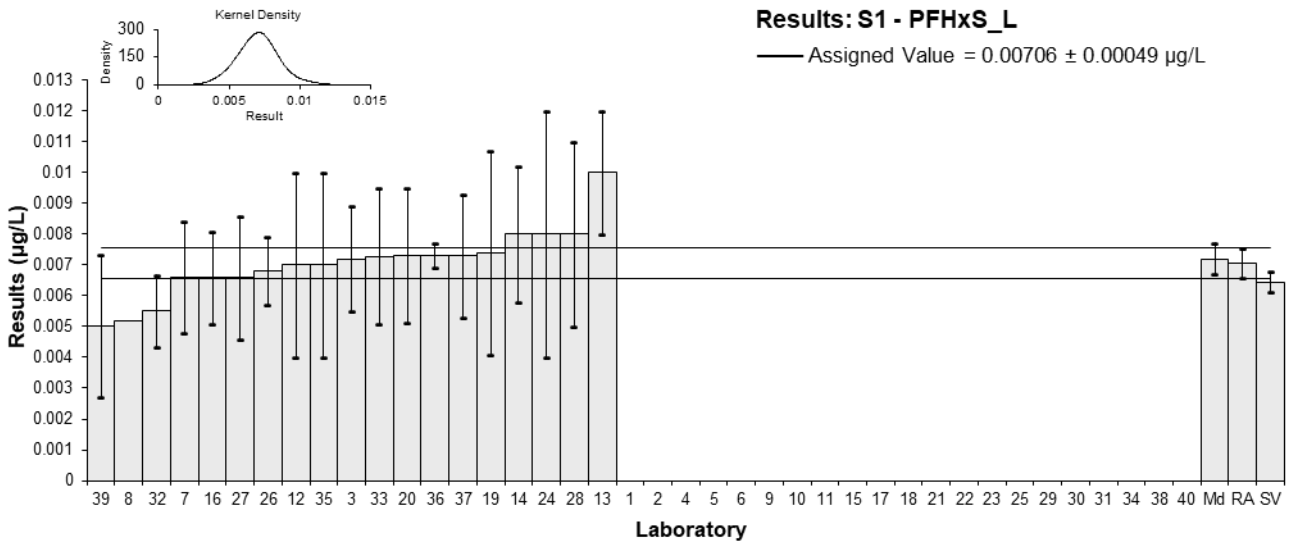
Sample No.	S1
Matrix	Potable Water
Analyte	PFHxS_L
Unit	µg/L

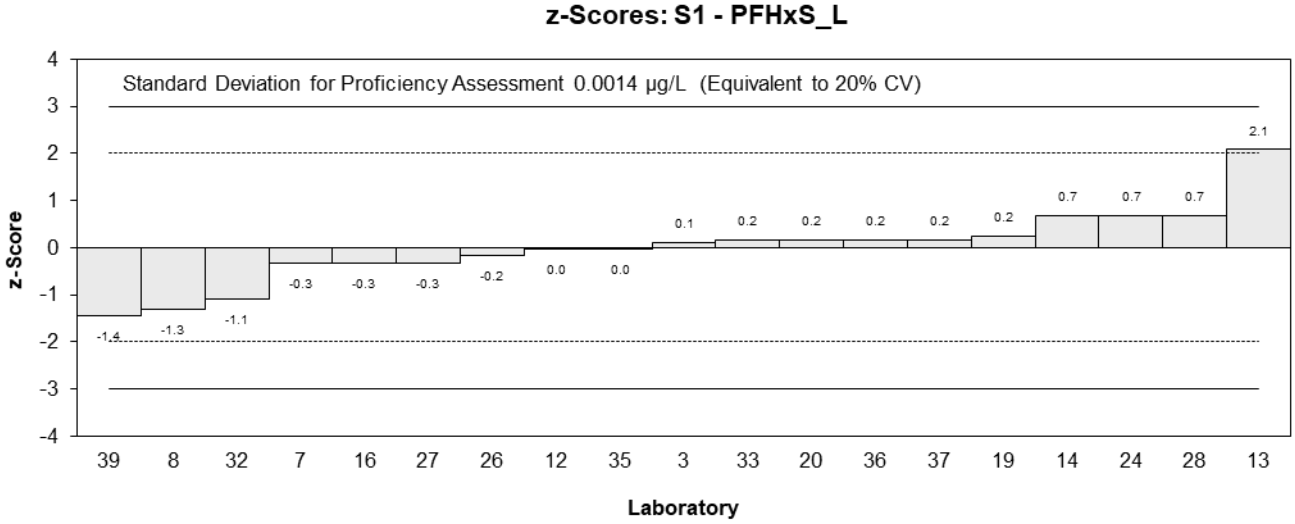
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NS	NS	NS		
3	0.0072	0.0017	NR	0.10	0.08
4	NS	NS	NS		
5	NT	NT	NT		
6	NT	NT	NT		
7	0.0066	0.0018	108	-0.33	-0.25
8	0.0052	NR	NR	-1.32	-3.80
9	NS	NS	NS		
10	NR	NR	NR		
11	NR	NR	NR		
12	0.007	0.003	83	-0.04	-0.02
13	0.01	0.002	80	2.08	1.43
14	0.008	0.0022	104	0.67	0.42
15	NT	NT	NT		
16	0.0066	0.0015	NR	-0.33	-0.29
17	NT	NT	NT		
18	<0.01	NR	NR		
19	0.0074	0.0033	85	0.24	0.10
20	0.0073	0.00219	125	0.17	0.11
21	NT	NR	130		
22	NT	NT	NT		
23	NT	NT	NT		
24	0.008	0.004	NR	0.67	0.23
25	NT	NT	NT		
26	0.0068	0.0011	112	-0.18	-0.22
27	0.0066	0.0020	NR	-0.33	-0.22
28	0.008	0.003	NR	0.67	0.31
29	<0.005	NR	NR		
30	NT	NT	NT		
31	NT	NT	NT		
32	0.0055	0.0011815	123.696	-1.10	-1.22
33	0.00728	0.0022	86	0.16	0.10
34	NT	NT	NT		
35	0.007	0.003	85	-0.04	-0.02
36	0.0073	0.0004	82	0.17	0.38
37	0.0073	0.002	106	0.17	0.12
38	NS	NS	NS		
39	0.00502	0.00231	101	-1.44	-0.86
40	NS	NS	NS		

Statistics

Assigned Value	0.00706	0.00049
Spike Value	0.00645	0.00032
Robust Average	0.00706	0.00049
Median	0.00720	0.00051
Mean	0.00706	
N	19	
Max	0.01	
Min	0.00502	
Robust SD	0.00085	
Robust CV	12%	


Kernel Density
Density
300
150
0
0
0.005
0.01
0.015
Result
Results: S1 - PFHxS_L
Assigned Value = 0.00706 ± 0.00049 µg/L
Results (µg/L)
0.013
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
39 8 32 7 16 27 26 12 35 3 33 20 36 37 19 14 24 28 13 1 2 4 5 6 9 10 11 15 17 18 21 22 23 25 29 30 31 34 38 40 Md RA SV
Laboratory


z-Scores: S1 - PFHxS_L
Standard Deviation for Proficiency Assessment 0.0014 µg/L (Equivalent to 20% CV)
z-Score
4
3
2
1
0
-1
-2
-3
-4
-1.4
-1.3
-1.1
-0.3
-0.3
-0.3
-0.2
0.0
0.0
0.1
0.2
0.2
0.2
0.2
0.2
0.7
0.7
0.7
2.1
39 8 32 7 16 27 26 12 35 3 33 20 36 37 19 14 24 28 13
Laboratory

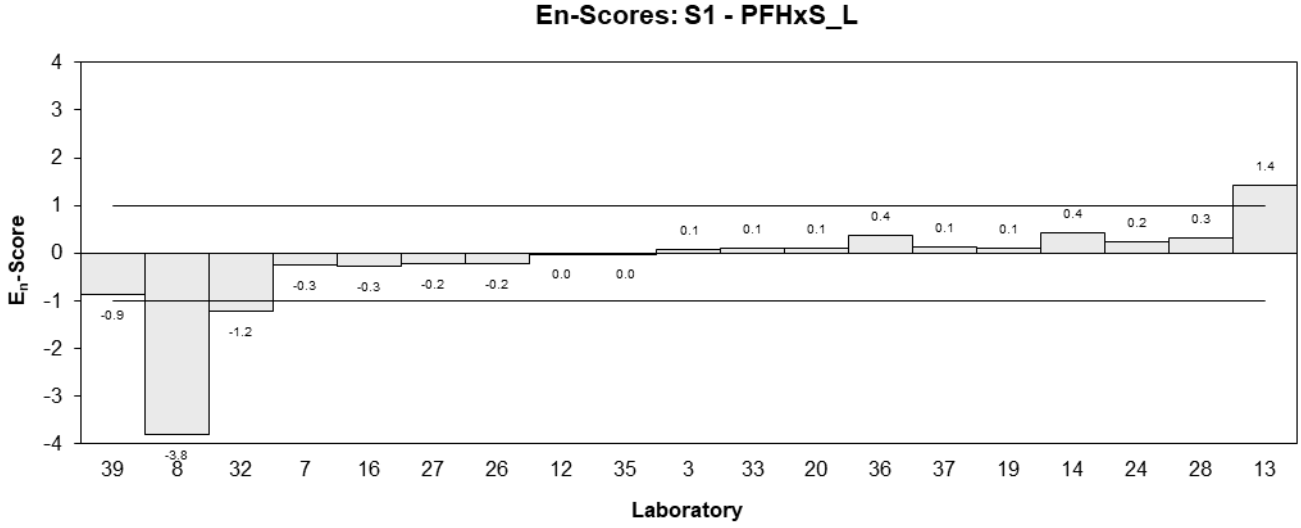

En-Scores: S1 - PFHxS_L
En-Score
4
3
2
1
0
-1
-2
-3
-4
-0.9
-3.8
-1.2
-0.3
-0.3
-0.2
-0.2
0.0
0.0
0.1
0.1
0.1
0.4
0.1
0.1
0.4
0.2
0.3
1.4
39 8 32 7 16 27 26 12 35 3 33 20 36 37 19 14 24 28 13
Laboratory

Figure 13

Table 18

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	PFHpS
Unit	µg/L

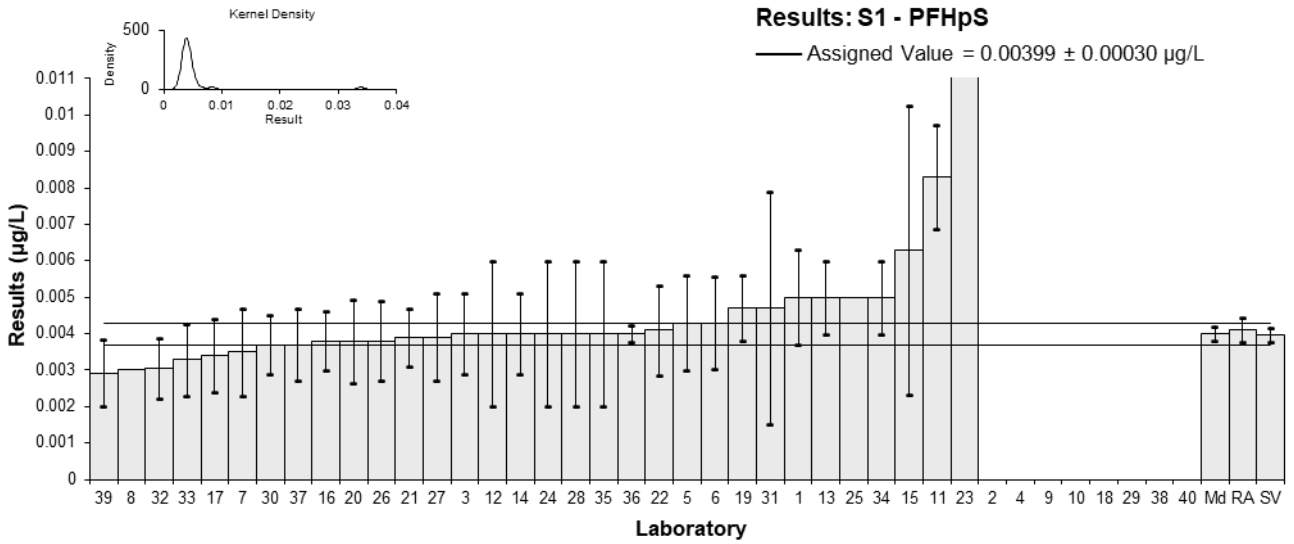
Participant Results

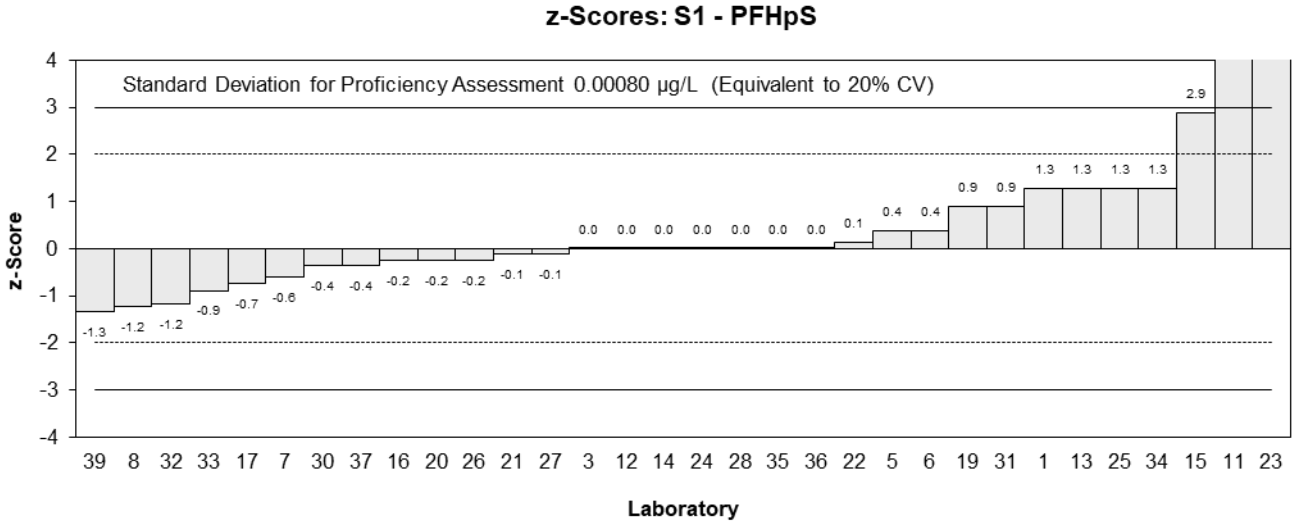
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0050	0.0013	89.88	1.27	0.76
2	NS	NS	NS		
3	0.004	0.0011	NR	0.01	0.01
4	NS	NS	NS		
5	0.0043	0.0013	91.5	0.39	0.23
6	0.0043	0.0012825	100	0.39	0.24
7	0.0035	0.0012	108	-0.61	-0.40
8	0.003	NR	NR	-1.24	-3.30
9	NS	NS	NS		
10	NR	NR	NR		
11*	0.0083	0.001434	NR	5.40	2.94
12	0.004	0.002	70	0.01	0.00
13	0.005	0.001	80	1.27	0.97
14	0.004	0.0011	102	0.01	0.01
15*	0.006298	0.003972	NR	2.89	0.58
16	0.0038	0.0008	NR	-0.24	-0.22
17	0.0034	0.0010	99.9	-0.74	-0.57
18	<0.01	NR	NR		
19	0.0047	0.0009	85	0.89	0.75
20	0.0038	0.00114	125	-0.24	-0.16
21	0.0039	0.0008	110	-0.11	-0.11
22	0.0041	0.00123	135	0.14	0.09
23*	0.0339	0.0075	NR	37.48	3.98
24	0.004	0.002	NR	0.01	0.00
25	0.005	NR	NR	1.27	3.37
26	0.0038	0.0011	112	-0.24	-0.17
27	0.0039	0.0012	NR	-0.11	-0.07
28	0.004	0.002	NR	0.01	0.00
29	<0.005	NR	NR		
30	0.0037	0.0008	107	-0.36	-0.34
31	0.0047	0.0032	76.8	0.89	0.22
32	0.00305	0.0008249	123.696	-1.18	-1.07
33	0.00328	0.0010	70	-0.89	-0.68
34	0.005	0.001	NR	1.27	0.97
35	0.004	0.002	80	0.01	0.00
36	0.0040	0.00023	84	0.01	0.03
37	0.0037	0.001	106	-0.36	-0.28
38	NS	NS	NS		
39	0.00292	0.00091	101	-1.34	-1.12
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.00399	0.00030
Spike Value	0.00396	0.00020
Robust Average	0.00411	0.00033
Median	0.00400	0.00020
Mean	0.0051	
N	32	
Max	0.0339	
Min	0.00292	
Robust SD	0.00076	
Robust CV	18%	


Kernel Density
Density
Result
Results: S1 - PFHpS
Assigned Value = 0.00399 ± 0.00030 µg/L
Results (µg/L)
Laboratory
39 8 32 33 17 7 30 37 16 20 26 21 27 3 12 14 24 28 35 36 22 5 6 19 31 1 13 25 34 15 11 23 2 4 9 10 18 29 38 40 Md RA SV


z-Scores: S1 - PFHpS
Standard Deviation for Proficiency Assessment 0.00080 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
39 8 32 33 17 7 30 37 16 20 26 21 27 3 12 14 24 28 35 36 22 5 6 19 31 1 13 25 34 15 11 23

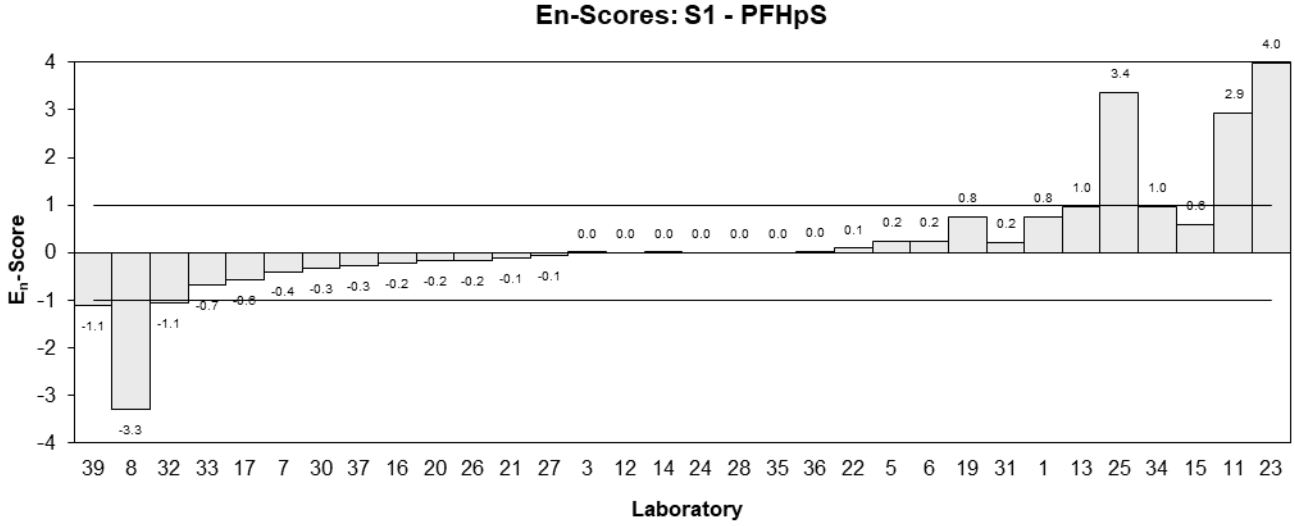

En-Scores: S1 - PFHpS
En-Score
Laboratory
39 8 32 33 17 7 30 37 16 20 26 21 27 3 12 14 24 28 35 36 22 5 6 19 31 1 13 25 34 15 11 23

Figure 14

Table 19

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	PFOS
Unit	µg/L

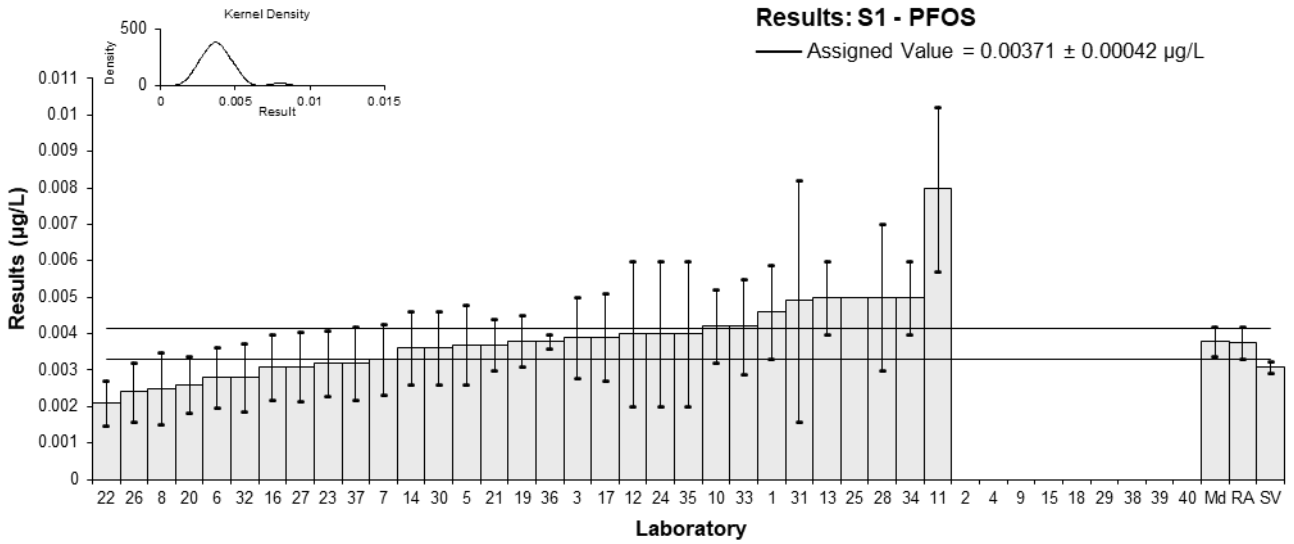
Participant Results

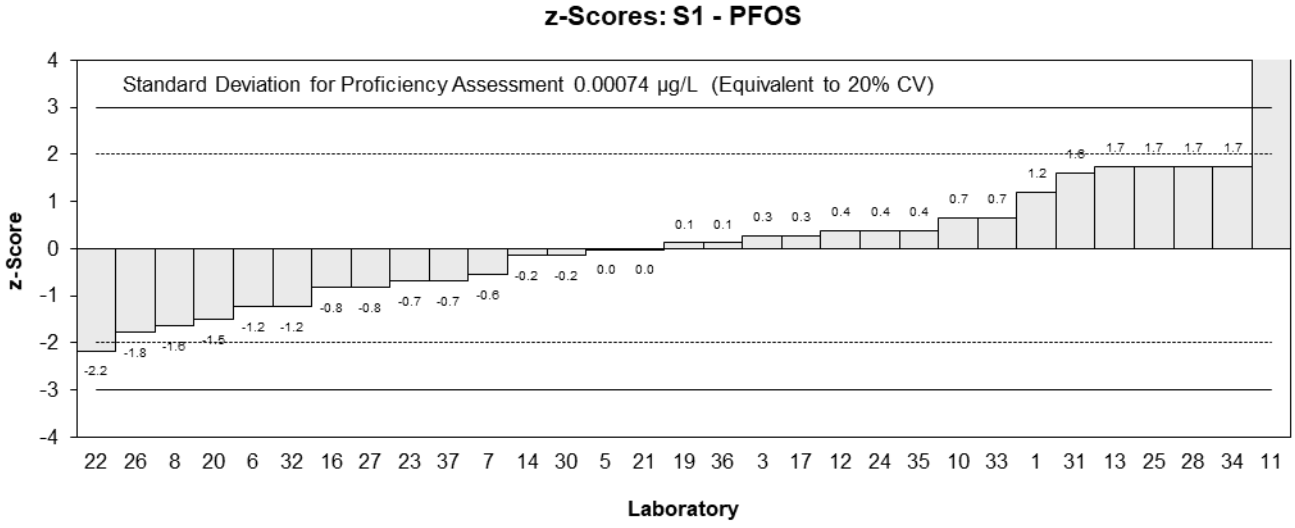
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0046	0.0013	80.36	1.20	0.65
2	NS	NS	NS		
3	0.0039	0.0011	NR	0.26	0.16
4	NS	NS	NS		
5	0.0037	0.0011	91.5	-0.01	-0.01
6	0.0028	0.00084	95	-1.23	-0.97
7	0.0033	0.00098	128	-0.55	-0.38
8	0.0025	0.001	95	-1.63	-1.12
9	NS	NS	NS		
10	0.0042	0.0010	NR	0.66	0.45
11*	0.00798	0.002256	NR	5.75	1.86
12	0.004	0.002	70	0.39	0.14
13	0.005	0.001	80	1.74	1.19
14	0.0036	0.0010	102	-0.15	-0.10
15	NR	NR	NR		
16	0.0031	0.0009	103	-0.82	-0.61
17	0.0039	0.0012	99.9	0.26	0.15
18	<0.01	NR	NR		
19	0.0038	0.0007	98	0.12	0.11
20	0.0026	0.00078	115	-1.50	-1.25
21	0.0037	0.0007	110	-0.01	-0.01
22	0.0021	0.00063	104	-2.17	-2.13
23	0.0032	0.0009	NR	-0.69	-0.51
24	0.004	0.002	128	0.39	0.14
25	0.005	NR	NR	1.74	3.07
26	0.0024	0.00082	136	-1.77	-1.42
27	0.0031	0.00096	NR	-0.82	-0.58
28	0.005	0.002	94	1.74	0.63
29	<0.135	NR	NR		
30	0.0036	0.001	98	-0.15	-0.10
31	0.0049	0.0033	115.69	1.60	0.36
32	0.0028	0.0009397	119.566	-1.23	-0.88
33	0.0042	0.0013	70	0.66	0.36
34	0.005	0.001	89	1.74	1.19
35	0.004	0.002	80	0.39	0.14
36	0.0038	0.00019	84	0.12	0.20
37	0.0032	0.001	114	-0.69	-0.47
38	NS	NS	NS		
39	NT	NT	NT		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.00371	0.00042
Spike Value	0.00309	0.00015
Robust Average	0.00376	0.00043
Median	0.00380	0.00040
Mean	0.00384	
N	31	
Max	0.00798	
Min	0.0021	
Robust SD	0.00095	
Robust CV	25%	


Kernel Density
Density
Result
Results: S1 - PFOS
Assigned Value = 0.00371 ± 0.00042 µg/L
Results (µg/L)
Laboratory


z-Scores: S1 - PFOS
Standard Deviation for Proficiency Assessment 0.00074 µg/L (Equivalent to 20% CV)
z-Score
Laboratory

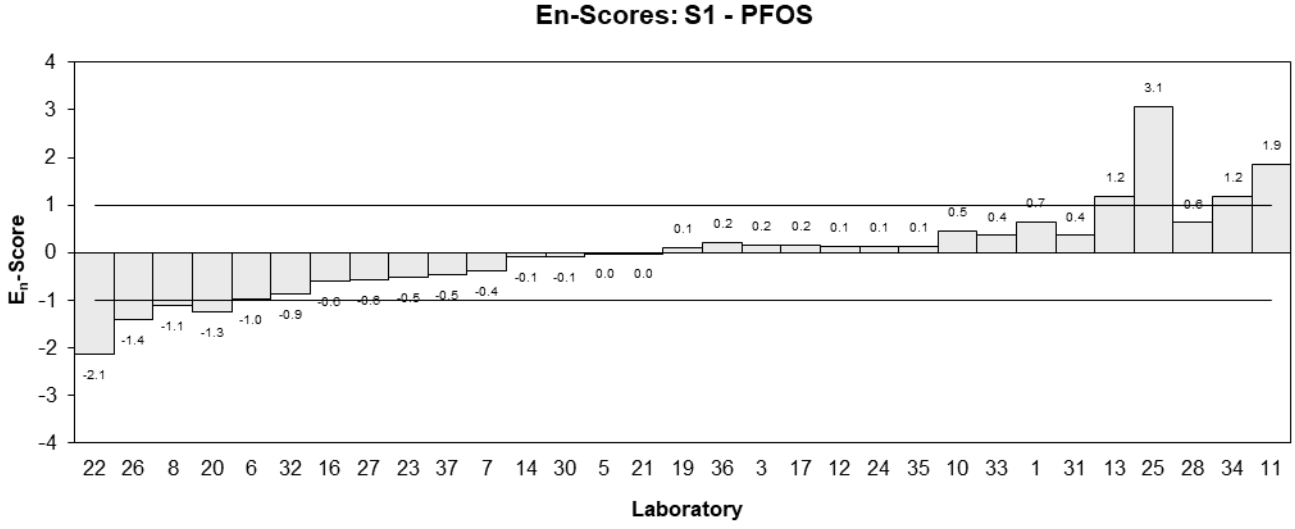

En-Scores: S1 - PFOS
En-Score
Laboratory

Figure 15

Table 20

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	PFOS_L
Unit	µg/L

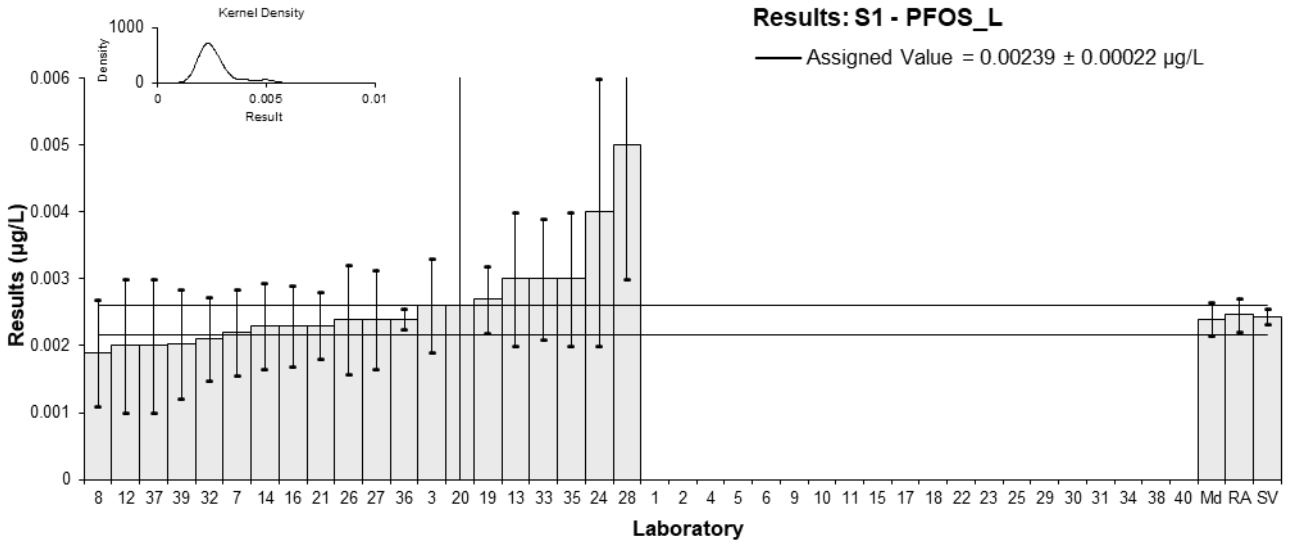
Participant Results

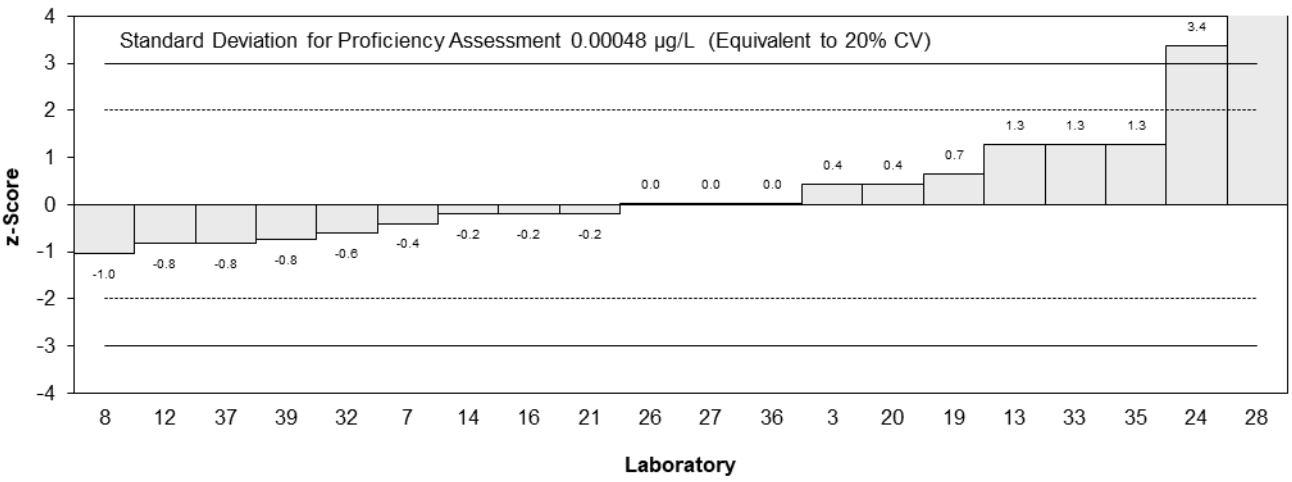
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NS	NS	NS		
3	0.0026	0.0007	NR	0.44	0.29
4	NS	NS	NS		
5	NT	NT	NT		
6	NT	NT	NT		
7	0.0022	0.00065	128	-0.40	-0.28
8	0.0019	0.0008	NR	-1.03	-0.59
9	NS	NS	NS		
10	NR	NR	NR		
11	NR	NR	NR		
12	0.002	0.001	70	-0.82	-0.38
13	0.003	0.001	80	1.28	0.60
14	0.0023	0.00064	102	-0.19	-0.13
15	NT	NT	NT		
16	0.0023	0.0006	NR	-0.19	-0.14
17	NT	NT	NT		
18	<0.01	NR	NR		
19	0.0027	0.0005	98	0.65	0.57
20	0.0026	0.0078	115	0.44	0.03
21	0.0023	0.0005	110	-0.19	-0.16
22	NT	NT	NT		
23	NT	NT	NT		
24*	0.004	0.002	NR	3.37	0.80
25	NT	NT	NT		
26	0.0024	0.00082	136	0.02	0.01
27	0.0024	0.00074	NR	0.02	0.01
28*	0.005	0.002	NR	5.46	1.30
29	<0.085	NR	NR		
30	NT	NT	NT		
31	<0.01	NR	115.69		
32	0.0021	0.0006279	119.566	-0.61	-0.44
33	0.003	0.0009	70	1.28	0.66
34	NT	NT	NT		
35	0.003	0.001	80	1.28	0.60
36	0.0024	0.00016	84	0.02	0.04
37	0.002	0.001	114	-0.82	-0.38
38	NS	NS	NS		
39	0.00203	0.00081	93	-0.75	-0.43
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.00239	0.00022
Spike Value	0.00244	0.00012
Robust Average	0.00247	0.00025
Median	0.00240	0.00025
Mean	0.00261	
N	20	
Max	0.005	
Min	0.0019	
Robust SD	0.00044	
Robust CV	18%	


Kernel Density
Density
Result
Results: S1 - PFOS_L
Assigned Value = 0.00239 ± 0.00022 µg/L
Results (µg/L)
Laboratory
8 12 37 39 32 7 14 16 21 26 27 36 3 20 19 13 33 35 24 28 1 2 4 5 6 9 10 11 15 17 18 22 23 25 29 30 31 34 38 40 Md RA SV


z-Scores: S1 - PFOS_L
Standard Deviation for Proficiency Assessment 0.00048 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
8 12 37 39 32 7 14 16 21 26 27 36 3 20 19 13 33 35 24 28

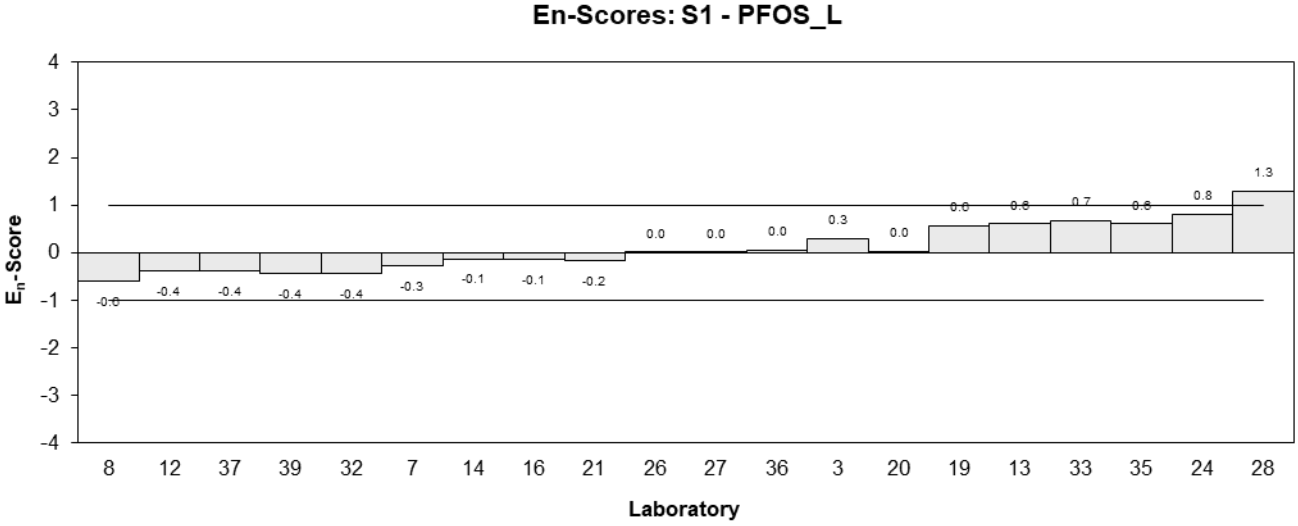

En-Scores: S1 - PFOS_L
En-Score
Laboratory
8 12 37 39 32 7 14 16 21 26 27 36 3 20 19 13 33 35 24 28

Figure 16

Table 21

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	PFDS
Unit	µg/L

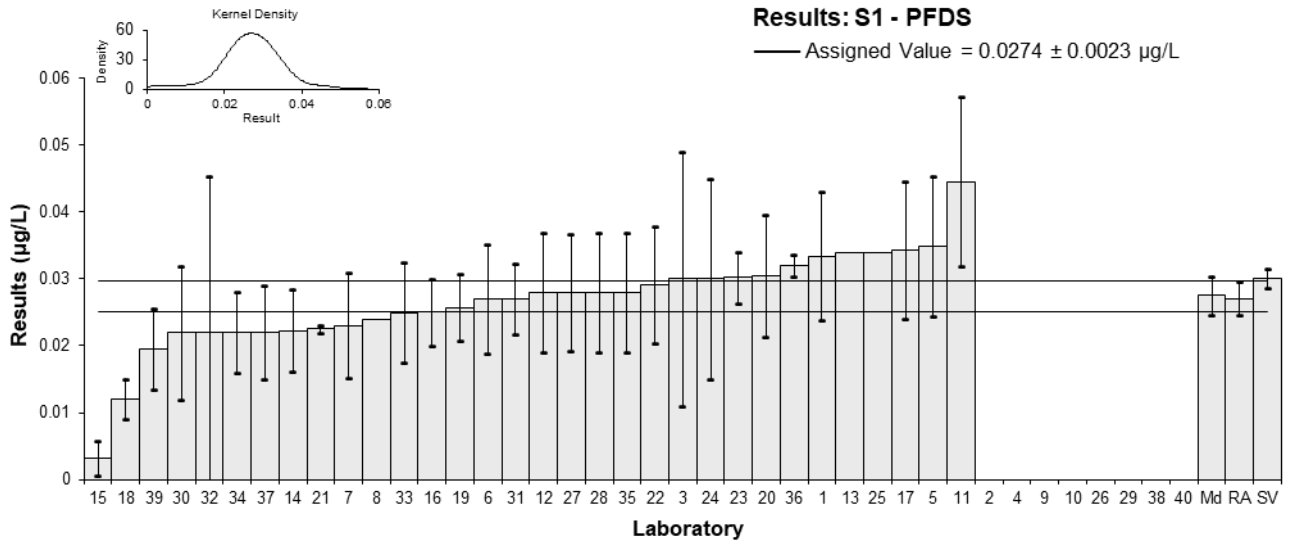
Participant Results

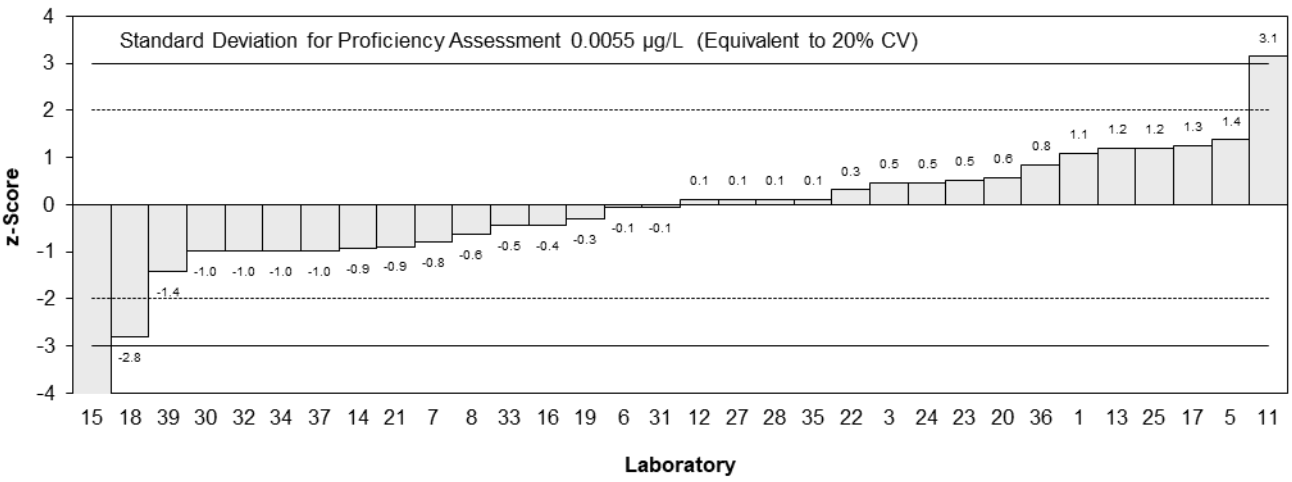
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0334	0.0096	89.88	1.09	0.61
2	NS	NS	NS		
3	0.03	0.0191	NR	0.47	0.14
4	NS	NS	NS		
5	0.0349	0.0105	91.5	1.37	0.70
6	0.027	0.0080925	90	-0.07	-0.05
7	0.023	0.0079	128	-0.80	-0.53
8	0.024	NR	NR	-0.62	-1.48
9	NS	NS	NS		
10	NR	NR	NR		
11*	0.0446	0.01265	NR	3.14	1.34
12	0.028	0.009	70	0.11	0.06
13	0.034	NR	NR	1.20	2.87
14	0.0223	0.0062	102	-0.93	-0.77
15*	0.003108	0.002617	NR	-4.43	-6.97
16	0.025	0.005	NR	-0.44	-0.44
17	0.0343	0.0103	99.9	1.26	0.65
18*	0.012	0.003	75	-2.81	-4.07
19	0.0257	0.005	98	-0.31	-0.31
20	0.0305	0.00915	115	0.57	0.33
21	0.0225	0.0006	110	-0.89	-2.06
22	0.0291	0.00873	80	0.31	0.19
23	0.0302	0.0038	NR	0.51	0.63
24	0.03	0.015	NR	0.47	0.17
25	0.034	NR	NR	1.20	2.87
26	NR	NT	NR		
27	0.028	0.0087	NR	0.11	0.07
28	0.028	0.009	NR	0.11	0.06
29	<0.025	NR	NR		
30	0.022	0.010	105	-0.99	-0.53
31	0.027	0.0053	115.69	-0.07	-0.07
32	0.022	0.0234657	119.566	-0.99	-0.23
33	0.02492	0.0075	70	-0.45	-0.32
34	0.022	0.006	NR	-0.99	-0.84
35	0.028	0.009	80	0.11	0.06
36	0.032	0.0017	84	0.84	1.61
37	0.022	0.007	96	-0.99	-0.73
38	NS	NS	NS		
39	0.01955	0.00606	65	-1.43	-1.21
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0274	0.0023
Spike Value	0.0301	0.0015
Robust Average	0.0271	0.0025
Median	0.0275	0.0029
Mean	0.0267	
N	32	
Max	0.0446	
Min	0.003108	
Robust SD	0.0057	
Robust CV	21%	


Kernel Density
Density
Result
Results: S1 - PFDS
Assigned Value = 0.0274 ± 0.0023 µg/L
Results (µg/L)
Laboratory
15 18 39 30 32 34 37 14 21 7 8 33 16 19 6 31 12 27 28 35 22 3 24 23 20 36 1 13 25 17 5 11 2 4 9 10 26 29 38 40 Md RA SV


z-Scores: S1 - PFDS
Standard Deviation for Proficiency Assessment 0.0055 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
15 18 39 30 32 34 37 14 21 7 8 33 16 19 6 31 12 27 28 35 22 3 24 23 20 36 1 13 25 17 5 11

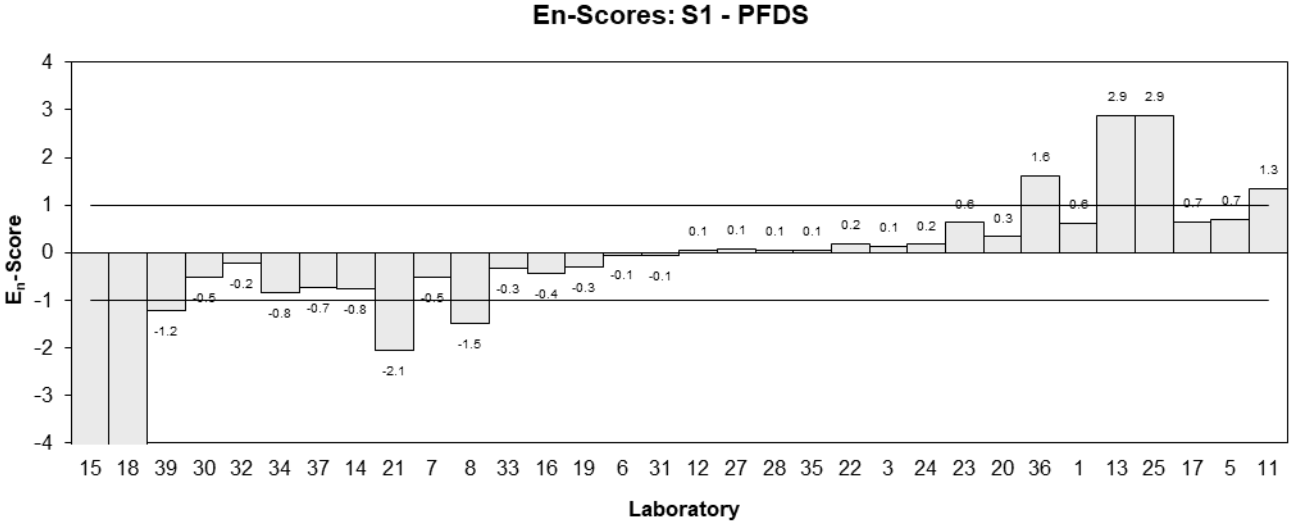

En-Scores: S1 - PFDS
En-Score
Laboratory
15 18 39 30 32 34 37 14 21 7 8 33 16 19 6 31 12 27 28 35 22 3 24 23 20 36 1 13 25 17 5 11

Figure 17

Table 22

Sample Details

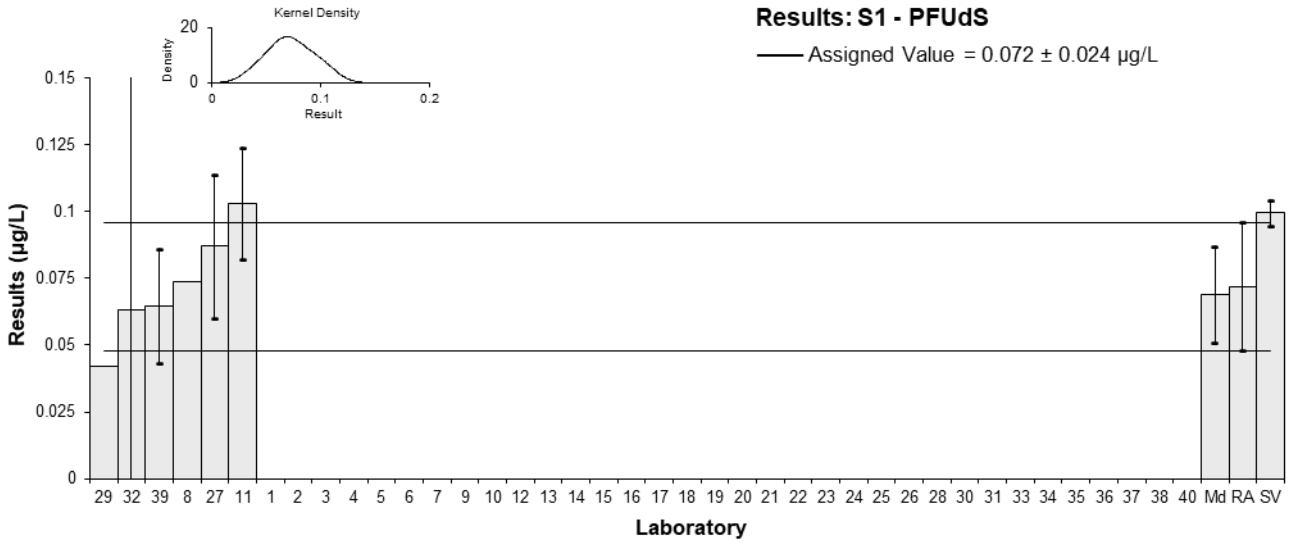
Sample No.	S1
Matrix	Potable Water
Analyte	PFUdS
Unit	µg/L

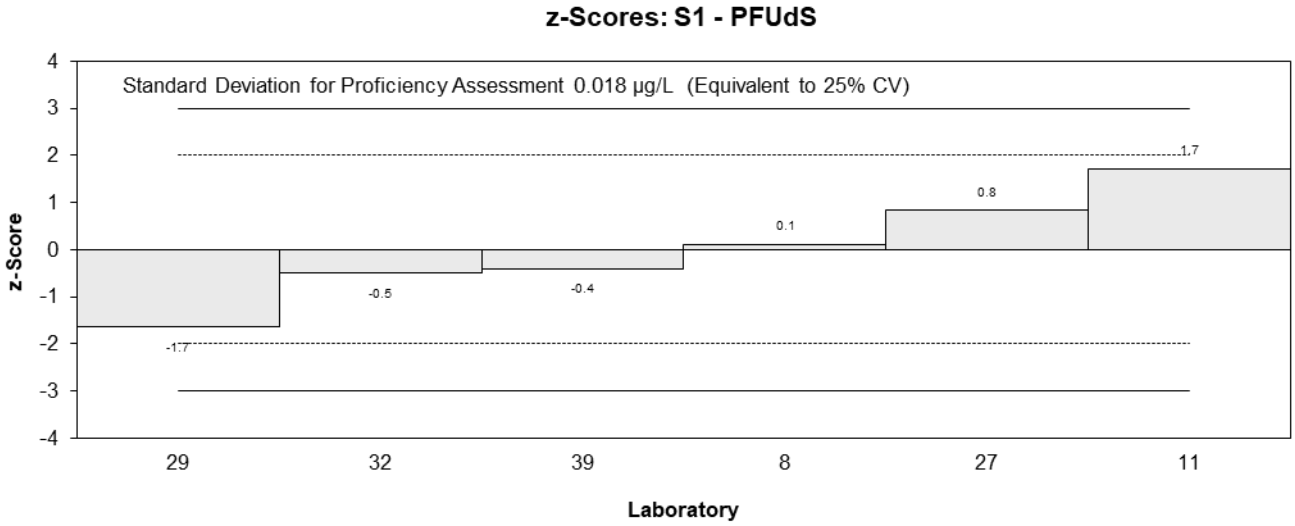
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NS	NS	NS		
3	NT	NT	NT		
4	NS	NS	NS		
5	NT	NT	NT		
6	NT	NT	NT		
7	NT	NT	NT		
8	0.074	NR	NR	0.11	0.08
9	NS	NS	NS		
10	NR	NR	NR		
11	0.103	0.021	NR	1.72	0.97
12	NT	NT	NT		
13	NT	NT	NT		
14	NT	NT	NT		
15	NR	NR	NR		
16	NT	NT	NT		
17	NT	NT	NT		
18	NT	NT	NT		
19	NT	NT	NT		
20	NT	NT	NT		
21	NT	NR	NT		
22	NT	NT	NT		
23	NT	NT	NT		
24	NT	NT	NT		
25	NT	NT	NT		
26	NT	NT	NT		
27	0.087	0.027	NR	0.83	0.42
28	NT	NT	NT		
29	0.0423	NR	NR	-1.65	-1.24
30	NT	NT	NT		
31	NT	NT	NT		
32	0.063	0.1012898	119.566	-0.50	-0.09
33	NT	NT	NT		
34	NT	NT	NT		
35	NT	NT	NT		
36	NT	NT	NT		
37	NT	NT	NT		
38	NS	NS	NS		
39	0.06475	0.02137	70	-0.40	-0.23
40	NS	NS	NS		

Statistics

Assigned Value	0.072	0.024
Spike Value	0.0995	0.0050
Robust Average	0.072	0.024
Median	0.069	0.018
Mean	0.072	
N	6	
Max	0.103	
Min	0.0423	
Robust SD	0.024	
Robust CV	33%	


Kernel Density
Density
Result
Results: S1 - PFUdS
Assigned Value = 0.072 ± 0.024 µg/L
Results (µg/L)
Laboratory
29 32 39 8 27 11 1 2 3 4 5 6 7 9 10 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 28 30 31 33 34 35 36 37 38 40 Md RA SV


z-Scores: S1 - PFUdS
Standard Deviation for Proficiency Assessment 0.018 µg/L (Equivalent to 25% CV)
z-Score
Laboratory
29 32 39 8 27 11
-1.7
-0.5
-0.4
0.1
0.8
1.7

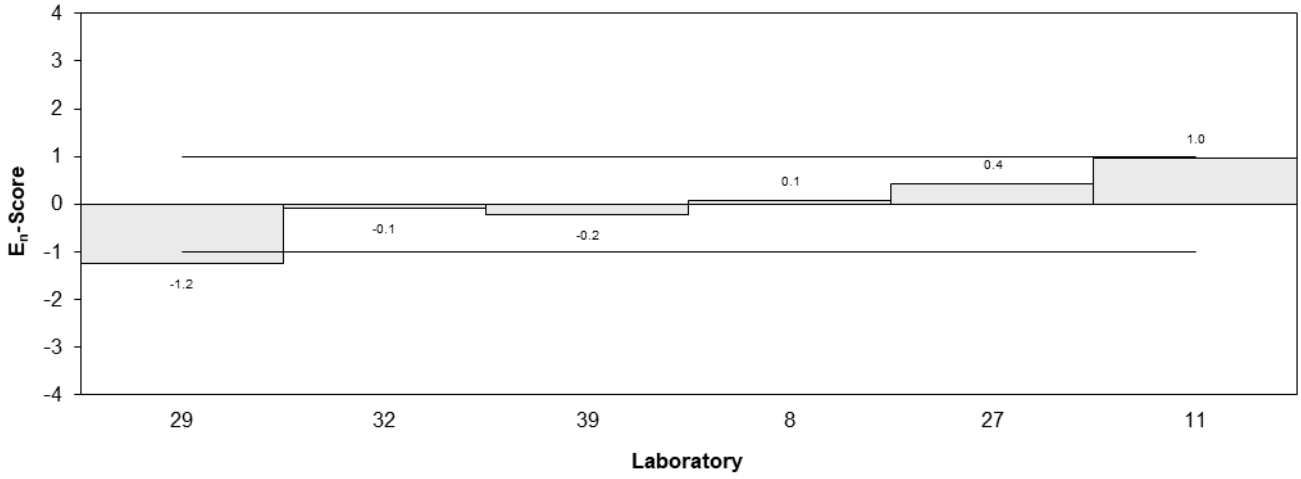

En-Scores: S1 - PFUdS
En-Score
Laboratory
29 32 39 8 27 11
-1.2
-0.1
-0.2
0.1
0.4
1.0

Figure 18

Table 23

Sample Details

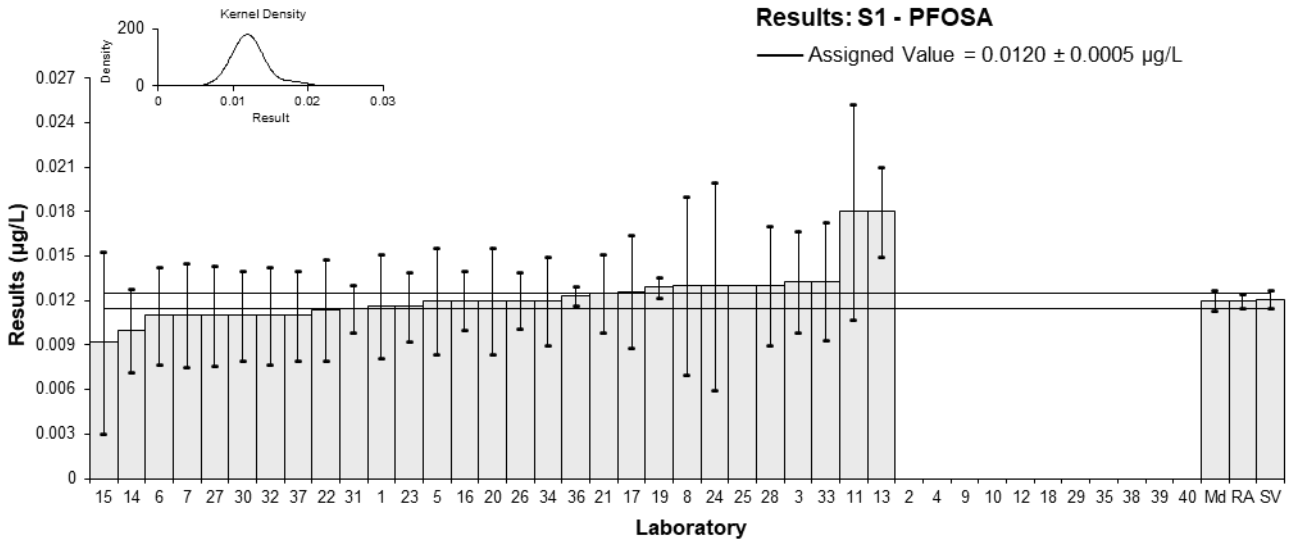
Sample No.	S1
Matrix	Potable Water
Analyte	PFOSA
Unit	µg/L

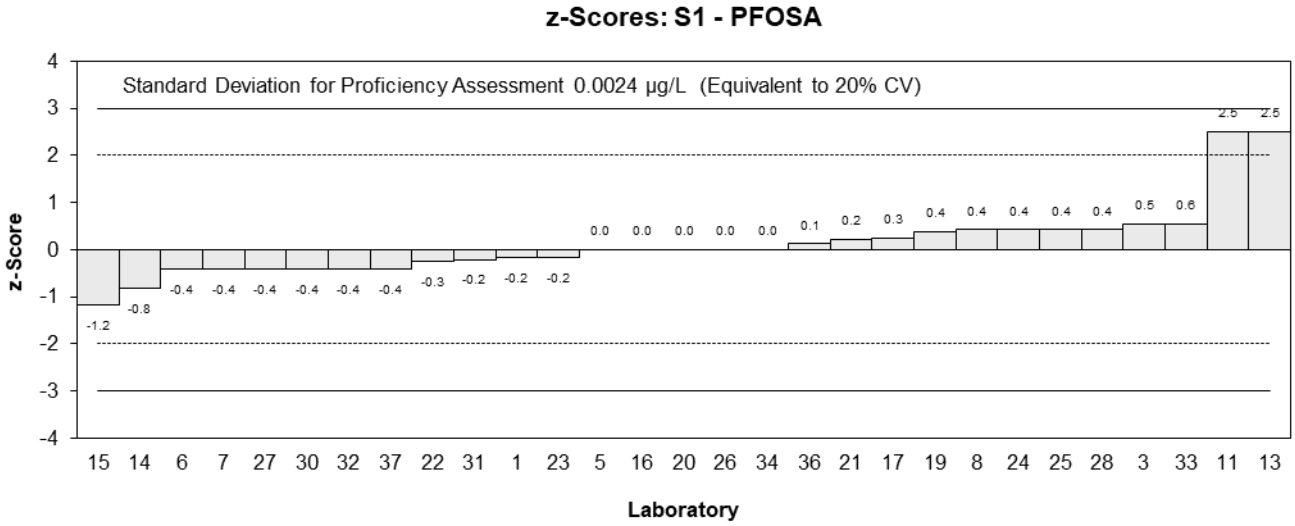
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0116	0.0035	76.94	-0.17	-0.11
2	NS	NS	NS		
3	0.0133	0.0034	NR	0.54	0.38
4	NS	NS	NS		
5	0.0120	0.0036	70.3	0.00	0.00
6	0.011	0.00327	110	-0.42	-0.30
7	0.011	0.0035	89	-0.42	-0.28
8	0.013	0.006	83	0.42	0.17
9	NS	NS	NS		
10	NR	NR	NR		
11	0.018	0.00726	NR	2.50	0.82
12	<0.01	NR	100		
13	0.018	0.003	80	2.50	1.97
14	0.01	0.0028	99	-0.83	-0.70
15	0.009183	0.006118	NR	-1.17	-0.46
16	0.012	0.002	83	0.00	0.00
17	0.0126	0.0038	94.3	0.25	0.16
18	<0.05	NR	NR		
19	0.0129	0.0007	40	0.37	1.05
20	0.012	0.0036	185	0.00	0.00
21	0.0125	0.0026	100	0.21	0.19
22	0.0114	0.00342	125	-0.25	-0.17
23	0.0116	0.0023	NR	-0.17	-0.17
24	0.013	0.007	122	0.42	0.14
25	0.013	NR	NR	0.42	2.00
26	0.012	0.0019	151	0.00	0.00
27	0.011	0.0034	NR	-0.42	-0.29
28	0.013	0.004	NR	0.42	0.25
29	<0.025	NR	NR		
30	0.011	0.003	80	-0.42	-0.33
31	0.0115	0.0016	88.28	-0.21	-0.30
32	0.011	0.0032583	114.055	-0.42	-0.30
33	0.01331	0.0040	69	0.55	0.32
34	0.012	0.003	70	0.00	0.00
35	<0.01	NR	115		
36	0.0123	0.00064	78	0.12	0.37
37	0.011	0.003	108	-0.42	-0.33
38	NS	NS	NS		
39	NT	NT	NT		
40	NS	NS	NS		

Statistics

Assigned Value	0.0120	0.0005
Spike Value	0.0121	0.0006
Robust Average	0.0120	0.0005
Median	0.0120	0.0007
Mean	0.0123	
N	29	
Max	0.018	
Min	0.009183	
Robust SD	0.0011	
Robust CV	9.3%	


Kernel Density
Density
Result
Results: S1 - PFOSA
Assigned Value = 0.0120 ± 0.0005 µg/L
Results (µg/L)
Laboratory
15 14 6 7 27 30 32 37 22 31 1 23 5 16 20 26 34 36 21 17 19 8 24 25 28 3 33 11 13 2 4 9 10 12 18 29 35 38 39 40 Md RA SV


z-Scores: S1 - PFOSA
Standard Deviation for Proficiency Assessment 0.0024 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
15 14 6 7 27 30 32 37 22 31 1 23 5 16 20 26 34 36 21 17 19 8 24 25 28 3 33 11 13

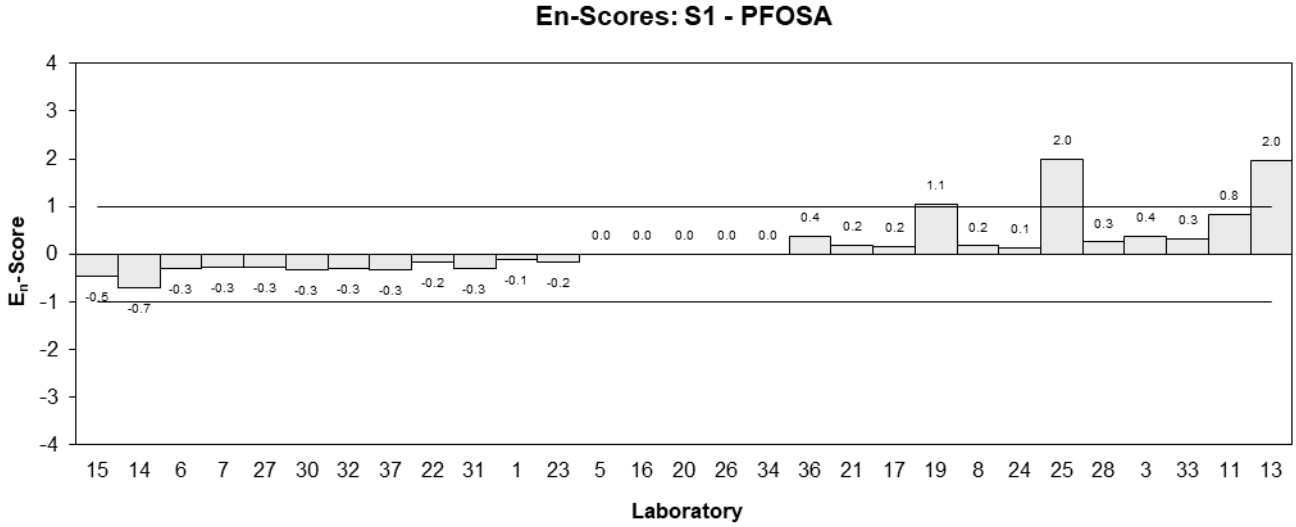

En-Scores: S1 - PFOSA
En-Score
Laboratory
15 14 6 7 27 30 32 37 22 31 1 23 5 16 20 26 34 36 21 17 19 8 24 25 28 3 33 11 13

Figure 19

Table 24

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	4:2FTS
Unit	µg/L

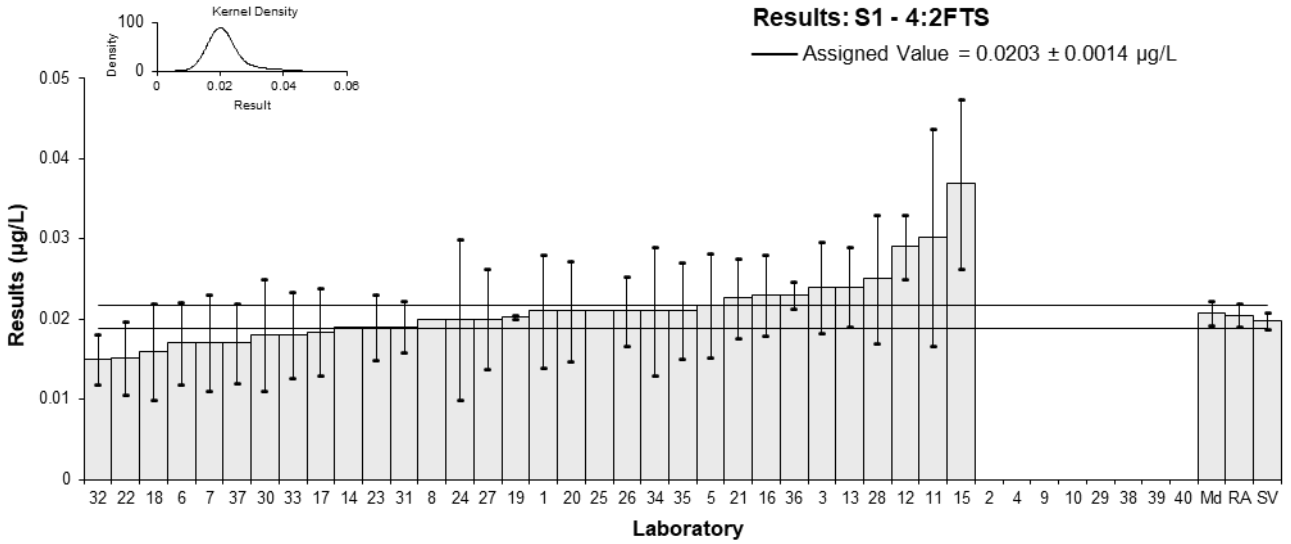
Participant Results

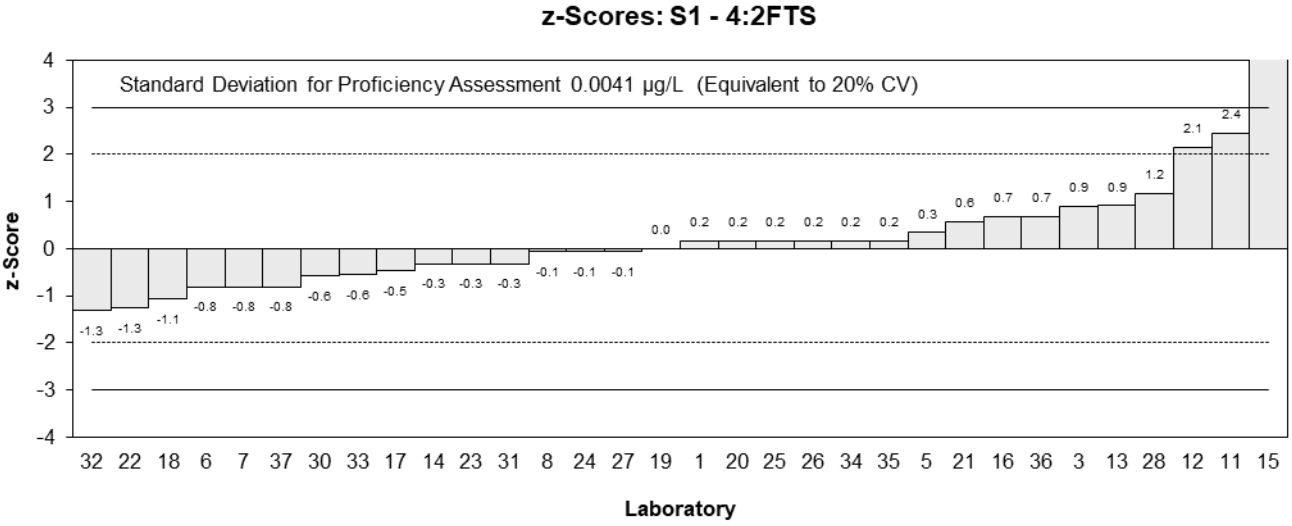
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.021	0.007	123.5	0.17	0.10
2	NS	NS	NS		
3	0.0239	0.0057	NR	0.89	0.61
4	NS	NS	NS		
5	0.0217	0.0065	89.0	0.34	0.21
6	0.017	0.00516	100	-0.81	-0.62
7	0.017	0.006	89	-0.81	-0.54
8	0.020	NR	60	-0.07	-0.21
9	NS	NS	NS		
10	NR	NR	NR		
11	0.0302	0.01359	NR	2.44	0.72
12	0.029	0.004	98	2.14	2.05
13	0.024	0.005	81	0.91	0.71
14	0.019	NR	180	-0.32	-0.93
15*	0.036858	0.010615	NR	4.08	1.55
16	0.023	0.005	138	0.67	0.52
17	0.0184	0.0055	131.6	-0.47	-0.33
18	0.016	0.006	200	-1.06	-0.70
19	0.0203	0.0002	227	0.00	0.00
20	0.021	0.0063	140	0.17	0.11
21	0.0226	0.005	184	0.57	0.44
22	0.0152	0.004545	100	-1.26	-1.07
23	0.019	0.0041	NR	-0.32	-0.30
24	0.020	0.010	156	-0.07	-0.03
25	0.021	NR	NR	0.17	0.50
26	0.021	0.0043	132	0.17	0.15
27	0.020	0.0062	NR	-0.07	-0.05
28	0.025	0.008	NR	1.16	0.58
29	<0.025	NR	NR		
30	0.018	0.007	85	-0.57	-0.32
31	0.019	0.0032	127.2	-0.32	-0.37
32	0.015	0.0031214	151.571	-1.31	-1.55
33	0.01801	0.0054	66	-0.56	-0.41
34	0.021	0.008	116	0.17	0.09
35	0.021	0.006	112	0.17	0.11
36	0.023	0.0017	94	0.67	1.23
37	0.017	0.005	108	-0.81	-0.64
38	NS	NS	NS		
39	NT	NT	NT		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0203	0.0014
Spike Value	0.0198	0.0010
Robust Average	0.0205	0.0015
Median	0.0207	0.0015
Mean	0.0211	
N	32	
Max	0.036858	
Min	0.015	
Robust SD	0.0034	
Robust CV	16%	


Kernel Density
Density
Result
Results: S1 - 4:2FTS
Assigned Value = 0.0203 ± 0.0014 µg/L
Results (µg/L)
Laboratory
32 22 18 6 7 37 30 33 17 14 23 31 8 24 27 19 1 20 25 26 34 35 5 21 16 36 3 13 28 12 11 15 2 4 9 10 29 38 39 40 Md RA SV


z-Scores: S1 - 4:2FTS
Standard Deviation for Proficiency Assessment 0.0041 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
32 22 18 6 7 37 30 33 17 14 23 31 8 24 27 19 1 20 25 26 34 35 5 21 16 36 3 13 28 12 11 15

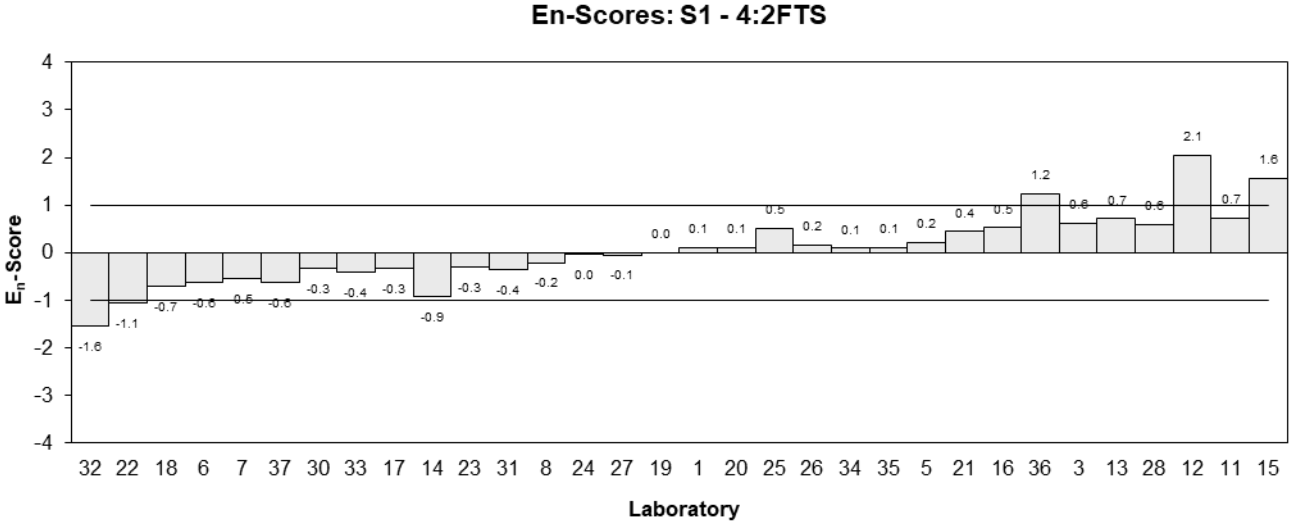

En-Scores: S1 - 4:2FTS
En-Score
Laboratory
32 22 18 6 7 37 30 33 17 14 23 31 8 24 27 19 1 20 25 26 34 35 5 21 16 36 3 13 28 12 11 15

Figure 20

Table 25

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	6:2FTS
Unit	µg/L

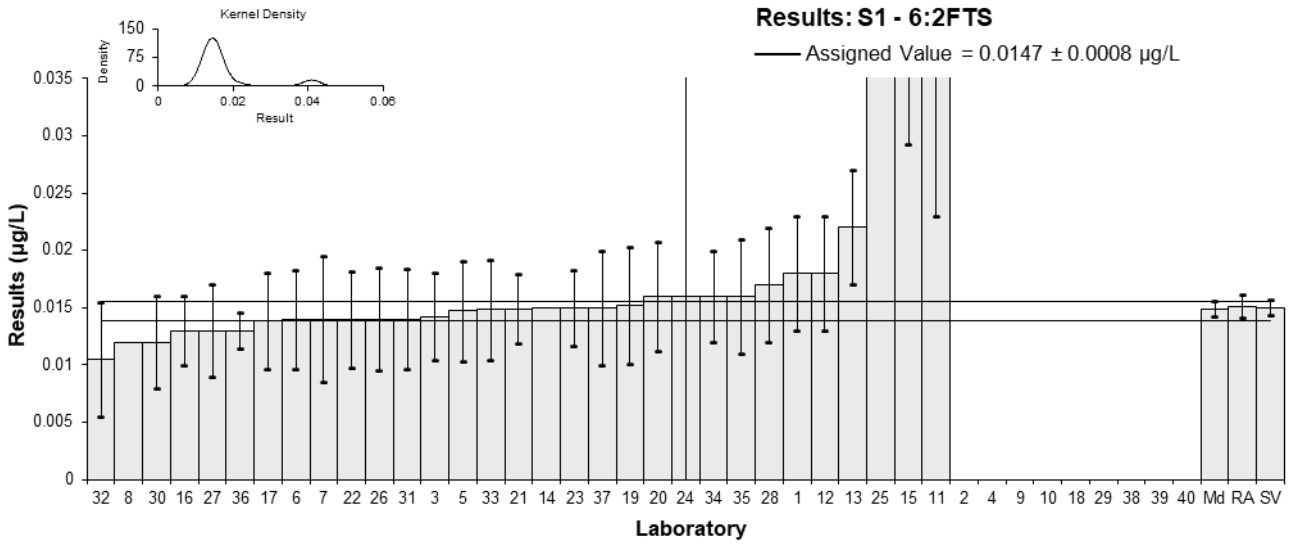
Participant Results

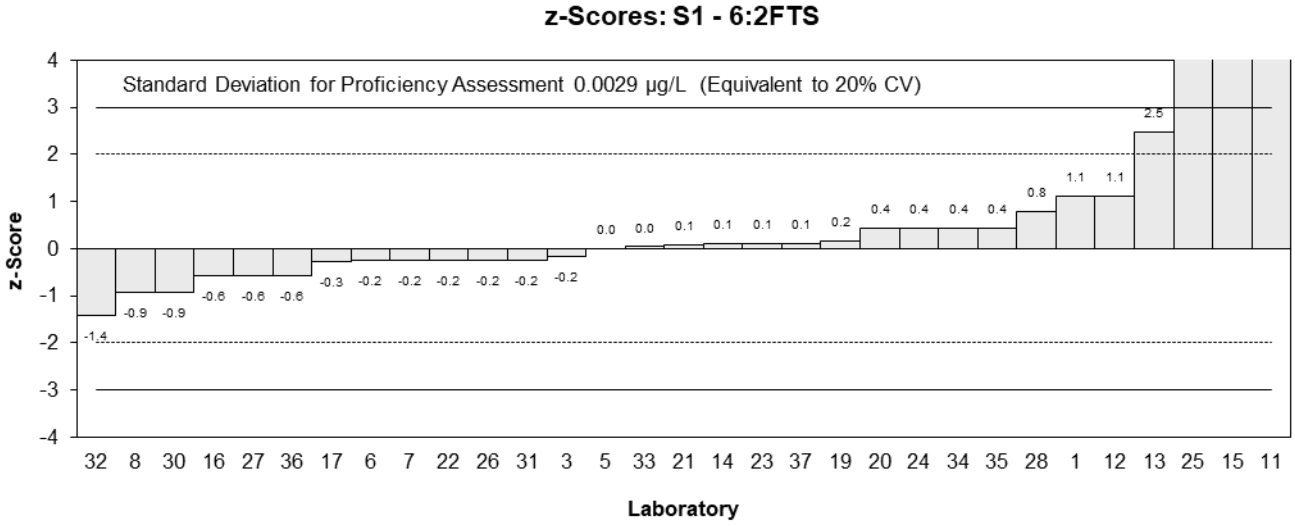
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.018	0.005	156.17	1.12	0.65
2	NS	NS	NS		
3	0.0142	0.0038	NR	-0.17	-0.13
4	NS	NS	NS		
5	0.0147	0.0044	90.9	0.00	0.00
6	0.014	0.004335	90	-0.24	-0.16
7	0.014	0.0055	90	-0.24	-0.13
8	0.012	NR	61	-0.92	-3.37
9	NS	NS	NS		
10	NR	NR	NR		
11*	0.0418	0.01881	NR	9.22	1.44
12	0.018	0.005	134	1.12	0.65
13	0.022	0.005	81	2.48	1.44
14	0.015	NR	178	0.10	0.37
15*	0.041058	0.011836	NR	8.97	2.22
16	0.013	0.003	113	-0.58	-0.55
17	0.0139	0.0042	93.6	-0.27	-0.19
18	<0.05	NR	NR		
19	0.0152	0.0051	171	0.17	0.10
20	0.016	0.0048	155	0.44	0.27
21	0.0149	0.003	288	0.07	0.06
22	0.0140	0.0042	120	-0.24	-0.16
23	0.015	0.0033	NR	0.10	0.09
24	0.016	0.08	146	0.44	0.02
25*	0.040	NR	NR	8.61	31.63
26	0.014	0.0045	123	-0.24	-0.15
27	0.013	0.0040	NR	-0.58	-0.42
28	0.017	0.005	NR	0.78	0.45
29	<0.025	NR	NR		
30	0.012	0.004	114	-0.92	-0.66
31	0.014	0.0044	179.58	-0.24	-0.16
32	0.0105	0.0049766	136.370	-1.43	-0.83
33	0.01482	0.0044	67	0.04	0.03
34	0.016	0.004	97	0.44	0.32
35	0.016	0.005	142	0.44	0.26
36	0.013	0.0016	89	-0.58	-0.95
37	0.015	0.005	110	0.10	0.06
38	NS	NS	NS		
39	NT	NT	NT		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0147	0.0008
Spike Value	0.0150	0.0007
Robust Average	0.0151	0.0010
Median	0.0149	0.0007
Mean	0.0174	
N	31	
Max	0.0418	
Min	0.0105	
Robust SD	0.0023	
Robust CV	15%	


Kernel Density
Density
Result
Results: S1 - 6:2FTS
Assigned Value = 0.0147 ± 0.0008 µg/L
Results (µg/L)
Laboratory
32 8 30 16 27 36 17 6 7 22 26 31 3 5 33 21 14 23 37 19 20 24 34 35 28 1 12 13 25 15 11 2 4 9 10 18 29 38 39 40 Md RA SV


z-Scores: S1 - 6:2FTS
Standard Deviation for Proficiency Assessment 0.0029 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
32 8 30 16 27 36 17 6 7 22 26 31 3 5 33 21 14 23 37 19 20 24 34 35 28 1 12 13 25 15 11

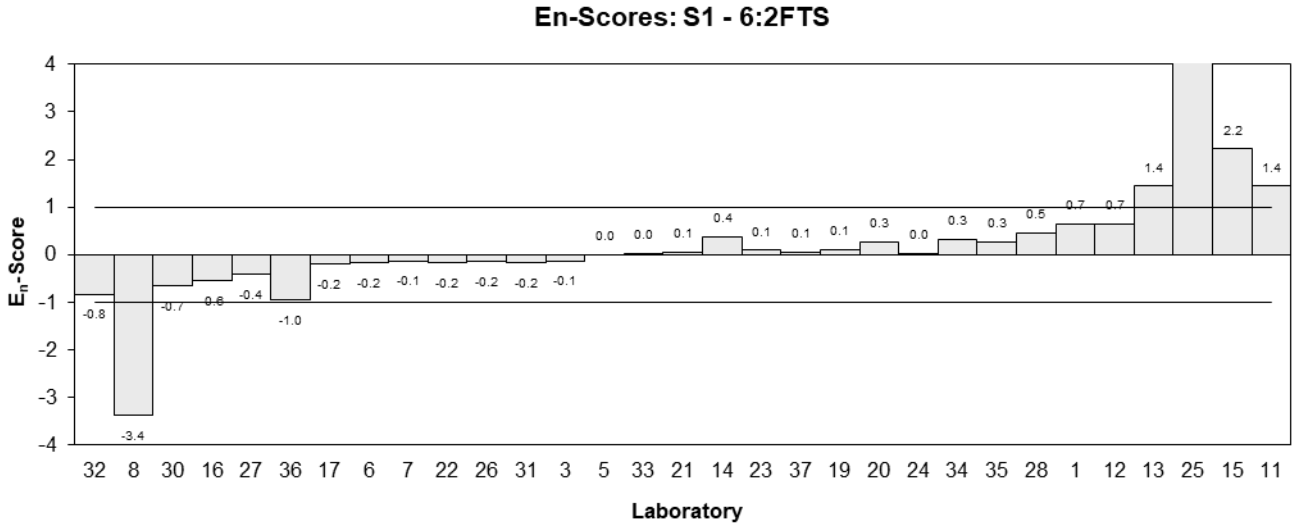

En-Scores: S1 - 6:2FTS
En-Score
Laboratory
32 8 30 16 27 36 17 6 7 22 26 31 3 5 33 21 14 23 37 19 20 24 34 35 28 1 12 13 25 15 11

Figure 21

Table 26

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	8:2diPAP
Unit	µg/L

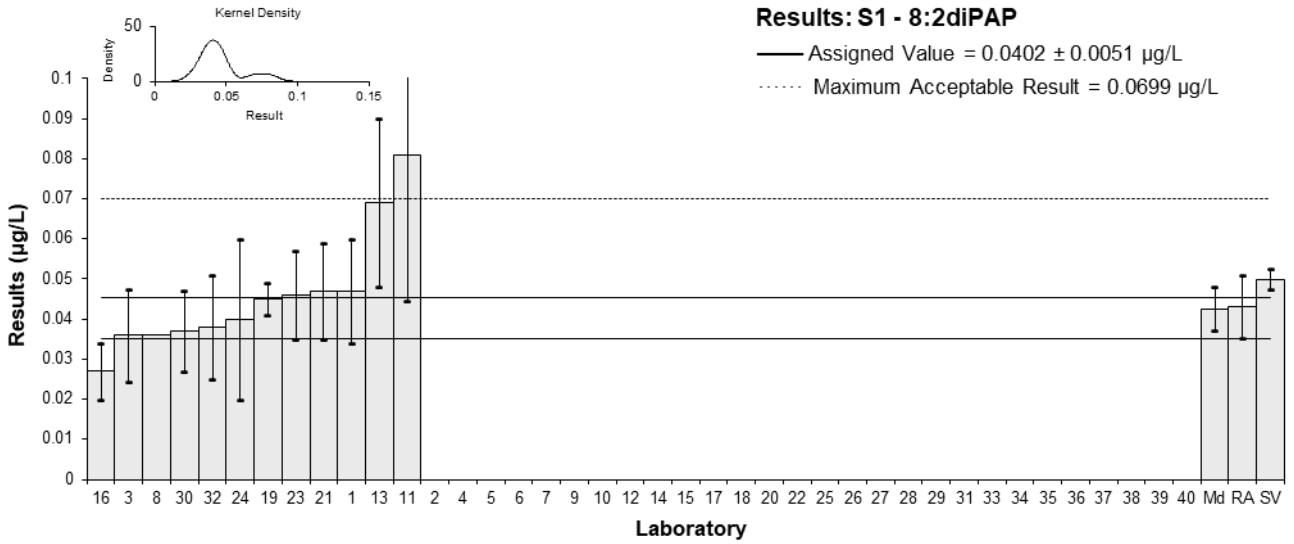
Participant Results

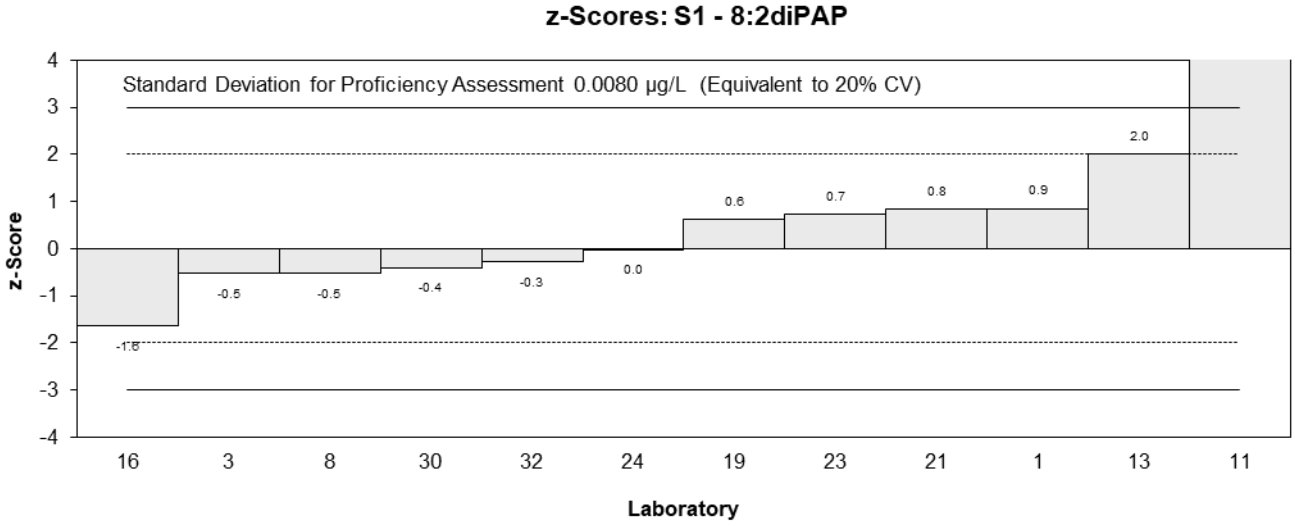
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.047	0.013	89.82	0.85	0.49
2	NS	NS	NS		
3	0.0359	0.0115	NR	-0.53	-0.34
4	NS	NS	NS		
5	NT	NT	NT		
6	NT	NT	NT		
7	NT	NT	NT		
8	0.036	NR	111	-0.52	-0.82
9	NS	NS	NS		
10	NR	NR	NR		
11*	0.0809	0.03641	NR	5.06	1.11
12	NT	NT	NT		
13*	0.069	0.021	41	2.00▼	
14	NT	NT	NT		
15	NT	NT	NT		
16	0.027	0.007	90	-1.64	-1.52
17	NT	NT	NT		
18	NT	NT	NT		
19	0.0451	0.004	245	0.61	0.76
20	NT	NT	NT		
21	0.0469	0.012	45	0.83	0.51
22	NT	NT	NT		
23	0.046	0.0110	NR	0.72	0.48
24	0.040	0.020	NR	-0.02	-0.01
25	NT	NT	NT		
26	NT	NT	NT		
27	NT	NT	NT		
28	NT	NT	NT		
29	NR	NR	NR		
30	0.037	0.010	9	-0.40	-0.29
31	<0.025	NR	275.48		
32	0.038	0.0130036	18.3397	-0.27	-0.16
33	NT	NT	NT		
34	NT	NT	NT		
35	NT	NT	NT		
36	NT	NT	NT		
37	NT	NT	NT		
38	NS	NS	NS		
39	NT	NT	NT		
40	NS	NS	NS		

* Outlier, see Section 4.2; ▼ Adjusted Score, see Section 6.3

Statistics

Assigned Value	0.0402	0.0051
Spike Value	0.0499	0.0025
Robust Average	0.0431	0.0078
Max Acceptable Result	0.0699	
Median	0.0426	0.0054
Mean	0.0457	
N	12	
Max	0.0809	
Min	0.027	
Robust SD	0.011	
Robust CV	25%	


Kernel Density
Density
Result
Results: S1 - 8:2diPAP
Assigned Value = 0.0402 ± 0.0051 µg/L
Maximum Acceptable Result = 0.0699 µg/L
Results (µg/L)
Laboratory
16 3 8 30 32 24 19 23 21 1 13 11 2 4 5 6 7 9 10 12 14 15 17 18 20 22 25 26 27 28 29 31 33 34 35 36 37 38 39 40 Md RA SV


z-Scores: S1 - 8:2diPAP
Standard Deviation for Proficiency Assessment 0.0080 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
16 3 8 30 32 24 19 23 21 1 13 11
-1.6 -0.5 -0.5 -0.4 -0.3 0.0 0.6 0.7 0.8 0.9 2.0

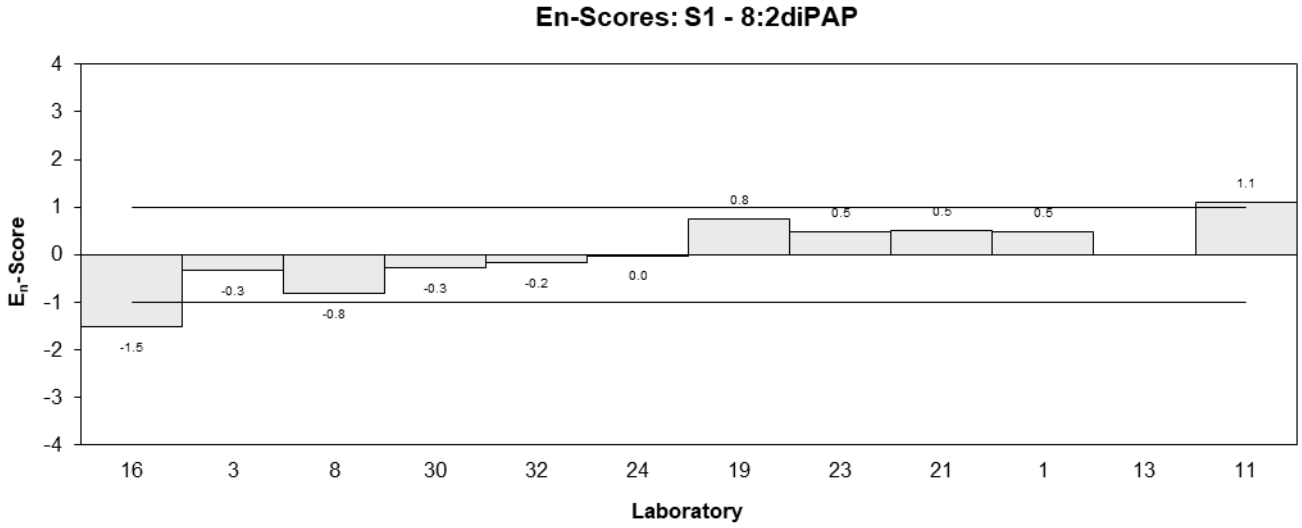

En-Scores: S1 - 8:2diPAP
En-Score
Laboratory
16 3 8 30 32 24 19 23 21 1 13 11
-1.5 -0.3 -0.8 -0.3 -0.2 0.0 0.8 0.5 0.5 0.5 1.1

Figure 22

Table 27

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	5:3FTCA
Unit	µg/L

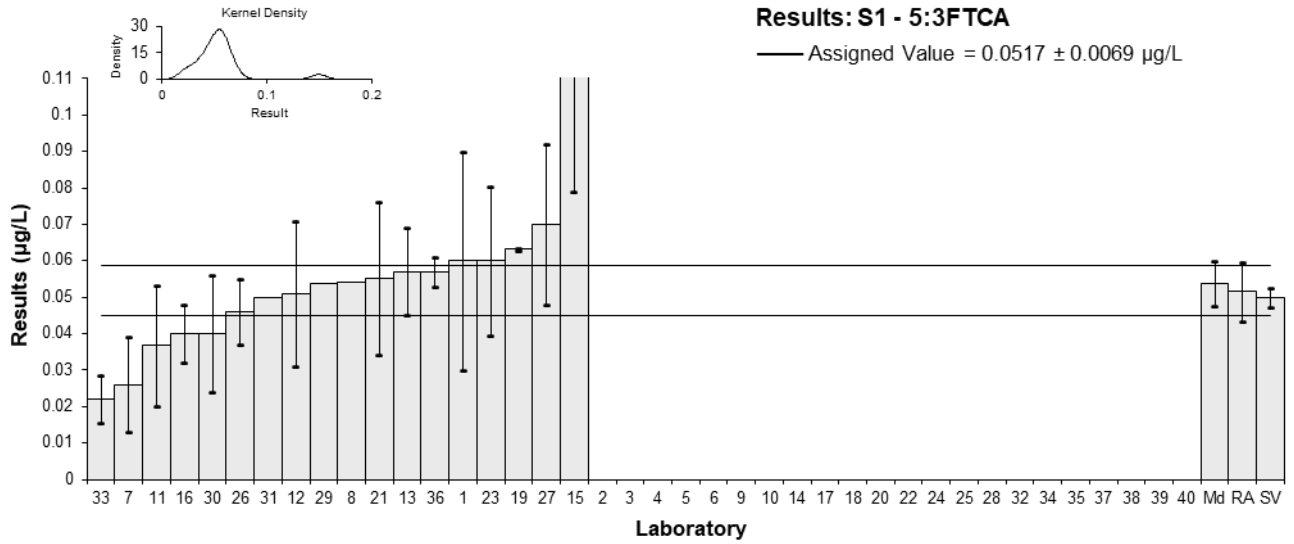
Participant Results

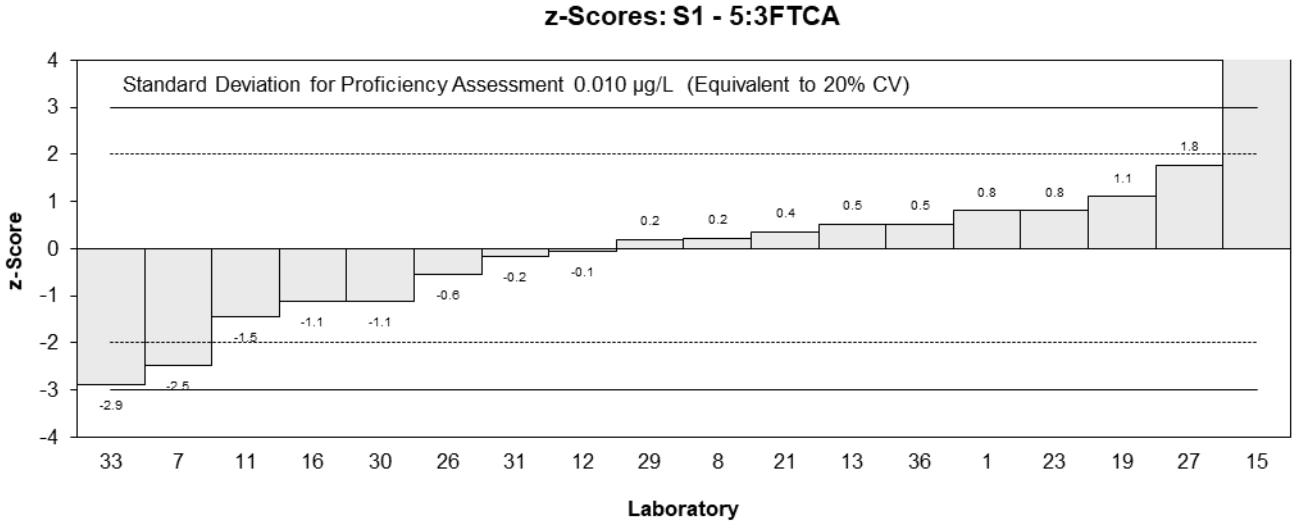
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.06	0.03	111.78	0.80	0.27
2	NS	NS	NS		
3	NT	NT	NT		
4	NS	NS	NS		
5	NT	NT	NT		
6	NT	NT	NT		
7	0.026	0.013	116	-2.49	-1.75
8	0.054	NR	NR	0.22	0.33
9	NS	NS	NS		
10	NR	NR	NR		
11	0.0367	0.01652	NR	-1.45	-0.84
12	0.051	0.02	88	-0.07	-0.03
13	0.057	0.012	NR	0.51	0.38
14	NT	NT	NT		
15*	0.149599	0.070484	NR	9.47	1.38
16	0.040	0.008	NR	-1.13	-1.11
17	NT	NT	NT		
18	NT	NT	NT		
19	0.0631	0.0003	96	1.10	1.65
20	NT	NT	NT		
21	0.0553	0.021	125	0.35	0.16
22	NT	NT	NT		
23	0.06	0.0205	NR	0.80	0.38
24	< 0.05	0.025	NR		
25	NT	NT	NT		
26	0.046	0.0091	109	-0.55	-0.50
27	0.070	0.022	NR	1.77	0.79
28	NT	NT	NT		
29	0.0536	NR	NR	0.18	0.28
30	0.040	0.016	106	-1.13	-0.67
31	0.05	NR	86.97	-0.16	-0.25
32	NR	NR	NR		
33*	0.02196	0.0066	NR	-2.88	-3.11
34	NT	NT	NT		
35	NT	NT	NT		
36	0.057	0.004	79	0.51	0.66
37	NT	NT	NT		
38	NS	NS	NS		
39	NT	NT	NT		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0517	0.0069
Spike Value	0.0499	0.0025
Robust Average	0.0515	0.0081
Median	0.0538	0.0061
Mean	0.055	
N	18	
Max	0.149599	
Min	0.02196	
Robust SD	0.014	
Robust CV	27%	


Kernel Density
Density
Result
Results: S1 - 5:3FTCA
Assigned Value = 0.0517 ± 0.0069 µg/L
Results (µg/L)
Laboratory
33 7 11 16 30 26 31 12 29 8 21 13 36 1 23 19 27 15 2 3 4 5 6 9 10 14 17 18 20 22 24 25 28 32 34 35 37 38 39 40 Md RA SV


z-Scores: S1 - 5:3FTCA
Standard Deviation for Proficiency Assessment 0.010 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
33 7 11 16 30 26 31 12 29 8 21 13 36 1 23 19 27 15

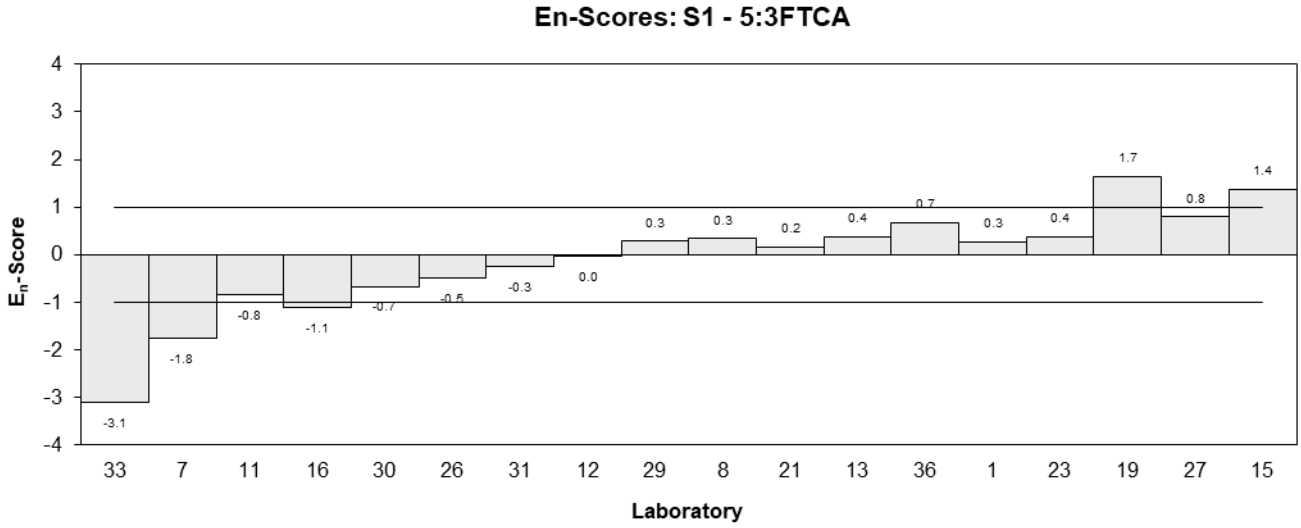

En-Scores: S1 - 5:3FTCA
En-Score
Laboratory
33 7 11 16 30 26 31 12 29 8 21 13 36 1 23 19 27 15

Figure 23

Table 28

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	GenX
Unit	µg/L

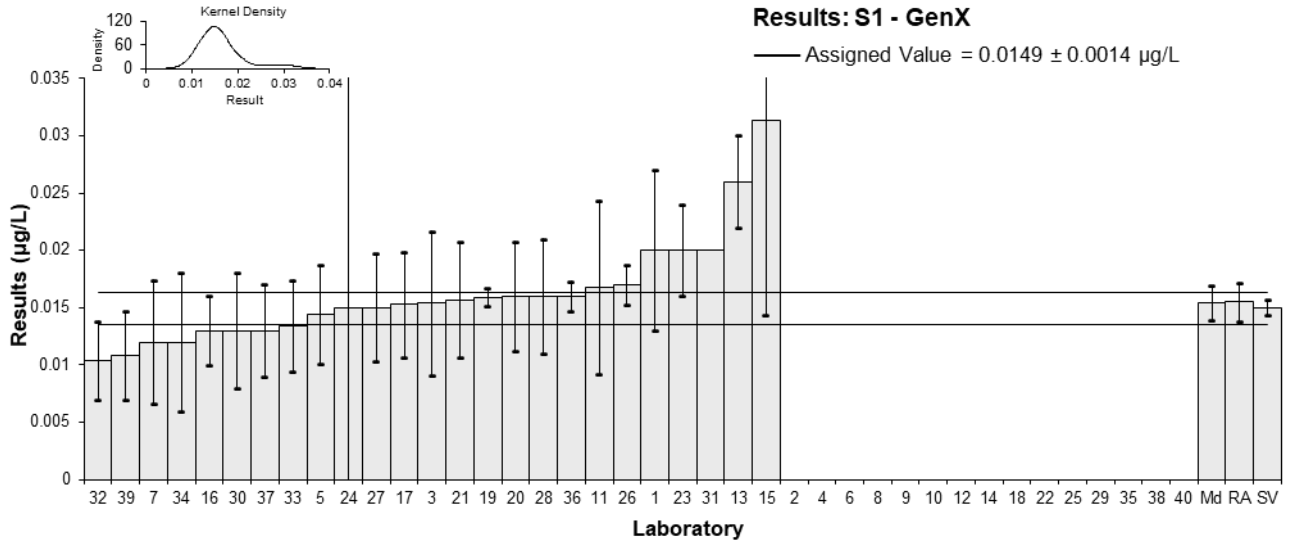
Participant Results

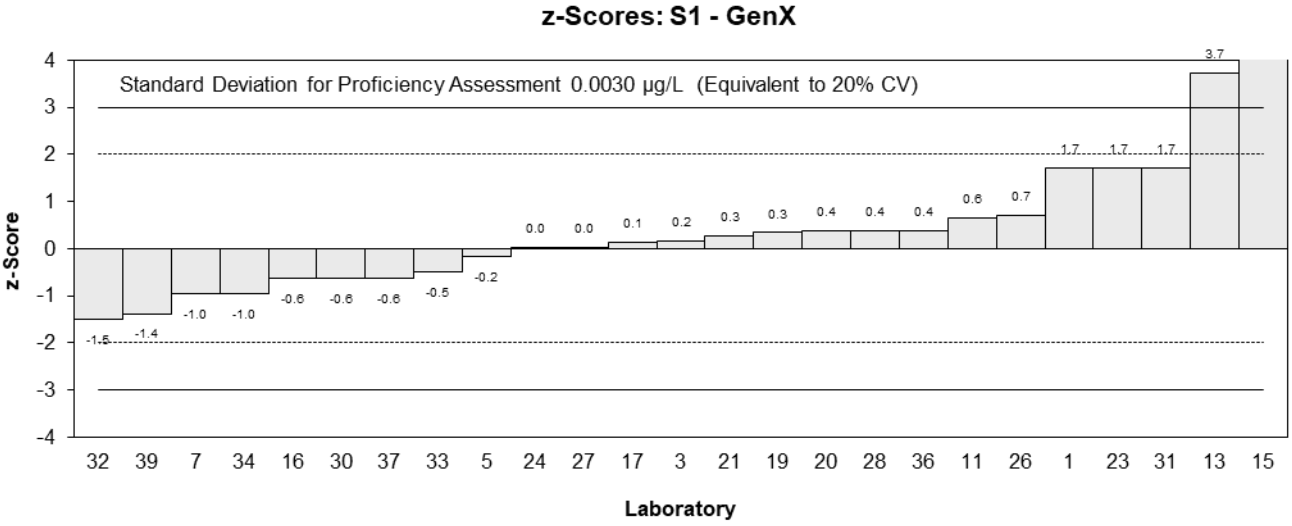
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.02	0.007	69.52	1.71	0.71
2	NS	NS	NS		
3	0.0154	0.0063	NR	0.17	0.08
4	NS	NS	NS		
5	0.0144	0.0043	86.1	-0.17	-0.11
6	NT	NT	NT		
7	0.012	0.0054	105	-0.97	-0.52
8	<0.05	NR	98		
9	NS	NS	NS		
10	NR	NR	NR		
11	0.0168	0.00756	NR	0.64	0.25
12	<0.02	NR	85		
13*	0.026	0.004	75	3.72	2.62
14	NT	NT	NT		
15*	0.031318	0.016940	NR	5.51	0.97
16	0.013	0.003	101	-0.64	-0.57
17	0.0153	0.0046	101.5	0.13	0.08
18	NT	NT	NT		
19	0.0159	0.0008	87	0.34	0.62
20	0.016	0.0048	120	0.37	0.22
21	0.0157	0.005	110	0.27	0.15
22	NT	NT	NT		
23	0.02	0.0040	NR	1.71	1.20
24	0.015	0.08	NR	0.03	0.00
25	NT	NT	NT		
26	0.017	0.0017	89	0.70	0.95
27	0.015	0.0047	NR	0.03	0.02
28	0.016	0.005	NR	0.37	0.21
29	<0.025	NR	NR		
30	0.013	0.005	95	-0.64	-0.37
31	0.02	NR	82.51	1.71	3.64
32	0.0104	0.0034130	117.958	-1.51	-1.22
33	0.01343	0.0040	NR	-0.49	-0.35
34	0.012	0.006	96	-0.97	-0.47
35	NT	NT	NT		
36	0.016	0.0013	81	0.37	0.58
37	0.013	0.004	96	-0.64	-0.45
38	NS	NS	NS		
39	0.01078	0.00388	94	-1.38	-1.00
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0149	0.0014
Spike Value	0.0150	0.0007
Robust Average	0.0155	0.0017
Median	0.0154	0.0015
Mean	0.0161	
N	25	
Max	0.031318	
Min	0.0104	
Robust SD	0.0034	
Robust CV	22%	


Kernel Density
Density
120
60
0
0
0.01
0.02
0.03
0.04
Result
Results: S1 - GenX
Assigned Value = 0.0149 ± 0.0014 µg/L
Results (µg/L)
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
32 39 7 34 16 30 37 33 5 24 27 17 3 21 19 20 28 36 11 26 1 23 31 13 15 2 4 6 8 9 10 12 14 18 22 25 29 35 38 40 Md RA SV
Laboratory


z-Scores: S1 - GenX
Standard Deviation for Proficiency Assessment 0.0030 µg/L (Equivalent to 20% CV)
z-Score
4
3
2
1
0
-1
-2
-3
-4
-1.5 -1.4 -1.0 -1.0 -0.6 -0.6 -0.6 -0.5 -0.2 0.0 0.0 0.1 0.2 0.3 0.3 0.4 0.4 0.4 0.6 0.7 1.7 1.7 1.7 3.7
32 39 7 34 16 30 37 33 5 24 27 17 3 21 19 20 28 36 11 26 1 23 31 13 15
Laboratory

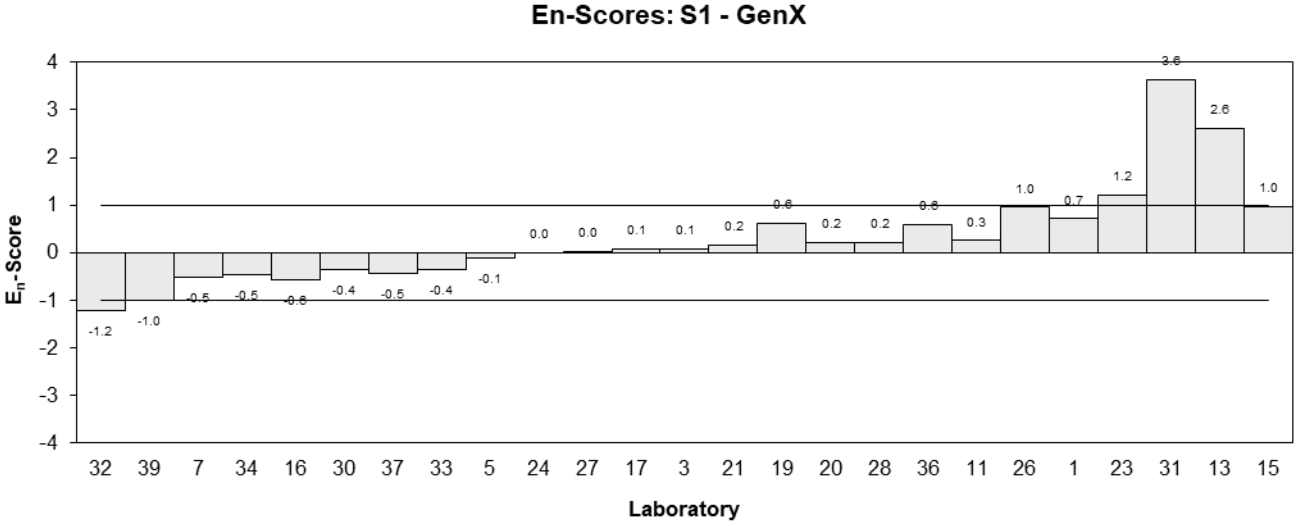

En-Scores: S1 - GenX
En-Score
4
3
2
1
0
-1
-2
-3
-4
-1.2 -1.0 -0.5 -0.5 -0.6 -0.4 -0.5 -0.4 -0.1 0.0 0.0 0.1 0.1 0.2 0.6 0.2 0.2 0.6 0.3 1.0 0.7 1.2 3.6 2.6 1.0
32 39 7 34 16 30 37 33 5 24 27 17 3 21 19 20 28 36 11 26 1 23 31 13 15
Laboratory

Figure 24

Table 29

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	PFMPA
Unit	µg/L

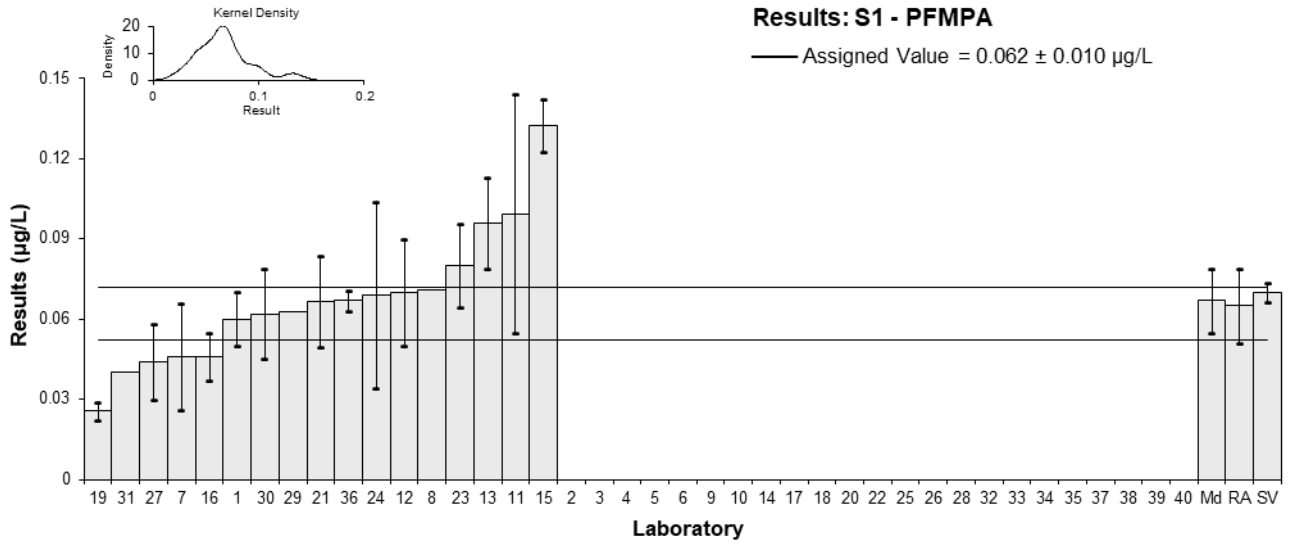
Participant Results

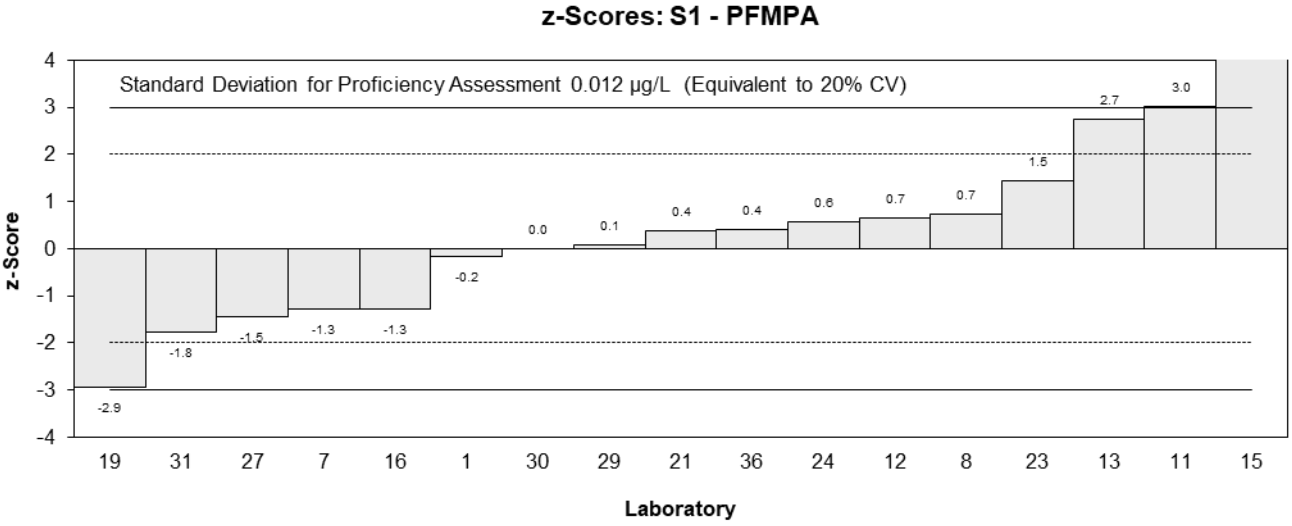
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.06	0.01	36.16	-0.16	-0.14
2	NS	NS	NS		
3	NT	NT	NT		
4	NS	NS	NS		
5	NT	NT	NT		
6	NT	NT	NT		
7	0.046	0.02	90	-1.29	-0.72
8	0.071	NR	NR	0.73	0.90
9	NS	NS	NS		
10	NR	NR	NR		
11*	0.0993	0.04469	NR	3.01	0.81
12	0.07	0.02	69	0.65	0.36
13	0.096	0.017	NR	2.74	1.72
14	NT	NT	NT		
15*	0.132467	0.009735	NR	5.68	5.05
16	0.046	0.009	NR	-1.29	-1.19
17	NT	NT	NT		
18	NT	NT	NT		
19*	0.0255	0.0035	98	-2.94	-3.45
20	NT	NT	NT		
21	0.0667	0.017	27	0.38	0.24
22	NT	NT	NT		
23	0.08	0.0155	NR	1.45	0.98
24	0.069	0.035	NR	0.56	0.19
25	NT	NT	NT		
26	NT	NT	NT		
27	0.044	0.014	NR	-1.45	-1.05
28	NT	NT	NT		
29	0.0629	NR	NR	0.07	0.09
30	0.062	0.017	77	0.00	0.00
31	0.04	NR	50.55	-1.77	-2.20
32	NR	NR	NR		
33	NT	NT	NT		
34	NT	NT	NT		
35	NT	NT	NT		
36	0.067	0.0038	84	0.40	0.47
37	NT	NT	NT		
38	NS	NS	NS		
39	NT	NT	NT		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.062	0.010
Spike Value	0.0699	0.0035
Robust Average	0.065	0.014
Median	0.067	0.012
Mean	0.067	
N	17	
Max	0.132467	
Min	0.0255	
Robust SD	0.023	
Robust CV	35%	


Kernel Density
Density
Result
Results: S1 - PFMPA
Assigned Value = 0.062 ± 0.010 µg/L
Results (µg/L)
Laboratory
19 31 27 7 16 1 30 29 21 36 24 12 8 23 13 11 15 2 3 4 5 6 9 10 14 17 18 20 22 25 26 28 32 33 34 35 37 38 39 40 Md RA SV


z-Scores: S1 - PFMPA
Standard Deviation for Proficiency Assessment 0.012 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
19 31 27 7 16 1 30 29 21 36 24 12 8 23 13 11 15

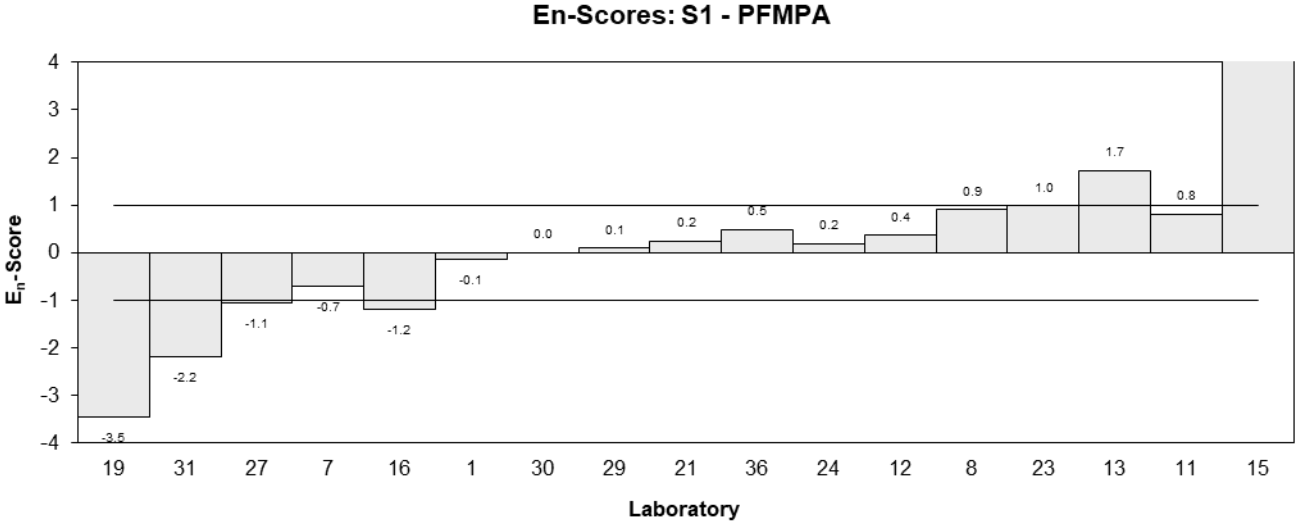

En-Scores: S1 - PFMPA
En-Score
Laboratory
19 31 27 7 16 1 30 29 21 36 24 12 8 23 13 11 15

Figure 25

Table 30

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	9Cl-PF3ONS
Unit	µg/L

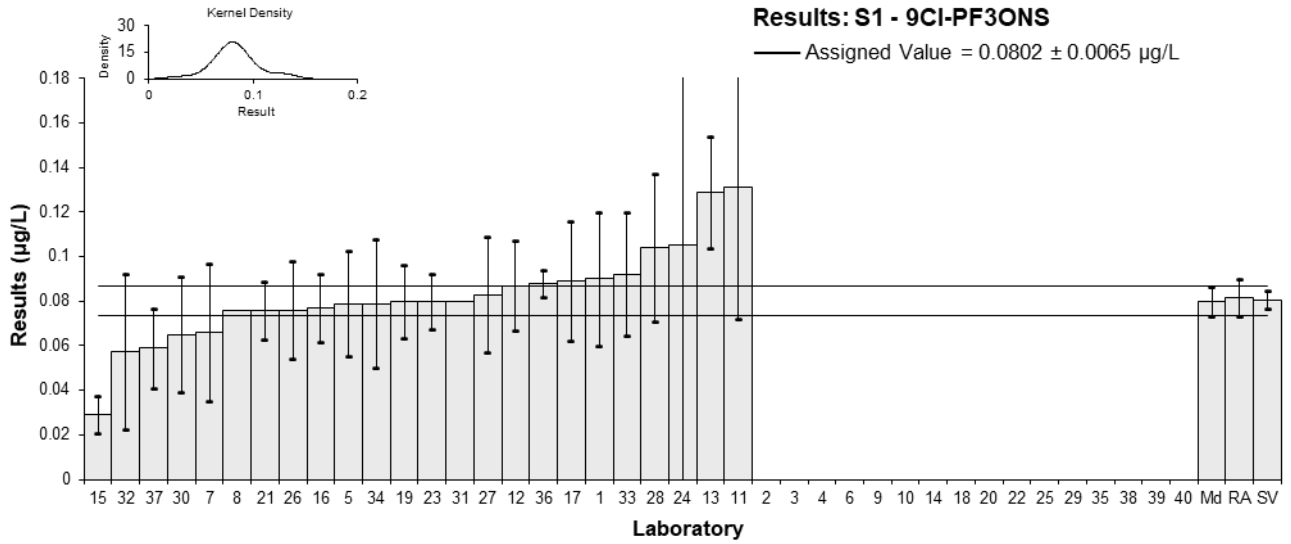
Participant Results

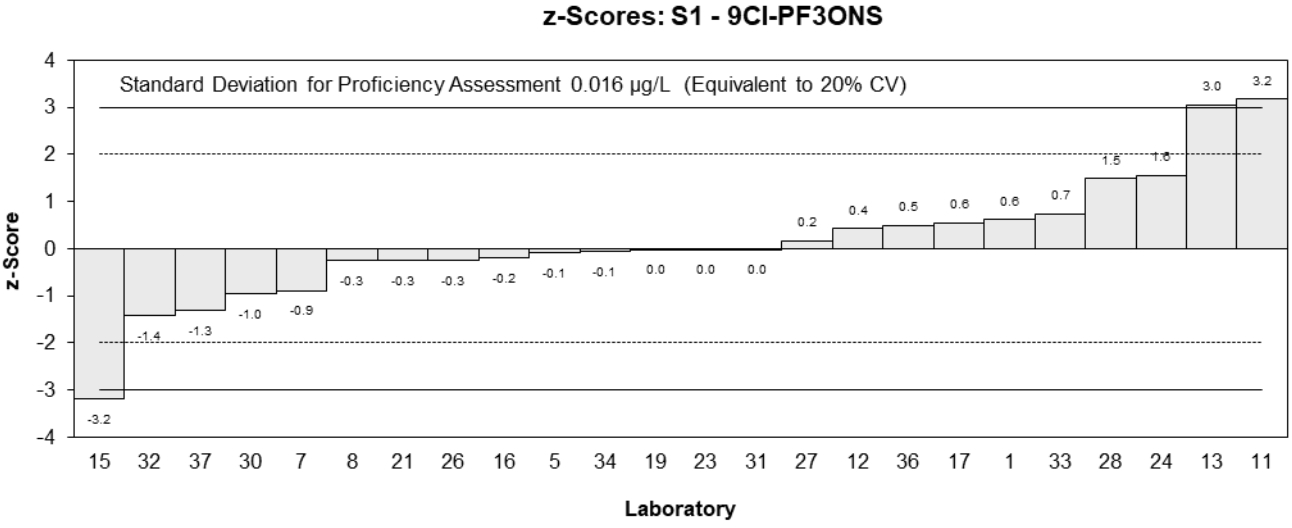
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.09	0.03	80.36	0.61	0.32
2	NS	NS	NS		
3	NT	NT	NT		
4	NS	NS	NS		
5	0.0788	0.0236	96.4	-0.09	-0.06
6	NT	NT	NT		
7	0.066	0.031	105	-0.89	-0.45
8	0.076	NR	NR	-0.26	-0.65
9	NS	NS	NS		
10	NR	NR	NR		
11*	0.131	0.059	NR	3.17	0.86
12	0.087	0.02	70	0.42	0.32
13*	0.129	0.025	NR	3.04	1.89
14	NT	NT	NT		
15*	0.029139	0.008623	NR	-3.18	-4.73
16	0.077	0.015	NR	-0.20	-0.20
17	0.0890	0.0267	103.9	0.55	0.32
18	NT	NT	NT		
19	0.0799	0.0163	98	-0.02	-0.02
20	NT	NT	NT		
21	0.076	0.013	110	-0.26	-0.29
22	NT	NT	NT		
23	0.08	0.0124	NR	-0.01	-0.01
24	0.105	0.525	NR	1.55	0.05
25	NT	NT	NT		
26	0.076	0.022	136	-0.26	-0.18
27	0.083	0.026	NR	0.17	0.10
28	0.104	0.033	NR	1.48	0.71
29	NR	NR	NR		
30	0.065	0.026	105	-0.95	-0.57
31	0.08	NR	89.39	-0.01	-0.03
32	0.0575	0.0348119	119.566	-1.42	-0.64
33	0.09212	0.0276	NR	0.74	0.42
34	0.079	0.029	NR	-0.07	-0.04
35	NT	NT	NT		
36	0.088	0.0062	81	0.49	0.87
37	0.059	0.018	110	-1.32	-1.11
38	NS	NS	NS		
39	NT	NT	NT		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0802	0.0065
Spike Value	0.0805	0.0040
Robust Average	0.0816	0.0085
Median	0.0800	0.0065
Mean	0.0824	
N	24	
Max	0.131	
Min	0.029139	
Robust SD	0.017	
Robust CV	20%	


Kernel Density
Density
Result
Results: S1 - 9Cl-PF3ONS
Assigned Value = 0.0802 ± 0.0065 µg/L
Results (µg/L)
Laboratory
15 32 37 30 7 8 21 26 16 5 34 19 23 31 27 12 36 17 1 33 28 24 13 11 2 3 4 6 9 10 14 18 20 22 25 29 35 38 39 40 Md RA SV


z-Scores: S1 - 9Cl-PF3ONS
Standard Deviation for Proficiency Assessment 0.016 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
15 32 37 30 7 8 21 26 16 5 34 19 23 31 27 12 36 17 1 33 28 24 13 11

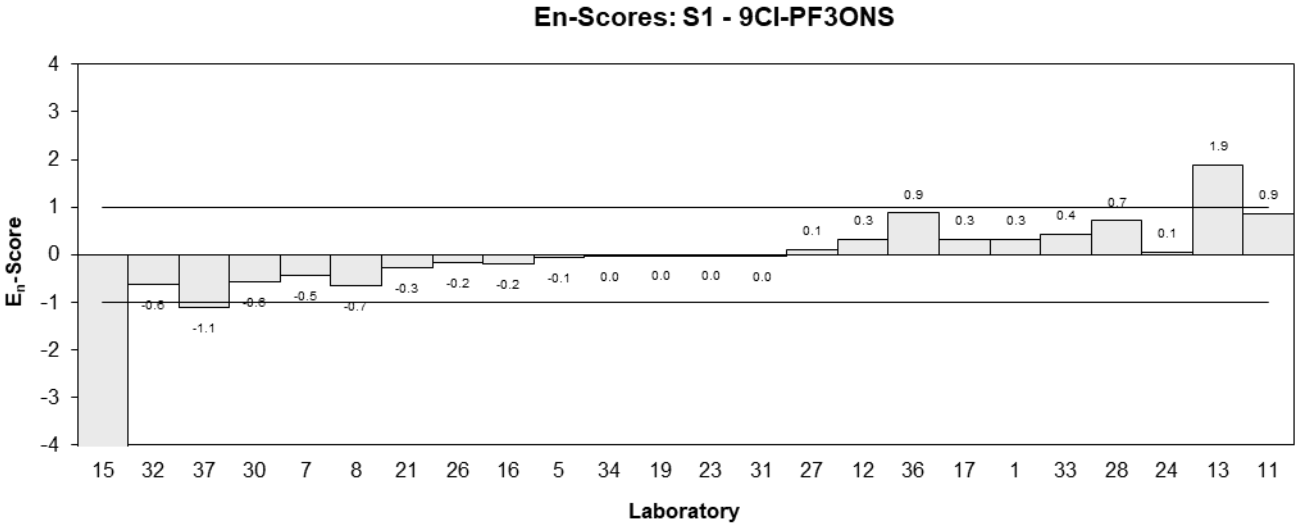

En-Scores: S1 - 9Cl-PF3ONS
En-Score
Laboratory
15 32 37 30 7 8 21 26 16 5 34 19 23 31 27 12 36 17 1 33 28 24 13 11

Figure 26

Table 31

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	11Cl-PF3OUdS
Unit	µg/L

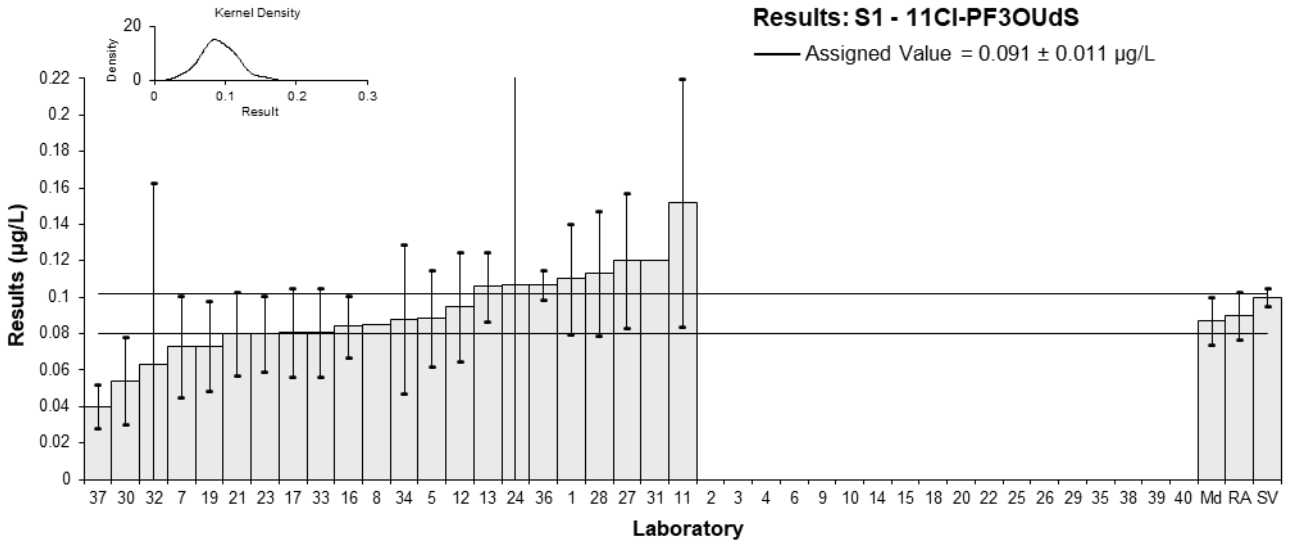
Participant Results

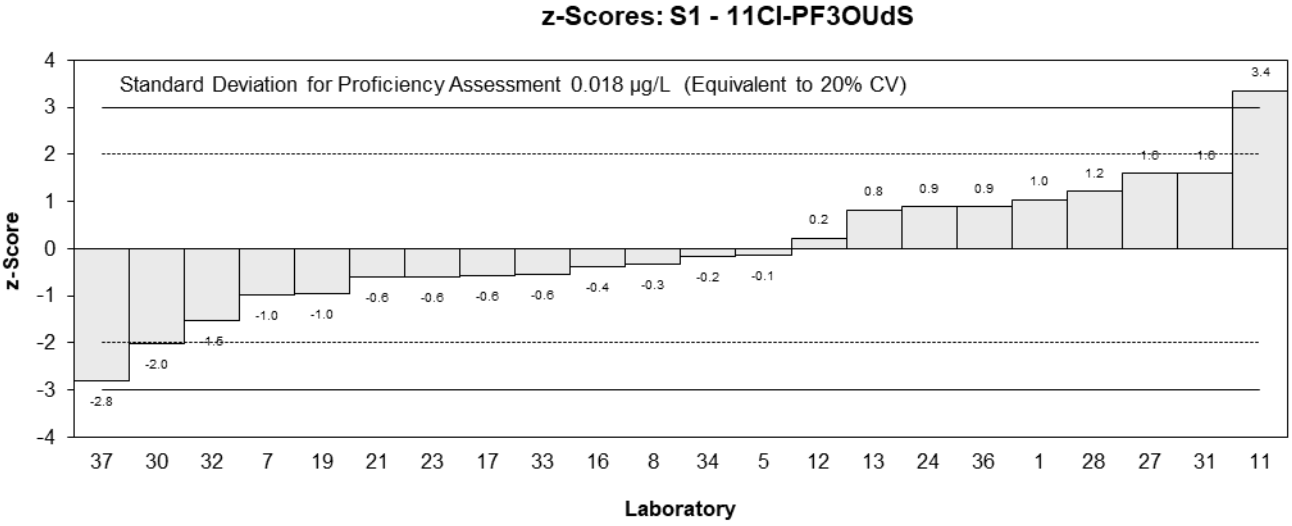
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.11	0.03	80.36	1.04	0.59
2	NS	NS	NS		
3	NT	NT	NT		
4	NS	NS	NS		
5	0.0886	0.0266	104.0	-0.13	-0.08
6	NT	NT	NT		
7	0.073	0.028	128	-0.99	-0.60
8	0.085	NR	NR	-0.33	-0.55
9	NS	NS	NS		
10	NR	NR	NR		
11*	0.152	0.068	NR	3.35	0.89
12	0.095	0.03	70	0.22	0.13
13	0.106	0.019	NR	0.82	0.68
14	NT	NT	NT		
15	<0.003772	NR	NR		
16	0.084	0.017	NR	-0.38	-0.35
17	0.0805	0.0242	118.6	-0.58	-0.39
18	NT	NT	NT		
19	0.0733	0.0249	98	-0.97	-0.65
20	NT	NT	NT		
21	0.08	0.023	110	-0.60	-0.43
22	NT	NT	NT		
23	0.08	0.0210	NR	-0.60	-0.46
24	0.107	0.535	NR	0.88	0.03
25	NT	NT	NT		
26	NR	NR	NR		
27	0.12	0.037	NR	1.59	0.75
28	0.113	0.034	NR	1.21	0.62
29	NR	NR	NR		
30	0.054	0.024	105	-2.03	-1.40
31	0.12	NR	76.3	1.59	2.64
32	0.063	0.0995046	119.566	-1.54	-0.28
33	0.08098	0.0243	NR	-0.55	-0.38
34	0.088	0.041	NR	-0.16	-0.07
35	NT	NT	NT		
36	0.107	0.008	81	0.88	1.18
37*	0.04	0.012	90	-2.80	-3.13
38	NS	NS	NS		
39	NT	NT	NT		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.091	0.011
Spike Value	0.100	0.005
Robust Average	0.090	0.013
Median	0.087	0.013
Mean	0.091	
N	22	
Max	0.152	
Min	0.04	
Robust SD	0.024	
Robust CV	26%	


Kernel Density
Density
Result
Results: S1 - 11Cl-PF3OUdS
Assigned Value = 0.091 ± 0.011 µg/L
Results (µg/L)
Laboratory
37 30 32 7 19 21 23 17 33 16 8 34 5 12 13 24 36 1 28 27 31 11 2 3 4 6 9 10 14 15 18 20 22 25 26 29 35 38 39 40 Md RA SV


z-Scores: S1 - 11Cl-PF3OUdS
Standard Deviation for Proficiency Assessment 0.018 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
37 30 32 7 19 21 23 17 33 16 8 34 5 12 13 24 36 1 28 27 31 11

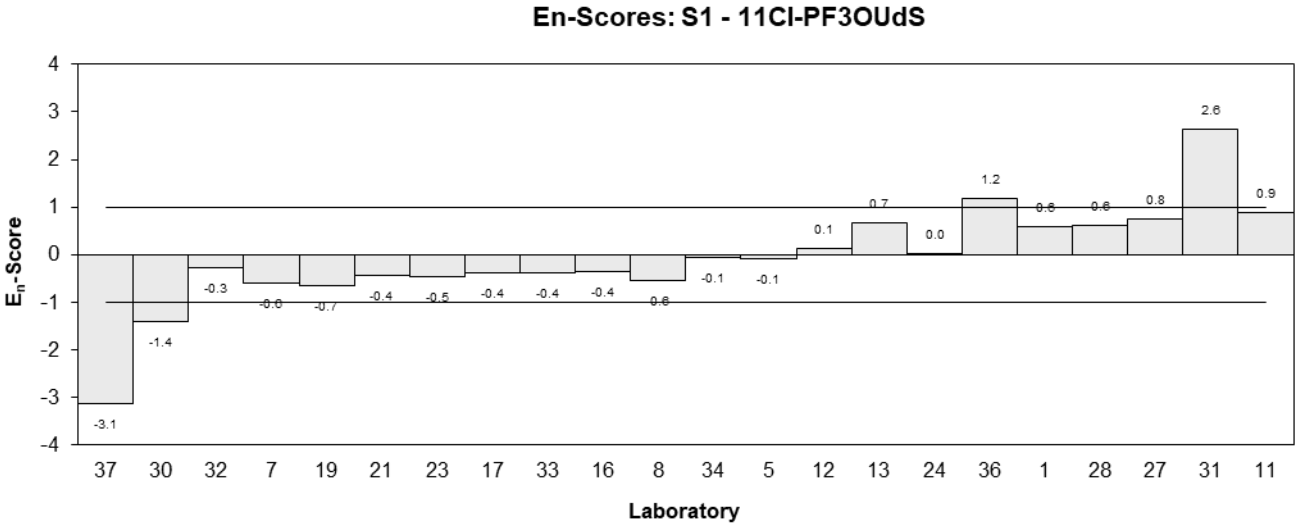

En-Scores: S1 - 11Cl-PF3OUdS
En-Score
Laboratory
37 30 32 7 19 21 23 17 33 16 8 34 5 12 13 24 36 1 28 27 31 11

Figure 27

Table 32

Sample Details

Sample No.	S1
Matrix	Potable Water
Analyte	PFEESA
Unit	µg/L

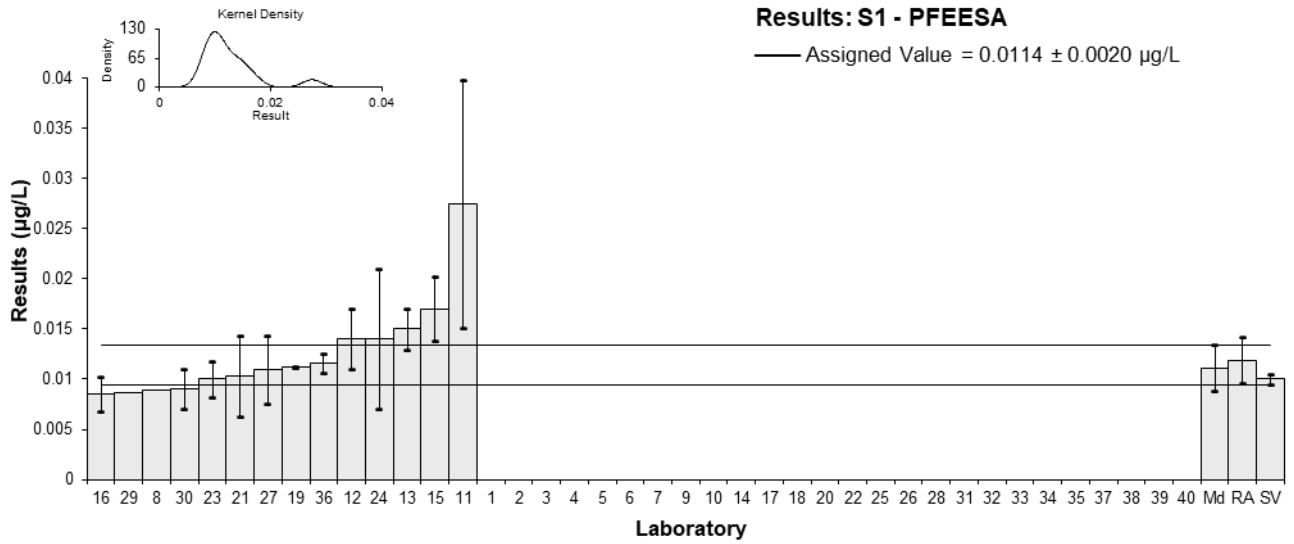
Participant Results

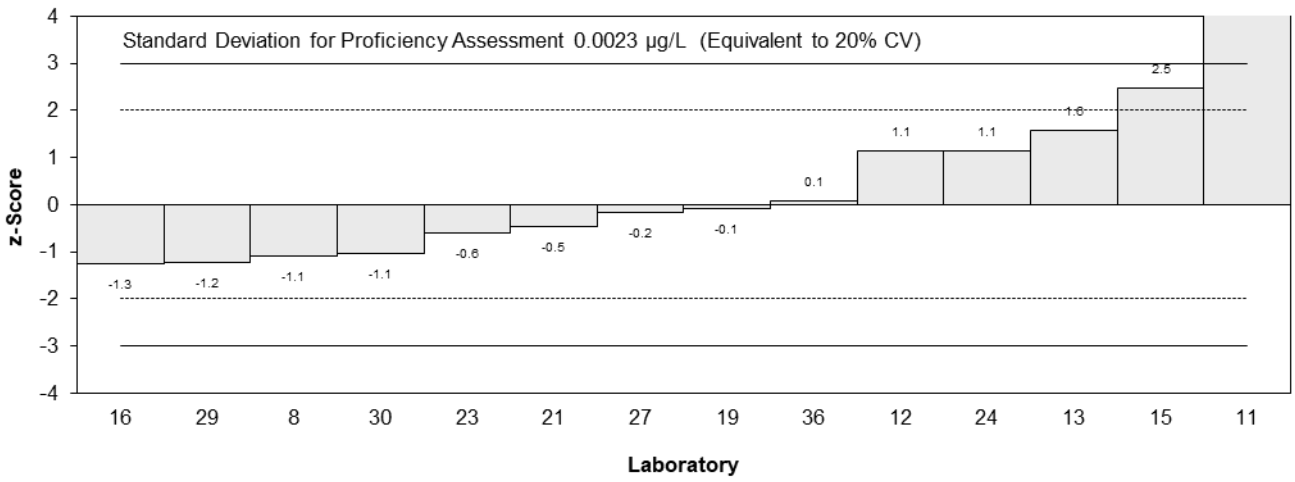
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	<0.01	NR	91		
2	NS	NS	NS		
3	NT	NT	NT		
4	NS	NS	NS		
5	NT	NT	NT		
6	NT	NT	NT		
7	<0.025	NR	98		
8	0.0089	NR	NR	-1.10	-1.25
9	NS	NS	NS		
10	NR	NR	NR		
11*	0.0275	0.01238	NR	7.06	1.28
12	0.014	0.003	69	1.14	0.72
13	0.015	0.002	NR	1.58	1.27
14	NT	NT	NT		
15	0.017035	0.003222	NR	2.47	1.49
16	0.0085	0.0017	NR	-1.27	-1.10
17	NT	NT	NT		
18	NT	NT	NT		
19	0.0112	0.00004	96	-0.09	-0.10
20	NT	NT	NT		
21	0.0103	0.004	108	-0.48	-0.25
22	NT	NT	NT		
23	0.01	0.0018	NR	-0.61	-0.52
24	0.014	0.007	NR	1.14	0.36
25	NT	NT	NT		
26	NT	NT	NT		
27	0.011	0.0034	NR	-0.18	-0.10
28	NT	NT	NT		
29	0.0086	NR	NR	-1.23	-1.40
30	0.009	0.002	85	-1.05	-0.85
31	<0.01	NR	92.26		
32	NR	NR	NR		
33	NT	NT	NT		
34	NT	NT	NT		
35	NT	NT	NT		
36	0.0116	0.00092	79	0.09	0.09
37	NT	NT	NT		
38	NS	NS	NS		
39	NT	NT	NT		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0114	0.0020
Spike Value	0.0100	0.0005
Robust Average	0.0119	0.0023
Median	0.0111	0.0023
Mean	0.0126	
N	14	
Max	0.0275	
Min	0.0085	
Robust SD	0.0034	
Robust CV	29%	


Kernel Density
Density
130
65
0
0
0.02
0.04
Result
Results: S1 - PFEESA
Assigned Value = 0.0114 ± 0.0020 µg/L
Results (µg/L)
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
16 29 8 30 23 21 27 19 36 12 24 13 15 11 1 2 3 4 5 6 7 9 10 14 17 18 20 22 25 26 28 31 32 33 34 35 37 38 39 40 Md RA SV
Laboratory


z-Scores: S1 - PFEESA
Standard Deviation for Proficiency Assessment 0.0023 µg/L (Equivalent to 20% CV)
z-Score
4
3
2
1
0
-1
-2
-3
-4
-1.3
-1.2
-1.1
-1.1
-0.6
-0.5
-0.2
-0.1
0.1
1.1
1.1
1.6
2.5
16 29 8 30 23 21 27 19 36 12 24 13 15 11
Laboratory

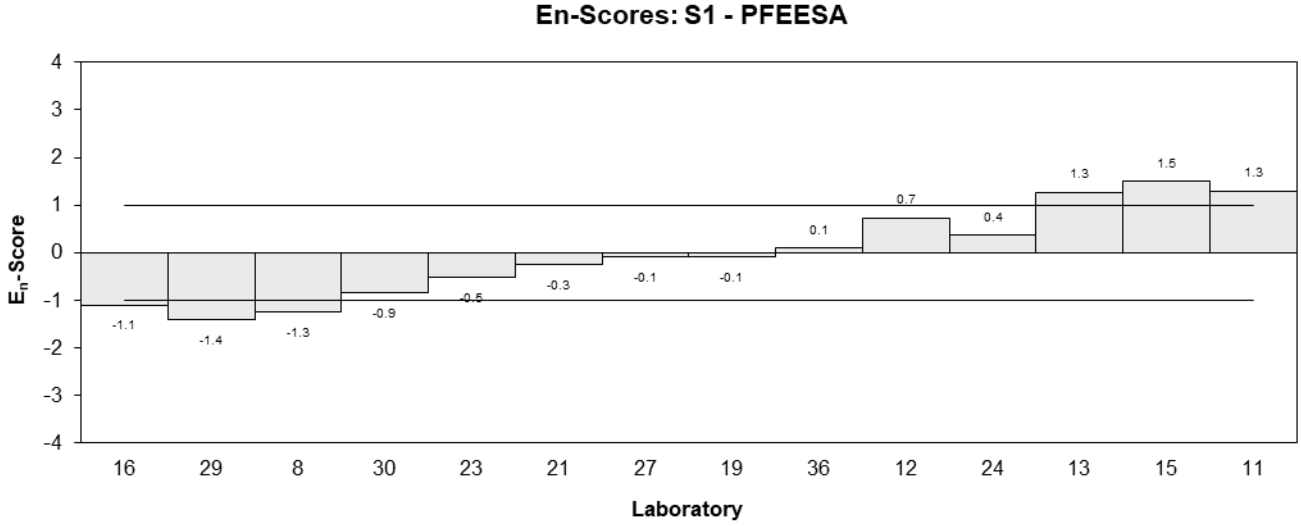

En-Scores: S1 - PFEESA
En-Score
4
3
2
1
0
-1
-2
-3
-4
-1.1
-1.4
-1.3
-0.9
-0.5
-0.3
-0.1
-0.1
0.1
0.7
0.4
1.3
1.5
1.3
16 29 8 30 23 21 27 19 36 12 24 13 15 11
Laboratory

Figure 28

Table 33

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	PFBA
Unit	µg/L

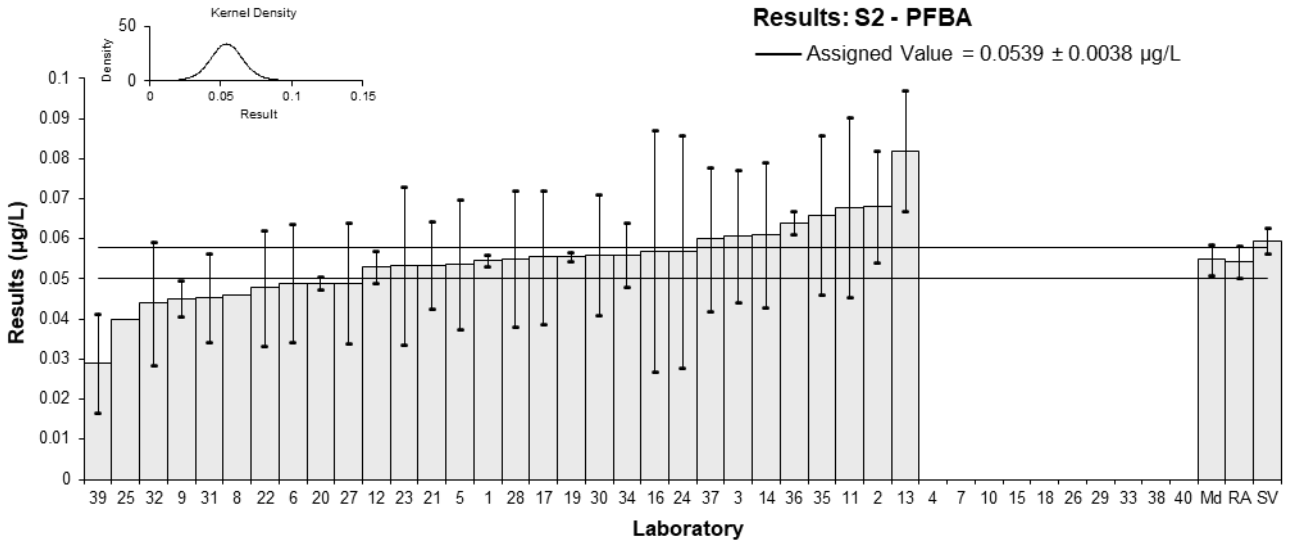
Participant Results

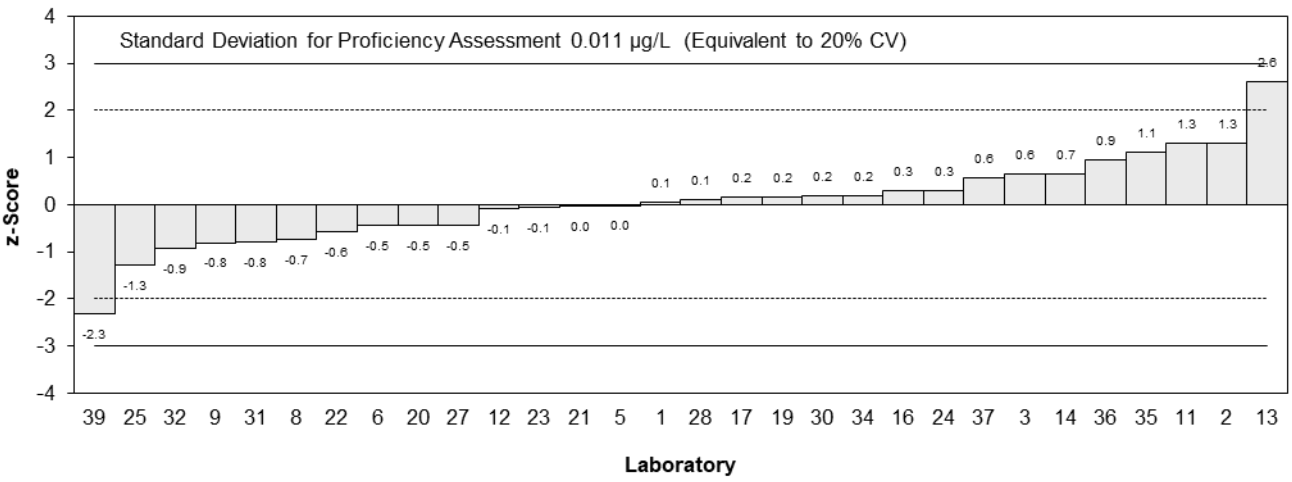
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0546	0.00153	51.94	0.06	0.17
2	0.068	0.014	NR	1.31	0.97
3	0.0608	0.0165	NR	0.64	0.41
4	NS	NS	NS		
5	0.0537	0.0161	89.0	-0.02	-0.01
6	0.049	0.0147	110	-0.45	-0.32
7	<0.05	NR	77		
8	0.046	NR	101	-0.73	-2.08
9	0.0451209	0.004512	>75	-0.81	-1.49
10	NS	NS	NS		
11	0.0679	0.0225	NR	1.30	0.61
12	0.053	0.004	53	-0.08	-0.16
13*	0.082	0.015	100	2.61	1.82
14	0.061	0.018	92	0.66	0.39
15	NS	NS	NS		
16	0.057	0.030	106	0.29	0.10
17	0.0555	0.0166	101.5	0.15	0.09
18	<0.05	NR	NR		
19	0.0557	0.0011	16	0.17	0.46
20	0.049	0.00147	78	-0.45	-1.20
21	0.0535	0.011	40	-0.04	-0.03
22	0.0478	0.01434	100	-0.57	-0.41
23	0.0532	0.0197	NR	-0.06	-0.03
24	0.057	0.029	124	0.29	0.11
25	0.040	NR	NR	-1.29	-3.66
26	<0.10	NR	101		
27	0.049	0.015	NR	-0.45	-0.32
28	0.055	0.017	106	0.10	0.06
29	<0.5	NR	NR		
30	0.056	0.015	40	0.19	0.14
31	0.0453	0.0111	11.21	-0.80	-0.73
32	0.044	0.0153844	118.479	-0.92	-0.62
33	< 0.1	NR	65		
34	0.056	0.008	96	0.19	0.24
35	0.066	0.02	76	1.12	0.59
36	0.064	0.0029	77	0.94	2.11
37	0.06	0.018	108	0.57	0.33
38	NT	NT	NT		
39	0.02896	0.01245	82	-2.31	-1.92
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0539	0.0038
Spike Value	0.0595	0.0032
Robust Average	0.0544	0.0040
Median	0.0548	0.0039
Mean	0.0545	
N	30	
Max	0.082	
Min	0.02896	
Robust SD	0.0087	
Robust CV	16%	


Kernel Density
Density
Result
Results: S2 - PFBA
Assigned Value = 0.0539 ± 0.0038 µg/L
Results (µg/L)
Laboratory
39 25 32 9 31 8 22 6 20 27 12 23 21 5 1 28 17 19 30 34 16 24 37 3 14 36 35 11 2 13 4 7 10 15 18 26 29 33 38 40 Md RA SV


z-Scores: S2 - PFBA
Standard Deviation for Proficiency Assessment 0.011 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
39 25 32 9 31 8 22 6 20 27 12 23 21 5 1 28 17 19 30 34 16 24 37 3 14 36 35 11 2 13

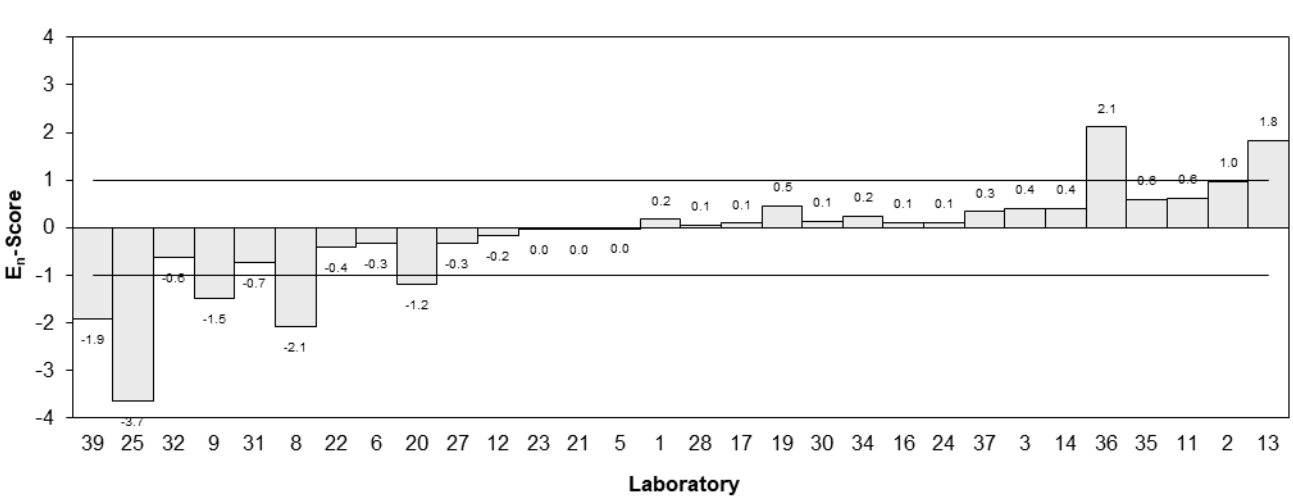

En-Scores: S2 - PFBA
En-Score
Laboratory
39 25 32 9 31 8 22 6 20 27 12 23 21 5 1 28 17 19 30 34 16 24 37 3 14 36 35 11 2 13

Figure 29

Table 34

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	PFPeA
Unit	µg/L

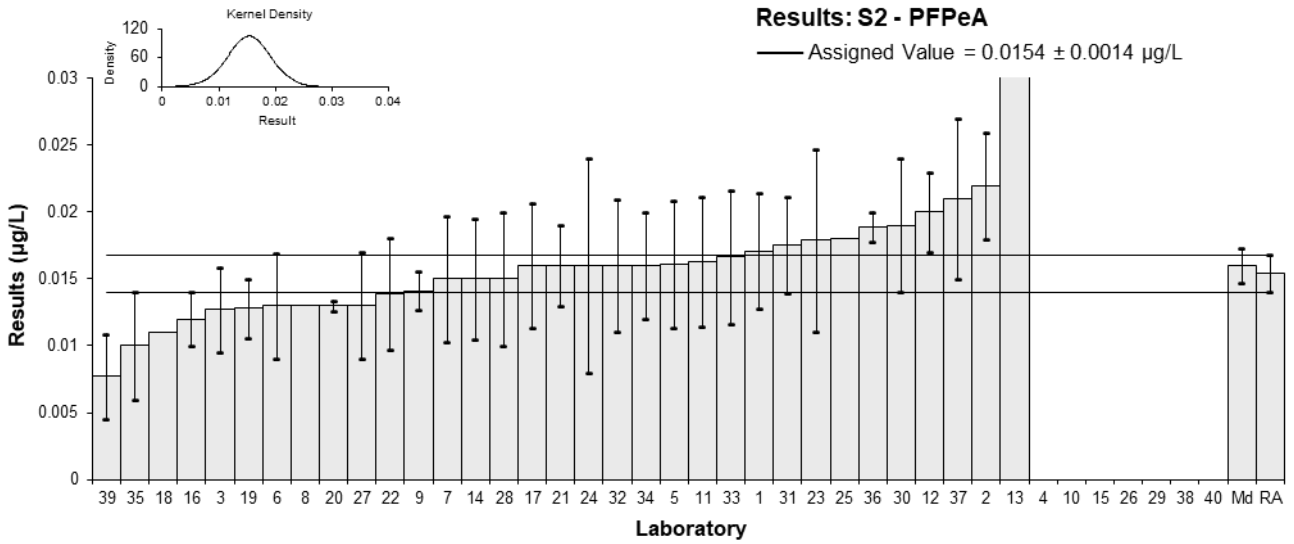
Participant Results

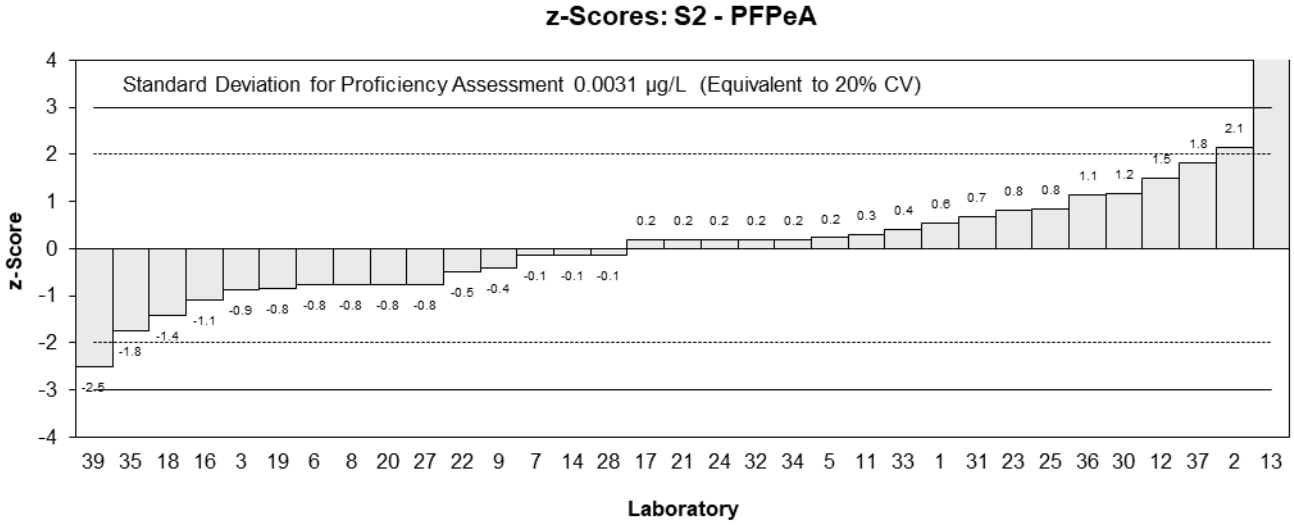
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0171	0.0043	76.24	0.55	0.38
2	0.022	0.004	NR	2.14	1.56
3	0.0127	0.0032	NR	-0.88	-0.77
4	NS	NS	NS		
5	0.0161	0.0048	89.7	0.23	0.14
6	0.013	0.00393	95	-0.78	-0.58
7	0.015	0.0047	92	-0.13	-0.08
8	0.013	NR	89	-0.78	-1.71
9	0.0141259	0.001413	>75	-0.41	-0.64
10	NS	NS	NS		
11	0.0163	0.00487	NR	0.29	0.18
12	0.02	0.003	63	1.49	1.39
13**	0.16	0.003	85	46.95	43.68
14	0.015	0.0045	104	-0.13	-0.08
15	NS	NS	NS		
16	0.012	0.002	144	-1.10	-1.39
17	0.0160	0.0047	86.6	0.19	0.12
18	0.011	NR	NR	-1.43	-3.14
19	0.0128	0.0022	106	-0.84	-1.00
20	0.013	0.00039	110	-0.78	-1.65
21	0.016	0.003	51	0.19	0.18
22	0.0139	0.00417	95	-0.49	-0.34
23	0.0179	0.0068	NR	0.81	0.36
24	0.016	0.008	110	0.19	0.07
25	0.018	NR	NR	0.84	1.86
26	<0.10	NR	105		
27	0.013	0.0040	NR	-0.78	-0.57
28	0.015	0.005	110	-0.13	-0.08
29	<0.05	NR	NR		
30	0.019	0.005	68	1.17	0.69
31	0.0175	0.0036	41.62	0.68	0.54
32	0.016	0.0049171	117.265	0.19	0.12
33	0.01666	0.0050	62	0.41	0.24
34	0.016	0.004	87	0.19	0.14
35	0.01	0.004	78	-1.75	-1.27
36	0.0189	0.0011	82	1.14	1.97
37	0.021	0.006	114	1.82	0.91
38	NT	NT	NT		
39	0.00771	0.00316	98	-2.50	-2.22
40	NS	NS	NS		

** Extreme Outlier, see Section 4.2. After the release of the Interim Report, this participant noted that this result had been reported incorrectly, and that the result was intended to be 0.016 ± 0.003 µg/L.

Statistics

Assigned Value	0.0154	0.0014
Spike Value	Not Spiked	
Robust Average	0.0154	0.0014
Median	0.0160	0.0013
Mean	0.0154	
N	32	
Max	0.022	
Min	0.00771	
Robust SD	0.0031	
Robust CV	20%	


Kernel Density
Density
Result
Results: S2 - PFPeA
Assigned Value = 0.0154 ± 0.0014 µg/L
Results (µg/L)
Laboratory
39 35 18 16 3 19 6 8 20 27 22 9 7 14 28 17 21 24 32 34 5 11 33 1 31 23 25 36 30 12 37 2 13 4 10 15 26 29 38 40 Md RA


z-Scores: S2 - PFPeA
Standard Deviation for Proficiency Assessment 0.0031 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
39 35 18 16 3 19 6 8 20 27 22 9 7 14 28 17 21 24 32 34 5 11 33 1 31 23 25 36 30 12 37 2 13

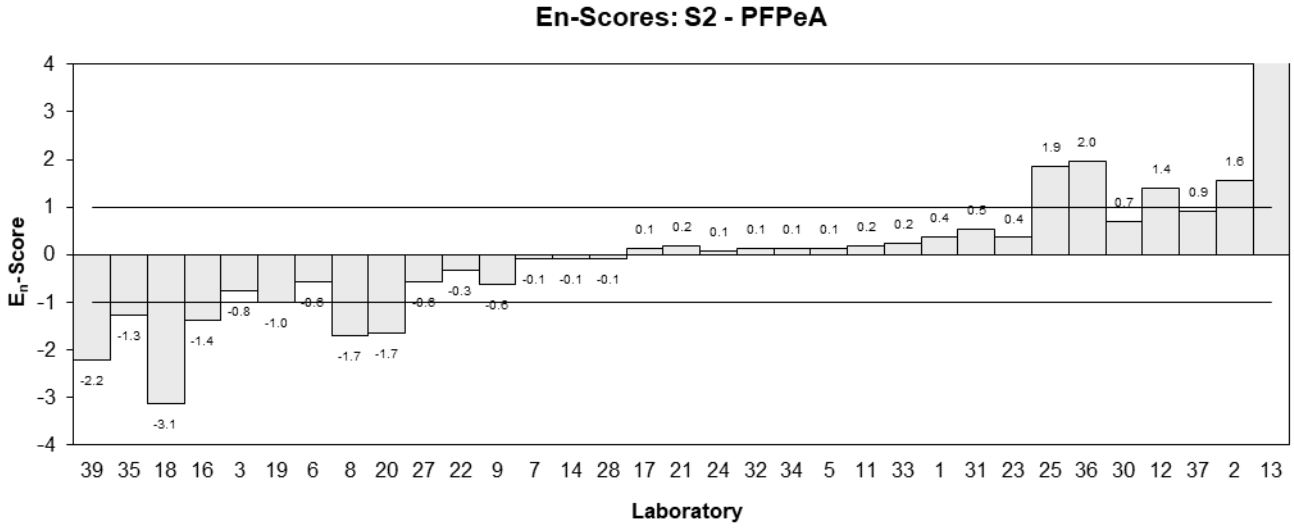

En-Scores: S2 - PFPeA
En-Score
Laboratory
39 35 18 16 3 19 6 8 20 27 22 9 7 14 28 17 21 24 32 34 5 11 33 1 31 23 25 36 30 12 37 2 13

Figure 30

Table 35

Sample Details

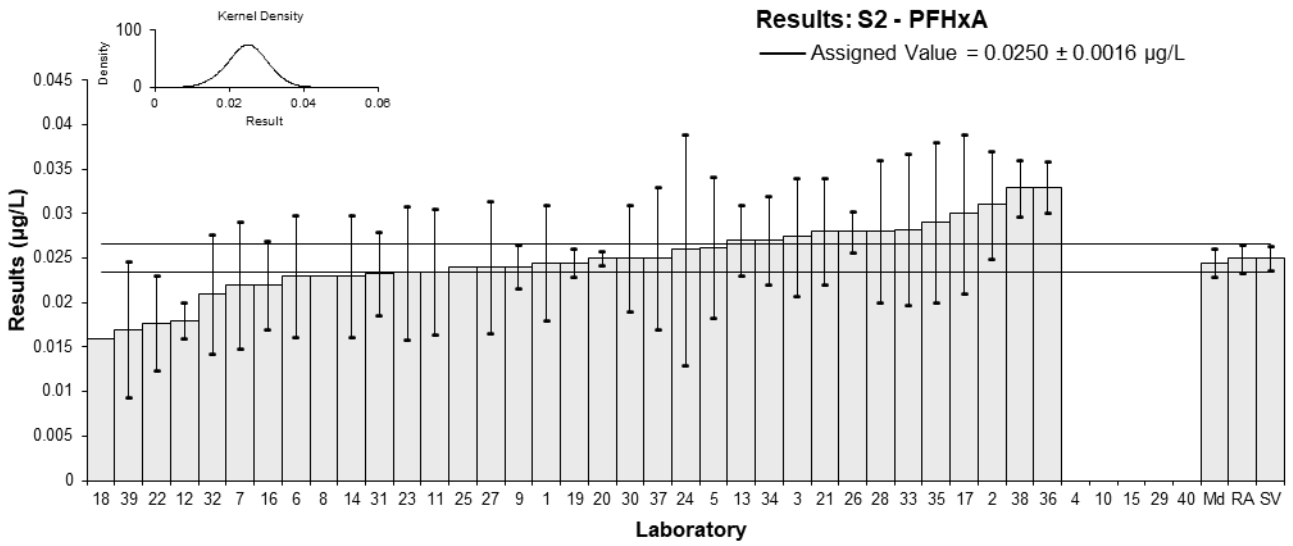
Sample No.	S2
Matrix	River Water
Analyte	PFHxA
Unit	µg/L

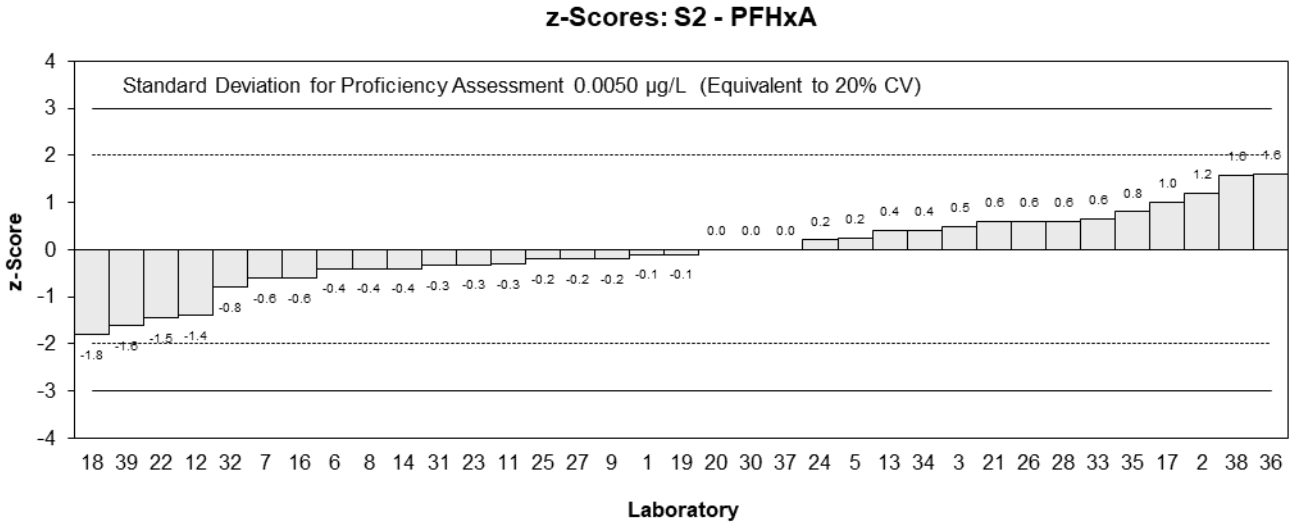
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0245	0.0065	81.63	-0.10	-0.07
2	0.031	0.006	NR	1.20	0.97
3	0.0274	0.0066	NR	0.48	0.35
4	NS	NS	NS		
5	0.0262	0.0079	86.9	0.24	0.15
6	0.023	0.00688	100	-0.40	-0.28
7	0.022	0.0071	92	-0.60	-0.41
8	0.023	NR	89	-0.40	-1.25
9	0.0240625	0.002406	>75	-0.19	-0.32
10	NS	NS	NS		
11	0.0235	0.00707	NR	-0.30	-0.21
12	0.018	0.002	84	-1.40	-2.73
13	0.027	0.004	91	0.40	0.46
14	0.023	0.0069	103	-0.40	-0.28
15	NS	NS	NS		
16	0.022	0.005	95	-0.60	-0.57
17	0.0300	0.0090	88.9	1.00	0.55
18	0.016	NR	NR	-1.80	-5.62
19	0.0245	0.0016	97	-0.10	-0.22
20	0.025	0.00075	130	0.00	0.00
21	0.028	0.006	85	0.60	0.48
22	0.0177	0.00531	90	-1.46	-1.32
23	0.0234	0.0075	NR	-0.32	-0.21
24	0.026	0.013	122	0.20	0.08
25	0.024	NR	NR	-0.20	-0.63
26	0.028	0.0023	102	0.60	1.07
27	0.024	0.0074	NR	-0.20	-0.13
28	0.028	0.008	114	0.60	0.37
29	<0.025	NR	NR		
30	0.025	0.006	106	0.00	0.00
31	0.0233	0.0047	60.83	-0.34	-0.34
32	0.021	0.0067428	127.001	-0.80	-0.58
33	0.02821	0.0085	52	0.64	0.37
34	0.027	0.005	98	0.40	0.38
35	0.029	0.009	94	0.80	0.44
36	0.033	0.0029	78	1.60	2.42
37	0.025	0.008	102	0.00	0.00
38	0.0329	0.00320	108	1.58	2.21
39	0.01698	0.00764	95	-1.60	-1.03
40	NS	NS	NS		

Statistics

Assigned Value	0.0250	0.0016
Spike Value	0.0250	0.0014
Robust Average	0.0250	0.0016
Median	0.0245	0.0016
Mean	0.0249	
N	35	
Max	0.033	
Min	0.016	
Robust SD	0.0038	
Robust CV	15%	


Kernel Density
Density
Result
Results: S2 - PFHxA
Assigned Value = 0.0250 ± 0.0016 µg/L
Results (µg/L)
Laboratory
18 39 22 12 32 7 16 6 8 14 31 23 11 25 27 9 1 19 20 30 37 24 5 13 34 3 21 26 28 33 35 17 2 38 36 4 10 15 29 40 Md RA SV


z-Scores: S2 - PFHxA
Standard Deviation for Proficiency Assessment 0.0050 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
18 39 22 12 32 7 16 6 8 14 31 23 11 25 27 9 1 19 20 30 37 24 5 13 34 3 21 26 28 33 35 17 2 38 36

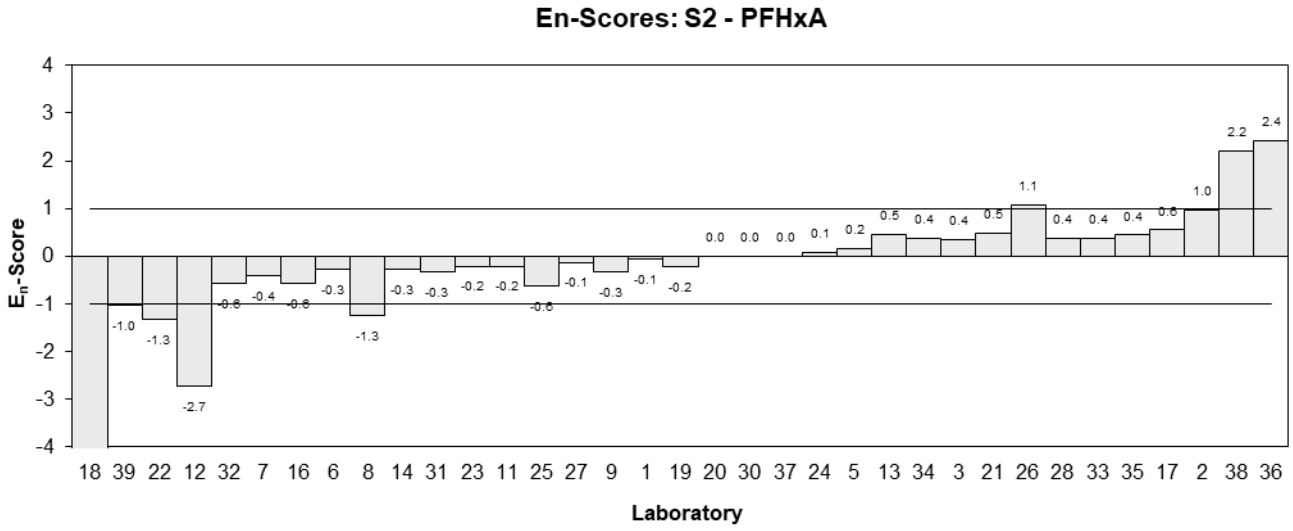

En-Scores: S2 - PFHxA
En-Score
Laboratory
18 39 22 12 32 7 16 6 8 14 31 23 11 25 27 9 1 19 20 30 37 24 5 13 34 3 21 26 28 33 35 17 2 38 36

Figure 31

Table 36

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	PFHpA
Unit	µg/L

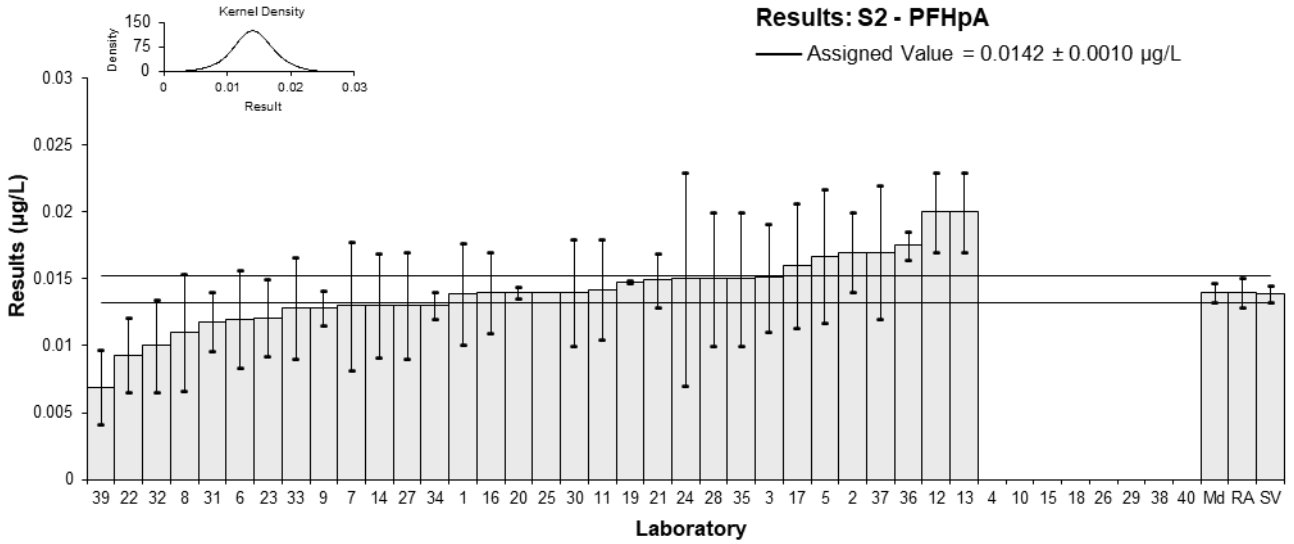
Participant Results

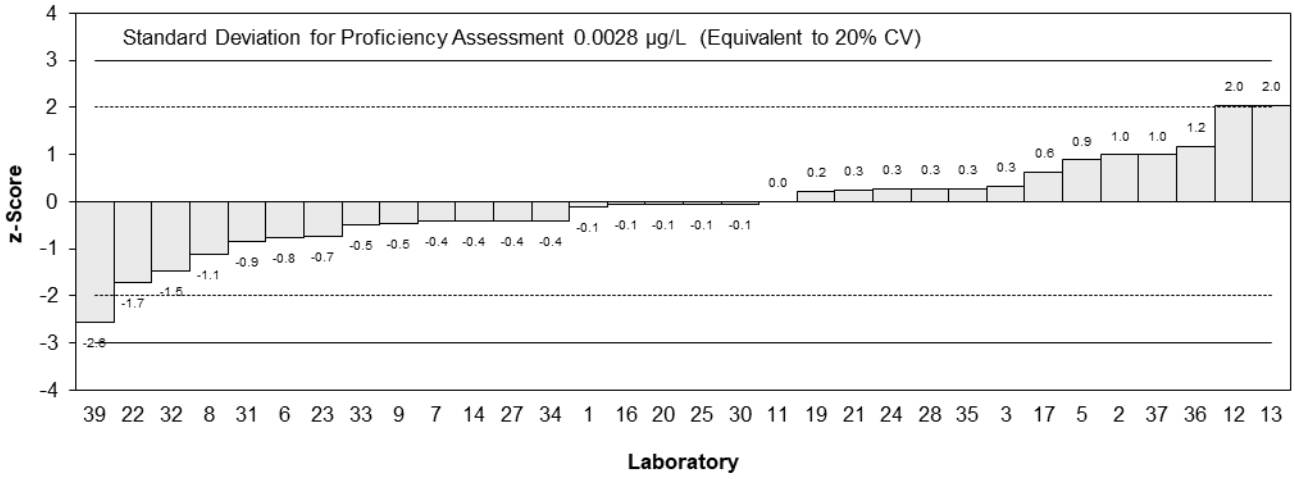
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0139	0.0038	61.3	-0.11	-0.08
2	0.017	0.003	NR	0.99	0.89
3	0.0151	0.004	NR	0.32	0.22
4	NS	NS	NS		
5	0.0167	0.0050	90.1	0.88	0.49
6	0.012	0.00363	100	-0.77	-0.58
7	0.013	0.0048	115	-0.42	-0.24
8	0.011	0.0044	95	-1.13	-0.71
9	0.0128608	0.001286	>75	-0.47	-0.82
10	NS	NS	NS		
11	0.0142	0.00376	NR	0.00	0.00
12	0.02	0.003	64	2.04	1.83
13	0.02	0.003	95	2.04	1.83
14	0.013	0.0039	107	-0.42	-0.30
15	NS	NS	NS		
16	0.014	0.003	97	-0.07	-0.06
17	0.0160	0.0047	102.3	0.63	0.37
18	<0.01	NR	NR		
19	0.0148	0.00007	90	0.21	0.60
20	0.014	0.00042	150	-0.07	-0.18
21	0.0149	0.002	73	0.25	0.31
22	0.0093	0.00279	92	-1.73	-1.65
23	0.0121	0.0029	NR	-0.74	-0.68
24	0.015	0.008	112	0.28	0.10
25	0.014	NR	NR	-0.07	-0.20
26	<0.025	NR	108		
27	0.013	0.0040	NR	-0.42	-0.29
28	0.015	0.005	114	0.28	0.16
29	<0.025	NR	NR		
30	0.014	0.004	83	-0.07	-0.05
31	0.0118	0.0022	56.5	-0.85	-0.99
32	0.01	0.0034143	138.354	-1.48	-1.18
33	0.01282	0.0038	57	-0.49	-0.35
34	0.013	0.001	96	-0.42	-0.85
35	0.015	0.005	91	0.28	0.16
36	0.0175	0.0011	74	1.16	2.22
37	0.017	0.005	112	0.99	0.55
38	NT	NT	NT		
39*	0.00692	0.00277	104	-2.56	-2.47
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0142	0.0010
Spike Value	0.0139	0.0006
Robust Average	0.0140	0.0011
Median	0.0140	0.0007
Mean	0.0140	
N	32	
Max	0.02	
Min	0.00692	
Robust SD	0.0024	
Robust CV	17%	


Kernel Density
Density
150
75
0
0
0.01
0.02
0.03
Result
Results: S2 - PFHpA
Assigned Value = 0.0142 ± 0.0010 µg/L
Results (µg/L)
0.03
0.025
0.02
0.015
0.01
0.005
0
39 22 32 8 31 6 23 33 9 7 14 27 34 1 16 20 25 30 11 19 21 24 28 35 3 17 5 2 37 36 12 13 4 10 15 18 26 29 38 40 Md RA SV
Laboratory


z-Scores: S2 - PFHpA
Standard Deviation for Proficiency Assessment 0.0028 µg/L (Equivalent to 20% CV)
z-Score
4
3
2
1
0
-1
-2
-3
-4
-2.6 -1.7 -1.5 -1.1 -0.9 -0.8 -0.7 -0.5 -0.5 -0.4 -0.4 -0.4 -0.4 -0.1 -0.1 -0.1 -0.1 -0.1 0.0 0.2 0.3 0.3 0.3 0.3 0.3 0.6 0.9 1.0 1.0 1.2 2.0 2.0
39 22 32 8 31 6 23 33 9 7 14 27 34 1 16 20 25 30 11 19 21 24 28 35 3 17 5 2 37 36 12 13
Laboratory

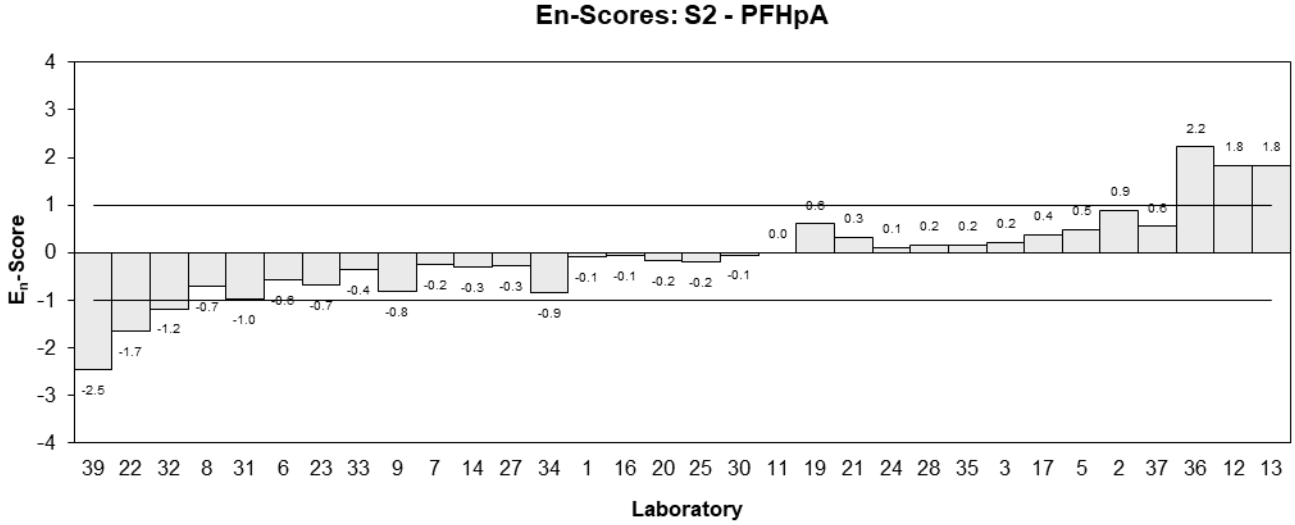

En-Scores: S2 - PFHpA
En-Score
4
3
2
1
0
-1
-2
-3
-4
-2.5 -1.7 -1.2 -0.7 -1.0 -0.6 -0.7 -0.4 -0.8 -0.2 -0.3 -0.3 -0.9 -0.1 -0.1 -0.2 -0.2 -0.1 0.0 0.6 0.3 0.1 0.2 0.2 0.2 0.4 0.5 0.9 0.6 2.2 1.8 1.8
39 22 32 8 31 6 23 33 9 7 14 27 34 1 16 20 25 30 11 19 21 24 28 35 3 17 5 2 37 36 12 13
Laboratory

Figure 32

Table 37

Sample Details

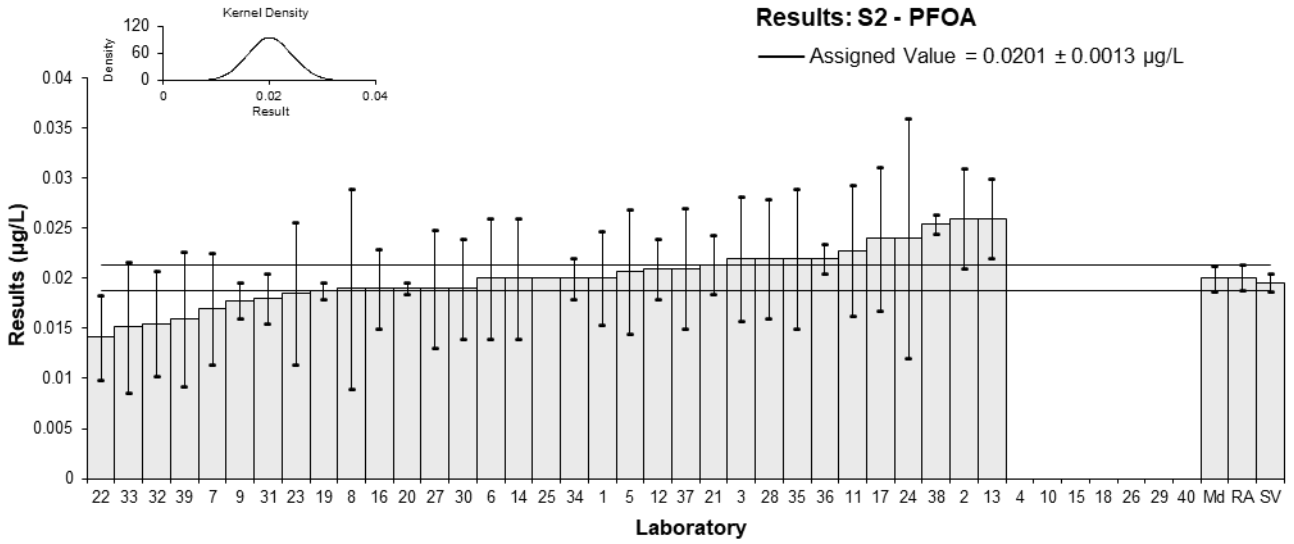
Sample No.	S2
Matrix	River Water
Analyte	PFOA
Unit	µg/L

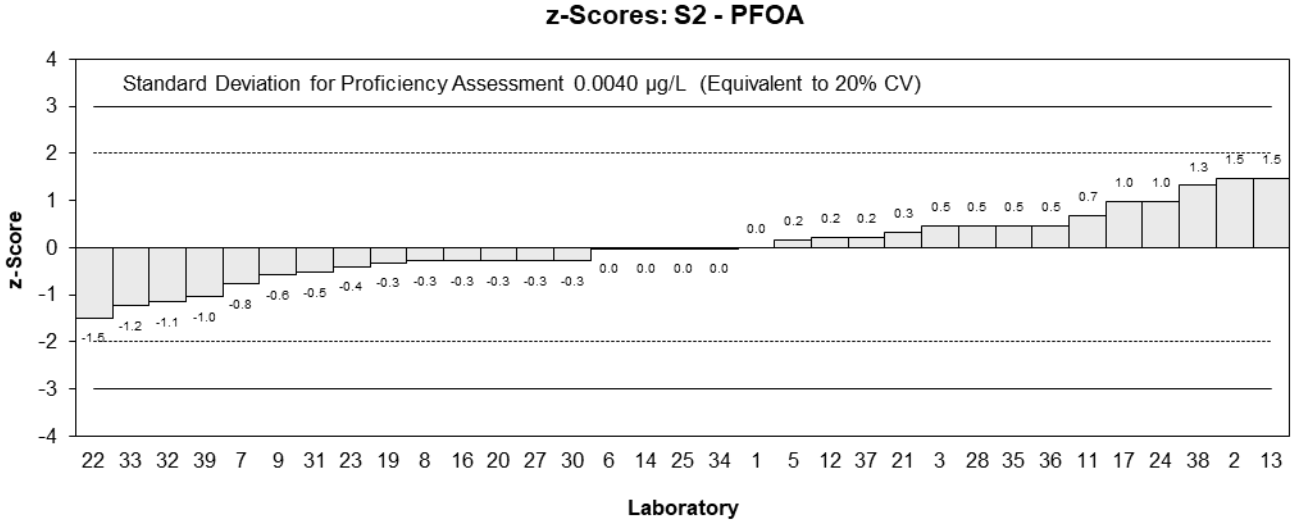
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0201	0.0047	104.54	0.00	0.00
2	0.026	0.005	115	1.47	1.14
3	0.022	0.0062	NR	0.47	0.30
4	NS	NS	NS		
5	0.0207	0.0062	99.4	0.15	0.09
6	0.020	0.00597	110	-0.02	-0.02
7	0.017	0.0056	89	-0.77	-0.54
8	0.019	0.01	95	-0.27	-0.11
9	0.0178038	0.001780	>75	-0.57	-1.04
10	NS	NS	NS		
11	0.0228	0.00656	NR	0.67	0.40
12	0.021	0.003	84	0.22	0.28
13	0.026	0.004	86	1.47	1.40
14	0.02	0.006	114	-0.02	-0.02
15	NS	NS	NS		
16	0.019	0.004	104	-0.27	-0.26
17	0.0240	0.0072	95.2	0.97	0.53
18	<0.05	NR	NR		
19	0.0188	0.0008	101	-0.32	-0.85
20	0.019	0.00057	160	-0.27	-0.77
21	0.0214	0.003	98	0.32	0.40
22	0.0141	0.00423	90	-1.49	-1.36
23	0.0185	0.0071	NR	-0.40	-0.22
24	0.024	0.012	112	0.97	0.32
25	0.020	NR	NR	-0.02	-0.08
26	<0.025	NR	101		
27	0.019	0.0059	NR	-0.27	-0.18
28	0.022	0.006	111	0.47	0.31
29	<0.025	NR	NR		
30	0.019	0.005	107	-0.27	-0.21
31	0.018	0.0025	79.39	-0.52	-0.75
32	0.0155	0.0053073	139.875	-1.14	-0.84
33	0.01513	0.0065	87	-1.24	-0.75
34	0.020	0.002	94	-0.02	-0.04
35	0.022	0.007	85	0.47	0.27
36	0.022	0.0015	85	0.47	0.96
37	0.021	0.006	100	0.22	0.15
38	0.0254	0.00096	107	1.32	3.28
39	0.01597	0.00671	106	-1.03	-0.60
40	NS	NS	NS		

Statistics

Assigned Value	0.0201	0.0013
Spike Value	0.0196	0.0009
Robust Average	0.0201	0.0013
Median	0.0200	0.0013
Mean	0.0202	
N	33	
Max	0.026	
Min	0.0141	
Robust SD	0.0030	
Robust CV	15%	


Kernel Density
Density
120
60
0
0
0.02
0.04
Result
Results: S2 - PFOA
Assigned Value = 0.0201 ± 0.0013 µg/L
Results (µg/L)
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
22 33 32 39 7 9 31 23 19 8 16 20 27 30 6 14 25 34 1 5 12 37 21 3 28 35 36 11 17 24 38 2 13 4 10 15 18 26 29 40 Md RA SV
Laboratory


z-Scores: S2 - PFOA
Standard Deviation for Proficiency Assessment 0.0040 µg/L (Equivalent to 20% CV)
z-Score
4
3
2
1
0
-1
-2
-3
-4
-1.5 -1.2 -1.1 -1.0 -0.8 -0.6 -0.5 -0.4 -0.3 -0.3 -0.3 -0.3 -0.3 -0.3 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.3 0.5 0.5 0.5 0.5 0.7 1.0 1.0 1.3 1.5 1.5
22 33 32 39 7 9 31 23 19 8 16 20 27 30 6 14 25 34 1 5 12 37 21 3 28 35 36 11 17 24 38 2 13
Laboratory

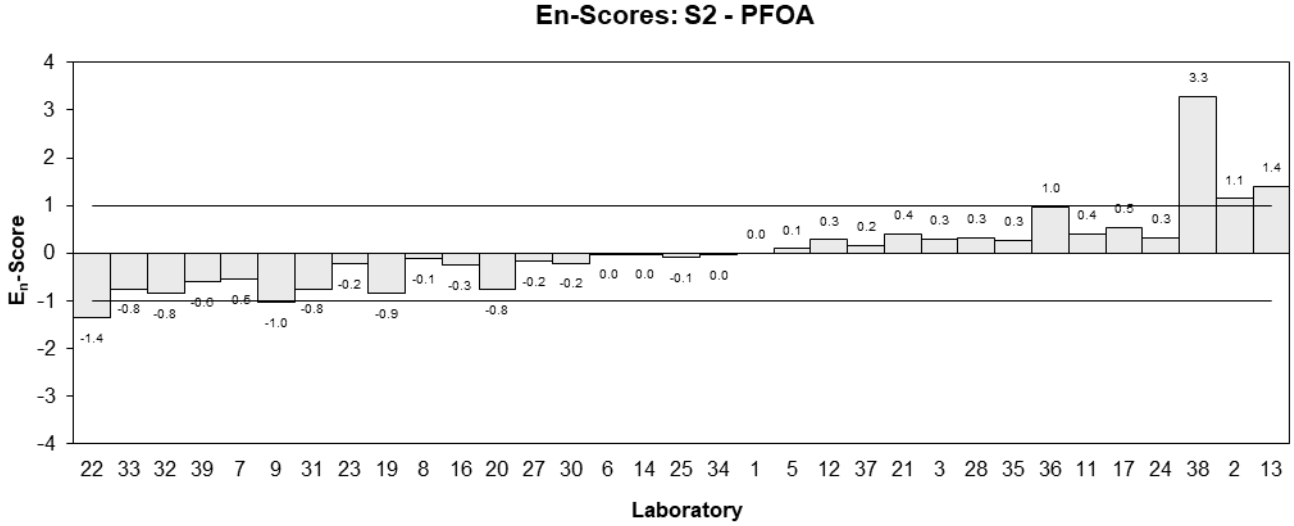

En-Scores: S2 - PFOA
En-Score
4
3
2
1
0
-1
-2
-3
-4
-1.4 -0.8 -0.8 -0.6 -0.5 -1.0 -0.8 -0.2 -0.9 -0.1 -0.3 -0.8 -0.2 -0.2 0.0 0.0 -0.1 0.0 0.0 0.1 0.3 0.2 0.4 0.3 0.3 0.3 1.0 0.4 0.5 0.3 3.3 1.1 1.4
22 33 32 39 7 9 31 23 19 8 16 20 27 30 6 14 25 34 1 5 12 37 21 3 28 35 36 11 17 24 38 2 13
Laboratory

Figure 33

Table 38

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	PFNA
Unit	µg/L

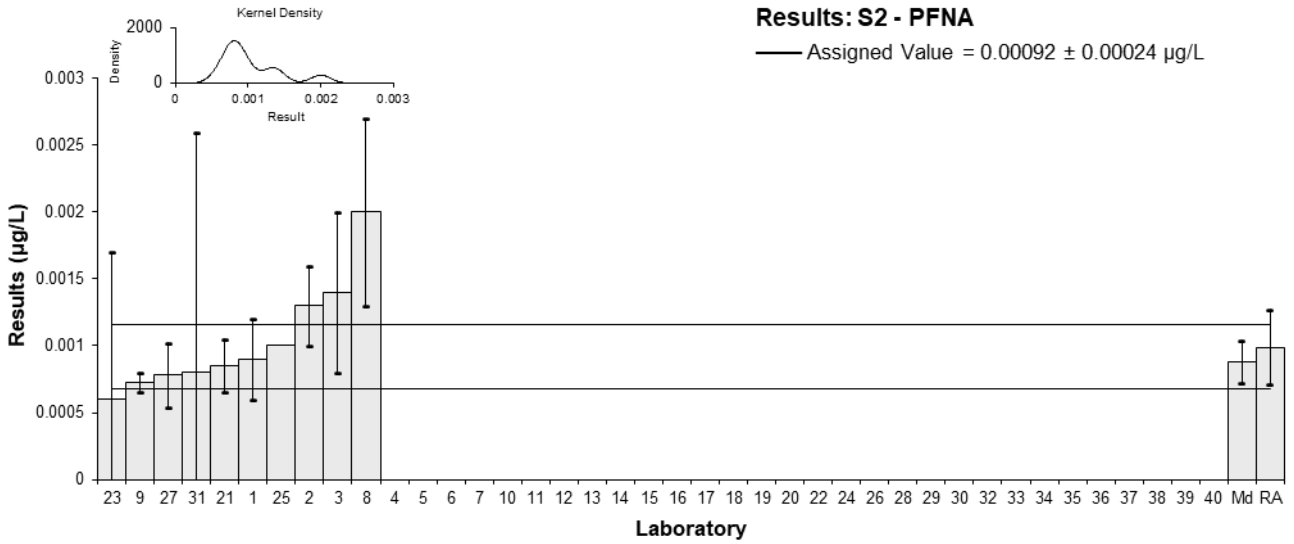
Participant Results

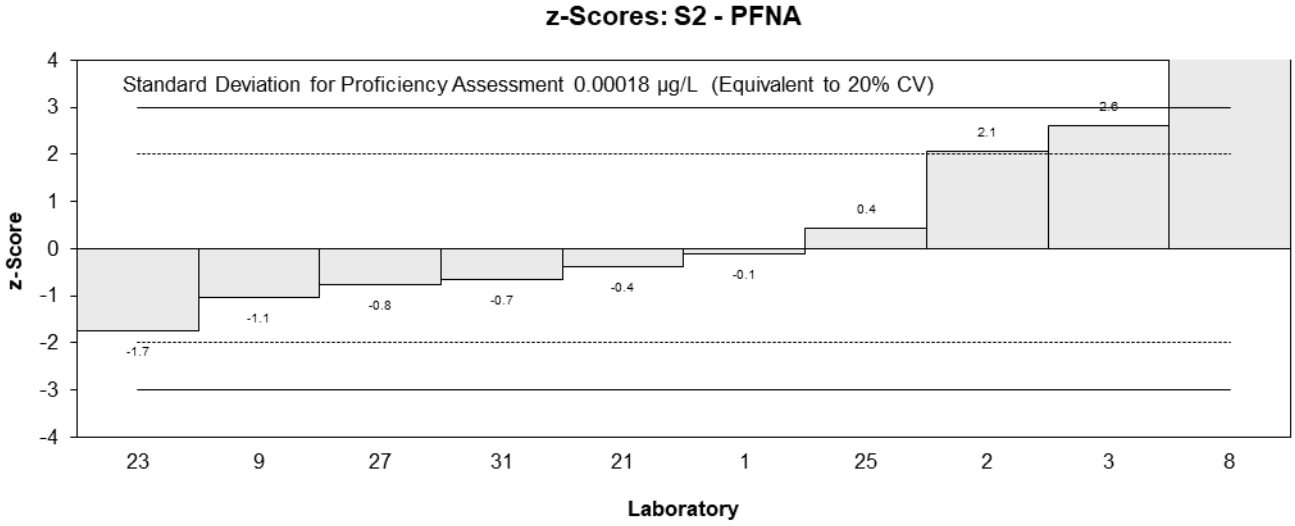
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0009	0.0003	96.94	-0.11	-0.05
2	0.0013	0.0003	NR	2.07	0.99
3	0.0014	0.0006	NR	2.61	0.74
4	NS	NS	NS		
5	<0.002	NR	93.6		
6	<0.001	NR	NR		
7	<0.001	NR	106		
8*	0.002	0.0007	99	5.87	1.46
9	0.0007272	0.000073	>75	-1.05	-0.77
10	NS	NS	NS		
11	<0.002	NR	NR		
12	<0.001	NR	79		
13	<0.01	NR	NR		
14	< 0.002	NR	131		
15	NS	NS	NS		
16	NR	NR	NR		
17	<0.002	NR	89.2		
18	<0.01	NR	NR		
19	<0.002	NR	104		
20	<0.001	NR	140		
21	0.00085	0.0002	149	-0.38	-0.22
22	<0.001	NR	NR		
23	0.0006	0.0011	NR	-1.74	-0.28
24	< 0.009	0.005	115		
25	0.001	NR	NR	0.43	0.33
26	<0.025	NR	95		
27	0.00078	0.00024	NR	-0.76	-0.41
28	<0.001	NR	119		
29	<0.005	NR	NR		
30	<0.002	NR	NR		
31	0.0008	0.0018	93.06	-0.65	-0.07
32	< 0.0007	NR	131.598		
33	< 0.001	NR	57		
34	<0.005	0.005	101		
35	<0.001	NR	89		
36	< 0.0010	0.00031	80		
37	< 0.001	NR	112		
38	NT	NT	NT		
39	<0.005	30	103		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.00092	0.00024
Spike Value	Not Spiked	
Robust Average	0.00099	0.00028
Median	0.00088	0.00016
Mean	0.00104	
N	10	
Max	0.002	
Min	0.0006	
Robust SD	0.00035	
Robust CV	35%	


Kernel Density
Density
Result
Results: S2 - PFNA
Assigned Value = 0.00092 ± 0.00024 µg/L
Results (µg/L)
Laboratory
23 9 27 31 21 1 25 2 3 8 4 5 6 7 10 11 12 13 14 15 16 17 18 19 20 22 24 26 28 29 30 32 33 34 35 36 37 38 39 40 Md RA


z-Scores: S2 - PFNA
Standard Deviation for Proficiency Assessment 0.00018 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
23 9 27 31 21 1 25 2 3 8
-1.7
-1.1
-0.8
-0.7
-0.4
-0.1
0.4
2.1
2.6

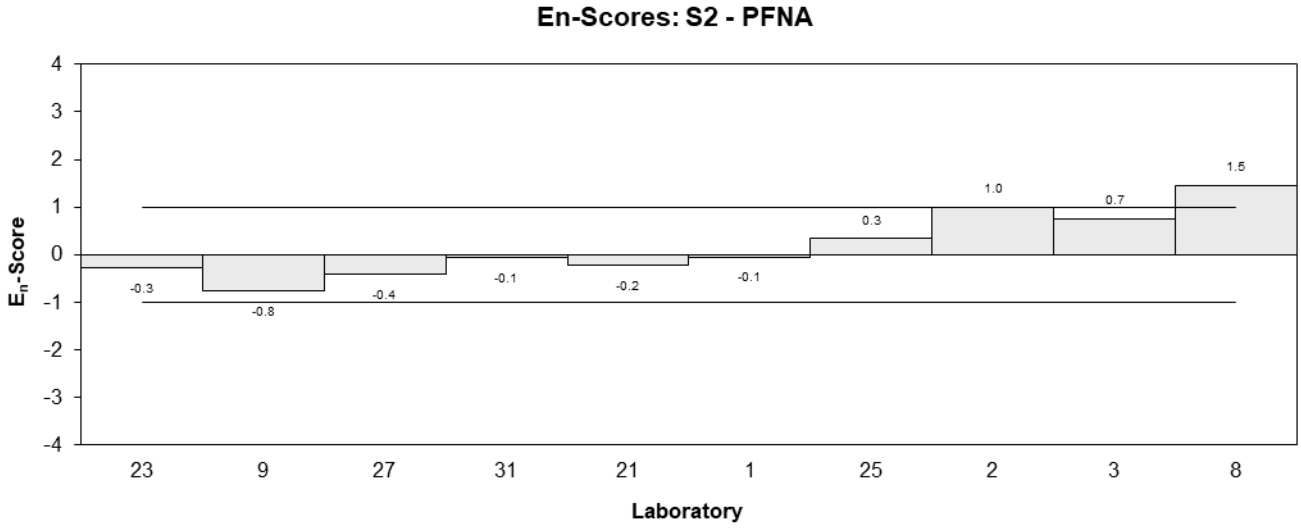

En-Scores: S2 - PFNA
En-Score
Laboratory
23 9 27 31 21 1 25 2 3 8
-0.3
-0.8
-0.4
-0.1
-0.2
-0.1
0.3
1.0
0.7
1.5

Figure 34

Table 39

Sample Details

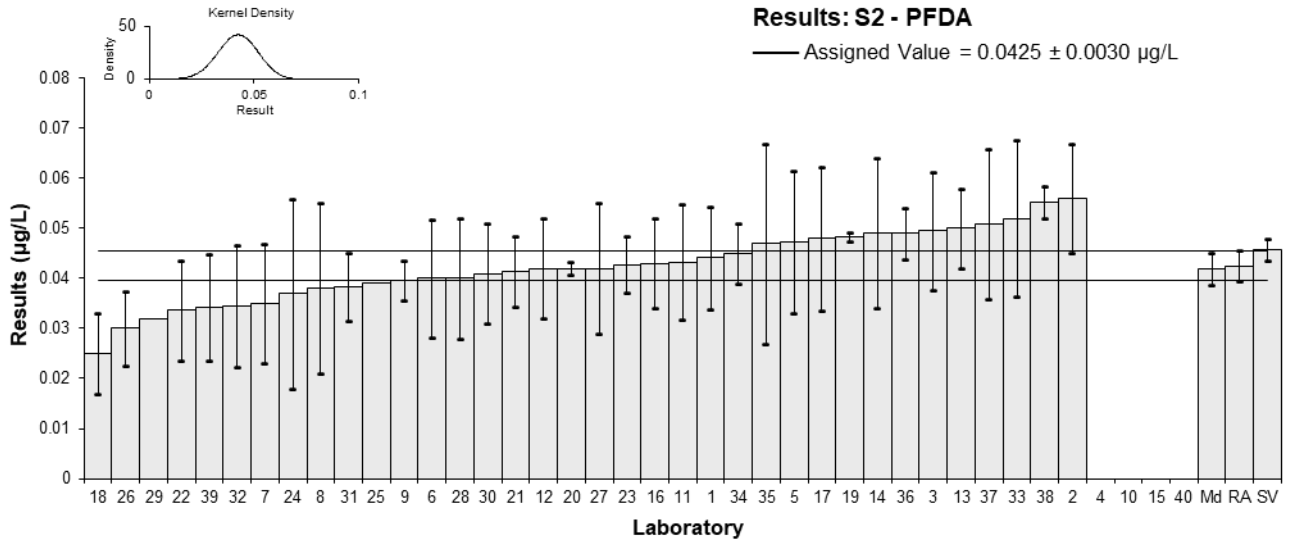
Sample No.	S2
Matrix	River Water
Analyte	PFDA
Unit	µg/L

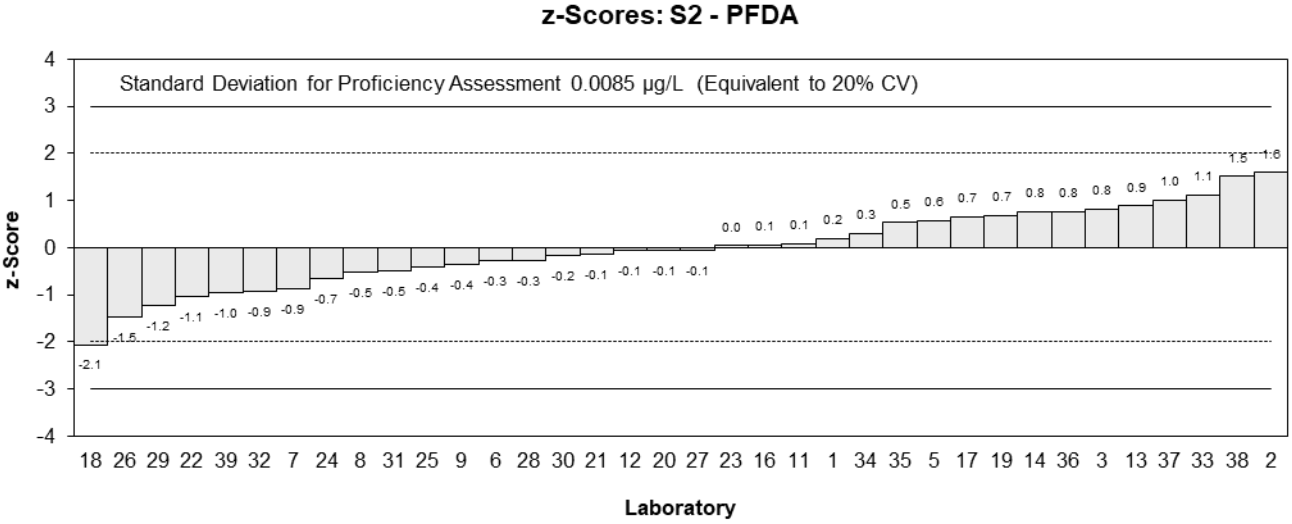
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0441	0.0103	91.49	0.19	0.15
2	0.056	0.011	NR	1.59	1.18
3	0.0495	0.0117	NR	0.82	0.58
4	NS	NS	NS		
5	0.0473	0.0142	95.8	0.56	0.33
6	0.040	0.01189	100	-0.29	-0.20
7	0.035	0.012	92	-0.88	-0.61
8	0.038	0.017	81	-0.53	-0.26
9	0.0395252	0.003953	>75	-0.35	-0.60
10	NS	NS	NS		
11	0.0433	0.01149	NR	0.09	0.07
12	0.042	0.01	83	-0.06	-0.05
13	0.05	0.008	84	0.88	0.88
14	0.049	0.015	103	0.76	0.42
15	NS	NS	NS		
16	0.043	0.009	99	0.06	0.05
17	0.048	0.0143	89.7	0.65	0.38
18	0.025	0.008	131	-2.06	-2.05
19	0.0483	0.0008	100	0.68	1.87
20	0.042	0.00126	130	-0.06	-0.15
21	0.0414	0.007	110	-0.13	-0.14
22	0.0336	0.01008	80	-1.05	-0.85
23	0.0428	0.0056	NR	0.04	0.05
24	0.037	0.019	106	-0.65	-0.29
25	0.039	NR	NR	-0.41	-1.17
26	0.030	0.0074	110	-1.47	-1.57
27	0.042	0.013	NR	-0.06	-0.04
28	0.04	0.012	121	-0.29	-0.20
29	0.032	NR	NR	-1.24	-3.50
30	0.041	0.010	95	-0.18	-0.14
31	0.0383	0.0067	100.28	-0.49	-0.57
32	0.0345	0.0122505	134.796	-0.94	-0.63
33	0.05203	0.0156	59	1.12	0.60
34	0.045	0.006	84	0.29	0.37
35	0.047	0.02	91	0.53	0.22
36	0.049	0.0051	85	0.76	1.10
37	0.051	0.015	113	1.00	0.56
38	0.0553	0.00325	87	1.51	2.89
39	0.03429	0.01063	92	-0.97	-0.74
40	NS	NS	NS		

Statistics

Assigned Value	0.0425	0.0030
Spike Value	0.0457	0.0022
Robust Average	0.0425	0.0030
Median	0.0420	0.0032
Mean	0.0424	
N	36	
Max	0.056	
Min	0.025	
Robust SD	0.0072	
Robust CV	17%	


Kernel Density
Density
Result
Results: S2 - PFDA
Assigned Value = 0.0425 ± 0.0030 µg/L
Results (µg/L)
Laboratory


z-Scores: S2 - PFDA
Standard Deviation for Proficiency Assessment 0.0085 µg/L (Equivalent to 20% CV)
z-Score
Laboratory

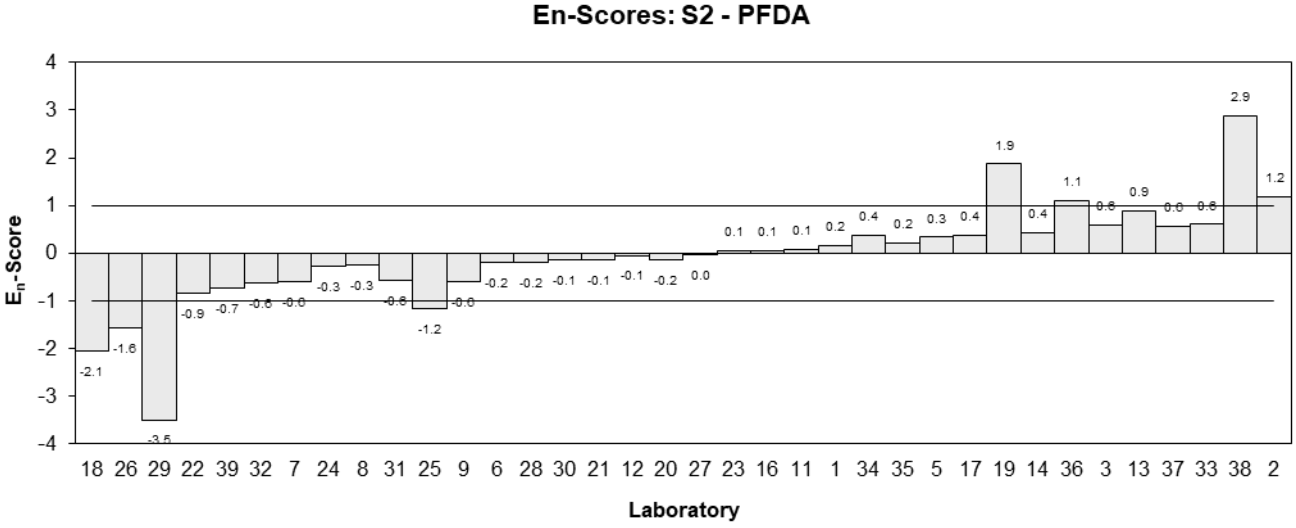

En-Scores: S2 - PFDA
En-Score
Laboratory

Figure 35

Table 40

Sample Details

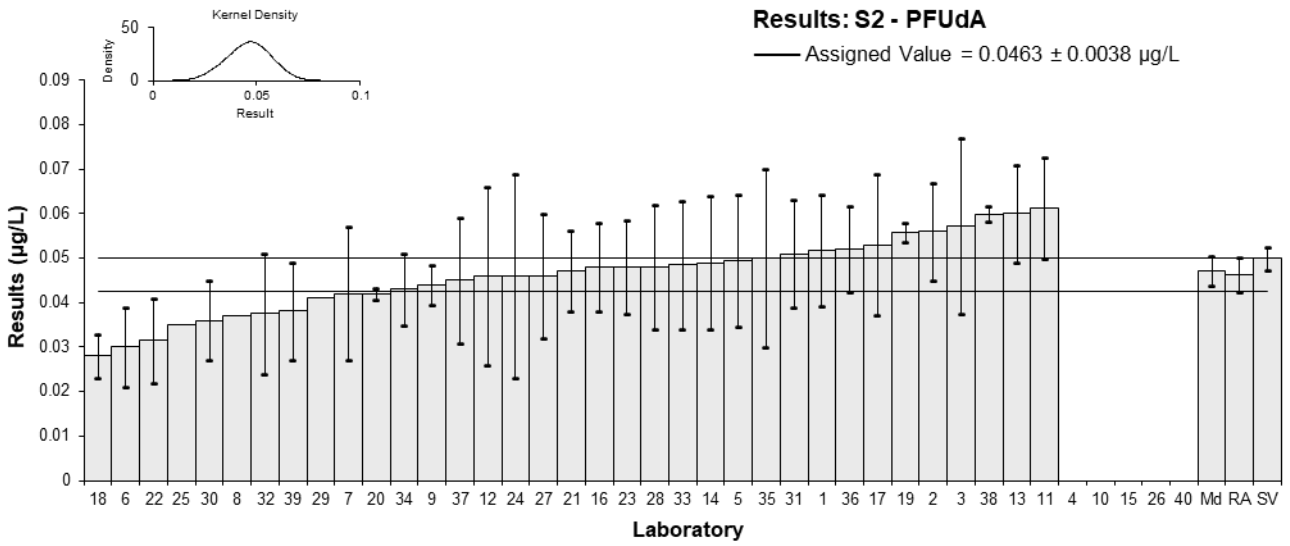
Sample No.	S2
Matrix	River Water
Analyte	PFUdA
Unit	µg/L

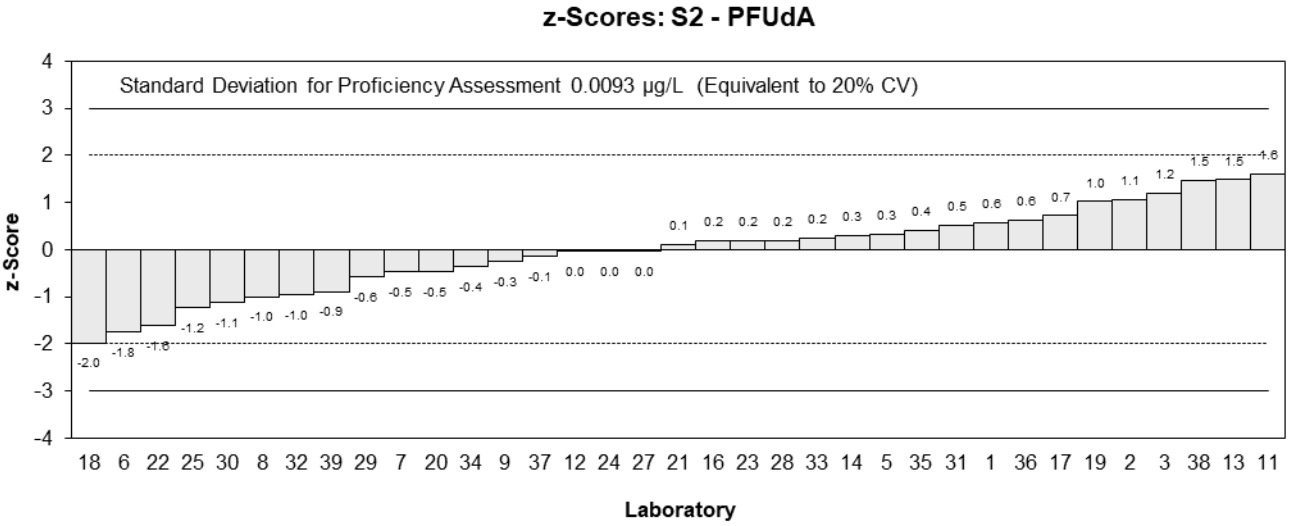
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0517	0.0125	93.92	0.58	0.41
2	0.056	0.011	NR	1.05	0.83
3	0.0573	0.0197	NR	1.19	0.55
4	NS	NS	NS		
5	0.0494	0.0148	101.3	0.33	0.20
6	0.030	0.00891	100	-1.76	-1.68
7	0.042	0.015	93	-0.46	-0.28
8	0.037	NR	112	-1.00	-2.45
9	0.0439617	0.004396	>75	-0.25	-0.40
10	NS	NS	NS		
11	0.0612	0.01141	NR	1.61	1.24
12	0.046	0.02	94	-0.03	-0.01
13	0.06	0.011	82	1.48	1.18
14	0.049	0.015	105	0.29	0.17
15	NS	NS	NS		
16	0.048	0.010	92	0.18	0.16
17	0.053	0.0158	96.9	0.72	0.41
18	0.028	0.005	114	-1.98	-2.91
19	0.0557	0.0022	91	1.02	2.14
20	0.042	0.00126	120	-0.46	-1.07
21	0.0472	0.009	118	0.10	0.09
22	0.0315	0.00945	100	-1.60	-1.45
23	0.048	0.0105	NR	0.18	0.15
24	0.046	0.023	108	-0.03	-0.01
25	0.035	NR	NR	-1.22	-2.97
26	NR	NR	NR		
27	0.046	0.014	NR	-0.03	-0.02
28	0.048	0.014	120	0.18	0.12
29	0.041	NR	NR	-0.57	-1.39
30	0.036	0.009	109	-1.11	-1.05
31	0.051	0.0121	105.09	0.51	0.37
32	0.0375	0.0134351	121.052	-0.95	-0.63
33	0.04848	0.0145	76	0.24	0.15
34	0.043	0.008	92	-0.36	-0.37
35	0.05	0.02	102	0.40	0.18
36	0.052	0.0097	81	0.62	0.55
37	0.045	0.014	110	-0.14	-0.09
38	0.0599	0.00173	90	1.47	3.26
39	0.03808	0.01104	79	-0.89	-0.70
40	NS	NS	NS		

Statistics

Assigned Value	0.0463	0.0038
Spike Value	0.0499	0.0025
Robust Average	0.0463	0.0038
Median	0.0472	0.0033
Mean	0.0461	
N	35	
Max	0.0612	
Min	0.028	
Robust SD	0.0089	
Robust CV	19%	


Kernel Density
Density
Result
Results: S2 - PFUdA
Assigned Value = 0.0463 ± 0.0038 µg/L
Results (µg/L)
Laboratory
18 6 22 25 30 8 32 39 29 7 20 34 9 37 12 24 27 21 16 23 28 33 14 5 35 31 1 36 17 19 2 3 38 13 11 4 10 15 26 40 Md RA SV


z-Scores: S2 - PFUdA
Standard Deviation for Proficiency Assessment 0.0093 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
18 6 22 25 30 8 32 39 29 7 20 34 9 37 12 24 27 21 16 23 28 33 14 5 35 31 1 36 17 19 2 3 38 13 11

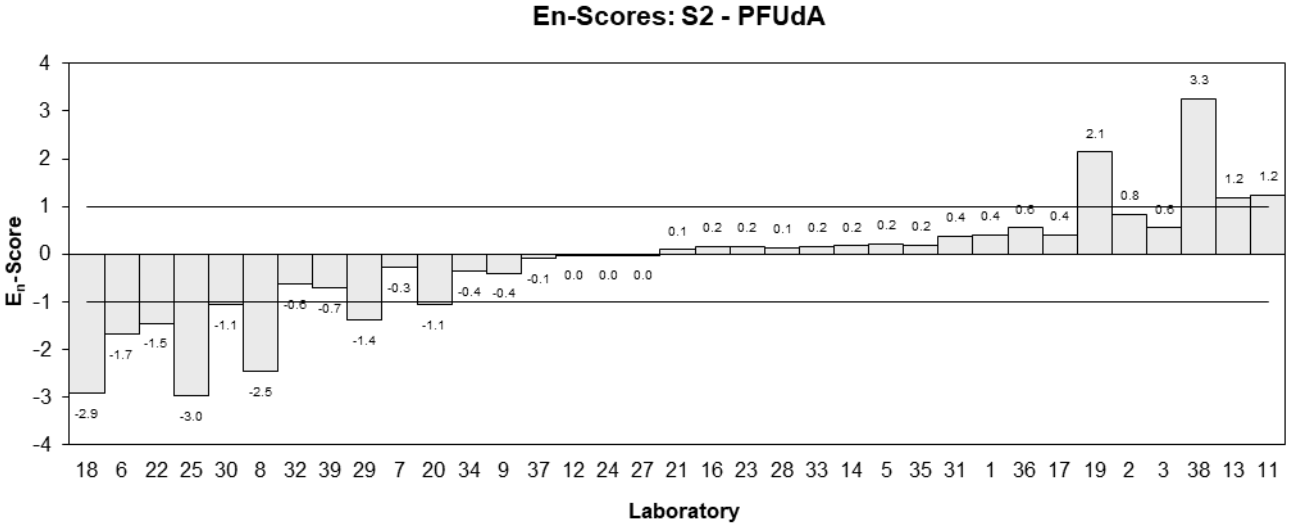

En-Scores: S2 - PFUdA
En-Score
Laboratory
18 6 22 25 30 8 32 39 29 7 20 34 9 37 12 24 27 21 16 23 28 33 14 5 35 31 1 36 17 19 2 3 38 13 11

Figure 36

Table 41

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	PFDoA
Unit	µg/L

Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0012	0.0004	87.97	1.98	0.78
2*	0.0019	0.0005	NR	6.05	1.97
3*	0.0019	0.0006	NR	6.05	1.67
4	NS	NS	NS		
5	<0.005	NR	102.2		
6	<0.001	NR	NR		
7	<0.001	NR	79		
8	<0.001	NR	103		
9	0.0006966	0.000070	>75	-0.95	-0.89
10	NS	NS	NS		
11	<0.002	NR	NR		
12	<0.005	NR	73		
13	<0.01	NR	NR		
14	< 0.002	NR	93		
15	NS	NS	NS		
16	NR	NR	NR		
17	<0.005	NR	104.9		
18	<0.01	NR	NR		
19	<0.002	NR	67		
20	<0.001	NR	120		
21	0.00079	0.0002	109	-0.41	-0.27
22	<0.001	NR	NR		
23	0.0007	0.0020	NR	-0.93	-0.08
24	< 0.005	0.003	115		
25	0.001	NR	NR	0.81	0.82
26	<0.10	NR	102		
27	0.00083	0.00026	NR	-0.17	-0.10
28	<0.001	NR	121		
29	<0.025	NR	NR		
30	<0.002	NR	NR		
31	0.0009	0.0024	105.09	0.23	0.02
32	< 0.0008	NR	114.513		
33	< 0.001	NR	74		
34	<0.005	0.005	92		
35	<0.005	NR	87		
36	< 0.0010	0.00033	78		
37	< 0.001	NR	110		
38	NT	NT	NT		
39	<0.015	33	76		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.00086	0.00017
Spike Value	Not Spiked	
Robust Average	0.00098	0.00025
Median	0.00090	0.00025
Mean	0.00110	
N	9	
Max	0.0019	
Min	0.0006966	
Robust SD	0.00029	
Robust CV	30%	

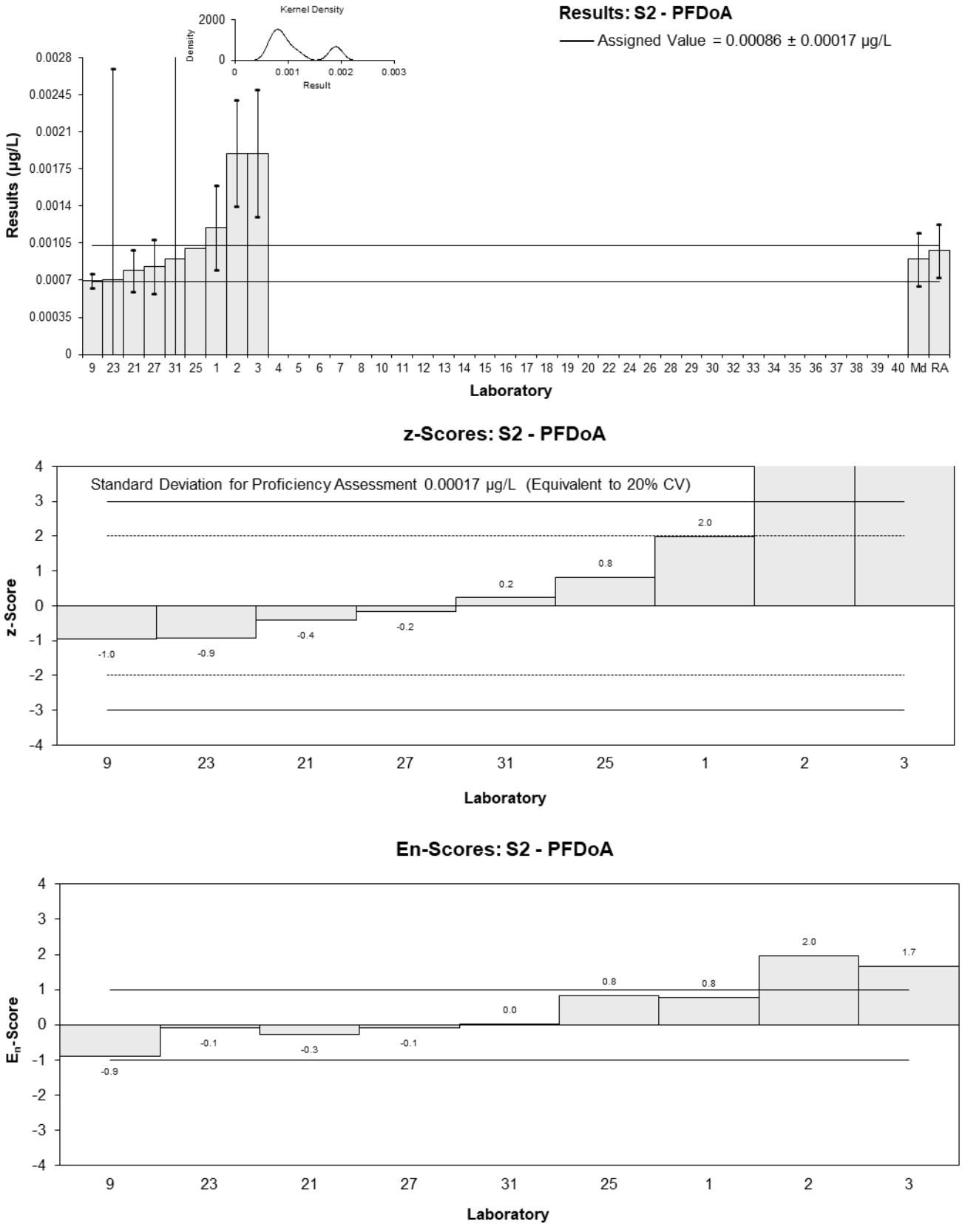

Kernel Density
Density
Result
Results: S2 - PFDoA
Assigned Value = 0.00086 ± 0.00017 µg/L
Results (µg/L)
Laboratory
z-Scores: S2 - PFDoA
Standard Deviation for Proficiency Assessment 0.00017 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
En-Scores: S2 - PFDoA
En-Score
Laboratory

Figure 37

Table 42

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	PFTrDA
Unit	µg/L

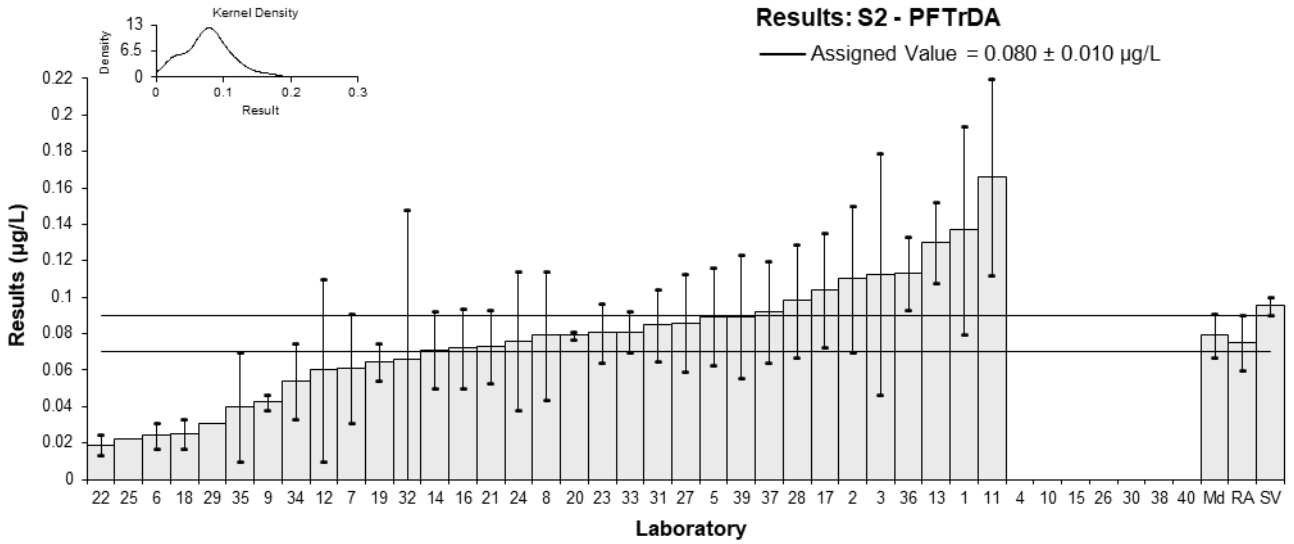
Participant Results

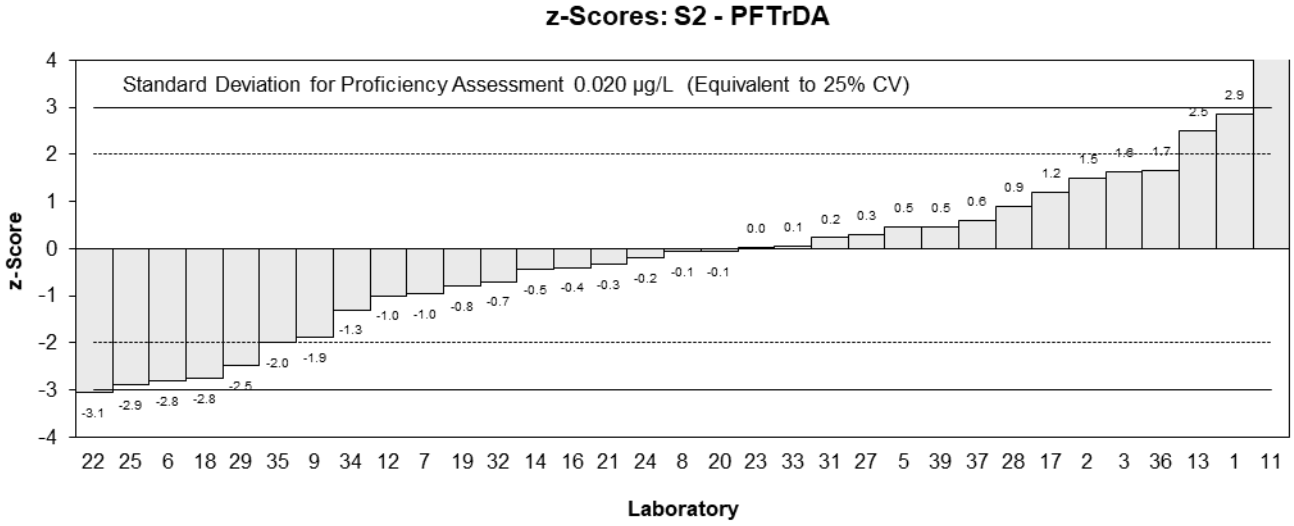
Lab. Code	Result	Uncertainty	Rec	z	E_n
1*	0.137	0.057	67.12	2.85	0.98
2	0.11	0.04	NR	1.50	0.73
3	0.1127	0.0664	NR	1.63	0.49
4	NS	NS	NS		
5	0.0893	0.0268	101.3	0.47	0.33
6*	0.024	0.00725	100	-2.80	-4.53
7	0.061	0.03	58	-0.95	-0.60
8	0.079	0.035	NR	-0.05	-0.03
9	0.0424988	0.004250	>75	-1.88	-3.45
10	NS	NS	NS		
11*	0.166	0.054	NR	4.30	1.57
12	0.06	0.05	90	-1.00	-0.39
13*	0.13	0.022	NR	2.50	2.07
14	0.071	0.021	94	-0.45	-0.39
15	NS	NS	NS		
16	0.072	0.022	NR	-0.40	-0.33
17	0.104	0.0312	85.3	1.20	0.73
18*	0.025	0.008	67	-2.75	-4.29
19	0.0643	0.0103	67	-0.79	-1.09
20	0.079	0.00237	76	-0.05	-0.10
21	0.0732	0.02	109	-0.34	-0.30
22*	0.0189	0.00567	85	-3.06	-5.32
23	0.0804	0.0162	NR	0.02	0.02
24	0.076	0.038	NR	-0.20	-0.10
25*	0.022	NR	NR	-2.90	-5.80
26	<0.10	NR	102		
27	0.086	0.027	NR	0.30	0.21
28	0.098	0.031	117	0.90	0.55
29*	0.0305	NR	NR	-2.48	-4.95
30	<0.2	NR	NR		
31	0.0847	0.0198	134.62	0.23	0.21
32	0.066	0.0822277	114.513	-0.70	-0.17
33	0.081	0.0113	55	0.05	0.07
34	0.054	0.021	NR	-1.30	-1.12
35	0.04	0.03	77	-2.00	-1.26
36	0.113	0.02	77	1.65	1.48
37	0.092	0.028	94	0.60	0.40
38	NT	NT	NT		
39	0.08931	0.03394	76	0.47	0.26
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.080	0.010
Spike Value	0.0953	0.0048
Robust Average	0.075	0.015
Median	0.079	0.012
Mean	0.077	
N	33	
Max	0.166	
Min	0.0189	
Robust SD	0.035	
Robust CV	47%	


Kernel Density
Density
Result
Results: S2 - PFTrDA
Assigned Value = 0.080 ± 0.010 µg/L
Results (µg/L)
Laboratory
22 25 6 18 29 35 9 34 12 7 19 32 14 16 21 24 8 20 23 33 31 27 5 39 37 28 17 2 3 36 13 1 11 4 10 15 26 30 38 40 Md RA SV


z-Scores: S2 - PFTrDA
Standard Deviation for Proficiency Assessment 0.020 µg/L (Equivalent to 25% CV)
z-Score
Laboratory
22 25 6 18 29 35 9 34 12 7 19 32 14 16 21 24 8 20 23 33 31 27 5 39 37 28 17 2 3 36 13 1 11

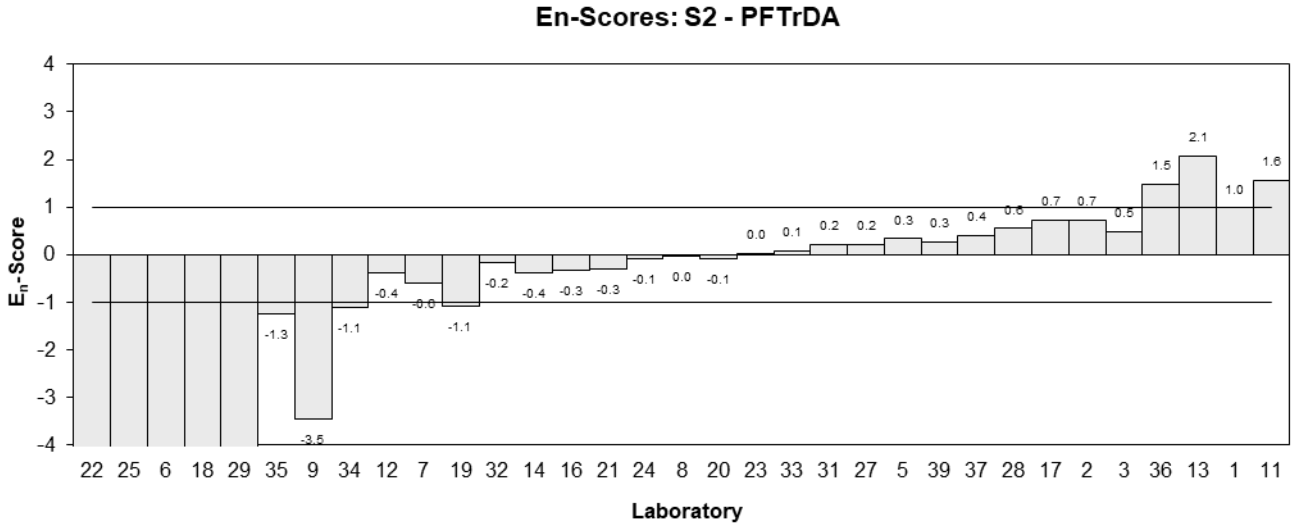

En-Scores: S2 - PFTrDA
En-Score
Laboratory
22 25 6 18 29 35 9 34 12 7 19 32 14 16 21 24 8 20 23 33 31 27 5 39 37 28 17 2 3 36 13 1 11

Figure 38

Table 43

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	PFTeDA
Unit	µg/L

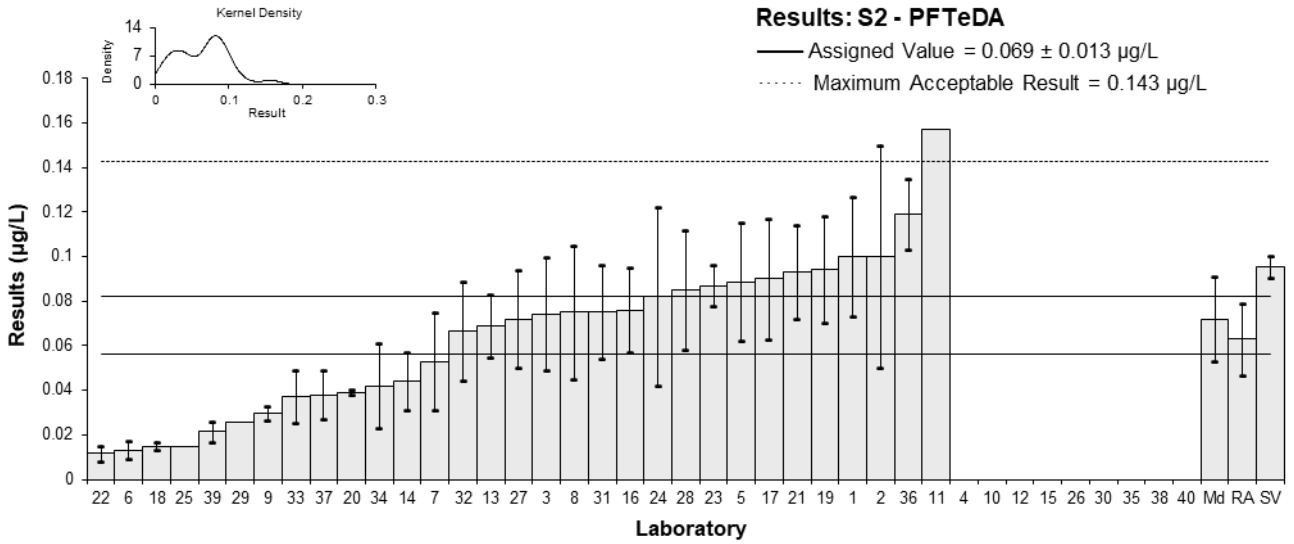
Participant Results

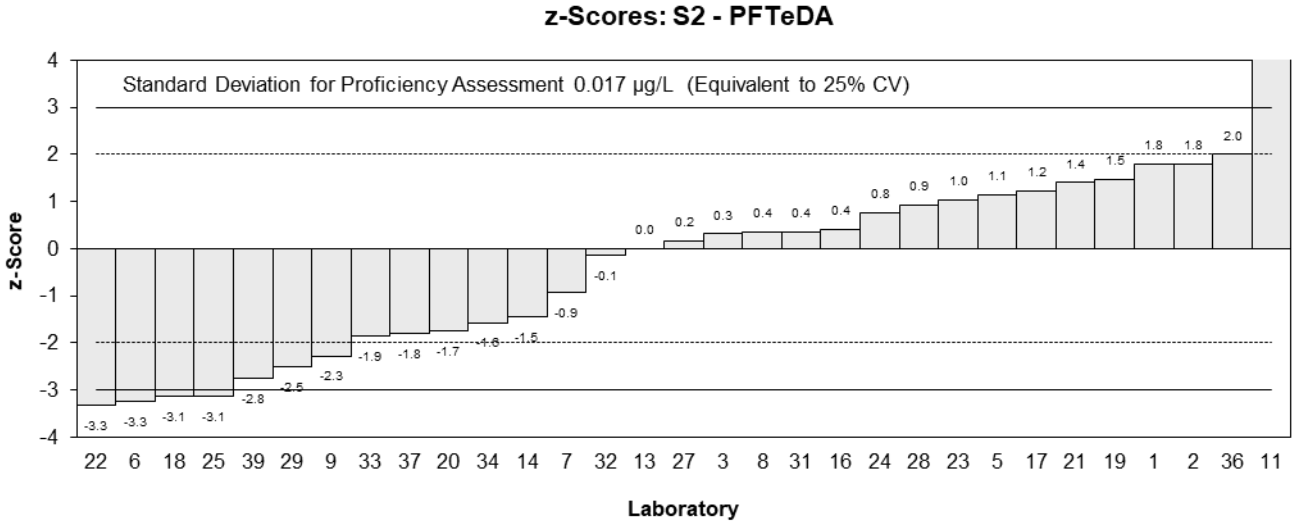
Lab. Code	Result	Uncertainty	Rec	z	E_n
1*	0.100	0.027	96.69	1.80	1.03
2*	0.1	0.05	NR	1.80	0.60
3	0.0744	0.0253	NR	0.31	0.19
4	NS	NS	NS		
5	0.0887	0.0266	101.3	1.14	0.67
6*	0.013	0.00404	105	-3.25	-4.11
7	0.053	0.022	58	-0.93	-0.63
8	0.075	0.03	100	0.35	0.18
9*	0.0296388	0.002964	>75	-2.28	-2.95
10	NS	NS	NS		
11*	0.157	NR	NR	5.10	6.77
12	<0.05	NR	90		
13	0.069	0.014	44	0.00	0.00
14	0.044	0.013	94	-1.45	-1.36
15	NS	NS	NS		
16	0.076	0.019	102	0.41	0.30
17	0.090	0.0269	85.3	1.22	0.70
18*	0.015	0.002	67	-3.13	-4.11
19	0.0942	0.0238	34	1.46	0.93
20	0.039	0.00117	76	-1.74	-2.30
21	0.0932	0.021	69	1.40	0.98
22*	0.0117	0.00351	85	-3.32	-4.26
23	0.087	0.0091	NR	1.04	1.13
24	0.082	0.04	96	0.75	0.31
25*	0.015	NR	NR	-3.13	-4.15
26	<0.10	NR	102		
27	0.072	0.022	NR	0.17	0.12
28	0.085	0.027	NR	0.93	0.53
29*	0.0256	NR	NR	-2.52	-3.34
30	<0.2	NR	NR		
31	0.0752	0.021	134.62	0.36	0.25
32	0.0665	0.0220487	101.086	-0.14	-0.10
33	0.0371	0.0120	55	-1.85	-1.80
34	0.042	0.019	92	-1.57	-1.17
35	<0.05	NR	77		
36*	0.119	0.016	74	2.00▼	
37	0.038	0.011	118	-1.80	-1.82
38	NT	NT	NT		
39*	0.02147	0.00472	76	-2.76	-3.44
40	NS	NS	NS		

* Outlier, see Section 4.2; ▼ Adjusted Score, see Section 6.3

Statistics

Assigned Value	0.069	0.013
Spike Value	0.0953	0.0048
Robust Average	0.063	0.016
Max Acceptable Result	0.143	
Median	0.072	0.019
Mean	0.064	
N	31	
Max	0.157	
Min	0.0117	
Robust SD	0.036	
Robust CV	58%	


Kernel Density
Density
Result
Results: S2 - PFTeDA
Assigned Value = 0.069 ± 0.013 µg/L
Maximum Acceptable Result = 0.143 µg/L
Results (µg/L)
Laboratory


z-Scores: S2 - PFTeDA
Standard Deviation for Proficiency Assessment 0.017 µg/L (Equivalent to 25% CV)
z-Score
Laboratory

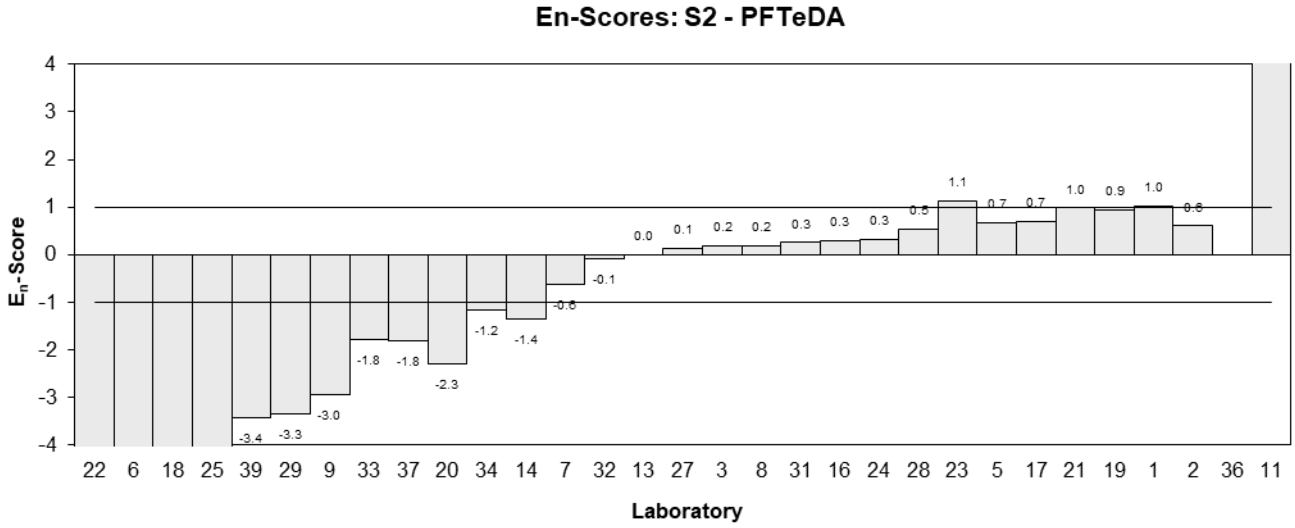

En-Scores: S2 - PFTeDA
En-Score
Laboratory

Figure 39

Table 44

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	PFODA
Unit	µg/L

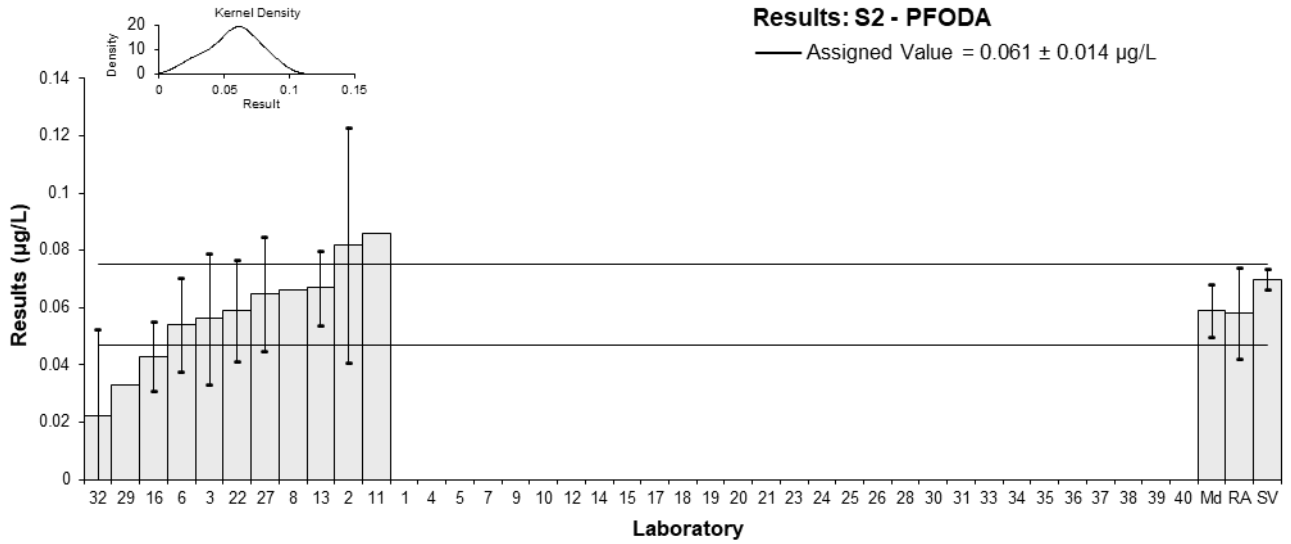
Participant Results

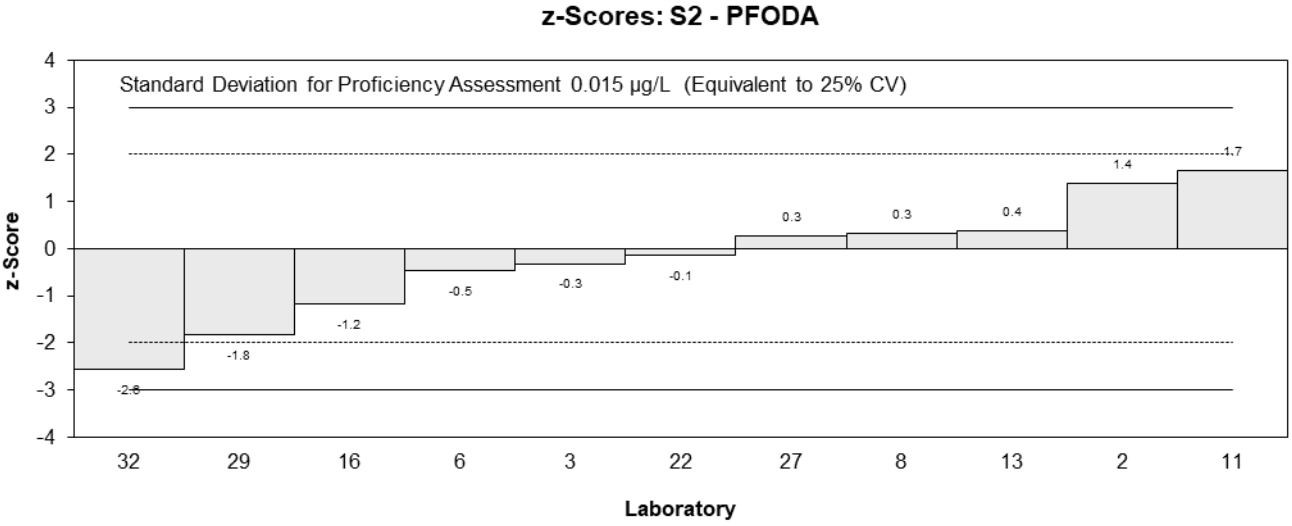
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	0.082	0.041	NR	1.38	0.48
3	0.0561	0.0227	NR	-0.32	-0.18
4	NS	NS	NS		
5	NT	NT	NT		
6	0.054	0.01625	90	-0.46	-0.33
7	NT	NT	NT		
8	0.066	NR	NR	0.33	0.36
9	NT	NT	NT		
10	NS	NS	NS		
11	0.0861	NR	NR	1.65	1.79
12	NT	NT	NT		
13	0.067	0.013	NR	0.39	0.31
14	NT	NT	NT		
15	NS	NS	NS		
16	0.043	0.012	NR	-1.18	-0.98
17	NT	NT	NT		
18	NT	NT	NT		
19	NT	NT	NT		
20	NT	NT	NT		
21	NT	NR	NT		
22	0.0589	0.01767	90	-0.14	-0.09
23	NT	NT	NT		
24	NT	NT	NT		
25	NT	NT	NT		
26	NT	NT	NT		
27	0.065	0.020	NR	0.26	0.16
28	NT	NT	NT		
29	0.0329	NR	NR	-1.84	-2.01
30	NT	NT	NT		
31	NT	NT	NT		
32*	0.022	0.0302757	41.1454	-2.56	-1.17
33	NT	NT	NT		
34	NT	NT	NT		
35	NT	NT	NT		
36	NT	NT	NT		
37	NT	NT	NT		
38	NT	NT	NT		
39	<0.015	40	NR		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.061	0.014
Spike Value	0.0699	0.0035
Robust Average	0.058	0.016
Median	0.0589	0.0091
Mean	0.058	
N	11	
Max	0.0861	
Min	0.022	
Robust SD	0.021	
Robust CV	36%	


Kernel Density
Density
Result
Results: S2 - PFODA
Assigned Value = 0.061 ± 0.014 µg/L
Results (µg/L)
Laboratory
32 29 16 6 3 22 27 8 13 2 11 1 4 5 7 9 10 12 14 15 17 18 19 20 21 23 24 25 26 28 30 31 33 34 35 36 37 38 39 40 Md RA SV


z-Scores: S2 - PFODA
Standard Deviation for Proficiency Assessment 0.015 µg/L (Equivalent to 25% CV)
z-Score
Laboratory
32 29 16 6 3 22 27 8 13 2 11
-2.6
-1.8
-1.2
-0.5
-0.3
-0.1
0.3
0.3
0.4
1.4
1.7

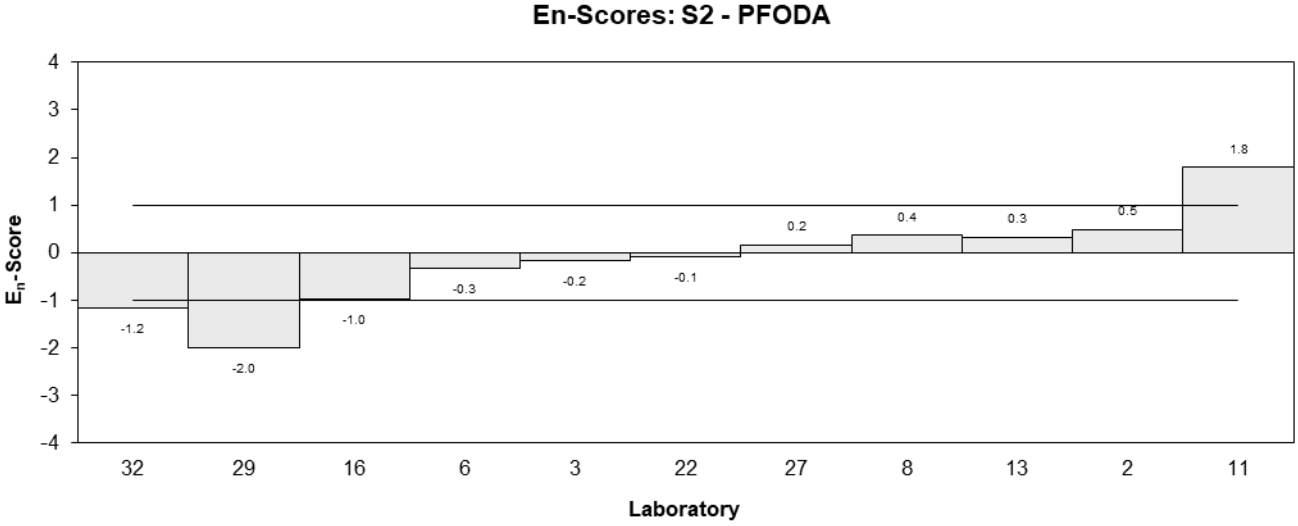

En-Scores: S2 - PFODA
En-Score
Laboratory
32 29 16 6 3 22 27 8 13 2 11
-1.2
-2.0
-1.0
-0.3
-0.2
-0.1
0.2
0.4
0.3
0.5
1.8

Figure 40

Table 45

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	PFBS
Unit	µg/L

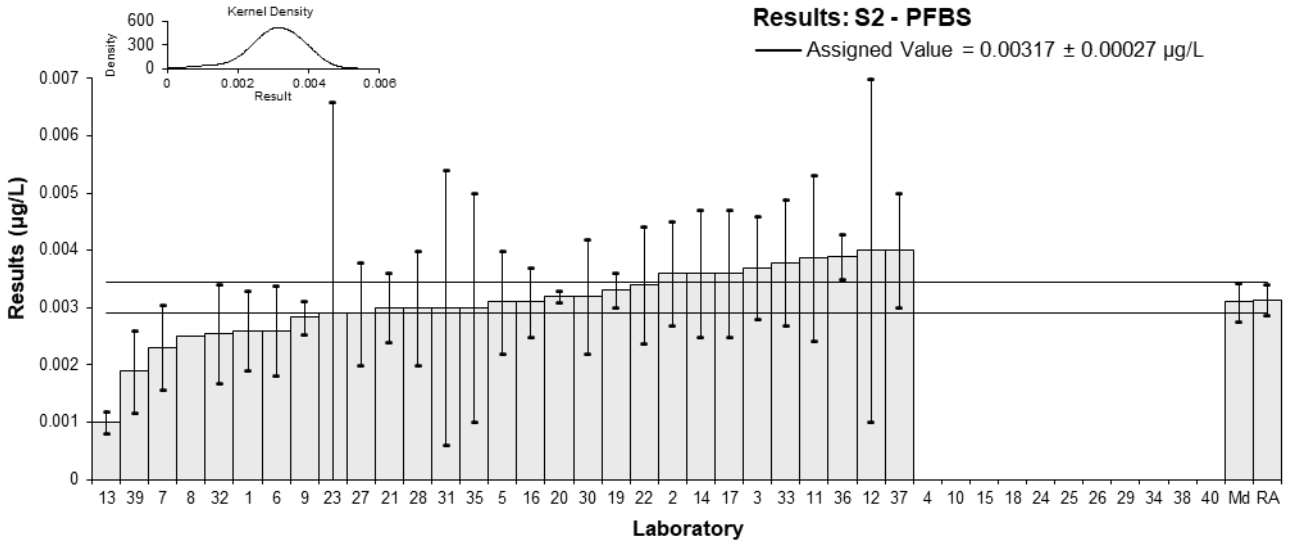
Participant Results

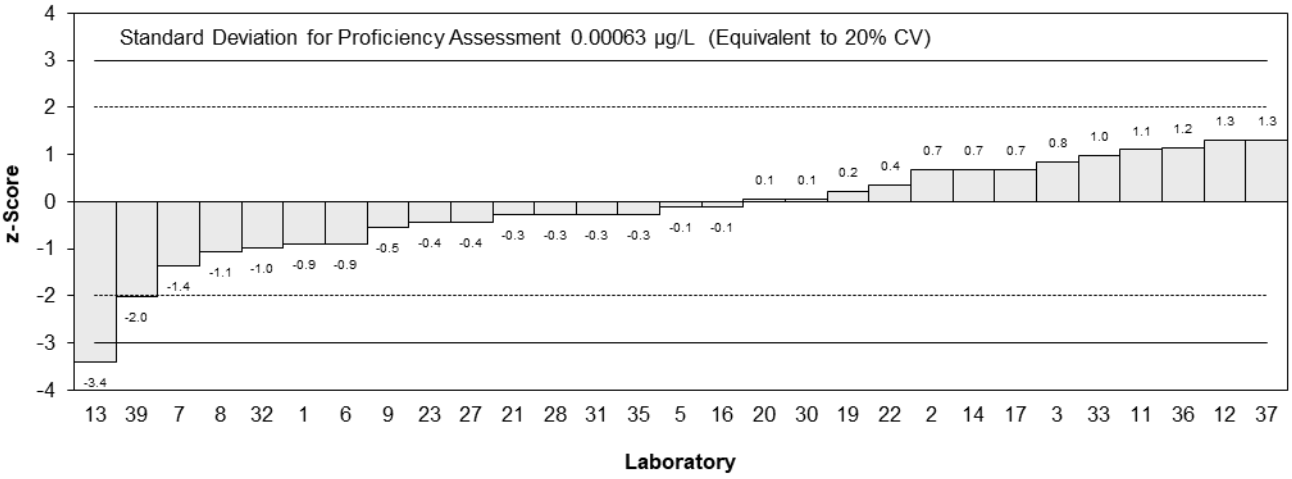
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0026	0.0007	101.04	-0.90	-0.76
2	0.0036	0.0009	NR	0.68	0.46
3	0.0037	0.0009	NR	0.84	0.56
4	NS	NS	NS		
5	0.0031	0.0009	84.6	-0.11	-0.07
6	0.0026	0.000785	100	-0.90	-0.69
7	0.0023	0.00074	101	-1.37	-1.10
8	0.0025	NR	96	-1.06	-2.48
9	0.0028268	0.000283	>75	-0.54	-0.88
10	NS	NS	NS		
11	0.00387	0.00145	NR	1.10	0.47
12	0.004	0.003	72	1.31	0.28
13*	0.001	0.0002	108	-3.42	-6.46
14	0.0036	0.0011	115	0.68	0.38
15	NS	NS	NS		
16	0.0031	0.0006	100	-0.11	-0.11
17	0.0036	0.0011	86.4	0.68	0.38
18	<0.01	NR	NR		
19	0.0033	0.0003	98	0.21	0.32
20	0.0032	0.000096	130	0.05	0.10
21	0.003	0.0006	92	-0.27	-0.26
22	0.0034	0.00102	140	0.36	0.22
23	0.0029	0.0037	NR	-0.43	-0.07
24	< 0.005	0.003	114		
25	NT	NT	NT		
26	<0.025	NR	91		
27	0.0029	0.00090	NR	-0.43	-0.29
28	0.003	0.001	106	-0.27	-0.16
29	<0.005	NR	NR		
30	0.0032	0.001	88	0.05	0.03
31	0.003	0.0024	83.48	-0.27	-0.07
32	0.00255	0.0008682	118.179	-0.98	-0.68
33	0.00379	0.0011	58	0.98	0.55
34	<0.01	0.01	NR		
35	0.003	0.002	88	-0.27	-0.08
36	0.0039	0.00039	79	1.15	1.54
37	0.004	0.001	106	1.31	0.80
38	NT	NT	NT		
39	0.00189	0.00072	102	-2.02	-1.66
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.00317	0.00027
Spike Value	Not Spiked	
Robust Average	0.00314	0.00028
Median	0.00310	0.00034
Mean	0.00308	
N	29	
Max	0.004	
Min	0.001	
Robust SD	0.00061	
Robust CV	19%	


Kernel Density
Density
Result
Results: S2 - PFBS
Assigned Value = 0.00317 ± 0.00027 µg/L
Results (µg/L)
Laboratory
13 39 7 8 32 1 6 9 23 27 21 28 31 35 5 16 20 30 19 22 2 14 17 3 33 11 36 12 37 4 10 15 18 24 25 26 29 34 38 40 Md RA


z-Scores: S2 - PFBS
Standard Deviation for Proficiency Assessment 0.00063 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
13 39 7 8 32 1 6 9 23 27 21 28 31 35 5 16 20 30 19 22 2 14 17 3 33 11 36 12 37

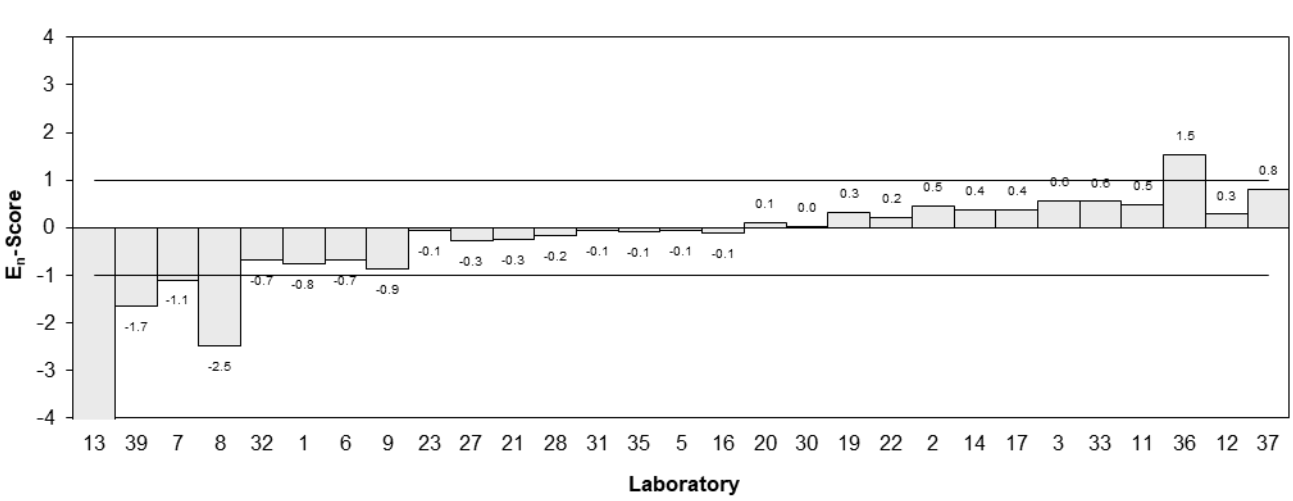

En-Scores: S2 - PFBS
En-Score
Laboratory
13 39 7 8 32 1 6 9 23 27 21 28 31 35 5 16 20 30 19 22 2 14 17 3 33 11 36 12 37

Figure 41

Table 46

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	PFPeS
Unit	µg/L

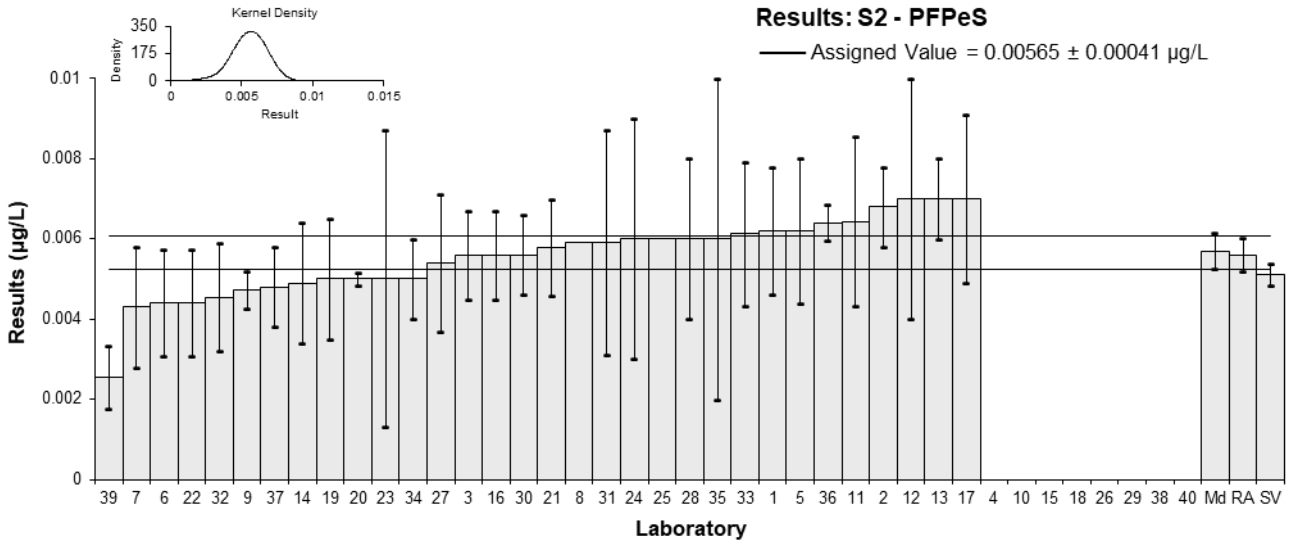
Participant Results

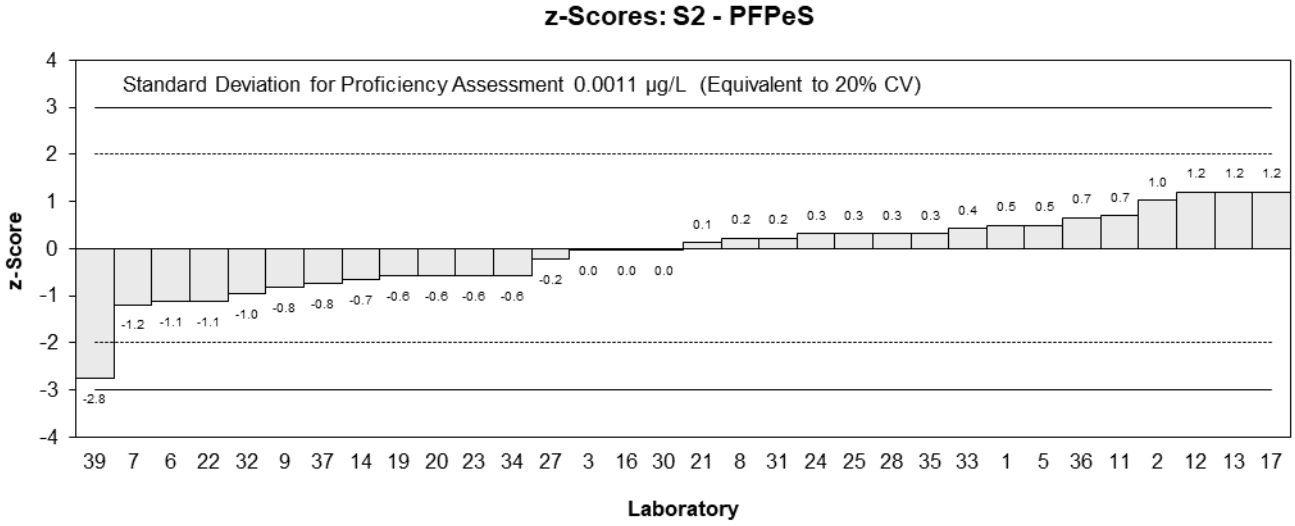
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0062	0.0016	92.19	0.49	0.33
2	0.0068	0.001	NR	1.02	1.06
3	0.0056	0.0011	NR	-0.04	-0.04
4	NS	NS	NS		
5	0.0062	0.0018	89.3	0.49	0.30
6	0.0044	0.0013275	100	-1.11	-0.90
7	0.0043	0.0015	101	-1.19	-0.87
8	0.0059	NR	NR	0.22	0.61
9	0.0047213	0.000472	>75	-0.82	-1.49
10	NS	NS	NS		
11	0.00643	0.00212	NR	0.69	0.36
12	0.007	0.003	81	1.19	0.45
13	0.007	0.001	NR	1.19	1.25
14	0.0049	0.0015	109	-0.66	-0.48
15	NS	NS	NS		
16	0.0056	0.0011	NR	-0.04	-0.04
17	0.0070	0.0021	96.6	1.19	0.63
18	<0.01	NR	NR		
19	0.005	0.0015	97	-0.58	-0.42
20	0.005	0.00015	160	-0.58	-1.49
21	0.00578	0.0012	104	0.12	0.10
22	0.0044	0.00132	100	-1.11	-0.90
23	0.005	0.0037	NR	-0.58	-0.17
24	0.006	0.003	NR	0.31	0.12
25	0.006	NR	NR	0.31	0.85
26	<0.025	NR	102		
27	0.0054	0.0017	NR	-0.22	-0.14
28	0.006	0.002	NR	0.31	0.17
29	<0.005	NR	NR		
30	0.0056	0.001	99	-0.04	-0.05
31	0.0059	0.0028	80.06	0.22	0.09
32	0.00455	0.0013437	119.617	-0.97	-0.78
33	0.00612	0.0018	79	0.42	0.25
34	0.005	0.001	NR	-0.58	-0.60
35	0.006	0.004	84	0.31	0.09
36	0.0064	0.00045	80	0.66	1.23
37	0.0048	0.001	104	-0.75	-0.79
38	NT	NT	NT		
39*	0.00254	0.00079	103	-2.75	-3.49
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.00565	0.00041
Spike Value	0.00511	0.00026
Robust Average	0.00560	0.00042
Median	0.00569	0.00045
Mean	0.00555	
N	32	
Max	0.007	
Min	0.00254	
Robust SD	0.00095	
Robust CV	17%	


Kernel Density
Density
Result
Results: S2 - PFPeS
Assigned Value = 0.00565 ± 0.00041 µg/L
Results (µg/L)
Laboratory
39 7 6 22 32 9 37 14 19 20 23 34 27 3 16 30 21 8 31 24 25 28 35 33 1 5 36 11 2 12 13 17 4 10 15 18 26 29 38 40 Md RA SV


z-Scores: S2 - PFPeS
Standard Deviation for Proficiency Assessment 0.0011 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
39 7 6 22 32 9 37 14 19 20 23 34 27 3 16 30 21 8 31 24 25 28 35 33 1 5 36 11 2 12 13 17

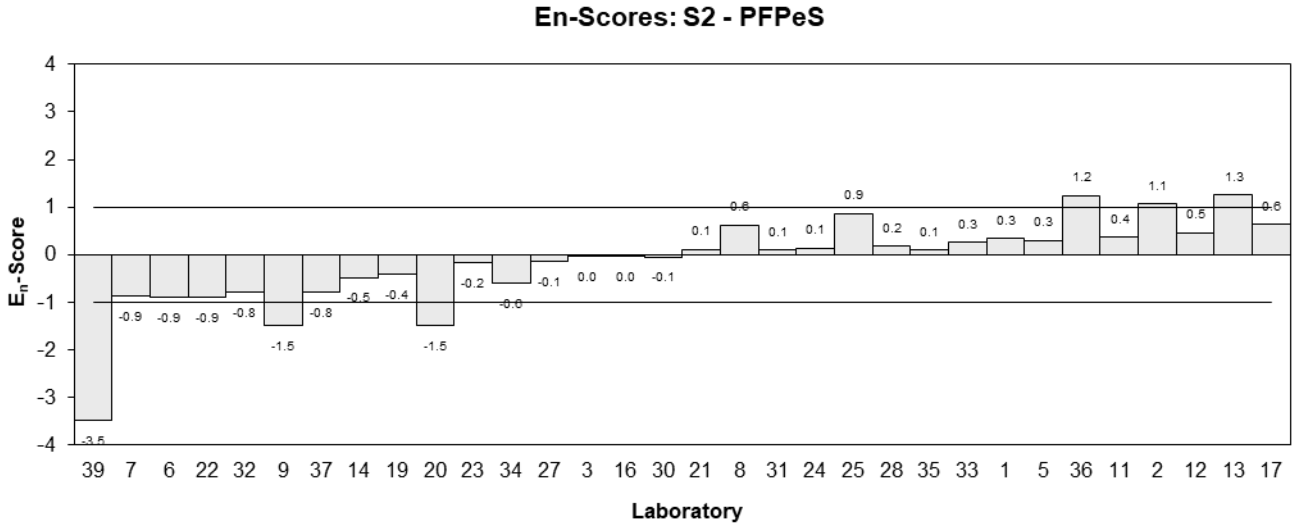

En-Scores: S2 - PFPeS
En-Score
Laboratory
39 7 6 22 32 9 37 14 19 20 23 34 27 3 16 30 21 8 31 24 25 28 35 33 1 5 36 11 2 12 13 17

Figure 42

Table 47

Sample Details

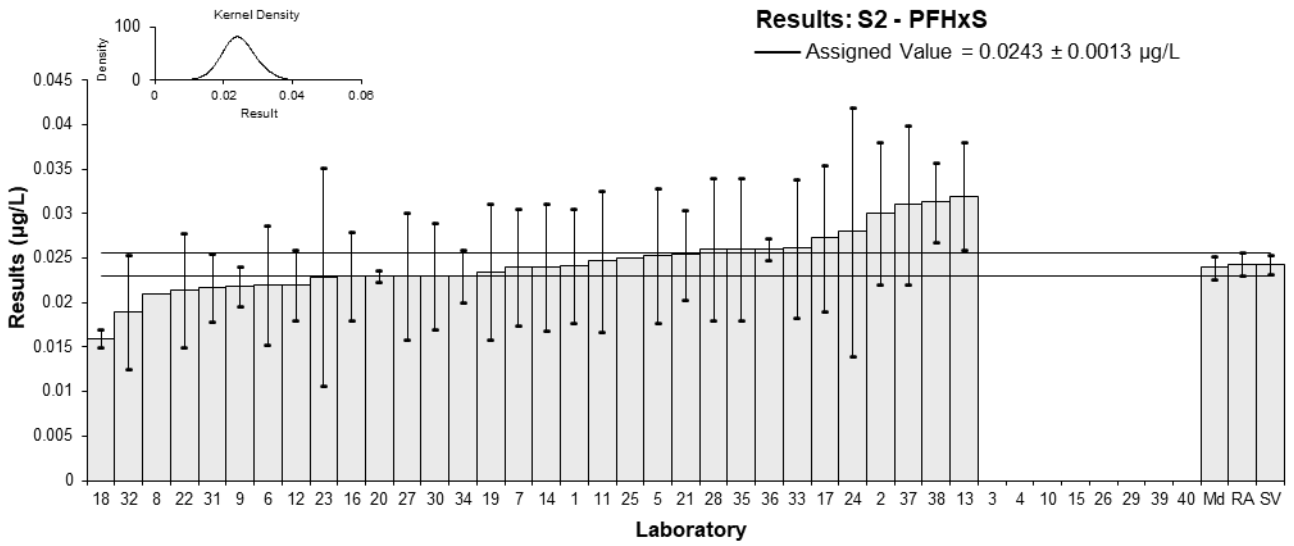
Sample No.	S2
Matrix	River Water
Analyte	PFHxS
Unit	µg/L

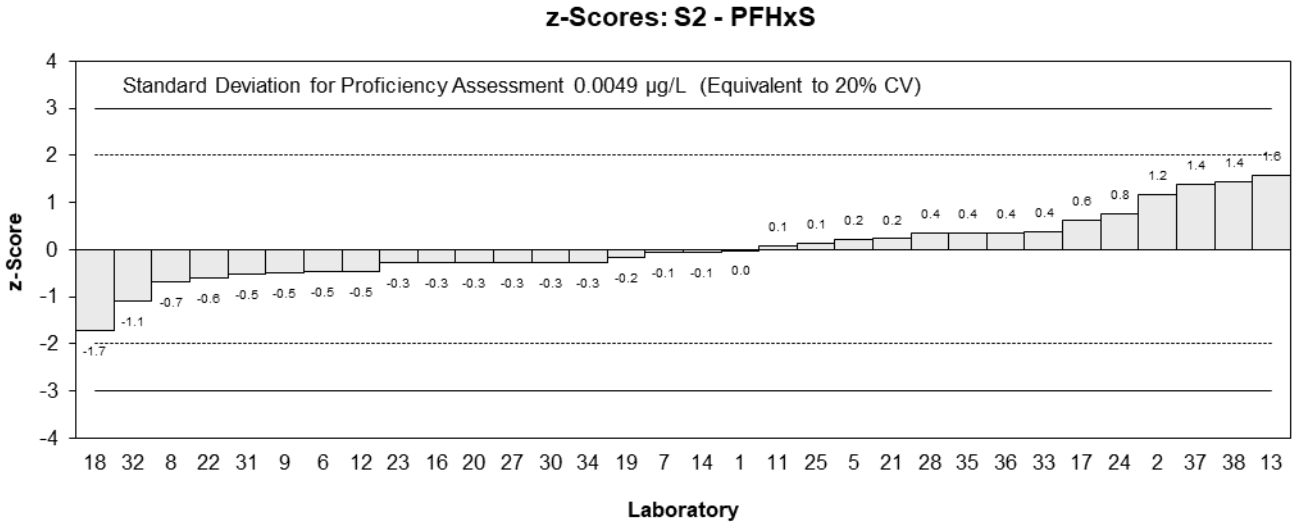
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0242	0.0064	92.19	-0.02	-0.02
2	0.03	0.008	NR	1.17	0.70
3	NT	NT	NT		
4	NS	NS	NS		
5	0.0253	0.0076	89.3	0.21	0.13
6	0.022	0.0067125	90	-0.47	-0.34
7	0.024	0.0065	86	-0.06	-0.05
8	0.021	NR	91	-0.68	-2.54
9	0.0218507	0.002185	>75	-0.50	-0.96
10	NS	NS	NS		
11	0.0247	0.00793	NR	0.08	0.05
12	0.022	0.004	81	-0.47	-0.55
13	0.032	0.006	90	1.58	1.25
14	0.024	0.0072	109	-0.06	-0.04
15	NS	NS	NS		
16	0.023	0.005	101	-0.27	-0.25
17	0.0273	0.0082	96.6	0.62	0.36
18	0.016	0.001	103	-1.71	-5.06
19	0.0235	0.0076	97	-0.16	-0.10
20	0.023	0.00069	160	-0.27	-0.88
21	0.0254	0.005	104	0.23	0.21
22	0.0214	0.00642	90	-0.60	-0.44
23	0.0229	0.0123	NR	-0.29	-0.11
24	0.028	0.014	114	0.76	0.26
25	0.025	NR	NR	0.14	0.54
26	<0.025	NR	91		
27	0.023	0.0071	NR	-0.27	-0.18
28	0.026	0.008	106	0.35	0.21
29	<0.025	NR	NR		
30	0.023	0.006	103	-0.27	-0.21
31	0.0217	0.0038	80.06	-0.53	-0.65
32	0.019	0.0064016	119.617	-1.09	-0.81
33	0.0261	0.0078	79	0.37	0.23
34	0.023	0.003	86	-0.27	-0.40
35	0.026	0.008	84	0.35	0.21
36	0.026	0.0012	80	0.35	0.96
37	0.031	0.009	106	1.38	0.74
38	0.0313	0.00444	114	1.44	1.51
39	NT	NT	NT		
40	NS	NS	NS		

Statistics

Assigned Value	0.0243	0.0013
Spike Value	0.0243	0.0011
Robust Average	0.0243	0.0013
Median	0.0240	0.0013
Mean	0.0245	
N	32	
Max	0.032	
Min	0.016	
Robust SD	0.0029	
Robust CV	12%	


Kernel Density
Density
Result
Results: S2 - PFHxS
Assigned Value = 0.0243 ± 0.0013 µg/L
Results (µg/L)
Laboratory
18 32 8 22 31 9 6 12 23 16 20 27 30 34 19 7 14 1 11 25 5 21 28 35 36 33 17 24 2 37 38 13 3 4 10 15 26 29 39 40 Md RA SV


z-Scores: S2 - PFHxS
Standard Deviation for Proficiency Assessment 0.0049 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
18 32 8 22 31 9 6 12 23 16 20 27 30 34 19 7 14 1 11 25 5 21 28 35 36 33 17 24 2 37 38 13

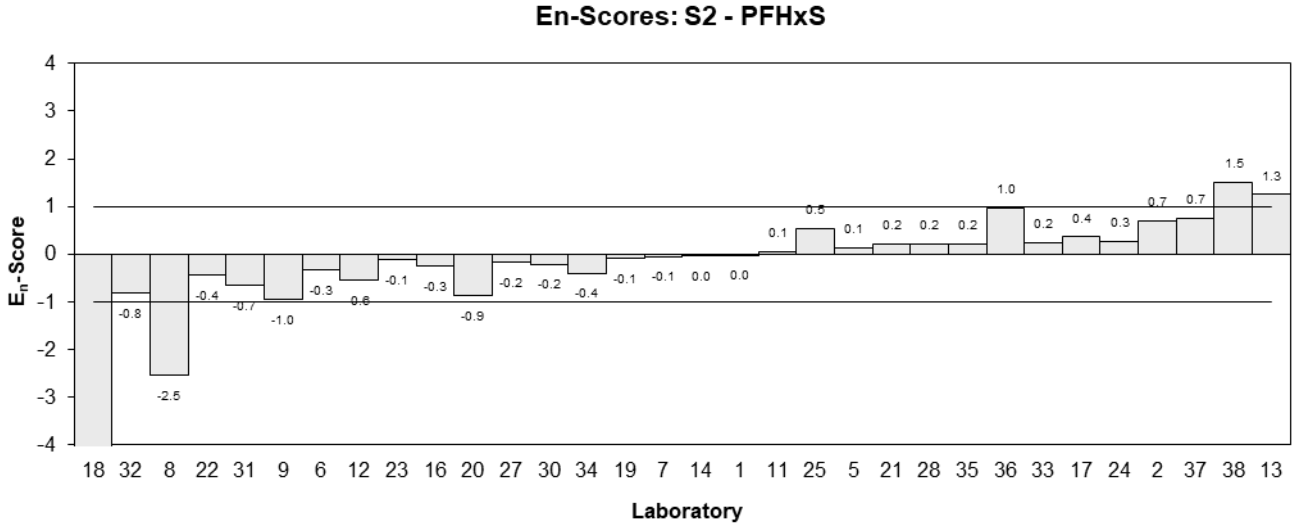

En-Scores: S2 - PFHxS
En-Score
Laboratory
18 32 8 22 31 9 6 12 23 16 20 27 30 34 19 7 14 1 11 25 5 21 28 35 36 33 17 24 2 37 38 13

Figure 43

Table 48

Sample Details

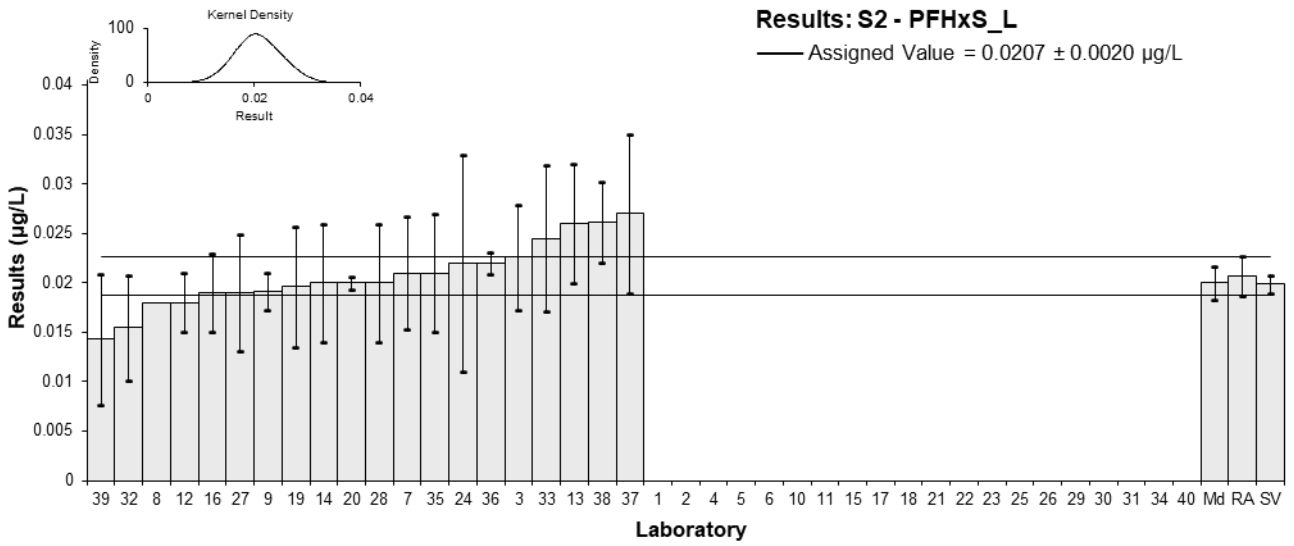
Sample No.	S2
Matrix	River Water
Analyte	PFHxS_L
Unit	µg/L

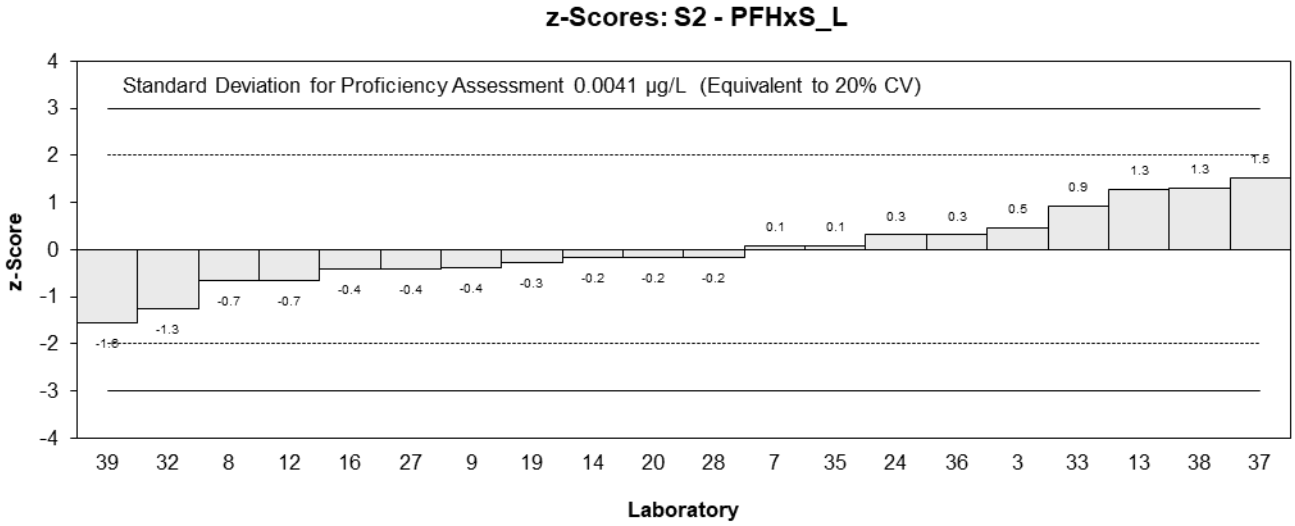
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NT	NT	NT		
3	0.0226	0.0053	NR	0.46	0.34
4	NS	NS	NS		
5	NT	NT	NT		
6	NT	NT	NT		
7	0.021	0.0057	86	0.07	0.05
8	0.018	NR	NR	-0.65	-1.35
9	0.0191251	0.001913	>75	-0.38	-0.57
10	NS	NS	NS		
11	NR	NR	NR		
12	0.018	0.003	81	-0.65	-0.75
13	0.026	0.006	90	1.28	0.84
14	0.02	0.0060	109	-0.17	-0.11
15	NS	NS	NS		
16	0.019	0.004	NR	-0.41	-0.38
17	NT	NT	NT		
18	NT	NT	NT		
19	0.0196	0.0061	97	-0.27	-0.17
20	0.02	0.0006	160	-0.17	-0.34
21	NT	NR	104		
22	NT	NT	NT		
23	NT	NT	NT		
24	0.022	0.011	NR	0.31	0.12
25	NT	NT	NT		
26	<0.025	NR	91		
27	0.019	0.0059	NR	-0.41	-0.27
28	0.02	0.006	NR	-0.17	-0.11
29	<0.025	NR	NR		
30	NT	NT	NT		
31	NT	NT	NT		
32	0.0155	0.0053220	119.617	-1.26	-0.91
33	0.0245	0.0074	79	0.92	0.50
34	NT	NT	NT		
35	0.021	0.006	84	0.07	0.05
36	0.022	0.0011	80	0.31	0.57
37	0.027	0.008	106	1.52	0.76
38	0.0261	0.00410	114	1.30	1.18
39	0.0143	0.00658	103	-1.55	-0.93
40	NS	NS	NS		

Statistics

Assigned Value	0.0207	0.0020
Spike Value	0.0199	0.0009
Robust Average	0.0207	0.0020
Median	0.0200	0.0017
Mean	0.0207	
N	20	
Max	0.027	
Min	0.0143	
Robust SD	0.0036	
Robust CV	17%	


Kernel Density
Density
Result
Results: S2 - PFHxS_L
Assigned Value = 0.0207 ± 0.0020 µg/L
Results (µg/L)
Laboratory
39 32 8 12 16 27 9 19 14 20 28 7 35 24 36 3 33 13 38 37 1 2 4 5 6 10 11 15 17 18 21 22 23 25 26 29 30 31 34 40 Md RA SV


z-Scores: S2 - PFHxS_L
Standard Deviation for Proficiency Assessment 0.0041 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
39 32 8 12 16 27 9 19 14 20 28 7 35 24 36 3 33 13 38 37

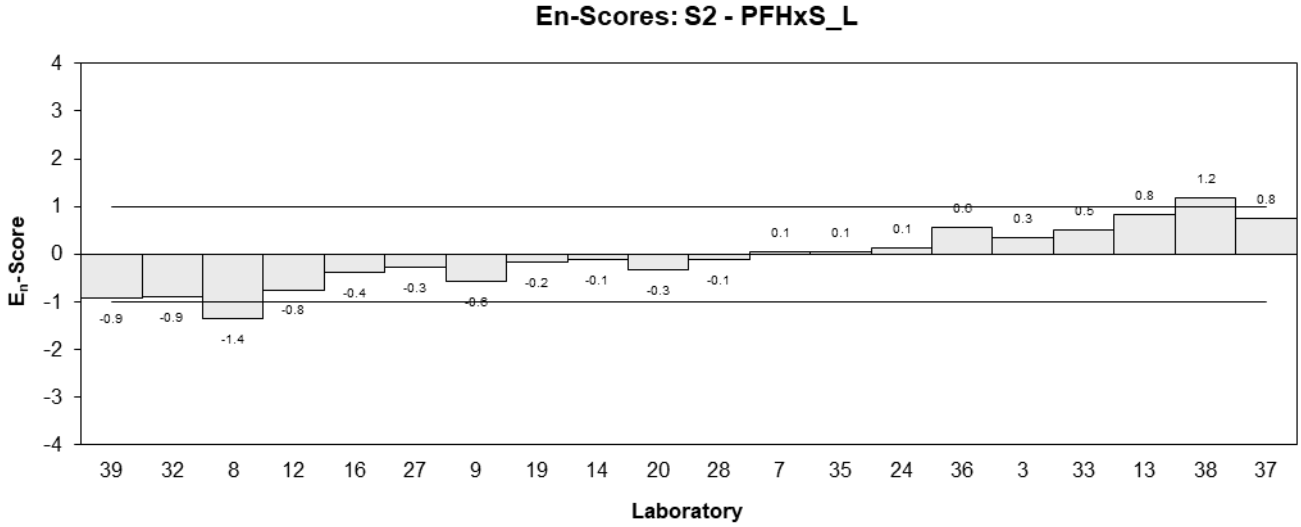

En-Scores: S2 - PFHxS_L
En-Score
Laboratory
39 32 8 12 16 27 9 19 14 20 28 7 35 24 36 3 33 13 38 37

Figure 44

Table 49

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	PFOS
Unit	µg/L

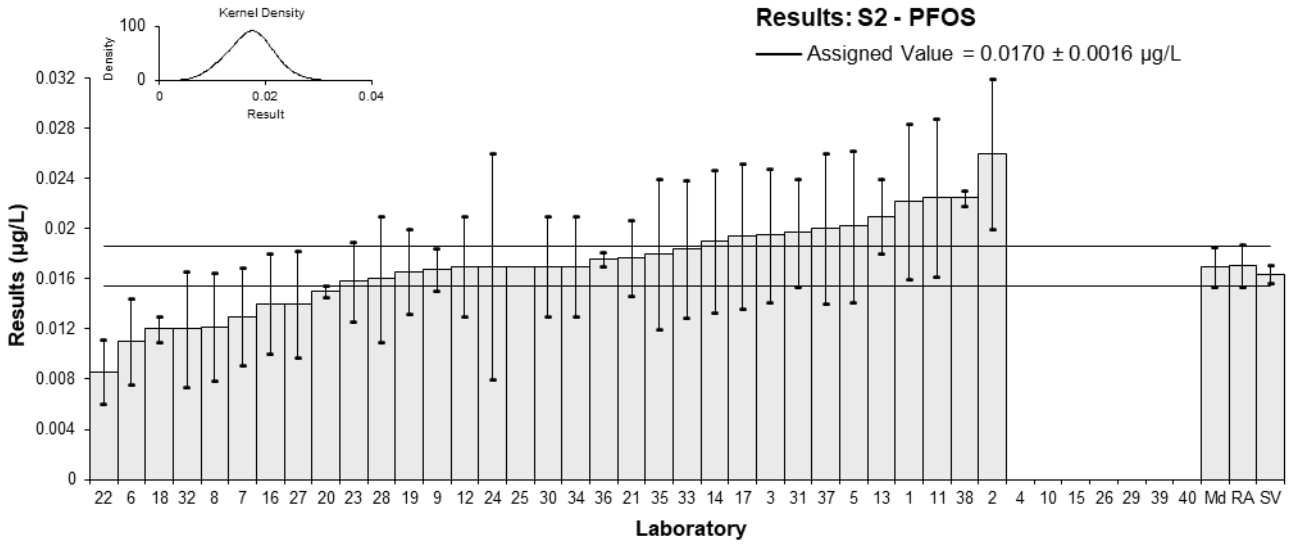
Participant Results

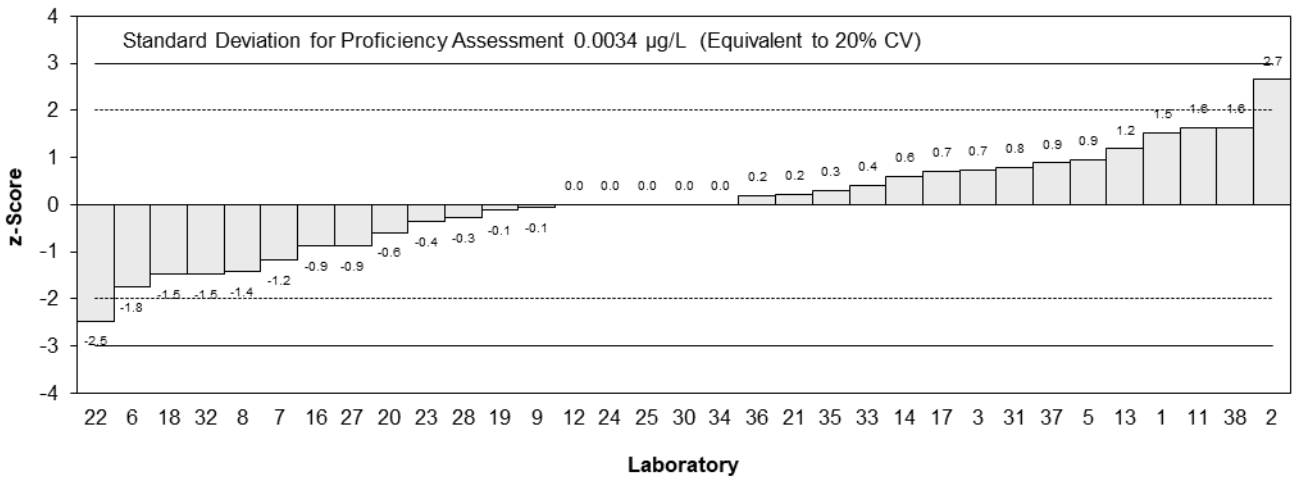
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0222	0.0062	72.45	1.53	0.81
2*	0.026	0.006	108	2.65	1.45
3	0.0195	0.0053	NR	0.74	0.45
4	NS	NS	NS		
5	0.0202	0.0060	92.1	0.94	0.52
6	0.011	0.00341	95	-1.76	-1.59
7	0.013	0.0039	104	-1.18	-0.95
8	0.0122	0.0043	81	-1.41	-1.05
9	0.0167532	0.001675	>75	-0.07	-0.11
10	NS	NS	NS		
11	0.0225	0.00629	NR	1.62	0.85
12	0.017	0.004	62	0.00	0.00
13	0.021	0.003	101	1.18	1.18
14	0.019	0.0057	101	0.59	0.34
15	NS	NS	NS		
16	0.014	0.004	104	-0.88	-0.70
17	0.0194	0.0058	84.5	0.71	0.40
18	0.012	0.001	97	-1.47	-2.65
19	0.0166	0.0034	100	-0.12	-0.11
20	0.015	0.00045	130	-0.59	-1.20
21	0.0177	0.003	135	0.21	0.21
22	0.0086	0.00258	104	-2.47	-2.77
23	0.0158	0.0032	NR	-0.35	-0.34
24	0.017	0.009	112	0.00	0.00
25	0.017	NR	NR	0.00	0.00
26	<0.025	NR	102		
27	0.014	0.0043	NR	-0.88	-0.65
28	0.016	0.005	108	-0.29	-0.19
29	<0.135	NR	NR		
30	0.017	0.004	98	0.00	0.00
31	0.0197	0.0043	109.77	0.79	0.59
32	0.012	0.0046137	114.180	-1.47	-1.02
33	0.0184	0.0055	57	0.41	0.24
34	0.017	0.004	84	0.00	0.00
35	0.018	0.006	77	0.29	0.16
36	0.0176	0.00056	81	0.18	0.35
37	0.02	0.006	114	0.88	0.48
38	0.0225	0.00062	94	1.62	3.21
39	NT	NT	NT		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0170	0.0016
Spike Value	0.0164	0.0007
Robust Average	0.0171	0.0017
Median	0.0170	0.0016
Mean	0.0171	
N	33	
Max	0.026	
Min	0.0086	
Robust SD	0.0038	
Robust CV	22%	


Kernel Density
Density
100
0
0
0.02
0.04
Result
Results: S2 - PFOS
Assigned Value = 0.0170 ± 0.0016 µg/L
Results (µg/L)
0.032
0.028
0.024
0.02
0.016
0.012
0.008
0.004
0
22 6 18 32 8 7 16 27 20 23 28 19 9 12 24 25 30 34 36 21 35 33 14 17 3 31 37 5 13 1 11 38 2 4 10 15 26 29 39 40 Md RA SV
Laboratory


z-Scores: S2 - PFOS
Standard Deviation for Proficiency Assessment 0.0034 µg/L (Equivalent to 20% CV)
z-Score
4
3
2
1
0
-1
-2
-3
-4
-2.5 -1.8 -1.5 -1.5 -1.4 -1.2 -0.9 -0.9 -0.6 -0.4 -0.3 -0.1 -0.1 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.3 0.4 0.6 0.7 0.7 0.8 0.9 0.9 1.2 1.5 1.6 1.6 2.7
22 6 18 32 8 7 16 27 20 23 28 19 9 12 24 25 30 34 36 21 35 33 14 17 3 31 37 5 13 1 11 38 2
Laboratory

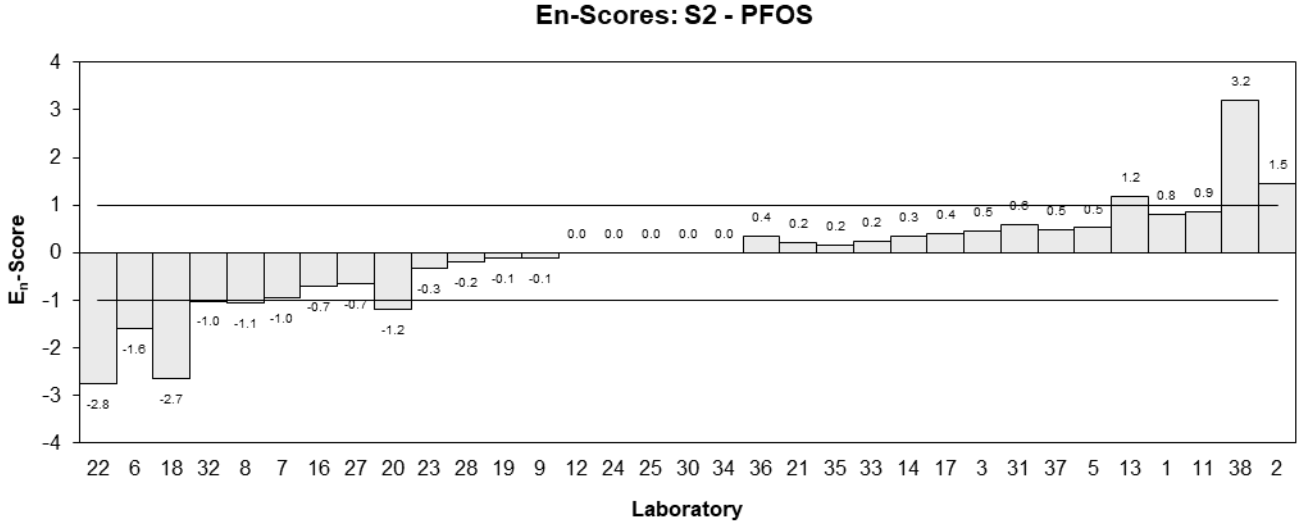

En-Scores: S2 - PFOS
En-Score
4
3
2
1
0
-1
-2
-3
-4
-2.8 -1.6 -2.7 -1.0 -1.1 -1.0 -0.7 -0.7 -1.2 -0.3 -0.2 -0.1 -0.1 0.0 0.0 0.0 0.0 0.0 0.4 0.2 0.2 0.2 0.3 0.4 0.5 0.6 0.5 0.5 1.2 0.8 0.9 3.2 1.5
22 6 18 32 8 7 16 27 20 23 28 19 9 12 24 25 30 34 36 21 35 33 14 17 3 31 37 5 13 1 11 38 2
Laboratory

Figure 45

Table 50

Sample Details

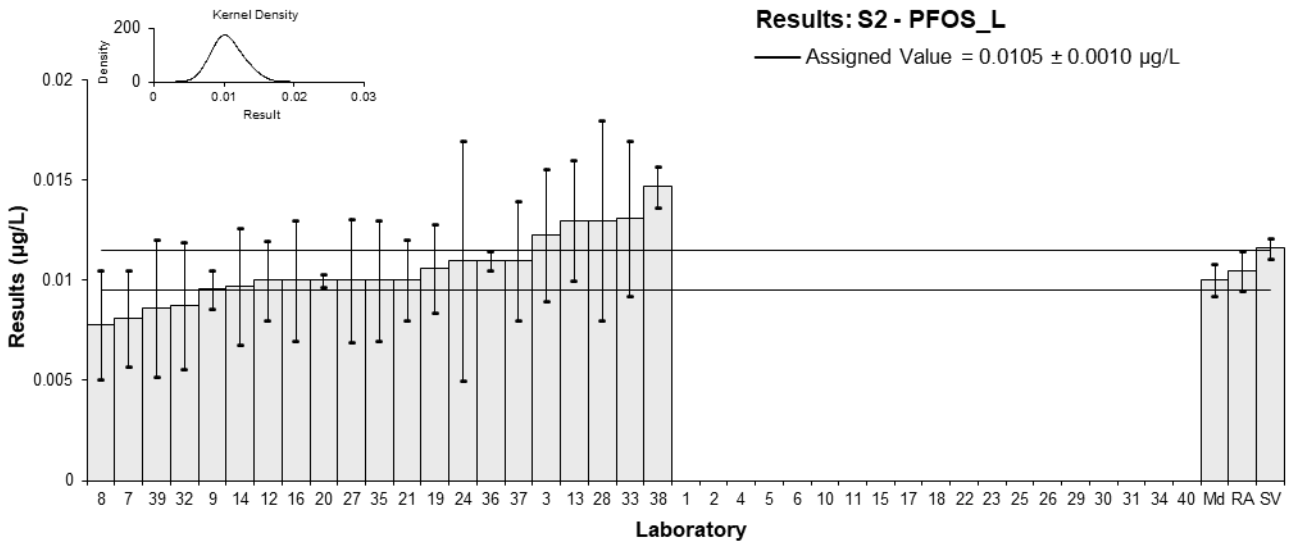
Sample No.	S2
Matrix	River Water
Analyte	PFOS_L
Unit	µg/L

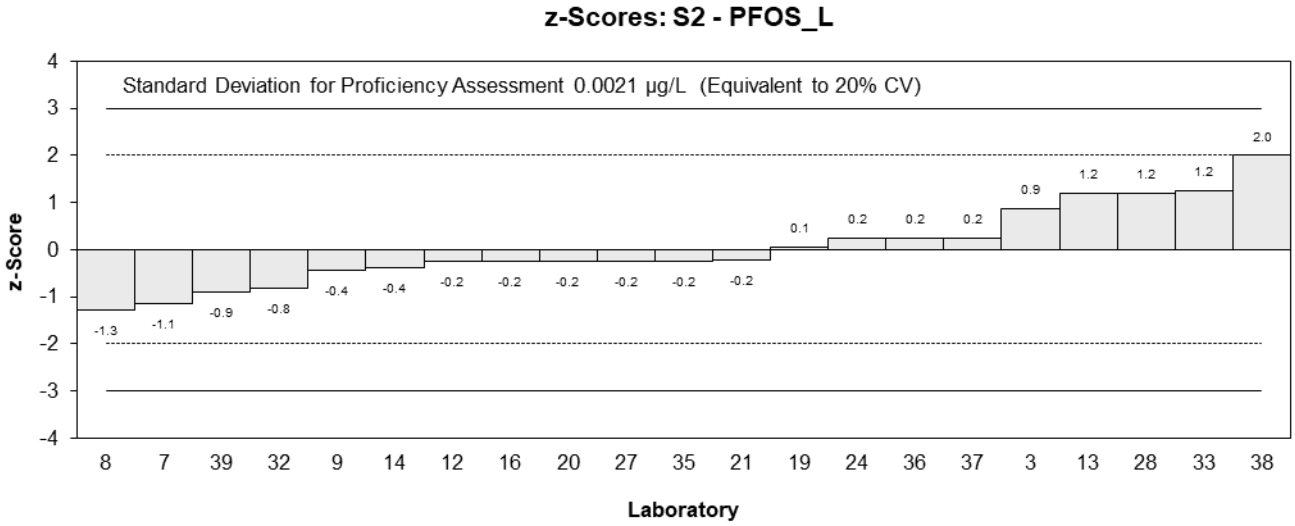
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NT	NT	NT		
3	0.0123	0.0033	NR	0.86	0.52
4	NS	NS	NS		
5	NT	NT	NT		
6	NT	NT	NT		
7	0.0081	0.0024	104	-1.14	-0.92
8	0.0078	0.00273	NR	-1.29	-0.93
9	0.0095708	0.000957	>75	-0.44	-0.67
10	NS	NS	NS		
11	NR	NR	NR		
12	0.01	0.002	62	-0.24	-0.22
13	0.013	0.003	101	1.19	0.79
14	0.0097	0.0029	101	-0.38	-0.26
15	NS	NS	NS		
16	0.010	0.003	NR	-0.24	-0.16
17	NT	NT	NT		
18	NT	NT	NT		
19	0.0106	0.0022	100	0.05	0.04
20	0.01	0.0003	130	-0.24	-0.48
21	0.01004	0.002	135	-0.22	-0.21
22	NT	NT	NT		
23	NT	NT	NT		
24	0.011	0.006	NR	0.24	0.08
25	NT	NT	NT		
26	<0.025	NR	102		
27	0.010	0.0031	NR	-0.24	-0.15
28	0.013	0.005	NR	1.19	0.49
29	<0.085	NR	NR		
30	NT	NT	NT		
31	<0.01	NR	109.77		
32	0.00875	0.0031980	114.180	-0.83	-0.52
33	0.0131	0.0039	57	1.24	0.65
34	NT	NT	NT		
35	0.01	0.003	77	-0.24	-0.16
36	0.0110	0.0005	81	0.24	0.45
37	0.011	0.003	114	0.24	0.16
38	0.0147	0.00102	94	2.00	2.94
39	0.0086	0.00344	94	-0.90	-0.53
40	NS	NS	NS		

Statistics

Assigned Value	0.0105	0.0010
Spike Value	0.0116	0.0005
Robust Average	0.0105	0.0010
Median	0.0100	0.0008
Mean	0.0106	
N	21	
Max	0.0147	
Min	0.0078	
Robust SD	0.0019	
Robust CV	18%	


Kernel Density
Density
Result
Results: S2 - PFOS_L
Assigned Value = 0.0105 ± 0.0010 µg/L
Results (µg/L)
Laboratory
8 7 39 32 9 14 12 16 20 27 35 21 19 24 36 37 3 13 28 33 38 1 2 4 5 6 10 11 15 17 18 22 23 25 26 29 30 31 34 40 Md RA SV


z-Scores: S2 - PFOS_L
Standard Deviation for Proficiency Assessment 0.0021 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
8 7 39 32 9 14 12 16 20 27 35 21 19 24 36 37 3 13 28 33 38

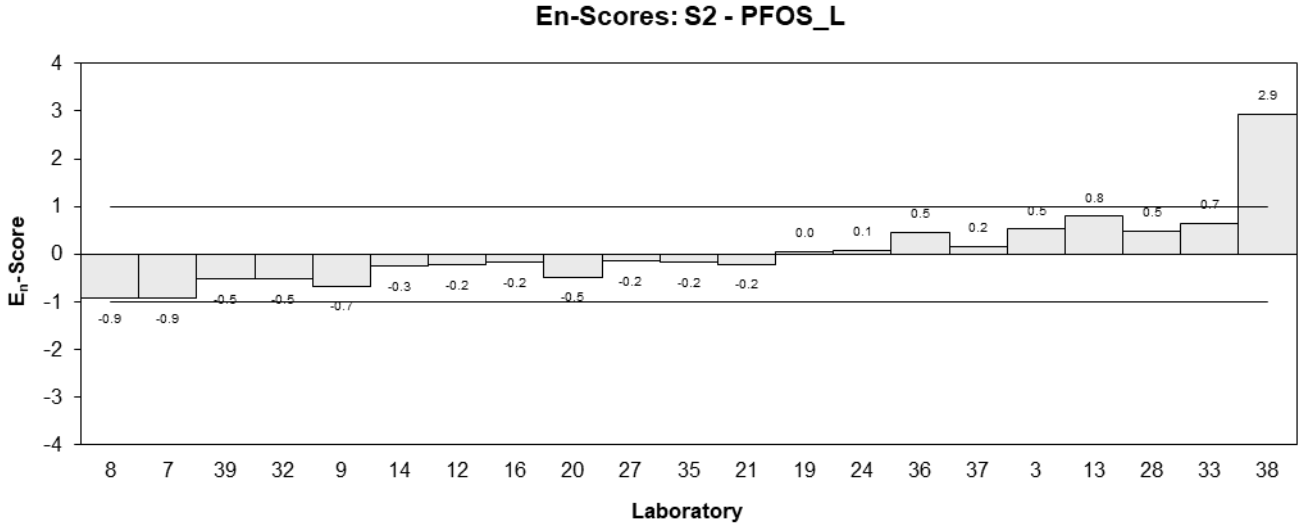

En-Scores: S2 - PFOS_L
En-Score
Laboratory
8 7 39 32 9 14 12 16 20 27 35 21 19 24 36 37 3 13 28 33 38

Figure 46

Table 51

Sample Details

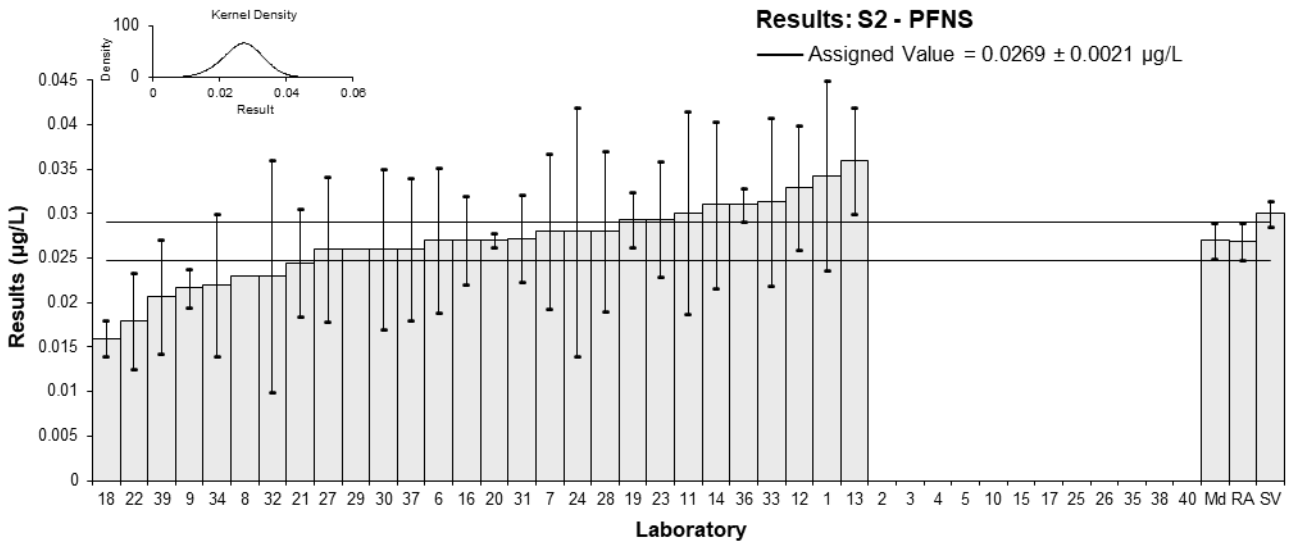
Sample No.	S2
Matrix	River Water
Analyte	PFNS
Unit	µg/L

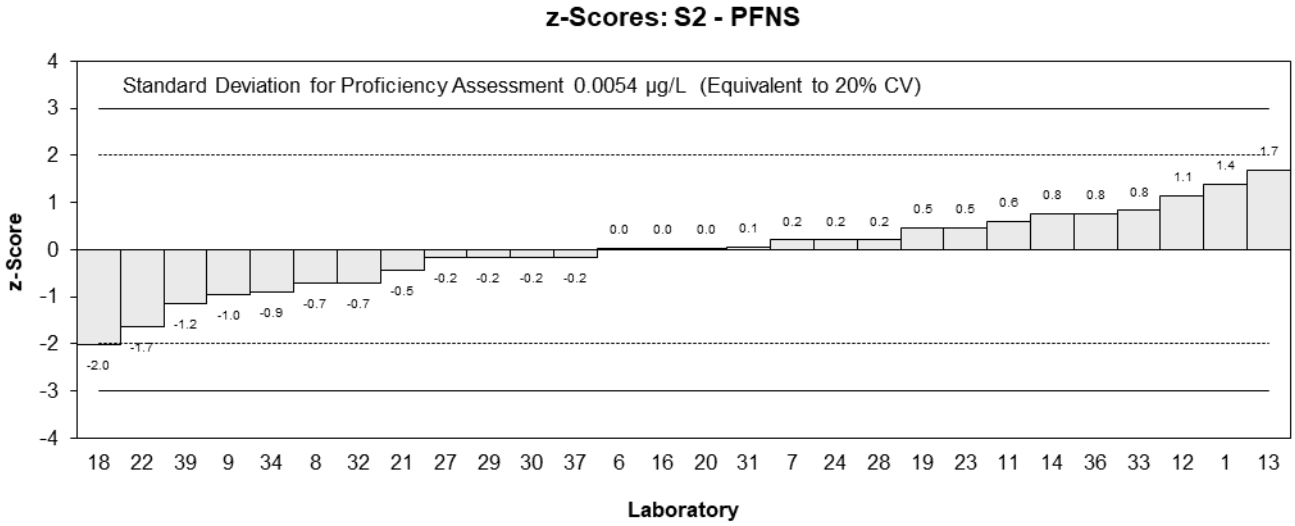
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0343	0.0107	90.67	1.38	0.68
2	NT	NT	NT		
3	NT	NT	NT		
4	NS	NS	NS		
5	NT	NT	NT		
6	0.027	0.00816	95	0.02	0.01
7	0.028	0.0087	92	0.20	0.12
8	0.023	NR	NR	-0.72	-1.86
9	0.0216577	0.002166	>75	-0.97	-1.74
10	NS	NS	NS		
11	0.0301	0.01137	NR	0.59	0.28
12	0.033	0.007	62	1.13	0.83
13	0.036	0.006	NR	1.69	1.43
14	0.031	0.0093	101	0.76	0.43
15	NS	NS	NS		
16	0.027	0.005	NR	0.02	0.02
17	NT	NT	NT		
18	0.016	0.002	97	-2.03	-3.76
19	0.0293	0.0031	100	0.45	0.64
20	0.027	0.00081	130	0.02	0.04
21	0.0245	0.006	135	-0.45	-0.38
22	0.018	0.0054	95	-1.65	-1.54
23	0.0294	0.0065	NR	0.46	0.37
24	0.028	0.014	NR	0.20	0.08
25	NT	NT	NT		
26	<0.050	NR	102		
27	0.026	0.0081	NR	-0.17	-0.11
28	0.028	0.009	NR	0.20	0.12
29	0.026	NR	NR	-0.17	-0.43
30	0.026	0.009	102	-0.17	-0.10
31	0.0272	0.0049	109.77	0.06	0.06
32	0.023	0.0130727	114.180	-0.72	-0.29
33	0.03138	0.0094	57	0.83	0.47
34	0.022	0.008	NR	-0.91	-0.59
35	NT	NT	NT		
36	0.031	0.0019	81	0.76	1.45
37	0.026	0.008	104	-0.17	-0.11
38	NT	NT	NT		
39	0.02066	0.00640	79	-1.16	-0.93
40	NS	NS	NS		

Statistics

Assigned Value	0.0269	0.0021
Spike Value	0.0300	0.0015
Robust Average	0.0269	0.0021
Median	0.0270	0.0020
Mean	0.0268	
N	28	
Max	0.036	
Min	0.016	
Robust SD	0.0045	
Robust CV	17%	


Kernel Density
Density
Result
Results: S2 - PFNS
Assigned Value = 0.0269 ± 0.0021 µg/L
Results (µg/L)
Laboratory
18 22 39 9 34 8 32 21 27 29 30 37 6 16 20 31 7 24 28 19 23 11 14 36 33 12 1 13 2 3 4 5 10 15 17 25 26 35 38 40 Md RA SV


z-Scores: S2 - PFNS
Standard Deviation for Proficiency Assessment 0.0054 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
18 22 39 9 34 8 32 21 27 29 30 37 6 16 20 31 7 24 28 19 23 11 14 36 33 12 1 13

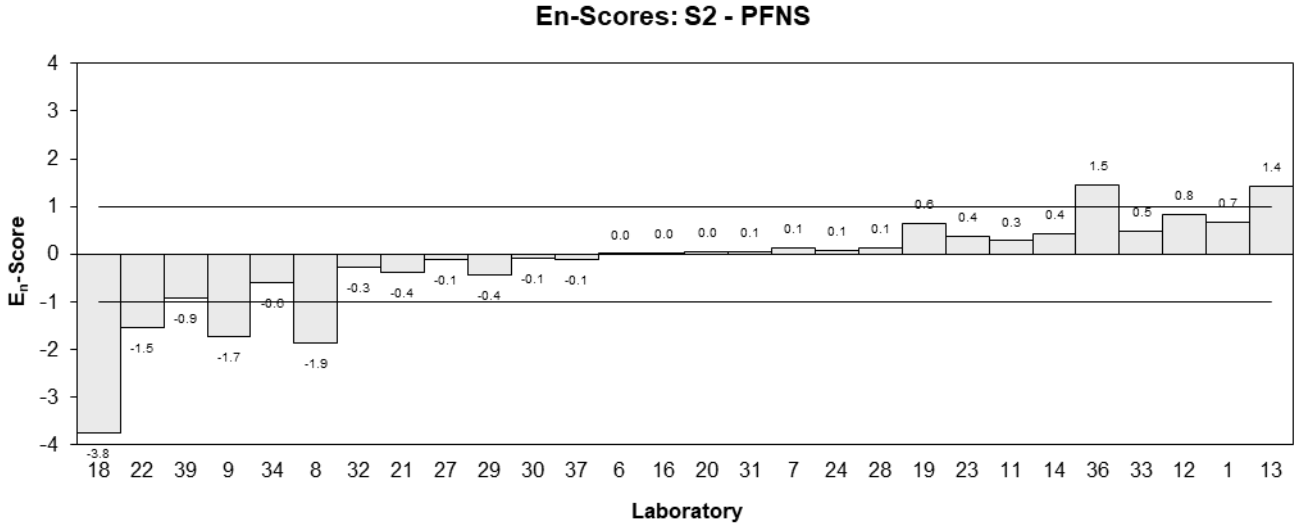

En-Scores: S2 - PFNS
En-Score
Laboratory
18 22 39 9 34 8 32 21 27 29 30 37 6 16 20 31 7 24 28 19 23 11 14 36 33 12 1 13

Figure 47

Table 52

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	PFDS
Unit	µg/L

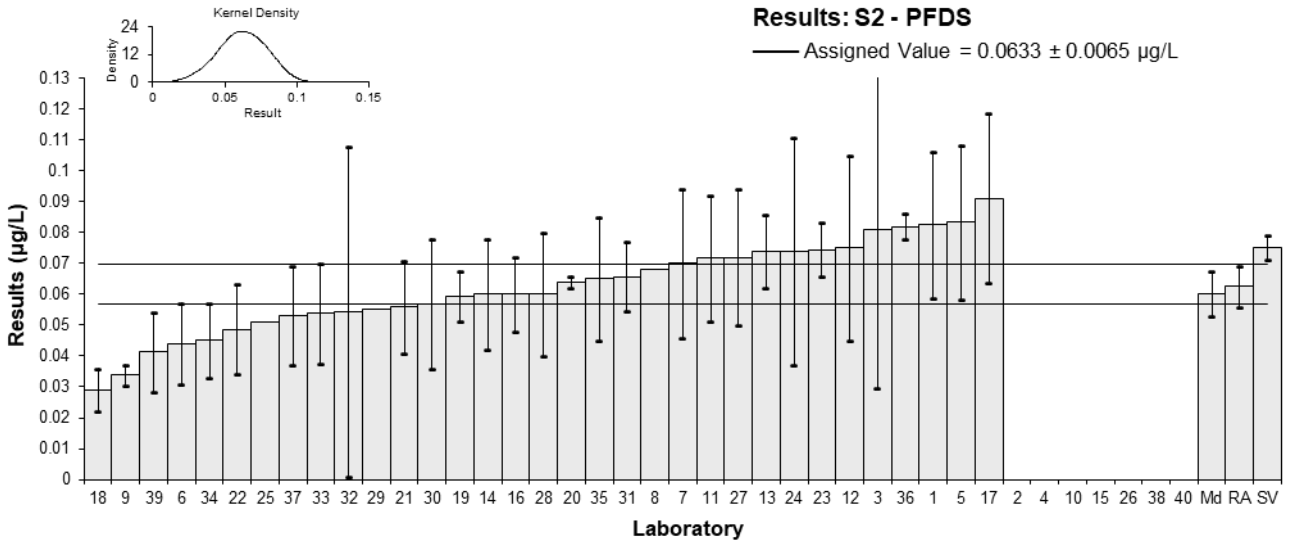
Participant Results

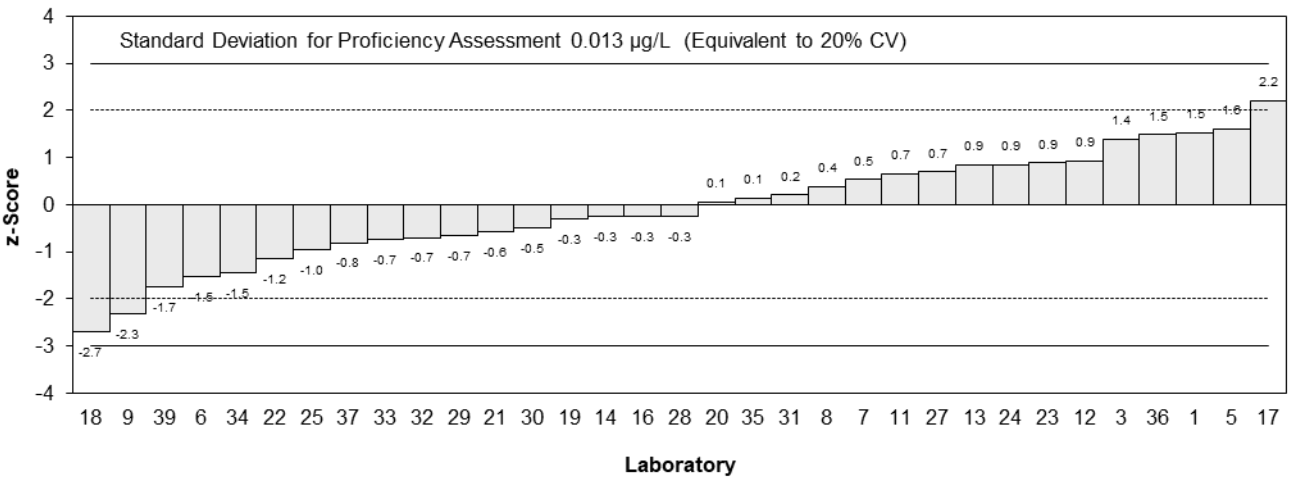
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0826	0.0238	90.67	1.52	0.78
2	NT	NT	NT		
3	0.0809	0.0515	NR	1.39	0.34
4	NS	NS	NS		
5	0.0835	0.0250	92.1	1.60	0.78
6	0.044	0.01326	90	-1.52	-1.31
7	0.07	0.024	92	0.53	0.27
8	0.068	NR	NR	0.37	0.72
9	0.0338745	0.003387	>75	-2.32	-4.01
10	NS	NS	NS		
11	0.0717	0.02033	NR	0.66	0.39
12	0.075	0.03	62	0.92	0.38
13	0.074	0.012	NR	0.85	0.78
14	0.06	0.018	101	-0.26	-0.17
15	NS	NS	NS		
16	0.060	0.012	NR	-0.26	-0.24
17	0.0912	0.0274	84.5	2.20	0.99
18*	0.029	0.007	97	-2.71	-3.59
19	0.0594	0.0081	100	-0.31	-0.38
20	0.064	0.00192	130	0.06	0.10
21	0.0559	0.015	135	-0.58	-0.45
22	0.0487	0.01461	80	-1.15	-0.91
23	0.0745	0.0087	NR	0.88	1.03
24	0.074	0.037	NR	0.85	0.28
25	0.051	NR	NR	-0.97	-1.89
26	<0.10	NR	102		
27	0.072	0.022	NR	0.69	0.38
28	0.06	0.02	NR	-0.26	-0.16
29	0.0551	NR	NR	-0.65	-1.26
30	0.057	0.021	102	-0.50	-0.29
31	0.0658	0.0114	109.77	0.20	0.19
32	0.0545	0.0535138	114.180	-0.70	-0.16
33	0.0539	0.0162	57	-0.74	-0.54
34	0.045	0.012	NR	-1.45	-1.34
35	0.065	0.02	77	0.13	0.08
36	0.082	0.0043	81	1.48	2.40
37	0.053	0.016	96	-0.81	-0.60
38	NT	NT	NT		
39	0.04128	0.01280	76	-1.74	-1.53
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0633	0.0065
Spike Value	0.0752	0.0038
Robust Average	0.0626	0.0066
Median	0.0600	0.0073
Mean	0.0623	
N	33	
Max	0.0912	
Min	0.029	
Robust SD	0.015	
Robust CV	24%	


Kernel Density
Density
Result
Results: S2 - PFDS
Assigned Value = 0.0633 ± 0.0065 µg/L
Results (µg/L)
Laboratory
18 9 39 6 34 22 25 37 33 32 29 21 30 19 14 16 28 20 35 31 8 7 11 27 13 24 23 12 3 36 1 5 17 2 4 10 15 26 38 40 Md RA SV


z-Scores: S2 - PFDS
Standard Deviation for Proficiency Assessment 0.013 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
18 9 39 6 34 22 25 37 33 32 29 21 30 19 14 16 28 20 35 31 8 7 11 27 13 24 23 12 3 36 1 5 17

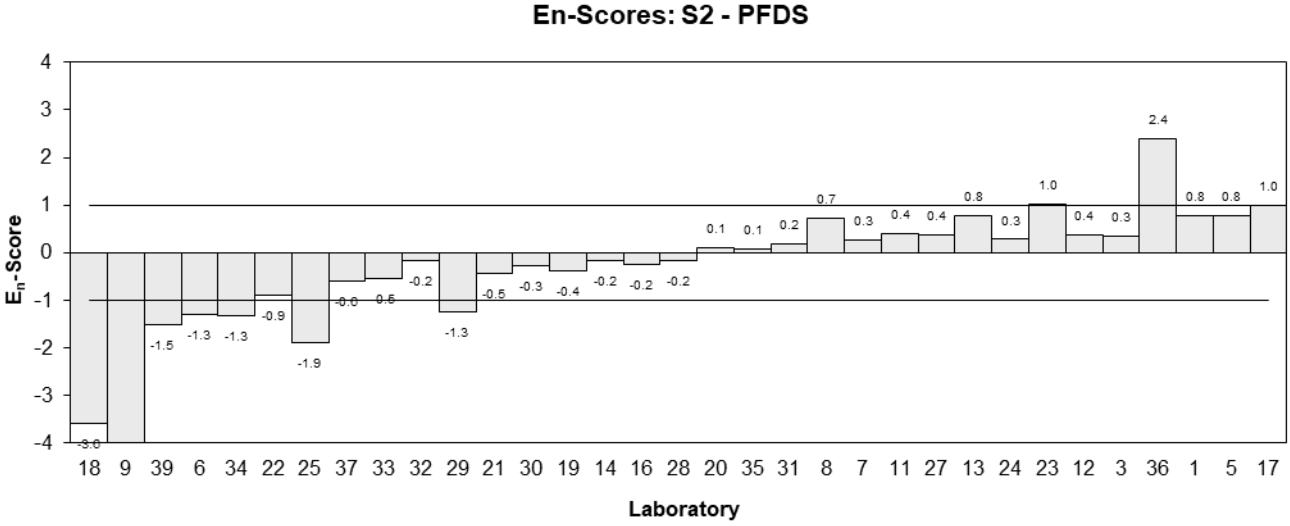

En-Scores: S2 - PFDS
En-Score
Laboratory
18 9 39 6 34 22 25 37 33 32 29 21 30 19 14 16 28 20 35 31 8 7 11 27 13 24 23 12 3 36 1 5 17

Figure 48

Table 53

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	PFDoS
Unit	µg/L

Participant Results

Lab. Code	Result	Uncertainty	Rec
1	NT	NT	NT
2	NT	NT	NT
3	NT	NT	NT
4	NS	NS	NS
5	NT	NT	NT
6	NT	NT	NT
7	<0.1	NR	92
8	0.075	NR	NR
9	0.0131421	0.001314	>75
10	NS	NS	NS
11	0.0903	0.02859	NR
12	NT	NT	NT
13	0.047	0.009	NR
14	NT	NT	NT
15	NS	NS	NS
16	0.065	0.013	96
17	NT	NT	NT
18	NT	NT	NT
19	0.0284	0.008	100
20	NT	NT	NT
21	0.0956	0.036	69
22	NT	NT	NT
23	NT	NT	NT
24	0.087	0.044	NR
25	NT	NT	NT
26	NT	NT	NT
27	0.067	0.021	NR
28	NT	NT	NT
29	0.0249	NR	NR
30	0.05	0.01	52
31	0.087	NR	109.77
32	0.0585	0.1314285	114.180
33	NT	NT	NT
34	NT	NT	NT
35	NT	NT	NT
36	0.093	0.0099	81
37	NT	NT	NT
38	NT	NT	NT
39	0.01569	0.00628	94
40	NS	NS	NS

Statistics

Assigned Value	Not Set	
Spike Value	0.100	0.005
Robust Average	0.060	0.021
Median	0.065	0.021
Mean	0.060	
N	15	
Max	0.0956	
Min	0.0131421	
Robust SD	0.033	
Robust CV	55%	

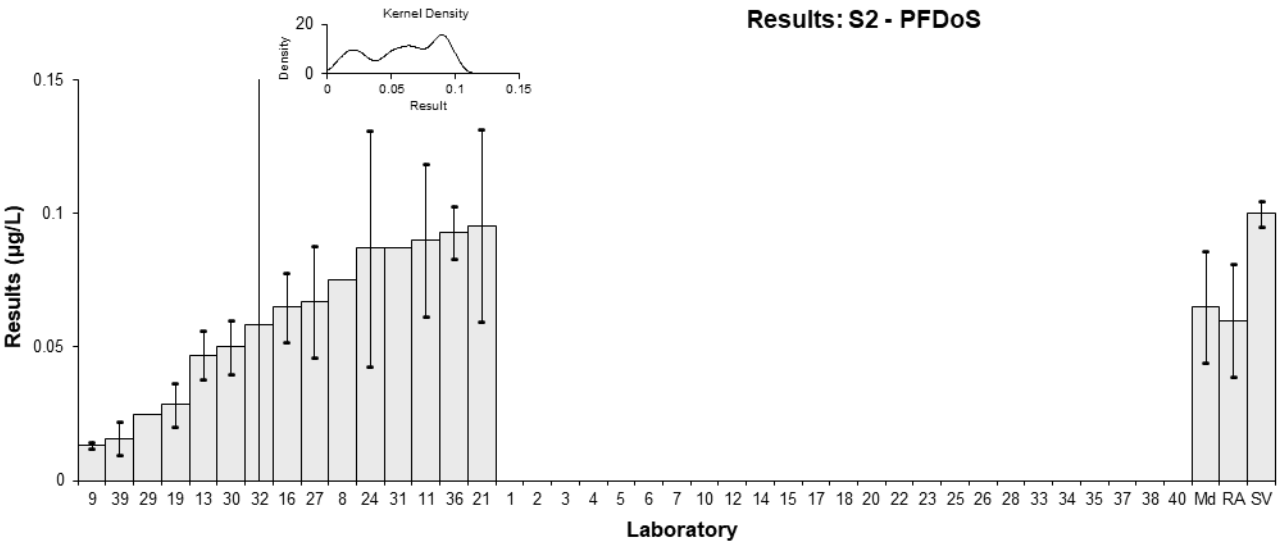

Results: S2 - PFDoS
Kernel Density
Density
20
0
0
0.05
0.1
0.15
Result
Results (µg/L)
0.15
0.1
0.05
0
9 39 29 19 13 30 32 16 27 8 24 31 11 36 21 1 2 3 4 5 6 7 10 12 14 15 17 18 20 22 23 25 26 28 33 34 35 37 38 40 Md RA SV
Laboratory

Figure 49

Table 54

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	PFTrDS
Unit	µg/L

Participant Results

Lab. Code	Result	Uncertainty	Rec
1	NT	NT	NT
2	NT	NT	NT
3	NT	NT	NT
4	NS	NS	NS
5	NT	NT	NT
6	NT	NT	NT
7	NT	NT	NT
8	0.048	NR	NR
9	0.0242518	0.002425	>75
10	NS	NS	NS
11	0.0673	0.02254	NR
12	NT	NT	NT
13	NT	NT	NT
14	NT	NT	NT
15	NS	NS	NS
16	NT	NT	NT
17	NT	NT	NT
18	NT	NT	NT
19	NT	NT	NT
20	NT	NT	NT
21	NT	NR	NT
22	NT	NT	NT
23	NT	NT	NT
24	NT	NT	NT
25	NT	NT	NT
26	NT	NT	NT
27	0.062	0.019	NR
28	NT	NT	NT
29	0.0145	NR	NR
30	NT	NT	NT
31	NT	NT	NT
32	0.056	0.1382768	114.180
33	NT	NT	NT
34	NT	NT	NT
35	NT	NT	NT
36	NT	NT	NT
37	NT	NT	NT
38	NT	NT	NT
39	0.01233	0.00493	76
40	NS	NS	NS

Statistics

Assigned Value	Not Set	
Spike Value	0.100	0.005
Robust Average	0.041	0.025
Median	0.048	0.027
Mean	0.041	
N	7	
Max	0.0673	
Min	0.01233	
Robust SD	0.026	
Robust CV	65%	

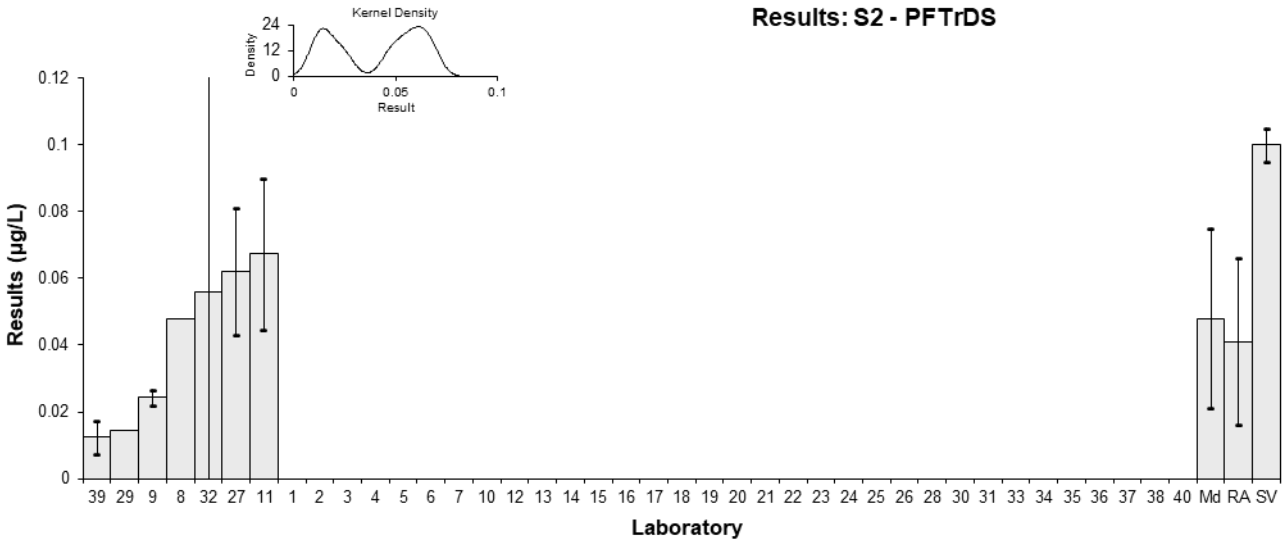

Results: S2 - PFTrDS
Kernel Density
Density
Result
Results (µg/L)
Laboratory
39 29 9 8 32 27 11 1 2 3 4 5 6 7 10 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 28 30 31 33 34 35 36 37 38 40 Md RA SV

Figure 50

Table 55

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	PFOSA
Unit	µg/L

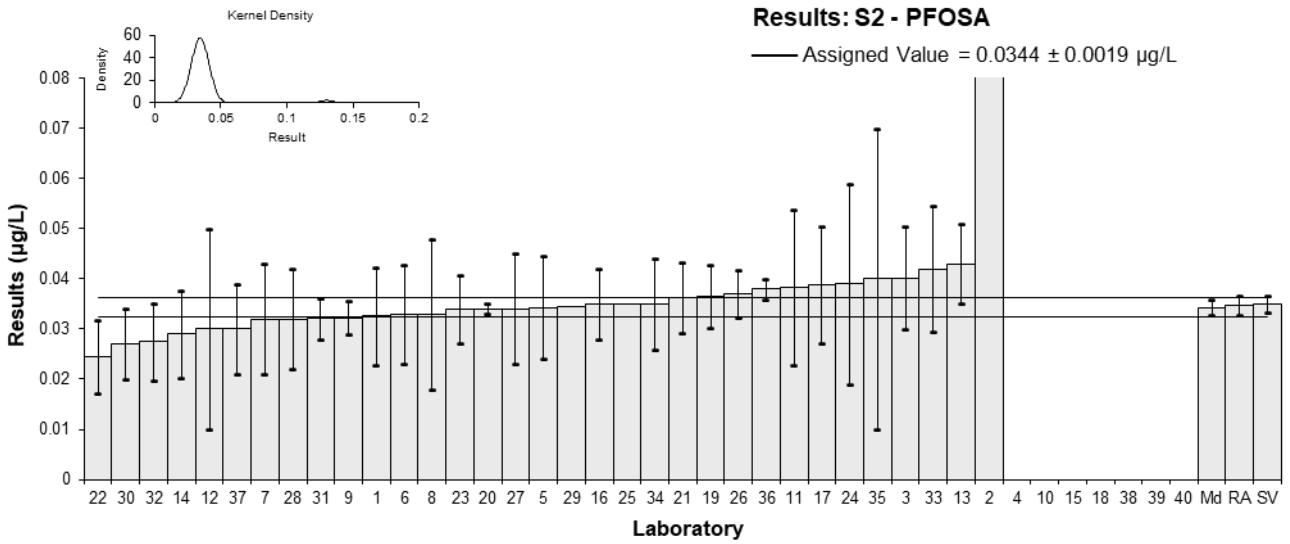
Participant Results

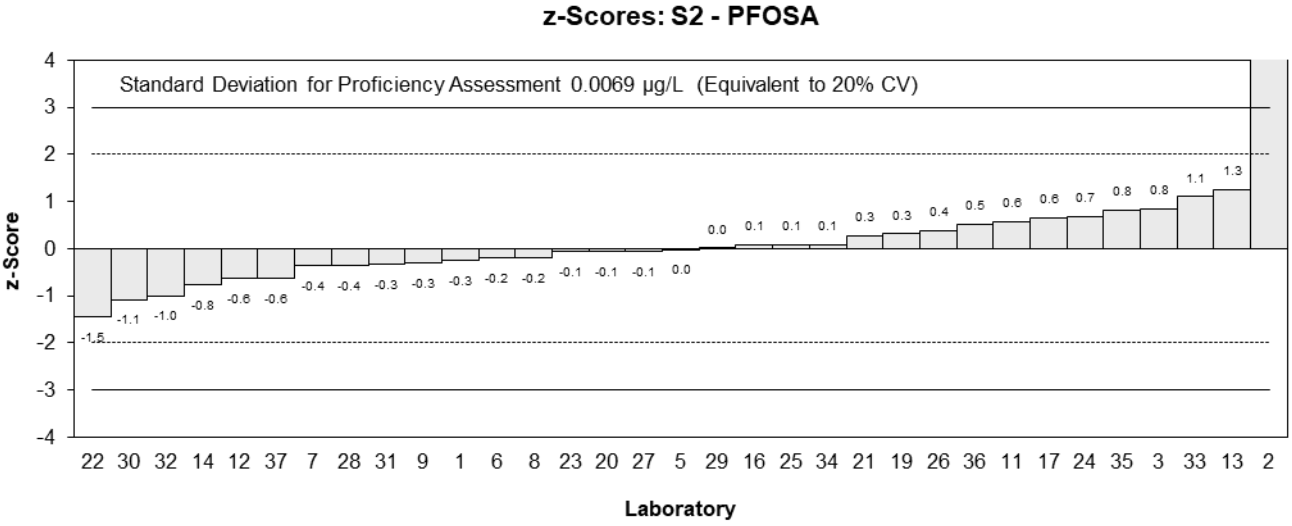
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0326	0.0097	80.4	-0.26	-0.18
2*	0.13	0.03	NR	13.90	3.18
3	0.0402	0.0102	NR	0.84	0.56
4	NS	NS	NS		
5	0.0343	0.0103	55.8	-0.01	-0.01
6	0.033	0.0099	110	-0.20	-0.14
7	0.032	0.011	91	-0.35	-0.21
8	0.033	0.015	96	-0.20	-0.09
9	0.0322827	0.003228	>75	-0.31	-0.57
10	NS	NS	NS		
11	0.0383	0.01545	NR	0.57	0.25
12	0.03	0.02	91	-0.64	-0.22
13	0.043	0.008	93	1.25	1.05
14	0.029	0.0087	109	-0.78	-0.61
15	NS	NS	NS		
16	0.035	0.007	82	0.09	0.08
17	0.0388	0.0116	85.0	0.64	0.37
18	<0.05	NR	NR		
19	0.0365	0.0062	51	0.31	0.32
20	0.034	0.00102	210	-0.06	-0.19
21	0.0362	0.007	80	0.26	0.25
22	0.0244	0.00732	125	-1.45	-1.32
23	0.0339	0.0068	NR	-0.07	-0.07
24	0.039	0.02	113	0.67	0.23
25	0.035	NR	NR	0.09	0.32
26	0.037	0.0047	105	0.38	0.51
27	0.034	0.011	NR	-0.06	-0.04
28	0.032	0.01	110	-0.35	-0.24
29	0.0345	NR	NR	0.01	0.05
30	0.027	0.007	101	-1.08	-1.02
31	0.0321	0.0041	83.62	-0.33	-0.51
32	0.0275	0.0076870	111.037	-1.00	-0.87
33	0.04199	0.0126	56	1.10	0.60
34	0.035	0.009	77	0.09	0.07
35	0.04	0.03	114	0.81	0.19
36	0.038	0.002	75	0.52	1.30
37	0.03	0.009	108	-0.64	-0.48
38	NT	NT	NT		
39	NT	NT	NT		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0344	0.0019
Spike Value	0.0349	0.0017
Robust Average	0.0347	0.0020
Median	0.0343	0.0015
Mean	0.0373	
N	33	
Max	0.13	
Min	0.0244	
Robust SD	0.0046	
Robust CV	13%	


Kernel Density
Density
Result
Results: S2 - PFOSA
Assigned Value = 0.0344 ± 0.0019 µg/L
Results (µg/L)
Laboratory
22 30 32 14 12 37 7 28 31 9 1 6 8 23 20 27 5 29 16 25 34 21 19 26 36 11 17 24 35 3 33 13 2 4 10 15 18 38 39 40 Md RA SV


z-Scores: S2 - PFOSA
Standard Deviation for Proficiency Assessment 0.0069 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 30 32 14 12 37 7 28 31 9 1 6 8 23 20 27 5 29 16 25 34 21 19 26 36 11 17 24 35 3 33 13 2

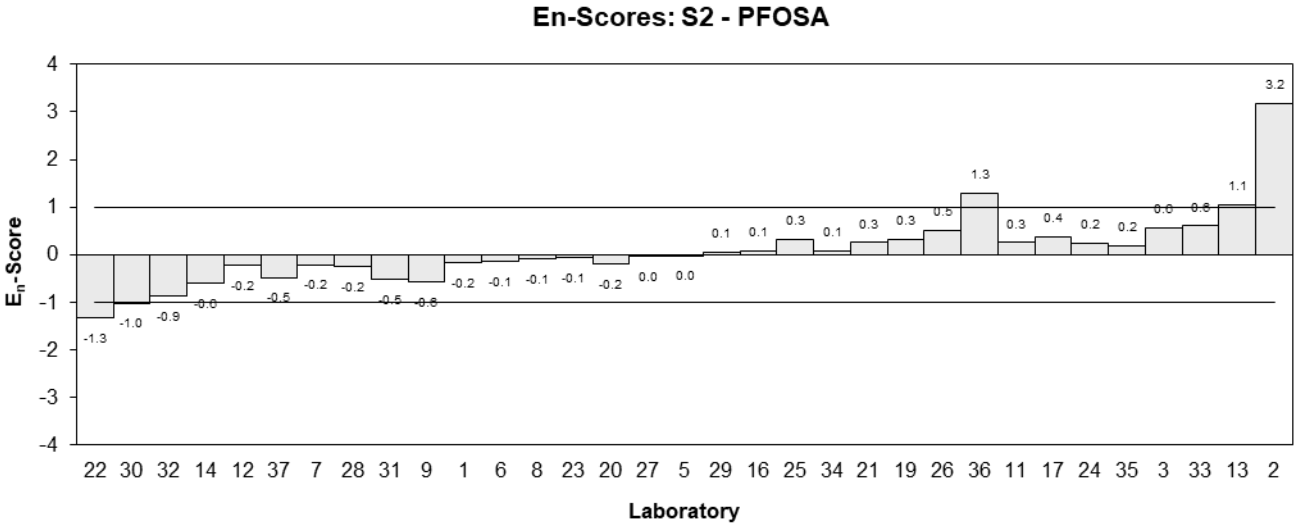

En-Scores: S2 - PFOSA
En-Score
Laboratory
22 30 32 14 12 37 7 28 31 9 1 6 8 23 20 27 5 29 16 25 34 21 19 26 36 11 17 24 35 3 33 13 2

Figure 51

Table 56

Sample Details

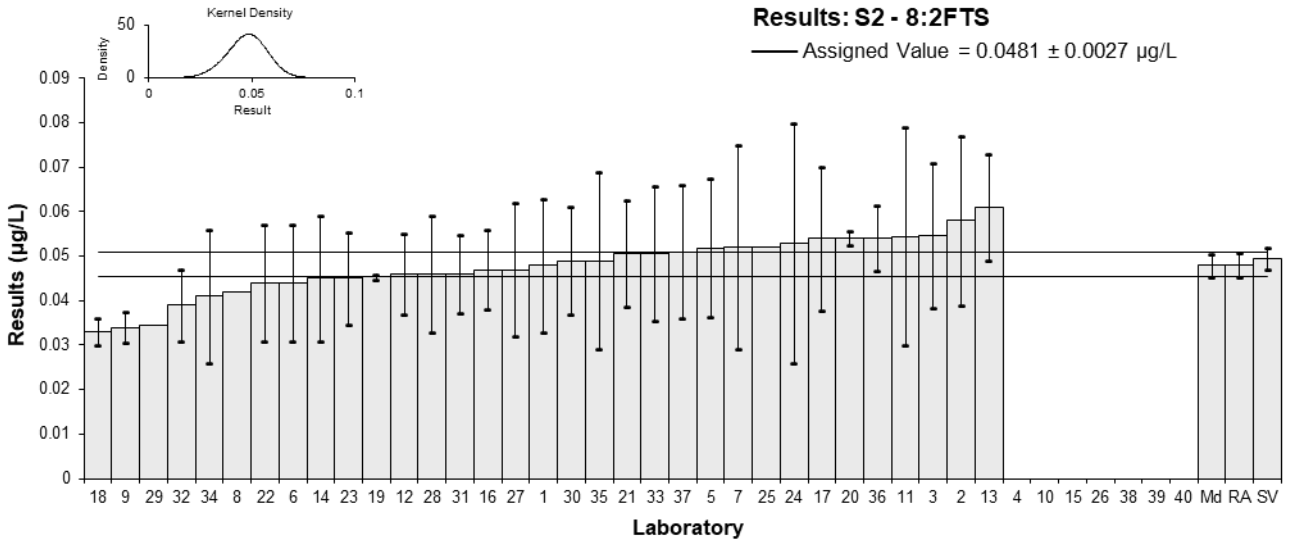
Sample No.	S2
Matrix	River Water
Analyte	8:2FTS
Unit	µg/L

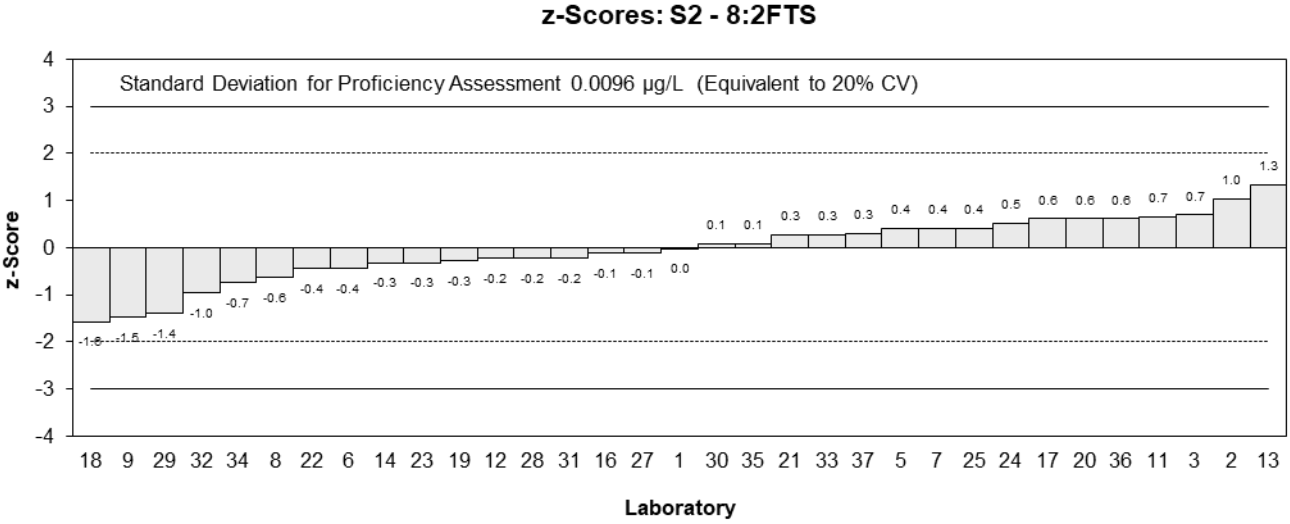
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.048	0.015	176.5	-0.01	-0.01
2	0.058	0.019	NR	1.03	0.52
3	0.0547	0.0162	NR	0.69	0.40
4	NS	NS	NS		
5	0.0519	0.0156	76.6	0.40	0.24
6	0.044	0.0131	100	-0.43	-0.31
7	0.052	0.023	86	0.41	0.17
8	0.042	NR	50	-0.63	-2.26
9	0.0339920	0.003399	>75	-1.47	-3.25
10	NS	NS	NS		
11	0.0544	0.02448	NR	0.65	0.26
12	0.046	0.009	149	-0.22	-0.22
13	0.061	0.012	105	1.34	1.05
14	0.045	0.014	147	-0.32	-0.22
15	NS	NS	NS		
16	0.047	0.009	100	-0.11	-0.12
17	0.0540	0.0162	72.8	0.61	0.36
18	0.033	0.003	107	-1.57	-3.74
19	0.0453	0.0006	156	-0.29	-1.01
20	0.054	0.00162	140	0.61	1.87
21	0.0506	0.012	279	0.26	0.20
22	0.0439	0.01317	100	-0.44	-0.31
23	0.045	0.0104	NR	-0.32	-0.29
24	0.053	0.027	114	0.51	0.18
25	0.052	NR	NR	0.41	1.44
26	<0.10	NR	83		
27	0.047	0.015	NR	-0.11	-0.07
28	0.046	0.013	119	-0.22	-0.16
29	0.0346	NR	NR	-1.40	-5.00
30	0.049	0.012	149	0.09	0.07
31	0.046	0.0089	239.89	-0.22	-0.23
32	0.039	0.0081332	115.394	-0.95	-1.06
33	0.0506	0.0152	97	0.26	0.16
34	0.041	0.015	114	-0.74	-0.47
35	0.049	0.02	117	0.09	0.04
36	0.054	0.0074	92	0.61	0.75
37	0.051	0.015	114	0.30	0.19
38	NT	NT	NT		
39	NT	NT	NT		
40	NS	NS	NS		

Statistics

Assigned Value	0.0481	0.0027
Spike Value	0.0495	0.0025
Robust Average	0.0481	0.0027
Median	0.0480	0.0026
Mean	0.0478	
N	33	
Max	0.061	
Min	0.033	
Robust SD	0.0062	
Robust CV	13%	


Kernel Density
Density
50
0
0
0.05
0.1
Result
Results: S2 - 8:2FTS
Assigned Value = 0.0481 ± 0.0027 µg/L
Results (µg/L)
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
18 9 29 32 34 8 22 6 14 23 19 12 28 31 16 27 1 30 35 21 33 37 5 7 25 24 17 20 36 11 3 2 13 4 10 15 26 38 39 40 Md RA SV
Laboratory


z-Scores: S2 - 8:2FTS
Standard Deviation for Proficiency Assessment 0.0096 µg/L (Equivalent to 20% CV)
z-Score
4
3
2
1
0
-1
-2
-3
-4
-1.6 -1.5 -1.4 -1.0 -0.7 -0.6 -0.4 -0.4 -0.3 -0.3 -0.3 -0.2 -0.2 -0.2 -0.1 -0.1 0.0 0.1 0.1 0.3 0.3 0.3 0.4 0.4 0.4 0.5 0.6 0.6 0.6 0.7 0.7 1.0 1.3
18 9 29 32 34 8 22 6 14 23 19 12 28 31 16 27 1 30 35 21 33 37 5 7 25 24 17 20 36 11 3 2 13
Laboratory

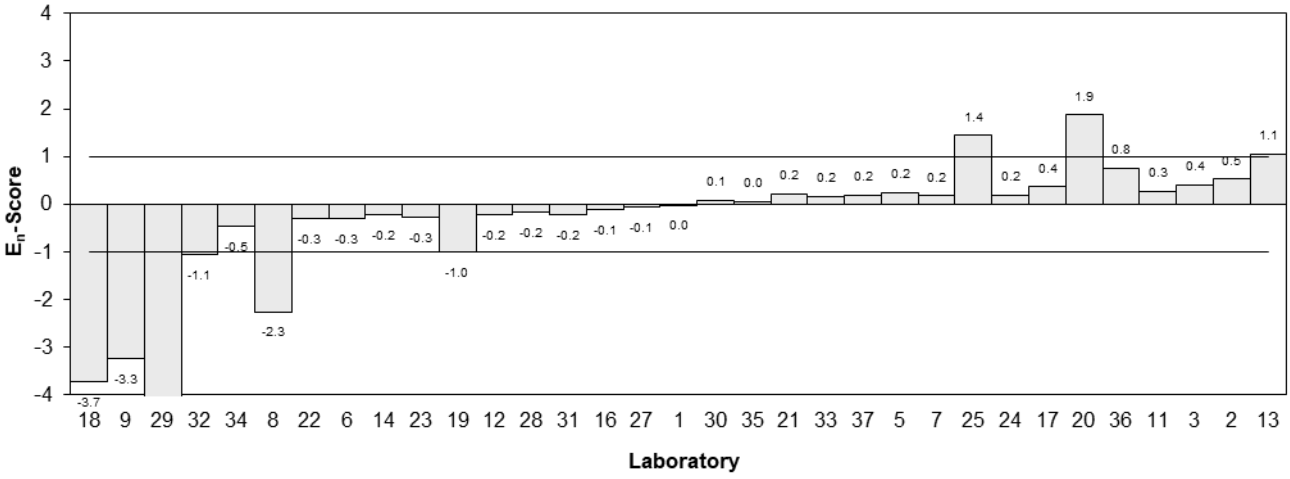

En-Scores: S2 - 8:2FTS
En-Score
4
3
2
1
0
-1
-2
-3
-4
-3.7 -3.3 -1.1 -0.5 -2.3 -0.3 -0.3 -0.2 -0.3 -1.0 -0.2 -0.2 -0.2 -0.1 -0.1 0.0 0.1 0.0 0.2 0.2 0.2 0.2 0.2 1.4 0.2 0.4 1.9 0.8 0.3 0.4 0.5 1.1
18 9 29 32 34 8 22 6 14 23 19 12 28 31 16 27 1 30 35 21 33 37 5 7 25 24 17 20 36 11 3 2 13
Laboratory

Figure 52

Table 57

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	10:2FTS
Unit	µg/L

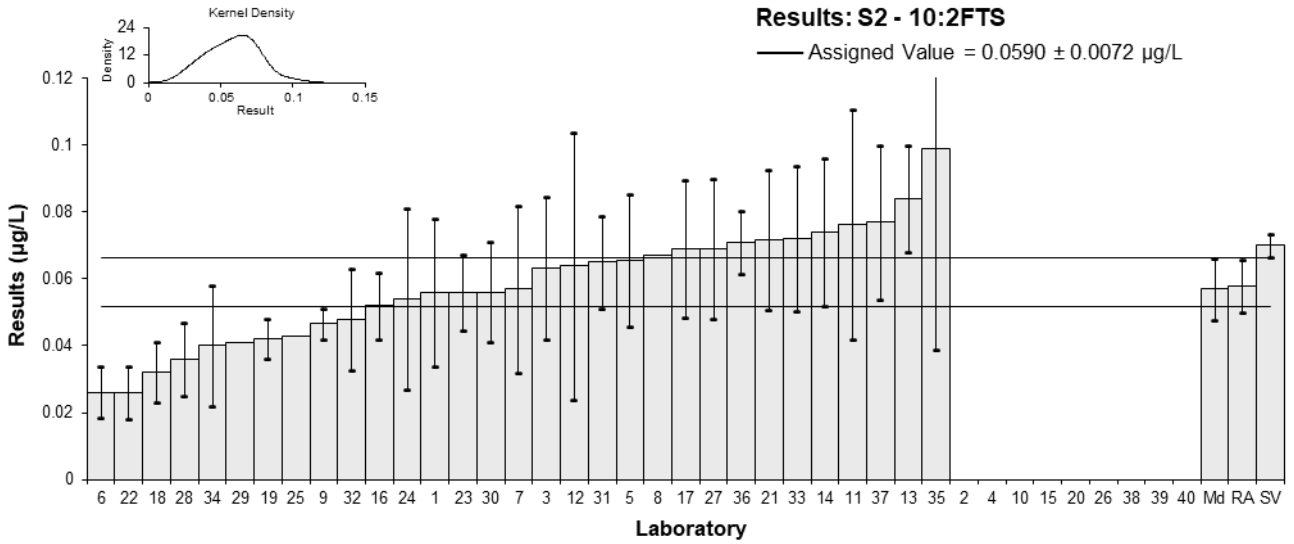
Participant Results

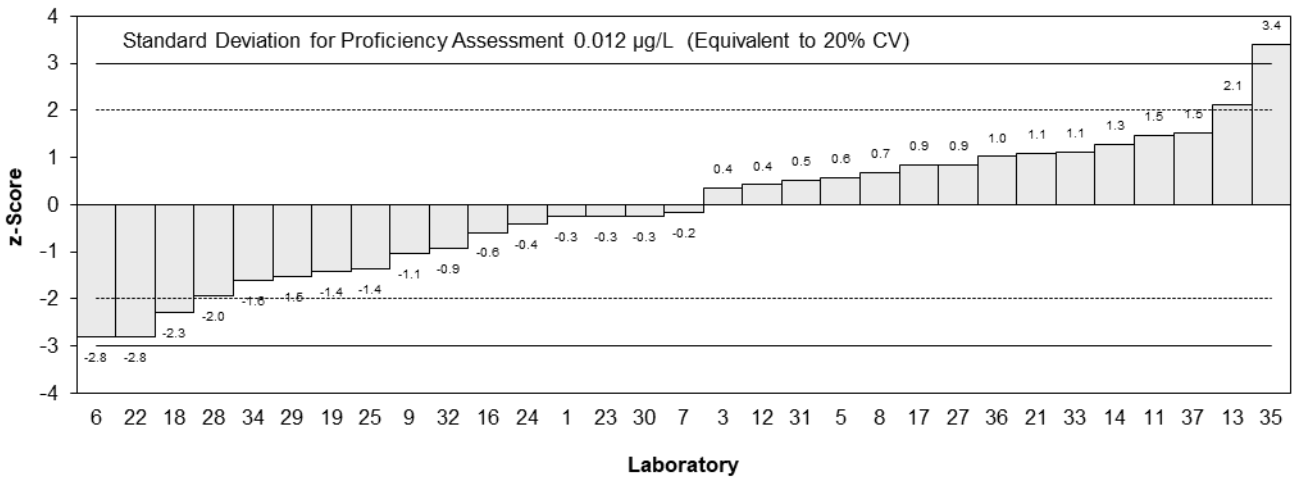
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.056	0.022	176.5	-0.25	-0.13
2	NT	NT	NT		
3	0.0632	0.0213	NR	0.36	0.19
4	NS	NS	NS		
5	0.0656	0.0197	96.2	0.56	0.31
6*	0.026	0.0076575	105	-2.80	-3.14
7	0.057	0.025	92	-0.17	-0.08
8	0.067	NR	116	0.68	1.11
9	0.0466629	0.004666	>75	-1.05	-1.44
10	NS	NS	NS		
11	0.0763	0.03434	NR	1.47	0.49
12	0.064	0.04	156	0.42	0.12
13	0.084	0.016	80	2.12	1.42
14	0.074	0.022	108	1.27	0.65
15	NS	NS	NS		
16	0.052	0.010	NR	-0.59	-0.57
17	0.0690	0.0206	93.2	0.85	0.46
18	0.032	0.009	102	-2.29	-2.34
19	0.0421	0.0058	156	-1.43	-1.83
20	NT	NT	NT		
21	0.0717	0.021	183	1.08	0.57
22*	0.026	0.0078	110	-2.80	-3.11
23	0.056	0.0114	NR	-0.25	-0.22
24	0.054	0.027	NR	-0.42	-0.18
25	0.043	NR	NR	-1.36	-2.22
26	<0.025	NR	102		
27	0.069	0.021	NR	0.85	0.45
28	0.036	0.011	NR	-1.95	-1.75
29	0.041	NR	NR	-1.53	-2.50
30	0.056	0.015	124	-0.25	-0.18
31	0.065	0.0139	208.72	0.51	0.38
32	0.048	0.0151396	112.113	-0.93	-0.66
33	0.0722	0.0217	74	1.12	0.58
34	0.040	0.018	NR	-1.61	-0.98
35*	0.099	0.06	117	3.39	0.66
36	0.071	0.0094	92	1.02	1.01
37	0.077	0.023	112	1.53	0.75
38	NT	NT	NT		
39	NT	NT	NT		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0590	0.0072
Spike Value	0.0700	0.0035
Robust Average	0.0579	0.0080
Median	0.0570	0.0093
Mean	0.0581	
N	31	
Max	0.099	
Min	0.026	
Robust SD	0.018	
Robust CV	31%	


Kernel Density
Density
Result
Results: S2 - 10:2FTS
Assigned Value = 0.0590 ± 0.0072 µg/L
Results (µg/L)
Laboratory
6 22 18 28 34 29 19 25 9 32 16 24 1 23 30 7 3 12 31 5 8 17 27 36 21 33 14 11 37 13 35 2 4 10 15 20 26 38 39 40 Md RA SV


z-Scores: S2 - 10:2FTS
Standard Deviation for Proficiency Assessment 0.012 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
6 22 18 28 34 29 19 25 9 32 16 24 1 23 30 7 3 12 31 5 8 17 27 36 21 33 14 11 37 13 35

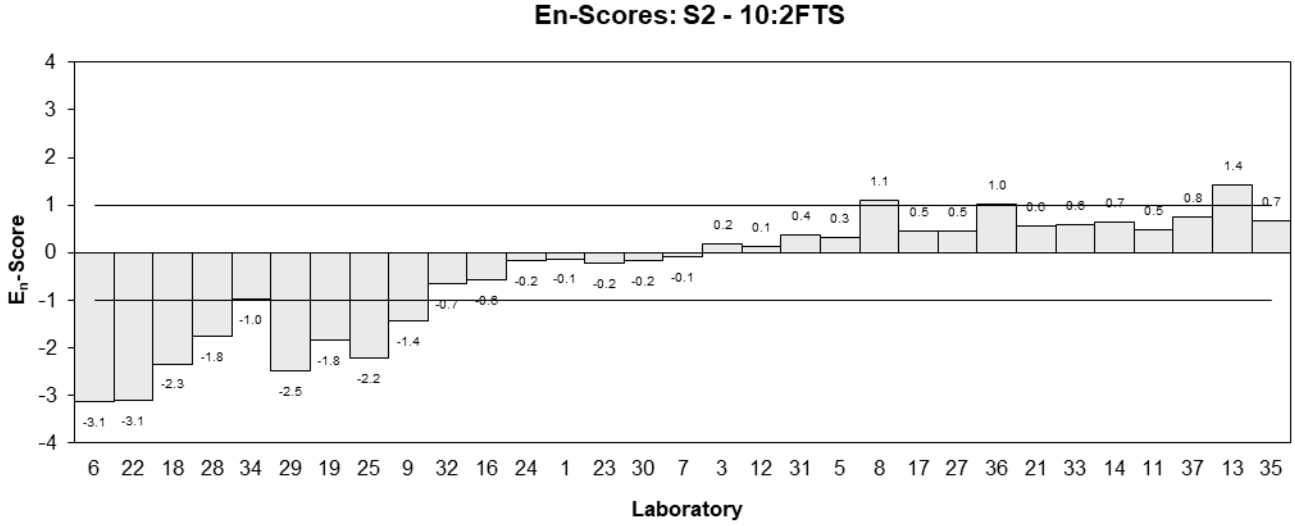

En-Scores: S2 - 10:2FTS
En-Score
Laboratory
6 22 18 28 34 29 19 25 9 32 16 24 1 23 30 7 3 12 31 5 8 17 27 36 21 33 14 11 37 13 35

Figure 53

Table 58

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	6:2diPAP
Unit	µg/L

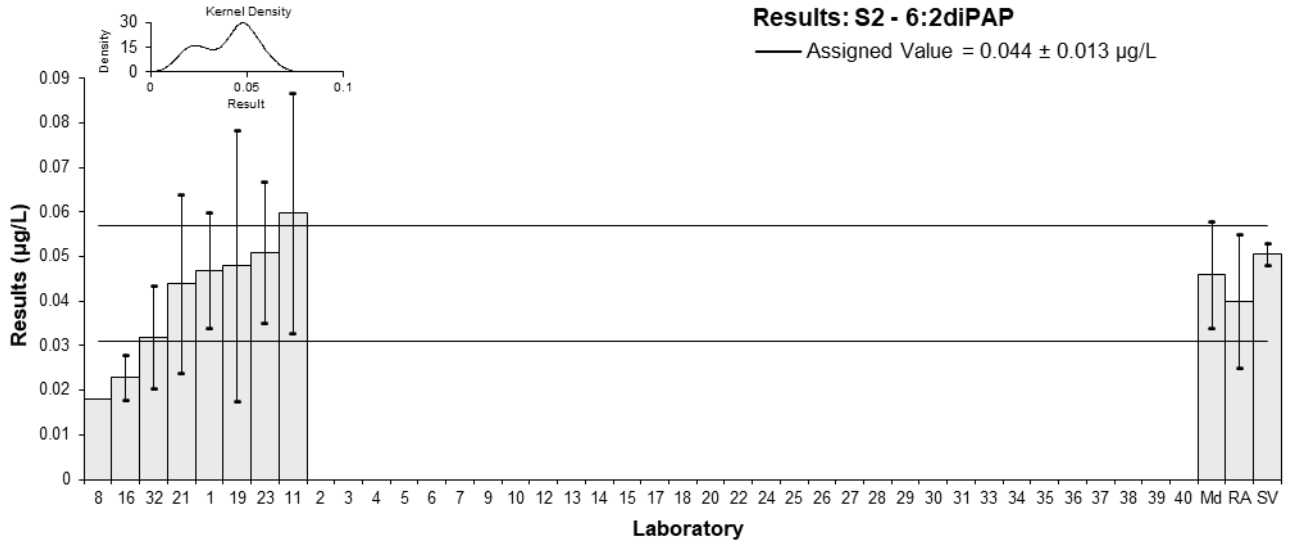
Participant Results

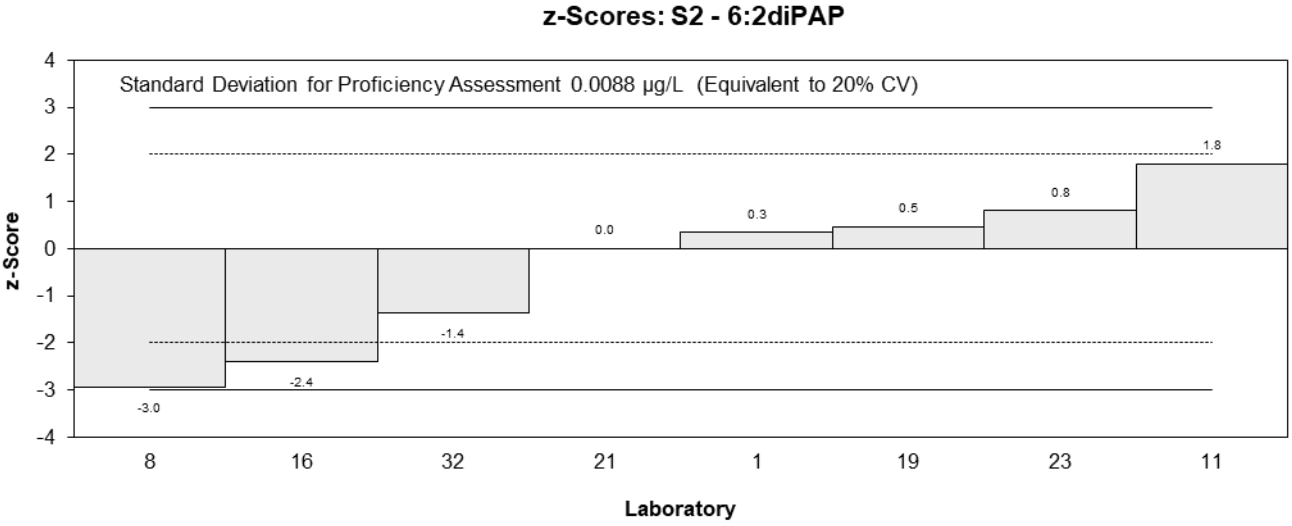
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.047	0.013	153.33	0.34	0.16
2	NT	NT	NT		
3	NT	NT	NT		
4	NS	NS	NS		
5	NT	NT	NT		
6	NT	NT	NT		
7	NT	NT	NT		
8*	0.018	NR	103	-2.95	-2.00
9	NT	NT	NT		
10	NS	NS	NS		
11	0.0598	0.02691	NR	1.80	0.53
12	NT	NT	NT		
13	NT	NT	NT		
14	NT	NT	NT		
15	NS	NS	NS		
16	0.023	0.005	NR	-2.39	-1.51
17	NT	NT	NT		
18	NT	NT	NT		
19	0.048	0.0303	77	0.45	0.12
20	NT	NT	NT		
21	0.044	0.02	116	0.00	0.00
22	NT	NT	NT		
23	0.051	0.0159	NR	0.80	0.34
24	NT	NT	NT		
25	NT	NT	NT		
26	NT	NT	NT		
27	NT	NT	NT		
28	NT	NT	NT		
29	<0.025	NR	NR		
30	<0.05	NR	NR		
31	<0.025	NR	251.63		
32	0.032	0.0115345	97.8682	-1.36	-0.69
33	NT	NT	NT		
34	NT	NT	NT		
35	NT	NT	NT		
36	NT	NT	NT		
37	NT	NT	NT		
38	NT	NT	NT		
39	NT	NT	NT		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.044	0.013
Spike Value	0.0506	0.0025
Robust Average	0.040	0.015
Median	0.046	0.012
Mean	0.040	
N	8	
Max	0.0598	
Min	0.018	
Robust SD	0.016	
Robust CV	41%	


Kernel Density
Density
Result
Results: S2 - 6:2diPAP
Assigned Value = 0.044 ± 0.013 µg/L
Results (µg/L)
Laboratory
8 16 32 21 1 19 23 11 2 3 4 5 6 7 9 10 12 13 14 15 17 18 20 22 24 25 26 27 28 29 30 31 33 34 35 36 37 38 39 40 Md RA SV


z-Scores: S2 - 6:2diPAP
Standard Deviation for Proficiency Assessment 0.0088 µg/L (Equivalent to 20% CV)
z-Score
-3.0
-2.4
-1.4
0.0
0.3
0.5
0.8
1.8
Laboratory
8 16 32 21 1 19 23 11

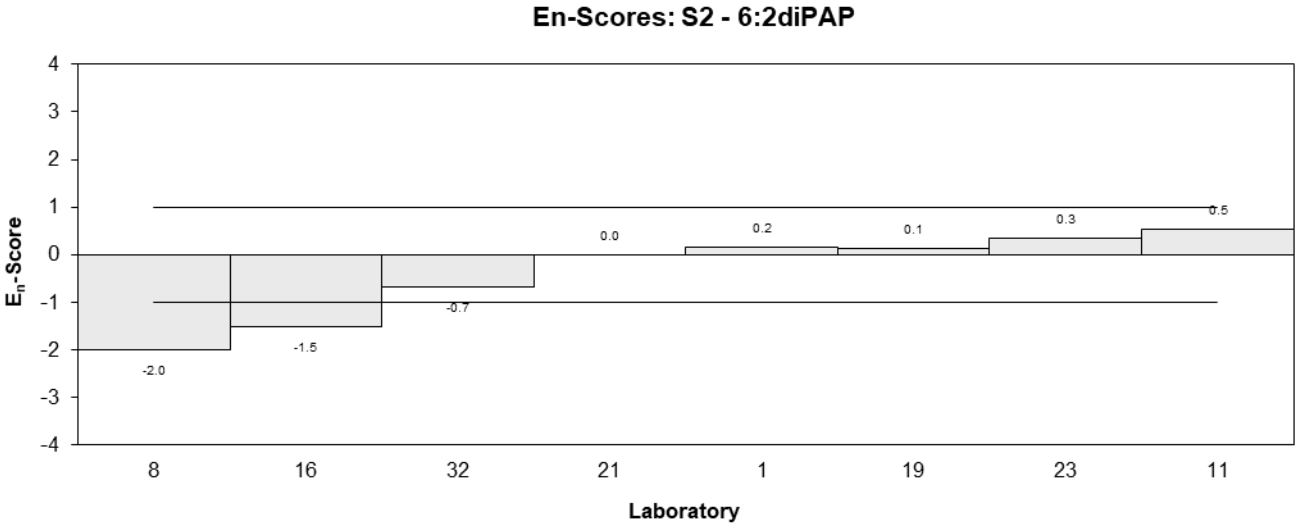

En-Scores: S2 - 6:2diPAP
En-Score
-2.0
-1.5
-0.7
0.0
0.2
0.1
0.3
0.5
Laboratory
8 16 32 21 1 19 23 11

Figure 54

Table 59

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	8:2diPAP
Unit	µg/L

Participant Results

Lab. Code	Result	Uncertainty	Rec
1	0.048	0.013	94.89
2	NT	NT	NT
3	0.0316	0.0102	NR
4	NS	NS	NS
5	NT	NT	NT
6	NT	NT	NT
7	NT	NT	NT
8	0.031	NR	111
9	0.0196899	0.001969	>75
10	NS	NS	NS
11	0.0672	0.03024	NR
12	NT	NT	NT
13	0.022	0.005	66
14	NT	NT	NT
15	NS	NS	NS
16	0.018	0.004	110
17	NT	NT	NT
18	NT	NT	NT
19	0.0428	0.0005	118
20	NT	NT	NT
21	0.0442	0.011	37
22	NT	NT	NT
23	0.044	0.0105	NR
24	0.035	0.018	NR
25	NT	NT	NT
26	NT	NT	NT
27	NT	NT	NT
28	NT	NT	NT
29	NR	NR	NR
30	<0.05	NR	NR
31	<0.025	NR	243.82
32	0.034	0.0122366	66.5522
33	NT	NT	NT
34	NT	NT	NT
35	NT	NT	NT
36	NT	NT	NT
37	NT	NT	NT
38	NT	NT	NT
39	NT	NT	NT
40	NS	NS	NS

Statistics

Assigned Value	Not Set	
Spike Value	0.0499	0.0025
Robust Average	0.0355	0.0097
Median	0.035	0.010
Mean	0.0365	
N	12	
Max	0.0672	
Min	0.018	
Robust SD	0.013	
Robust CV	38%	

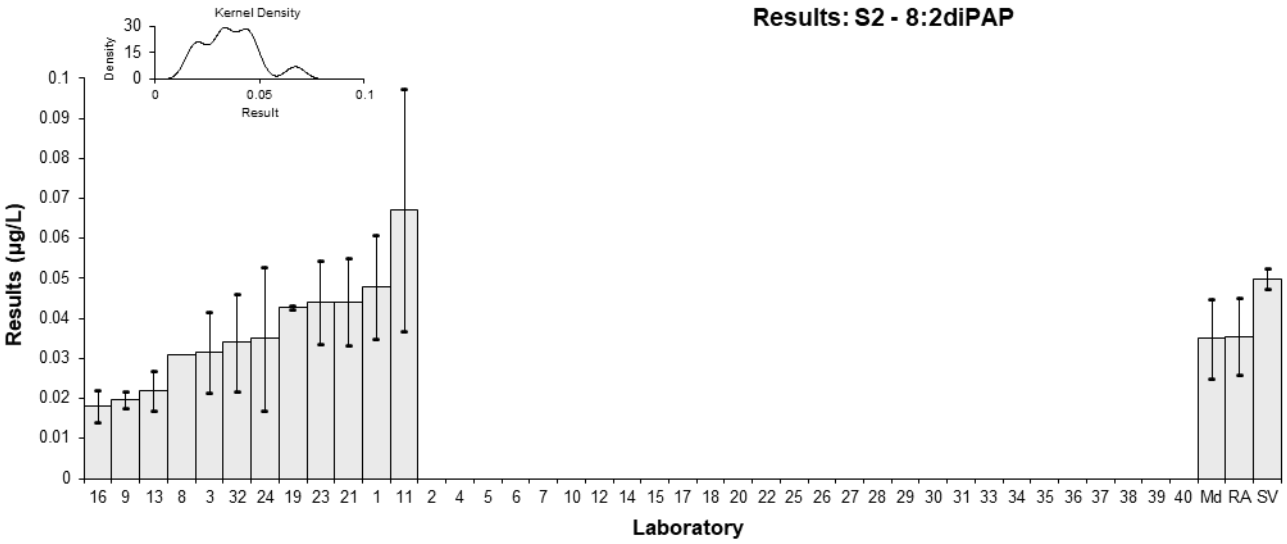

Results: S2 - 8:2diPAP
Kernel Density
Density
30
15
0
0
0.05
0.1
Result
Results (µg/L)
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
16 9 13 8 3 32 24 19 23 21 1 11 2 4 5 6 7 10 12 14 15 17 18 20 22 25 26 27 28 29 30 31 33 34 35 36 37 38 39 40 Md RA SV
Laboratory

Figure 55

Table 60

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	3:3FTCA
Unit	µg/L

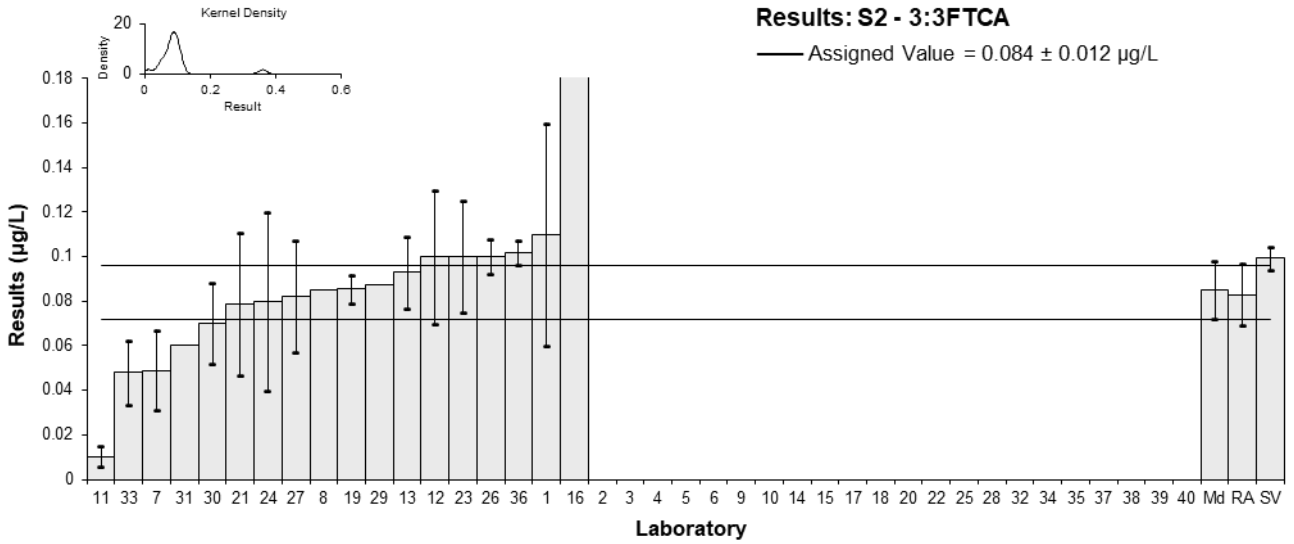
Participant Results

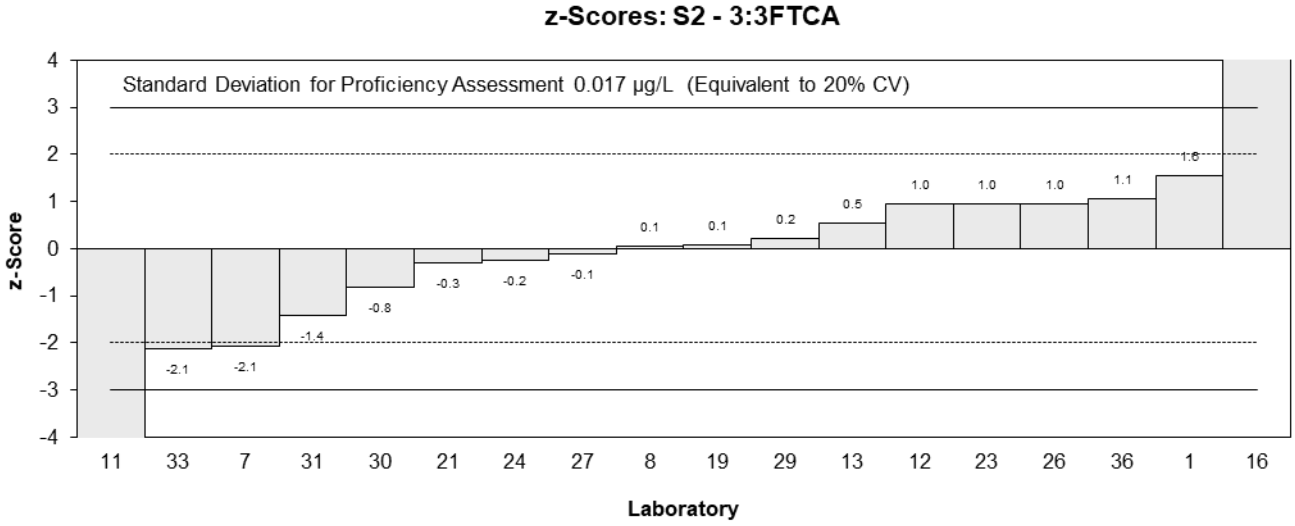
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.11	0.05	54.85	1.55	0.51
2	NT	NT	NT		
3	NT	NT	NT		
4	NS	NS	NS		
5	NT	NT	NT		
6	NT	NT	NT		
7	0.049	0.018	92	-2.08	-1.62
8	0.085	NR	NR	0.06	0.08
9	NT	NT	NT		
10	NS	NS	NS		
11*	0.0103	0.00463	NR	-4.39	-5.73
12	0.1	0.03	84	0.95	0.50
13	0.093	0.016	NR	0.54	0.45
14	NT	NT	NT		
15	NS	NS	NS		
16*	0.36	0.07	NR	16.43	3.89
17	NT	NT	NT		
18	NT	NT	NT		
19	0.0855	0.0064	106	0.09	0.11
20	NT	NT	NT		
21	0.0789	0.032	85	-0.30	-0.15
22	NT	NT	NT		
23	0.1	0.0250	NR	0.95	0.58
24	0.08	0.04	NR	-0.24	-0.10
25	NT	NT	NT		
26	0.10	0.0076	105	0.95	1.13
27	0.082	0.025	NR	-0.12	-0.07
28	NT	NT	NT		
29	0.0876	NR	NR	0.21	0.30
30	0.07	0.018	88	-0.83	-0.65
31	0.06	NR	92.01	-1.43	-2.00
32	NR	NR	NR		
33	0.04805	0.0144	NR	-2.14	-1.92
34	NT	NT	NT		
35	NT	NT	NT		
36	0.102	0.0054	82	1.07	1.37
37	NT	NT	NT		
38	NT	NT	NT		
39	NT	NT	NT		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.084	0.012
Spike Value	0.0993	0.0050
Robust Average	0.083	0.014
Median	0.085	0.013
Mean	0.095	
N	18	
Max	0.36	
Min	0.0103	
Robust SD	0.024	
Robust CV	29%	


Kernel Density
Density
Result
Results: S2 - 3:3FTCA
Assigned Value = 0.084 ± 0.012 µg/L
Results (µg/L)
Laboratory
11 33 7 31 30 21 24 27 8 19 29 13 12 23 26 36 1 16 2 3 4 5 6 9 10 14 15 17 18 20 22 25 28 32 34 35 37 38 39 40 Md RA SV


z-Scores: S2 - 3:3FTCA
Standard Deviation for Proficiency Assessment 0.017 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
11 33 7 31 30 21 24 27 8 19 29 13 12 23 26 36 1 16

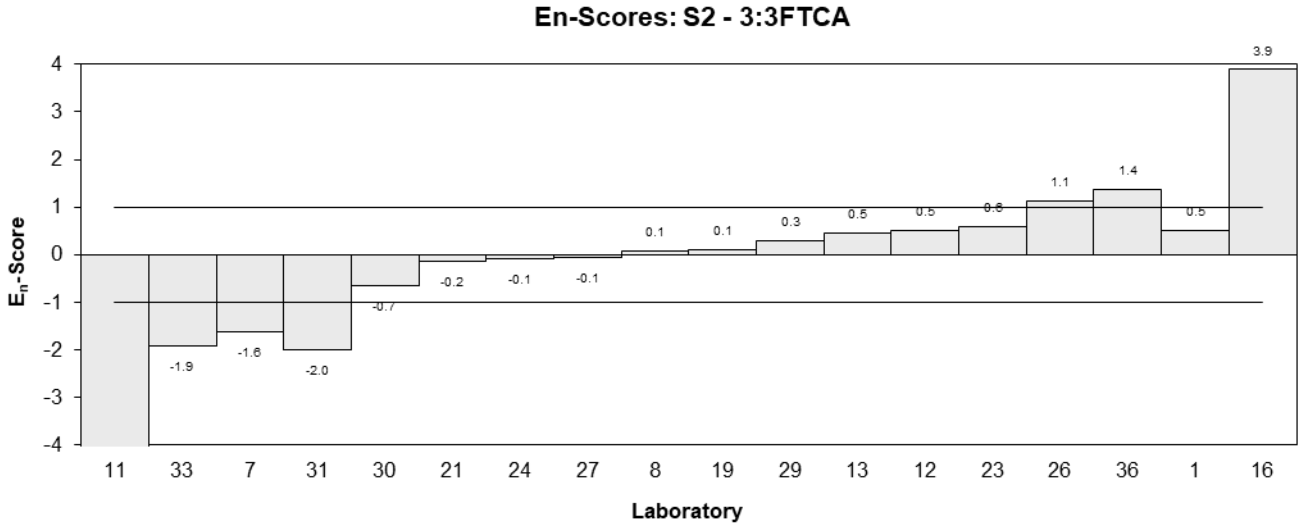

En-Scores: S2 - 3:3FTCA
En-Score
Laboratory
11 33 7 31 30 21 24 27 8 19 29 13 12 23 26 36 1 16

Figure 56

Table 61

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	ADONA
Unit	µg/L

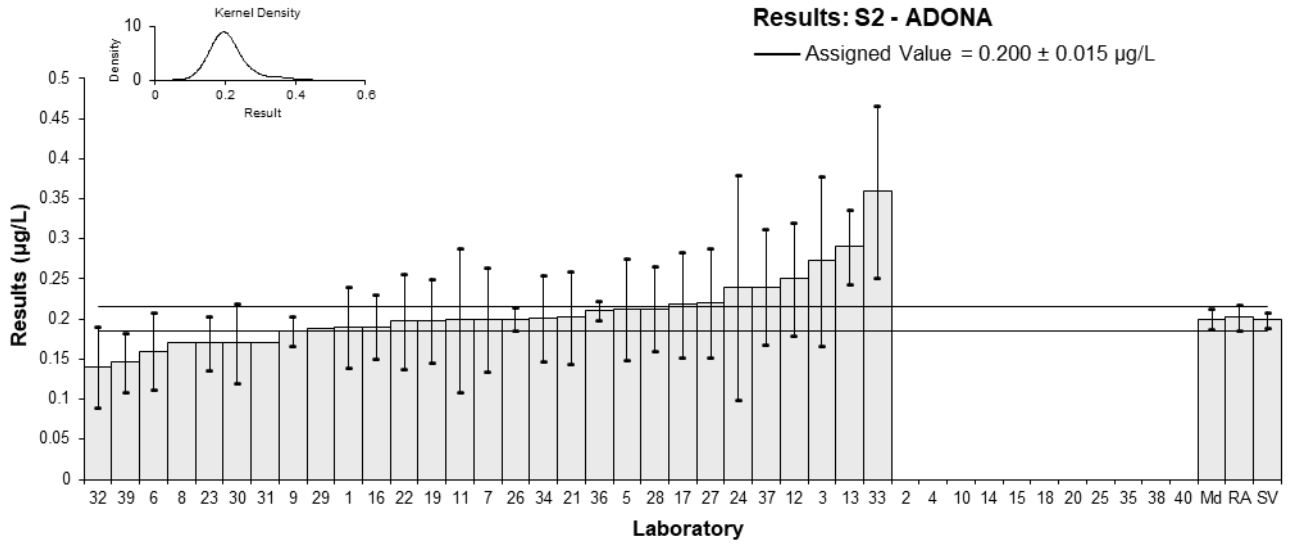
Participant Results

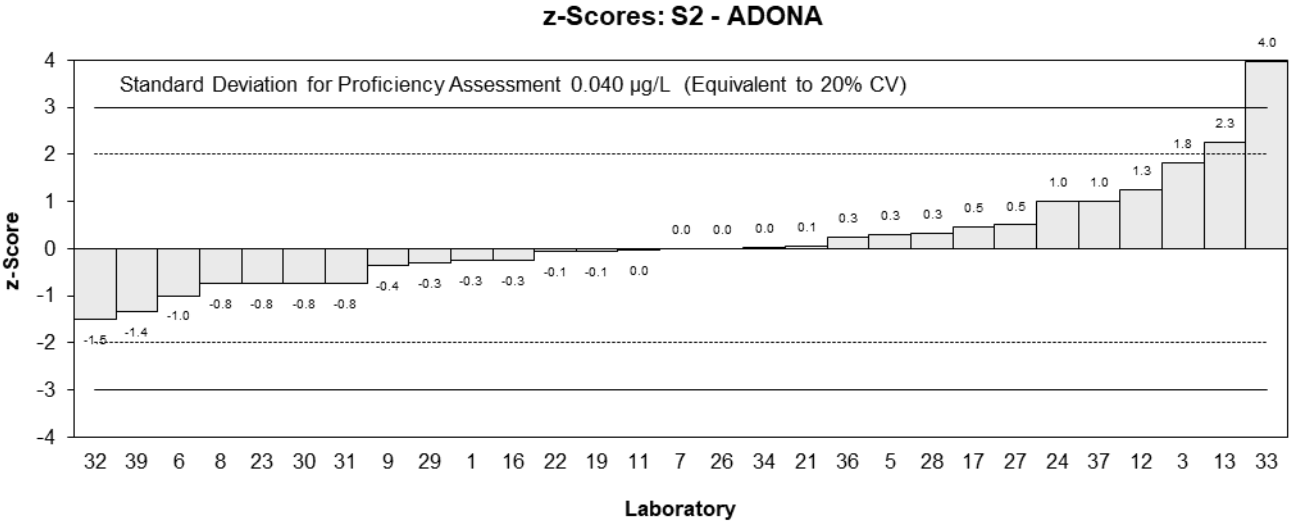
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.19	0.05	61.3	-0.25	-0.19
2	NT	NT	NT		
3	0.2729	0.1055	NR	1.82	0.68
4	NS	NS	NS		
5	0.2120	0.0636	89.3	0.30	0.18
6	0.16	0.0482575	90	-1.00	-0.79
7	0.2	0.065	88	0.00	0.00
8	0.17	NR	NR	-0.75	-2.00
9	0.1854879	0.018549	>75	-0.36	-0.61
10	NS	NS	NS		
11	0.199	0.09	NR	-0.03	-0.01
12	0.25	0.07	64	1.25	0.70
13	0.29	0.047	NR	2.25	1.82
14	NT	NT	NT		
15	NS	NS	NS		
16	0.19	0.04	NR	-0.25	-0.23
17	0.2182	0.0655	96.6	0.45	0.27
18	NT	NT	NT		
19	0.198	0.052	90	-0.05	-0.04
20	NT	NT	NT		
21	0.202	0.058	73	0.05	0.03
22	0.1974	0.05922	42	-0.07	-0.04
23	0.17	0.0340	NR	-0.75	-0.81
24	0.24	0.14	NR	1.00	0.28
25	NT	NT	NT		
26	0.20	0.014	108	0.00	0.00
27	0.22	0.068	NR	0.50	0.29
28	0.213	0.053	NR	0.32	0.24
29	0.188	NR	NR	-0.30	-0.80
30	0.17	0.05	99	-0.75	-0.57
31	0.17	NR	55.22	-0.75	-2.00
32	0.14	0.0507520	139.875	-1.50	-1.13
33*	0.35908	0.1077	NR	3.98	1.46
34	0.201	0.054	NR	0.03	0.02
35	NT	NT	NT		
36	0.21	0.012	81	0.25	0.52
37	0.24	0.072	108	1.00	0.54
38	NT	NT	NT		
39	0.14589	0.03647	104	-1.35	-1.37
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.200	0.015
Spike Value	0.199	0.010
Robust Average	0.202	0.016
Median	0.200	0.013
Mean	0.207	
N	29	
Max	0.35908	
Min	0.14	
Robust SD	0.035	
Robust CV	17%	


Kernel Density
Density
Result
Results: S2 - ADONA
Assigned Value = 0.200 ± 0.015 µg/L
Results (µg/L)
Laboratory
32 39 6 8 23 30 31 9 29 1 16 22 19 11 7 26 34 21 36 5 28 17 27 24 37 12 3 13 33 2 4 10 14 15 18 20 25 35 38 40 Md RA SV


z-Scores: S2 - ADONA
Standard Deviation for Proficiency Assessment 0.040 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
32 39 6 8 23 30 31 9 29 1 16 22 19 11 7 26 34 21 36 5 28 17 27 24 37 12 3 13 33

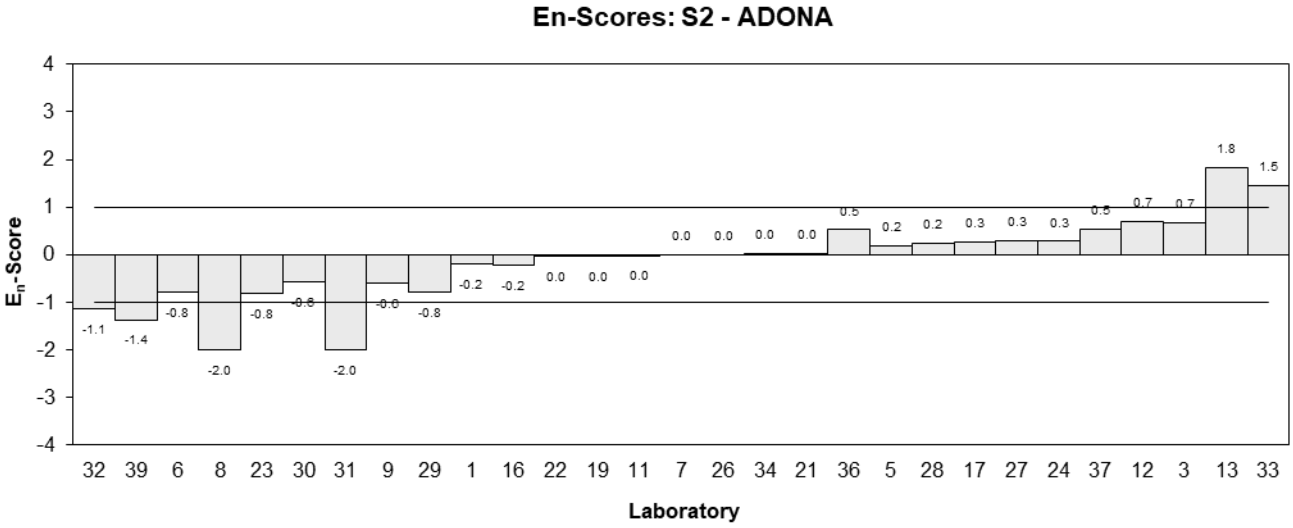

En-Scores: S2 - ADONA
En-Score
Laboratory
32 39 6 8 23 30 31 9 29 1 16 22 19 11 7 26 34 21 36 5 28 17 27 24 37 12 3 13 33

Figure 57

Table 62

Sample Details

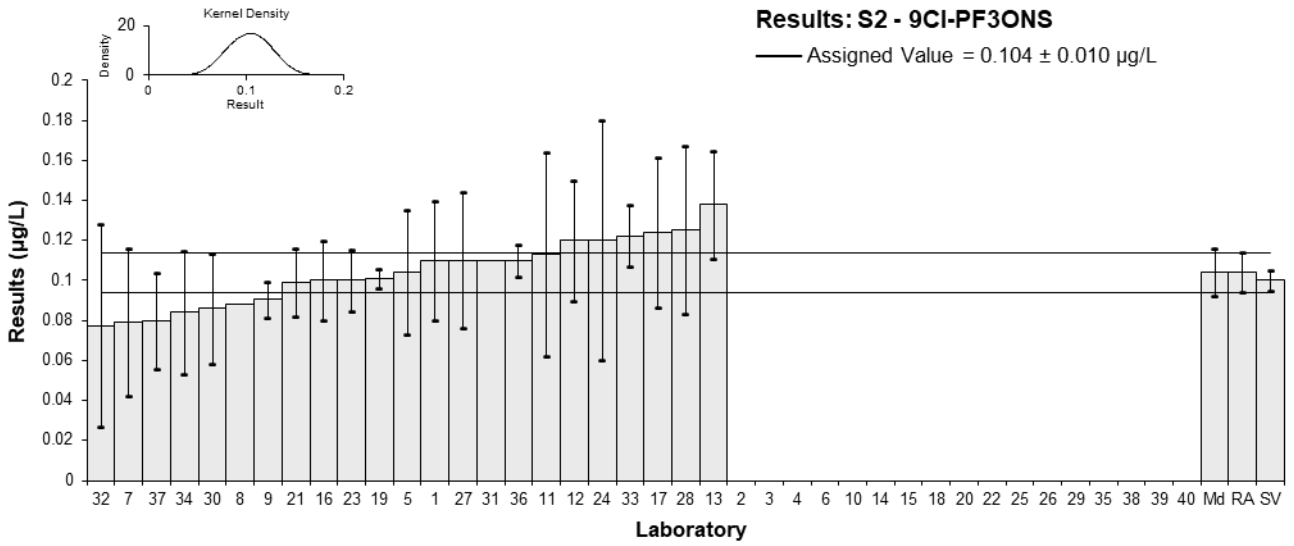
Sample No.	S2
Matrix	River Water
Analyte	9Cl-PF3ONS
Unit	µg/L

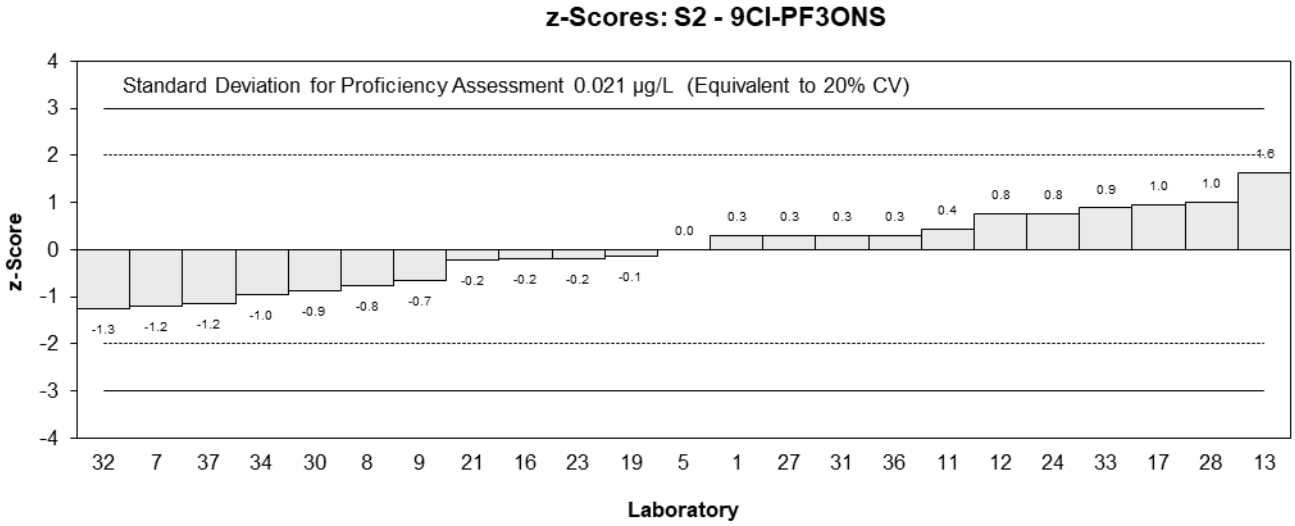
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.11	0.03	72.45	0.29	0.19
2	NT	NT	NT		
3	NT	NT	NT		
4	NS	NS	NS		
5	0.1041	0.0312	95.8	0.00	0.00
6	NT	NT	NT		
7	0.079	0.037	98	-1.20	-0.65
8	0.088	NR	NR	-0.77	-1.60
9	0.0904931	0.009049	>75	-0.65	-1.00
10	NS	NS	NS		
11	0.113	0.051	NR	0.43	0.17
12	0.12	0.03	62	0.77	0.51
13	0.138	0.027	NR	1.63	1.18
14	NT	NT	NT		
15	NS	NS	NS		
16	0.10	0.02	NR	-0.19	-0.18
17	0.1240	0.0373	89.2	0.96	0.52
18	NT	NT	NT		
19	0.101	0.005	100	-0.14	-0.27
20	NT	NT	NT		
21	0.0993	0.017	135	-0.23	-0.24
22	NT	NT	NT		
23	0.1	0.0154	NR	-0.19	-0.22
24	0.12	0.06	NR	0.77	0.26
25	NT	NT	NT		
26	<0.10	NR	102		
27	0.11	0.034	NR	0.29	0.17
28	0.125	0.042	NR	1.01	0.49
29	NR	NR	NR		
30	0.086	0.0275	108	-0.87	-0.62
31	0.11	NR	86.33	0.29	0.60
32	0.0775	0.0504508	114.180	-1.27	-0.52
33	0.12237	0.0154	NR	0.88	1.00
34	0.084	0.031	NR	-0.96	-0.61
35	NT	NT	NT		
36	0.11	0.0078	81	0.29	0.47
37	0.08	0.024	110	-1.15	-0.92
38	NT	NT	NT		
39	NT	NT	NT		
40	NS	NS	NS		

Statistics

Assigned Value	0.104	0.010
Spike Value	0.100	0.005
Robust Average	0.104	0.010
Median	0.104	0.012
Mean	0.104	
N	23	
Max	0.138	
Min	0.0775	
Robust SD	0.018	
Robust CV	18%	


Kernel Density
Density
Result
Results: S2 - 9Cl-PF3ONS
Assigned Value = 0.104 ± 0.010 µg/L
Results (µg/L)
Laboratory
32 7 37 34 30 8 9 21 16 23 19 5 1 27 31 36 11 12 24 33 17 28 13 2 3 4 6 10 14 15 18 20 22 25 26 29 35 38 39 40 Md RA SV


z-Scores: S2 - 9Cl-PF3ONS
Standard Deviation for Proficiency Assessment 0.021 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
32 7 37 34 30 8 9 21 16 23 19 5 1 27 31 36 11 12 24 33 17 28 13

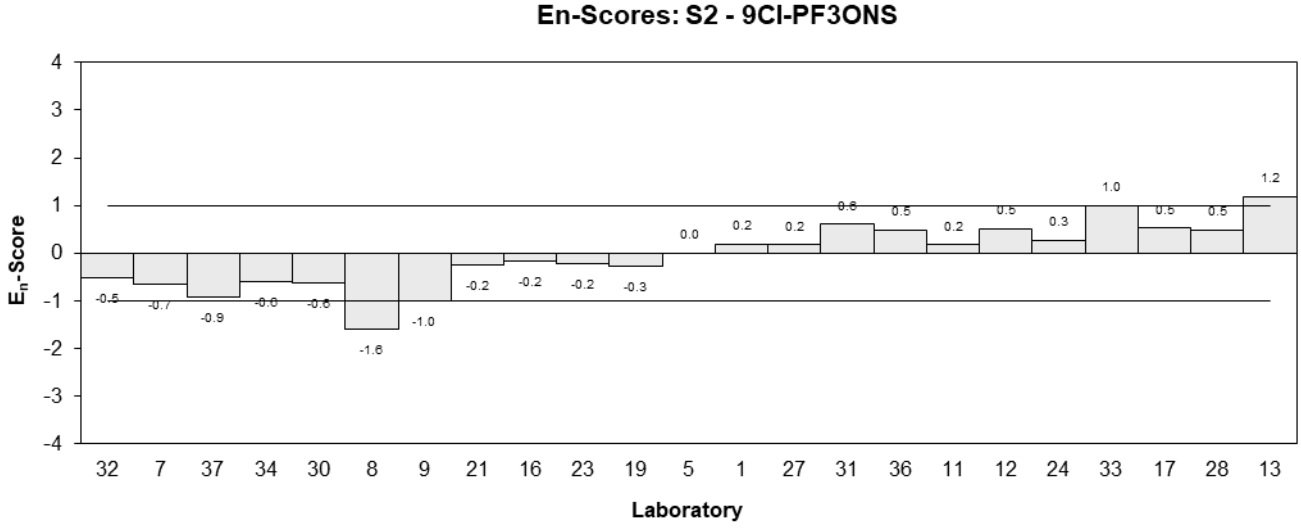

En-Scores: S2 - 9Cl-PF3ONS
En-Score
Laboratory
32 7 37 34 30 8 9 21 16 23 19 5 1 27 31 36 11 12 24 33 17 28 13

Figure 58

Table 63

Sample Details

Sample No.	S2
Matrix	River Water
Analyte	11Cl-PF3OUdS
Unit	µg/L

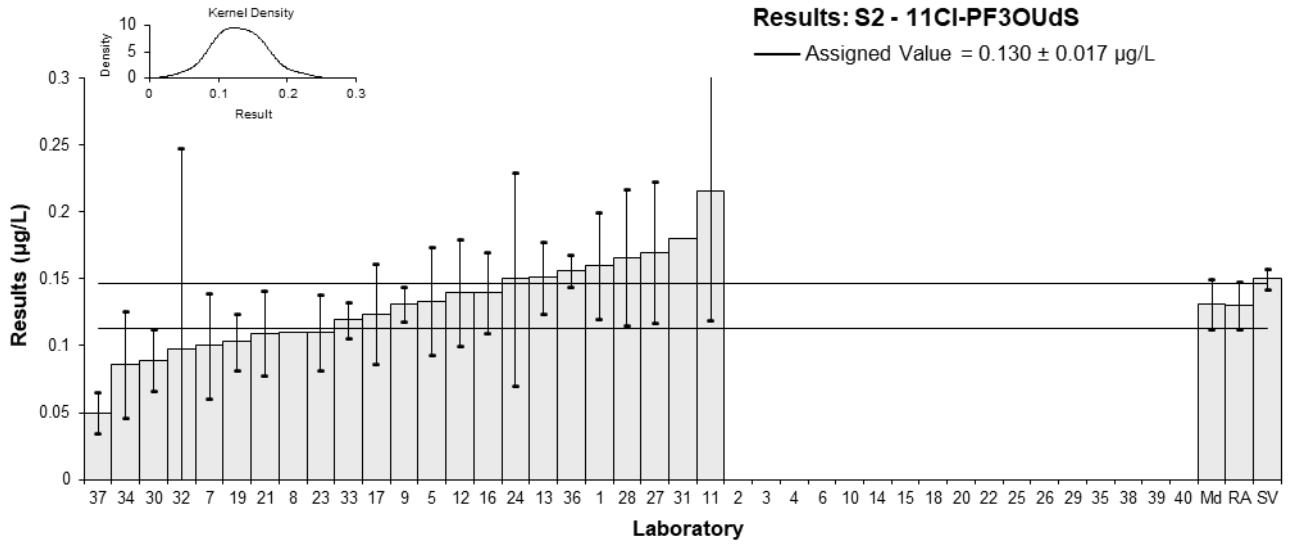
Participant Results

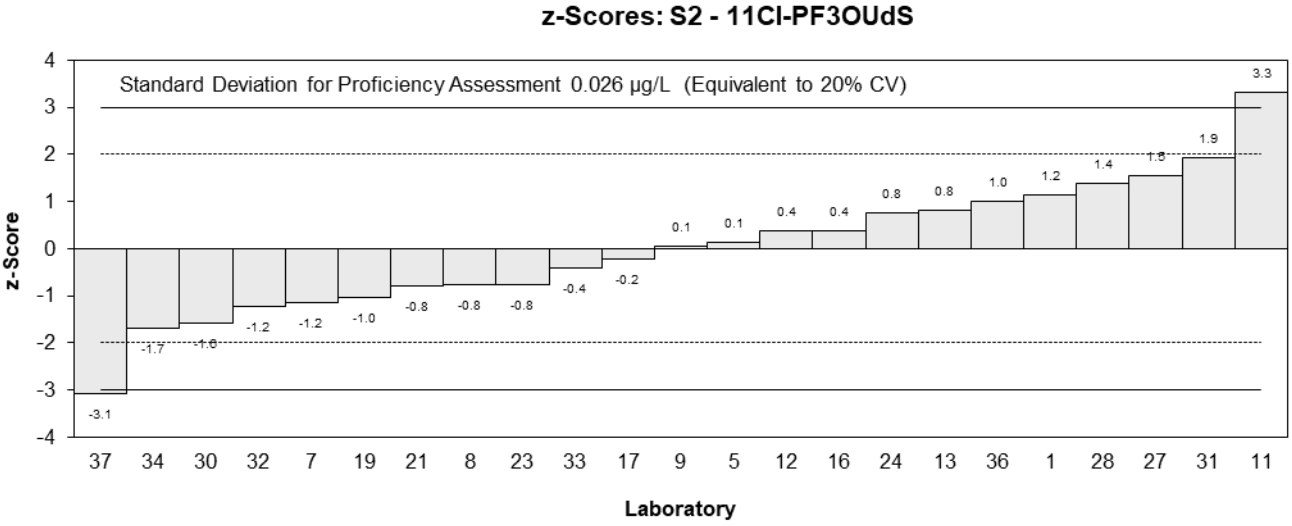
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.16	0.04	72.45	1.15	0.69
2	NT	NT	NT		
3	NT	NT	NT		
4	NS	NS	NS		
5	0.1335	0.0401	101.3	0.13	0.08
6	NT	NT	NT		
7	0.1	0.039	115	-1.15	-0.71
8	0.11	NR	NR	-0.77	-1.18
9	0.1314088	0.013141	>75	0.05	0.07
10	NS	NS	NS		
11*	0.216	0.097	NR	3.31	0.87
12	0.14	0.04	62	0.38	0.23
13	0.151	0.027	NR	0.81	0.66
14	NT	NT	NT		
15	NS	NS	NS		
16	0.14	0.03	NR	0.38	0.29
17	0.1240	0.0371	104.9	-0.23	-0.15
18	NT	NT	NT		
19	0.103	0.021	100	-1.04	-1.00
20	NT	NT	NT		
21	0.1095	0.032	135	-0.79	-0.57
22	NT	NT	NT		
23	0.11	0.0287	NR	-0.77	-0.60
24	0.15	0.08	NR	0.77	0.24
25	NT	NT	NT		
26	<0.050	NR	102		
27	0.17	0.053	NR	1.54	0.72
28	0.166	0.051	NR	1.38	0.67
29	NR	NR	NR		
30	0.089	0.023	108	-1.58	-1.43
31	0.18	NR	78.3	1.92	2.94
32	0.098	0.1497915	114.180	-1.23	-0.21
33	0.11928	0.0135	NR	-0.41	-0.49
34	0.086	0.040	NR	-1.69	-1.01
35	NT	NT	NT		
36	0.156	0.012	81	1.00	1.25
37*	0.05	0.015	90	-3.08	-3.53
38	NT	NT	NT		
39	NT	NT	NT		
40	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.130	0.017
Spike Value	0.150	0.008
Robust Average	0.130	0.018
Median	0.131	0.019
Mean	0.130	
N	23	
Max	0.216	
Min	0.05	
Robust SD	0.035	
Robust CV	27%	


Kernel Density
Density
Result
Results: S2 - 11Cl-PF3OUdS
Assigned Value = 0.130 ± 0.017 µg/L
Results (µg/L)
Laboratory
37 34 30 32 7 19 21 8 23 33 17 9 5 12 16 24 13 36 1 28 27 31 11 2 3 4 6 10 14 15 18 20 22 25 26 29 35 38 39 40 Md RA SV


z-Scores: S2 - 11Cl-PF3OUdS
Standard Deviation for Proficiency Assessment 0.026 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
37 34 30 32 7 19 21 8 23 33 17 9 5 12 16 24 13 36 1 28 27 31 11

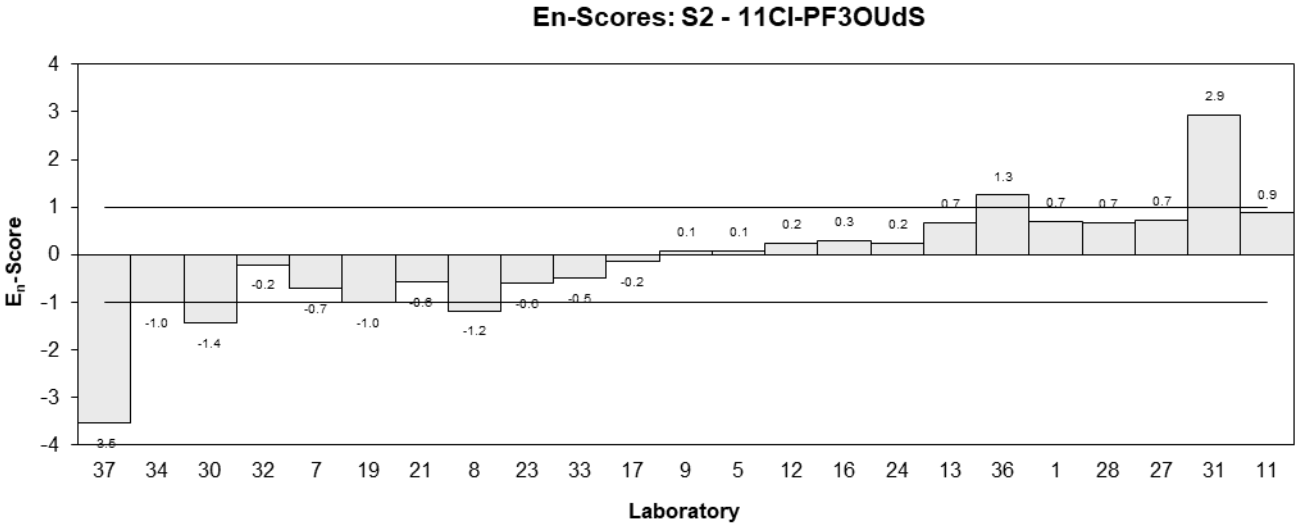

En-Scores: S2 - 11Cl-PF3OUdS
En-Score
Laboratory
37 34 30 32 7 19 21 8 23 33 17 9 5 12 16 24 13 36 1 28 27 31 11

Figure 59

Table 64

Sample Details

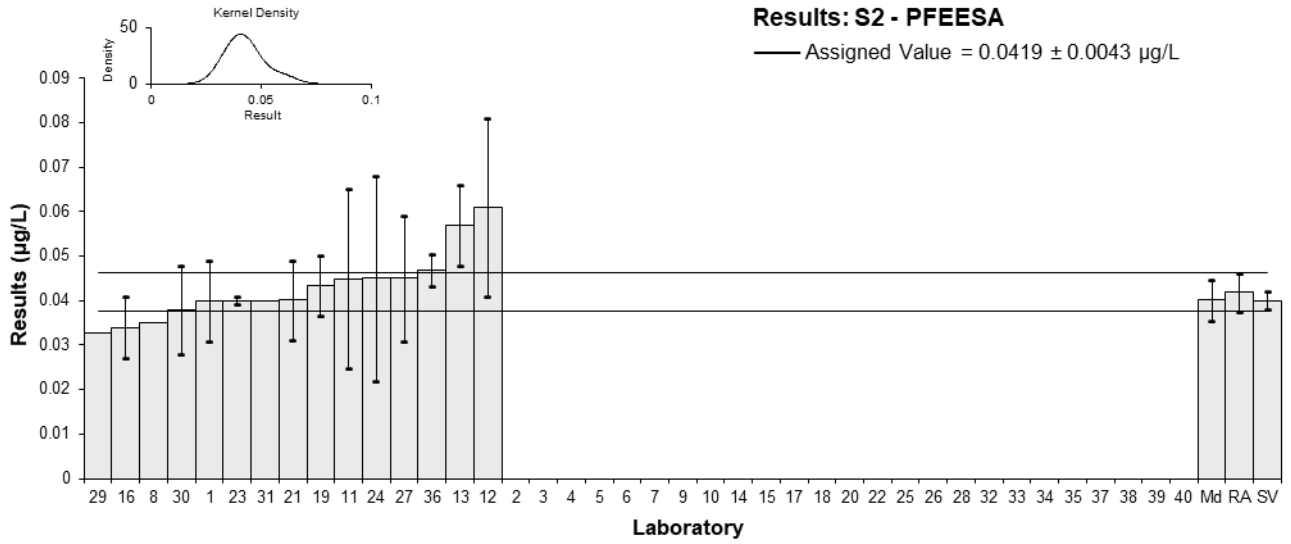
Sample No.	S2
Matrix	River Water
Analyte	PFEESA
Unit	µg/L

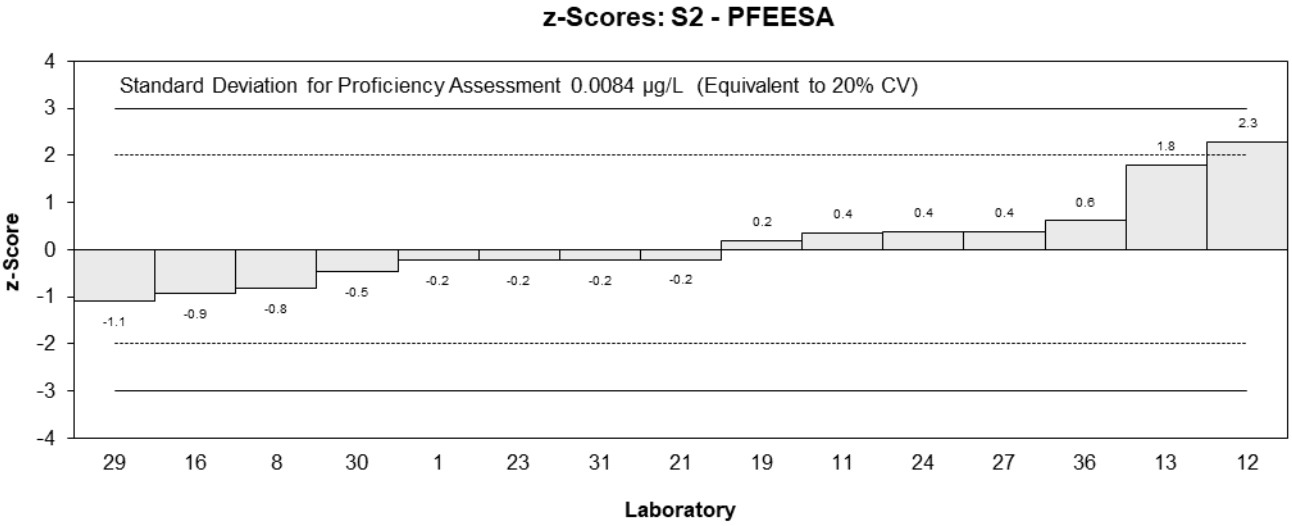
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.04	0.009	101.04	-0.23	-0.19
2	NT	NT	NT		
3	NT	NT	NT		
4	NS	NS	NS		
5	NT	NT	NT		
6	NT	NT	NT		
7	<0.05	NR	88		
8	0.035	NR	NR	-0.82	-1.60
9	NT	NT	NT		
10	NS	NS	NS		
11	0.0449	0.0202	NR	0.36	0.15
12	0.061	0.02	63	2.28	0.93
13	0.057	0.009	NR	1.80	1.51
14	NT	NT	NT		
15	NS	NS	NS		
16	0.034	0.007	NR	-0.94	-0.96
17	NT	NT	NT		
18	NT	NT	NT		
19	0.0434	0.0067	97	0.18	0.19
20	NT	NT	NT		
21	0.0401	0.009	92	-0.21	-0.18
22	NT	NT	NT		
23	0.04	0.0009	NR	-0.23	-0.43
24	0.045	0.023	NR	0.37	0.13
25	NT	NT	NT		
26	NT	NT	NT		
27	0.045	0.014	NR	0.37	0.21
28	NT	NT	NT		
29	0.0327	NR	NR	-1.10	-2.14
30	0.038	0.010	88	-0.47	-0.36
31	0.04	NR	92.01	-0.23	-0.44
32	NR	NR	NR		
33	NT	NT	NT		
34	NT	NT	NT		
35	NT	NT	NT		
36	0.047	0.0036	78	0.61	0.91
37	NT	NT	NT		
38	NT	NT	NT		
39	NT	NT	NT		
40	NS	NS	NS		

Statistics

Assigned Value	0.0419	0.0043
Spike Value	0.0400	0.0020
Robust Average	0.0419	0.0043
Median	0.0401	0.0047
Mean	0.0429	
N	15	
Max	0.061	
Min	0.0327	
Robust SD	0.0066	
Robust CV	16%	


Kernel Density
Density
50
0
0
0.05
0.1
Result
Results: S2 - PFEESA
Assigned Value = 0.0419 ± 0.0043 µg/L
Results (µg/L)
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
29 16 8 30 1 23 31 21 19 11 24 27 36 13 12 2 3 4 5 6 7 9 10 14 15 17 18 20 22 25 26 28 32 33 34 35 37 38 39 40 Md RA SV
Laboratory


z-Scores: S2 - PFEESA
Standard Deviation for Proficiency Assessment 0.0084 µg/L (Equivalent to 20% CV)
z-Score
4
3
2
1
0
-1
-2
-3
-4
-1.1
-0.9
-0.8
-0.5
-0.2
-0.2
-0.2
-0.2
0.2
0.4
0.4
0.4
0.6
1.8
2.3
29 16 8 30 1 23 31 21 19 11 24 27 36 13 12
Laboratory

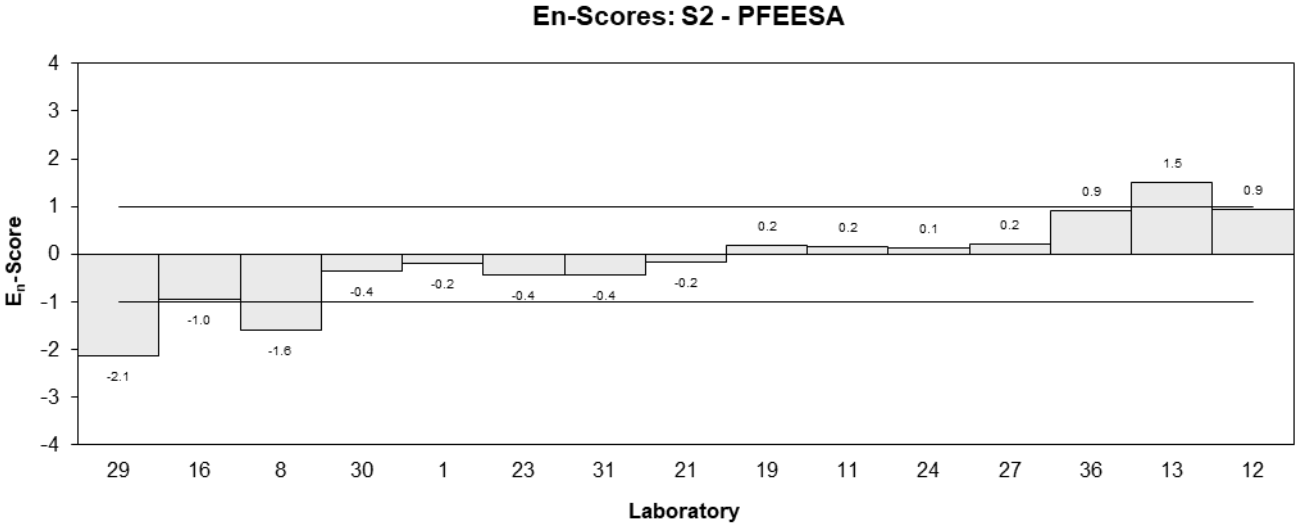

En-Scores: S2 - PFEESA
En-Score
4
3
2
1
0
-1
-2
-3
-4
-2.1
-1.0
-1.6
-0.4
-0.2
-0.4
-0.4
-0.2
0.2
0.2
0.1
0.2
0.9
1.5
0.9
29 16 8 30 1 23 31 21 19 11 24 27 36 13 12
Laboratory

Figure 60

Table 65

Sample Details

Sample No.	S3
Matrix	Reagent Grade Water
Analyte	PFBA
Unit	µg/L

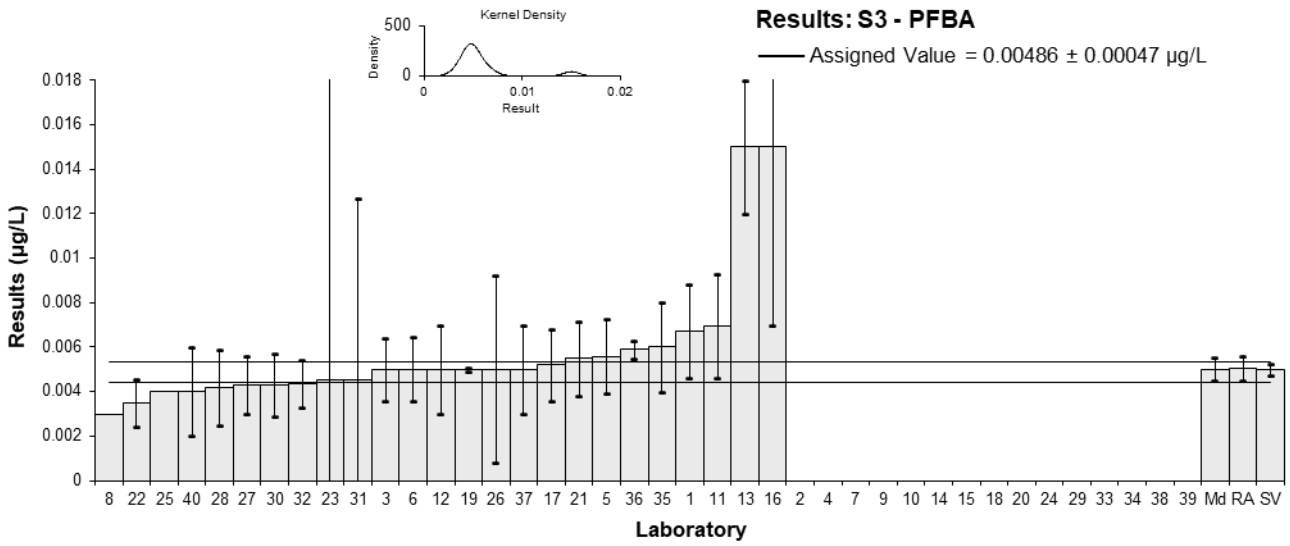
Participant Results

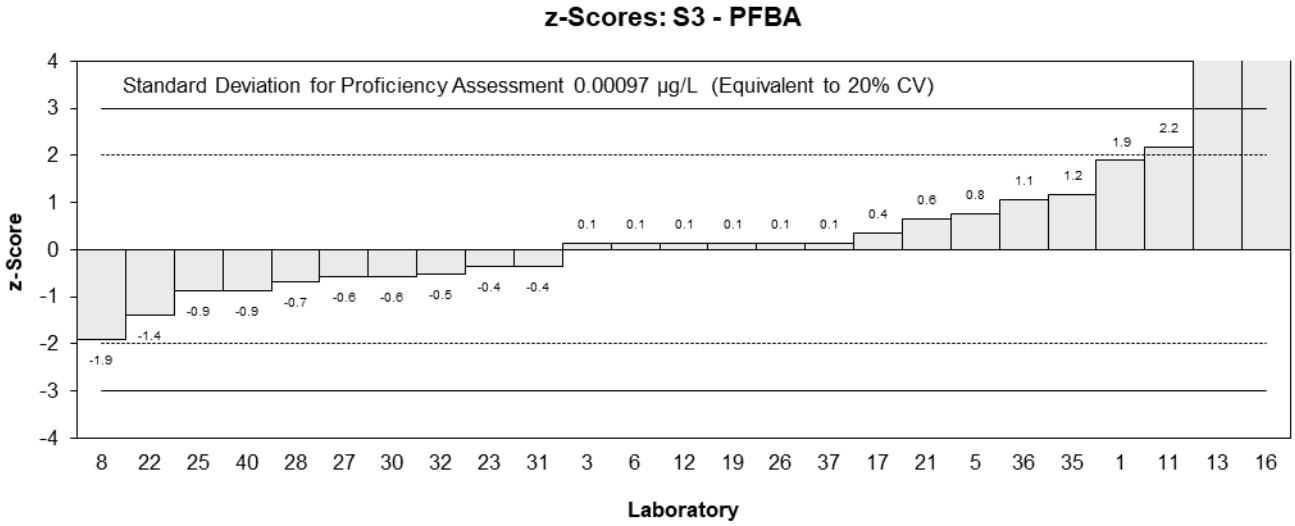
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0067	0.0021	153.33	1.89	0.86
2	NS	NS	NS		
3	0.005	0.0014	NR	0.14	0.09
4	NS	NS	NS		
5	0.00559	0.001677	98.9	0.75	0.42
6	0.005	0.0014325	110	0.14	0.09
7	<0.005	NR	101		
8	0.003	NR	100	-1.91	-3.96
9	NS	NS	NS		
10	NS	NS	NS		
11	0.00697	0.002331	NR	2.17	0.89
12	0.005	0.002	97	0.14	0.07
13*	0.015	0.003	98	10.43	3.34
14	< 0.005	NR	100		
15	NS	NS	NS		
16*	0.015	0.008	108	10.43	1.27
17	0.0052	0.0016	107.1	0.35	0.20
18	<0.005	NR	NR		
19	0.005	0.0001	96	0.14	0.29
20	<0.010	NR	120		
21	0.00548	0.0017	112	0.64	0.35
22	0.0035	0.00105	100	-1.40	-1.18
23	0.0045	0.0187866	NR	-0.37	-0.02
24	< 0.01	0.005	127		
25	0.004	NR	NR	-0.88	-1.83
26	0.0050	0.0042	106	0.14	0.03
27	0.0043	0.0013	NR	-0.58	-0.41
28	0.0042	0.0017	95	-0.68	-0.37
29	<0.5	NR	NR		
30	0.0043	0.0014	92	-0.58	-0.38
31	0.0045	0.0082	88.14	-0.37	-0.04
32	0.00435	0.0010668	129.719	-0.52	-0.44
33	< 0.005	NR	74		
34	<0.01	0.01	108		
35	0.006	0.002	81	1.17	0.55
36	0.0059	0.0004	81	1.07	1.69
37	0.005	0.002	108	0.14	0.07
38	NS	NS	NS		
39	NS	NS	NS		
40	0.004	0.002	NR	-0.88	-0.42

* Outlier, see Section 4.2

Statistics

Assigned Value	0.00486	0.00047
Spike Value	0.00500	0.00025
Robust Average	0.00504	0.00056
Median	0.00500	0.00052
Mean	0.0057	
N	25	
Max	0.015	
Min	0.003	
Robust SD	0.0011	
Robust CV	22%	


Results: S3 - PFBA
Assigned Value = 0.00486 ± 0.00047 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
8 22 25 40 28 27 30 32 23 31 3 6 12 19 26 37 17 21 5 36 35 1 11 13 16 2 4 7 9 10 14 15 18 20 24 29 33 34 38 39 Md RA SV


z-Scores: S3 - PFBA
Standard Deviation for Proficiency Assessment 0.00097 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
8 22 25 40 28 27 30 32 23 31 3 6 12 19 26 37 17 21 5 36 35 1 11 13 16

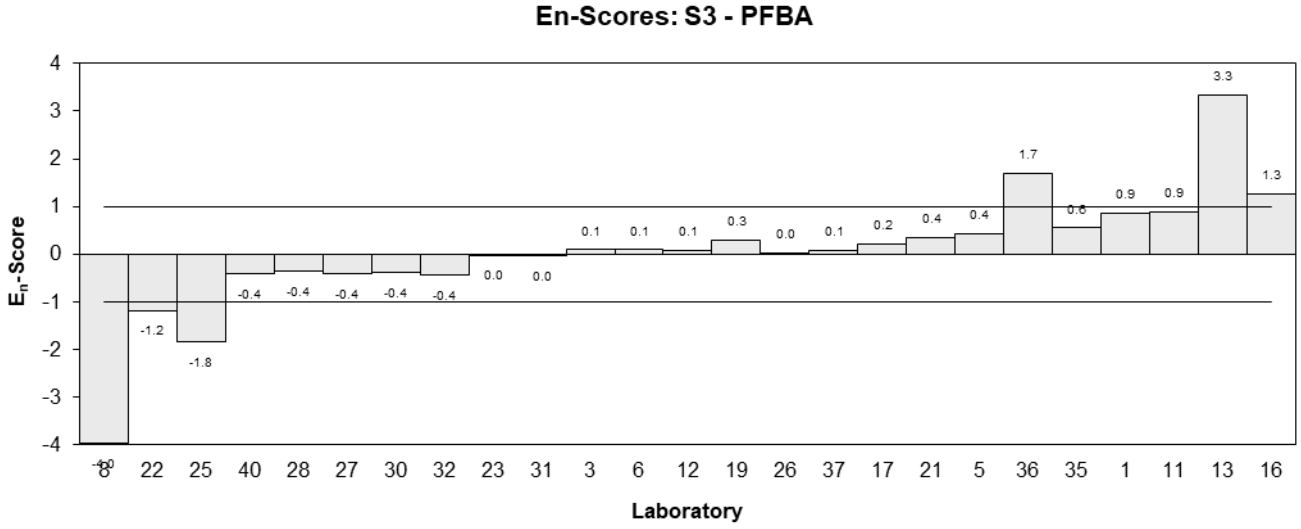

En-Scores: S3 - PFBA
En-Score
Laboratory
8 22 25 40 28 27 30 32 23 31 3 6 12 19 26 37 17 21 5 36 35 1 11 13 16

Figure 61

Table 66

Sample Details

Sample No.	S3
Matrix	Reagent Grade Water
Analyte	PFHxA
Unit	µg/L

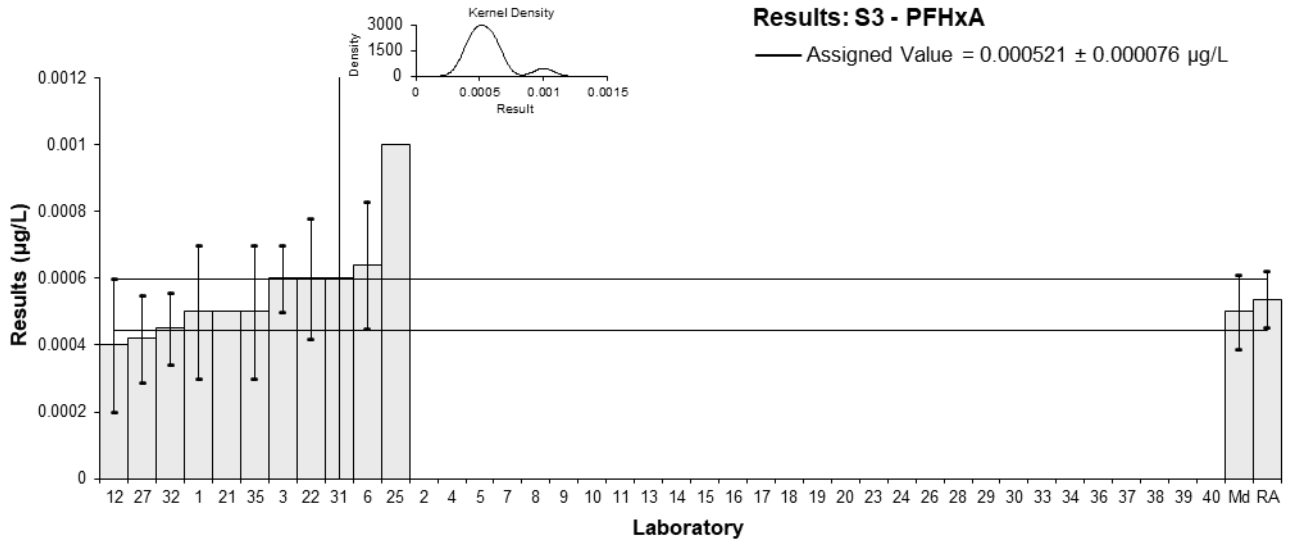
Participant Results

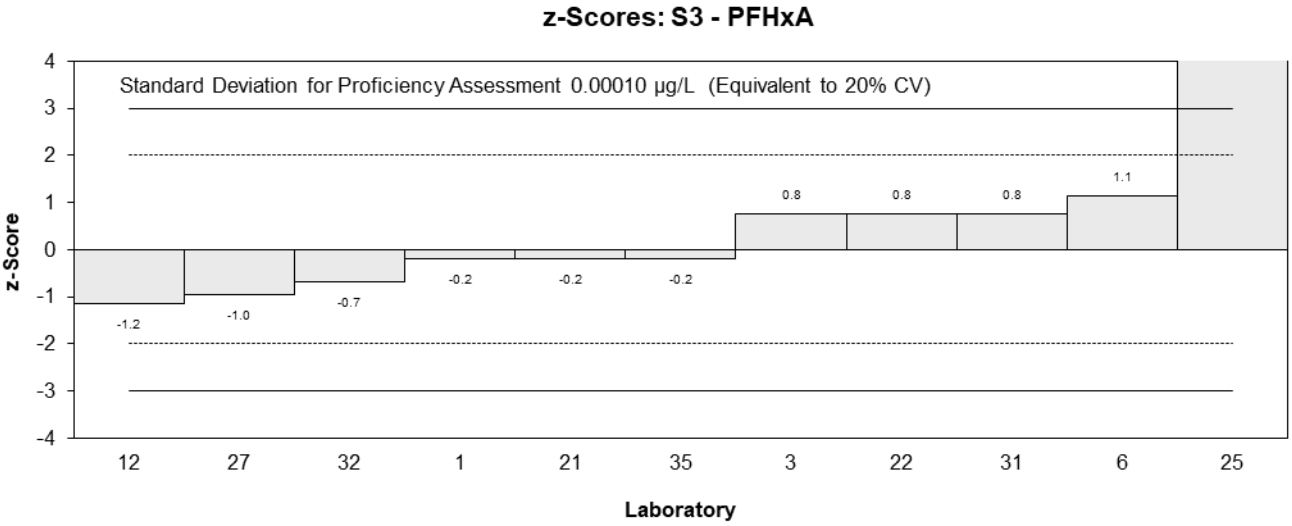
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0005	0.0002	118.58	-0.20	-0.10
2	NS	NS	NS		
3	0.0006	0.0001	NR	0.76	0.63
4	NS	NS	NS		
5	<0.002	NR	90.1		
6	0.00064	0.000192	100	1.14	0.58
7	<0.001	NR	116		
8	<0.0005	NR	113		
9	NS	NS	NS		
10	NS	NS	NS		
11	<0.001	NR	NR		
12	0.0004	0.0002	95	-1.16	-0.57
13	<0.001	NR	NR		
14	< 0.001	NR	135		
15	NS	NS	NS		
16	NR	NR	NR		
17	<0.002	NR	91.9		
18	<0.001	NR	NR		
19	<0.001	NR	101		
20	<0.0010	NR	120		
21	0.0005	NR	98	-0.20	-0.28
22	0.0006	0.00018	90	0.76	0.40
23	<0.0005	0.0064305	NR		
24	< 0.002	0.001	121		
25*	0.001	NR	NR	4.60	6.30
26	<0.0010	NR	109		
27	0.00042	0.00013	NR	-0.97	-0.67
28	<0.001	NR	94		
29	<0.025	NR	NR		
30	<0.0005	NR	NR		
31	0.0006	0.0015	121.28	0.76	0.05
32	0.00045	0.0001078	135.114	-0.68	-0.54
33	< 0.001	NR	92		
34	<0.005	0.005	87		
35	0.0005	0.0002	102	-0.20	-0.10
36	< 0.0010	0.00032	83		
37	< 0.001	NR	102		
38	NS	NS	NS		
39	NS	NS	NS		
40	< 0.001	0.0005	NR		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.000521	0.000076
Spike Value	Not Spiked	
Robust Average	0.000538	0.000084
Median	0.00050	0.00011
Mean	0.000565	
N	11	
Max	0.001	
Min	0.0004	
Robust SD	0.00011	
Robust CV	21%	


Results: S3 - PFHxA
Assigned Value = 0.000521 ± 0.000076 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
12 27 32 1 21 35 3 22 31 6 25 2 4 5 7 8 9 10 11 13 14 15 16 17 18 19 20 23 24 26 28 29 30 33 34 36 37 38 39 40 Md RA


z-Scores: S3 - PFHxA
Standard Deviation for Proficiency Assessment 0.00010 µg/L (Equivalent to 20% CV)
z-Score
-1.2
-1.0
-0.7
-0.2
-0.2
-0.2
0.8
0.8
0.8
1.1
Laboratory
12 27 32 1 21 35 3 22 31 6 25

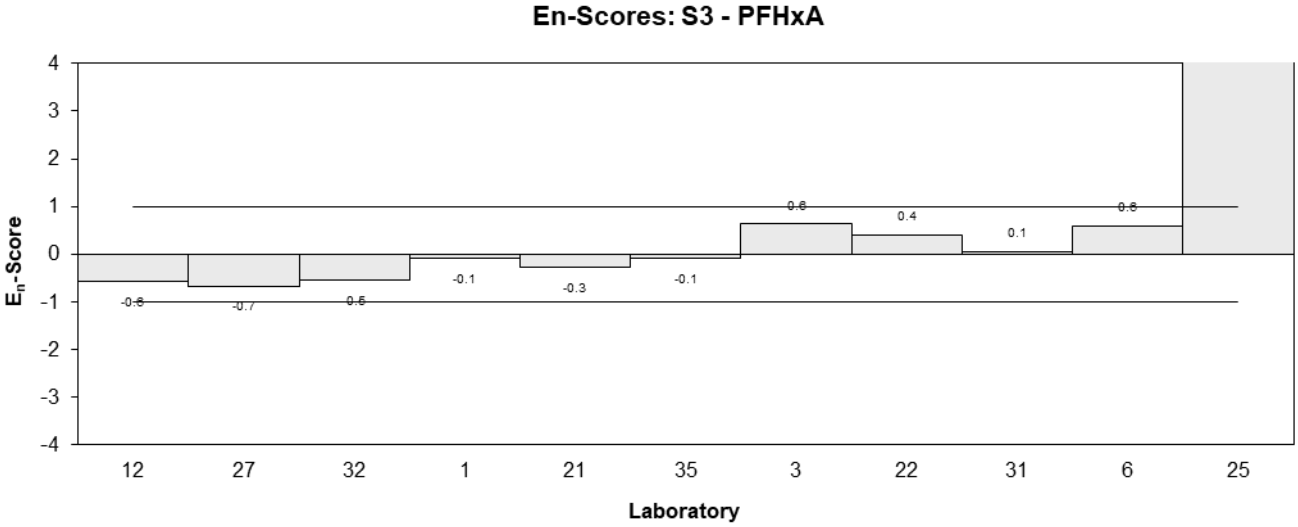

En-Scores: S3 - PFHxA
En-Score
-0.6
-0.7
-0.5
-0.1
-0.3
-0.1
0.6
0.4
0.1
0.6
Laboratory
12 27 32 1 21 35 3 22 31 6 25

Figure 62

Table 67

Sample Details

Sample No.	S3
Matrix	Reagent Grade Water
Analyte	PFOA
Unit	µg/L

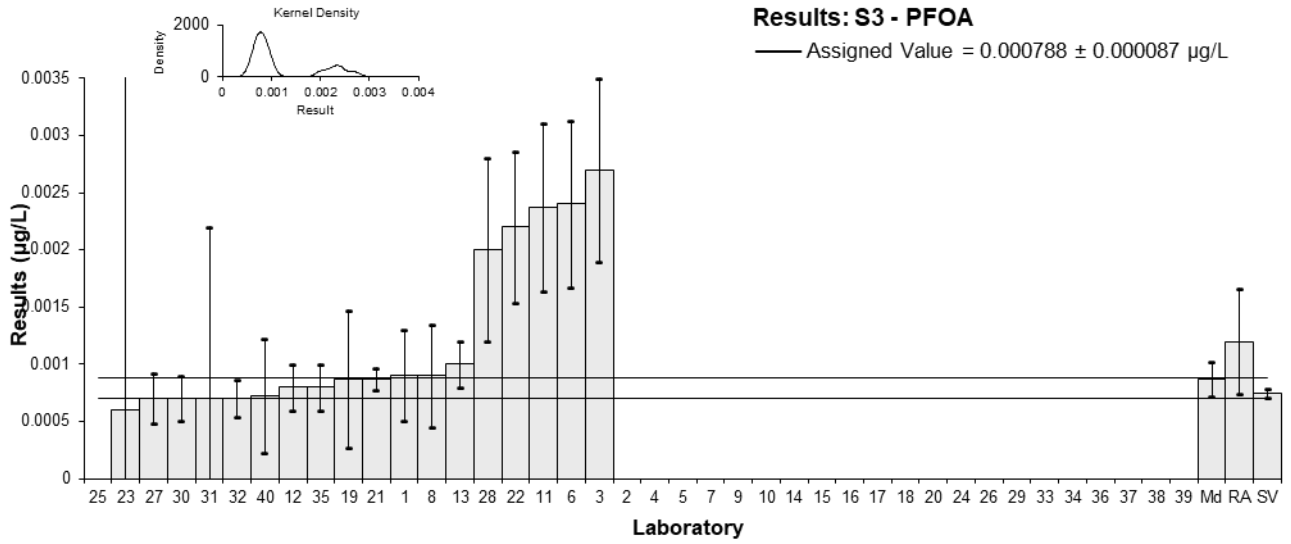
Participant Results

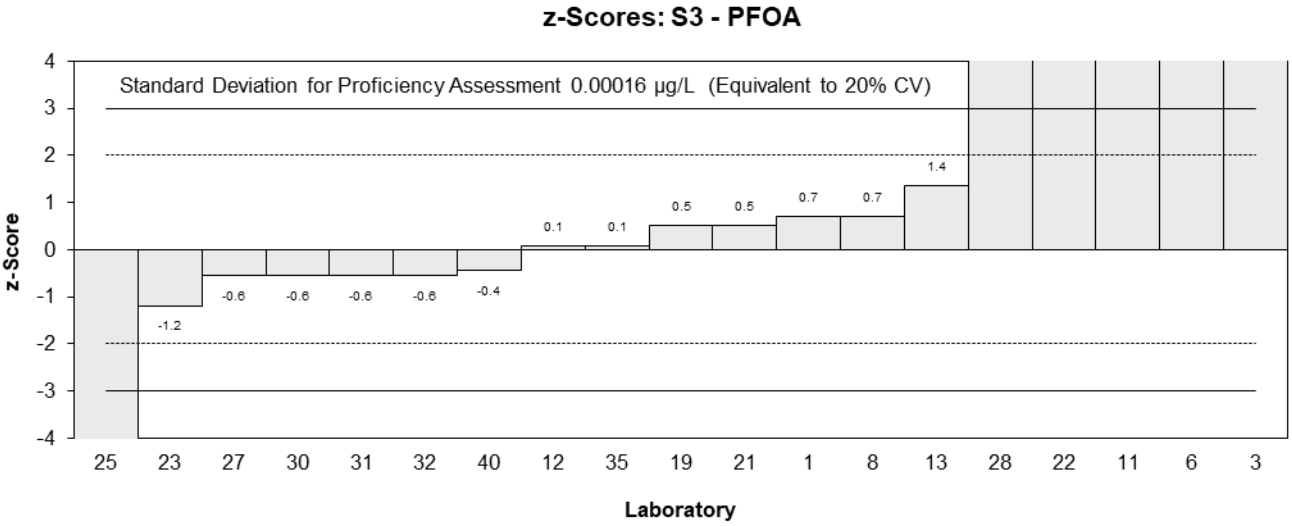
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0009	0.0004	123.96	0.71	0.27
2	NS	NS	NS		
3*	0.0027	0.0008	NR	12.13	2.38
4	NS	NS	NS		
5	<0.002	NR	102.9		
6*	0.0024	0.0007305	110	10.23	2.19
7	<0.001	NR	133		
8	0.0009	0.00045	98	0.71	0.24
9	NS	NS	NS		
10	NS	NS	NS		
11*	0.00237	0.000737	NR	10.04	2.13
12	0.0008	0.0002	90	0.08	0.06
13	0.001	0.0002	86	1.35	0.97
14	< 0.001	NR	119		
15	NS	NS	NS		
16	NR	NR	NR		
17	<0.002	NR	96.0		
18	<0.001	NR	NR		
19	0.00087	0.0006	102	0.52	0.14
20	<0.0010	NR	120		
21	0.00087	0.0001	111	0.52	0.62
22*	0.0022	0.00066	90	8.96	2.12
23	0.0006	0.0057346	NR	-1.19	-0.03
24	< 0.004	0.002	135		
25**	0.000	NR	NR	-5.00	-9.06
26	<0.0010	NR	120		
27	0.00070	0.00022	NR	-0.56	-0.37
28*	0.002	0.0008	95	7.69	1.51
29	<0.025	NR	NR		
30	0.0007	0.0002	120	-0.56	-0.40
31	0.0007	0.0015	109.46	-0.56	-0.06
32	0.0007	0.0001600	136.572	-0.56	-0.48
33	< 0.001	NR	118		
34	<0.002	0.002	91		
35	0.0008	0.0002	73	0.08	0.06
36	< 0.0010	0.00029	90		
37	< 0.001	NR	100		
38	NS	NS	NS		
39	NS	NS	NS		
40	0.00072	0.0005	NR	-0.43	-0.13

* Outlier, ** Extreme Outlier, see Section 4.2

Statistics

Assigned Value	0.000788	0.000087
Spike Value	0.000745	0.000037
Robust Average	0.00120	0.00046
Median	0.00087	0.00015
Mean	0.00122	
N	18	
Max	0.0027	
Min	0.0006	
Robust SD	0.00078	
Robust CV	65%	


Results: S3 - PFOA
Assigned Value = 0.000788 ± 0.000087 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
25 23 27 30 31 32 40 12 35 19 21 1 8 13 28 22 11 6 3 2 4 5 7 9 10 14 15 16 17 18 20 24 26 29 33 34 36 37 38 39 Md RA SV


z-Scores: S3 - PFOA
Standard Deviation for Proficiency Assessment 0.00016 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 23 27 30 31 32 40 12 35 19 21 1 8 13 28 22 11 6 3

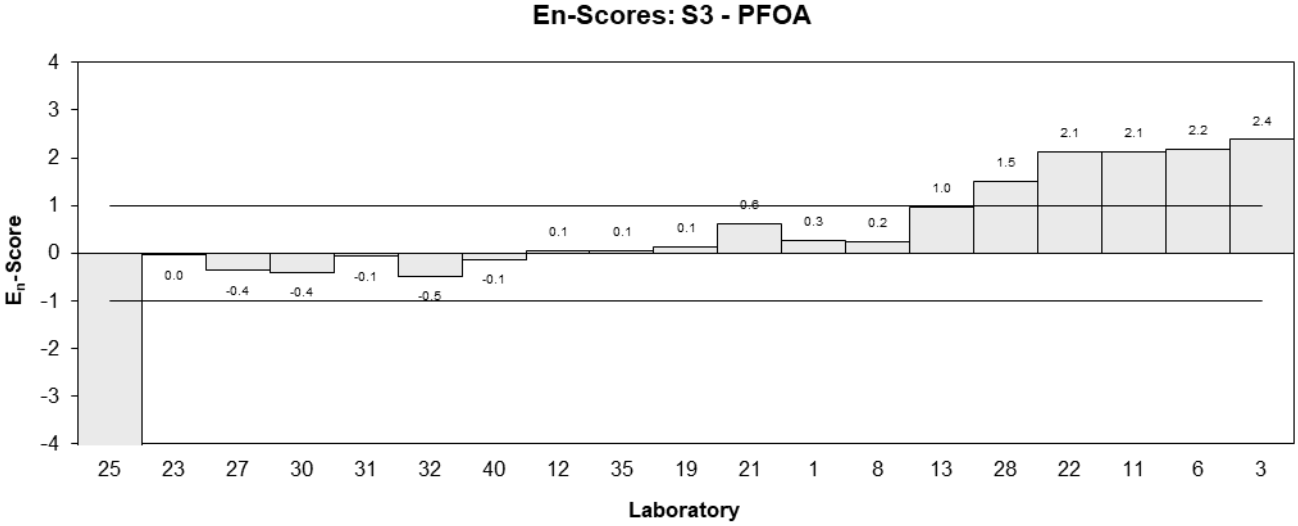

En-Scores: S3 - PFOA
En-Score
Laboratory
25 23 27 30 31 32 40 12 35 19 21 1 8 13 28 22 11 6 3

Figure 63

Table 68

Sample Details

Sample No.	S3
Matrix	Reagent Grade Water
Analyte	PFHxS
Unit	µg/L

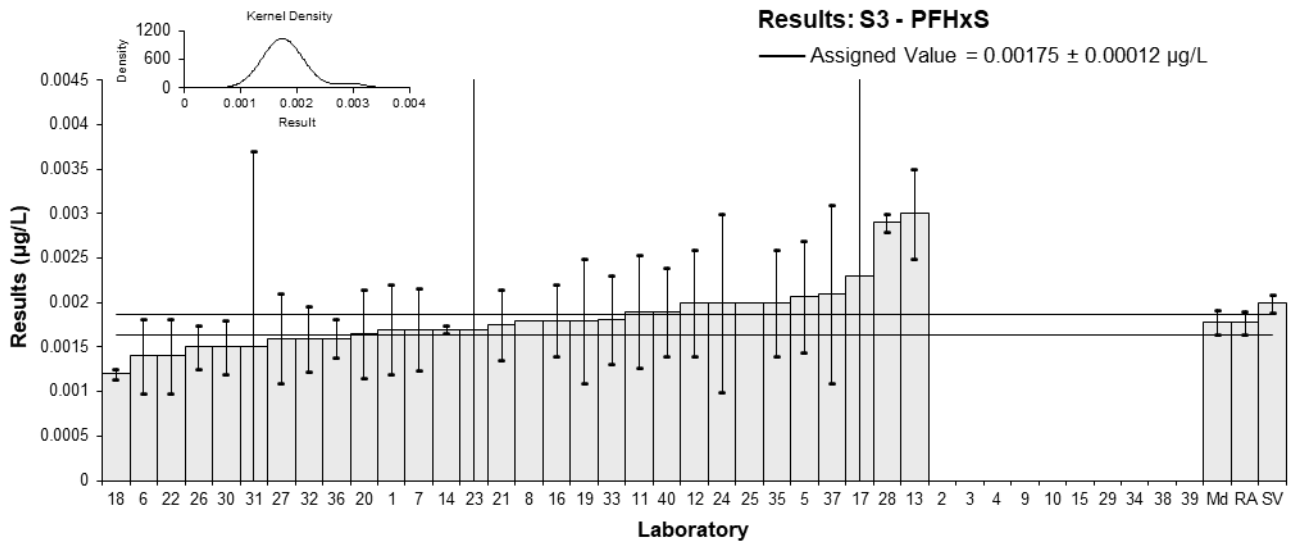
Participant Results

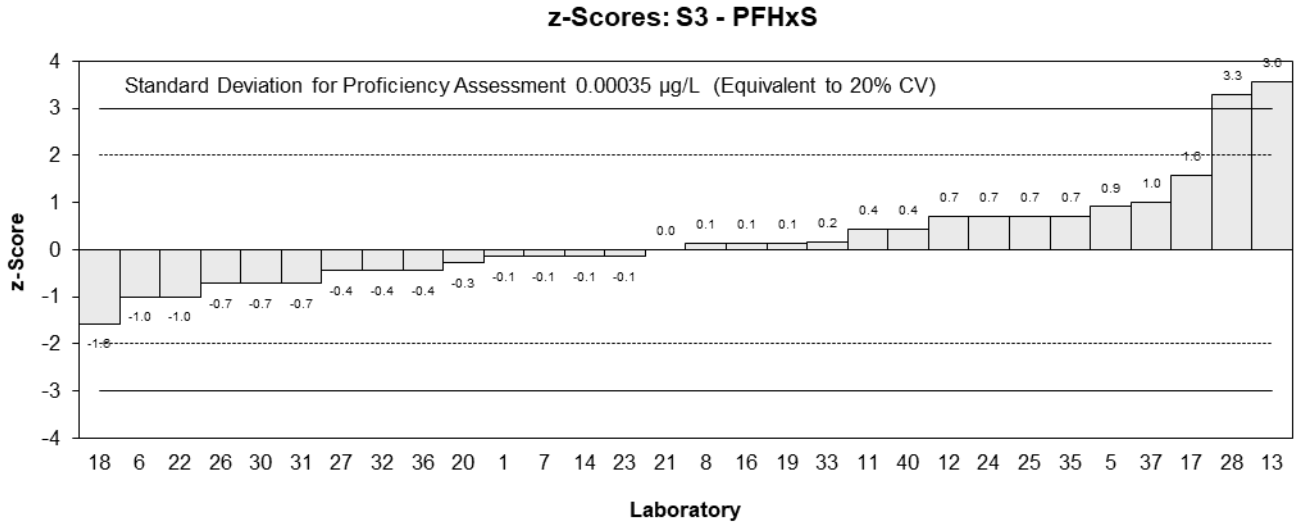
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0017	0.0005	108.23	-0.14	-0.10
2	NS	NS	NS		
3	NT	NT	NT		
4	NS	NS	NS		
5	0.00207	0.000621	93.0	0.91	0.51
6	0.0014	0.000414	90	-1.00	-0.81
7	0.0017	0.00046	60	-0.14	-0.11
8	0.0018	NR	94	0.14	0.42
9	NS	NS	NS		
10	NS	NS	NS		
11	0.0019	0.000632	NR	0.43	0.23
12	0.002	0.0006	82	0.71	0.41
13*	0.003	0.0005	86	3.57	2.43
14	0.0017	0.000048	108	-0.14	-0.39
15	NS	NS	NS		
16	0.0018	0.0004	101	0.14	0.12
17	0.0023	0.007	99.0	1.57	0.08
18	0.0012	0.00006	161	-1.57	-4.10
19	0.0018	0.0007	91	0.14	0.07
20	0.00165	0.000495	110	-0.29	-0.20
21	0.00175	0.0004	105	0.00	0.00
22	0.0014	0.00042	90	-1.00	-0.80
23	0.0017	0.0120460	NR	-0.14	0.00
24	0.002	0.001	132	0.71	0.25
25	0.002	NR	NR	0.71	2.08
26	0.0015	0.00025	116	-0.71	-0.90
27	0.0016	0.00050	NR	-0.43	-0.29
28*	0.0029	0.0001	93	3.29	7.36
29	<0.025	NR	NR		
30	0.0015	0.0003	112	-0.71	-0.77
31	0.0015	0.0022	85.61	-0.71	-0.11
32	0.0016	0.0003677	109.200	-0.43	-0.39
33	0.00181	0.0005	97	0.17	0.12
34	<0.005	0.005	79		
35	0.002	0.0006	87	0.71	0.41
36	0.0016	0.00022	82	-0.43	-0.60
37	0.0021	0.001	106	1.00	0.35
38	NS	NS	NS		
39	NS	NS	NS		
40	0.0019	0.0005	NR	0.43	0.29

* Outlier, see Section 4.2

Statistics

Assigned Value	0.00175	0.00012
Spike Value	0.00199	0.00010
Robust Average	0.00178	0.00013
Median	0.00178	0.00014
Mean	0.00183	
N	30	
Max	0.003	
Min	0.0012	
Robust SD	0.00028	
Robust CV	16%	


Kernel Density
Density
Result
Results: S3 - PFHxS
Assigned Value = 0.00175 ± 0.00012 µg/L
Results (µg/L)
Laboratory
18 6 22 26 30 31 27 32 36 20 1 7 14 23 21 8 16 19 33 11 40 12 24 25 35 5 37 17 28 13 2 3 4 9 10 15 29 34 38 39 Md RA SV


z-Scores: S3 - PFHxS
Standard Deviation for Proficiency Assessment 0.00035 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
18 6 22 26 30 31 27 32 36 20 1 7 14 23 21 8 16 19 33 11 40 12 24 25 35 5 37 17 28 13

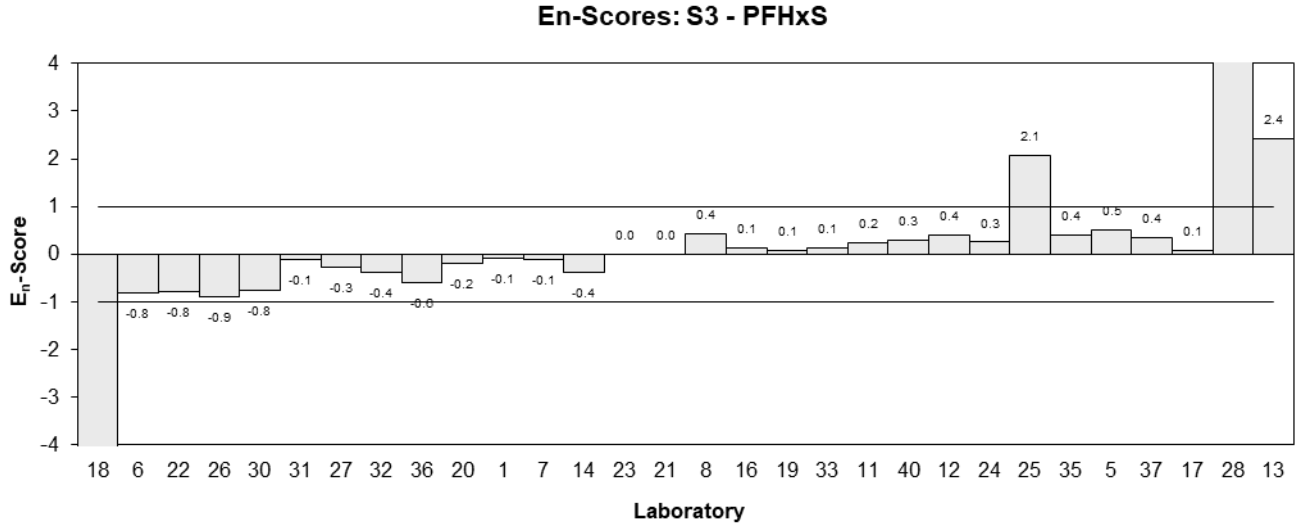

En-Scores: S3 - PFHxS
En-Score
Laboratory
18 6 22 26 30 31 27 32 36 20 1 7 14 23 21 8 16 19 33 11 40 12 24 25 35 5 37 17 28 13

Figure 64

Table 69

Sample Details

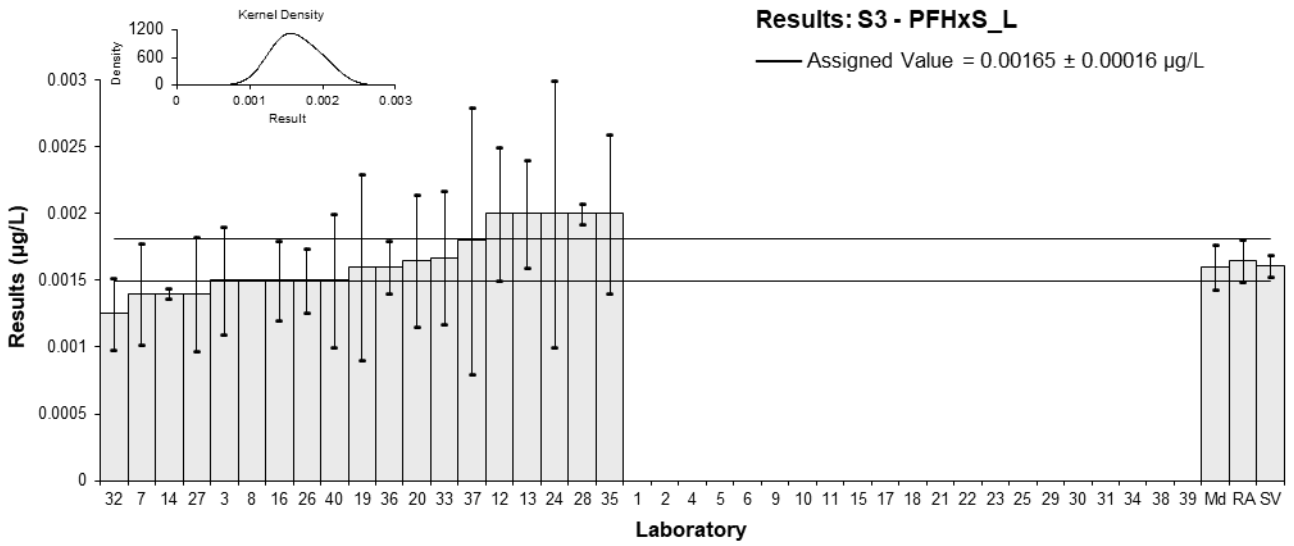
Sample No.	S3
Matrix	Reagent Grade Water
Analyte	PFHxS_L
Unit	µg/L

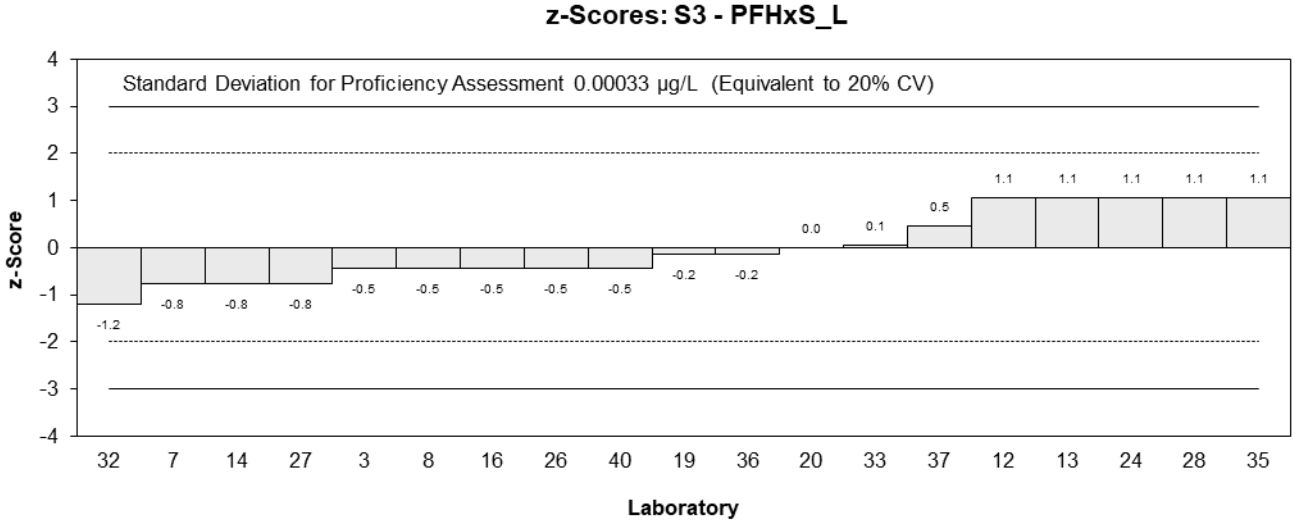
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NS	NS	NS		
3	0.0015	0.0004	NR	-0.45	-0.35
4	NS	NS	NS		
5	NT	NT	NT		
6	NT	NT	NT		
7	0.0014	0.00038	60	-0.76	-0.61
8	0.0015	NR	NR	-0.45	-0.94
9	NS	NS	NS		
10	NS	NS	NS		
11	NR	NR	NR		
12	0.002	0.0005	82	1.06	0.67
13	0.002	0.0004	86	1.06	0.81
14	0.0014	0.000039	108	-0.76	-1.52
15	NS	NS	NS		
16	0.0015	0.0003	101	-0.45	-0.44
17	NT	NT	NT		
18	NT	NT	NT		
19	0.0016	0.0007	91	-0.15	-0.07
20	0.00165	0.000495	110	0.00	0.00
21	NT	NR	105		
22	NT	NT	NT		
23	NT	NT	NT		
24	0.002	0.001	NR	1.06	0.35
25	NT	NT	NT		
26	0.0015	0.00024	116	-0.45	-0.52
27	0.0014	0.00043	NR	-0.76	-0.54
28	0.002	0.00008	NR	1.06	1.96
29	<0.025	NR	NR		
30	NT	NT	NT		
31	NT	NT	NT		
32	0.00125	0.0002685	109.200	-1.21	-1.28
33	0.00167	0.0005	97	0.06	0.04
34	NT	NT	NT		
35	0.002	0.0006	87	1.06	0.56
36	0.0016	0.0002	82	-0.15	-0.20
37	0.0018	0.001	106	0.45	0.15
38	NS	NS	NS		
39	NS	NS	NS		
40	0.0015	0.0005	NR	-0.45	-0.29

Statistics

Assigned Value	0.00165	0.00016
Spike Value	0.00161	0.00008
Robust Average	0.00165	0.00016
Median	0.00160	0.00017
Mean	0.00165	
N	19	
Max	0.002	
Min	0.00125	
Robust SD	0.00028	
Robust CV	17%	


Kernel Density
Density
Result
Results: S3 - PFHxS_L
Assigned Value = 0.00165 ± 0.00016 µg/L
Results (µg/L)
Laboratory


z-Scores: S3 - PFHxS_L
Standard Deviation for Proficiency Assessment 0.00033 µg/L (Equivalent to 20% CV)
z-Score
Laboratory

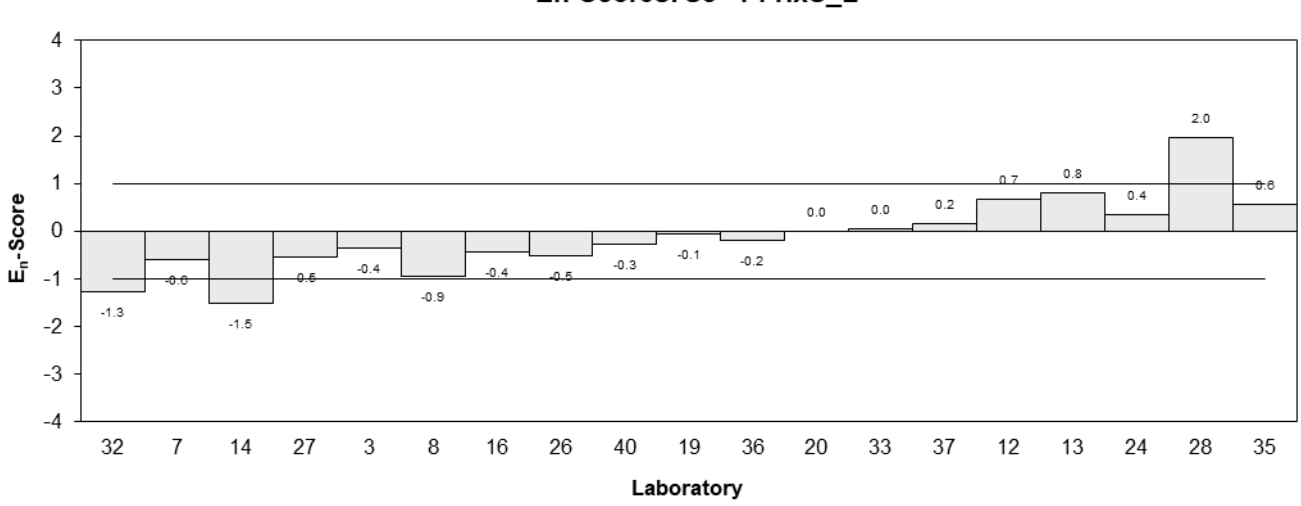

En-Scores: S3 - PFHxS_L
En-Score
Laboratory

Figure 65

Table 70

Sample Details

Sample No.	S3
Matrix	Reagent Grade Water
Analyte	PFOS
Unit	µg/L

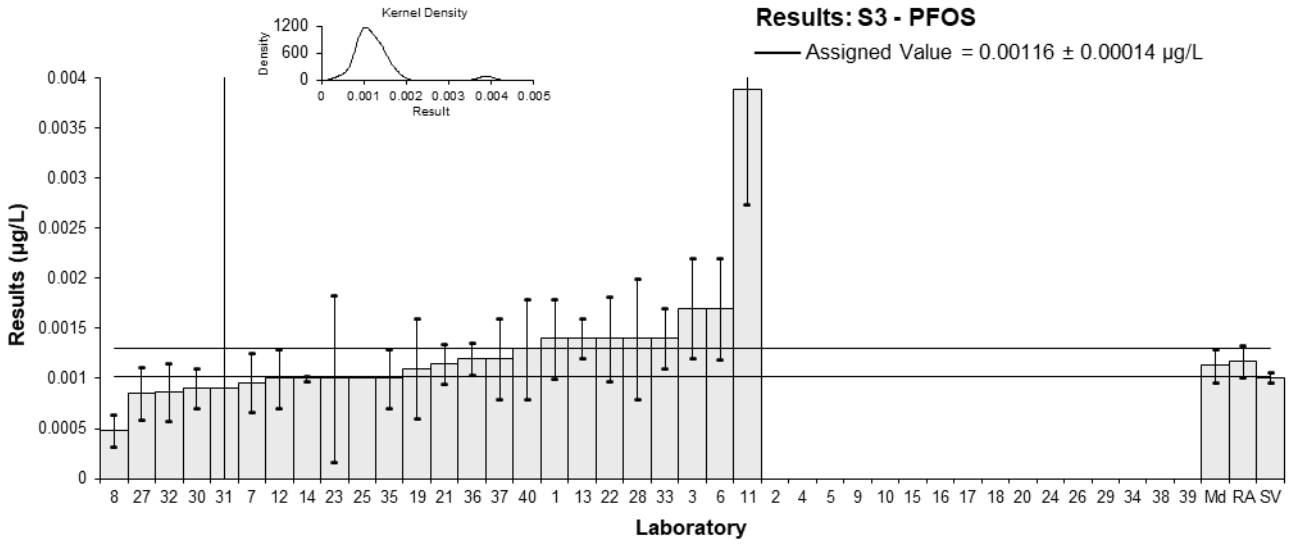
Participant Results

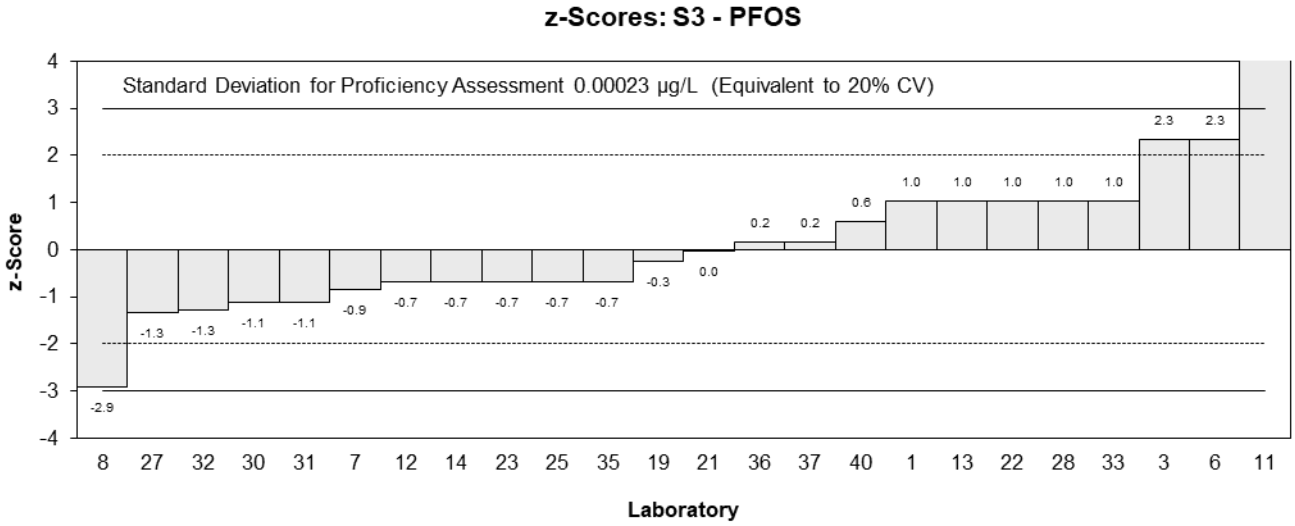
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0014	0.0004	69.69	1.03	0.57
2	NS	NS	NS		
3	0.0017	0.0005	NR	2.33	1.04
4	NS	NS	NS		
5	<0.002	NR	96.0		
6	0.0017	0.000504	95	2.33	1.03
7	0.00096	0.00029	115	-0.86	-0.62
8*	0.00048	0.00016	116	-2.93	-3.20
9	NS	NS	NS		
10	NS	NS	NS		
11*	0.00389	0.001144	NR	11.77	2.37
12	0.001	0.0003	65	-0.69	-0.48
13	0.0014	0.0002	82	1.03	0.98
14	0.001	0.000028	95	-0.69	-1.12
15	NS	NS	NS		
16	NR	NR	NR		
17	<0.005	NR	90.2		
18	<0.001	NR	NR		
19	0.0011	0.0005	101	-0.26	-0.12
20	<0.0010	NR	115		
21	0.00115	0.0002	119	-0.04	-0.04
22	0.0014	0.00042	104	1.03	0.54
23	0.001	0.0008339	NR	-0.69	-0.19
24	< 0.004	0.002	128		
25	0.001	NR	NR	-0.69	-1.14
26	<0.0010	NR	121		
27	0.00085	0.00026	NR	-1.34	-1.05
28	0.0014	0.0006	94	1.03	0.39
29	<0.135	NR	NR		
30	0.0009	0.0002	103	-1.12	-1.07
31	0.0009	0.0032	119.55	-1.12	-0.08
32	0.00086	0.0002886	99.9189	-1.29	-0.94
33	0.0014	0.0003	100	1.03	0.72
34	<0.002	0.002	70		
35	0.001	0.0003	76	-0.69	-0.48
36	0.0012	0.00016	85	0.17	0.19
37	0.0012	0.0004	114	0.17	0.09
38	NS	NS	NS		
39	NS	NS	NS		
40	0.0013	0.0005	NR	0.60	0.27

* Outlier, see Section 4.2

Statistics

Assigned Value	0.00116	0.00014
Spike Value	0.00101	0.00005
Robust Average	0.00117	0.00016
Median	0.00113	0.00017
Mean	0.00126	
N	24	
Max	0.00389	
Min	0.00048	
Robust SD	0.00030	
Robust CV	26%	


Results: S3 - PFOS
Assigned Value = 0.00116 ± 0.00014 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
8 27 32 30 31 7 12 14 23 25 35 19 21 36 37 40 1 13 22 28 33 3 6 11 2 4 5 9 10 15 16 17 18 20 24 26 29 34 38 39 Md RA SV


z-Scores: S3 - PFOS
Standard Deviation for Proficiency Assessment 0.00023 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
8 27 32 30 31 7 12 14 23 25 35 19 21 36 37 40 1 13 22 28 33 3 6 11

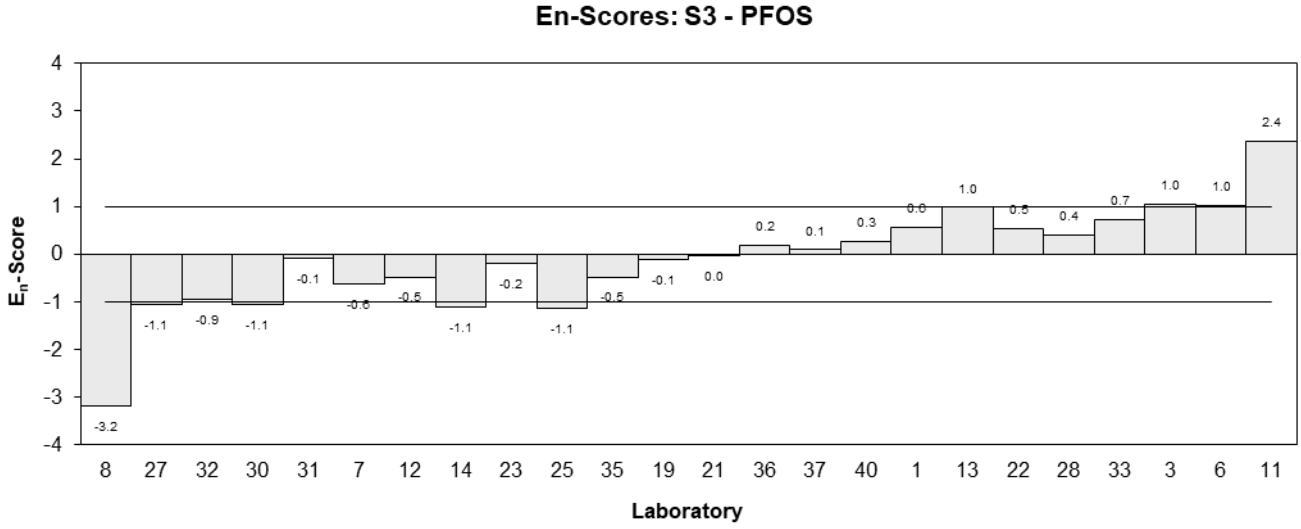

En-Scores: S3 - PFOS
En-Score
Laboratory
8 27 32 30 31 7 12 14 23 25 35 19 21 36 37 40 1 13 22 28 33 3 6 11

Figure 66

Table 71

Sample Details

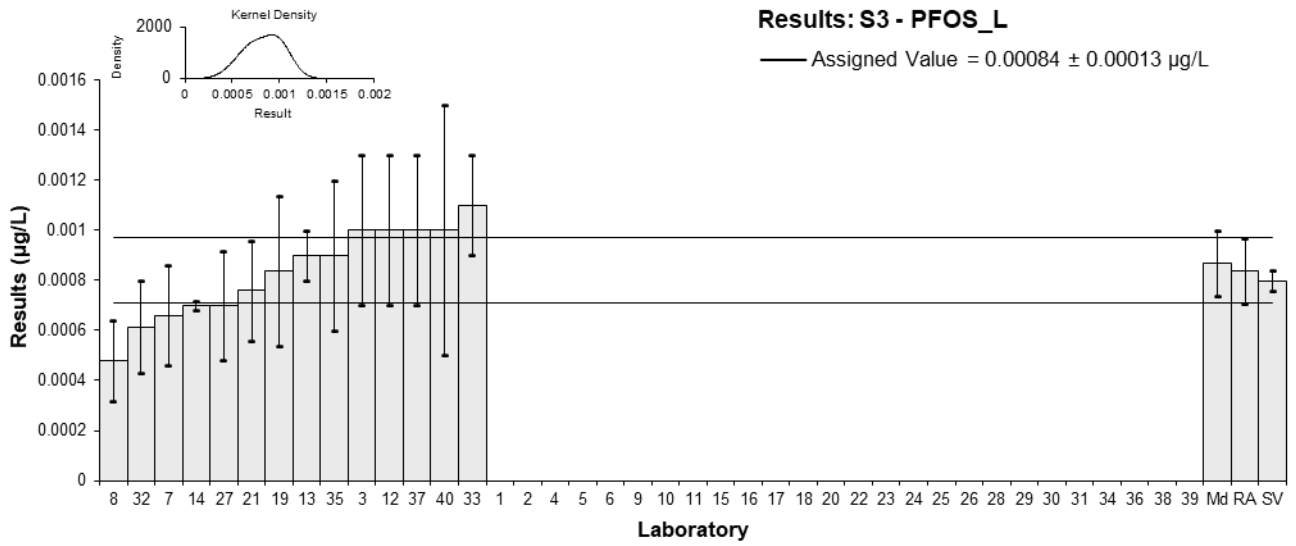
Sample No.	S3
Matrix	Reagent Grade Water
Analyte	PFOS_L
Unit	µg/L

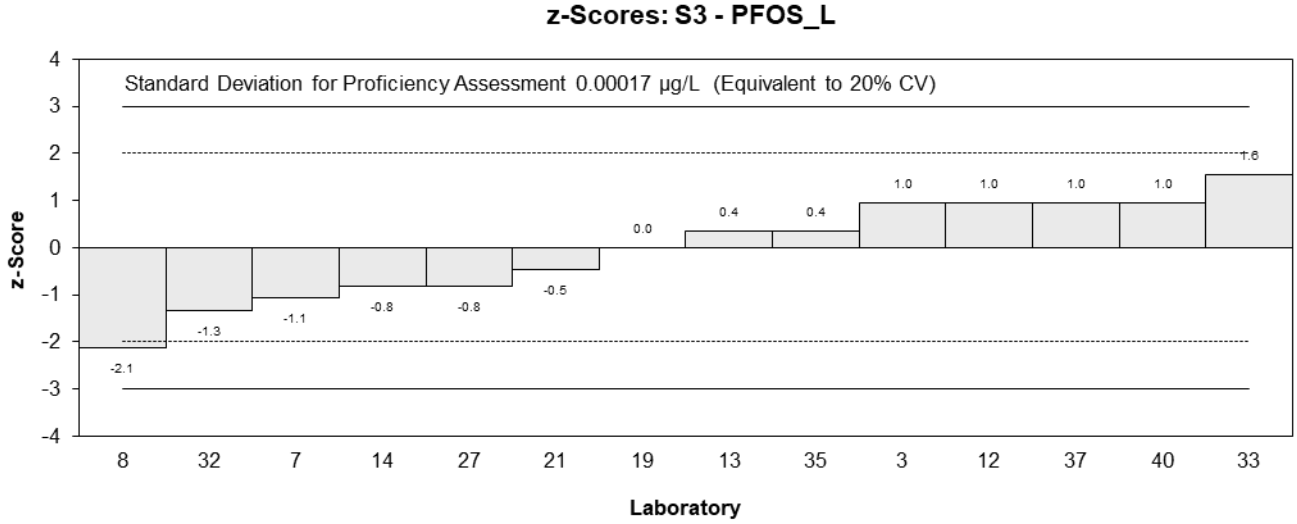
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NS	NS	NS		
3	0.001	0.0003	NR	0.95	0.49
4	NS	NS	NS		
5	NT	NT	NT		
6	NT	NT	NT		
7	0.00066	0.0002	115	-1.07	-0.75
8	0.00048	0.00016	NR	-2.14	-1.75
9	NS	NS	NS		
10	NS	NS	NS		
11	NR	NR	NR		
12	0.001	0.0003	65	0.95	0.49
13	0.0009	0.0001	82	0.36	0.37
14	0.0007	0.000020	95	-0.83	-1.06
15	NS	NS	NS		
16	NR	NR	NR		
17	NT	NT	NT		
18	<0.001	NR	NR		
19	0.00084	0.0003	101	0.00	0.00
20	<0.0010	NR	115		
21	0.00076	0.0002	119	-0.48	-0.34
22	NT	NT	NT		
23	NT	NT	NT		
24	< 0.004	0.002	NR		
25	NT	NT	NT		
26	<0.0010	NR	121		
27	0.00070	0.00022	NR	-0.83	-0.55
28	NR	NR	NR		
29	<0.085	NR	NR		
30	NT	NT	NT		
31	<0.01	NR	119.55		
32	0.000615	0.0001838	99.9189	-1.34	-1.00
33	0.0011	0.0002	100	1.55	1.09
34	NT	NT	NT		
35	0.0009	0.0003	76	0.36	0.18
36	< 0.0010	0.00013	85		
37	0.001	0.0003	114	0.95	0.49
38	NS	NS	NS		
39	NS	NS	NS		
40	0.001	0.0005	NR	0.95	0.31

Statistics

Assigned Value	0.00084	0.00013
Spike Value	0.000799	0.000040
Robust Average	0.00084	0.00013
Median	0.00087	0.00013
Mean	0.000833	
N	14	
Max	0.0011	
Min	0.00048	
Robust SD	0.00019	
Robust CV	23%	


Kernel Density
Density
2000
0
0 0.0005 0.001 0.0015 0.002
Result
Results: S3 - PFOS_L
Assigned Value = 0.00084 ± 0.00013 µg/L
Results (µg/L)
0.0016
0.0014
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
8 32 7 14 27 21 19 13 35 3 12 37 40 33 1 2 4 5 6 9 10 11 15 16 17 18 20 22 23 24 25 26 28 29 30 31 34 36 38 39 Md RA SV
Laboratory


z-Scores: S3 - PFOS_L
Standard Deviation for Proficiency Assessment 0.00017 µg/L (Equivalent to 20% CV)
z-Score
4
3
2
1
0
-1
-2
-3
-4
-2.1
-1.3
-1.1
-0.8
-0.8
-0.5
0.0
0.4
0.4
1.0
1.0
1.0
1.0
1.6
8 32 7 14 27 21 19 13 35 3 12 37 40 33
Laboratory

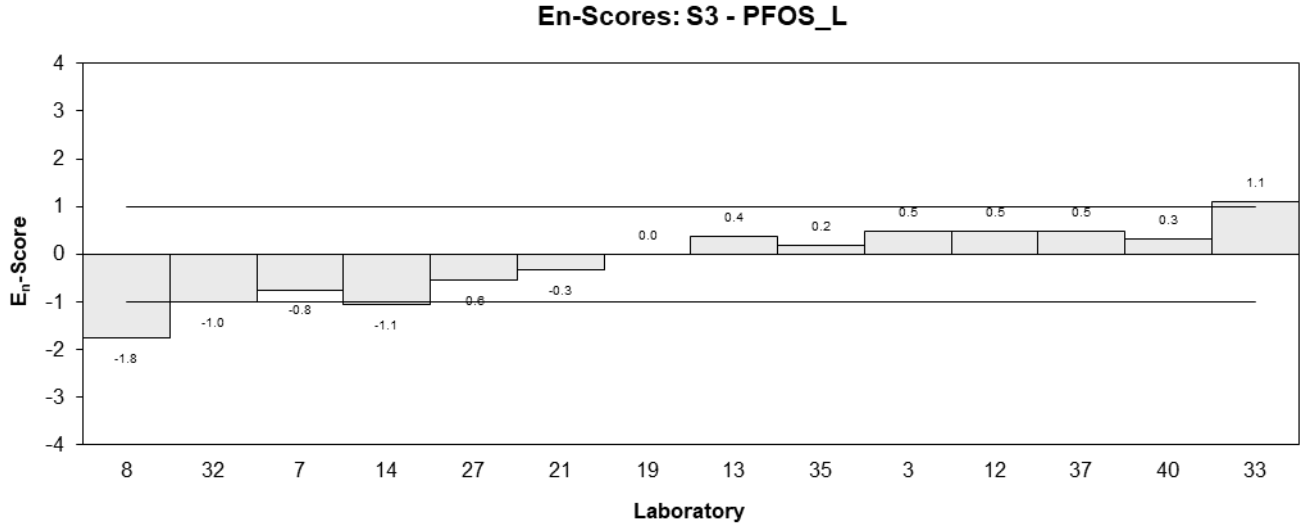

En-Scores: S3 - PFOS_L
En-Score
4
3
2
1
0
-1
-2
-3
-4
-1.8
-1.0
-0.8
-1.1
-0.6
-0.3
0.0
0.4
0.2
0.5
0.5
0.5
0.3
1.1
8 32 7 14 27 21 19 13 35 3 12 37 40 33
Laboratory

Figure 67

Table 72

Sample Details

Sample No.	S3
Matrix	Reagent Grade Water
Analyte	PFOSA
Unit	µg/L

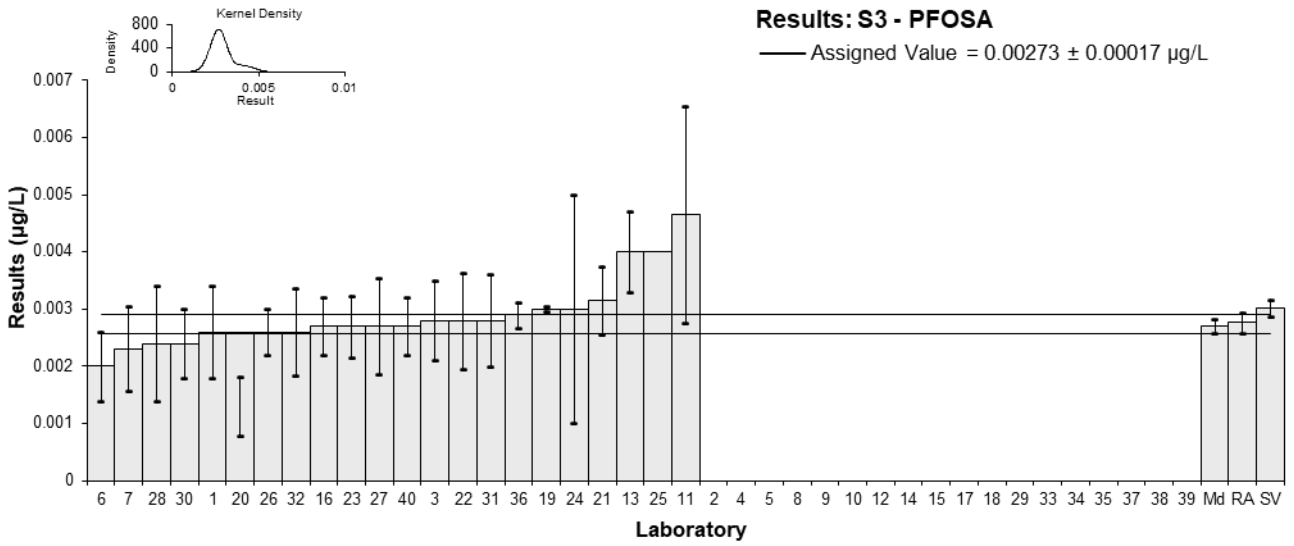
Participant Results

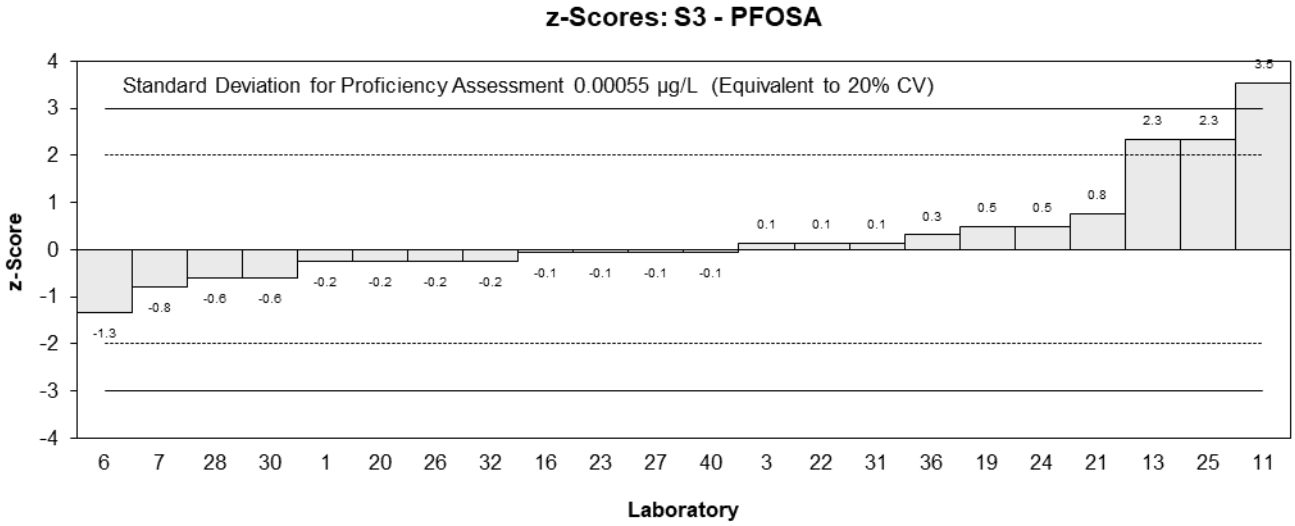
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0026	0.0008	80.66	-0.24	-0.16
2	NS	NS	NS		
3	0.0028	0.0007	NR	0.13	0.10
4	NS	NS	NS		
5	<0.005	NR	79.1		
6	0.0020	0.000606	110	-1.34	-1.16
7	0.0023	0.00074	142	-0.79	-0.57
8	<0.002	NR	120		
9	NS	NS	NS		
10	NS	NS	NS		
11*	0.00466	0.001893	NR	3.53	1.02
12	<0.01	NR	94		
13	0.004	0.0007	70	2.33	1.76
14	< 0.005	NR	83		
15	NS	NS	NS		
16	0.0027	0.0005	86	-0.05	-0.06
17	<0.005	NR	94.8		
18	<0.005	NR	NR		
19	0.003	0.00005	88	0.49	1.52
20	0.0026	0.00078	120	-0.24	-0.16
21	0.00315	0.0006	89	0.77	0.67
22	0.0028	0.00084	125	0.13	0.08
23	0.0027	0.00054	NR	-0.05	-0.05
24	0.003	0.002	121	0.49	0.13
25	0.004	NR	NR	2.33	7.47
26	0.0026	0.00040	91	-0.24	-0.30
27	0.0027	0.00084	NR	-0.05	-0.04
28	0.0024	0.001	NR	-0.60	-0.33
29	<0.025	NR	NR		
30	0.0024	0.0006	94	-0.60	-0.53
31	0.0028	0.0008	92.58	0.13	0.09
32	0.0026	0.0007701	99.5050	-0.24	-0.16
33	< 0.005	NR	72		
34	<0.005	0.005	69		
35	<0.01	NR	116		
36	0.0029	0.00022	78	0.31	0.61
37	< 0.005	NR	108		
38	NS	NS	NS		
39	NS	NS	NS		
40	0.0027	0.0005	NR	-0.05	-0.06

* Outlier, see Section 4.2

Statistics

Assigned Value	0.00273	0.00017
Spike Value	0.00302	0.00015
Robust Average	0.00276	0.00018
Median	0.00270	0.00012
Mean	0.00288	
N	22	
Max	0.00466	
Min	0.002	
Robust SD	0.00034	
Robust CV	12%	


Kernel Density
Density
800
400
0
0
0.005
0.01
Result
Results: S3 - PFOSA
Assigned Value = 0.00273 ± 0.00017 µg/L
Results (µg/L)
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
6 7 28 30 1 20 26 32 16 23 27 40 3 22 31 36 19 24 21 13 25 11 2 4 5 8 9 10 12 14 15 17 18 29 33 34 35 37 38 39 Md RA SV
Laboratory


z-Scores: S3 - PFOSA
Standard Deviation for Proficiency Assessment 0.00055 µg/L (Equivalent to 20% CV)
z-Score
4
3
2
1
0
-1
-2
-3
-4
-1.3 -0.8 -0.6 -0.6 -0.2 -0.2 -0.2 -0.2 -0.1 -0.1 -0.1 -0.1 0.1 0.1 0.1 0.3 0.5 0.5 0.8 2.3 2.3 3.5
6 7 28 30 1 20 26 32 16 23 27 40 3 22 31 36 19 24 21 13 25 11
Laboratory

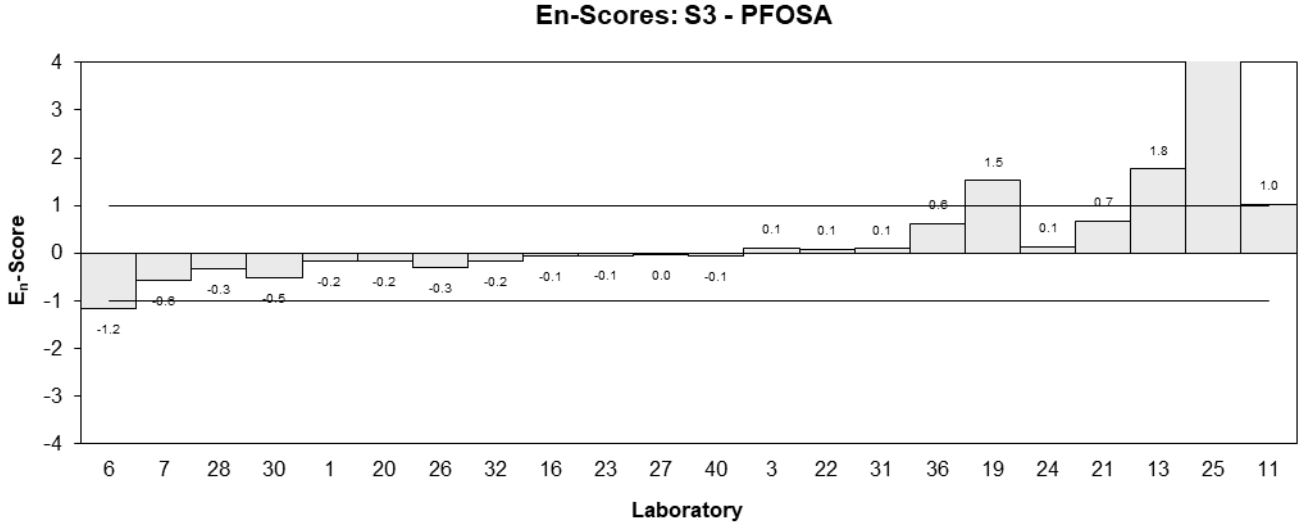

En-Scores: S3 - PFOSA
En-Score
4
3
2
1
0
-1
-2
-3
-4
-1.2 -0.6 -0.3 -0.5 -0.2 -0.2 -0.3 -0.2 -0.1 -0.1 0.0 -0.1 0.1 0.1 0.1 0.6 1.5 0.1 0.7 1.8 1.0
6 7 28 30 1 20 26 32 16 23 27 40 3 22 31 36 19 24 21 13 25 11
Laboratory

Figure 68

Table 73

Sample Details

Sample No.	S3
Matrix	Reagent Grade Water
Analyte	6:2FTS
Unit	µg/L

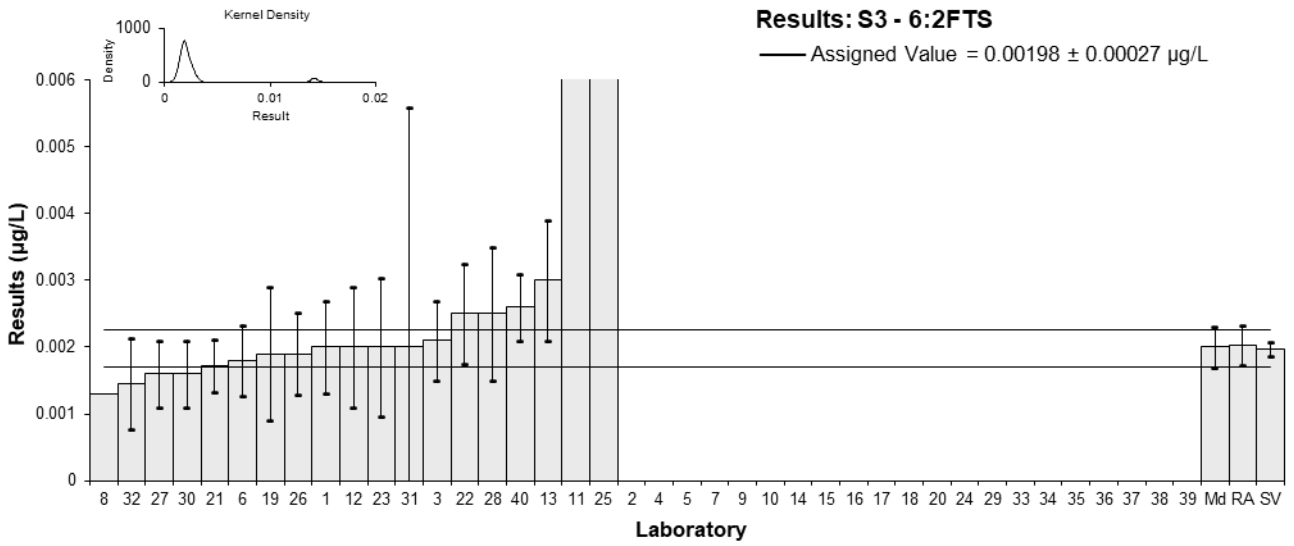
Participant Results

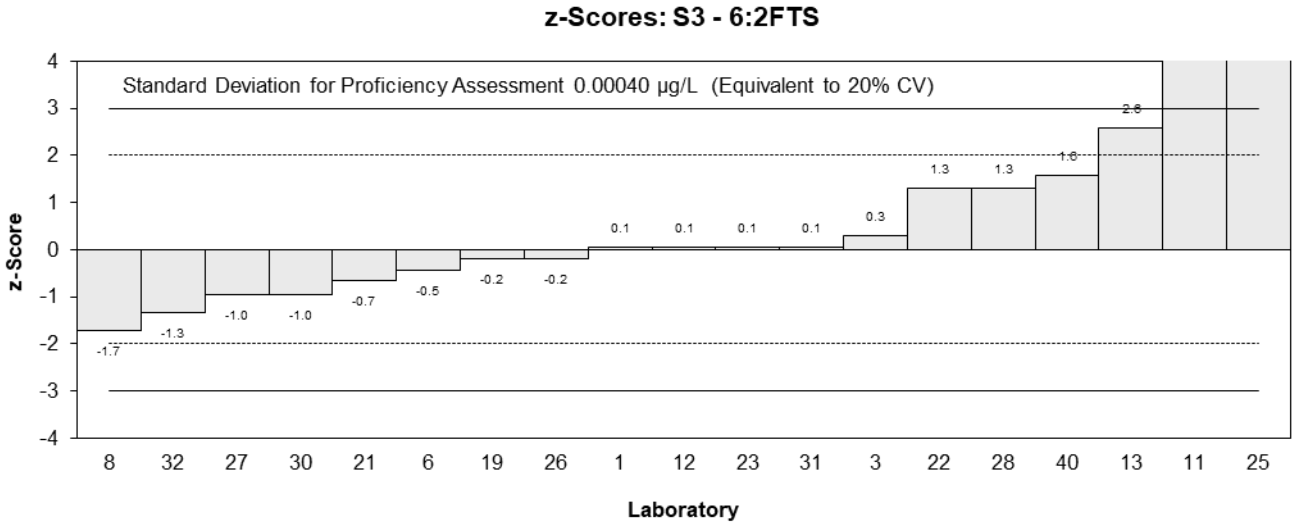
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.002	0.0007	170.22	0.05	0.03
2	NS	NS	NS		
3	0.0021	0.0006	NR	0.30	0.18
4	NS	NS	NS		
5	<0.005	NR	94.4		
6	0.0018	0.0005325	90	-0.45	-0.30
7	<0.005	NR	78		
8	0.0013	NR	92	-1.72	-2.52
9	NS	NS	NS		
10	NS	NS	NS		
11*	0.0142	0.00639	NR	30.86	1.91
12	0.002	0.0009	129	0.05	0.02
13	0.003	0.0009	103	2.58	1.09
14	< 0.01	NR	296		
15	NS	NS	NS		
16	NR	NR	NR		
17	<0.005	NR	80.4		
18	<0.005	NR	NR		
19	0.0019	0.001	164	-0.20	-0.08
20	<0.0050	NR	130		
21	0.00172	0.0004	202	-0.66	-0.54
22	0.0025	0.00075	120	1.31	0.65
23	0.002	0.0010400	NR	0.05	0.02
24	< 0.01	0.005	150		
25**	0.020	NR	NR	45.51	66.74
26	0.0019	0.00061	130	-0.20	-0.12
27	0.0016	0.00050	NR	-0.96	-0.67
28	0.0025	0.001	NR	1.31	0.50
29	<0.025	NR	NR		
30	0.0016	0.0005	148	-0.96	-0.67
31	0.002	0.0036	249.94	0.05	0.01
32	0.00145	0.0006872	131.856	-1.34	-0.72
33	< 0.005	NR	117		
34	<0.01	0.01	108		
35	<0.0004	NR	107		
36	< 0.002	0.00072	95		
37	< 0.005	NR	110		
38	NS	NS	NS		
39	NS	NS	NS		
40	0.0026	0.0005	NR	1.57	1.09

* Outlier, ** Extreme Outlier, see Section 4.2

Statistics

Assigned Value	0.00198	0.00027
Spike Value	0.00197	0.00010
Robust Average	0.00203	0.00029
Median	0.00200	0.00030
Mean	0.0027	
N	18	
Max	0.0142	
Min	0.0013	
Robust SD	0.00050	
Robust CV	25%	


Kernel Density
Density
1000
0
0
0.01
0.02
Result
Results: S3 - 6:2FTS
Assigned Value = 0.00198 ± 0.00027 µg/L
Results (µg/L)
0.006
0.005
0.004
0.003
0.002
0.001
0
8 32 27 30 21 6 19 26 1 12 23 31 3 22 28 40 13 11 25 2 4 5 7 9 10 14 15 16 17 18 20 24 29 33 34 35 36 37 38 39 Md RA SV
Laboratory


z-Scores: S3 - 6:2FTS
Standard Deviation for Proficiency Assessment 0.00040 µg/L (Equivalent to 20% CV)
z-Score
4
3
2
1
0
-1
-2
-3
-4
-1.7
-1.3
-1.0
-1.0
-0.7
-0.5
-0.2
-0.2
0.1
0.1
0.1
0.1
0.3
1.3
1.3
1.6
2.6
8 32 27 30 21 6 19 26 1 12 23 31 3 22 28 40 13 11 25
Laboratory

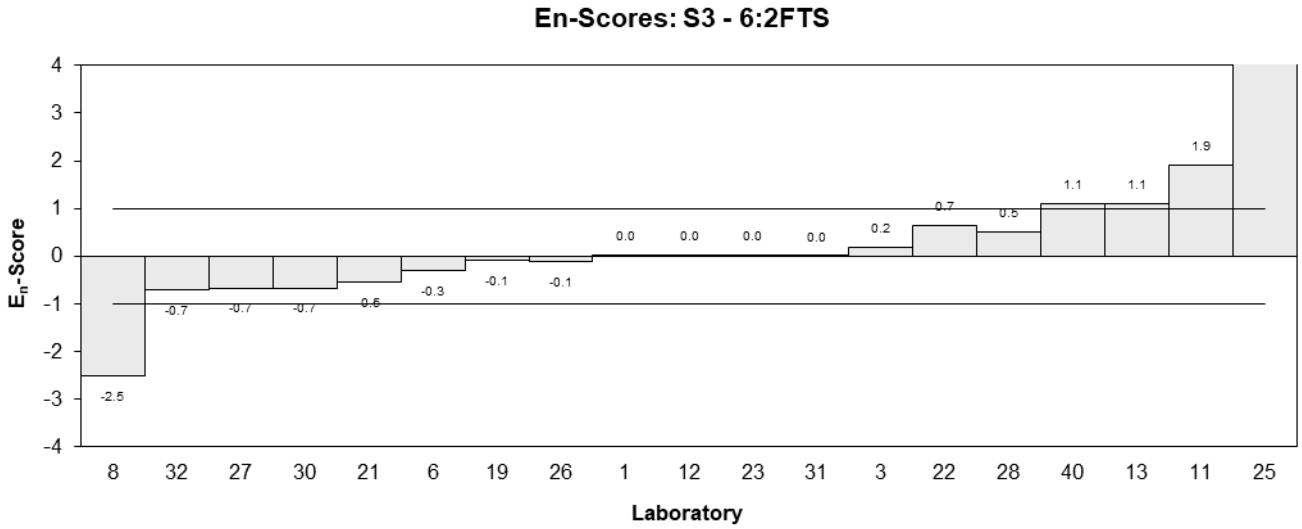

En-Scores: S3 - 6:2FTS
En-Score
4
3
2
1
0
-1
-2
-3
-4
-2.5
-0.7
-0.7
-0.7
-0.5
-0.3
-0.1
-0.1
0.0
0.0
0.0
0.0
0.2
0.7
0.5
1.1
1.1
1.9
8 32 27 30 21 6 19 26 1 12 23 31 3 22 28 40 13 11 25
Laboratory

Figure 69

Table 74

Sample Details

Sample No.	S4
Matrix	Reagent Grade Water
Analyte	PFPrA
Unit	µg/L

Participant Results

Lab. Code	Result	Uncertainty	Rec
1	NT	NT	NT
2	NS	NS	NS
3	NT	NT	NT
4	5.1	0.553	93
5	NT	NT	NT
6	NT	NT	NT
7	NT	NT	NT
8	6.1	NR	NR
9	NT	NT	NT
10	NS	NS	NS
11	1.375	0.55	NR
12	NT	NT	NT
13	NT	NT	NT
14	NT	NT	NT
15	14.50	0.53	NR
16	NR	NR	NR
17	NT	NT	NT
18	NT	NT	NT
19*	4.8951	0.069	111
20	NS	NS	NS
21	5.026	1.136	98
22	NT	NT	NT
23	NT	NT	NT
24	NR	NR	NR
25	NT	NT	NT
26	NS	NS	NS
27	4.4	1.7	NR
28	NT	NT	NT
29	NR	NR	NR
30	NT	NT	NT
31	NT	NT	NT
32	4.25	0.81	94.8
33	NS	NS	NS
34	NS	NS	NS
35	NT	NT	NT
36	NT	NT	NT
37	NS	NS	NS
38	NS	NS	NS
39	NS	NS	NS
40	NR	NR	NR

* Result submitted after the release of the Preliminary Report. This has been included here for information only, as Sample S4 is a pilot sample not being scored.

Statistics

Assigned Value	Not Set	
Spike Value	4.99	0.25
Robust Average	5.0	1.3
Median	4.96	0.83
Mean	5.7	
N	8	
Max	14.5	
Min	1.375	
Robust SD	1.5	
Robust CV	30%	

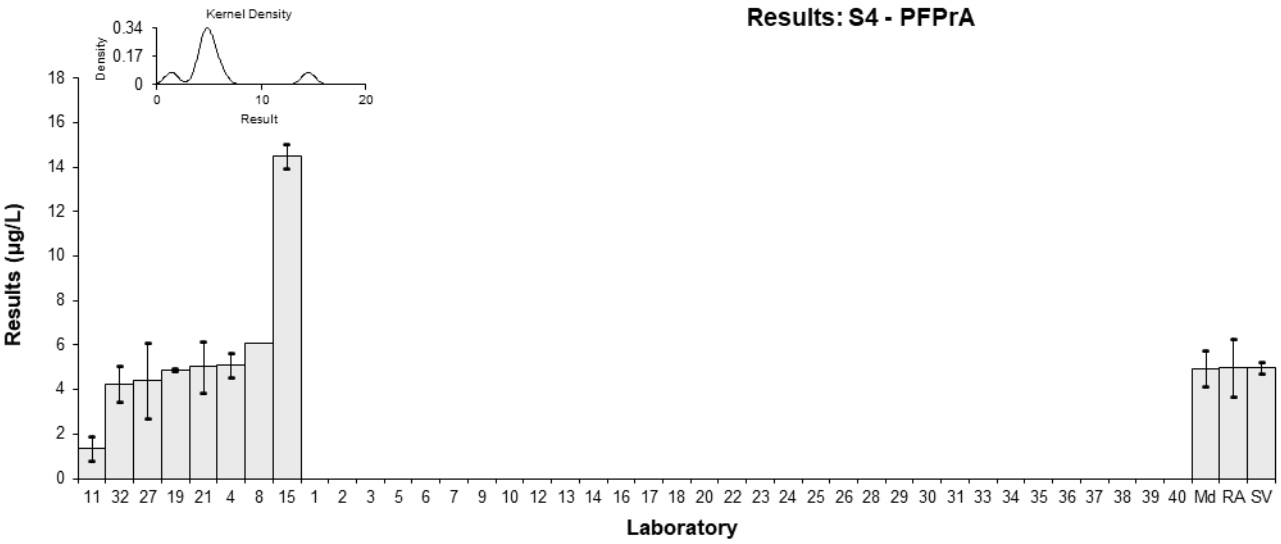

Results: S4 - PFPrA
Kernel Density
Density
0.34
0.17
0
0
10
20
Result
Results (µg/L)
18
16
14
12
10
8
6
4
2
0
11 32 27 19 21 4 8 15 1 2 3 5 6 7 9 10 12 13 14 16 17 18 20 22 23 24 25 26 28 29 30 31 33 34 35 36 37 38 39 40 Md RA SV
Laboratory

Figure 70

Table 75

Sample Details

Sample No.	S4
Matrix	Reagent Grade Water
Analyte	TFMS
Unit	µg/L

Participant Results

Lab. Code	Result	Uncertainty	Rec
1	NT	NT	NT
2	NS	NS	NS
3	NT	NT	NT
4	0.53	0.057	96
5	NT	NT	NT
6	NT	NT	NT
7	NT	NT	NT
8	0.58	NR	NR
9	NT	NT	NT
10	NS	NS	NS
11	0.14	0.056	NR
12	NT	NT	NT
13	NT	NT	NT
14	NT	NT	NT
15	1.161	0.143	NR
16	NR	NR	NR
17	NT	NT	NT
18	NT	NT	NT
19	NT	NT	NT
20	NS	NS	NS
21	0.6135	0.157	97
22	NT	NT	NT
23	NT	NT	NT
24	NR	NR	NR
25	NT	NT	NT
26	NS	NS	NS
27	0.50	0.19	NR
28	NT	NT	NT
29	NR	NR	NR
30	NT	NT	NT
31	NT	NT	NT
32	0.5	0.11	58.6
33	NS	NS	NS
34	NS	NS	NS
35	NT	NT	NT
36	NT	NT	NT
37	NS	NS	NS
38	NS	NS	NS
39	NS	NS	NS
40	NR	NR	NR

Statistics

Assigned Value	Not Set	
Spike Value	0.502	0.025
Robust Average	0.54	0.22
Median	0.530	0.070
Mean	0.57	
N	7	
Max	1.161	
Min	0.14	
Robust SD	0.24	
Robust CV	43%	

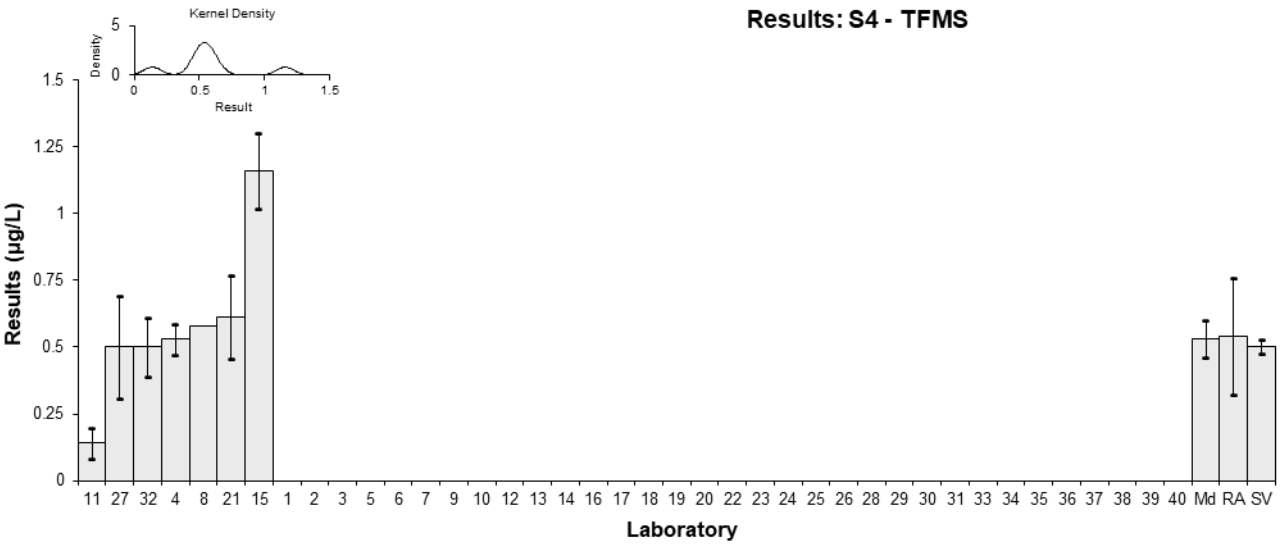

Results: S4 - TFMS
Kernel Density
Density
Result
Results (µg/L)
Laboratory
11 27 32 4 8 21 15 1 2 3 5 6 7 9 10 12 13 14 16 17 18 19 20 22 23 24 25 26 28 29 30 31 33 34 35 36 37 38 39 40 Md RA SV

Figure 71

Table 76

Sample Details

Sample No.	S4
Matrix	Reagent Grade Water
Analyte	Adsorbable Organic Fluorine
Unit	µg/L

Participant Results

Lab. Code	Result	Uncertainty	Rec
1	NT	NT	NT
2	NS	NS	NS
3	NT	NT	NT
4	NT	NT	NT
5	NT	NT	NT
6	NT	NT	NT
7	18	2.5	NR
8	NT	NT	NT
9	NT	NT	NT
10	NS	NS	NS
11	15.5	6.2	NR
12	NT	NT	NT
13	NT	NT	NT
14	NT	NT	NT
15	NT	NT	NT
16	NR	NR	NR
17	NT	NT	NT
18	NT	NT	NT
19	NT	NT	NT
20	NS	NS	NS
21	NR	NR	NR
22	NT	NT	NT
23	NT	NT	NT
24	NR	NR	NR
25	NT	NT	NT
26	NS	NS	NS
27	NT	NT	NT
28	NT	NT	NT
29	11.3	3.9	NR
30	NT	NT	NT
31	NT	NT	NT
32	NR	NR	NR
33	NS	NS	NS
34	NS	NS	NS
35	NT	NT	NT
36	NT	NT	NT
37	NS	NS	NS
38	NS	NS	NS
39	NS	NS	NS
40	NR	NR	NR

Statistics

Assigned Value	Not Set	
Spike Value	16.8	0.8
Robust Average	NA (N<6)	
Median	15.5	5.4
Mean	14.9	
N	3	
Max	18	
Min	11.3	
Robust SD	NA (N<6)	
Robust CV	NA (N<6)	

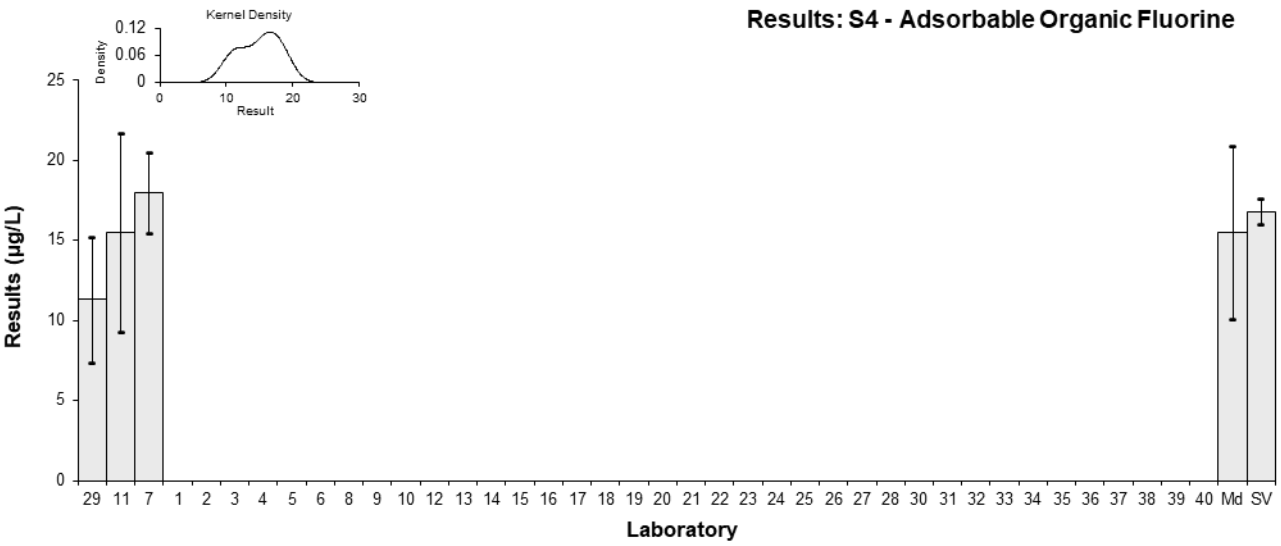

Results: S4 - Adsorbable Organic Fluorine
Kernel Density
Density
0.12
0.06
0
0
10
20
30
Result
Results (µg/L)
25
20
15
10
5
0
29 11 7 1 2 3 4 5 6 8 9 10 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 30 31 32 33 34 35 36 37 38 39 40 Md SV
Laboratory

Figure 72

6 DISCUSSION OF RESULTS

6.1 Assigned Value

Assigned values for the tests in the study samples were the robust averages of participants' results. If there were results less than 50% or greater than 150% of the robust average, these were excluded from the calculation of each assigned value.[3,4] The robust averages and their associated expanded uncertainties were calculated using the procedure described in ISO 13528.[5] Appendix 2 sets out the calculation for the expanded uncertainty of the robust average of PFOA in Sample S2.

No assigned value was set for Sample S1 6:2FTOH and Sample S2 PFDoS, PFTrDS and 8:2diPAP, as either too few numeric results were reported, or the reported results were too variable. Sample S1 was spiked with 6:2FTOH at 0.0499 ± 0.0025 µg/L. Laboratory **11** reported 0.165 ± 0.074 µg/L while Laboratory **39** reported a result of 0.00177 ± 0.00041 µg/L. Due to the large discrepancies between the reported results and between the results and spiked value, no summary statistics or graphical representation are provided for this test in Section 5 as it would be misleading.

A comparison of the assigned value versus spiked value for all fortified analytes in the four samples is presented in Table 77. The potable water used for Sample S1 may contain incurred analytes, which may explain some of the assigned values being higher than the spiked value. Incurred values (where applicable) have been included in the spiked value for Sample S2 analytes. The incurred value was determined by NMIA using a routine method.

Table 77 Comparison of Assigned Value and Spiked Value

Sample	Matrix	Analyte	Assigned Value (µg/L)	Spiked Value (µg/L)	Assigned/Spiked (%)
S1	Potable Water	PFBA	0.0105	0.00999	105
S1	Potable Water	PFPeA	0.0141	0.0119	118
S1	Potable Water	PFHxA	0.00323	0.00291	111
S1	Potable Water	PFOA	0.00695	0.00618	112
S1	Potable Water	PFNA	0.00207	0.00199	104
S1	Potable Water	PFDoA	0.0419	0.0499	84
S1	Potable Water	PFTeDA	0.0401	0.0499	80
S1	Potable Water	PFHxDA	0.080	0.0999	80
S1	Potable Water	FOUEA	0.047	0.0499	94
S1	Potable Water	PFBS	0.00654	0.00754	87
S1	Potable Water	PFHxS	0.00829	0.00795	104
S1	Potable Water	PFHxS_L	0.00706	0.00645	109
S1	Potable Water	PFHpS	0.00399	0.00396	101
S1	Potable Water	PFOS	0.00371	0.00309	120
S1	Potable Water	PFOS_L	0.00239	0.00244	98
S1	Potable Water	PFDS	0.0274	0.0301	91
S1	Potable Water	PFUdS	0.072	0.0995	72
S1	Potable Water	PFOSA	0.0120	0.0121	99
S1	Potable Water	4:2FTS	0.0203	0.0198	103

Sample	Matrix	Analyte	Assigned Value (µg/L)	Spiked Value (µg/L)	Assigned/Spiked (%)
S1	Potable Water	6:2FTS	0.0147	0.0150	98
S1	Potable Water	8:2diPAP	0.0402	0.0499	81
S1	Potable Water	5:3FTCA	0.0517	0.0499	104
S1	Potable Water	GenX	0.0149	0.0150	99
S1	Potable Water	PFMPA	0.062	0.0699	89
S1	Potable Water	9Cl-PF3ONS	0.0802	0.0805	100
S1	Potable Water	11Cl-PF3OUdS	0.091	0.100	91
S1	Potable Water	PFEESA	0.0114	0.0100	114
S2	River Water	PFBA	0.0539	0.0595**	91
S2	River Water	PFHxA	0.0250	0.0250**	100
S2	River Water	PFHpA	0.0142	0.0139**	102
S2	River Water	PFOA	0.0201	0.0196**	103
S2	River Water	PFDA	0.0425	0.0457**	93
S2	River Water	PFUdA	0.0463	0.0499	93
S2	River Water	PFTrDA	0.080	0.0953	84
S2	River Water	PFTeDA	0.069	0.0953	72
S2	River Water	PFODA	0.061	0.0699	87
S2	River Water	PFPeS	0.00565	0.00511	111
S2	River Water	PFHxS	0.0243	0.0243**	100
S2	River Water	PFHxS_L	0.0207	0.0199**	104
S2	River Water	PFOS	0.0170	0.0164**	104
S2	River Water	PFOS_L	0.0105	0.0116**	91
S2	River Water	PFNS	0.0269	0.0300	90
S2	River Water	PFDS	0.0633	0.0752	84
S2	River Water	PFDoS	0.060*	0.100	60
S2	River Water	PFTrDS	0.041*	0.100	41
S2	River Water	PFOSA	0.0344	0.0349	99
S2	River Water	8:2FTS	0.0481	0.0495	97
S2	River Water	10:2FTS	0.0590	0.0700	84
S2	River Water	6:2diPAP	0.044	0.0506**	87
S2	River Water	8:2diPAP	0.0355*	0.0499	71
S2	River Water	3:3FTCA	0.084	0.0993	85
S2	River Water	ADONA	0.200	0.199	101
S2	River Water	9Cl-PF3ONS	0.104	0.100	104
S2	River Water	11Cl-PF3OUdS	0.130	0.150	87
S2	River Water	PFEESA	0.0419	0.0400	105
S3	Reagent Grade Water	PFBA	0.00486	0.00500	97

Sample	Matrix	Analyte	Assigned Value (µg/L)	Spiked Value (µg/L)	Assigned/Spiked (%)
S3	Reagent Grade Water	PFOA	0.000788	0.000745	106
S3	Reagent Grade Water	PFHxS	0.00175	0.00199	88
S3	Reagent Grade Water	PFHxS_L	0.00165	0.00161	102
S3	Reagent Grade Water	PFOS	0.00116	0.00101	115
S3	Reagent Grade Water	PFOS_L	0.00084	0.000799	105
S3	Reagent Grade Water	PFOSA	0.00273	0.00302	90
S3	Reagent Grade Water	6:2FTS	0.00198	0.00197	101
S4	Reagent Grade Water	PFPrA	5.0*	4.99	100
S4	Reagent Grade Water	TFMS	0.54*	0.502	108
S4	Reagent Grade Water	AOF	15.5*	16.8	92

*Robust Average or Median as applicable (when assigned value not set). ** Incurred value included

Sample S4 was a pilot sample designed to assess laboratories' capabilities in measuring short-chain PFAS as well as AOF, EOF and TF; no assigned values were set for this sample. However, participants can still compare their results against those of other participants, as well as the spiked values, as presented in Section 5.

Only one result was reported for EOF and TF in Sample S4, so no graphical representation is available for these tests in Section 5. Laboratory **11** reported a result of 16.6 ± 6.64 µg/L for EOF in S4 and a result of 74.1 ± 14.82 µg/L for TF. The spike value for these analytes was 16.8 ± 0.8 µg/L and 96.6 ± 4.8 µg/L respectively.

Traceability: The consensus of participants' results is not traceable to any external reference, so although assigned values have been expressed in SI units, metrological traceability has not been established.

6.2 Measurement Uncertainty Reported by Participants

Participants were asked to report an evaluation of the expanded measurement uncertainty associated with their results. It is a requirement of ISO/IEC 17025 that laboratories have procedures to evaluate the uncertainty of chemical measurements and to report this in specific circumstances, including when the client's instruction so requires.[7]

Of 1669 numerical results for analytes of interest in this study, 1541 (92%) were reported with an expanded measurement uncertainty.

The participants used a wide variety of procedures to evaluate expanded measurement uncertainty. These are presented in Tables 3 and 4. Several participants reported using the NATA GAG Estimating and Reporting MU as their guide; this document has been officially removed from the NATA website and is considered obsolete.[9]

The magnitude of the reported expanded uncertainties was within the range 0.4% to 956% however the majority of reported expanded uncertainties (86%) were within the range of 10% to 50% relative, which study coordinator considers to be realistic for routine PFAS measurements.

Participation in proficiency testing programs allows participants to check how reasonable their evaluations of measurement uncertainty are. Results and the expanded MU are presented in the bar charts for each analyte in this study (Figures 2 to 72).

Laboratories **1**, **12**, **13**, **14**, **15**, **18**, **19**, **20**, **21**, **23**, **26**, **28**, **34**, **36**, and **38** should review their procedure for evaluating measurement uncertainty as some of the relative uncertainties reported by them were lower than 10%.

Laboratories **3**, **8**, **12**, **15**, **16**, **17**, **19**, **20**, **23**, **24**, **26**, **31**, **32**, **35**, **37**, and **40** reported measurement uncertainties greater than 50%. These participants should also review their procedure as it might not be fit-for-purpose.

The following participants may need to review if their reported uncertainties are realistic and fit-for-purpose, or if an error was made when reporting their uncertainties:

- Laboratory **14** reported relative uncertainties of around 30% for analytes in Samples S1 and S2 (low level and standard level sample respectively), while relative uncertainties were ten times lower at around 3% for Sample S3 (trace level sample).
- Laboratory **15** reported a wide range of relative uncertainties, ranging from 4% to 102% of the result.
- Laboratory **17** reported very large relative uncertainties for Sample S1 PFHxA (698%) and Sample S3 PFHxS (304%), while relative uncertainties for all other results were around 30%.
- Laboratory **19** reported a wide range of relative uncertainties, ranging from 0.4% to 69% of the result.
- Laboratory **20** reported relative uncertainties of 300% for Sample S1 PFTeDA and PFOS_L, while relative uncertainties were ten times lower at 30% for the other analytes in Samples S1 and S3, and a further ten times lower at 3% for Sample S2 analytes.
- Laboratory **23** reported a wide range of relative uncertainties, ranging from 2% to 956% of the result.
- Laboratory **24** reported relative uncertainties of 500% for Sample S1 6:2FTS, GenX, 9Cl-PF3ONS and 11Cl-PF3OUdS, while relative uncertainties for all other results were around ten times lower at around 50%.
- Laboratory **28** reported small relative uncertainties for Sample S3 PFHxS (3%) and PFHxS_L (4%), while relative uncertainties for all other results were around ten times greater (25–50%).
- Laboratory **31** reported a wide range of relative uncertainties, ranging from 13% to 356% of the result.
- Laboratory **32** reported relative uncertainties around or greater than 100% for Sample S1 PFDS, PFUdS and 11Cl-PF3OUdS and Sample S2 PFTrDA, PFODA, PFDS, PFDoS, PFTrDs and 11Cl-PF3OUdS, while relative uncertainties for all other results were lower (19%–65%).

Participants were also requested to report the coverage factor (k) associated with their uncertainties (Table 3). All participants reported k = 2.

Results that returned an acceptable *z*-score but an unacceptable E_n-score may have underestimated the uncertainty.

Laboratories **23**, **24**, **34**, **36**, **39**, and **40** attached an evaluation of the expanded measurement uncertainty to a result reported as being less than their limit of reporting. An evaluation of

uncertainty expressed as a numerical value cannot be attached to a result expressed as a range.[8]

In some cases, the results were reported with an inappropriate number of significant figures. Including too many significant figures may inaccurately reflect measurement precision. The recommended format is to write uncertainty to no more than two significant figures and then to write the result with the corresponding number of decimal places. For example, instead of 0.011176 ± 0.002390 µg/L, report 0.0112 ± 0.0024 µg/L.[8]

Laboratories **9**, **23**, and **32** reported some results, uncertainties and/or recoveries with a large number of significant figures. The last digits were omitted for these values presented in tables due to lack of space, however all significant figures were used for results assessment (*z*-score and E_n-score calculations).

Laboratory **39** reported their results with relative uncertainties (*x*%). Where numeric results were reported, these were converted to absolute uncertainties, in µg/L, by the study coordinator.

6.3 z-Score

The z-score compares the participant's deviation from the assigned value with the standard deviation for proficiency assessment (SDPA). The SDPA defines acceptable performance in a PT study.

A SDPA equivalent to 20% PCV was used to calculate *z*-scores for all scored analytes, except for Sample S1 PFTeDA, PFHxDA, and PFUdS, and Sample S2 PFTrDA, PFTeDA, and PFODA where a SDPA equivalent to 25% PCV was used instead. Unlike the standard deviation based on between-laboratory CV, setting the SDPA as a realistic set value enables *z*-scores to be used as reference value points for assessment of laboratory performance, independent of group performance.

The between-laboratory coefficient of variation predicted by the Thompson-Horwitz equation,[6] the between-laboratory CVs, and the SDPAs (as PCVs) are presented for comparison in Table 78.

Table 78 Comparison of Thompson-Horwitz CVs, Between-Laboratory CVs and SDPAs*

Sample	Analyte	Assigned Value (µg/L)	Thompson-Horwitz CV (%)	Between-Laboratory CV (%)	SDPA (as PCV, %)
S1	PFBA	0.0105	22	22	20
S1	PFPeA	0.0141	22	22	20
S1	PFHxA	0.00323	22	21	20
S1	PFOA	0.00695	22	14	20
S1	PFNA	0.00207	22	13	20
S1	PFDoA	0.0419	22	17	20
S1	PFTeDA	0.0401	22	29	25
S1	PFHxDA	0.080	22	33	25
S1	FOUEA	0.047	22	27	20
S1	PFBS	0.00654	22	12	20
S1	PFHxS	0.00829	22	12	20
S1	PFHxS_L	0.00706	22	12	20
S1	PFHpS	0.00399	22	16	20

Sample	Analyte	Assigned Value (µg/L)	Thompson-Horwitz CV (%)	Between-Laboratory CV (%)	SDPA (as PCV, %)
S1	PFOS	0.00371	22	25	20
S1	PFOS_L	0.00239	22	15	20
S1	PFDS	0.0274	22	18	20
S1	PFUdS	0.072	22	33	25
S1	PFOSA	0.0120	22	9.3	20
S1	4:2FTS	0.0203	22	16	20
S1	6:2FTS	0.0147	22	12	20
S1	8:2diPAP	0.0402	22	16	20
S1	5:3FTCA	0.0517	22	21	20
S1	GenX	0.0149	22	18	20
S1	PFMPA	0.062	22	25	20
S1	9Cl-PF3ONS	0.0802	22	15	20
S1	11Cl-PF3OUdS	0.091	22	23	20
S1	PFEESA	0.0114	22	25	20
S2	PFBA	0.0539	22	15	20
S2	PFPeA	0.0154	22	20	20
S2	PFHxA	0.0250	22	15	20
S2	PFHpA	0.0142	22	16	20
S2	PFOA	0.0201	22	15	20
S2	PFNA	0.00092	22	31	20
S2	PFDA	0.0425	22	17	20
S2	PFUdA	0.0463	22	19	20
S2	PFDoA	0.00086	22	21	20
S2	PFTrDA	0.080	22	26	25
S2	PFTeDA	0.069	22	33	25
S2	PFODA	0.061	22	29	25
S2	PFBS	0.00317	22	18	20
S2	PFPeS	0.00565	22	16	20
S2	PFHxS	0.0243	22	12	20
S2	PFHxS_L	0.0207	22	17	20
S2	PFOS	0.0170	22	22	20
S2	PFOS_L	0.0105	22	18	20
S2	PFNS	0.0269	22	17	20
S2	PFDS	0.0633	22	23	20
S2	PFDoS	0.060**	22	55	Not Set
S2	PFTrDS	0.041**	22	65	Not Set
S2	PFOSA	0.0344	22	13	20
S2	8:2FTS	0.0481	22	13	20

Sample	Analyte	Assigned Value (µg/L)	Thompson-Horwitz CV (%)	Between-Laboratory CV (%)	SDPA (as PCV, %)
S2	10:2FTS	0.0590	22	26	20
S2	6:2diPAP	0.044	22	32	20
S2	8:2diPAP	0.0355**	22	38	Not Set
S2	3:3FTCA	0.084	22	23	20
S2	ADONA	0.200	22	16	20
S2	9Cl-PF3ONS	0.104	22	18	20
S2	11Cl-PF3OUdS	0.130	22	24	20
S2	PFEESA	0.0419	22	16	20
S3	PFBA	0.00486	22	19	20
S3	PFHxA	0.000521	22	18	20
S3	PFOA	0.000788	22	16	20
S3	PFHxS	0.00175	22	14	20
S3	PFHxS_L	0.00165	22	17	20
S3	PFOS	0.00116	22	23	20
S3	PFOS_L	0.00084	22	23	20
S3	PFOSA	0.00273	22	11	20
S3	6:2FTS	0.00198	22	23	20
S4	PFPrA	5.0**	22	30	Not Set
S4	TFMS	0.54**	22	43	Not Set
S4	Adsorbable Org	15.5**	22	26	Not Set

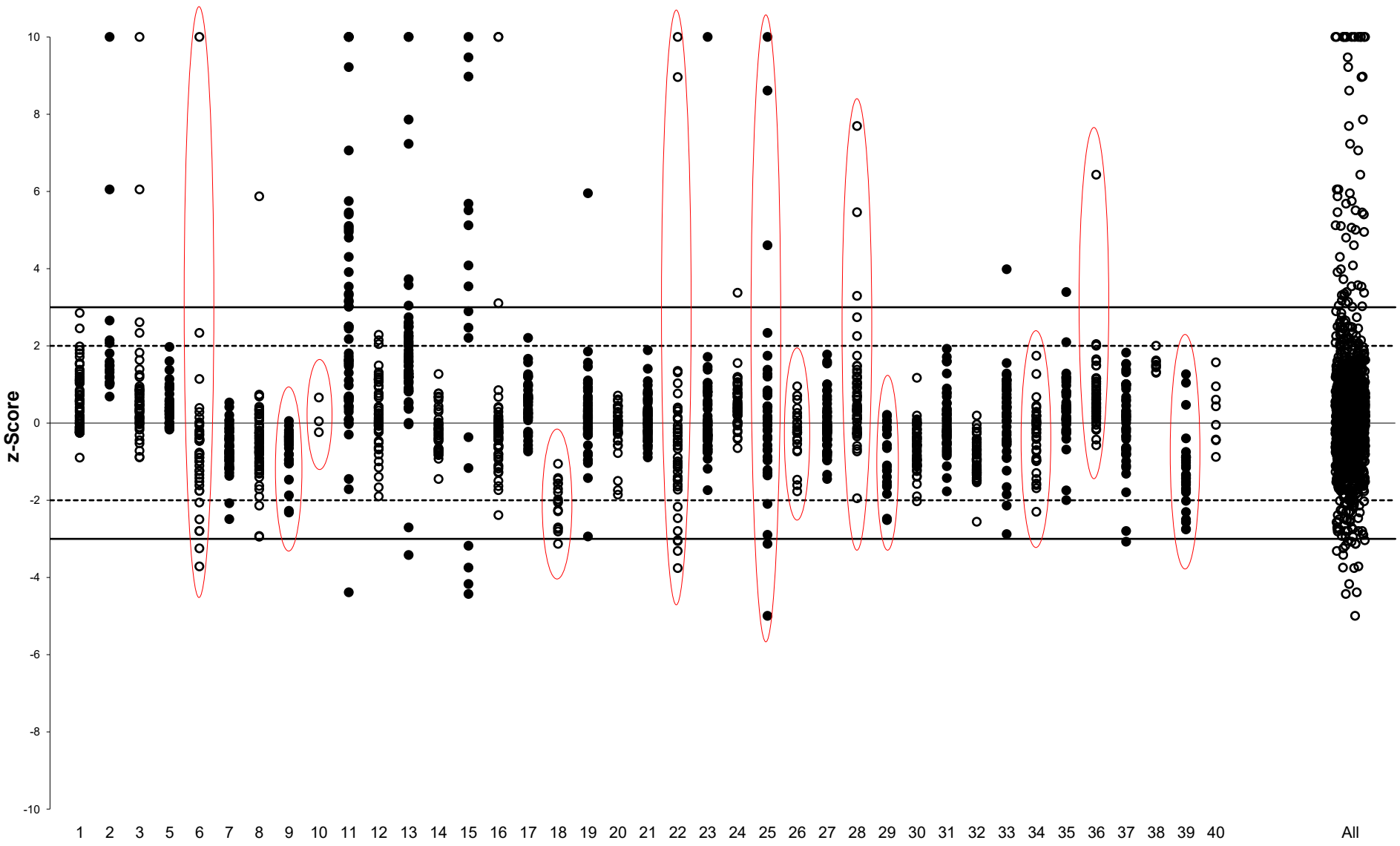
*The between-laboratory CV outliers removed, if applicable. Shaded cells represent between-laboratory CVs higher than both the SDPA and the Thompson-Horwitz CV for scored analytes. **Robust Average or Median value as applicable (when assigned value not set).

To account for possible bias in the consensus values due to laboratories using inefficient analytical/extraction techniques, a total of three z-scores were adjusted across Sample S1 PFHxDA and 8:2diPAP, and Sample S2 PFTeDA. A maximum acceptable result was set as the spiked value plus two SDPAs of the spiked value. Results less than the maximum acceptable result but with *z*-scores greater than 2.0 had their *z*-scores adjusted to 2.0. This approach ensured that participants reporting results close to the spiked value were not penalised. *z*-Scores for results higher than the maximum acceptable result and *z*-scores less than 2.0 were left unaltered.

The dispersal of participants' *z*-scores is presented graphically by laboratory in Figure 73 and by analyte in Figure 74.

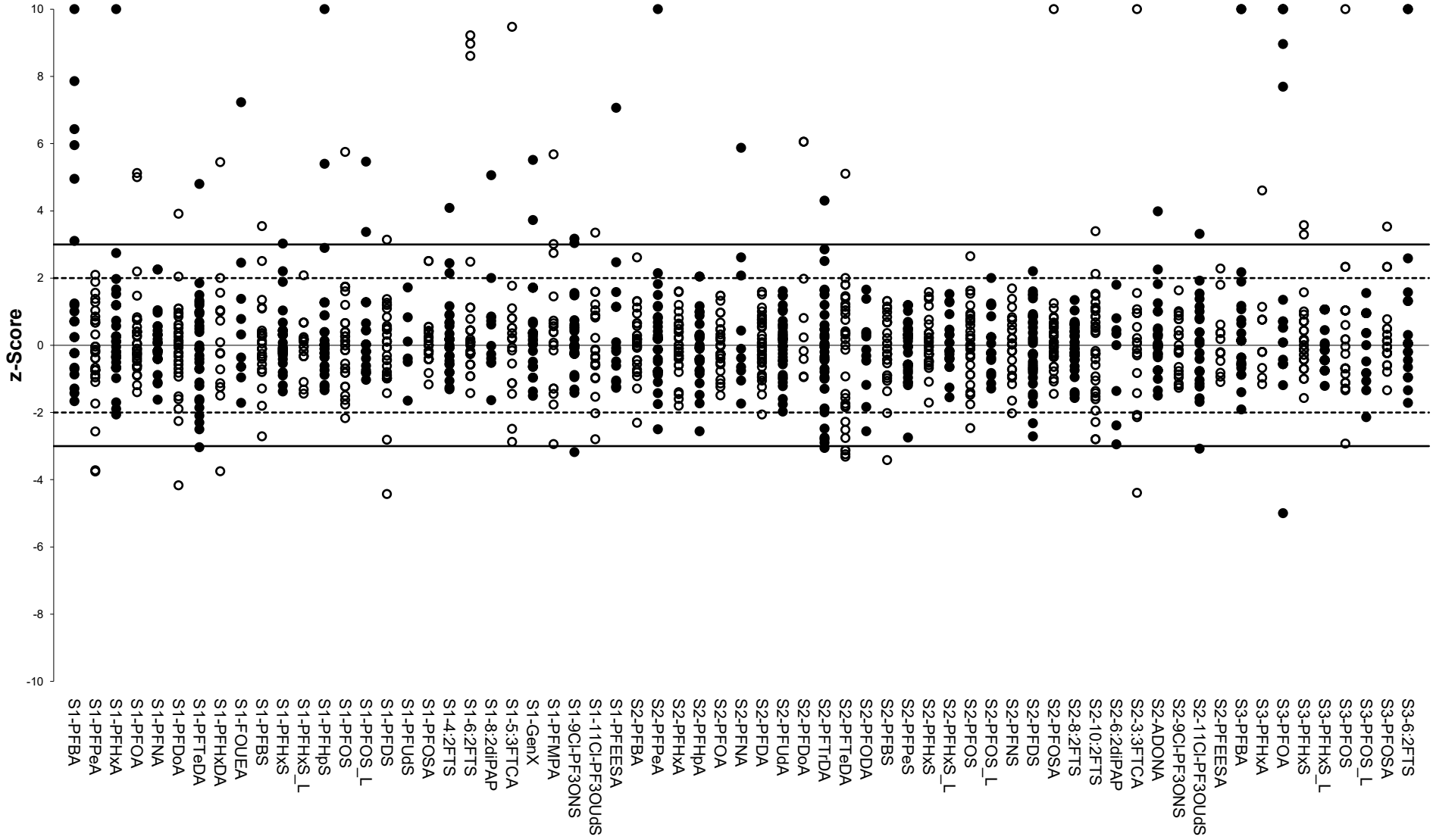
Of the 1613 results for which *z*-scores were calculated, 1459 (90%) returned an acceptable *z*-score of $|z| \leq 2.0$, and 78 (5%) returned a questionable *z*-score of $2.0 < |z| < 3.0$.

Participants with multiple *z*-scores larger than 2.0 or smaller than -2.0 should check for method or laboratory bias.



Scores greater than 10.0 have been plotted as 10.0. Circled participants did not add labelled standards directly into the sample bottle for at least one sample (see Section 6.6).

Figure 73 *z*-Score Dispersal by Laboratory for Samples S1, S2, and S3



Scores greater than 10.0 have been plotted as 10.0.

Figure 74 *z*-Score Dispersal by Analyte for Samples S1, S2, and S3

6.4 E_n-Score

The E_n-score indicates how closely a result agrees with the assigned value taking into account the respective uncertainties. E_n-Scores can be interpreted in conjunction with z-scores, as an unacceptable E_n-score for an analyte can either be caused by issues with measurement, an inappropriate evaluation of measurement uncertainty, or both.

Where a participant did not report an expanded uncertainty with a result, an expanded uncertainty of zero (0) was used to calculate the E_n-score. For results whose z-scores were adjusted (see Section 6.3), no E_n-score has been calculated.

The dispersal of participants' E_n-scores is graphically presented in Figure 75.

Of 1610 results for which E_n-scores were calculated, 1239 (77%) returned an acceptable score of $|E_n| < 1.0$, indicating agreement of the participants' results with the assigned values within their respective expanded measurement uncertainties.

6.5 Summary of Participants' Results and Performances

Summaries of participants' results and performance for scored analytes in this study are presented in Tables 79 to 82, and Figure 76.

A total of 65 analytes were scored in this study, and no participant reported results for all analytes. Laboratory **27** reported the highest number of scored analytes (62), and returned acceptable z-scores for all analytes.

Nine participants received acceptable z-scores for all scored analytes that they reported results for: Laboratories **21** (59), **31** (52), **14** (41), **5** (40), **20** (40), **26** (28), **38** (8), **40** (8), and **10** (3).

Most of the questionable or unacceptable results returned by Laboratories **11**, **13**, and **15** were above the assigned value. These participants may need to check for laboratory or method bias.

Laboratory **4** received only Sample S4 and therefore did not have any scored results in this study.

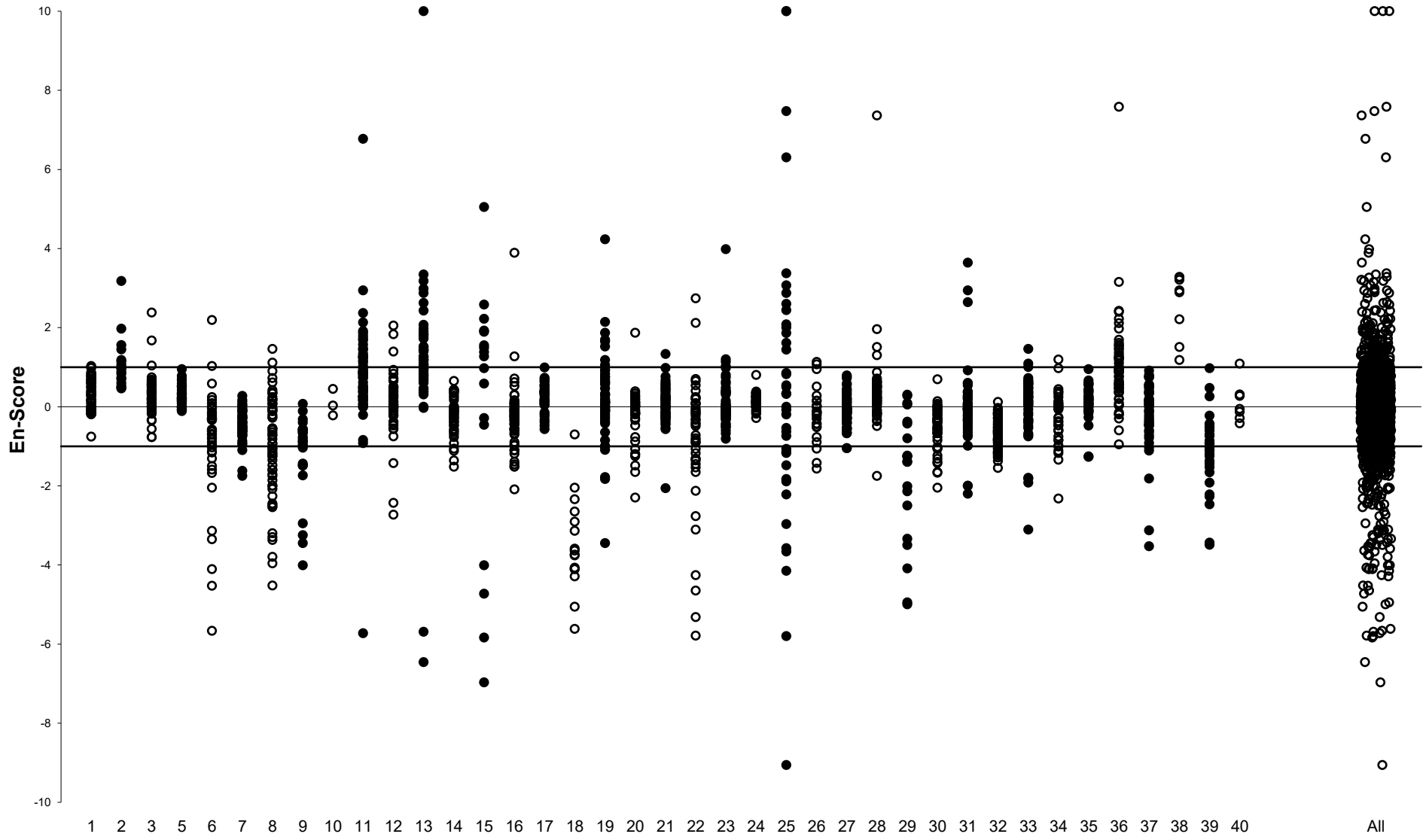
No participant returned acceptable E_n-scores for all scored analytes. Laboratory **27** returned the highest number E_n-scores (60 out of 62 scored analytes).

Four participants received acceptable E_n-scores for all reported results that were scored: Laboratories **24** (49), **5** (40), **17** (40), and **10** (3).

All results reported by Laboratory **38** returned unacceptable En-scores (8). This laboratory may need to review whether they have underestimated their uncertainties, as all their reported results returned acceptable z-scores.

Thirteen participants reported at least one additional analyte for Samples S1, S2, and/or S3 (total of 20 results). For the pilot Sample S4, seven participants reported at least one additional analyte (total of 10 results). These results are presented in Appendix 4.

Twenty-two participants did not report numeric results for at least one analyte that they tested for and was present in the test samples (total of 100 results). These results are presented in Appendix 5.



Scores greater than 10.0 have been plotted as 10.0.

Figure 75 E_n-Score Dispersal by Laboratory for Samples S1, S2, and S3

Table 79 Summary of Participants' Results and Performance for Sample S1 (all values are in µg/L)*

Lab. Code	PFBA	PFPeA	PFHxA	PFOA	PFNA	PFDoA	PFTeDA	PFHxDA	FOUEA	PFBS	PFHxS	PFHxS_L	PFHpS	PFOS	PFOS_L
AV	0.0105	0.0141	0.00323	0.00695	0.00207	0.0419	0.0401	0.080	0.047	0.00654	0.00829	0.00706	0.00399	0.00371	0.00239
1	<0.0182	0.0162	0.0031	0.0075	0.0023	0.0510	0.0534	NT	0.07	0.0067	0.0079	NT	0.0050	0.0046	NT
2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
3	0.0131	0.0116	0.0036	0.0068	0.0023	0.045	0.04	0.0656	NT	0.0066	NT	0.0072	0.004	0.0039	0.0026
4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
5	0.0126	0.0137	0.0045	0.0075	0.0022	0.0469	0.0494	NT	NT	0.0069	0.0088	NT	0.0043	0.0037	NT
6	0.0075	0.0036	0.0019	0.0065	0.0014	0.035	0.015	0.055	NT	0.0069	0.0068	NT	0.0043	0.0028	NT
7	<0.01	0.012	0.0026	0.0061	0.0021	0.04	0.033	NT	NT	0.0056	0.0076	0.0066	0.0035	0.0033	0.0022
8	0.011	0.013	0.0029	0.0066	0.0022	0.043	0.039	0.075	0.041	0.0061	0.0063	0.0052	0.003	0.0025	0.0019
9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
10	NR	NR	NR	0.007	NR	NR	NR	NR	NR	NR	0.0079	NR	NR	0.0042	NR
11	0.0209	0.0185	0.00421	0.0139	0.00247	0.0747	0.0882	0.189	0.0308	0.00981	0.0133	NR	0.0083	0.00798	NR
12	0.007	0.015	0.002	0.007	0.002	0.044	0.035	NT	NT	0.008	0.008	0.007	0.004	0.004	0.002
13	0.027	0.014	0.004	0.01	0.003	0.051	0.052	0.122	0.115	0.003	0.0114	0.01	0.005	0.005	0.003
14	0.0091	0.012	0.0032	0.0066	0.002	0.038	0.033	NT	NT	0.007	0.009	0.008	0.004	0.0036	0.0023
15	NT	NT	0.009989	0.014066	NT	0.006949	NR	0.004984	0.043543	0.011176	0.011942	NT	0.006298	NR	NT
16	0.017	0.0092	0.0030	0.0061	0.0021	0.049	0.039	0.050	0.041	0.0055	0.0081	0.0066	0.0038	0.0031	0.0023
17	0.011	0.0122	0.0043	0.0077	0.0022	0.0425	0.0449	NT	NT	0.0061	0.0094	NT	0.0034	0.0039	NT
18	<0.05	<0.01	<0.01	<0.01	<0.01	0.023	<0.01	NT	NT	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
19	0.023	0.0114	0.0033	0.0081	0.0025	0.0496	0.0586	0.1112	NT	0.0069	0.0088	0.0074	0.0047	0.0038	0.0027
20	0.012	0.0135	0.0034	0.00735	0.00225	0.0425	0.0215	NT	NT	0.0064	0.0084	0.0073	0.0038	0.0026	0.0026
21	<0.002	0.0194	0.0034	0.0073	0.00214	0.0413	0.0499	0.0946	0.0543	0.0069	0.0088	NT	0.0039	0.0037	0.0023
22	0.0600	0.0035	0.0028	0.0075	0.0017	0.0391	0.0096	0.0819	NT	0.0083	0.0080	NT	0.0041	0.0021	NT
23	<0.015	0.017	0.0028	0.0063	0.0019	0.0449	0.0458	NT	0.06	0.0061	0.0078	NT	0.0339	0.0032	NT
24	0.013	0.013	0.004	0.008	< 0.004	0.042	0.044	NT	NT	0.007	0.010	0.008	0.004	0.004	0.004
25	0.009	0.018	0.003	0.008	0.002	0.037	0.019	NT	NT	NT	0.009	NT	0.005	0.005	NT
26	0.012	0.012	0.0034	0.0068	0.0019	NR	0.024	NT	NT	0.0062	0.0081	0.0068	0.0038	0.0024	0.0024
27	0.010	0.012	0.0031	0.0067	0.0019	0.047	0.050	0.10	NT	0.0064	0.0079	0.0066	0.0039	0.0031	0.0024
28	0.012	0.012	0.005	0.009	0.003	0.043	0.047	NT	NT	0.007	0.009	0.008	0.004	0.005	0.005
29	<0.5	<0.025	<0.025	<0.025	<0.005	0.0284	<0.025	0.0574	NR	0.0064	<0.005	<0.005	<0.005	<0.135	<0.085
30	<0.002	0.011	0.003	0.0050	0.0019	0.026	0.028	0.055	0.038	0.0058	0.0060	NT	0.0037	0.0036	NT
31	<0.0020	0.0177	0.0033	0.0064	0.002	0.0448	0.037	NT	0.05	0.0064	0.0074	NT	0.0047	0.0049	<0.01
32	0.0078	0.014	0.0028	0.0053	0.0016	0.034	0.036	0.0755	NR	0.00485	0.00695	0.0055	0.00305	0.0028	0.0021
33	< 0.02	0.01649	0.00303	0.00569	0.00197	0.04614	0.02344	NT	NT	0.00796	0.00813	0.00728	0.00328	0.0042	0.003
34	0.010	0.016	<0.005	0.007	<0.005	0.036	0.017	NT	NT	<0.01	0.008	NT	0.005	0.005	NT
35	0.01	0.02	0.004	0.008	0.002	0.05	<0.05	NT	NT	0.006	0.009	0.007	0.004	0.004	0.003
36	0.024	0.0136	0.0037	0.0075	0.002	0.059	0.055	NT	NT	0.0071	0.0082	0.0073	0.0040	0.0038	0.0024
37	< 0.005	0.016	0.0028	0.006	0.0021	0.04	0.029	NT	NT	0.0061	0.0088	0.0073	0.0037	0.0032	0.002
38	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
39	0.00868	0.00686	0.00213	0.00571	0.00161	0.02918	0.05269	0.10071	NT	0.00419	NT	0.00502	0.00292	NT	0.00203
40	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

*AV = Assigned Value, NS = Not Supplied, NT = Not Tested, NR = Not Reported. Shaded cells are results which returned a questionable or unacceptable *z*-score.

Table 79 Summary of Participants' Results and Performance for Sample S1 (all values are in µg/L)* (continued)

Lab. Code	PFDS	PFUdS	PFOSA	4:2FTS	6:2FTS	8:2diPAP	6:2FTOH	5:3FTCA	GenX	PFMPA	9Cl-PF3ONS	11Cl-PF3OUdS	PFEESA
AV	0.0274	0.072	0.0120	0.0203	0.0147	0.0402	Not Set	0.0517	0.0149	0.062	0.0802	0.091	0.0114
1	0.0334	NT	0.0116	0.021	0.018	0.047	NT	0.06	0.02	0.06	0.09	0.11	<0.01
2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
3	0.03	NT	0.0133	0.0239	0.0142	0.0359	NT	NT	0.0154	NT	NT	NT	NT
4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
5	0.0349	NT	0.0120	0.0217	0.0147	NT	NT	NT	0.0144	NT	0.0788	0.0886	NT
6	0.027	NT	0.011	0.017	0.014	NT	NT	NT	NT	NT	NT	NT	NT
7	0.023	NT	0.011	0.017	0.014	NT	NT	0.026	0.012	0.046	0.066	0.073	<0.025
8	0.024	0.074	0.013	0.020	0.012	0.036	<0.1	0.054	<0.05	0.071	0.076	0.085	0.0089
9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
10	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
11	0.0446	0.103	0.018	0.0302	0.0418	0.0809	0.165	0.0367	0.0168	0.0993	0.131	0.152	0.0275
12	0.028	NT	<0.01	0.029	0.018	NT	NT	0.051	<0.02	0.07	0.087	0.095	0.014
13	0.034	NT	0.018	0.024	0.022	0.069	NT	0.057	0.026	0.096	0.129	0.106	0.015
14	0.0223	NT	0.01	0.019	0.015	NT	NT	NT	NT	NT	NT	NT	NT
15	0.003108	NR	0.009183	0.036858	0.041058	NT	NT	0.149599	0.031318	0.132467	0.029139	<0.003772	0.017035
16	0.025	NT	0.012	0.023	0.013	0.027	NT	0.040	0.013	0.046	0.077	0.084	0.0085
17	0.0343	NT	0.0126	0.0184	0.0139	NT	NT	NT	0.0153	NT	0.0890	0.0805	NT
18	0.012	NT	<0.05	0.016	<0.05	NT	NT	NT	NT	NT	NT	NT	NT
19	0.0257	NT	0.0129	0.0203	0.0152	0.0451	NT	0.0631	0.0159	0.0255	0.0799	0.0733	0.0112
20	0.0305	NT	0.012	0.021	0.016	NT	NT	NT	0.016	NT	NT	NT	NT
21	0.0225	NT	0.0125	0.0226	0.0149	0.0469	NT	0.0553	0.0157	0.0667	0.076	0.08	0.0103
22	0.0291	NT	0.0114	0.0152	0.0140	NT	NT	NT	NT	NT	NT	NT	NT
23	0.0302	NT	0.0116	0.019	0.015	0.046	NT	0.06	0.02	0.08	0.08	0.08	0.01
24	0.03	NT	0.013	0.020	0.016	0.040	NT	< 0.05	0.015	0.069	0.105	0.107	0.014
25	0.034	NT	0.013	0.021	0.040	NT	NT	NT	NT	NT	NT	NT	NT
26	NR	NT	0.012	0.021	0.014	NT	NT	0.046	0.017	NT	0.076	NR	NT
27	0.028	0.087	0.011	0.020	0.013	NT	NT	0.070	0.015	0.044	0.083	0.12	0.011
28	0.028	NT	0.013	0.025	0.017	NT	NT	NT	0.016	NT	0.104	0.113	NT
29	<0.025	0.0423	<0.025	<0.025	<0.025	NR	NR	0.0536	<0.025	0.0629	NR	NR	0.0086
30	0.022	NT	0.011	0.018	0.012	0.037	NT	0.040	0.013	0.062	0.065	0.054	0.009
31	0.027	NT	0.0115	0.019	0.014	<0.025	NT	0.05	0.02	0.04	0.08	0.12	<0.01
32	0.022	0.063	0.011	0.015	0.0105	0.038	NR	NR	0.0104	NR	0.0575	0.063	NR
33	0.02492	NT	0.01331	0.01801	0.01482	NT	NT	0.02196	0.01343	NT	0.09212	0.08098	NT
34	0.022	NT	0.012	0.021	0.016	NT	NT	NT	0.012	NT	0.079	0.088	NT
35	0.028	NT	<0.01	0.021	0.016	NT	NT	NT	NT	NT	NT	NT	NT
36	0.032	NT	0.0123	0.023	0.013	NT	NT	0.057	0.016	0.067	0.088	0.107	0.0116
37	0.022	NT	0.011	0.017	0.015	NT	NT	NT	0.013	NT	0.059	0.04	NT
38	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
39	0.01955	0.06475	NT	NT	NT	NT	0.00177	NT	0.01078	NT	NT	NT	NT
40	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

*AV = Assigned Value, NS = Not Supplied, NT = Not Tested, NR = Not Reported. Shaded cells are results which returned a questionable or unacceptable *z*-score.

Table 80 Summary of Participants' Results and Performance for Sample S2 (all values are in µg/L)*

Lab. Code	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUdA	PFDoA	PFTrDA	PFTeDA
AV	0.0539	0.0154	0.0250	0.0142	0.0201	0.00092	0.0425	0.0463	0.00086	0.080	0.069
1	0.0546	0.0171	0.0245	0.0139	0.0201	0.0009	0.0441	0.0517	0.0012	0.137	0.100
2	0.068	0.022	0.031	0.017	0.026	0.0013	0.056	0.056	0.0019	0.11	0.1
3	0.0608	0.0127	0.0274	0.0151	0.022	0.0014	0.0495	0.0573	0.0019	0.1127	0.0744
4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
5	0.0537	0.0161	0.0262	0.0167	0.0207	<0.002	0.0473	0.0494	<0.005	0.0893	0.0887
6	0.049	0.013	0.023	0.012	0.020	<0.001	0.040	0.030	<0.001	0.024	0.013
7	<0.05	0.015	0.022	0.013	0.017	<0.001	0.035	0.042	<0.001	0.061	0.053
8	0.046	0.013	0.023	0.011	0.019	0.002	0.038	0.037	<0.001	0.079	0.075
9	0.0451209	0.0141259	0.0240625	0.0128608	0.0178038	0.0007272	0.0395252	0.0439617	0.0006966	0.0424988	0.0296388
10	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
11	0.0679	0.0163	0.0235	0.0142	0.0228	<0.002	0.0433	0.0612	<0.002	0.166	0.157
12	0.053	0.02	0.018	0.02	0.021	<0.001	0.042	0.046	<0.005	0.06	<0.05
13	0.082	0.16	0.027	0.02	0.026	<0.01	0.05	0.06	<0.01	0.13	0.069
14	0.061	0.015	0.023	0.013	0.02	< 0.002	0.049	0.049	< 0.002	0.071	0.044
15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
16	0.057	0.012	0.022	0.014	0.019	NR	0.043	0.048	NR	0.072	0.076
17	0.0555	0.0160	0.0300	0.0160	0.0240	<0.002	0.048	0.053	<0.005	0.104	0.090
18	<0.05	0.011	0.016	<0.01	<0.05	<0.01	0.025	0.028	<0.01	0.025	0.015
19	0.0557	0.0128	0.0245	0.0148	0.0188	<0.002	0.0483	0.0557	<0.002	0.0643	0.0942
20	0.049	0.013	0.025	0.014	0.019	<0.001	0.042	0.042	<0.001	0.079	0.039
21	0.0535	0.016	0.028	0.0149	0.0214	0.00085	0.0414	0.0472	0.00079	0.0732	0.0932
22	0.0478	0.0139	0.0177	0.0093	0.0141	<0.001	0.0336	0.0315	<0.001	0.0189	0.0117
23	0.0532	0.0179	0.0234	0.0121	0.0185	0.0006	0.0428	0.048	0.0007	0.0804	0.087
24	0.057	0.016	0.026	0.015	0.024	< 0.009	0.037	0.046	< 0.005	0.076	0.082
25	0.040	0.018	0.024	0.014	0.020	0.001	0.039	0.035	0.001	0.022	0.015
26	<0.10	<0.10	0.028	<0.025	<0.025	<0.025	0.030	NR	<0.10	<0.10	<0.10
27	0.049	0.013	0.024	0.013	0.019	0.00078	0.042	0.046	0.00083	0.086	0.072
28	0.055	0.015	0.028	0.015	0.022	<0.001	0.04	0.048	<0.001	0.098	0.085
29	<0.5	<0.05	<0.025	<0.025	<0.025	<0.005	0.032	0.041	<0.025	0.0305	0.0256
30	0.056	0.019	0.025	0.014	0.019	<0.002	0.041	0.036	<0.002	<0.2	<0.2
31	0.0453	0.0175	0.0233	0.0118	0.018	0.0008	0.0383	0.051	0.0009	0.0847	0.0752
32	0.044	0.016	0.021	0.01	0.0155	< 0.0007	0.0345	0.0375	< 0.0008	0.066	0.0665
33	< 0.1	0.01666	0.02821	0.01282	0.01513	< 0.001	0.05203	0.04848	< 0.001	0.081	0.0371
34	0.056	0.016	0.027	0.013	0.020	<0.005	0.045	0.043	<0.005	0.054	0.042
35	0.066	0.01	0.029	0.015	0.022	<0.001	0.047	0.05	<0.005	0.04	<0.05
36	0.064	0.0189	0.033	0.0175	0.022	< 0.0010	0.049	0.052	< 0.0010	0.113	0.119
37	0.06	0.021	0.025	0.017	0.021	< 0.001	0.051	0.045	< 0.001	0.092	0.038
38	NT	NT	0.0329	NT	0.0254	NT	0.0553	0.0599	NT	NT	NT
39	0.02896	0.00771	0.01698	0.00692	0.01597	<0.005	0.03429	0.03808	<0.015	0.08931	0.02147
40	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

*AV = Assigned Value, NS = Not Supplied, NT = Not Tested, NR = Not Reported. Shaded cells are results which returned a questionable or unacceptable *z*-score.

Table 80 Summary of Participants' Results for Sample S2 (all values are in µg/L)* (continued)

Lab. Code	PFODA	PFBS	PFPeS	PFHxS	PFHxS_L	PFOS	PFOS_L	PFNS	PFDS	PFDoS	PFTrDS
AV	0.061	0.00317	0.00565	0.0243	0.0207	0.0170	0.0105	0.0269	0.0633	Not Set	Not Set
1	NT	0.0026	0.0062	0.0242	NT	0.0222	NT	0.0343	0.0826	NT	NT
2	0.082	0.0036	0.0068	0.03	NT	0.026	NT	NT	NT	NT	NT
3	0.0561	0.0037	0.0056	NT	0.0226	0.0195	0.0123	NT	0.0809	NT	NT
4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
5	NT	0.0031	0.0062	0.0253	NT	0.0202	NT	NT	0.0835	NT	NT
6	0.054	0.0026	0.0044	0.022	NT	0.011	NT	0.027	0.044	NT	NT
7	NT	0.0023	0.0043	0.024	0.021	0.013	0.0081	0.028	0.07	<0.1	NT
8	0.066	0.0025	0.0059	0.021	0.018	0.0122	0.0078	0.023	0.068	0.075	0.048
9	NT	0.0028268	0.0047213	0.0218507	0.0191251	0.0167532	0.0095708	0.0216577	0.0338745	0.0131421	0.0242518
10	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
11	0.0861	0.00387	0.00643	0.0247	NR	0.0225	NR	0.0301	0.0717	0.0903	0.0673
12	NT	0.004	0.007	0.022	0.018	0.017	0.01	0.033	0.075	NT	NT
13	0.067	0.001	0.007	0.032	0.026	0.021	0.013	0.036	0.074	0.047	NT
14	NT	0.0036	0.0049	0.024	0.02	0.019	0.0097	0.031	0.06	NT	NT
15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
16	0.043	0.0031	0.0056	0.023	0.019	0.014	0.010	0.027	0.060	0.065	NT
17	NT	0.0036	0.0070	0.0273	NT	0.0194	NT	NT	0.0912	NT	NT
18	NT	<0.01	<0.01	0.016	NT	0.012	NT	0.016	0.029	NT	NT
19	NT	0.0033	0.005	0.0235	0.0196	0.0166	0.0106	0.0293	0.0594	0.0284	NT
20	NT	0.0032	0.005	0.023	0.02	0.015	0.01	0.027	0.064	NT	NT
21	NT	0.003	0.00578	0.0254	NT	0.0177	0.01004	0.0245	0.0559	0.0956	NT
22	0.0589	0.0034	0.0044	0.0214	NT	0.0086	NT	0.018	0.0487	NT	NT
23	NT	0.0029	0.005	0.0229	NT	0.0158	NT	0.0294	0.0745	NT	NT
24	NT	< 0.005	0.006	0.028	0.022	0.017	0.011	0.028	0.074	0.087	NT
25	NT	NT	0.006	0.025	NT	0.017	NT	NT	0.051	NT	NT
26	NT	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.050	<0.10	NT	NT
27	0.065	0.0029	0.0054	0.023	0.019	0.014	0.010	0.026	0.072	0.067	0.062
28	NT	0.003	0.006	0.026	0.02	0.016	0.013	0.028	0.06	NT	NT
29	0.0329	<0.005	<0.005	<0.025	<0.025	<0.135	<0.085	0.026	0.0551	0.0249	0.0145
30	NT	0.0032	0.0056	0.023	NT	0.017	NT	0.026	0.057	0.05	NT
31	NT	0.003	0.0059	0.0217	NT	0.0197	<0.01	0.0272	0.0658	0.087	NT
32	0.022	0.00255	0.00455	0.019	0.0155	0.012	0.00875	0.023	0.0545	0.0585	0.056
33	NT	0.00379	0.00612	0.0261	0.0245	0.0184	0.0131	0.03138	0.0539	NT	NT
34	NT	<0.01	0.005	0.023	NT	0.017	NT	0.022	0.045	NT	NT
35	NT	0.003	0.006	0.026	0.021	0.018	0.01	NT	0.065	NT	NT
36	NT	0.0039	0.0064	0.026	0.022	0.0176	0.0110	0.031	0.082	0.093	NT
37	NT	0.004	0.0048	0.031	0.027	0.02	0.011	0.026	0.053	NT	NT
38	NT	NT	NT	0.0313	0.0261	0.0225	0.0147	NT	NT	NT	NT
39	<0.015	0.00189	0.00254	NT	0.0143	NT	0.0086	0.02066	0.04128	0.01569	0.01233
40	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

*AV = Assigned Value, NS = Not Supplied, NT = Not Tested, NR = Not Reported. Shaded cells are results which returned a questionable or unacceptable *z*-score.

Table 80 Summary of Participants' Results for Sample S2 (all values are in µg/L)* (continued)

Lab. Code	PFOSA	8:2FTS	10:2FTS	6:2diPAP	8:2diPAP	3:3FTCA	ADONA	9Cl-PF3ONS	11Cl-PF3OUdS	PFEESA
AV	0.0344	0.0481	0.0590	0.044	Not Set	0.084	0.200	0.104	0.130	0.0419
1	0.0326	0.048	0.056	0.047	0.048	0.11	0.19	0.11	0.16	0.04
2	0.13	0.058	NT	NT	NT	NT	NT	NT	NT	NT
3	0.0402	0.0547	0.0632	NT	0.0316	NT	0.2729	NT	NT	NT
4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
5	0.0343	0.0519	0.0656	NT	NT	NT	0.2120	0.1041	0.1335	NT
6	0.033	0.044	0.026	NT	NT	NT	0.16	NT	NT	NT
7	0.032	0.052	0.057	NT	NT	0.049	0.2	0.079	0.1	<0.05
8	0.033	0.042	0.067	0.018	0.031	0.085	0.17	0.088	0.11	0.035
9	0.0322827	0.0339920	0.0466629	NT	0.0196899	NT	0.1854879	0.0904931	0.1314088	NT
10	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
11	0.0383	0.0544	0.0763	0.0598	0.0672	0.0103	0.199	0.113	0.216	0.0449
12	0.03	0.046	0.064	NT	NT	0.1	0.25	0.12	0.14	0.061
13	0.043	0.061	0.084	NT	0.022	0.093	0.29	0.138	0.151	0.057
14	0.029	0.045	0.074	NT	NT	NT	NT	NT	NT	NT
15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
16	0.035	0.047	0.052	0.023	0.018	0.36	0.19	0.10	0.14	0.034
17	0.0388	0.0540	0.0690	NT	NT	NT	0.2182	0.1240	0.1240	NT
18	<0.05	0.033	0.032	NT	NT	NT	NT	NT	NT	NT
19	0.0365	0.0453	0.0421	0.048	0.0428	0.0855	0.198	0.101	0.103	0.0434
20	0.034	0.054	NT	NT	NT	NT	NT	NT	NT	NT
21	0.0362	0.0506	0.0717	0.044	0.0442	0.0789	0.202	0.0993	0.1095	0.0401
22	0.0244	0.0439	0.026	NT	NT	NT	0.1974	NT	NT	NT
23	0.0339	0.045	0.056	0.051	0.044	0.1	0.17	0.1	0.11	0.04
24	0.039	0.053	0.054	NT	0.035	0.08	0.24	0.12	0.15	0.045
25	0.035	0.052	0.043	NT	NT	NT	NT	NT	NT	NT
26	0.037	<0.10	<0.025	NT	NT	0.1	0.20	<0.10	<0.050	NT
27	0.034	0.047	0.069	NT	NT	0.082	0.22	0.11	0.17	0.045
28	0.032	0.046	0.036	NT	NT	NT	0.213	0.125	0.166	NT
29	0.0345	0.0346	0.041	<0.025	NR	0.0876	0.188	NR	NR	0.0327
30	0.027	0.049	0.056	<0.05	<0.05	0.07	0.17	0.086	0.089	0.038
31	0.0321	0.046	0.065	<0.025	<0.025	0.06	0.17	0.11	0.18	0.04
32	0.0275	0.039	0.048	0.032	0.034	NR	0.14	0.0775	0.098	NR
33	0.04199	0.0506	0.0722	NT	NT	0.04805	0.35908	0.12237	0.11928	NT
34	0.035	0.041	0.040	NT	NT	NT	0.201	0.084	0.086	NT
35	0.04	0.049	0.099	NT	NT	NT	NT	NT	NT	NT
36	0.038	0.054	0.071	NT	NT	0.102	0.21	0.11	0.156	0.047
37	0.03	0.051	0.077	NT	NT	NT	0.24	0.08	0.05	NT
38	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
39	NT	NT	NT	NT	NT	NT	0.14589	NT	NT	NT
40	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

*AV = Assigned Value, NS = Not Supplied, NT = Not Tested, NR = Not Reported. Shaded cells are results which returned a questionable or unacceptable *z*-score.

Table 81 Summary of Participants' Results for Sample S3 (all values are in µg/L)*

Lab. Code	PFBA	PFHxA	PFOA	PFHxS	PFHxS_L	PFOS	PFOS_L	PFOSA	6:2FTS
AV	0.00486	0.000521	0.000788	0.00175	0.00165	0.00116	0.00084	0.00273	0.00198
1	0.0067	0.0005	0.0009	0.0017	NT	0.0014	NT	0.0026	0.002
2	NS	NS	NS	NS	NS	NS	NS	NS	NS
3	0.005	0.0006	0.0027	NT	0.0015	0.0017	0.001	0.0028	0.0021
4	NS	NS	NS	NS	NS	NS	NS	NS	NS
5	0.00559	<0.002	<0.002	0.00207	NT	<0.002	NT	<0.005	<0.005
6	0.005	0.00064	0.0024	0.0014	NT	0.0017	NT	0.0020	0.0018
7	<0.005	<0.001	<0.001	0.0017	0.0014	0.00096	0.00066	0.0023	<0.005
8	0.003	<0.0005	0.0009	0.0018	0.0015	0.00048	0.00048	<0.002	0.0013
9	NS	NS	NS	NS	NS	NS	NS	NS	NS
10	NS	NS	NS	NS	NS	NS	NS	NS	NS
11	0.00697	<0.001	0.00237	0.0019	NR	0.00389	NR	0.00466	0.0142
12	0.005	0.0004	0.0008	0.002	0.002	0.001	0.001	<0.01	0.002
13	0.015	<0.001	0.001	0.003	0.002	0.0014	0.0009	0.004	0.003
14	< 0.005	< 0.001	< 0.001	0.0017	0.0014	0.001	0.0007	< 0.005	< 0.01
15	NS	NS	NS	NS	NS	NS	NS	NS	NS
16	0.015	NR	NR	0.0018	0.0015	NR	NR	0.0027	NR
17	0.0052	<0.002	<0.002	0.0023	NT	<0.005	NT	<0.005	<0.005
18	<0.005	<0.001	<0.001	0.0012	NT	<0.001	<0.001	<0.005	<0.005
19	0.005	<0.001	0.00087	0.0018	0.0016	0.0011	0.00084	0.003	0.0019
20	<0.010	<0.0010	<0.0010	0.00165	0.00165	<0.0010	<0.0010	0.0026	<0.0050
21	0.00548	0.0005	0.00087	0.00175	NT	0.00115	0.00076	0.00315	0.00172
22	0.0035	0.0006	0.0022	0.0014	NT	0.0014	NT	0.0028	0.0025
23	0.0045	<0.0005	0.0006	0.0017	NT	0.001	NT	0.0027	0.002
24	< 0.01	< 0.002	< 0.004	0.002	0.002	< 0.004	< 0.004	0.003	< 0.01
25	0.004	0.001	0.000	0.002	NT	0.001	NT	0.004	0.020
26	0.0050	<0.0010	<0.0010	0.0015	0.0015	<0.0010	<0.0010	0.0026	0.0019
27	0.0043	0.00042	0.00070	0.0016	0.0014	0.00085	0.00070	0.0027	0.0016
28	0.0042	<0.001	0.002	0.0029	0.002	0.0014	NR	0.0024	0.0025
29	<0.5	<0.025	<0.025	<0.025	<0.025	<0.135	<0.085	<0.025	<0.025
30	0.0043	<0.0005	0.0007	0.0015	NT	0.0009	NT	0.0024	0.0016
31	0.0045	0.0006	0.0007	0.0015	NT	0.0009	<0.01	0.0028	0.002
32	0.00435	0.00045	0.0007	0.0016	0.00125	0.00086	0.000615	0.0026	0.00145
33	< 0.005	< 0.001	< 0.001	0.00181	0.00167	0.0014	0.0011	< 0.005	< 0.005
34	<0.01	<0.005	<0.002	<0.005	NT	<0.002	NT	<0.005	<0.01
35	0.006	0.0005	0.0008	0.002	0.002	0.001	0.0009	<0.01	<0.0004
36	0.0059	< 0.0010	< 0.0010	0.0016	0.0016	0.0012	< 0.0010	0.0029	< 0.002
37	0.005	< 0.001	< 0.001	0.0021	0.0018	0.0012	0.001	< 0.005	< 0.005
38	NS	NS	NS	NS	NS	NS	NS	NS	NS
39	NS	NS	NS	NS	NS	NS	NS	NS	NS
40	0.004	< 0.001	0.00072	0.0019	0.0015	0.0013	0.001	0.0027	0.0026

*AV = Assigned Value, NS = Not Supplied, NT = Not Tested, NR = Not Reported. Shaded cells are results which returned a questionable or unacceptable *z*-score.

Table 82 Summary of Participants' Results for Sample S4 (all values are in µg/L)*

Lab. Code	PFPrA	TFMS	Adsorbable Organic Fluorine	Extractable Organic Fluorine	Total Fluorine
SV	4.99	0.502	16.8	16.8	96.6
1	NT	NT	NT	NT	NT
2	NS	NS	NS	NS	NS
3	NT	NT	NT	NT	NT
4	5.1	0.53	NT	NT	NT
5	NT	NT	NT	NT	NT
6	NT	NT	NT	NT	NT
7	NT	NT	18	NT	<5000
8	6.1	0.58	NT	NT	NT
9	NT	NT	NT	NT	NT
10	NS	NS	NS	NS	NS
11	1.375	0.14	15.5	16.6	74.1
12	NT	NT	NT	NT	NT
13	NT	NT	NT	NT	NT
14	NT	NT	NT	NT	NT
15	14.50	1.161	NT	NT	NT
16	NR	NR	NR	NR	NR
17	NT	NT	NT	NT	NT
18	NT	NT	NT	NT	NT
19	4.8951	NT	NT	NT	NT
20	NS	NS	NS	NS	NS
21	5.026	0.6135	NR	NR	NR
22	NT	NT	NT	NT	NT
23	NT	NT	NT	NT	NT
24	NR	NR	NR	NR	NR
25	NT	NT	NT	NT	NT
26	NS	NS	NS	NS	NS
27	4.4	0.50	NT	NT	NT
28	NT	NT	NT	NT	NT
29	NR	NR	11.3	<200	<2000
30	NT	NT	NT	NT	NT
31	NT	NT	NT	NT	NT
32	4.25	0.5	NR	NR	NR
33	NS	NS	NS	NS	NS
34	NS	NS	NS	NS	NS
35	NT	NT	NT	NT	NT
36	NT	NT	NT	NT	NT
37	NS	NS	NS	NS	NS
38	NS	NS	NS	NS	NS
39	NS	NS	NS	NS	NS
40	NR	NR	NR	NR	NR

*SV = Spiked Value, NS = Not Supplied, NT = Not Tested, NR = Not Reported.

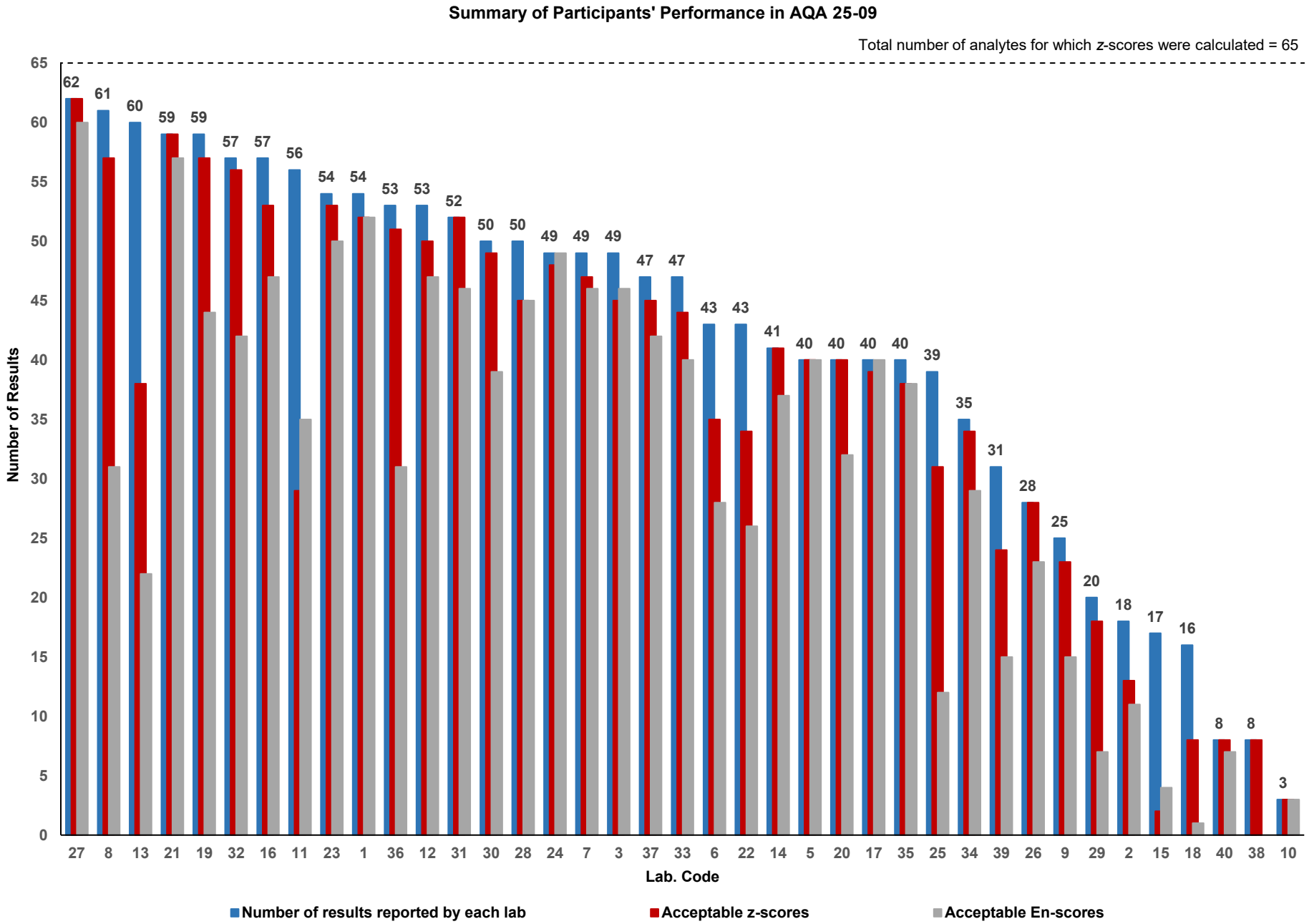


Figure 76 Summary of Participants' Performance

6.6 Participants' Results and Analytical Methods for PFAS in Samples S1 and S2

The method descriptions provided by participants for PFAS measurements are presented in Appendix 6.

Results that were removed from all statistical calculations in Section 5 have also been removed from all discussion in this section.

Overall PFHxA, PFOA, PFUdA, PFHxS and 8:2FTS in river water Sample S2 were among the least challenging analytes for participants. A high proportion of participants reported results for these compounds and all results returned acceptable *z*-scores. The assigned values for these tests were also in excellent agreement with the spiked values.

Extraction

Sample S1 was potable water fortified for 28 PFAS compounds. Sample S2 was river water fortified for 28 PFAS compounds, with an additional 4 incurred PFAS compounds. Analytes' concentration in the two water samples was between 0.00086 µg/L and 0.200 µg/L.

To account for analyte absorption into the wall of the container, participants were instructed to use the entire content of the bottle for analysis and to rinse the bottle. Two identical bottles have been sent to give participant the option to repeat analysis.

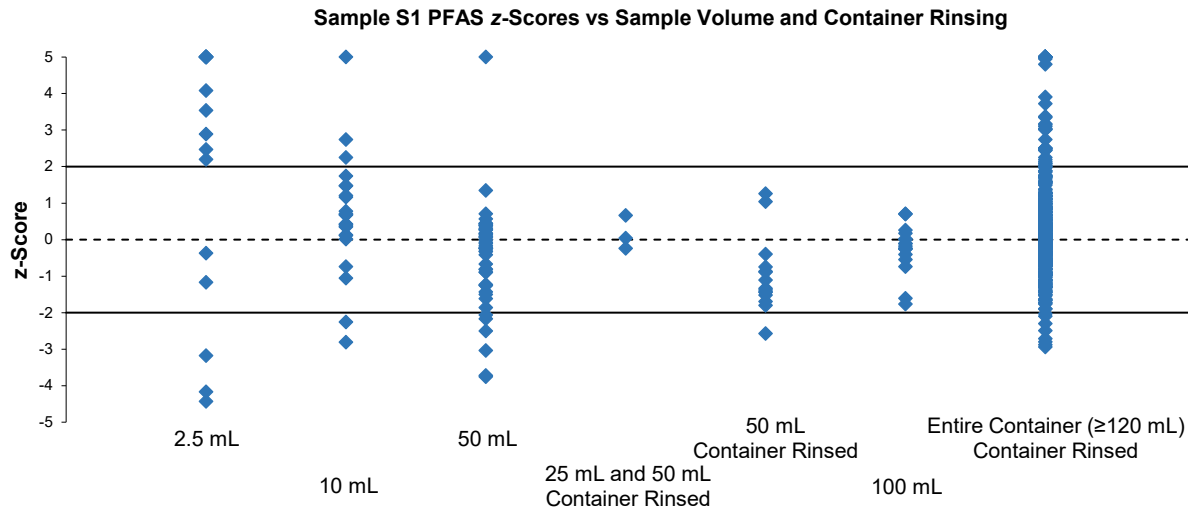
For Sample S1, most participants (24) reported using the entire container and also rinsing the container. Other participants reported using between 2.5 mL to 100 mL of the provided water sample. Laboratory **10** reported using the entire container but also reported using a sample size of 25 mL and 50 mL; this participant might have exhausted the entire container but did not use the entire sample for each analysis. Laboratory **39** reported that they didn't use the whole container (subsampling 2 x 50 mL for a total of 100 mL), however they reported that they rinsed the container.

For Sample S2, most participants (27) reported using the entire container and also rinsing the container. Three participants reporting using the whole container but not rinsing the container. Other participants reported using between 1 mL to 25 mL of the provided water sample. Laboratory **29** reported rinsing the container however did not report how much sample they took for analysis. Laboratory **39** reported that they didn't use the whole container (subsampling 2 x 25 mL for a total of 50 mL), however they reported that they rinsed the container.

Plots of participants' performance versus amount of sample used for analysis are presented in Figures 77 and 78 for Samples S1 and S2 respectively. Most of the results reported by participants who did not use the entire sample for analysis and/or did not rinse the bottle were biased low, particularly for long-chain PFAS.

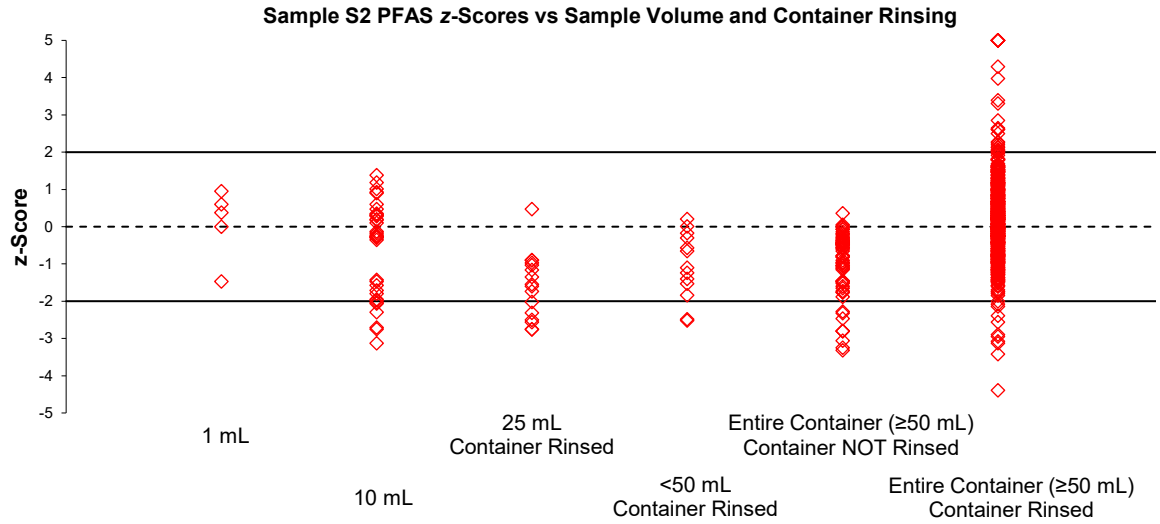
Plots of participants' performance versus extraction technique and reagent are presented in Figure 79. Most participants used solid phase extraction (SPE) with a variety of solvents; no trends in participants performance with the reagent used were evident. The majority of the results reported by participants who used direct injection (DI) were biased high, however no similar pattern was identified in previous NMIA PT studies for PFAS in water

Of those participants using SPE, most used weak anion exchange (WAX) SPE. Laboratories **6** and **22** used hydrophilic lipophilic balance (HLB) SPE instead, and both participants' results were biased low.



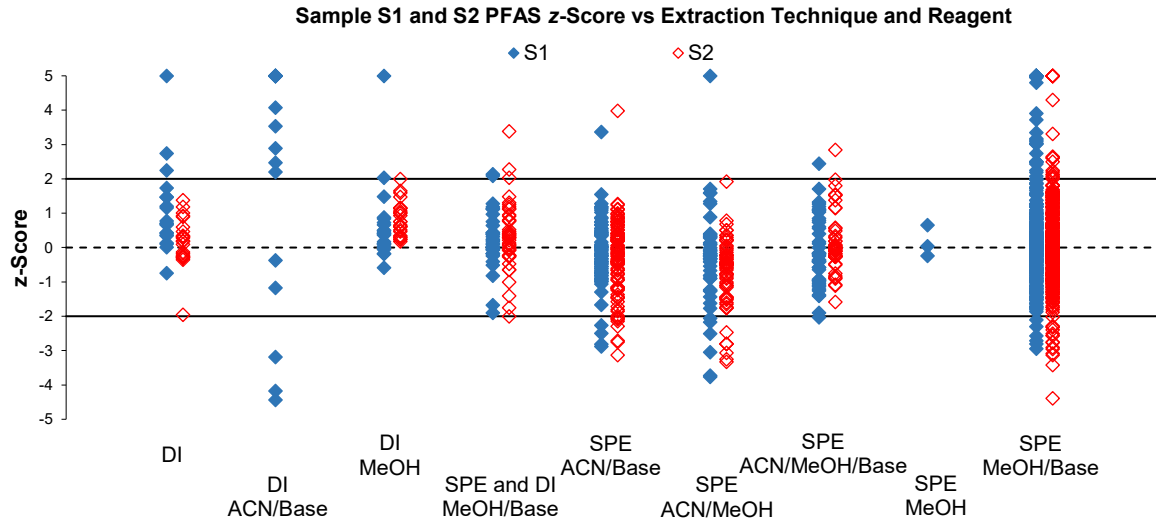
Scores greater than 5.0 have been plotted as 5.0.

Figure 77 Sample S1 *z*-Scores vs Sample Volume



Scores greater than 5.0 have been plotted as 5.0.

Figure 78 Sample S2 *z*-Scores vs Sample Volume

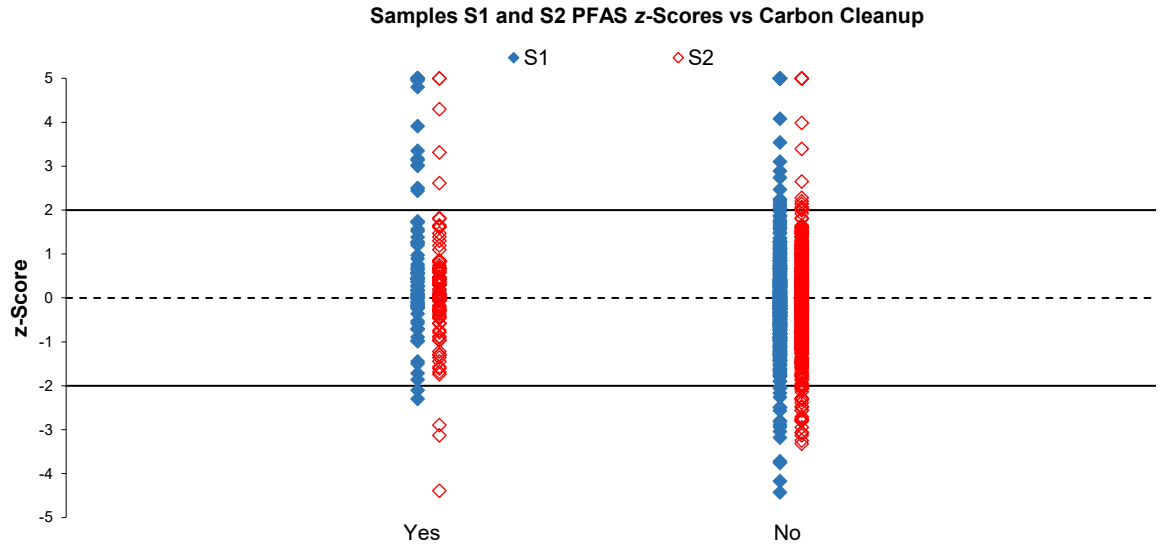


Scores greater than 5.0 have been plotted as 5.0.

Figure 79 Samples S1 and S2 *z*-Scores vs Extraction Technique and Reagent

Laboratory **36** reported using a modified ASTM D8421 method. The ASTM D8421 method involves co-solving the analytes using a sample/methanol ratio of 1 to 1; this participant also reported taking the entire sample for analysis. Laboratory **36** might have used more than one method for the determination of PFAS compounds, as several analytes in Samples S1 and S2 were lower than the ASTM D8421 method's recommended lower reporting limit of 0.01 µg/L.[10]

Only five participants conducted a carbon cleanup (Figure 80). USEPA Method 1633A employs both SPE and carbon cleanup to remove interferences in water samples, but notes that the use of carbon cleanup may remove analytes if there is low organic carbon content.[11] In this study, no significant differences were observed between the results reported by participants who performed a carbon cleanup and those who omitted this step.



Scores greater than 5.0 have been plotted as 5.0.

Figure 80 Samples S1 and S2 *z*-Scores vs Carbon Cleanup

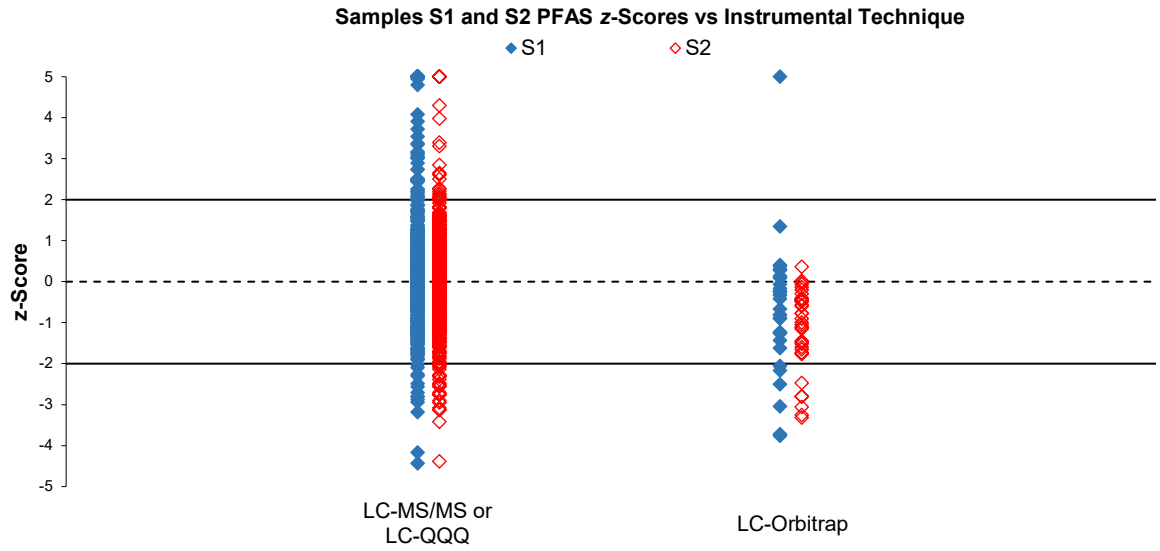
Thirty-five participants reported adding labelled standards before extractions. Of these 35 participants, 11 did not add the standards directly into the sample container to adjust for errors that might be introduced during sample preparation before extraction. Additionally, one participant reported not adding labelled standards at all before extraction. The results reported by the majority of these participants were either biased low or high (Figure 73).

Participants reported a wide variety of extract concentration temperatures (ranging from room temperature up to heating at 60°C) and extract concentration times (ranging from 15 minutes to 6 hours). There was no significant trend for results with respect to either of these parameters.

The most popular sample preparation method used was SPE extraction procedure which involved using the entire sample, methanol base as elution solvent, and no carbon cleanup step.

Instrumental Technique

With the exception of two participants, Laboratories **6** and **22** who used LC-Orbitrap, all other laboratories reported using LC-MS/MS(QQQ) (Figure 81). Results from LC-Orbitrap were biased low. No similar pattern was identified in any of NMIA previous PT studies for PFAS in water. This could potentially be attributed to other methodology parameters such as their extraction technique: both these participants did not rinse their sample bottles, and they also were the only ones to use HLB SPE for extraction.



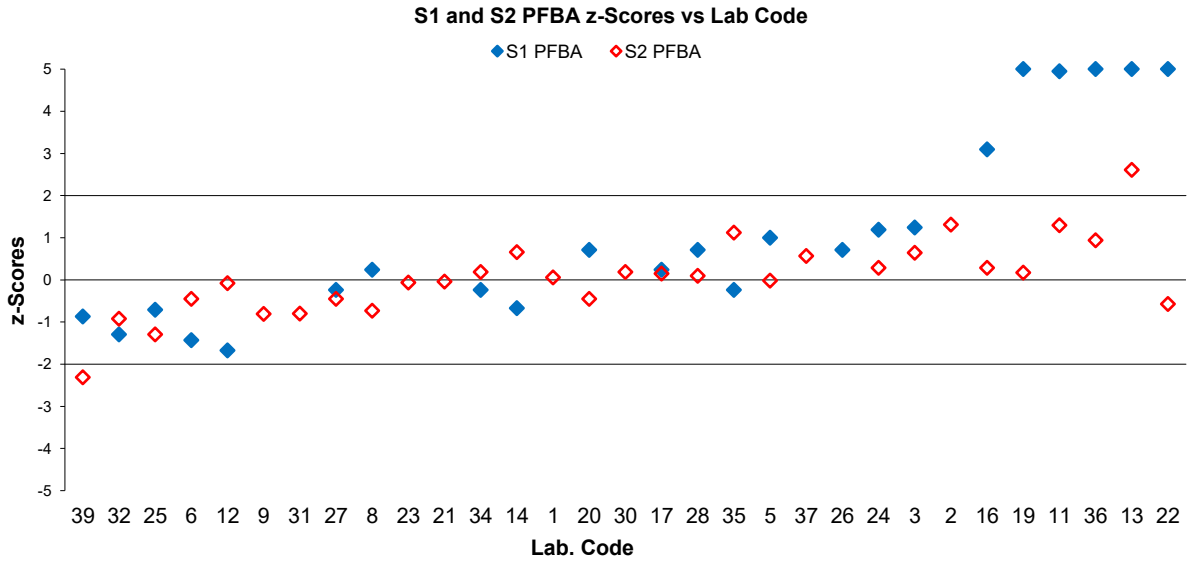
Scores greater than 5.0 have been plotted as 5.0.

Figure 81 Samples S1 and S2 *z*-Scores vs Instrumental Technique

6.6.1 Individual PFCA Analytes

The robust CV excluding outliers for scored PFCAs in Samples S1 and S2 were between 13% and 33% (Table 78). Medium-chain PFCAs (C5-C9) generally did not present any analytical challenges to participants except at incurred trace levels. The majority of the results reported by participants for these tests were in excellent agreement with each other.

PFBA This analyte was spiked in potable water Sample S1 at 0.00999 µg/L and in the river water Sample S2 six times higher at 0.0595 µg/L. Plots of participants performance for PFBA in Samples S1 and S2 are presented in Figure 82. Six laboratories reported unacceptable results for PFBA in the low-level potable water Sample S1, while their results for the high-level Sample S2 were acceptable. Contamination may explain this poor performance, as all unacceptable results were significantly higher than the assigned value. These participants should investigate potential sources of contamination in their laboratory environment for PFBA.



Scores greater than 5.0 have been plotted as 5.0.

Figure 82 Samples S1 and S2 PFBA *z*-Scores vs Laboratory

PFDA, **PFUdA, PFDoA, PFTrDA, PFTeDA**, **PFHxDA**, and **PFODA** were identified from literature as well as previous experience as being analytes which are at risk of being absorbed into the wall of the container during sample preparation and/or during analysis.[11-18] All analytes, including these longer chain PFCAs, were spiked directly into each bottle with the aim of minimising loss during preparation. The assigned values for these PFCAs were between 72% and 93% of the spiked value.

Plots of participants' *z*-scores versus sample volume are presented in Figures 83 to 91. Most of the low *z*-scores were from participants who did not use the entire sample and/or did not rinse the container.

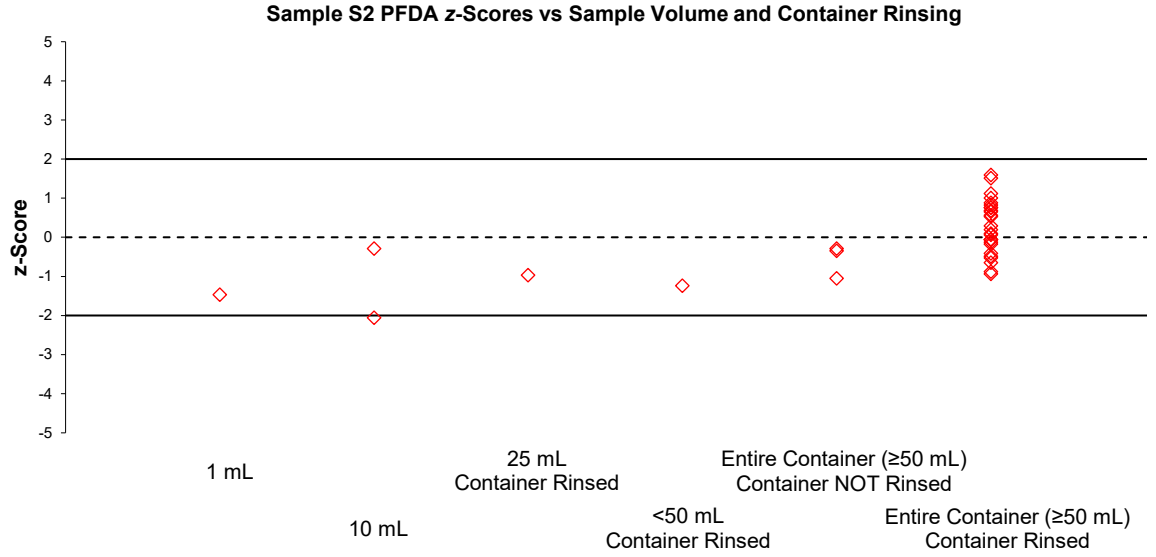


Figure 83 Sample S2 PFDA *z*-Scores vs Sample Volume

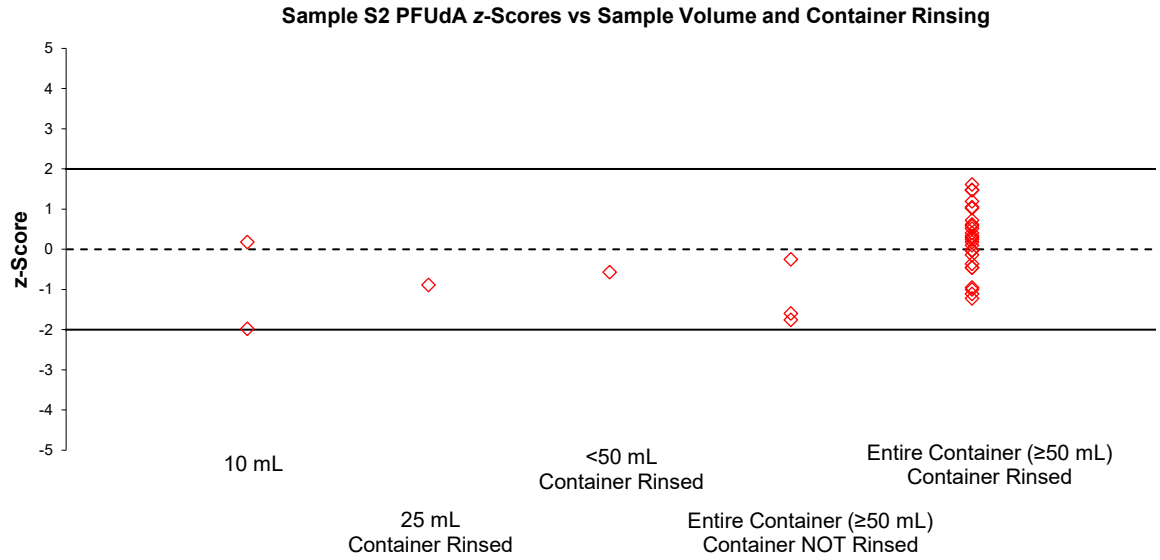


Figure 84 Sample S2 PFUdA *z*-Scores vs Sample Volume

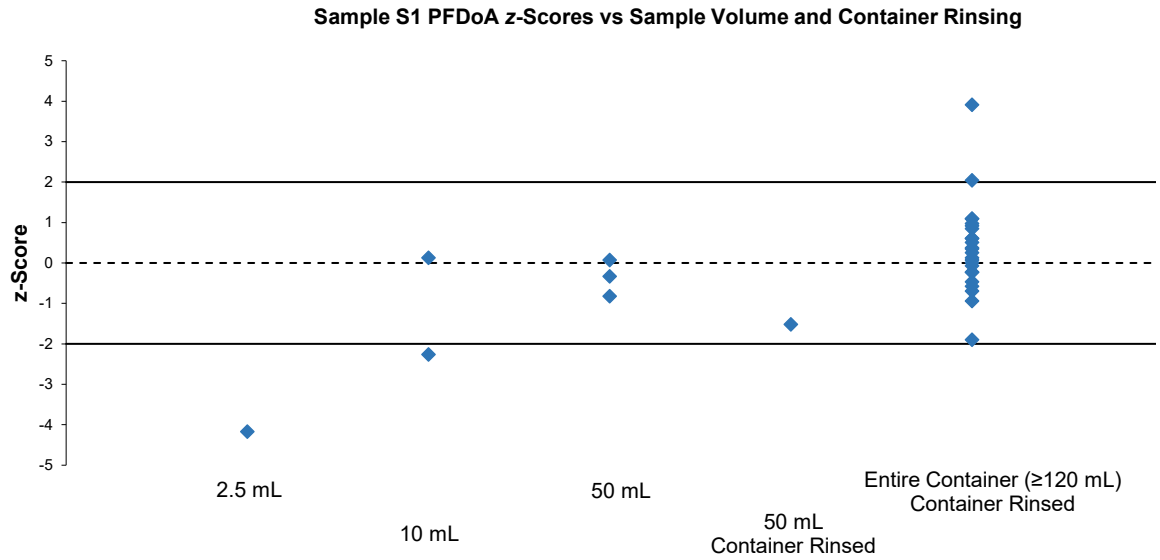
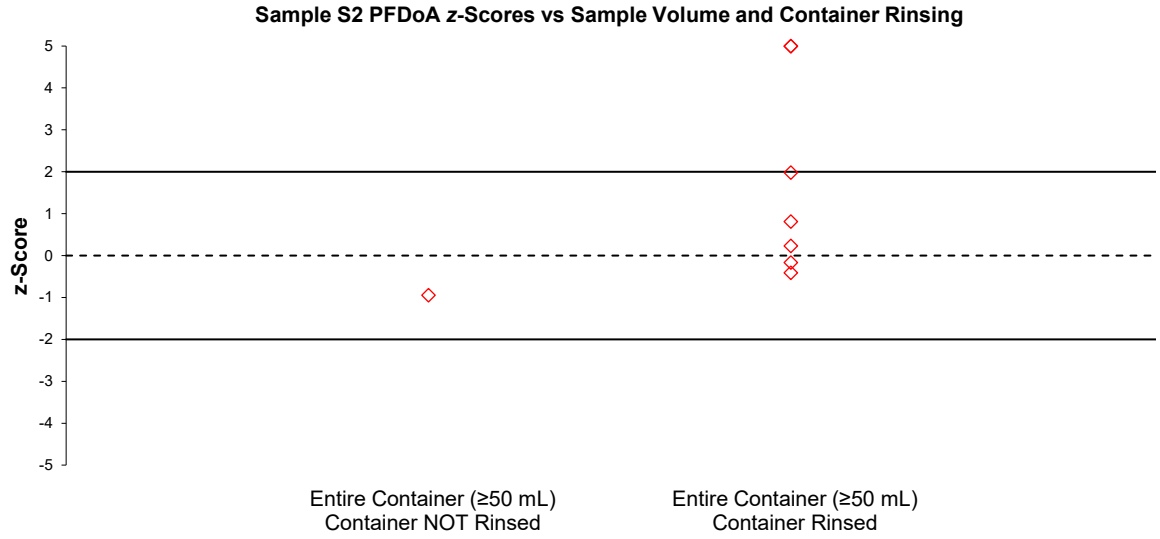


Figure 85 Sample S1 PFDoA *z*-Scores vs Sample Volume



Scores greater than 5.0 have been plotted as 5.0.

Figure 86 Sample S2 PFDoA *z*-Scores vs Sample Volume

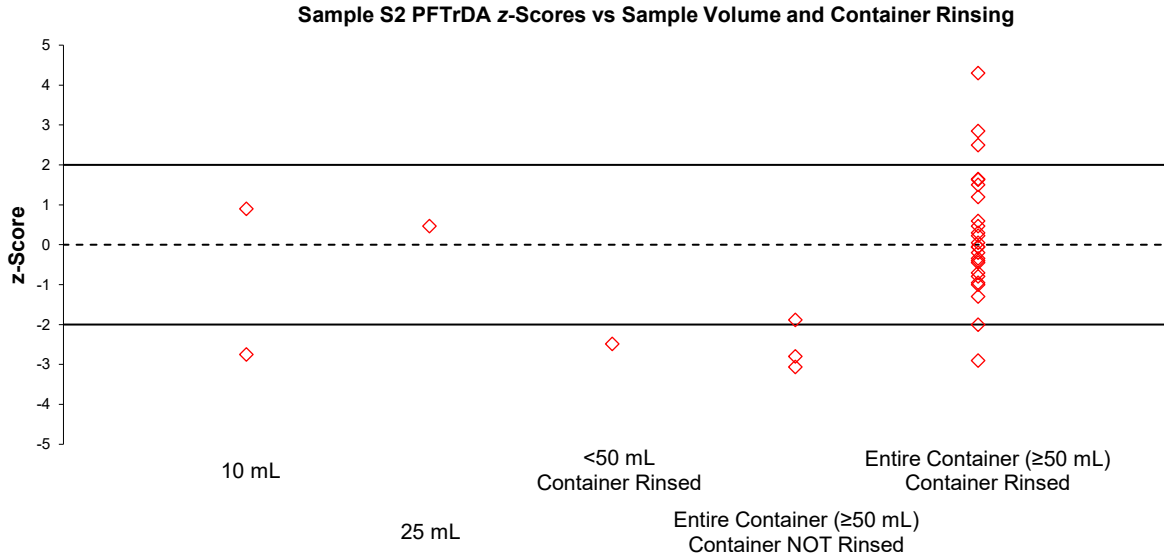


Figure 87 Sample S2 PFTrDA *z*-Scores vs Sample Volume

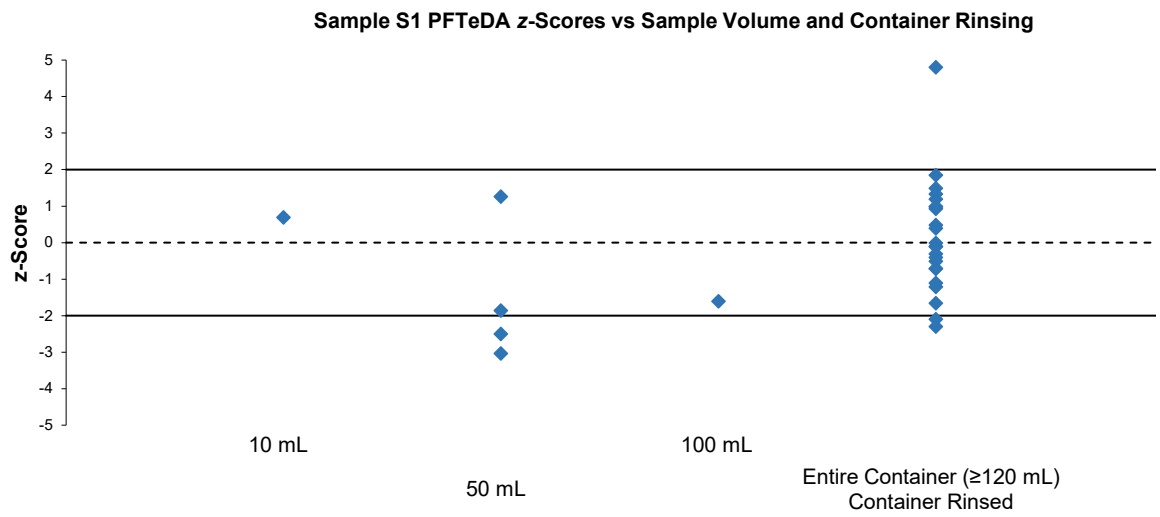
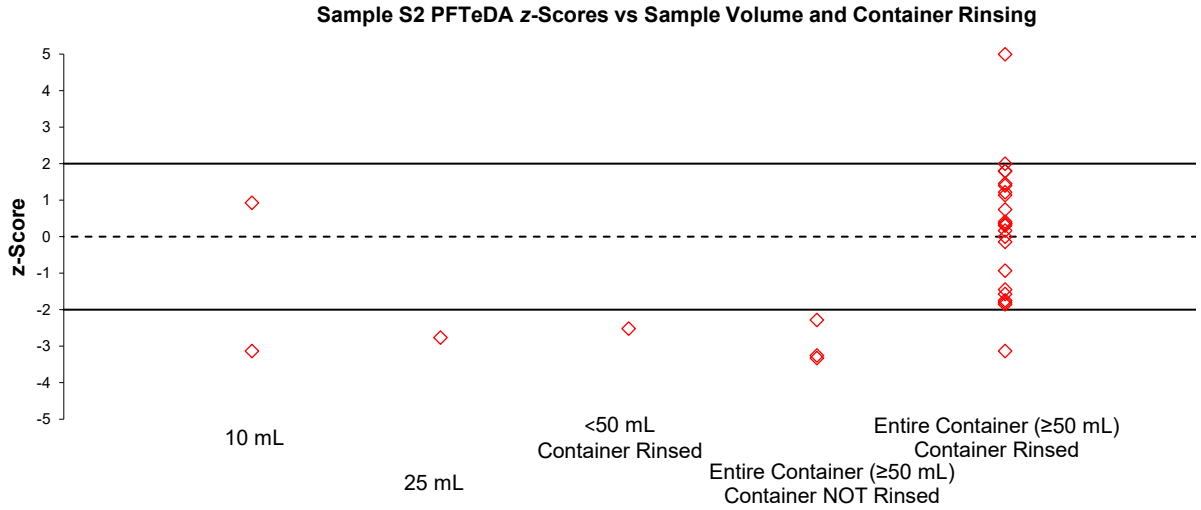
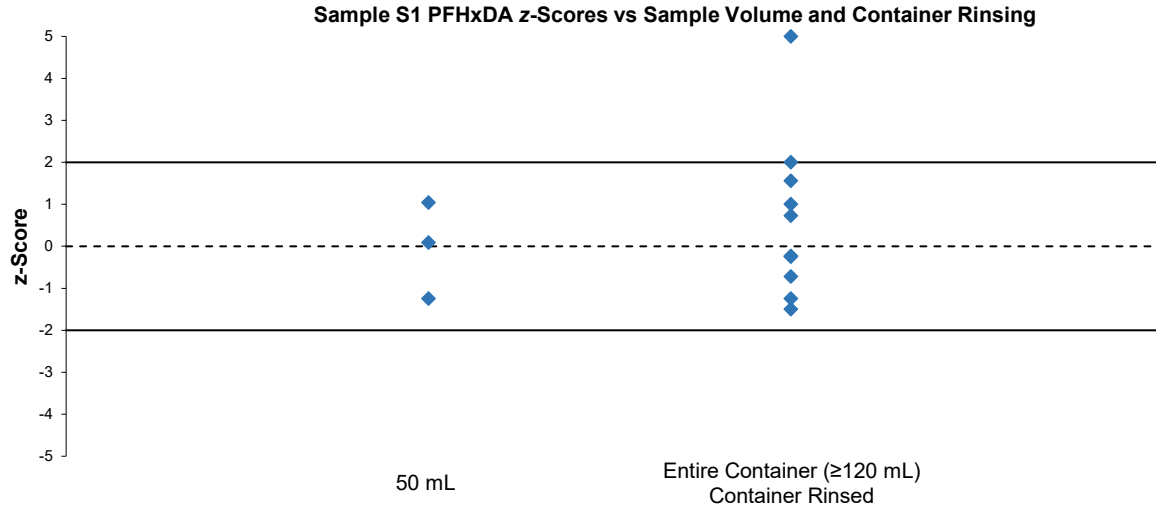


Figure 88 Sample S1 PFTeDA *z*-Scores vs Sample Volume



Scores greater than 5.0 have been plotted as 5.0.

Figure 89 Sample S2 PFTeDA *z*-Scores vs Sample Volume



Scores greater than 5.0 have been plotted as 5.0.

Figure 90 Sample S1 PFHxDA *z*-Scores vs Sample Volume

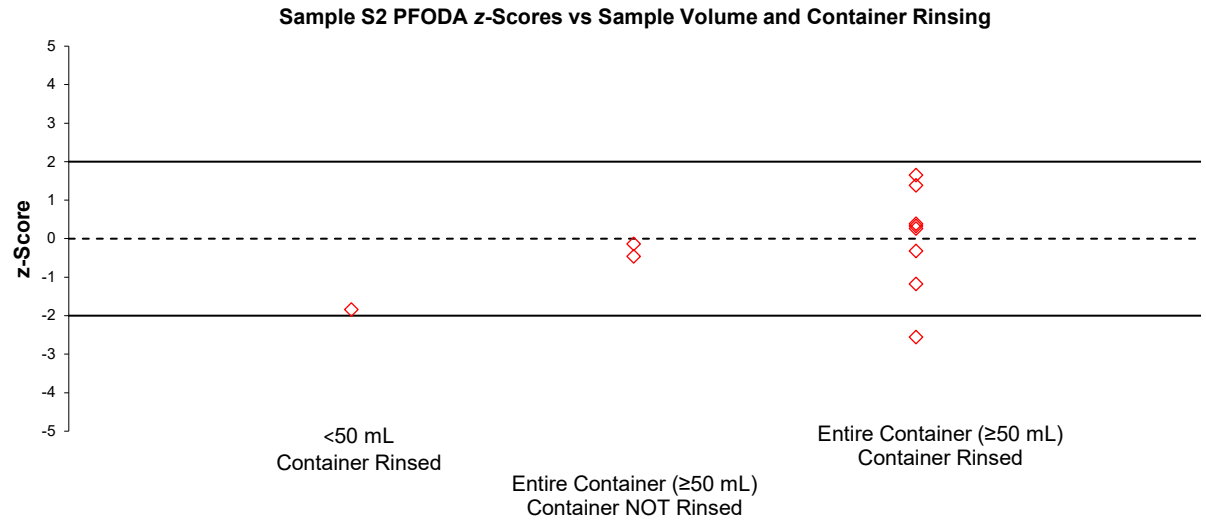
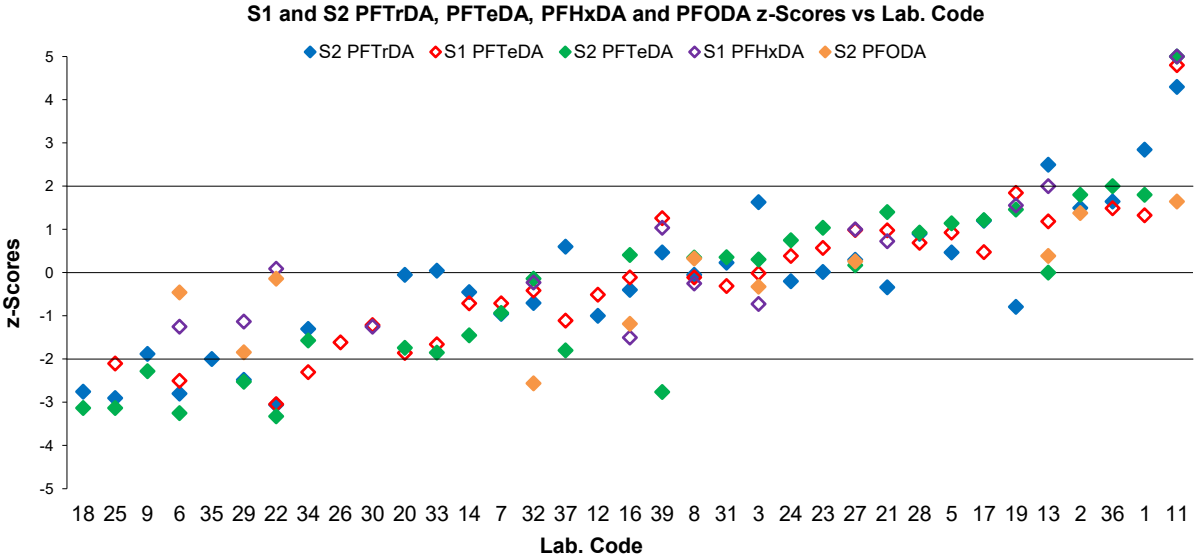


Figure 91 Sample S2 PFODA *z*-Scores vs Sample Volume

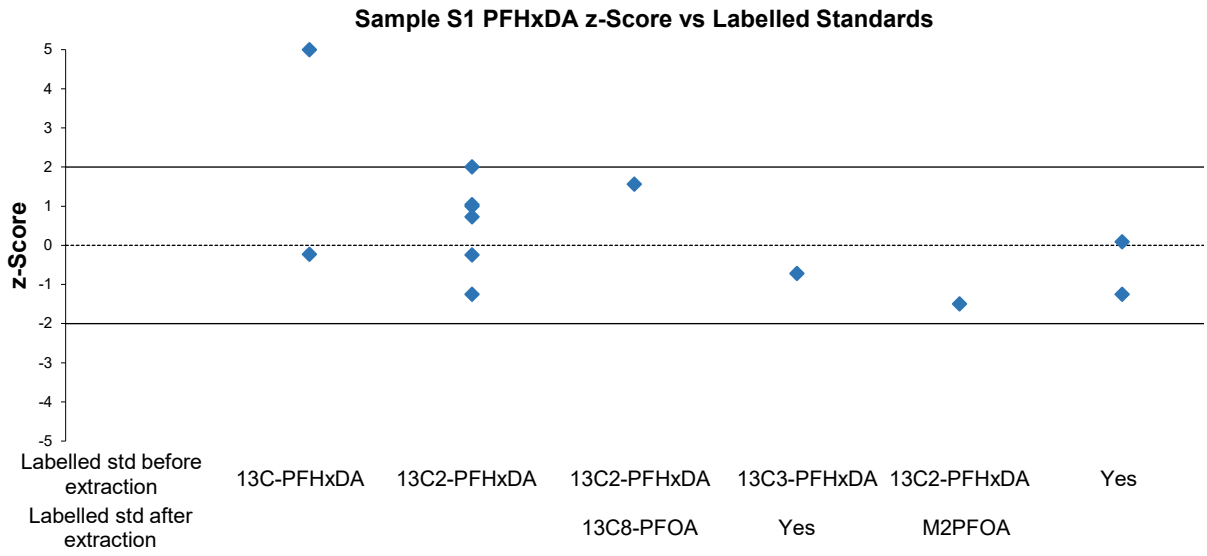
Plots of participants' *z*-scores for PFTrDA, PFTeDA, PFHxDA, and PFODA versus laboratory code number are presented in Figure 92. Participants with multiple *z*-scores larger than 2.0 or smaller than -2.0 should review their method of analysis for long-chain carboxylic acids.



Scores greater than 5.0 have been plotted as 5.0.

Figure 92 Samples S1 and S2 PFTrDA, PFTeDA, PFHxDA, and PFODA *z*-Scores vs Laboratory

PFHxDA This is the first time that PFHxDA has been introduced in a water sample in NMIA's PFAS PT program, with 14 participants reporting numeric results.. Participants' results were in reasonable agreement with each other, as well as the spiked value. All participants used an PFHxDA isotopically labelled standard before extraction (Figure 93).



Scores greater than 5.0 have been plotted as 5.0.

Figure 93 Sample S1 PFHxDA *z*-Scores vs Labelled Standard

PFODA This analyte was previously included in both potable water and river water samples in NMIA PFAS in Water PT study (AQA 24-12). No assigned value could be set for this analyte that study because there were too few results reported.[18] In the present study, PFODA was spiked into the river water Sample S2 at the same level as last year's study at 0.0699 µg/L. Eleven participants reported numeric results for this analyte; the results were in reasonable agreement with each other and the spiked value, indicating improvement in laboratories' capabilities for the analysis of PFODA in river water. Only one participant reported adding labelled standard before and after extraction (Figure 94).

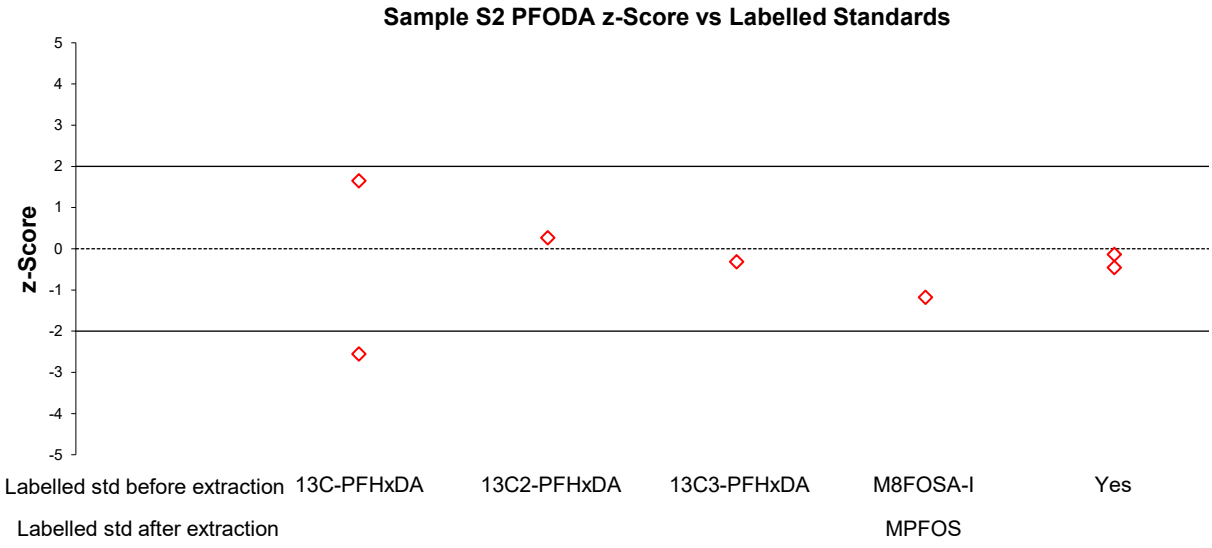
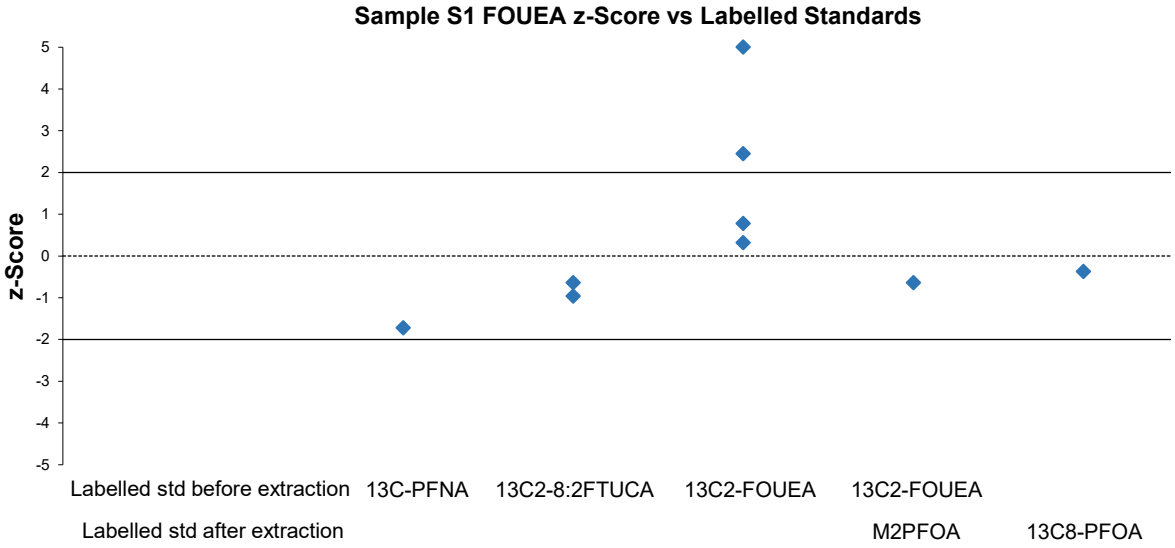


Figure 94 Sample S2 PFODA *z*-Scores vs Labelled Standard

FOUEA This is the first time that FOUEA has been included in a water sample in NMIA's PFAS PT program, with 10 participants reporting numeric results for it. The spiking level in Sample S1 was 0.0499 µg/L. Most results were in good agreement with each other, as well as with the spiked value (assigned value was 94% of the spiked value). Various labelled standards were used before and after extraction. Plots of participants' *z*-scores versus sample labelled standard is presented in Figure 95.



Scores greater than 5.0 have been plotted as 5.0.

Figure 95 Sample S1 FOUEA *z*-Scores vs Labelled Standard

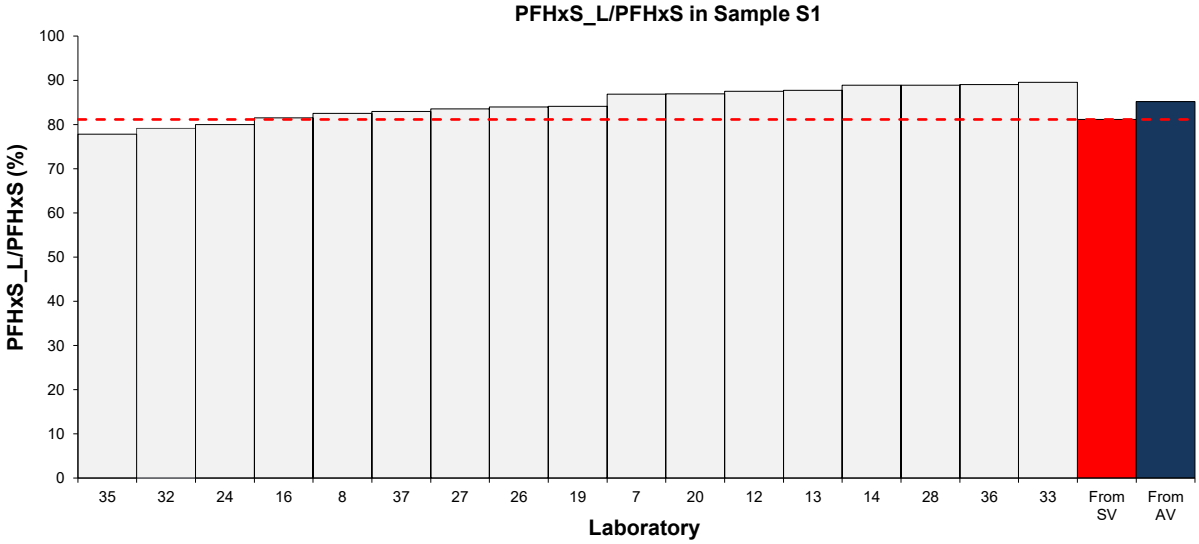
6.6.2 Individual PFSA Analytes

The robust CV excluding outliers scored PFSAs in Samples S1 and S2 were between 12% and 33% (Table 78). Short to medium-chain PFSAs (C4-C9) generally did not present any analytical challenges to participants, and participants reported numeric results for these analytes in good agreement with each other.

PFHxS, **PFHxS_L**, **PFOS**, and **PFOS_L** For PFHxS and PFOS, participants were asked to report both total (the sum of linear and branched isomers) and linear (the linear isomers only) results.

Samples S1 and S2 were both spiked with a mixture of branched and linear PFHxS.

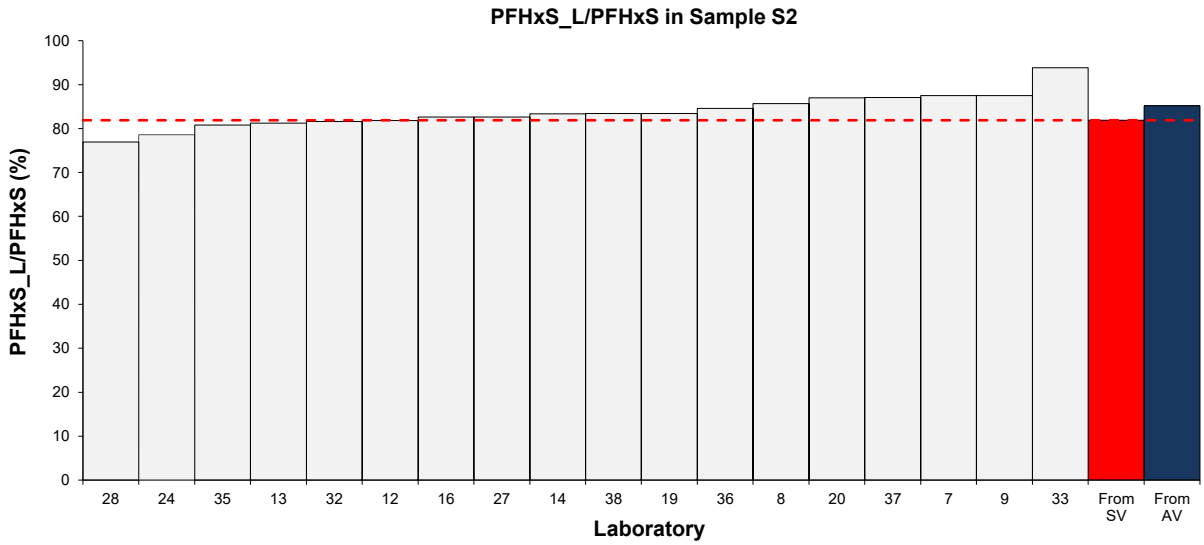
Seventeen participants reported results for both total and linear PFHxS in Sample S1. The spiked value ratio of PFHxS linear versus PFHxS total was 81%. Participants' ratios were between 78% and 90%, and the assigned value ratio was 85% (Figure 96).



The ratio from the AV is calculated based on the results reported by all participants including those who reported results for only one analyte.

Figure 96 Bar Chart of PFHxS_L/PFHxS in Sample S1

Eighteen participants reported results for both total and linear PFHxS in Sample S2. The spiked value ratio of PFHxS linear versus PFHxS total was 82%. Participants' ratios were between 77% and 94%, and the assigned value ratio was 85% (Figure 97).

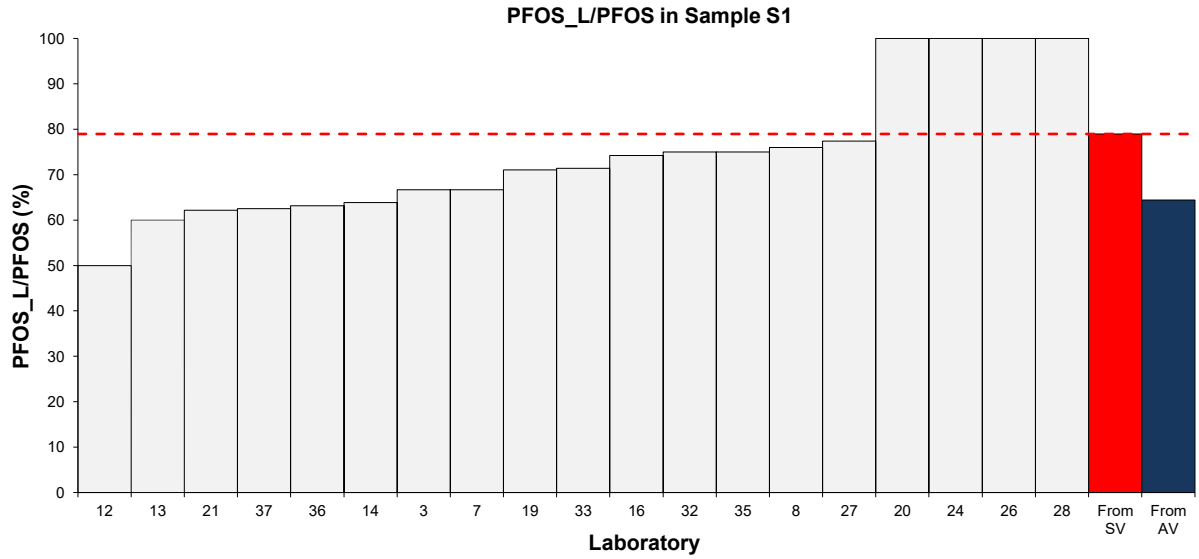


The ratio from the AV is calculated based on the results reported by all participants including those who reported results for only one analyte.

Figure 97 Bar Chart of PFHxS_L/PFHxS in Sample S2

Samples S1 and S2 were both spiked with a mixture of branched and linear PFOS, and the expected ratio linear vs total was 79%.

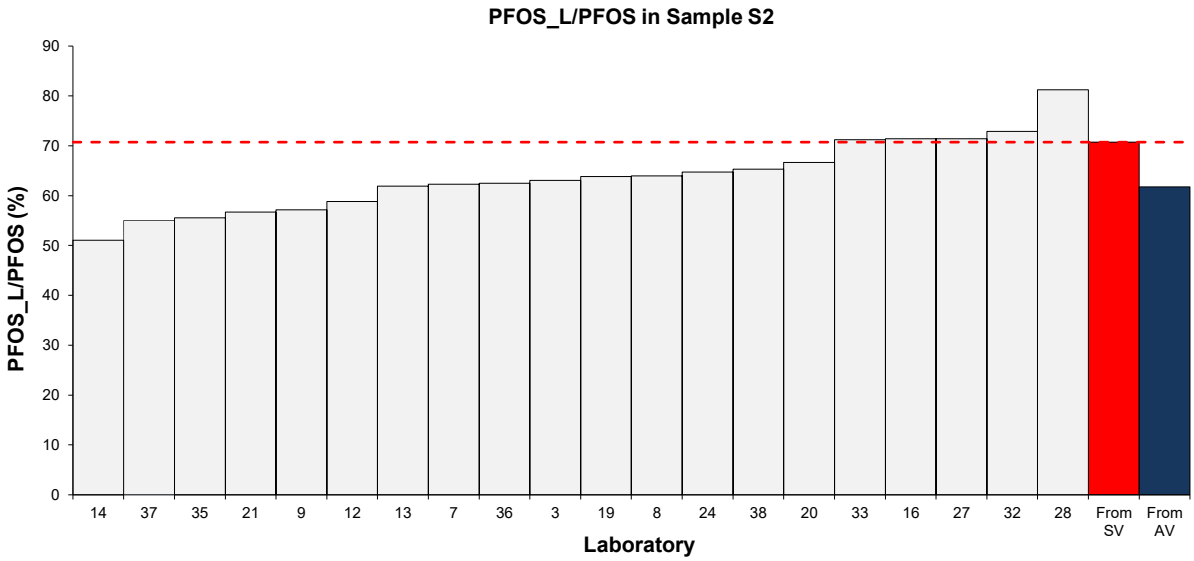
Nineteen participants reported results for both total and linear PFOS in Sample S1. Participants' ratios were between 50% and 100%, and the assigned value ratio was 64% (Figure 98). Laboratories **20**, **24**, **26**, and **28** reported 100% linear PFOS; these participants may need to review their methods for branched PFOS isomers measurement.



The ratio from the AV is calculated based on the results reported by all participants including those who reported results for only one analyte.

Figure 98 Bar Chart of PFOS_L/PFOS in Sample S1

Twenty participants reported results for both total and linear PFOS in Sample S2. The spiked value ratio of PFOS linear versus PFOS total was 71%, the assigned value ratio was 62%, while the participants' ratios were between 51% and 81%, and (Figure 99).



The ratio from the AV is calculated based on the results reported by all participants including those who reported results for only one analyte.

Figure 99 Bar Chart of PFOS_L/PFOS in Sample S2

In this study, participants were more challenged by PFOS linear/total analysis as compared to PFHxS linear/total analysis. Participants had a broader range of linear to total ratios for PFOS as compared to PFHxS, and the difference in the ratio from the assigned value as compared to the spiked value was also greater for PFOS than PFHxS.

When a laboratory uses a combined branched/linear standard and integrated branched/linear together for totals, the result could be different to a linear only result due to response factor differences between the isomers.

PFUdS Participants improved their capabilities in measurement of PFUdS in water. This analyte has been spiked in two previous NMIA PFAS in Water PT studies: AQA 21-07 and AQA 24-12. In both studies, only two participants reported numeric results; and both significantly lower than the spiked value.[18,19] In the present study, six participants reported numeric results for Sample S1 PFUdS, and these were in relative good agreement with each other and with the spike value (assigned value was 72% of the spiked value). Participants reported using 13C-PFOS, 13C2-PFDoA and 13C2-PFTeDA as labelled standards added before extraction. The results were compatible with each other (Figure 100).

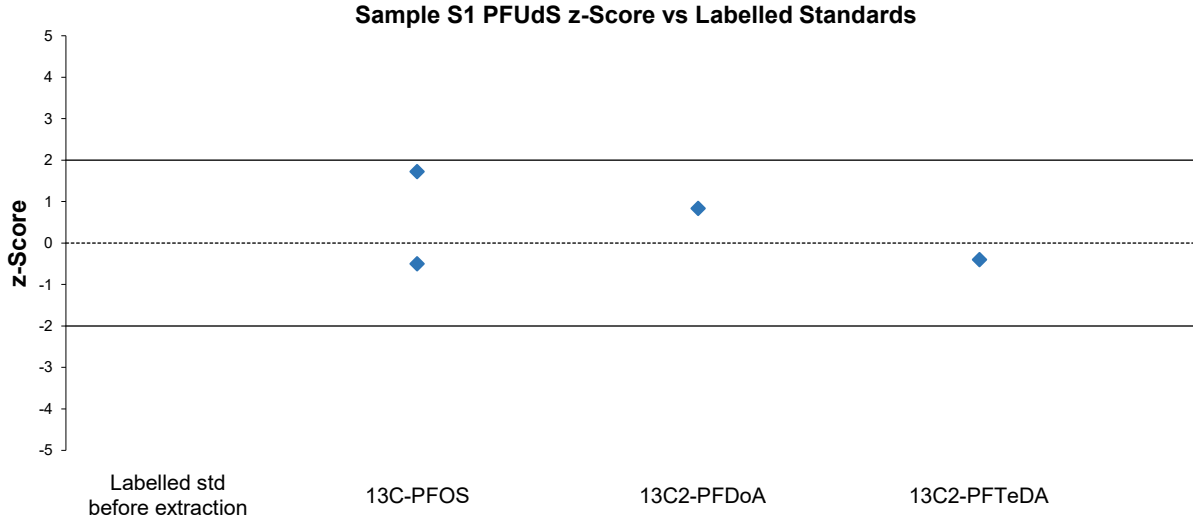


Figure 100 Sample S1 PFUdS *z*-Scores vs Labelled Standard

PFDoS and **PFTrDS** in Sample S2 challenged participants' analytical techniques. The robust CVs were large of 55% and 65% respectively. Plots of normalised results to the spiked value versus the sample volume used by participants is presented in Figures 101 and 102. For both analytes, not using the entire container and/or not rinsing the container resulted in a lower recovery of the analyte.

Plots of participants' results versus the labelled standards used is presented in Figures 103 and 104; a wide range of labelled standards was used and no trend was evident for either analyte.

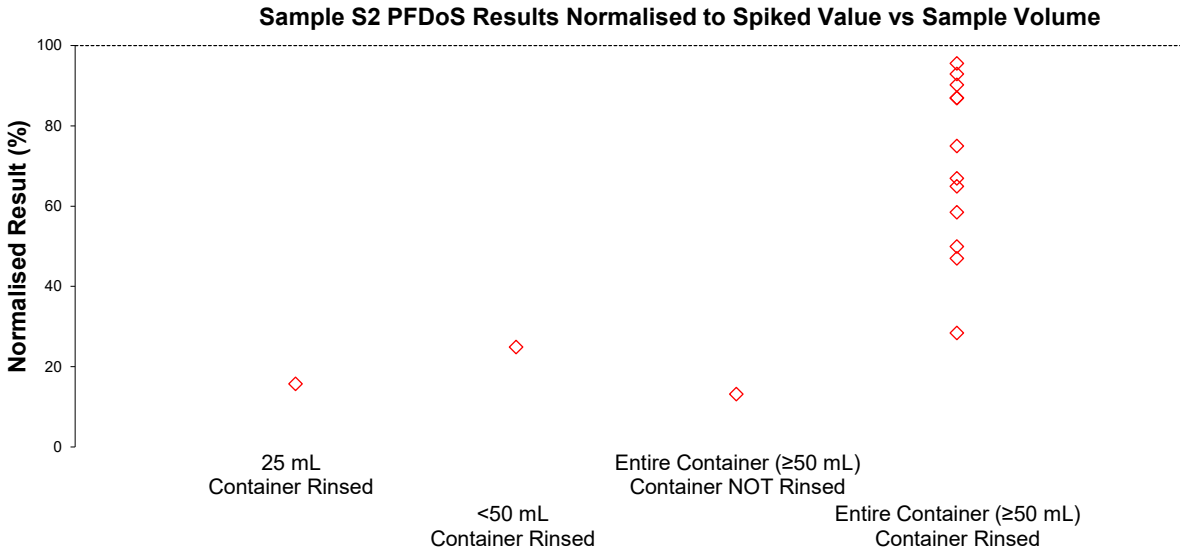


Figure 101 Sample S2 PFDoS Normalised Results vs Sample Volume

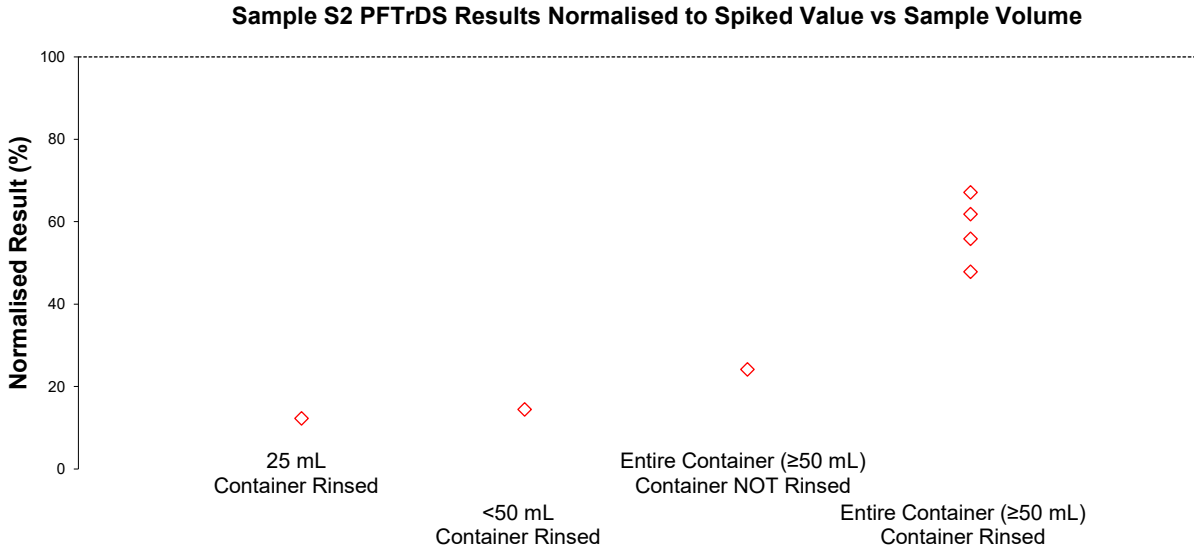


Figure 102 Sample S2 PFTrDS Normalised Results vs Sample Volume

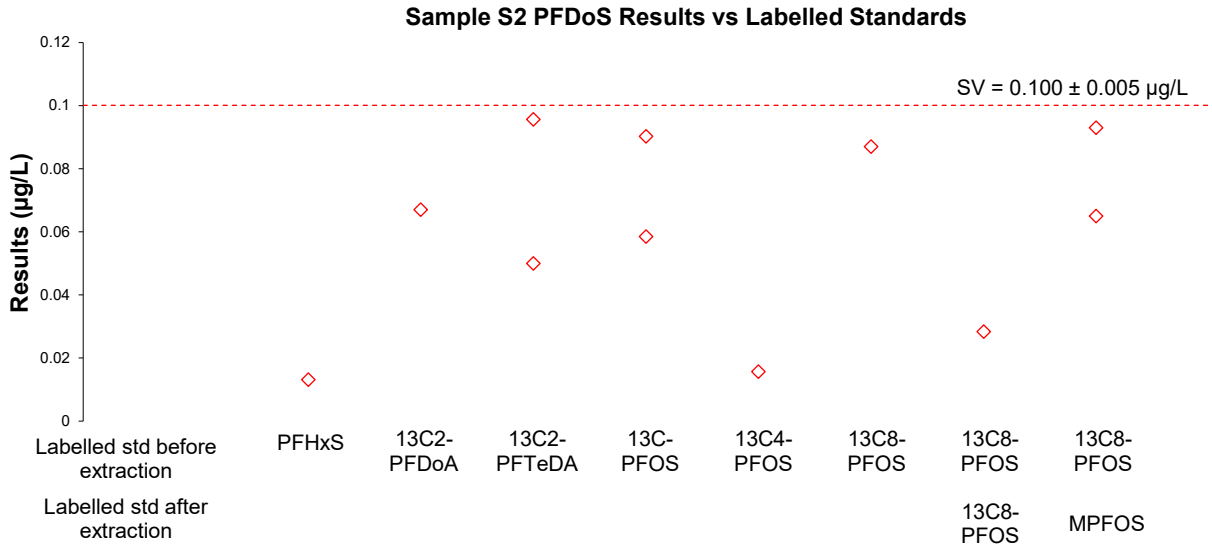


Figure 103 Sample S2 PFDoS Results vs Labelled Standard

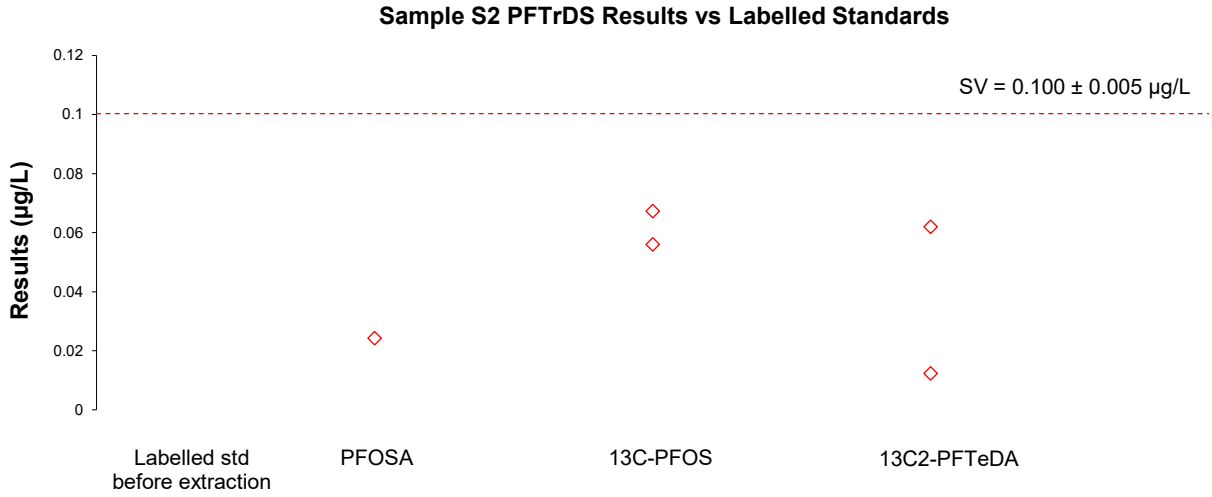


Figure 104 Sample S2 PFTrDS Results vs Labelled Standard

6.6.3 Individual PFAA Precursor Analytes

The robust CV excluding outliers for scored PFAA precursor analytes in Samples S1 and S2 were between 9.3% and 32% (Table 78). In general, participants performed better for Sample S1 potable water as compared to Sample S2 river water, even though analytes were spiked at similar or higher levels in Sample S2. Matrix effects may explain the discrepancy.

The majority of participants reported numeric results for PFOSA and the FTS compounds. Fewer participants reported for the FTOH, diPAP and FTCA compounds; these tests may not yet be part of most laboratories' PFAS analysis suite. Participants can use the samples from present study to develop or improve their methods for these tests.

10:2FTS was introduced for the first time in a NMIA PT study two years ago in 2023 (AQA 23-14). Eighteen participants reported results in this study, and no assigned value could be set at that time because the results were too variable and there was poor recovery compared to the spiked value.[17] In the present study, 31 participants returned numeric results. The results were in reasonable agreement with each other (between-laboratory CV was 26%) and with the spiked value (assigned value was 84% of the spiked value).

Plots of participants' performance versus labelled standards used are presented in Figure 105.

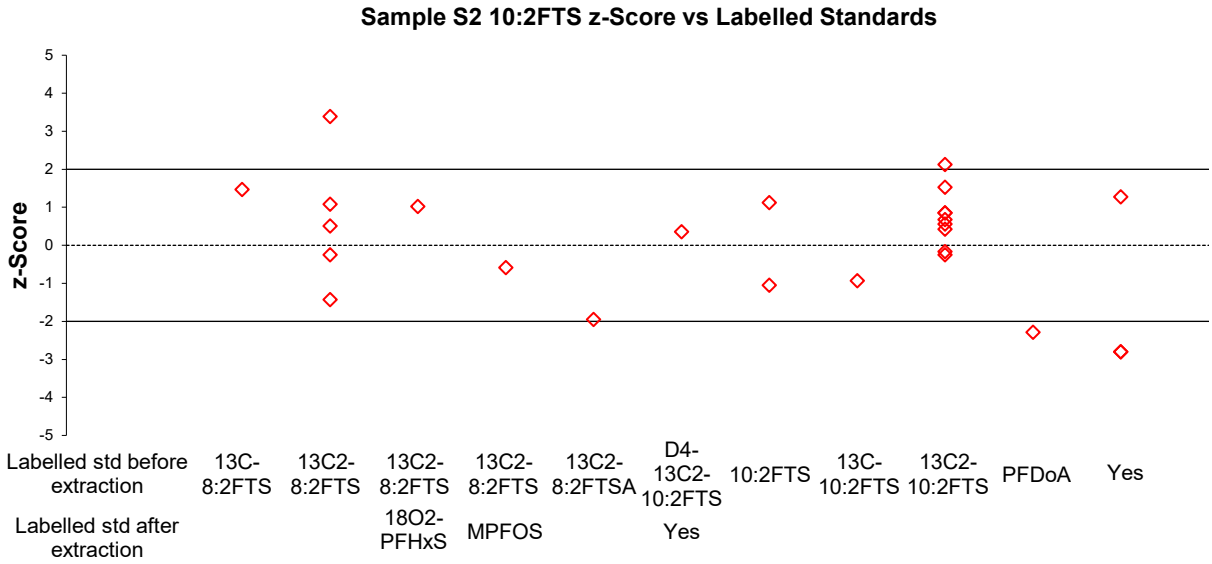
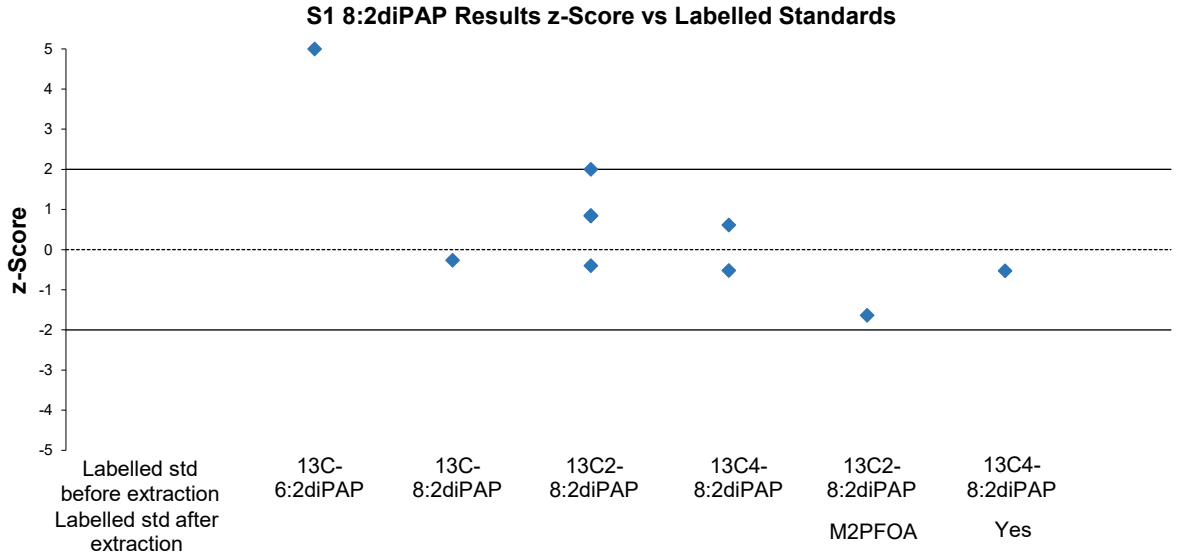


Figure 105 Sample S2 10:2FTS *z*-Scores vs Labelled Standard

8:2diPAP were spiked at approximately the same level in the river and potable water samples S1 and S2. The results returned by participants for Sample S1 8:2diPAP were in excellent agreement with each other (excluding outliers), however the results in Sample S2 were much more variable than in Sample S1. Matrix effects may explain the discrepancy.

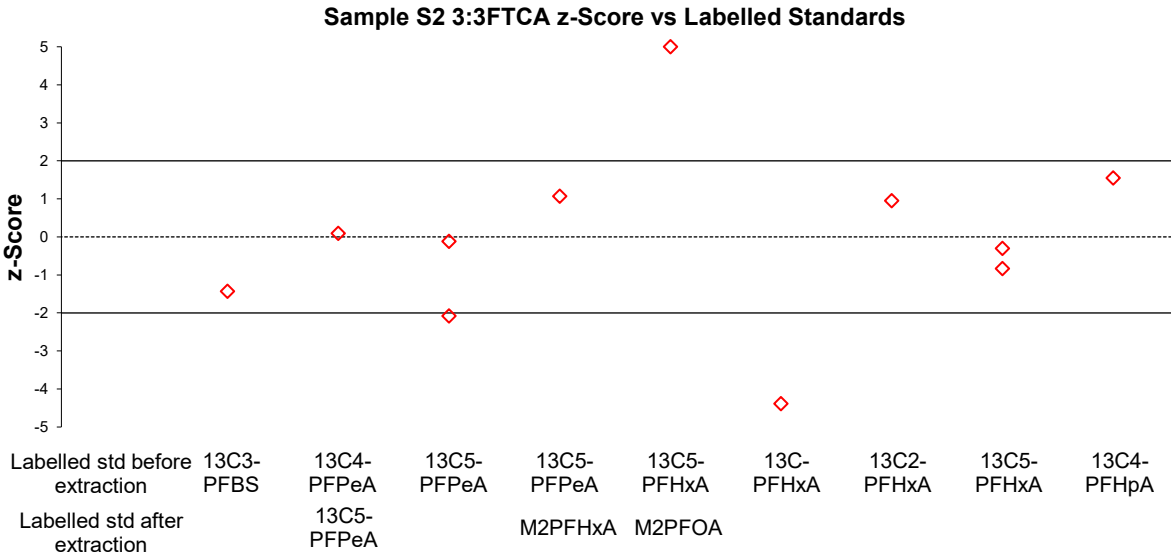
All participants reported using the isotopic labelled analogue of the targeted analyte, except for Laboratory **11** who used isotopically labelled 6:2diPAP for 8:2diPAP analysis instead (Figure 106).



Scores greater than 5.0 have been plotted as 5.0.

Figure 106 Sample S1 8:2diPAP z-Scores vs Labelled Standard

3:3FTCA This is the first time that 3:3FTCA has been introduced in a water sample in NMIA's PFAS PT program, with 18 participants reporting numeric results. Most results reported by participants were in good agreement with each other and the spiked value. Participants used a wide range of labelled standards for this analyte (Figure 107).



Scores greater than 5.0 have been plotted as 5.0.

Figure 107 Sample S2 3:3FTCA *z*-Scores vs Labelled Standard

6:2FTOH This is the first time that 6:2FTOH has been tested for in a water sample in NMIA's PFAS PT program. This volatile analyte presented significant analytical challenges, with only two participants reporting numeric results. The two results were neither in agreement with each other, nor with the spiked value. While there are LC methods available for FTOHs analysis, generally GC methods are used.[20,21] Routine laboratories may not be running these methods as standard, resulting in the few numeric results reported. There were no specific questions in the results sheet pertaining to this analyte so the methodology reported by the two participants may not be the one used for this specific analyte. The questionnaire will be updated for our next study to address this.

6.6.4 Individual PFECA and PFESA Analytes

The PFECA and PFESA analytes did not present significant analytical challenges to participants. For scored analytes, the robust CV excluding outliers were between 15% and 25% (Table 78)

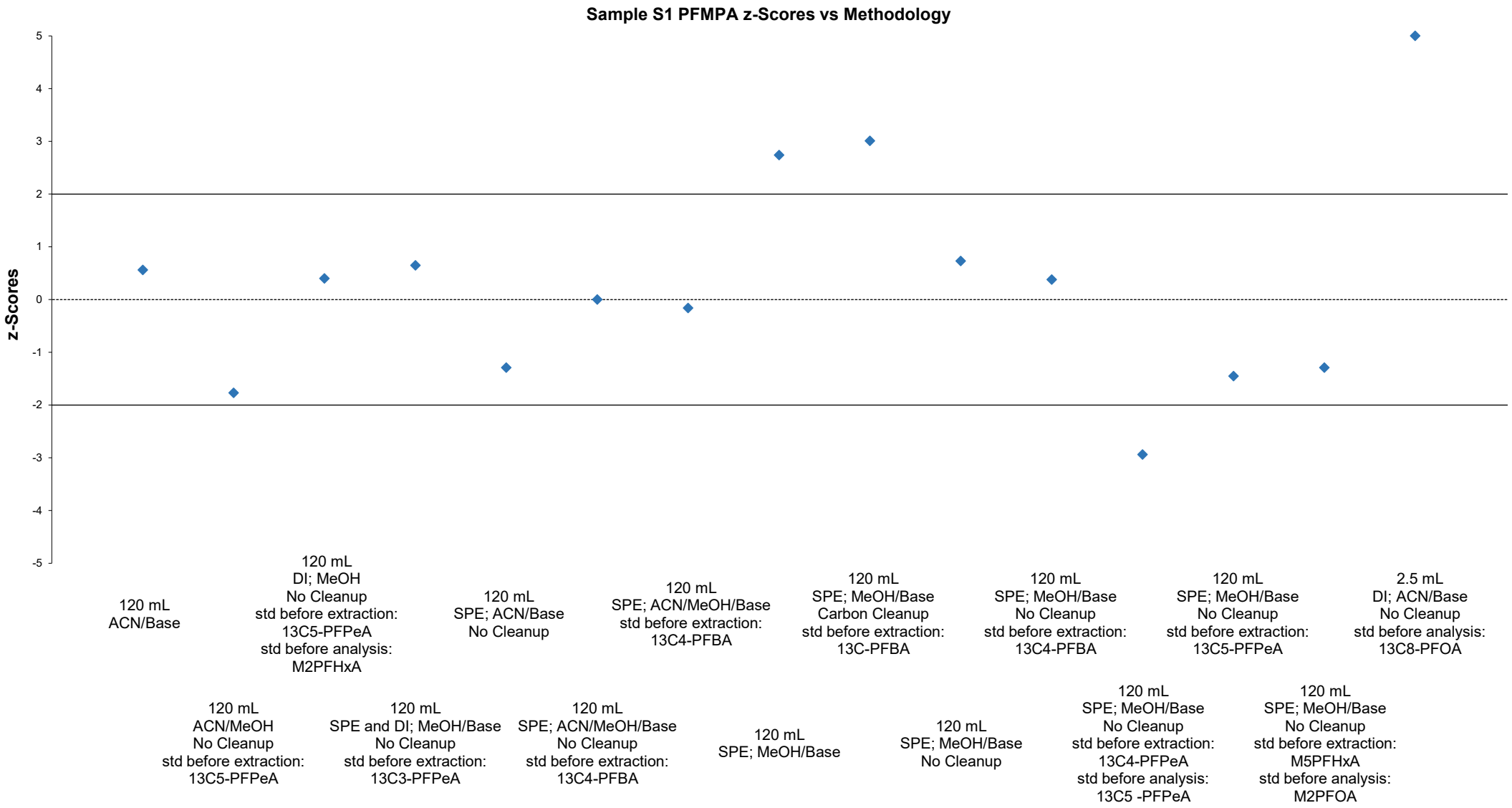
While more than half of the participants reported numeric results for GenX, ADONA, 9Cl-PF3ONS, and 11Cl-PF3OUdS fewer submitted results for PFMPA and PFEESA, 17 and 14 respectively.

PFMPA This is the first time that PFMPA has been introduced in a water sample in the NMIA's PFAS PT program. In Sample S1, 89% of the spiked value was recovered for this analyte. Seventeen numeric results were reported, and they were in reasonable agreement with each other (between-laboratory CV excluding outliers was 25%).

The methods employed by participants for this test, including the labelled standards used, are presented in Figure 108.

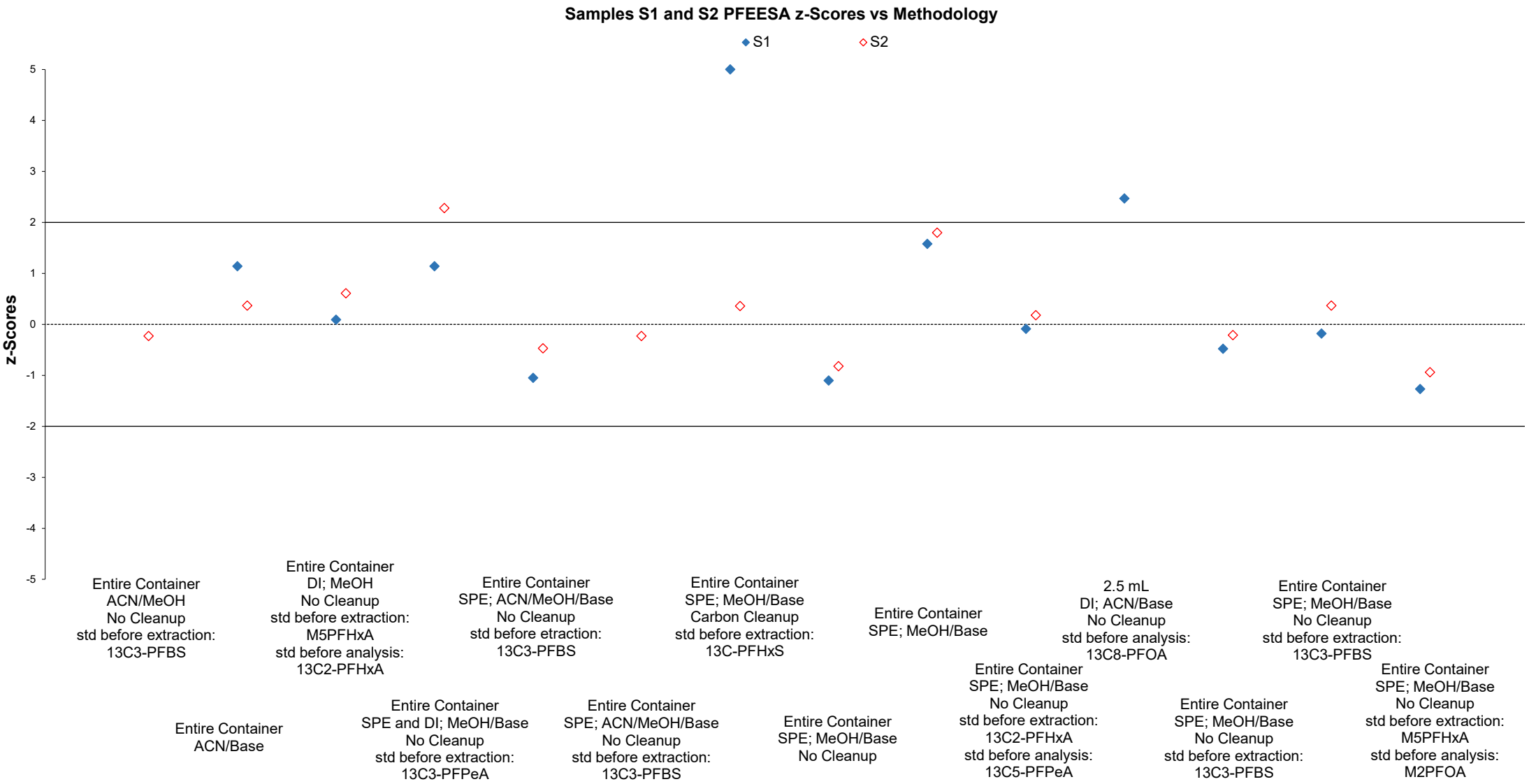
PFEESA This is the second time that PFEESA has been introduced in a water sample in NMIA's PFAS PT program.

Figure 109 presents the plot of PFEESA *z*-scores for Samples S1 and S2 versus methodology used. The majority of participants returned results that were similarly biased across both samples.



Scores greater than 5.0 were plotted at 5.0.

Figure 108 Sample S1 PFMPA z-Scores vs Methodology



Scores greater than 5.0 were plotted at 5.0. Entire container corresponds to ≥120 mL for Sample S1 and ≥50 mL for Sample S2.

Figure 109 Samples S1 and S2 PFEESA z-scores vs Methodology

6.7 Participants' Results and Analytical Methods for PFAS in Sample S3

Results that were removed from all statistical calculations in Section 5 have also been removed from all discussion in this section.

The reagent water Sample S3 was fortified for eight individual PFAS (PFBA, PFOA, PFHxS, PFHxS_L, PFOS, PFOS_L, PFOSA, and 6:2FTS) spiked at trace level between 0.000745 µg/L to 0.00500 µg/L. There was also incurred PFHxA detected at 0.000521 µg/L. This sample's design was aimed at helping laboratories assess their capabilities in measuring PFAS at trace levels in water.

Thirty-three participants enrolled in Sample S3, and 31 participants reported at least one numeric result for PFAS analytes in this sample. These results together with their corresponding uncertainties are presented in Tables 65 to 73. Owing to the low level and increased likelihood of background contamination, participants would reasonably be expected to report higher measurement uncertainties than for Samples S1 and S2; however, this was not the case for some participants (Section 6.2).

The method descriptions provided by participants are presented in Appendix 6. To account for analyte absorption into the wall of the container, participants were instructed to use the entire content of the bottle for analysis and to rinse the bottle. Two identical bottles have been sent to give participant the option to repeat analysis. Most participants (26) reported taking the entire amount of sample and rinsing the bottle for analysis, with another two participants reported taking the entire amount of sample but not rinsing the bottle. Those participants taking a subset of the sample, reporting using between 50 mL and 100 mL. This is a significant change from the previous trace level sample run in AQA 24-12, where only 16 of 27 participants used the whole sample.[18]

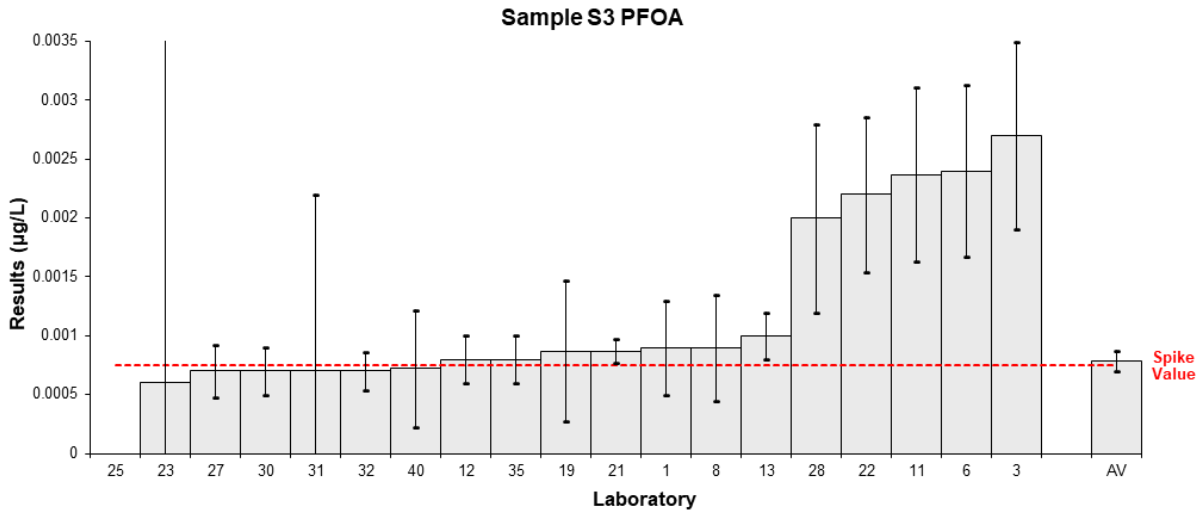
Most participants reported using the same extraction technique as for Samples S1 and/or S2. Laboratories **6**, **18**, **22**, and **28** changed the sample volume used, going from not using the whole sample, to using the whole sample (whether rinsing or not).

Overall, measurements of the PFAS analytes in water at trace level did not challenge participants' analytical techniques. The majority of the reported results were in good agreement with each other and with the spiked value.

The assigned values for several analytes were greater than the spiked value: PFOA, PFHxS_L, PFOS, PFOS_L, and 6:2FTS. The ratio of the assigned value to spike value for these tests was between 101% and 115% (Figures 110 to 114). This may indicate possible background PFAS contamination in the laboratories which are more noticeable for trace level analysis.

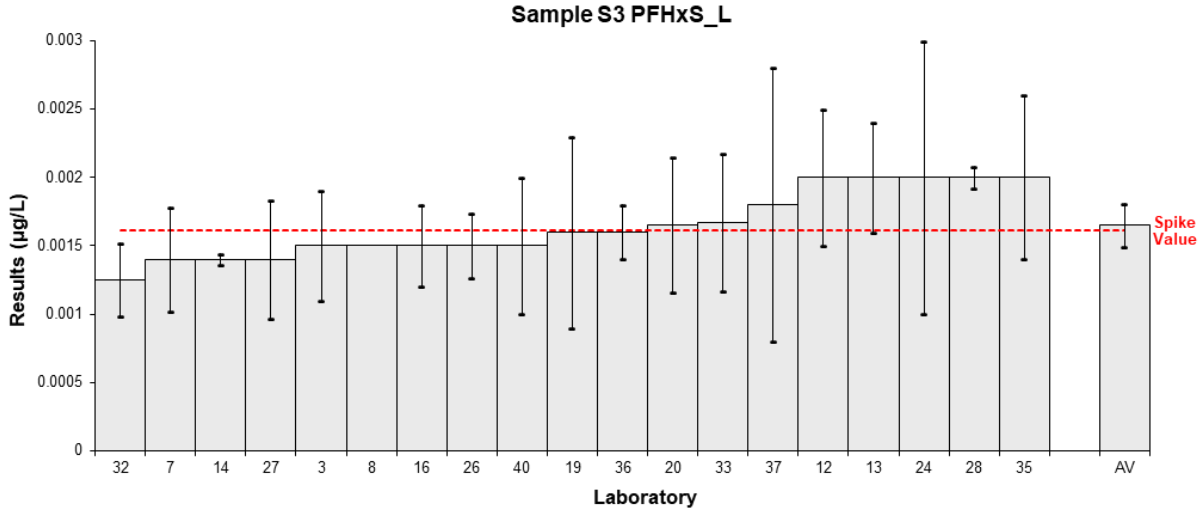
PFOS was the test with the greatest difference, which is similar to what was observed in AQA 24-12.[18] PFOA also had several results that were biased high and not in agreement with the spiked value.

Participants whose results were higher than the spiked value should check for sources of contamination for these tests in the laboratory.



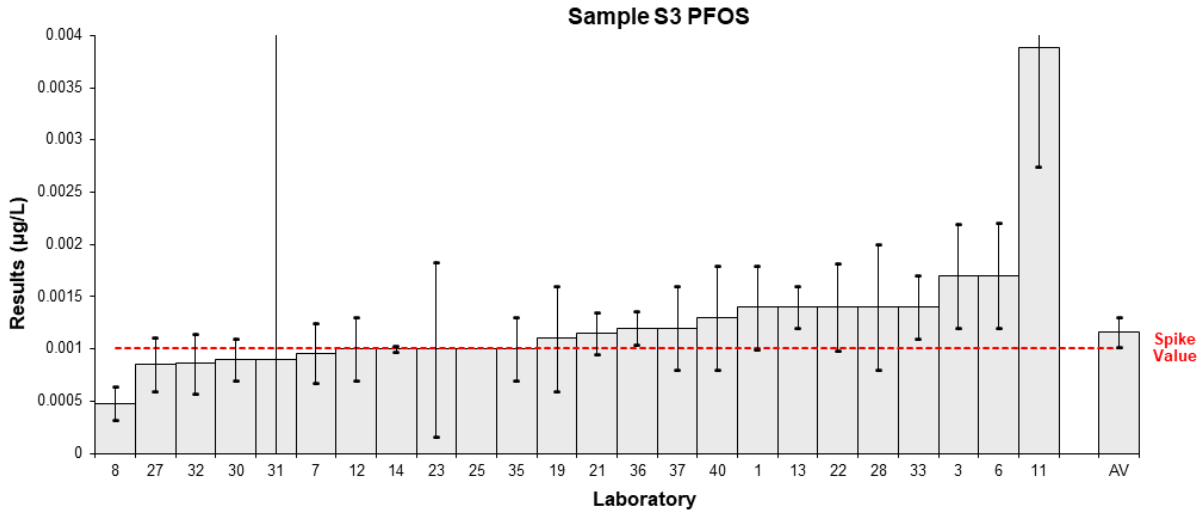
AV = Assigned Value

Figure 110 Sample S3 PFOA Results vs Laboratory



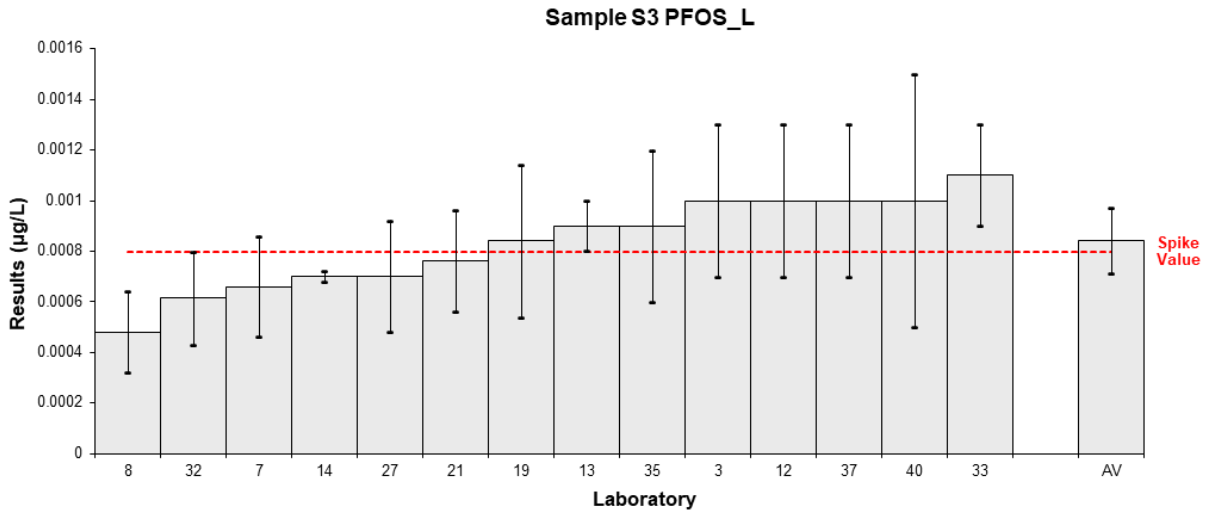
AV = Assigned Value

Figure 111 Sample S3 PFHxS_L Results vs Laboratory



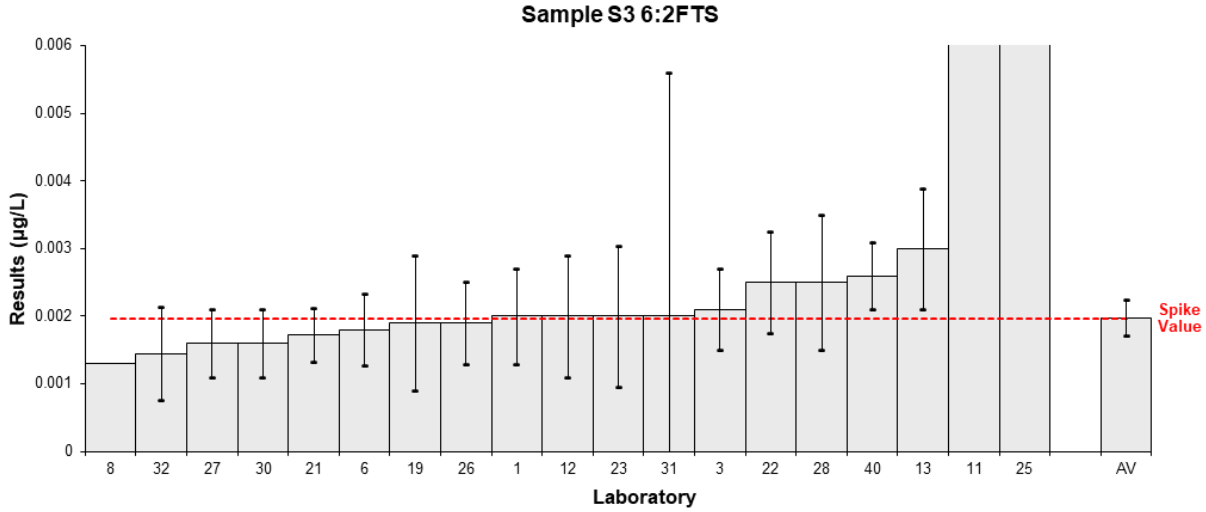
AV = Assigned Value

Figure 112 Sample S3 PFOS Results vs Laboratory



AV = Assigned Value

Figure 113 Sample S3 PFOS_L Results vs Laboratory



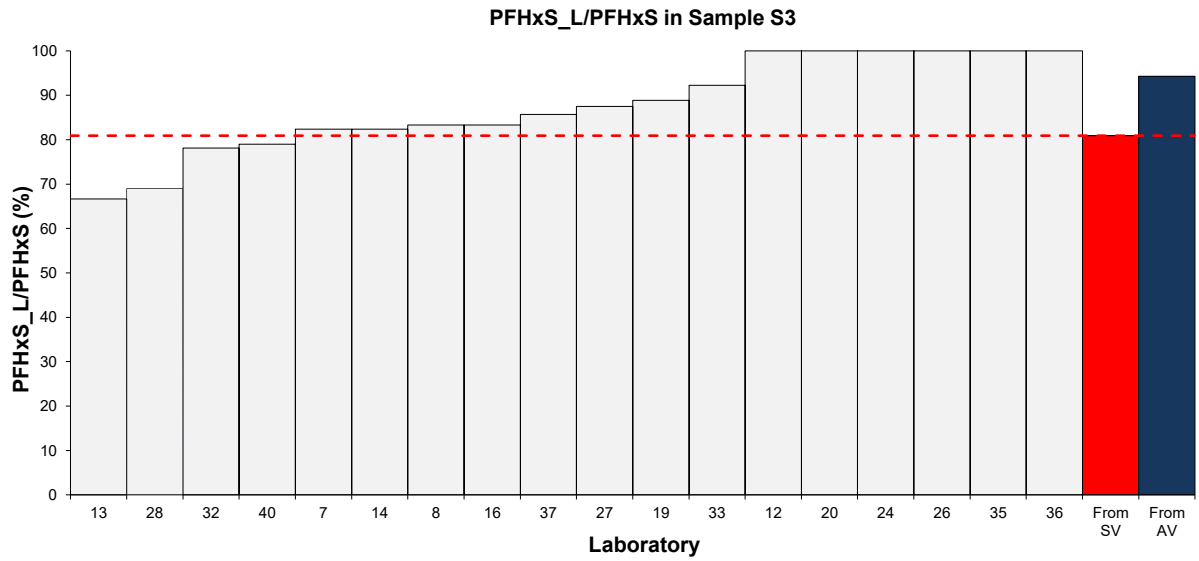
AV = Assigned Value

Figure 114 Sample S3 6:2FTS Results vs Laboratory

Participants were asked to report for Sample S3 both total (the sum of linear and branched isomers) and linear (the linear isomers only) results for PFHxS and PFOS.

Sample S3 was spiked with a mixture of branched and linear PFHxS and PFOS.

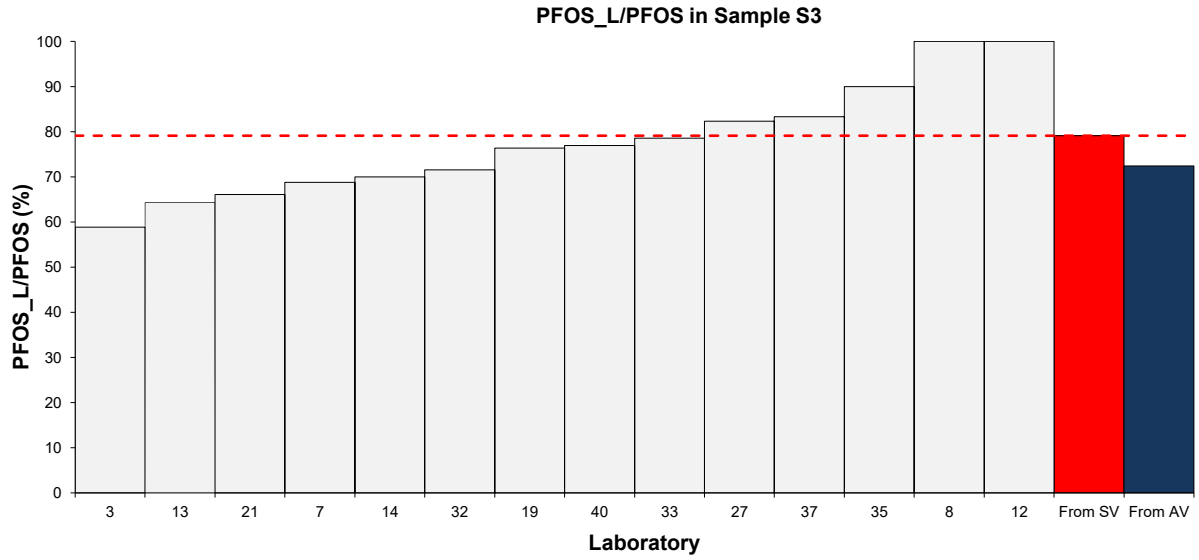
Eighteen participants reported results for both PFHxS isomers. The expected ratio for PFHxS linear versus PFHxS total was 81%. Participants' ratios were between 67% and 100%, and the assigned value ratio was 94% (Figure 115). Laboratories **12**, **20**, **24**, **26**, **35**, and **36** reported 100% linear PFHxS. These participants may need to review their methods used for analysing branched PFHxS isomers at trace levels, as all of them reported branched PFHxS isomers in Samples S1 and S2 which had similar spiked ratios of linear to branched isomers.



The ratio from the AV is calculated based on the results reported by all participants including those who reported results for only one analyte.

Figure 115 Bar Chart of PFHxS_L/PFHxS in Sample S3

Fourteen participants reported results for both total and linear PFOS. The spiked value ratio of PFOS linear versus PFOS total was 79%. Participants' ratios were between 59% and 100%, and the assigned value ratio was 72% (Figure 116). Laboratories **8** and **12** reported 100% linear PFOS. These participants may need to review their method for branched PFOS isomers measurements at trace level, as both reported branched PFOS isomers in Samples S1 (slightly higher spiked linear ratio) and S2 (similar spiked ratio).



The ratio from the AV is calculated based on the results reported by all participants including those who reported results for only one analyte.

Figure 116 Bar Chart of PFOS_L/PFOS in Sample S3

Laboratories **8**, **18**, **20**, **23**, **26**, **30**, and **35** reported results below their level of reporting for analytes that were above their reporting level (Appendix 5). Participants may need to revise their LORs to ensure they are suitable for trace level analysis.

6.8 Participants' Results and Analytical Methods for Individual Short-Chain PFAS, AOF, EOF, and TF in Sample S4

Sample S4 was a pilot sample, spiked with two short-chain PFAS analytes (PFPrA and TFMS) and with PFOA, and inorganic fluoride. Laboratory **19** submitted a result for Sample S4 PFPrA after the release of the Preliminary Report; it has been included in this report for information only, as Sample S4 performance was not assessed.

Participants were asked to report:

- Short-chain PFAS analytes, defined as PFAS containing fewer than four fully fluorinated carbon atoms in their perfluoroalkyl chain;
- AOF (Adsorbable Organic Fluorine), representing total organic fluorine measured after adsorption onto an activated carbon column;
- EOF (Extractable Organic Fluorine), representing total organic fluorine determined by solid-phase extraction; and
- TF (Total Fluorine), which includes both organic and inorganic fluorine.

This sample was designed to help laboratories assess their capabilities for measurement of these emerging tests for PFAS in water. No individual performance assessment was conducted for this sample, and no assigned values were set for any tests in this sample. However, participants can still assess their results against other participants results and/or the spiked values (Tables 74 to 76). Where applicable they also may assess whether their reported results fall within the acceptable range as suggested by the study coordinator below (determined as the robust average excluding outliers, with a PCV of 20%).

PFPrA and **TFMS** Eight participants reported numeric results for PFPrA, and seven participants reported numeric results for TFMS. Most results were in excellent agreement with each other and the spiked value.

The results reported by Laboratory **11** were biased low by the same factor for both analytes of 0.3, whereas the results reported by Laboratory **15** were biased high for both analytes by approximately the same factor of 2.6. The method used by these participants may have produced results compatible to other results, but they need to review their calculation procedure for standard or sample preparation.

Participants can assess whether their reported results fall within the suggested acceptable range in Figures 117 and 118.

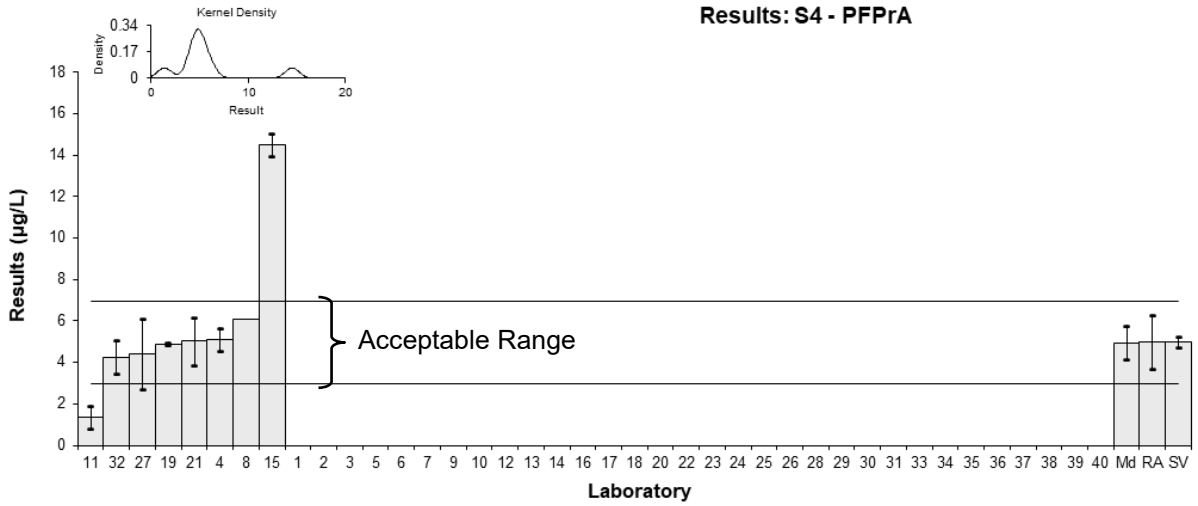


Figure 117 Sample S4 PFPrA Results and Suggested Acceptable Range

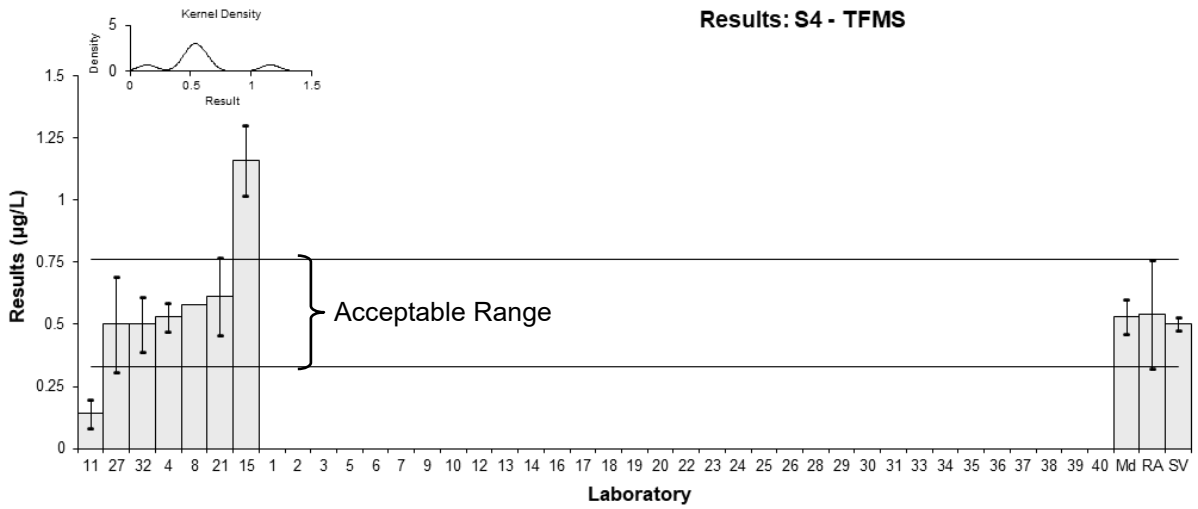


Figure 118 Sample S4 TFMS Results and Suggested Acceptable Range

AOF, **EOF**, and **TF** are not yet routine tests for analytical laboratories, as only three participants reported numeric results for AOF, and only one participant reported a numeric result for EOF and TF. The ultrapure water sample was spiked with PFOA and inorganic fluoride, for the purposes of contributing to the AOF, EOF or TF value.

AOF The methods currently available for this test have reported achieving recoveries of around 70% to 100% for PFAS analyte mixtures in water matrices.[22-24] Three participants reported results for AOF in Sample S4 (Laboratories **7**, **11**, and **29**). Participants achieved between 67% and 107% recovery relative to the expected value for this test (Table 83).

Table 83 Comparison of Sample S4 AOF Results and Spiked Value

Lab. Code	Result (µg/L)	Spiked Value (µg/L)	Result / Spiked Value (%)
7	18	16.8	107
11	15.5		92
29	11.3		67

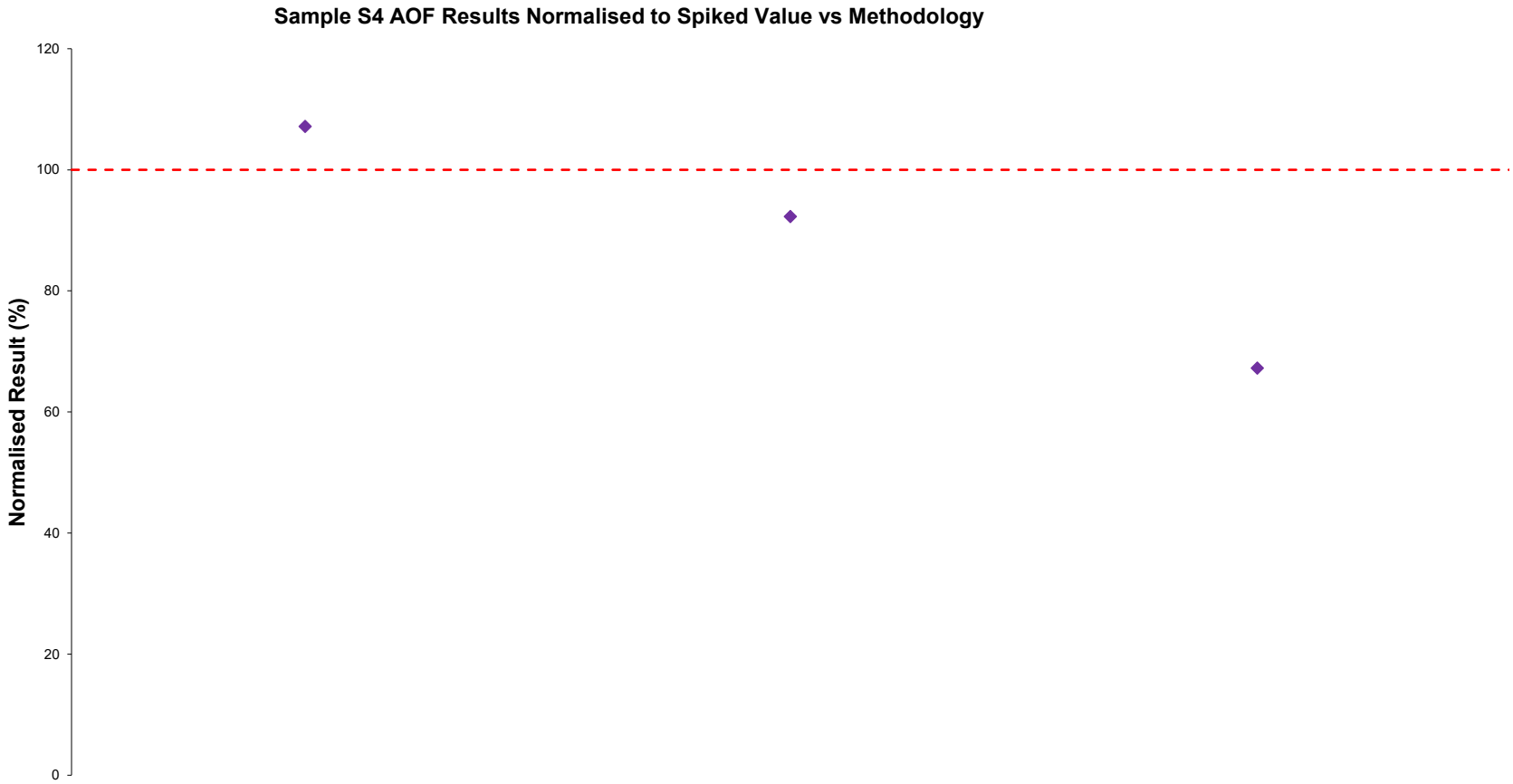
The three participants used similar methods (Figure 119), based on ISO 18127 or DIN 38409-59.[25,26]

EOF Only one participant (Laboratory **11**) reported a numeric result for EOF. The result 16.6 µg/L, was in excellent agreement with the expected value of 16.84 µg/L (99% recovery). This participant used SPE for extraction, with 5 mL methanol/base as elution solvent, a combustion time of 5 minutes, a combustion temperature of 1050°C, and Na_2CO_3/$NaHCO_3$ mixture as the IC eluent. One other laboratory tested for EOF, however reported that the sample was below their limit of reporting of 200 µg/L.

TF Only Laboratory **11** reported a numeric result for TF. The result (74.1 µg/L) was in relatively good agreement with the spike value of 96.6 µg/L. Two other participants also tested for TF, however both reported that the sample was below their limit of reporting of 2000 µg/L and 5000 µg/L.

All participants who analysed this sample for TF reported using a combustion ion chromatographic method.

A similar pilot sample will be included in NMIA's next PT study for PFAS in water, to continue supporting laboratories in developing their methods for the analyses of short-chain PFAS, AOF, EOF, and TF.



Sample Diluted?	No	Yes	No
Sample Volume (mL)	44.781	100	50
pH Adjustment?	No	No	No
AC Column Pre-rinsed?	No	No	Yes
AC Column Rinsing Solution	NaNO3		NaNO3
Combustion Time (min)	5	6	7
Combustion Temperature (°C)	1050	1050	1050
Adsorption Buffer Solution	DI water	Water	DI water
IC Eluent	Na2CO3/NaHCO3 mixture	Na2CO3/NaHCO3 mixture	Na2CO3/NaHCO3 mixture
IC Column	Metrosep A Supp 5 - 150/4.0		Metrosep A Supp 5 - 150/4.0
Reference Method	No	ISO 18127	DIN 38409-59

Figure 119 Sample S4 AOF Normalised Results vs Methodology

6.9 False Negatives

Appendix 5 presents false negative results. These are analytes present in the samples which a participant tested for but did not report a numeric result; for example, participants reporting a 'less than' result (< *x*) when the assigned value was higher than their limit of reporting (LOR), or participants that did not report anything. For analytes where no assigned value was set, results have only been considered to be false negatives where the consensus value and spiked value (if applicable) were significantly higher than the participants' LOR (i.e. the consensus value minus the expanded uncertainty, and the spiked value minus the expanded uncertainty, were both greater than the LOR), or if no value was reported.

6.10 Effects of Analyte Level and Sample Matrix

In general, performance across the different water samples and different analyte concentrations were similar (Table 84).

Table 84 Acceptable *z*-Scores for Each Sample

Sample	Expected Number of Results	Numeric Results Reported (% expected number of results)	z-Scores Calculated (% of numeric results reported)	Acceptable z-Scores (% of z-Scores Calculated)
S1 Potable Water (Low Level)	980	663 (68%)	661 (99.7%)	587 (89%)
S2 River Water (Standard Level)	1152	803 (70%)	769 (96%)	712 (93%)
S3 Reagent Grade Water (Trace Level)	297	183 (62%)	183 (100%)	160 (87%)

6.11 Comparison with Previous PFAS in Water Studies

In the first study conducted by NMIA for PFAS analytes in water in 2015, participants were asked to report results for total and linear PFOS and PFOA only. Eleven laboratories enrolled, of which ten reported results. The lack of mass-labelled linear and branched standards was the main problem encountered by participants. Since then, a large number of high-quality standards and labelled standards have become available and so more analytes have been added each year to subsequent PT studies. Laboratories have developed methods for the analysis of a wide spectrum of PFAS contaminants and in general the reported results were compatible, showing that the mass-labelled standards are capable of correcting for the differences between these methods. Also in this study, the pilot Sample S4 was introduced, which covered short-chain PFAS, as well as AOF, EOF and TF.

A summary of the rates of participation and reported results over the last 10 studies (2016 to 2025) is presented in Figure 120. For most analytes, the same set SDPA was used in the present study as in previous studies, with exceptions for some long-chain PFCAs and PFSAs. Having a set SDPA allows for a comparison of participants' performance over time and provides a benchmark for progressive improvement.

This study had the highest proportion of NT ('Not Tested') results over this period. This may be due to the new types of analytes introduced in this study (e.g. short-chain PFAS analytes, and some PFAA precursors and related compounds, PFECA and PFESA analytes). Many routine analytical laboratories may not yet be analysing these analytes.

A summary of participants' performance in the measurement of PFAS analytes in water over the last 10 studies is presented in Figure 121.

Many analyte levels in the present study were lower than in previous studies, however overall, most participants performed similarly.

For PFODA, PFUdS and 10:2FTS, these analytes had been introduced in previous NMIA PT studies, however, they have not previously been set assigned values due to either too few participants reporting numeric results, or poor consensus between results reported. Overall, laboratories have improved their capabilities for measuring these analytes in water, and in the present study, assigned values were able to be set for these analytes for the first time.

Of the new analytes introduced in this study for the PFAS in Water program, participants demonstrated strong capabilities for the measurement of PFHxDA, FOUEA, 3:3FTCA, and PFMPA, and assigned values were able to be set for these analytes.

Over time, laboratories should expect at least 95% of their scores to lay within the range $|z| \leq 2.0$. Scores in the range $2.0 < |z| < 3.0$ can occasionally occur, however these should be interpreted in conjunction with the other scores obtained by that laboratory. For example, a trend of *z*-scores on one side of the zero line is an indication of method or laboratory bias. Individual performance history reports are emailed to each participant at the end of the study; the consideration of *z*-scores for an analyte over time provides much more useful information than a single *z*-score.

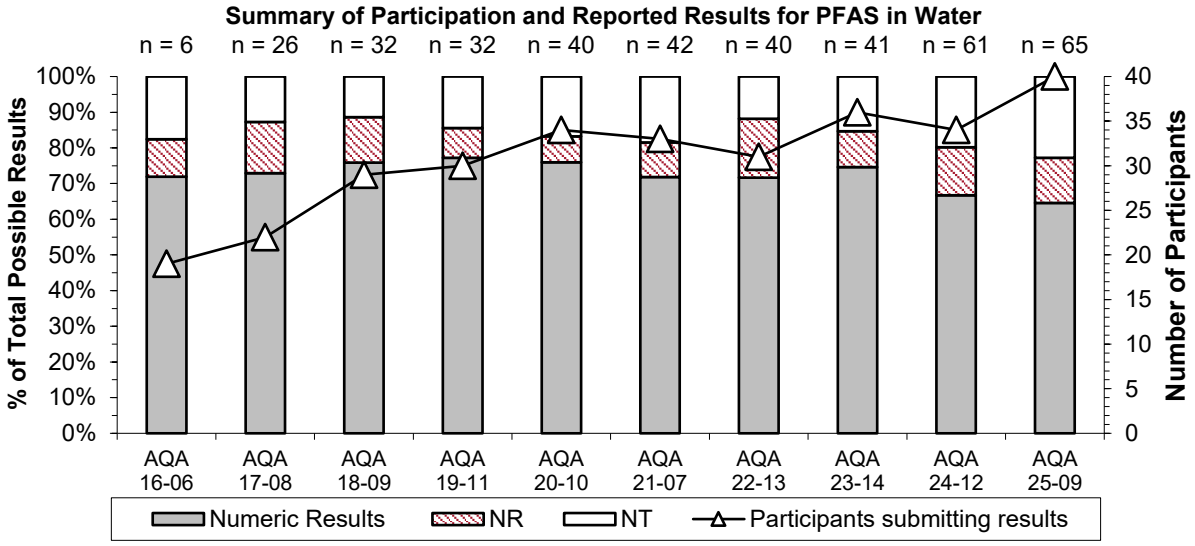


Figure 120 Summary of Participation and Reported Results for PFAS Water PT Studies (n = number of analytes)

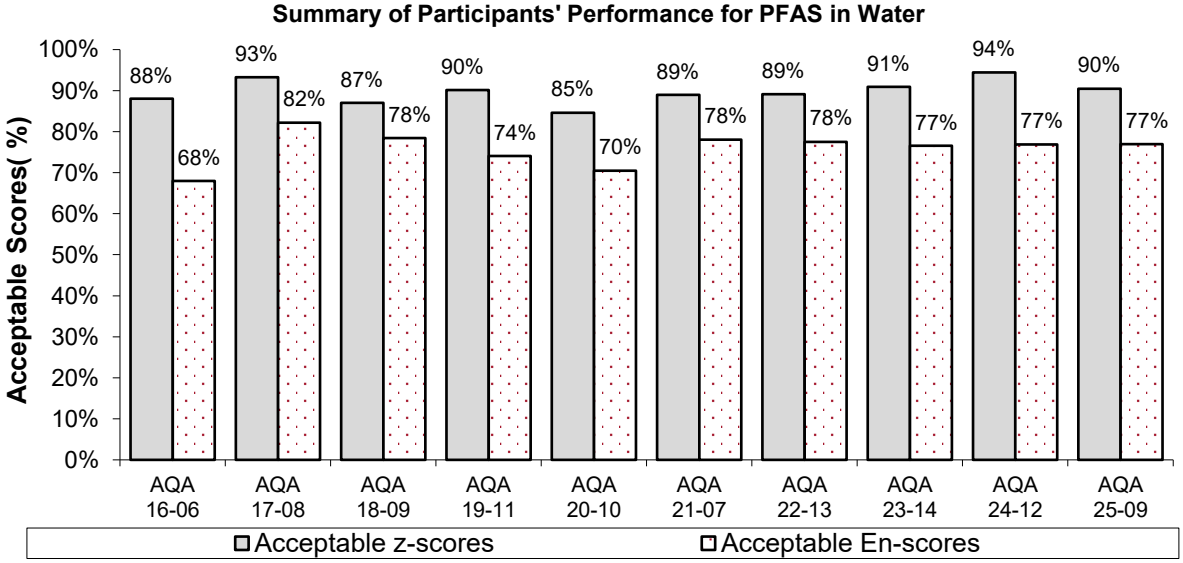


Figure 121 Summary of Participants' Performance for PFAS in Water PT Studies

7 REFERENCES

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APPENDIX 1 SAMPLE PREPARATION

Sample S1: Potable water was autoclaved, and dispensed into HDPE bottles (120 mL each). Each bottle was spiked individually with a composite spike solution containing the target analytes.

Sample S2: River water was filtered and autoclaved, and dispensed into HDPE bottles (55 mL each). Each bottle was spiked individually with a composite spike solution containing the target analytes.

Sample S3: Reagent grade water was dispensed into HDPE bottles (120 mL each). Each bottle was spiked individually with a composite spike solution containing the target analytes.

Sample S4: Reagent grade water was dispensed into HDPE bottles (55 mL each). Each bottle was spiked individually with a composite spike solution containing the target analytes.

The samples were stored in a coolroom at 4°C prior to dispatch.

APPENDIX 2 ROBUST AVERAGE AND ASSOCIATED UNCERTAINTY, z-SCORE AND E_N-SCORE CALCULATIONS

A2.1 Robust Average and Associated Uncertainty

Robust averages were calculated using the procedure described in ISO 13528.[5] The uncertainty was evaluated as:

$$u_{rob\ av} = 1.25 \times \frac{s_{rob\ av}}{\sqrt{p}} \qquad \textit{Equation 4}$$

where:

$u_{\text{rob av}}$ is the standard uncertainty of the robust average

$s_{rob\ av}$ is the standard deviation of the robust average

p is the number of results

The expanded uncertainty ($U_{rob\ av}$) is the standard uncertainty multiplied by a coverage factor of 2 at approximately 95% confidence level.

A worked example is set out below in Table 85.

Table 85 Uncertainty Evaluation for PFOA in Sample S2

No. results (p)	33
Robust Average	0.0201 µg/L
$S_{rob\ av}$	0.0030 µg/L
$u_{rob\ av}$	0.00065 µg/L
k	2
$U_{rob\ av}$	0.0013 µg/L

Therefore, the robust average for PFOA in Sample S2 is 0.0201 ± 0.0013 µg/L.

A2.2 z-Score and E_n-Score Calculations

For each participant's result, a z-score and E_n-score are calculated according to Equations 2 and 3 respectively (see Section 4).

A worked example is set out below in Table 86.

Table 86 z-Score and E_n-Score for Sample S2 PFOA Result Reported by Laboratory 36

Participant Result (µg/L)	Assigned Value (µg/L)	SDPA	z-Score	E_n-Score
0.022 ± 0.0015	0.0201 ± 0.0013	20% as PCV, or: 0.2 × 0.0201 = 0.00402 µg/L	$z = \frac{0.022 - 0.0201}{0.00402} = 0.47$	$E_n = \frac{0.022 - 0.0201}{\sqrt{0.0015^2 + 0.0013^2}} = 0.96$

APPENDIX 3 USING PT DATA FOR UNCERTAINTY EVALUATION

When a laboratory has successfully participated in at least six PT studies, the standard deviation from PT studies can also be used to evaluate the uncertainty of their measurement results.[27] An example is given. Between 2015 and 2025, NMIA carried out PT studies of PFAS in water. These studies involved analyses of PFAS analytes at low and high levels.

Laboratory X submitted results for PFOA in most of these PT studies. All reported results below returned acceptable z-scores (Table 87).

Table 87 Laboratory X Reported Results for PFOA

Study No.	Sample	Laboratory Result (µg/L)	Assigned Value (µg/L)	Number of Results	Robust CV of All Results (%)
AQA 15-03	S4	3.92	3.7	9	6.8
AQA 16-06	S6	13.54	10.83	15	16
AQA 18-09	S3	0.846	0.735	27	19
AQA 18-09	S4	0.038	0.036	27	14
AQA 19-11	S3	0.39	0.404	28	22
AQA 19-11	S4	0.064	0.0696	30	14
AQA 20-10	S3	0.53	0.503	31	17
AQA 20-10	S4	0.047	0.0443	29	16
AQA 21-07	S3	0.284	0.225	30	16
AQA 21-07	S4	0.0365	0.0292	30	11
AQA 22-13	S4	0.0222	0.0225	24	17
AQA 23-14	S4	0.0079	0.00914	27	15
AQA 23-14	S5	0.0345	0.0342	35	11
AQA 24-12	S1	0.0107	0.0110	27	8.9
AQA 24-12	S2	0.026	0.0249	30	15
AQA 25-09	S1	0.0073	0.00695	31	14
AQA 25-09	S2	0.0214	0.0201	33	15
AQA 25-09	S3	0.00087	0.000788	13	16
				Average	15*
$\boldsymbol{pooled\ s\%} = \sqrt{\frac{(\mathbf{9}-\mathbf{1})\times\mathbf{6.8^2}+(\mathbf{15}-\mathbf{1})\times\mathbf{16^2}+\cdots\cdots+(\mathbf{13}-\mathbf{1})\times\mathbf{16^2})}{\mathbf{476}-\mathbf{18}}}$					15

*The pooled standard deviation was used.

Taking the pooled standard deviation of the robust CV over these PT samples gives an evaluation of the relative standard uncertainty of 15%. Using a coverage factor of two gives a relative expanded uncertainty of 30%, at a level of confidence of approximately 95%.

Table 88 sets out the expanded uncertainty for results of the measurement of PFOA in water over the range 0.001 – 15 µg/L.

Table 88 Uncertainty of PFOA Results Evaluated Using PT Data

Results (µg/L)	Uncertainty (µg/L)
0.0010	0.0003
0.10	0.03
1.0	0.3
7.5	2.3
15.0	4.5

The evaluation of 30% passes the test of being reasonable, and the analysis of the 18 different PT samples over 11 years can be assumed to include all the relevant uncertainty components (different matrices, operators, reagents, calibrators, etc.), and so complies with ISO/IEC 17025.[7]

APPENDIX 4 ADDITIONAL ANALYTES

Tables 89 and 90 presents additional analytes reported by participants.

Table 89 Additional Analytes – Samples S1, S2, and S3

Lab. Code	Sample	Analyte	Result (µg/L)	Uncertainty (µg/L)	Recovery (%)
1	S2	6:2FTS	0.002	0.0007	177.04
2	S2	PFHxDA	0.0016	0.0008	NR
		MeFOSAA	0.011	0.004	NR
		EtFOSAA	0.0078	0.0018	NR
3	S1	PFHpA	0.0003	0.0001	NR
	S3	ADONA	0.0002	0.0001	NR
6	S3	PFBS	0.00022	0.000066	100
7	S2	6:2FTS	0.0068	0.0027	68
9	S2	MeFOSAA	0.0003109	0.000031	>75
11	S2	6:2FTS	0.00835	0.00375	NR
	S3	PFPeA	0.00121	0.000495	NR
15	S1	PFHpA	0.003043	0.002019	NR
22	S1	10:2FTS	0.0002	0.00006	110
	S3	PFBS	0.0003	0.00009	140
		10:2FTS	0.0002	0.00006	110
25	S2	6:2FTS	0.017	NR	NR
27	S2	PFUdS	0.00046	0.00014	NR
31	S1	PFHpA	0.0009	0.0015	27.86
	S3	PFMPA	0.04	NR	95.26
39	S2	6:2FTOH	0.01478	0.00340	NR

Table 90 Additional Analytes – Sample S4

Lab. Code	Sample	Analyte	Result (µg/L)	Uncertainty (µg/L)	Recovery (%)
6	S4	PFBA	0.0042	0.001245	110
		PFBS	0.0001	0.00003	100
9	S4	PFBA	0.000944254	0.000094	120
11	S4	TFA	0.15	0.06	NR
13	S4	PFBA	0.043	0.009	116
15	S4	PFEtS	0.009081	0.001834	NR
		PFPrS	0.001889	0.000948	NR
22	S4	PFBA	0.0039	0.00117	100
		PFBS	0.0001	0.00003	140
36	S4	PFBA	0.0017	0.00031	81

APPENDIX 5 FALSE NEGATIVES

Table 91 False Negatives

Lab. Code	Sample	Analyte	Assigned Value (µg/L)	Spiked Value (µg/L)	Reported Result** (µg/L)
1	S1	PFEESA	0.0114	0.0100	<0.01
7	S1	PFBA	0.0105	0.00999	<0.01
	S2	PFBA	0.0539	0.0595	<0.05
8	S3	PFHxA	0.000521	Not spiked	<0.0005
		PFOSA	0.00273	0.00302	<0.002
10	S1	PFBA	0.0105	0.00999	NR
		PFPeA	0.0141	0.0119	NR
		PFHxA	0.00323	0.00291	NR
		PFNA	0.00207	0.00199	NR
		PFDoA	0.0419	0.0499	NR
		PFTeDA	0.0401	0.0499	NR
		PFHxDA	0.080	0.0999	NR
		FOUEA	0.047	0.0499	NR
		PFBS	0.00654	0.00754	NR
		PFHxS_L	0.00706	0.00645	NR
		PFHpS	0.00399	0.00396	NR
		PFOS_L	0.00239	0.00244	NR
		PFDS	0.0274	0.0301	NR
		PFUdS	0.072	0.0995	NR
		PFOSA	0.0120	0.0121	NR
		4:2FTS	0.0203	0.0198	NR
		6:2FTS	0.0147	0.0150	NR
		8:2diPAP	0.0402	0.0499	NR
		5:3FTCA	0.0517	0.0499	NR
		GenX	0.0149	0.0150	NR
		PFMPA	0.062	0.0699	NR
		9Cl-PF3ONS	0.0802	0.0805	NR
		11Cl-PF3OUdS	0.091	0.100	NR
		PFEESA	0.0114	0.0100	NR
11	S1	PFHxS_L	0.00706	0.00645	NR
		PFOS_L	0.00239	0.00244	NR
	S2	PFHxS_L	0.0207	0.0199	NR
		PFOS_L	0.0105	0.0116	NR
	S3	PFHxS_L	0.00165	0.00161	NR

Lab. Code	Sample	Analyte	Assigned Value (µg/L)	Spiked Value (µg/L)	Reported Result** (µg/L)
		PFOS_L	0.00084	0.000799	NR
12	S1	PFOSA	0.0120	0.0121	<0.01
	S2	PFTeDA	0.069	0.0953	<0.05
15	S1	PFTeDA	0.0401	0.0499	NR
		PFOS	0.00371	0.00309	NR
		PFUdS	0.072	0.0995	NR
		11Cl-PF3OUdS	0.091	0.100	<0.003772
16	S2	PFNA	0.00092	Not spiked	NR
		PFDoA	0.00086	Not spiked	NR
	S3	PFHxA	0.000521	Not spiked	NR
		PFOA	0.000788	0.000745	NR
		PFOS	0.00116	0.00101	NR
		PFOS_L	0.00084	0.000799	NR
		6:2FTS	0.00198	0.00197	NR
18	S1	PFPeA	0.0141	0.0119	<0.01
		PFTeDA	0.0401	0.0499	<0.01
	S2	PFBA	0.0539	0.0595	<0.05
		PFHpA	0.0142	0.0139	<0.01
	S3	PFOS	0.00116	0.00101	<0.001
20	S3	PFOS	0.00116	0.00101	<0.0010
21	S1	PFBA	0.0105	0.00999	<0.002
23	S3	PFHxA	0.000521	Not spiked	<0.0005
24	S1	5:3FTCA	0.0517	0.0499	< 0.05
26	S1	PFDoA	0.0419	0.0499	NR
		PFDS	0.0274	0.0301	NR
		11Cl-PF3OUdS	0.091	0.100	NR
	S2	PFUdA	0.0463	0.0499	NR
		10:2FTS	0.0590	0.0700	<0.025
		9Cl-PF3ONS	0.104	0.100	<0.10
		11Cl-PF3OUdS	0.130	0.150	<0.050
	S3	PFOS	0.00116	0.00101	<0.0010
28	S3	PFOS_L	0.00084	0.000799	NR
29	S1	PFTeDA	0.0401	0.0499	<0.025
		FOUEA	0.047	0.0499	NR
		PFHxS	0.00829	0.00795	<0.005
		PFHxS_L	0.00706	0.00645	<0.005
		PFDS	0.0274	0.0301	<0.025

Lab. Code	Sample	Analyte	Assigned Value (µg/L)	Spiked Value (µg/L)	Reported Result** (µg/L)
		8:2diPAP	0.0402	0.0499	NR
		9Cl-PF3ONS	0.0802	0.0805	NR
		11Cl-PF3OUdS	0.091	0.100	NR
	S2	PFPeS	0.00565	0.00511	<0.005
		6:2diPAP	0.044	0.0506	<0.025
		8:2diPAP	0.0355*	0.0499	NR
		9Cl-PF3ONS	0.104	0.100	NR
		11Cl-PF3OUdS	0.130	0.150	NR
30	S1	PFBA	0.0105	0.00999	<0.002
	S3	PFHxA	0.000521	Not spiked	<0.0005
31	S1	PFBA	0.0105	0.00999	<0.0020
		8:2diPAP	0.0402	0.0499	<0.025
		PFEESA	0.0114	0.0100	<0.01
	S2	PFOS_L	0.0105	0.0116	<0.01
		6:2diPAP	0.044	0.0506	<0.025
		8:2diPAP	0.0355*	0.0499	<0.025
32	S1	FOUEA	0.047	0.0499	NR
		5:3FTCA	0.0517	0.0499	NR
		PFMPA	0.062	0.0699	NR
		PFEESA	0.0114	0.0100	NR
	S2	PFNA	0.00092	Not spiked	< 0.0007
		PFDoA	0.00086	Not spiked	< 0.0008
		3:3FTCA	0.084	0.0993	NR
		PFEESA	0.0419	0.0400	NR
35	S1	PFOSA	0.0120	0.0121	<0.01
	S2	PFTeDA	0.069	0.0953	<0.05
	S3	6:2FTS	0.00198	0.00197	<0.0004
37	S1	PFBA	0.0105	0.00999	< 0.005
39	S2	PFODA	0.061	0.0699	<0.015

*Robust Average (assigned value not set).
**Results reported as NR may or may not be false negatives, depending on the participant's actual LOR.

APPENDIX 6 PARTICIPANTS' TEST METHODS

A6.1 Participants' Test Methods for Samples S1 and S2

Table 92 Participant Methodology Samples S1 and S2 – Extraction**

Lab. Code	S1 Entire Container Used?	S1 Was the Container Rinsed?	S1 Sample Amount Used (mL)	S2 Entire Container Used?	S2 Was the Container Rinsed?	S2 Sample Amount Used (mL)	Labelled Standard Added Before Extraction?	Labelled Standard Directly into Bottle?	Other Sample Pre-treatment?	Extraction Technique	Extraction/Elution Solvent	Extraction Time (min)	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Final pH Adjustment?	Carbon cleanup?
1	Yes	Yes		Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	ACN/ MeOH in 0.1% NH4OH	2 hours	40	2 hours	NA	NA
2	NS			Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH	2	60		No	No
3	Yes	Yes		Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	MeOH, MeOH (1% AmOH)		30	1h30m	Yes	Yes
5	Yes	Yes	NA	Yes	Yes	NA	Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH	NA	NA	NA	Yes	No
6	No		50	No		50	Yes	No		Solid-Phase Extraction:	ACN/ MeOH	15		15	No	No

Lab. Code	S1 Entire Container Used?	S1 Was the Container Rinsed?	S1 Sample Amount Used (mL)	S2 Entire Container Used?	S2 Was the Container Rinsed?	S2 Sample Amount Used (mL)	Labelled Standard Added Before Extraction?	Labelled Standard Directly into Bottle?	Other Sample Pre-treatment?	Extraction Technique	Extraction/Elution Solvent	Extraction Time (min)	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Final pH Adjustment?	Carbon cleanup?
										HLB type (hydrophilic lipophilic balance)						
7	Yes	Yes		Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	Basic ACN and Acetone	60	45	35	No	No
8	Yes	Yes		Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH	1h	25		Yes	No
9	NS			Yes	No		Yes	No	-	Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH				Yes	No
10	Yes	Yes	25, 50	NS			Yes	No	No	Solid-Phase Extraction: WAX type (weak anion exchange)	MeOH	NA	Room tempe rature	30 mins	No	No
11	Yes	Yes		Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type	NH4OH/ MeOH	120	45	30	No	Yes

Lab. Code	S1 Entire Container Used?	S1 Was the Container Rinsed?	S1 Sample Amount Used (mL)	S2 Entire Container Used?	S2 Was the Container Rinsed?	S2 Sample Amount Used (mL)	Labelled Standard Added Before Extraction?	Labelled Standard Directly into Bottle?	Other Sample Pre-treatment?	Extraction Technique	Extraction/Elution Solvent	Extraction Time (min)	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Final pH Adjustment?	Carbon cleanup?
										(weak anion exchange)						
12	Yes	Yes	NA	Yes	Yes	NA	Yes	Yes	pH Adjustment	SPE and Direct injection	Basified Methanol	approx. 60 mins	40°C	approx. 20 mins	No	No
13	Yes	Yes		Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	MeOH, 0.3% NH3		Room tempe rature			
14	Yes	Yes		Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	Basic ACN and Acetone	20 mins	40 °C	30 mins	No	No
15	No	No	2.5mL	NS					syringe filtration, 50% MeOH dilution	Direct Injection	Eluent A : 0.5mM ammonium formate in DIW, Eluent B : ACN				No	No
16	Yes	Yes		Yes	Yes		Yes	Yes	pH adjustment	Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH		40	40	No	No

Lab. Code	S1 Entire Container Used?	S1 Was the Container Rinsed?	S1 Sample Amount Used (mL)	S2 Entire Container Used?	S2 Was the Container Rinsed?	S2 Sample Amount Used (mL)	Labelled Standard Added Before Extraction?	Labelled Standard Directly into Bottle?	Other Sample Pre-treatment?	Extraction Technique	Extraction/Elution Solvent	Extraction Time (min)	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Final pH Adjustment?	Carbon cleanup?
17	Yes	Yes	NA	Yes	Yes	NA	Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH	NA	NA	NA	Yes	No
18	No		10	No		10	Yes	No	None	Solid-Phase Extraction: WAX type (weak anion exchange)	Basic ACN				No	No
19	Yes	Yes		Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	0.2% ammonia in methanol	45			No	No
20	No	NA	50mL	Yes	Yes	NA	Yes	Yes	NA	Solid-Phase Extraction: WAX type (weak anion exchange)	MeOH, 0.3% NH3	NA	NA	NA	Yes	Yes
21	Yes	Yes		Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH	60		30	Yes	No
22	No		50	No		50	Yes	No		Solid-Phase Extraction:	ACN/ MeOH	15		15	No	No

Lab. Code	S1 Entire Container Used?	S1 Was the Container Rinsed?	S1 Sample Amount Used (mL)	S2 Entire Container Used?	S2 Was the Container Rinsed?	S2 Sample Amount Used (mL)	Labelled Standard Added Before Extraction?	Labelled Standard Directly into Bottle?	Other Sample Pre-treatment?	Extraction Technique	Extraction/Elution Solvent	Extraction Time (min)	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Final pH Adjustment?	Carbon cleanup?
										HLB type (hydrophilic lipophilic balance)						
24	Yes	Yes		Yes	Yes		Yes	Yes			10:89:1 IPA/ACN/ Ammonium hydroxide					
25	Yes	Yes		Yes	Yes		Yes	No		Solid-Phase Extraction: WAX type (weak anion exchange)	MeOH, 3% NH3				Yes	Yes
26*	No	No	100	No	No	1	Yes	No	NA	Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH	240	40	30	No	No
27	Yes	Yes		Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	MeOH, 1%NH3				No	No
28	No		10	No		10	Yes	No		Direct Injection					Yes	No
29	No	NA		No	Yes		Yes	No								

Lab. Code	S1 Entire Container Used?	S1 Was the Container Rinsed?	S1 Sample Amount Used (mL)	S2 Entire Container Used?	S2 Was the Container Rinsed?	S2 Sample Amount Used (mL)	Labelled Standard Added Before Extraction?	Labelled Standard Directly into Bottle?	Other Sample Pre-treatment?	Extraction Technique	Extraction/Elution Solvent	Extraction Time (min)	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Final pH Adjustment?	Carbon cleanup?
30	Yes	Yes		Yes	Yes		Yes	Yes	Acidification	Solid-Phase Extraction: WAX type (weak anion exchange)	ACN/ MeOH in 0.1% NH4OH	40 min	Room temp	120 min	Yes	No
31	Yes	Yes	n/a	Yes	Yes	n/a	Yes	Yes	None	None	ACN/ MeOH	45 min	Room temp	n/a	n/a	None
32	Yes	Yes		Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH		20		No	No
33	Yes	Yes		Yes	Yes		Yes	Yes	Measure sample volume by (1) marking the level of the sample on the bottle/tube; or (2) weighing the sample + bottle to the nearest 0.1 gram	Solid-Phase Extraction: WAX type (weak anion exchange)	Basic ACN and Acetone	Varied	40	Approx. 60	No	No
34*	Yes	Yes		Yes	Yes		Yes	No		Solid-Phase Extraction: WAX type (weak anion exchange)	MeOH, 1% NH3				Yes	Yes

Lab. Code	S1 Entire Container Used?	S1 Was the Container Rinsed?	S1 Sample Amount Used (mL)	S2 Entire Container Used?	S2 Was the Container Rinsed?	S2 Sample Amount Used (mL)	Labelled Standard Added Before Extraction?	Labelled Standard Directly into Bottle?	Other Sample Pre-treatment?	Extraction Technique	Extraction/Elution Solvent	Extraction Time (min)	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Final pH Adjustment?	Carbon cleanup?
35	Yes	Yes	NA	Yes	Yes	NA	Yes	Yes	pH Adjustment	SPE and Direct injection	Basified Methanol	approx. 60 mins	40°C	approx. 20 mins	No	No
36	Yes	Yes		Yes	Yes		No	No		Direct Injection	MeOH	20			Yes	No
37	Yes	Yes		Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	MeOH, 0.3% NH3	10 min	NA	40min	No	No
38*	NS			Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH	60	34	360	Yes	No
39*	No	Yes	100 ml for 2 replicates of 50 ml	No	Yes	50 ml for 2 replicates of 25 ml	Yes	No	Addition of formic acid	Solid-Phase Extraction: WAX type (weak anion exchange)	MeOH and MeOH + 0,1% NH4OH	165	45	90-120	No	No

*Additional Information in Table 93.

**Some responses may be modified so that the participant cannot be identified.

Table 93 Participant Methodology Samples S1 and S2 – Extraction Additional Information

Lab. Code	Extraction Additional Information
26	Sample S2: tested by dilute-and-shoot
34	Sample S2: WAX/GCB was used.
38	Concentration was performed using centrifugal concentrator
39	Extraction time is 165 min for a set of 6 samples

Table 94 Participant Methodology Samples S1 and S2 – Instrumental Technique and Analysis

Lab. Code	Instrument	Dilution Factor	Blank Corrected?
1	LC-MSMS or LC-QQQ		No
2	LC-MSMS or LC-QQQ	No	No
3	LC-MSMS or LC-QQQ		No
4	NS		
5	LC-MSMS or LC-QQQ		No
6	LC-Orbitrap	0.02	Yes
7	LC-MSMS or LC-QQQ		No
8	LC-MSMS or LC-QQQ		No
9	LC-MSMS or LC-QQQ	100	Yes
10	LC-MSMS or LC-QQQ	No	No
11	LC-MSMS or LC-QQQ		No
12	LC-MSMS or LC-QQQ	No	No
13	LC-MSMS or LC-QQQ		No
14	LC-MSMS or LC-QQQ	No	No
15*	LC-MSMS or LC-QQQ	2	No
16	LC-MSMS or LC-QQQ		No

Lab. Code	Instrument	Dilution Factor	Blank Corrected?
17	LC-MSMS or LC-QQQ		No
18	LC-MSMS or LC-QQQ		Yes
19	LC-MSMS or LC-QQQ	No	No
20	LC-MSMS or LC-QQQ	No	Yes
21	LC-MSMS or LC-QQQ	No	No
22	LC-Orbitrap	0.02	Yes
23			
24*	LC-MSMS or LC-QQQ		No
25	LC-MSMS or LC-QQQ	No	No
26	LC-MSMS or LC-QQQ	No	No
27	LC-MSMS or LC-QQQ		No
28	LC-MSMS or LC-QQQ	2	No
29	LC-MSMS or LC-QQQ	x5 for some analytes	Yes
30	LC-MSMS or LC-QQQ	Neat, 10x	No
31	LC-MSMS or LC-QQQ	No	No
32	LC-MSMS or LC-QQQ		Yes
33	LC-MSMS or LC-QQQ	0.001	No
34	LC-MSMS or LC-QQQ	No	No
35	LC-MSMS or LC-QQQ	No	No
36	LC-MSMS or LC-QQQ		No
37	LC-MSMS or LC-QQQ	No	No
38	LC-MSMS or LC-QQQ		Yes
39	LC-MSMS or LC-QQQ		Yes
40	NS		

*Additional Information in Table 95.

Table 95 Participant Methodology Sample S1 and S2 – Instrumental Technique Additional Information

Lab. Code	Instrumental Technique Additional Information
15	Dynamic MRM
24	In this method the linear standards are used to quantify both the linear as well as the branched isomers

Table 96 Participant Methodology Samples S1 and S2 – Labelled Standards

Lab. Code	Labelled Standard Source	Recovery Correction?	Standard Method?	Secondary Standard Source as Check?
1	Wellington	No	In house method based on USEPA method 533	Only for the ICV
2	Wellington	No	US EPA 533	No
3	Wellington	Yes		Yes
5	Wellington	Yes	No	YES
6	Wellington Laboratories	No		
7	Wellington	No	No	Yes
8	Wellington Laboratories	No	1663	
9	Wellington	Yes		Yes
10	Wellington	No	NA	Yes
11	yes	yes	In-house	No
12	Wellington	Yes	No. In-house	Standards of separate lot numbers
13	Wellington Laboratories and Cambridge Isotope Laboratories	Yes		Yes
14	Wellington	Yes		PFAC-24PAR from Wellington
15	Wellington	Yes		
16	Wellington Laboratories	Yes	USEPA 537	
17	Wellington	Yes	No	YES

Lab. Code	Labelled Standard Source	Recovery Correction?	Standard Method?	Secondary Standard Source as Check?
18	Wellington Laboratories	Yes	No	No
19	Wellington	Yes	Isotopic dilution	No
20	Wellington Labs	Yes	No	Yes
21	Wellington Laboratories	Yes		
22	Wellington Laboratories	No		
24	Wellington	Yes		
25	Wellington			
26	Wellington	Yes	No	No
27	Greyhound, Wellington, TLC, LGC	No	DIN38407-42, UNEP Chemicals Branch 2015	
28	Wellington Labs	No		Yes
29	Wellington, deuterated versions of above	Yes		Yes
30	Wellington	Yes	In-house	Yes
31	Wellington Laboratories	No	No	
32	Wellington	Yes	No	Yes
33	Wellington	Yes	Isotope Dilution	Yes
34	Wellington	Yes	In-house Method	No
35	Wellington	Yes	No. In-house	Standards of separate lot numbers
36	Wellington Labs	Yes	ASTM D8421 modified	Yes
37	Wellington	Yes		
38	Wellington	Yes		No
39	Wellington	No	based on the ISO21675	another mix is used for the control and it's provided by Campro

Table 97 Additional Participant Methodology Comments

Lab. Code	Sample	Participant's Comments
26	S1	PFDoA, PFTrDA, PFDS, 10:2 FTS and 11Cl-PF3OUdS not reported (NR) due to poor recovery in our QC Sample. NT = Not Tested
	S2	PFUdA not reported (NR) due to poor recovery in our QC Sample. NT = Not Tested
39	S1	based on the information received concerning the range of concentration, a dilution of the sample was applied (5 times)
	S2	based on the information received concerning the range of concentration, a dilution of the sample was applied (10 times)

Table 98 Labelled Standards for PFBA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFBA	N/A
2	Y	
3	PBA-13C4	Yes
4	NS	
5	PFBA-13C4	
6	Yes	
7	13C4-PFBA	
8	PFBA-13C4	PFBA-13C3
9	PFBA	
10		
11	13C-PFBA	
12	13C4-PFBA	N/A
13	13C4-PFBA	13C3-PFBA
14	Yes	
15		13C4-PFBA
16	MPFBA	M3PFBA
17	PFBA-13C4	
18	Yes	
19	13C4-PFBA	13C3-PFBA
20	13C4-PFBA	No
21	13C4-PFBA	
22	Yes	
23		
24	Perfluoro-n-[13C4] butanoic acid MPFBA	Perfluoro-n-[2,3,4-13C4] butanoic acid M3PFBA
25		
26	M4PFBA	NA
27	13C4-PFBA	
28	13C4-PFBA	
29		
30	13C4-PFBA	NA
31	13C4-PFBA	
32	13C-PFBA	
33	13C4-PFBA	
34	MPFBA	
35	13C4-PFBA	N/A
36	M4PFBA	M3PFBA
37	13C3_PFBS.IS 13C3_PFBS.IS	
38	NT	NT
39	PFBA 13C4	
40	NS	

Table 99 Labelled Standards for PFPeA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C5-PFPeA	N/A
2		
3	PFPeA-13C3	Yes
4	NS	
5	PFPeA-13C3	
6	Yes	
7	13C5-PFPeA	
8	PFPeA-13C5	
9	PFPeA	
10		
11	13C-PFPeA	
12	13C3-PFPeA	N/A
13	13C5-PFPeA	
14	Yes	
15		13C5-PFPeA
16	M5PFPeA	M3PFBA
17	PFPeA-13C3	
18	Yes	
19	13C4-PFPeA	13C5 -PFPeA
20	13C5-PFPeA	No
21	13C5-PFPeA	
22	Yes	
23		
24	Perfluoro-n-[13C5] pentanoic acid M5PFPeA	
25		
26	M5PFPeA	NA
27	13C5-PFPeA	
28	13C5-PFPeA	
29		
30	13C5-PFPeA	NA
31	13C5-PFPeA	
32	13C-PFPeA	
33	13C5-PFPeA	
34	M5PFPeA	
35	13C3-PFPeA	N/A
36	M5PFPeA	M2PFHxA
37	13C2_6:2FTS.IS	
38	NT	NT
39	PFPeA 13C4	
40	NS	

Table 100 Labelled Standards for PFHxA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C5-PFHxA	N/A
2	Y	
3	PFHxA-13C2	Yes
4	NS	
5	PFHxA-13C2	
6	Yes	
7	13C2-PFHxA	
8	PFHxA-13C5	
9	PFHxA	
10		
11	13C-PFHxA	
12	13C2-PFHxA	N/A
13	13C5-PFPxA	13C2-PFHxA
14	Yes	
15		13C5-PFHxA
16	M5PFHxA	M3PFBA
17	PFHxA-13C2	
18	Yes	
19	13C2-PFHxA	13C5 -PFPeA
20	13C5-PFHxA	No
21	13C5-PFHxA	
22	Yes	
23		
24	Perfluoro-n-[1,2,3,4,6-13C5] hexanoic acid M5PFHxA	Perfluoro-n-[1,2-13C5] hexanoic acid MPFHxA
25		
26	M5PFHxA	NA
27	13C5-PFHxA	
28	13C5-PFHxA	
29		
30	13C5-PFHxA	NA
31	13C5-PFHxA	
32	13C-PFHxA	
33	13C2-PFHxA	
34	M5PFHxA	
35	13C2-PFHxA	N/A
36	M5PFHxA	M2PFHxA
37	18O2_PFHxS.IS	
38	M5PFHxA	M2PFHxA
39	PFHxA 13C2	
40	NS	

Table 101 Labelled Standards for PFHpA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFHpA	N/A
2		
3	PFHpA-13C4	Yes
4	NS	
5	PFHpA-13C4	
6	Yes	
7	13C4-PFHpA	
8	PFHpA-13C4	
9	PFHpA	
10		
11	13C-PFHpA	
12	13C4-PFHpA	N/A
13	13C4-PFHpA	
14	Yes	
15		13C4-PFHpA
16	M4PFHpA	M3PFBA
17	PFHpA-13C4	
18	Yes	
19	13C3-PFHpA	13C8-PFOA
20	13C4-PFHpA	No
21	13C4-PFHpA	
22	Yes	
23		
24	Perfluoro-n-[1,2,3,4-13C4] heptanoic acid M4PFHpA	
25		
26	MPFHpA	NA
27	13C4-PFHpA	
28	13C4-PFHpA	
29		
30	13C4-PFHpA	NA
31	13C4-PFHpA	
32	13C-PFHpA	
33	13C4-PFHpA	
34	M4PFHpA	
35	13C4-PFHpA	N/A
36	M4PFHpA	M2PFHxA
37	18O2_PFHxS.IS	
38	NT	NT
39	PFHpA 13C4	
40	NS	

Table 102 Labelled Standards for PFOA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOA	N/A
2	Y	
3	PFOA-13C8	Yes
4	NS	
5	PFOA-13C4	PFOA-13C2
6	Yes	
7	13C8-PFOA	
8	PFOA-13C4	PFOA-13C2
9	PFOA	
10	[13C4]-PFOA	
11	13C-PFOA	
12	13C4-PFOA	N/A
13	13C8-PFOA	13C4-PFOA
14	Yes	
15		13C8-PFOA
16	M8PFOA	M2PFOA
17	PFOA-13C4	PFOA-13C2
18	Yes	
19	13C4-PFOA	13C8-PFOA
20	13C8-PFOA	No
21	13C8-PFOA	
22	Yes	
23		
24	Perfluoro-n-[13C8] octanoic acid M8PFOA	Perfluoro-n-[1,2,3,4-13C8] octanoic acid MPFOA
25		
26	M8PFOA	NA
27	13C4-PFOA	
28	13C8-PFOA	
29		
30	13C4-PFOA	NA
31	13C4-PFOA	
32	13C-PFOA	
33	13C8-PFOA	
34	M8PFOA	
35	13C4-PFOA	N/A
36	M8PFOA	M2PFOA
37	13C2_8:2FTS.IS	
38	M8PFOA	M4PFOA
39	PFOA 13C4	
40	NS	

Table 103 Labelled Standards for PFNA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C9-PFNA	N/A
2	Y	
3	PFDA-13C2	Yes
4	NS	
5	PFNA-13C5	
6	Yes	
7	13C5-PFNA	
8	PFNA-13C9	PFNA-13C5
9	PFNA	
10		
11	13C-PFNA	
12	13C5-PFNA	N/A
13	13C9-PFNA	13C5-PFNA
14	Yes	
15		13C9-PFNA
16	M9PFNA	M2PFOA
17	PFNA-13C5	
18	Yes	
19	13C5-PFNA	13C8-PFOA
20	13C9-PFNA	No
21	13C5-PFNA	
22	Yes	
23		
24	Perfluoro-n-[13C9] nonanoic acid M9PFNA	Perfluoro-n-[1,2,3,4,5-13C9] nonanoic acid MPFNA
25		
26	M9PFNA	NA
27	13C5-PFNA	
28	13C9-PFNA	
29		
30	13C5-PFNA	NA
31	13C5-PFNA	
32	13C-PFNA	
33	13C5-PFNA	
34	M9PFNA	
35	13C5-PFNA	N/A
36	M9PFNA	M5PFNA
37	13C8_PFOS.IS	
38	NT	NT
39	PFNA 13C5	
40	NS	

Table 104 Labelled Standards for PFDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C6PFDA	N/A
2	Y	
3	PFDA-13C2	Yes
4	NS	
5	PFDA-13C2	
6	Yes	
7	13C6-PFDA	
8	PFDA-13C6	PFDA-13C2
9	PFDA	
10		
11	13C-PFDA	
12	13C2-PFDA	N/A
13	13C6-PFDA	13C2-PFDA
14	Yes	
15		13C6-PFDA
16	M6PFDA	MPFDA
17	PFDA-13C2	
18	Yes	
19	13C2-PFDA	13C8-PFOA
20	13C6-PFDA	No
21	13C6-PFDA	
22	Yes	
23		
24	Perfluoro-n-[1,2,3,4,6-13C6] decanoic acid M6PFDA	Perfluoro-n-[1,2-13C6] decanoic acid MPFDA
25		
26	M6PFDA	NA
27	13C6-PFDA	
28	13C6 PFDA	
29		
30	13C6-PFDA	NA
31	13C6-PFDA	
32	13C-PFDA	
33	13C6-PFDA	
34	M6PFDA	
35	13C2-PFDA	N/A
36	M6PFDA	M2PFDA
37	13C8_PFOS.IS	
38	M6PFDA	M2PFDA
39	PFDA 13C2	
40	NS	

Table 105 Labelled Standards for PFUdA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C7-PFUnDA	N/A
2	Y	
3	PFDA-13C2	Yes
4	NS	
5	PFUdA-13C2	
6	Yes	
7	13C2-PFUnA	
8	PFUdA-13C7	
9	PFUdA	
10		
11	13C-PFUndA	
12	13C2-PFUdA	N/A
13	13C2-PFUnA	
14	Yes	
15		13C7-PFUnDA
16	M7PFUdA	MPFDA
17	PFUdA-13C2	
18	Yes	
19	13C2-PFUdA	13C8-PFOA
20	13C7-PFUdA	No
21	13C2-PFUnDA	
22	Yes	
23		
24	Perfluoro-n-[1,2,3,4,6,7-13C7] undecanoic acid M7PFUdA	
25		
26	M7PFUnDA	NA
27	13C7-PFUdA	
28	13C7-PFUdA	
29		
30	13C2-PFUnDA	NA
31	13C2-PFUnDA	
32	13C-PFUnDA	
33	13C2-PFUnA	
34	M7PFUdA	
35	13C2-PFUdA	N/A
36	M7PFUnDA	M2PFDA
37	d5_N-EtFOSAA.IS	
38	M7PFUdA	M2PFDA
39	PFUnDA 13C2	
40	NS	

Table 106 Labelled Standards for PFDoA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFDoDA	N/A
2	Y	
3	PFDoA-13C2	Yes
4	NS	
5	PFDoA-13C2	
6	Yes	
7	13C2-PFDoA	
8	PFDoA-13C2	
9	PFDoA	
10		
11	13C-PFDoDA	
12	13C2-PFDoDA	N/A
13		
14	Yes	
15		13C2-PFDoDA
16	MPFDoA	MPFDA
17	PFDoA-13C2	
18	Yes	
19	13C2-PFDoA	13C8-PFOA
20	13C2-PFDoDA	No
21	13C2-PFDoDA	
22	Yes	
23		
24	Perfluoro-n-[1,2 13C2] dodecanoic acid MPFDoA	
25		
26	MPFDoDA	NA
27	13C2-PFDoA	
28	13C2-PFDoDA	
29		
30	13C2-PFDoDA	NA
31	13C2-PFDoDA	
32	13C-PFDoDA	
33	13C2-PFDoA	
34	MPFDoA	
35	13C2-PFDoDA	N/A
36	M2PFDoDA	M2PFDA
37	d7_N-MeFOSE.IS	
38	NT	NT
39	PFDoDA 13C2	
40	NS	

Table 107 Labelled Standards for PFTrDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	D9-NEtFOSE	N/A
2		
3	PFTeDA-13C2	Yes
4	NS	
5	PFTeDA-13C2	
6	Yes	
7	13C2-PFTeDA	
8		
9	PFDoA	
10		
11	13C-PFTeA	
12	13C2-PFTeDA	N/A
13	13C2-PFTeDA	
14	Yes	
15		13C8-PFOS
16	MPFDoA	MPFDA
17	PFTeDA-13C2	
18	No, used labelled PFTeDA	
19	13C2-PFDoA	13C8-PFOA
20	13C2-PFTeDA	No
21	13C2-PFTeDA	
22	Yes	
23		
24		
25		
26	MPFDoDA	NA
27	13C2-PFTrDA	
28	13C2-PFTrDA	
29		
30	13C2-PFDoDA	NA
31	13C2-PFDoDA	
32	13C-PFDoDA	
33	13C2-PFTeDA	
34		
35	13C2-PFTeDA	N/A
36	Avg M2PFDoDA & M2PFTeDA	M2PFDA
37	13C2_PFUdA.IS	
38	NT	NT
39	PFTreDA 13C2	
40	NS	

Table 108 Labelled Standards for PFTeDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFTeDA	N/A
2		
3	PFTeDA-13C2	Yes
4	NS	
5	PFTeDA-13C2	
6	Yes	
7	13C2-PFTeDA	
8	PFTeDA-13C2	
9	PFTeDA	
10		
11	13C-PFTeA	
12	13C2-PFTeDA	N/A
13	13C2-PFTeDA	
14	Yes	
15		13C2-PFTDA
16	M2PFTeDA	MPFDA
17	PFTeDA-13C2	
18	Yes	
19	13C2-PFTeDA	13C8-PFOA
20	13C2-PFTeDA	No
21	13C2-PFTeDA	
22	Yes	
23		
24	Perfluoro-n-[1,2 13C2] tetradecanoic acid M2PFTeDA	
25		
26	MPFTeDA	NA
27	13C2-PFTeDA	
28	NT	
29		
30	13C2-PFTeDA	NA
31	13C2-PFTeDA	
32	13C-PFTeDA	
33	13C2-PFTeDA	
34	M2PFTeDA	
35	13C2-PFTeDA	N/A
36	M2PFTeDA	M2PFDA
37	NT	
38	NT	NT
39	PFTreDA 13C2	
40	NS	

Table 109 Labelled Standards for PFHxDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFHxDA	N/A
2	Y	
3	PFHxDA-13C3	Yes
4	NS	
5		
6	Yes	
7	NA	
8	PFHxDA-13C2	
9		
10		
11	13C-PFHxDA	
12	NT	NT
13	13C2-PFHxDA	
14	NT	
15		13C5-PFHxA
16	M2PFHxDA	M2PFOA
17		
18	NA	
19	13C2-PFHxDA	13C8-PFOA
20	NT	NT
21	13C2-PFHxDA	
22	Yes	
23		
24		
25		
26	NT	NA
27	13C2-PFHxDA	
28	NT	
29		
30	13C2-PFHxDA	NA
31	13C2-PFHxDA	
32	13C-PFHxDA	
33	NT	
34		
35	NT	NT
36	-	-
37	NT	
38	NT	NT
39	PFHxDA 13C2	
40	NS	

Table 110 Labelled Standards for PFODA

Lab. Code	Before Extraction	Before Instrument Analysis
1	NA	N/A
2		
3	PFHxDA-13C3	Yes
4	NS	
5		
6	Yes	
7	NA	
8		
9		
10		
11	13C-PFHxDA	
12	NT	NT
13		
14	NT	
15		13C8-PFOA
16	M8FOSA-I	MPFOS
17		
18	NA	
19	13C2-PFHxDA	13C8-PFOA
20	NT	NT
21	Not applicable	
22	Yes	
23		
24		
25		
26	NT	NA
27	13C2-PFHxDA	
28	NT	
29		
30	NT	NA
31	--	
32	13C-PFHxDA	
33	NT	
34		
35	NT	NT
36	-	-
37	13C4_PFBA.IS	
38	NT	NT
39	-	
40	NS	

Table 111 Labelled Standards for FOUEA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-FOUEA	N/A
2		
3		
4	NS	
5		
6		
7	NA	
8	8:2 FTUCA-13C2	
9		
10		
11	13C-PFNA	
12	NT	NT
13	13C2-FOUEA	
14	NT	
15		13C8-PFOA
16	MFOUEA	M2PFOA
17		
18	NA	
19		
20	NT	NT
21	13C2-FOUEA	
22		
23		
24		
25		
26	NT	NA
27	NT	
28	NT	
29		
30	13C2 8:2 FTUCA	NA
31	13C2-MFOUEA	
32		
33	NT	
34		
35	NT	NT
36	-	-
37	13C5_PFPeA.IS	
38	NT	NT
39	NT	
40	NS	

Table 112 Labelled Standards for PFBS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFBS	N/A
2		
3	PFBS-13C3	Yes
4	NS	
5	PFBS-1C3	
6	Yes	
7	13C3-PFBS	
8	PFBS-13C3	
9	PFBS	
10		
11	13C-PFBS	
12	13C3-PFBS	N/A
13	13C3-PFBS	
14	Yes	
15		13C3-PFBS
16	M3PFBS	MPFDA
17	PFBS-1C3	
18	Yes	
19	13C3-PFBS	13C3-PFHxS
20	13C3-PFBS-Na	No
21	13C3-PFBS	
22	Yes	
23		
24	Sodium perfluoro-1-[2,3,4 13C3] butanesulfonate M3PFBS	
25		
26	M3PFBS	NA
27	13C3-PFBS	
28	13C3-PFBS	
29		
30	13C3-PFBS	NA
31	13C3-PFBS	
32	13C-PFBS	
33	13C3-PFBS	
34	M3PFBS	
35	13C3-PFBS	N/A
36	M3PFBS	18O2 PFHxS
37	13C2_PFHxA.IS	
38	NT	NT
39	PFBS 13C3	
40	NS	

Table 113 Labelled Standards for PFPeS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFHxS	N/A
2		
3	PFHxS-13C3	Yes
4	NS	
5	PFHxS-18O2	
6	Yes	
7	13C3-PFBS	
8		
9	PFHxS	
10		
11	13C-PFHxS	
12	18O2-PFHxS	N/A
13		
14	Yes	
15		13C3-PFHxS
16	M3PFBS	MPFDA
17	PFHxS-18O2	
18	Yes	
19	18O2-PFHxS	13C3-PFHxS
20	13C3-PFHxS-Na	No
21	16O2-PFHxS	
22	Yes	
23		
24		
25		
26	M5PFHxA	NA
27	13C3-PFBS	
28	13C3-PFBS	
29		
30	16O2-PFHxS	NA
31	18O2-PFHxS	
32	13C-PFHxS	
33	18O2-PFHxS	
34		
35	18O2-PFHxS	N/A
36	M3PFHxS	18O2 PFHxS
37	13C4_PFHpA.IS	
38	NT	NT
39	PFHxS 18O2	
40	NS	

Table 114 Labelled Standards for PFHxS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFHxS	N/A
2		
3		
4	NS	
5	PFHxS-18O2	PFHxS-13C3
6	Yes	
7	18O2-PFHxS	
8	PFHxS-13C3	PFHxS-18O2
9	PFHxS	
10	[13C3]-PFHxS	
11	13C-PFHxS	
12	18O2-PFHxS	N/A
13	13C3-PFHxS	18O2-PFHxS
14	Yes	
15		13C3-PFHxS
16	M3PFHxS	MPFDA
17	PFHxS-18O2	PFHxS-13C3
18		
19	18O2-PFHxS	13C3-PFHxS
20	13C3-PFHxS-Na	No
21	16O2-PFHxS	
22	Yes	
23		
24	Sodium perfluoro-1-[1,2,3 13C3] hexanesulfonate M3PFHxS	Sodium perfluoro-1- hexane (1O2) sulfonate MPFHxS
25		
26	M3PFHxS	NA
27	18O2-PFHxS	
28	13C3-PFHxS	
29		
30	16O2-PFHxS	NA
31	18O2-PFHxS	
32	13C-PFHxS	
33	18O2-PFHxS	
34	M3PFHxS	
35	18O2-PFHxS	N/A
36	M3PFHxS	18O2 PFHxS
37	13C8_PFOA.IS	
38	M3PFHxS	18O-PFHxS
39	NT	
40	NS	

Table 115 Labelled Standards for PFHxS_L

Lab. Code	Before Extraction	Before Instrument Analysis
1	N/A	N/A
2	Y	
3	PFHxS-13C3	Yes
4	NS	
5		
6		
7	18O2-PFHxS	
8		
9	PFHxS	
10		
11	13C-PFHxS	
12	18O2-PFHxS	N/A
13	13C3-PFHxS	
14	Yes	
15		
16	M3PFHxS	MPFDA
17		
18	Yes	
19	18O2-PFHxS	13C3-PFHxS
20	13C3-PFHxS-Na	No
21	Not applicable	
22		
23		
24		
25		
26	M3PFHxS	NA
27	18O2-PFHxS	
28		
29		
30	NT	NA
31	--	
32	13C-PFHxS	
33	18O2-PFHxS	
34		
35	18O2-PFHxS	N/A
36	M3PFHxS	18O2 PFHxS
37	13C5_PFNA.IS	
38	M3PFHxS	18O-PFHxS
39	PFHxS 18O2	
40	NS	

Table 116 Labelled Standards for PFHpS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	N/A
2		
3	PFOS-13C4	Yes
4	NS	
5	PFOS-13C4	
6	Yes	
7	18O2-PFHxS	
8		
9		
10		
11	13C-PFOS	
12	13C4-PFOS	N/A
13		
14	Yes	
15		13C3-PFHxS
16	M3PFHxS	MPFDA
17	PFOS-13C4	
18	Yes	
19	18O2-PFHxS	13C3-PFHxS
20	13C3-PFHxS-Na	No
21	13C8-PFOS	
22	Yes	
23		
24		
25		
26	M3PFHxS	NA
27	18O2-PFHxS	
28	13C3-PHHxS	
29		
30	16O2-PFHxS	NA
31	18O2-PFHxS	
32	13C-PFHxS	
33	13C8-PFOS	
34		
35	13C4-PFOS	N/A
36	M8PFOS	MPFOS
37	13C6_PFDA.IS	
38	NT	NT
39	PFHxS 18O2	
40	NS	

Table 117 Labelled Standards for PFOS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	N/A
2		
3	PFOS-13C4	Yes
4	NS	
5	PFOS-13C4	PFOS-13C8
6	Yes	
7	13C8-PFOS	
8	PFOS-13C8	PFOS-13C4
9	PFOS	
10	[13C4]-PFOS	
11	13C-PFOS	
12	13C4-PFOS	N/A
13	13C8-PFOS	13C4-PFOS
14	Yes	
15		13C8-PFOS
16	M8PFOS	MPFOS
17	PFOS-13C4	PFOS-13C8
18		
19	13C4-PFOS	13C8-PFOS
20	13C8-PFOS-Na	No
21	13C4-PFOS	
22	Yes	
23		
24	Sodium perfluoro-1-[13C8] ocatanesulfonate M8PFOS	Sodium perfluoro-1-[1,2,3,4-13C4] ocatanesulfonate MPFOS
25		
26	M8PFOS	NA
27	13C8-PFOS	
28	13C8-PFOS	
29		
30	13C8-PFOS	NA
31	13C8-PFOS	
32	13C-PFOS	
33	13C8-PFOS	
34	M8PFOS	
35	13C4-PFOS	N/A
36	M8PFOS	MPFOS
37	13C2_PFUdA.IS	
38	M8PFOS	M4PFOS
39	NT	
40	NS	

Table 118 Labelled Standards for PFOS_L

Lab. Code	Before Extraction	Before Instrument Analysis
1	N/A	N/A
2	Y	
3	PFOS-13C4	Yes
4	NS	NS
5		
6		
7	13C8-PFOS	
8		
9	PFOS	
10		
11	13C-PFOS	
12	13C4-PFOS	N/A
13	13C8-PFOS	
14	Yes	
15		
16	M8PFOS	MPFOS
17		
18	Yes	
19	13C4-PFOS	13C8-PFOS
20	13C8-PFOS-Na	No
21	13C8-PFOS	
22		
23		
24		
25		
26	M8PFOS	NA
27	13C8-PFOS	
28		
29		
30	NT	NA
31	13C8-PFOS	
32	13C-PFOS	
33	13C8-PFOS	
34		
35	13C4-PFOS	N/A
36	M8PFOS	MPFOS
37	13C2_PFDoA.IS	
38	M8PFOS	M4PFOS
39	PFOS13C4	
40	NS	NS

Table 119 Labelled Standards for PFNS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	N/A
2		
3		
4	NS	
5		
6	Yes	
7	13C8-PFOS	
8		
9	PFHxS	
10		
11	13C-PFOS	
12	13C4-PFOS	N/A
13		
14	Yes	
15		13C8-PFOS
16	M8PFOS	MPFOS
17		
18	No, used labelled PFOS	
19	13C4-PFOS	13C8-PFOS
20	13C8-PFOS-Na	No
21	13C8-PFOS	
22	Yes	
23		
24		
25		
26	M8PFOS	NA
27	13C8-PFOS	
28	13C8-PFOS	
29		
30	13C8-PFOS	NA
31	13C8-PFOS	
32	13C-PFOS	
33	13C8-PFOS	
34		
35	13C4-PFOS	N/A
36	M8PFOS	MPFOS
37	d3_MeFOSA.IS	
38	NT	NT
39	PFUnDA 13C2	
40	NS	

Table 120 Labelled Standards for PFDS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	N/A
2		
3	PFOS-13C4	Yes
4	NS	
5	PFOS-13C4	
6	Yes	
7	13C8-PFOS	
8		
9	PFOS	
10		
11	13C-PFOS	
12	13C4-PFOS	N/A
13		
14	Yes	
15		13C8-PFOS
16	M8PFOS	MPFOS
17	PFOS-13C4	
18	No, used labelled PFOS	
19	13C4-PFOS	13C8-PFOS
20	13C8-PFOS-Na	No
21	13C8-PFOS	
22	Yes	
23		
24		
25		
26	M8PFOS	NA
27	13C2-PFDoA	
28	13C8-PFOS	
29		
30	13C8-PFOS	NA
31	13C8-PFOS	
32	13C-PFOS	
33	13C8-PFOS	
34		
35	13C4-PFOS	N/A
36	M8PFOS	MPFOS
37	13C2_PFTeDA.IS	
38	NT	NT
39	PFDoDA 13C2	
40	NS	

Table 121 Labelled Standards for PFUdS

Lab. Code	Before Extraction	Before Instrument Analysis
1	NA	N/A
2		
3		
4	NS	
5		
6		
7	NA	
8		
9		
10		
11	13C-PFOS	
12	NT	NT
13		
14	NT	
15		13C8-PFOS
16	NT	NT
17		
18	NA	
19		
20	NT	NT
21	Not applicable	
22		
23		
24		
25		
26	NT	NA
27	13C2-PFDoA	
28	NT	
29		
30	NT	NA
31	--	
32	13C-PFOS	
33	NT	
34		
35	NT	NT
36	-	-
37	NT	
38	NT	NT
39	PFTreDA 13C2	
40	NS	

Table 122 Labelled Standards for PFDoS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	N/A
2		
3		
4	NS	
5		
6		
7	NA	
8		
9	PFHxS	
10		
11	13C-PFOS	
12	NT	NT
13		
14	NT	
15		13C8-PFOS
16	M8PFOS	MPFOS
17		
18	NA	
19	13C4-PFOS	13C8-PFOS
20	NT	NT
21	13C2-PFTeDA	
22		
23		
24		
25		
26	NT	NA
27	13C2-PFDoA	
28	NT	
29		
30	13C2-PFTeDA	NA
31	13C8-PFOS	
32	13C-PFOS	
33	NT	
34		
35	NT	NT
36	M8PFOS	MPFOS
37	NT	
38	NT	NT
39	PFOS13C4	
40	NS	

Table 123 Labelled Standards for PFTrDS

Lab. Code	Before Extraction	Before Instrument Analysis
1	NA	N/A
2		
3		
4	NS	
5		
6		
7	NA	
8		
9	PFOSA	
10		
11	13C-PFOS	
12	NT	NT
13		
14	NT	
15		13C8-PFOS
16	NT	NT
17		
18	NA	
19		
20	NT	NT
21	Not applicable	
22		
23		
24		
25		
26	NT	NA
27	13C2-PFTeDA	
28	NT	
29		
30	NT	NA
31	--	
32	13C-PFOS	
33	NT	
34		
35	NT	NT
36	-	-
37	NT	
38	NT	NT
39	PFTreDA 13C2	
40	NS	

Table 124 Labelled Standards for PFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOSA	N/A
2		
3	PFOSA-13C8	Yes
4	NS	
5	FOSA-13C8	
6	Yes	
7	13C8-FOSA	
8	FOSA-13C8	
9		
10		
11	13C-PFOSA	
12	13C8-FOSA	N/A
13	13C8-PFOSA	
14	Yes	
15		
16	M8FOSA-I	MPFDA
17	FOSA-13C8	
18	Yes	
19	13C8-FOSA	
20	13C8-FOSA	No
21	13C8-FOSA	
22	Yes	
23		
24	N-methyl-d3-perfluoro-1-octancesulfonamide M8FOSA	
25		
26	MPFOSA	NA
27	13C8-PFOSA	
28	13C8PFOSA	
29		
30	13C8-FOSA	NA
31	13C8-FOSA	
32	13C-PFOSA	
33	13C8-FOSA	
34	M8FOSA	
35	13C8-FOSA	N/A
36	M8PFOS	MPFOS
37	13C8_PFOSA.IS	
38	NT	NT
39	NT	
40	NS	

Table 125 Labelled Standards for 4:2FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-4:2FTS	N/A
2		
3	4:2 FTS-13C2	Yes
4	NS	
5	4:2FTS-13C2	
6	Yes	
7	13C2-4-2 FTS	
8	4:2 FTS-13C2	
9		
10		
11	13C-4:2 FTS	
12	13C2 4:2-FTS	N/A
13		
14	Yes	
15		13C2-4-2-FTSA
16	M2-4:2 FTS	MPFOS
17	4:2FTS-13C2	
18	Yes	
19	13C2-4:2 FTS	
20	13C2-4:2 FTS-Na	No
21	13C2-4:2 FTS	
22	Yes	
23		
24	Sodium 1H,1H,2H,2H-perfluoro1-[1,2-13C2]-hexane sulfonate M2-4:2FTS	
25		
26	M4:2 FTS	NA
27	13C2-4:2FTS	
28	13C2-6:2-FTSA	
29		
30	13C2-4:2 FTS	NA
31	13C2-4:2 FTS	
32	13C-4:2FTS	
33	13C2-4-2 FTS	
34	M2-4,2FTS	
35	13C2 4:2-FTS	N/A
36	M2-4:2 FTS	18O2 PFHxS
37	13C2_4:2 FTS.IS	
38	NT	NT
39	NT	
40	NS	

Table 126 Labelled Standards for 6:2FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-6:2FTS	N/A
2		
3	6:2 FTS-13C2	Yes
4	NS	
5	6:2FTS-13C2	
6	Yes	
7	13C2-6-2 FTS	
8	6:2 FTS-13C2	
9		
10		
11	13C-8:2 FTS	
12	13C2,12C6 6:2-FTS	N/A
13	13C2-6:2FTS	
14	Yes	
15		13C2-6-2-FTSA
16	M2-6:2 FTS	MPFOS
17	6:2FTS-13C2	
18	Yes	
19	13C2-6:2 FTS	
20	13C2-6:2 FTS-Na	No
21	13C2-6:2 FTS	
22	Yes	
23		
24	Sodium 1H,1H,2H,2H-perfluoro1-[1,2-13C2]-octane sulfonate M2-6:2FTS	
25		
26	M6:2 FTS	NA
27	13C2-6:2FTS	
28	13C2-6:2-FTSA	
29		
30	13C2-6:2 FTS	NA
31	13C2-6:2 FTS	
32	13C-6:2FTS	
33	13C2-6-2 FTS	
34	M2-6,2FTS	
35	13C2,12C6 6:2-FTS	N/A
36	M2-6:2 FTS	18O2 PFHxS
37	13C2_6:2FTS.IS	
38	NT	NT
39	NT	
40	NS	

Table 127 Labelled Standards for 8:2FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-8:2FTS	N/A
2		
3	8:2 FTS-13C2	Yes
4	NS	
5	8:2FTS-13C2	
6	Yes	
7	13C2-8-2 FTS	
8	8:2 FTS -13C2	
9	8:2 FTS	
10		
11	13C-8:2 FTS	
12	13C2 8:2-FTS	N/A
13	13C2-8:2FTS	
14	Yes	
15		13C2-8-FTSA
16	M2-8:2 FTS	MPFOS
17	8:2FTS-13C2	
18	Yes	
19	13C2-8:2 FTS	
20	13C2-8:2 FTS-Na	No
21	13C2-8:2 FTS	
22	Yes	
23		
24	Sodium 1H,1H,2H,2H-perfluoro1-[1,2-13C2]-decane sulfonate M2-9:2FTS	
25		
26	M8:2 FTS	NA
27	13C2-8:2FTS	
28	13C2-8:2-FTSA	
29		
30	13C2-8:2 FTS	NA
31	13C2-8:2 FTS	
32	13C-8:2FTS	
33	13C2-8-2 FTS	
34	M2-8,2FTS	
35	13C2 8:2-FTS	N/A
36	M2-8:2 FTS	18O2 PFHxS
37	13C2_8:2FTS.IS	
38	NT	NT
39	NT	
40	NS	

Table 128 Labelled Standards for 10:2FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-8:2FTS	N/A
2		
3	10:2 FTS 13C2-D4	Yes
4	NS	
5	10:2FTS-13C2	
6	Yes	
7	13C2-10-2 FTS	
8	10:2 FTS-13C2	
9	10:FTS	
10		
11	13C-8:2 FTS	
12	13C2 10:2-FTS	N/A
13	13C2-10:2FTS	
14	Yes	
15		13C8-PFOS
16	M2-8:2 FTS	MPFOS
17	10:2FTS-13C2	
18	No, used labelled PFDoA	
19	13C2-8:2 FTS	
20	NT	NT
21	13C2-8:2 FTS	
22	Yes	
23		
24		
25		
26	MPFDoDA	NA
27	13C2-10:2FTS	
28	13C2-8:2-FTSA	
29		
30	13C2-10:2 FTS	NA
31	13C2-8:2 FTS	
32	13C-10:2FTS	
33	10-2 FTS_ISTD	
34		
35	13C2 8:2-FTS	N/A
36	M2-8:2 FTS	18O2 PFHxS
37	13C2_10:2 FTS.IS	
38	NT	NT
39	NT	
40	NS	

Table 129 Labelled Standards for 6:2diPAP

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-6:2diPAP	N/A
2		
3		
4	NS	
5		
6		
7	NA	
8	6:2 diPAP-13C4	
9		
10		
11	13C-6:2 DiPAP	
12	NT	NT
13		
14	NT	
15		
16	M4-6:2diPAP	M2PFOA
17		
18	NA	
19	13C4-6:2DiPAP	
20	NT	NT
21	13C2-6:2diPAP	
22		
23		
24		
25		
26	NT	NA
27	NT	
28	NT	
29		
30	13C2-6:2 diPAP	NA
31	13C2-6:2diPAP	
32	13C-6:2diPAP	
33	NT	
34		
35	NT	NT
36	-	-
37	NT	
38	NT	NT
39	NT	
40	NS	

Table 130 Labelled Standards for 8:2diPAP

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-8:2diPAP	N/A
2		
3	8:2 diPAP-13C4	Yes
4	NS	
5		
6		
7	NA	
8	8:2 diPAP-13C4	
9	8:2 DIPAP	
10		
11	13C-6:2 DiPAP	
12	NT	NT
13	13C2-8:2diPAP	
14	NT	
15		
16	M4-8:2diPAP	M2PFOA
17		
18	NA	
19	13C4-8:2DiPAP	
20	NT	NT
21	13C2-8:2diPAP	
22		
23		
24		
25		
26	NT	NA
27	NT	
28	NT	
29		
30	13C2-8:2 diPAP	NA
31	13C2-8:2diPAP	
32	13C-8:2diPAP	
33	NT	
34		
35	NT	NT
36	-	-
37	NT	
38	NT	NT
39	NT	
40	NS	

Table 131 Labelled Standards for 6:2FTOH

Lab. Code	Before Extraction	Before Instrument Analysis
1	NA	N/A
2		
3		
4	NS	
5		
6		
7	NA	
8		
9		
10		
11	NT	
12	NT	NT
13		
14	NT	
15		
16	NT	NT
17		
18	NA	
19		
20	NT	NT
21	Not applicable	
22		
23		
24		
25		
26	NT	NA
27	6:2FTOH-13C2-d2	
28	NT	
29		
30	NT	NA
31	--	
32		
33	NT	
34		
35	NT	NT
36	-	-
37	NT	
38	NT	NT
39	-	
40	NS	

Table 132 Labelled Standards for 3:3FTCA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFHpA	N/A
2		
3		
4	NS	
5		
6		
7	13C5-PFPeA	
8		
9		
10		
11	13C-PFHxA	
12	13C2-PFHxA	N/A
13		
14	NT	
15		13C8-PFOA
16	M5PFHxA	M2PFOA
17		
18	NA	
19	13C4-PFPeA	13C5 -PFPeA
20	NT	NT
21	13C5-PFHxA	
22		
23		
24		
25		
26	NT	NA
27	13C5-PFPeA	
28	NT	
29		
30	13C5-PFHxA	NA
31	13C3-PFBS	
32		
33	No	
34		
35	NT	NT
36	M5PFPeA	M2PFHxA
37	NT	
38	NT	NT
39	NT	
40	NS	

Table 133 Labelled Standards for 5:3FTCA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-FHEA	N/A
2		
3		
4	NS	
5		
6		
7	13C2-PFHxA	
8		
9		
10		
11	13C-PFHpA	
12	13C4-PFOA	N/A
13		
14	NT	
15		13C8-PFOA
16	M5PFHxA	M2PFOA
17		
18	NA	
19	13C2-PFHxA	13C5 -PFPeA
20	NT	NT
21	13C5-PFHxA	
22		
23		
24		
25		
26	NT	NA
27	13C5-PFPeA	
28	NT	
29		
30	13C4-PFOA	NA
31	13C2-FHUEA	
32		
33	No	
34		
35	NT	NT
36	M5PFHxA	M2PFHxA
37	NT	
38	NT	NT
39	NT	
40	NS	

Table 134 Labelled Standards for GenX

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-HFPO-DA	N/A
2		
3	HPFO-DA-M3	Yes
4	NS	
5	HFPO-DA-13C3	
6		
7	M3HFPO-DA	
8	HFPO-DA-13C2	
9		
10		
11	13C-Gen-X	
12	13C312C3HF11O3	N/A
13	13C3-HFPO-DA	
14	NT	
15		13C8-PFOA
16	M3-HFPO-DA	MPFDA
17	HFPO-DA-13C3	
18	NA	
19	13C3-GenX	
20	13C3-HFPO-DA	No
21	M3HFPO-DA	
22		
23		
24	2 3 3 3-tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)(13C8)propanoic acid M3HFPO-DA	
25		
26	M3HFPO-DA	NA
27	13C3-GenX	
28	13C3-HFPO-DA	
29		
30	13C3-GenX	NA
31	13C3-HFPO-DA	
32	13C-HFPO-DA	
33	13C3-GenX	
34	M3HFPO-DA	
35	NT	NT
36	M3HFPO-DA	M2PFHxA
37	13C3_GenX.IS	
38	NT	NT
39	GenX13C3	
40	NS	

Table 135 Labelled Standards for ADONA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFHpA	N/A
2		
3	HPFO-DA-M3	Yes
4	NS	
5	PFHxS-18O2	
6	Yes	
7	M3HFPO-DA	
8		
9	PFHpA	
10		
11	13C-PFHpA	
12	13C4-PFHpA	N/A
13		
14	NT	
15		13C8-PFOA
16	M3-HFPO-DA	MPFDA
17	PFHxS-18O2	
18	NA	
19	13C3-PFHpA	13C8-PFOA
20	NT	NT
21	13C4-PFHpA	
22	Yes	
23		
24		
25		
26	MPFHpA	NA
27	13C4-PFHpA	
28	13C3-HFPO-DA	
29		
30	13C4-PFHpA	NA
31	13C4-PFHpA	
32	13C-PFOA	
33	No	
34		
35	NT	NT
36	M3HFPO-DA	M2PFHxA
37	13C3_GenX.IS	
38	NT	NT
39	-	
40	NS	

Table 136 Labelled Standards for PFMPA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFBA	N/A
2		
3		
4	NS	
5		
6		
7	NA	
8		
9		
10		
11	13C-PFBA	
12	13C3-PFPeA	N/A
13		
14	NT	
15		13C8-PFOA
16	M5PFHxA	M2PFOA
17		
18	NA	
19	13C4-PFPeA	13C5 -PFPeA
20	NT	NT
21	13C4-PFBA	
22		
23		
24		
25		
26	NT	NA
27	13C5-PFPeA	
28	NT	
29		
30	13C4-PFBA	NA
31	13C5-PFPeA	
32		
33	NT	
34		
35	NT	NT
36	M5PFPeA	M2PFHxA
37	NT	
38	NT	NT
39	NT	
40	NS	

Table 137 Labelled Standards for 9Cl-PF3ONS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	N/A
2		
3		
4	NS	
5	PFDA-13C2	
6		
7	M3HFPO-DA	
8		
9	PFOS	
10		
11	13C-PFOS	
12	13C4-PFOS	N/A
13		
14	NT	
15		13C8-PFOS
16	M3-HFPO-DA	MPFDA
17	PFNA-13C5	
18	NA	
19	13C4-PFOS	13C8-PFOS
20	NT	NT
21	13C8-PFOS	
22		
23		
24		
25		
26	M8PFOS	NA
27	13C8-PFOS	
28	13C8-PFOS	
29		
30	13C5-PFNA	NA
31	13C5-PFNA	
32	13C-PFOS	
33	No	
34		
35	NT	NT
36	M3HFPO-DA	M2PFHxA
37	13C3_GenX.IS	
38	NT	NT
39	NT	
40	NS	

Table 138 Labelled Standards for 11Cl-PF3OUdS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	N/A
2		
3		
4	NS	
5	PFUdA-13C2	
6		
7	M3HFPO-DA	
8		
9	PFDoA	
10		
11	13C-PFDoDA	
12	13C4-PFOS	N/A
13		
14	NT	
15		13C8-PFOS
16	M3-HFPO-DA	MPFDA
17	PFDoA-13C2	
18	NA	
19	13C4-PFOS	13C8-PFOS
20	NT	NT
21	13C8-PFOS	
22		
23		
24		
25		
26	MPFDoDA	NA
27	13C8-PFOS	
28	13C8-PFOS	
29		
30	13C5-PFNA	NA
31	13C2-PFUnDA	
32	13C-PFOS	
33	No	
34		
35	NT	NT
36	M3HFPO-DA	M2PFHxA
37	13C3_GenX.IS	
38	NT	NT
39	NT	
40	NS	

Table 139 Labelled Standards for PFEESA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFBS	N/A
2		
3		
4	NS	
5		
6		
7	NA	
8		
9		
10		
11	13C-PFHxS	
12	13C3-PFPeA	N/A
13		
14	NT	
15		13C8-PFOA
16	M5PFHxA	M2PFOA
17		
18	NA	
19	13C2-PFHxA	13C5 -PFPeA
20	NT	NT
21	13C3-PFBS	
22		
23		
24		
25		
26	NT	NA
27	13C3-PFBS	
28	NT	
29		
30	13C3-PFBS	NA
31	13C3-PFBS	
32		
33	NT	
34		
35	NT	NT
36	M5PFHxA	M2PFHxA
37	NT	
38	NT	NT
39	NT	
40	NS	

A6.2 Participants' Test Methods for Sample S3

Table 140 Participant Methodology Sample S3 – Extraction**

Lab. Code	S3 Entire Container Used?	S3 Was the Container Rinsed?	S3 Sample Amount Used (mL)	Labelled Standard Added Before Extraction?	Labelled Standard Directly into Bottle?	Other Sample Pre-treatment?	Extraction Technique	Extraction/Elution Solvent	Extraction Time (min)	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Final pH Adjustment?	Carbon cleanup?
1	Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	ACN/ MeOH in 0.1% NH4OH	2 hours	40	2 hours	NA	NA
3	Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	MeOH, MeOH (1% AmOH)		30	1h30m	Yes	Yes
5	Yes	Yes	NA	Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH	NA	NA	NA	Yes	No
6	Yes	No		Yes	No		Solid-Phase Extraction: HLB type (hydrophilic lipophilic balance)	ACN/MeOH	15		15	No	No
7	Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	Basic ACN and Acetone	60	45	35	No	No
8	Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH	1h	25		Yes	No

Lab. Code	S3 Entire Container Used?	S3 Was the Container Rinsed?	S3 Sample Amount Used (mL)	Labelled Standard Added Before Extraction?	Labelled Standard Directly into Bottle?	Other Sample Pre-treatment?	Extraction Technique	Extraction/Elution Solvent	Extraction Time (min)	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Final pH Adjustment?	Carbon cleanup?
11	Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH	120	45	30	No	Yes
12	Yes	Yes	NA	Yes	Yes	NA	SPE and Direct injection	Basified Methanol	approx. 60 mins	40°C	approx. 20 mins	No	No
13	Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	MeOH, 0.3% NH3					
14	Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	Basic ACN and Acetone	20mins	40 °C	30mins	No	No
16	Yes	Yes		Yes	Yes	pH adjustment	Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH		40	40	No	No
17	Yes	Yes	NA	Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH	NA	NA	NA	Yes	No
18	Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	Basic ACN				No	No
19	Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	0.2% ammonia in methanol	45			No	No

Lab. Code	S3 Entire Container Used?	S3 Was the Container Rinsed?	S3 Sample Amount Used (mL)	Labelled Standard Added Before Extraction?	Labelled Standard Directly into Bottle?	Other Sample Pre-treatment?	Extraction Technique	Extraction/Elution Solvent	Extraction Time (min)	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Final pH Adjustment?	Carbon cleanup?
20	No	NA	50mL	Yes	Yes	NA	Solid-Phase Extraction: WAX type (weak anion exchange)	MeOH, 0.3% NH3	NA	NA	NA	Yes	Yes
21	Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH	60		30	Yes	No
22	Yes	No		Yes	No		Solid-Phase Extraction: HLB type (hydrophilic lipophilic balance)	ACN/MeOH	15		15	No	No
24	Yes	Yes		Yes	Yes			10:89:1 IPA/ACN/Ammonium hydroxide					
25	Yes	Yes		Yes	No		Solid-Phase Extraction: WAX type (weak anion exchange)	MeOH, 3% NH3				Yes	Yes
26	No	NA	100	Yes	No	NA	Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH	240	40	30	No	No
27	Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	MEOH, 1%NH3				No	No
28	Yes	Yes		Yes			Direct Injection					Yes	

Lab. Code	S3 Entire Container Used?	S3 Was the Container Rinsed?	S3 Sample Amount Used (mL)	Labelled Standard Added Before Extraction?	Labelled Standard Directly into Bottle?	Other Sample Pre-treatment?	Extraction Technique	Extraction/Elution Solvent	Extraction Time (min)	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Final pH Adjustment?	Carbon cleanup?
29	No												
30	Yes	Yes		Yes	Yes	Acidification	Solid-Phase Extraction: WAX type (weak anion exchange)	ACN/MeOH in 0.1% NH4OH	40min	Room temp	120min	Yes	No
31	Yes	Yes	n/a	Yes	Yes	None	None	ACN/MeOH	45 min	Room temp	n/a	n/a	None
32	Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH		20		No	No
33	Yes	Yes		Yes	Yes	Measure sample volume by (1) marking the level of the sample on the bottle/tube; or (2) weighing the sample + bottle to the nearest 0.1 gram	Solid-Phase Extraction: WAX type (weak anion exchange)	Basic ACN and Acetone	Varied	40	Approx. 60	No	No
34*	Yes	Yes		Yes	No		Solid-Phase Extraction: WAX type (weak anion exchange)	MeOH, 1% NH3				Yes	Yes

Lab. Code	S3 Entire Container Used?	S3 Was the Container Rinsed?	S3 Sample Amount Used (mL)	Labelled Standard Added Before Extraction?	Labelled Standard Directly into Bottle?	Other Sample Pre-treatment?	Extraction Technique	Extraction/Elution Solvent	Extraction Time (min)	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Final pH Adjustment?	Carbon cleanup?
35	Yes	Yes	NA	Yes	Yes	NA	SPE and Direct injection	Basified Methanol	approx. 60 mins	40°C	approx. 20 mins	No	No
36	Yes	Yes		Yes	Yes		Direct Injection	MeOH	20			Yes	No
37	Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	MeOH, 0.3% NH3	10min	NA	40min	No	No
40			88	Yes			Liquid/liquid	Ethylacetate	30	Room			No

*Additional Information in Table 141. **Some responses may be modified so that the participant cannot be identified.

Table 141 Participant Methodology Sample S3 – Extraction Additional Information

Lab. Code	Extraction Additional Information
34	WAX/GCB was used.

Table 142 Participant Methodology Samples S3 – Instrumental Technique and Analysis

Lab. Code	Instrument	Dilution Factor	Blank Corrected?
1	LC-MSMS or LC-QQQ		No
3	LC-MSMS or LC-QQQ		No
5	LC-MSMS or LC-QQQ		No
6	LC-Orbitrap	0.02	Yes
7	LC-MSMS or LC-QQQ		No

Lab. Code	Instrument	Dilution Factor	Blank Corrected?
8	LC-MSMS or LC-QQQ		No
11	LC-MSMS or LC-QQQ	no	No
14	LC-MSMS or LC-QQQ	No	No
16	LC-MSMS or LC-QQQ		No
17	LC-MSMS or LC-QQQ		No
18	LC-MSMS or LC-QQQ		Yes
19	LC-MSMS or LC-QQQ	No	No
20	LC-MSMS or LC-QQQ	No	Yes
21	LC-MSMS or LC-QQQ	No	No
22	LC-Orbitrap	0.02	Yes
24*	LC-MSMS or LC-QQQ		No
25	LC-MSMS or LC-QQQ		No
26	LC-MSMS or LC-QQQ	NA	No
27	LC-MSMS or LC-QQQ		No
28	LC-MSMS or LC-QQQ	no	No
29	LC-MSMS or LC-QQQ		
30	LC-MSMS or LC-QQQ	No	No
31	LC-MSMS or LC-QQQ	No	No
32	LC-MSMS or LC-QQQ		Yes
33	LC-MSMS or LC-QQQ	0.001	No
34	LC-MSMS or LC-QQQ	No	No
35	LC-MSMS or LC-QQQ	NO	No
36	LC-MSMS or LC-QQQ		No
37	LC-MSMS or LC-QQQ	No	No

Lab. Code	Instrument	Dilution Factor	Blank Corrected?
40	LC-MSMS or LC-QQQ		Yes

*Additional Information in Table 143.

Table 143 Participant Methodology Sample S3 – Instrumental Technique Additional Information

Lab. Code	Instrumental Technique Additional Information
24	In this method the linear standards are used to quantify both the linear as well as the branched isomers

Table 144 Participant Methodology Sample S3 – Labelled Standards

Lab. Code	Labelled Standard Source	Recovery Correction?	Standard Method?	Secondary Standard Source as Check?
1	Wellington	No	In house method based on USEPA method 533	
3	Wellington	Yes		Yes
5	Wellington	Yes	NO	
6	Wellington Laboratories	No		
7	Wellington	No	No	Yes
8	Wellington Laboratories	No	1663	
11	yes	yes	In-house	no
12	Wellington	Yes	No. In-house	Standards of separate lot numbers
13	Wellington Laboratories and Cambridge Isotope Laboratories	Yes		Yes
14	Wellington	Yes		PFAC-24PAR from Wellington
16	Wellington Laboratories	Yes	USEPA 537	
17	Wellington	Yes	NO	
18	Wellington Laboratories	Yes	No	
19	Wellington	Yes	Isotope dilution	No
20	Wellington Labs	Yes	No	Yes

Lab. Code	Labelled Standard Source	Recovery Correction?	Standard Method?	Secondary Standard Source as Check?
21	Wellington Laboratories	Yes		
22	Wellington Laboratories	No		
24	Wellington	Yes		
25	Wellington	Yes		
26	Wellington	Yes	No	No
27	Greyhound, Wellington, TLC, LGC	No	DIN38407-42, UNEP Chemicals Branch 2015	
28	Wellington Labs	No		yes
29	Wellington			
30	Wellington	Yes	In-house	
31	Wellington Laboratories	No	No	No
32	Wellington	Yes	No	YES
33	Wellington	Yes	Isotope Dilution	Yes
34	Wellington			
35	Wellington	Yes	No. In-house	Standards of separate lot numbers
36	Wellington Labs	Yes	ASTM D8421 modified	Yes
37	Wellington	Yes		
40		Yes		Yes

Table 145 Additional Participant Methodology Comments

Lab. Code	Sample	Participant's Comments
26	S3	PFTrDA, PFDS, and 10:2 FTS not reported (NR) due to poor recovery in our QC Sample. NT = Not Tested

Table 146 Labelled Standards for PFBA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFBA	N/A
2	NS	
3	PBA-13C4	Yes
4	NS	
5	PFBA-13C4	
6	Yes	
7	13C4-PFBA	
8	PFBA-13C4	PFBA-13C3
9	NS	
10	NS	
11	13C-PFBA	
12	13C4-PFBA	N/A
13	13C4-PFBA	13C3-PFBA
14	Yes	
15	NS	
16	MPFBA	M3PFBA
17	PFBA-13C4	
18	Yes	
19	13C4-PFBA	13C3-PFBA
20	13C4-PFBA	No
21	13C4-PFBA	
22	Yes	
23		
24	Perfluoro-n-[13C4] butanoic acid MPFBA	Perfluoro-n-[2,3,4-13C4] butanoic acid M3PFBA
25		
26	M4PFBA	NA
27	13C4-PFBA	
28	13C4-PFBA	
29		
30	13C4-PFBA	NA
31	13C4-PFBA	
32	13C-PFBA	
33	13C4-PFBA	
34	MPFBA	
35	13C4-PFBA	N/A
36	M4PFBA	M3PFBA
37	13C3_PFBS.IS 13C3_PFBS.IS	
38	NS	
39	NS	
40	x	

Table 147 Labelled Standards for PFHxA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C5-PFHxA	N/A
2	NS	
3	PFHxA-13C2	Yes
4	NS	
5	PFHxA-13C2	
6	Yes	
7	13C2-PFHxA	
8	PFHxA-13C5	
9	NS	
10	NS	
11	13C-PFHxA	
12	13C2-PFHxA	N/A
13	13C5-PFPxA	13C2-PFHxA
14	Yes	
15	NS	
16	M5PFHxA	M3PFBA
17	PFHxA-13C2	
18	Yes	
19	13C2-PFHxA	13C5 -PFPeA
20	13C5-PFHxA	No
21	13C5-PFHxA	
22	Yes	
23		
24	Perfluoro-n-[1,2,3,4,6-13C5] hexanoic acid M5PFHxA	Perfluoro-n-[1,2-13C5] hexanoic acid MPFHxA
25		
26	M5PFHxA	NA
27	13C5-PFHxA	
28	13C5-PFHxA	
29		
30	13C5-PFHxA	NA
31	13C5-PFHxA	
32	13C-PFHxA	
33	13C2-PFHxA	
34	M5PFHxA	
35	13C2-PFHxA	N/A
36	M5PFHxA	M2PFHxA
37	18O2_PFHxS.IS	
38	NS	
39	NS	
40	x	

Table 148 Labelled Standards for PFOA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOA	N/A
2	NS	
3	PFOA-13C8	Yes
4	NS	
5	PFOA-13C4	PFOA-13C2
6	Yes	
7	13C8-PFOA	
8	PFOA-13C4	PFOA-13C2
9	NS	
10	NS	
11	13C-PFOA	
12	13C4-PFOA	N/A
13	13C8-PFOA	13C4-PFOA
14	Yes	
15	NS	
16	M8PFOA	M2PFOA
17	PFOA-13C4	PFOA-13C2
18	Yes	
19	13C4-PFOA	13C8-PFOA
20	13C8-PFOA	No
21	13C8-PFOA	
22	Yes	
23		
24	Perfluoro-n-[13C8] octanoic acid M8PFOA	Perfluoro-n-[1,2,3,4-13C8] octanoic acid MPFOA
25		
26	M8PFOA	NA
27	13C4-PFOA	
28	13C8-PFOA	
29		
30	13C4-PFOA	NA
31	13C4-PFOA	
32	13C-PFOA	
33	13C8-PFOA	
34	M8PFOA	
35	13C4-PFOA	N/A
36	M8PFOA	M2PFOA
37	13C2_8:2FTS.IS	
38	NS	
39	NS	
40	x	

Table 149 Labelled Standards for PFHxS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFHxS	N/A
2	NS	
3		
4	NS	
5	PFHxS-18O2	PFHxS-13C3
6	Yes	
7	18O2-PFHxS	
8	PFHxS-13C3	PFHxS-18O2
9	NS	
10	NS	
11	13C-PFHxS	
12	18O2-PFHxS	N/A
13	13C3-PFHxS	18O2-PFHxS
14	Yes	
15	NS	
16	M3PFHxS	MPFDA
17	PFHxS-18O2	PFHxS-13C3
18		
19	18O2-PFHxS	13C3-PFHxS
20	13C3-PFHxS-Na	No
21	16O2-PFHxS	
22	Yes	
23		
24	Sodium perfluoro-1-[1,2,3 13C3] hexanesulfonate M3PFHxS	Sodium perfluoro-1- hexane (1O2) sulfonate MPFHxS
25		
26	M3PFHxS	NA
27	18O2-PFHxS	
28	13C3-PFHxS	
29		
30	16O2-PFHxS	NA
31	18O2-PFHxS	
32	13C-PFHxS	
33	18O2-PFHxS	
34	M3PFHxS	
35	18O2-PFHxS	N/A
36	M3PFHxS	18O2 PFHxS
37	13C8_PFOA.IS	
38	NS	
39	NS	
40		

Table 150 Labelled Standards for PFHxS_L

Lab. Code	Before Extraction	Before Instrument Analysis
1	N/A	N/A
2	NS	
3	PFHxS-13C3	Yes
4	NS	
5		
6		
7	18O2-PFHxS	
8		
9	NS	
10	NS	
11	13C-PFHxS	
12	18O2-PFHxS	N/A
13	13C3-PFHxS	18O2-PFHxS
14	Yes	
15	NS	
16	M3PFHxS	MPFDA
17		
18	Yes	
19	18O2-PFHxS	13C3-PFHxS
20	13C3-PFHxS-Na	No
21	Not applicable	
22		
23		
24		
25		
26	M3PFHxS	NA
27	18O2-PFHxS	
28		
29		
30	NT	NA
31	--	
32	13C-PFHxS	
33	18O2-PFHxS	
34		
35	18O2-PFHxS	N/A
36	M3PFHxS	18O2 PFHxS
37	13C5_PFNA.IS	
38	NS	
39	NS	
40	x	

Table 151 Labelled Standards for PFOS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	N/A
2	NS	
3	PFOS-13C4	Yes
4	NS	
5	PFOS-13C4	PFOS-13C8
6	Yes	
7	13C8-PFOS	
8	PFOS-13C8	PFOS-13C4
9	NS	
10	NS	
11	13C-PFOS	
12	13C4-PFOS	N/A
13	13C8-PFOS	13C4-PFOS
14	Yes	
15	NS	
16	M8PFOS	MPFOS
17	PFOS-13C4	PFOS-13C8
18		
19	13C4-PFOS	13C8-PFOS
20	13C8-PFOS-Na	No
21	13C4-PFOS	
22	Yes	
23		
24	Sodium perfluoro-1-[13C8] ocatanesulfonate M8PFOS	Sodium perfluoro-1-[1,2,3,4-13C4] ocatanesulfonate MPFOS
25		
26	M8PFOS	NA
27	13C8-PFOS	
28	13C8-PFOS	
29		
30	13C8-PFOS	NA
31	13C8-PFOS	
32	13C-PFOS	
33	13C8-PFOS	
34	M8PFOS	
35	13C4-PFOS	N/A
36	M8PFOS	MPFOS
37	13C2_PFUdA.IS	
38	NS	
39	NS	
40		

Table 152 Labelled Standards for PFOS_L

Lab. Code	Before Extraction	Before Instrument Analysis
1	N/A	N/A
2	NS	
3	PFOS-13C4	Yes
4	NS	
5		
6		
7	13C8-PFOS	
8		
9	NS	
10	NS	
11	13C-PFOS	
12	13C4-PFOS	N/A
13	13C8-PFOS	13C4-PFOS
14	Yes	
15	NS	
16	M8PFOS	MPFOS
17		
18	Yes	
19	13C4-PFOS	13C8-PFOS
20	13C8-PFOS-Na	No
21	13C8-PFOS	
22		
23		
24		
25		
26	M8PFOS	NA
27	13C8-PFOS	
28		
29		
30	NT	NA
31	13C8-PFOS	
32	13C-PFOS	
33	13C8-PFOS	
34		
35	13C4-PFOS	N/A
36	M8PFOS	MPFOS
37	13C2_PFDoA.IS	
38	NS	
39	NS	
40	x	

Table 153 Labelled Standards for PFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOSA	N/A
2	NS	
3	PFOSA-13C8	Yes
4	NS	
5	FOSA-13C8	
6	Yes	
7	13C8-FOSA	
8	FOSA-13C8	
9	NS	
10	NS	
11	13C-PFOSA	
12	13C8-FOSA	N/A
13	13C8-PFOSA	
14	Yes	
15	NS	
16	M8FOSA-I	MPFDA
17	FOSA-13C8	
18	Yes	
19	13C8-FOSA	
20	13C8-FOSA	No
21	13C8-FOSA	
22	Yes	
23		
24	N-methyl-d3-perfluoro-1-octancesulfonamide M8FOSA	
25		
26	MPFOSA	NA
27	13C8-PFOSA	
28	13C8PFOSA	
29		
30	13C8-FOSA	NA
31	13C8-FOSA	
32	13C-PFOSA	
33	13C8-FOSA	
34	M8FOSA	
35	13C8-FOSA	N/A
36	M8PFOS	MPFOS
37	13C8_PFOSA.IS	
38	NS	
39	NS	
40	x	

Table 154 Labelled Standards for 6:2FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-6:2FTS	N/A
2	NS	
3	6:2 FTS-13C2	Yes
4	NS	
5	6:2FTS-13C2	
6	Yes	
7	13C2-6-2 FTS	
8	6:2 FTS-13C2	
9	NS	
10	NS	
11	13C-8:2 FTS	
12	13C2,12C6 6:2-FTS	N/A
13	13C2-6:2FTS	
14	Yes	
15	NS	
16	M2-6:2 FTS	MPFOS
17	6:2FTS-13C2	
18	Yes	
19	13C2-6:2 FTS	
20	13C2-6:2 FTS-Na	No
21	13C2-6:2 FTS	
22	Yes	
23		
24	Sodium 1H,1H,2H,2H-perfluoro1-[1,2-13C2]-octane sulfonate M2-6:2FTS	
25		
26	M6:2 FTS	NA
27	13C2-6:2FTS	
28	13C2-6:2-FTSA	
29		
30	13C2-6:2 FTS	NA
31	13C2-6:2 FTS	
32	13C-6:2FTS	
33	13C2-6-2 FTS	
34	M2-6,2FTS	
35	13C2,12C6 6:2-FTS	N/A
36	M2-6:2 FTS	18O2 PFHxS
37	13C2_6:2FTS.IS	
38	NS	
39	NS	
40	x	

A6.3 Participants' Test Methods for Sample S4

Table 155 Participant Methodology Sample S4 (Short Chain PFAS) – Extraction**

Lab. Code	S4 Short Chain PFAS Entire Container Used?	S4 Short Chain PFAS Was the Container Rinsed?	S4 Short Chain PFAS Sample Amount Used (mL)	Labelled Standard Added Before Extraction?	Labelled Standard Directly into Bottle?	Other Sample Pre-treatment?	Extraction Technique	Extraction/Elution Solvent	Extraction Time (min)	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Final pH Adjustment?	Carbon cleanup?
1	Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	ACN/MeOH in 0.1% NH4OH	2 hours	40	2 hours	NA	NA
3	No		1 ml				Direct Injection					No	No
4	no	no	5ml	no	no	no	na	na	na	na	no	no	no
6	No		50	Yes	No		Solid-Phase Extraction: HLB type (hydrophilic lipophilic balance)	ACN/MeOH	15		15	No	No
7	No	NA	10mL	Yes	No		Solid-Phase Extraction: WAX type (weak anion exchange)	Basic ACN and Acetone	15	45	35	No	No
8	Yes	Yes	NA	No	No	NA	Filtration	0.2% AcOH in MeOH	NA	NA	NA	No	NA
11	Yes	Yes		No			Solid-Phase Extraction: WAX type (weak anion exchange)	NH4OH/ MeOH	120	45	30	No	Yes
13*	No		10 mL (PFOA and PFBA) 1 mL for TFA	Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	MeOH, 0.3% NH3					
14	Yes	Yes		Yes	Yes		Solid-Phase Extraction: WAX type (weak anion exchange)	Basic ACN and Acetone	20mins	40 °C	30mins	No	No

Lab. Code	S4 Short Chain PFAS Entire Container Used?	S4 Short Chain PFAS Was the Container Rinsed?	S4 Short Chain PFAS Sample Amount Used (mL)	Labelled Standard Added Before Extraction?	Labelled Standard Directly into Bottle?	Other Sample Pre-treatment?	Extraction Technique	Extraction/Elution Solvent	Extraction Time (min)	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Final pH Adjustment?	Carbon cleanup?
15	No	No	2.5mL			syringe filtration, 50% MeOH dilution	Direct Injection	Eluent A: 0.5mM ammonium formate in DIW, Eluent B: ACN				No	No
19	No		0.8	Yes	No		Direct Injection					No	No
21	No		1mL	Yes	No		Direct Injection	MeOH	20	NA	NA	NA	No
22	No		50	Yes	No		Solid-Phase Extraction: HLB type (hydrophilic lipophilic balance)	ACN/MeOH	15		15	No	No
25	Yes	Yes		Yes	NA		Solid-Phase Extraction: WAX type (weak anion exchange)	MeOH, 3% NH3				Yes	Yes
27	No		0.96	Yes	No		Direct Injection					No	No
29	Yes	No		No	No								
31	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
32	No		50	Yes	No		Phenomenex Strata PFAS (WAX/GCB) 200mg	MEOH + NH4OH/ MeOH		NA	NA	NA	NA
36	Yes	Yes		No	No		Direct Injection	MeOH	20			Yes	No

*Additional Information in Table 156. **Some responses may be modified so that the participant cannot be identified.

Table 156 Participant Methodology Sample S4 (Short Chain PFAS) – Extraction Additional Information

Lab. Code	Extraction Additional Information
13	TFA analysis was by direct injection. No extraction technique used.

Table 157 Participant Methodology Samples S4 (Short Chain PFAS) – Instrumental Technique and Analysis

Lab. Code	Instrument	Dilution Factor	Blank Corrected?
1	LC-MSMS or LC-QQQ		No
3	LC-MSMS or LC-QQQ		No
4	UPLC-Triple Quadrupole Mass Spectrometer	no	yes
6	LC-Orbitrap	0.02	No
7	LC-MSMS or LC-QQQ		No
8	LC-MSMS or LC-QQQ	No	Yes
11	LC-MSMS or LC-QQQ	no	No
13	LC-MSMS or LC-QQQ		No
14	LC-MSMS or LC-QQQ	No	No
15*	LC-MSMS or LC-QQQ	2	No
19	LC-MSMS or LC-QQQ	No	No
21	LC-MSMS or LC-QQQ	No	No
22	LC-Orbitrap	0.02	No
25	LC-MSMS or LC-QQQ		No
27	LC-MSMS or LC-QQQ		No
29	Various black box type analysers based on combustion		Yes
31	NA	NA	NA
32	LC-MSMS or LC-QQQ	No	Yes
36	LC-MSMS or LC-QQQ		No

*Additional Information in Table 158.

Table 158 Participant Methodology Sample S4 (Short Chain PFAS) – Instrumental Technique Additional Information

Lab. Code	Instrumental Technique Additional Information
15	Dynamic MRM

Table 159 Participant Methodology Sample S4 (Short Chain PFAS) – Labelled Standards

Lab. Code	Labelled Standard Source	Recovery Correction?	Standard Method?	Additional Information
1	Wellington	No	In house method based on USEPA method 533	
4	Wellington laboratory	no		
6	Wellington Laboratories	No		
7	Wellington	No	No	
8	Wellington Laboratories	No		
11	yes	no		
13	Wellington Laboratories and Cambridge Isotope Laboratories	NA		PFOA was present in the sample S4. The labelled standard added before extraction was 13C8-PFOA
14	Wellington	Yes		
15	Wellington			
19	Wellington	Yes	Isotopic dilution	
21	Wellington Laboratories	Yes		
22	Wellington Laboratories	No		
27	TLC, LGC	No		
31	NA	NA	NA	NA
32	Wellington	Yes	No	
36	Wellington Labs	Yes	ASTM D8421 modified	

Table 160 Additional Participant Methodology Comments

Lab. Code	Sample	Participant's Comments
13	S4	PFOA (31.11 µg/L) was detected in Sample S4 and MU ± 5.5 µg/L. Recovery of labelled standard before extraction - 120%

Table 161 Labelled Standards for PFPrA

Lab. Code	Before Extraction	Before Instrument Analysis
1	NA	N/A
2	NS	
3		
4	no	no
5		
6		
7	NA	
8		
9		
10	NS	
11	13C-PFBA	
12		
13		
14	NT	
15		13C8-PFOA
16		
17		
18		
19	13C4-PFBA	
20	NS	
21	13C2 PFPrA	
22		
23		
24		
25		
26	NS	
27	13C3-PFPrA	
28		
29		
30		
31	NA	NA
32	13C-PFPrA	
33	NS	
34	NS	
35		
36	-	-
37	NS	
38	NS	
39	NS	
40		

Table 162 Labelled Standards for TFMS

Lab. Code	Before Extraction	Before Instrument Analysis
1	N/A	N/A
2	NS	
3		
4	no	no
5		
6		
7	NA	
8		
9		
10	NS	
11	13C-PFBS	
12		
13		
14	NT	
15		13C8-PFOS
16		
17		
18		
19		
20	NS	
21	13C3-PFBS	
22		
23		
24		
25		
26	NS	
27	none	
28		
29		
30		
31	NA	NA
32	13C-PFBS	
33	NS	
34	NS	
35		
36	-	-
37	NS	
38	NS	
39	NS	
40		

Table 163 Participant Methodology Sample S4 (Adsorbable Organic Fluorine)

Lab. Code	S4 AOF Sample Diluted?	S4 AOF Sample Volume Used (mL)	pH Adjustment?	AC Column Pre-rinsed?	AC Column Rinsing Solution	Combustion Time (mins)	Combustion Temperature (°C)	Adsorption Buffer Solution Used	IC Eluent	IC Column	Reference Method
7	No	44.781mL	No	No	NaNO3	5	1050	diH2O	Na2CO3/NaHCO3 mixture	Metrosep A Supp 5 - 150/4.0	No
11	Yes	100mL	No	No		6 minutes	1050°C	Water	Na2CO3/NaHCO3 mixture		ISO 18127
29	No	50mL	No	Yes	NaNO3	7	1050	DI water	Na2CO3/NaHCO3 mixture	Metrosep A Sup 5 150x4mm 5.0um	DIN 38409-59

Table 164 Participant Methodology Sample S4 (Extractable Organic Fluorine)

Lab. Code	S4 EOF Sample Diluted?	S4 EOF Sample Volume Used (mL)	pH Adjustment?	Extraction Technique	Washing Solution After Loading into Cartridge	SPE Cartridge Drying Time (min)	Extraction/Elution Solution	Eluent Pre-soak Time (min)	Eluent volume (mL)	Combustion Time (min)	Combustion Temperature (°C)	Adsorption Buffer Solution Used	IC Eluent	IC Column	Reference Method
11	No	50 mL	No	Solid-Phase Extraction: WAX type with GCB (extra layer of graphitised carbon black)	Yes		NH4OH/ MeOH		5 mL	5 min	1050 °C	H2O	Na2CO3/ NaHCO3 mixture	Metrosep A Supp 5 - 150/4,0	

Lab. Code	S4 EOF Sample Diluted?	S4 EOF Sample Volume Used (mL)	pH Adjustment?	Extraction Technique	Washing Solution After Loading into Cartridge	SPE Cartridge Drying Time (min)	Extraction/Elution Solution	Eluent Pre-soak Time (min)	Eluent volume (mL)	Combustion Time (min)	Combustion Temperature (°C)	Adsorption Buffer Solution Used	IC Eluent	IC Column	Reference Method
29	No	25	No	Solid-Phase Extraction: WAX type (weak anion exchange)	Yes	10 min	MeOH, 0.3% NH3		2.5mL	7	1050	DI water	Na2CO3/ NaHCO3 mixture	Metrosep A Sup 5 150x4mm 5.0um	Internal Method

Table 165 Participant Methodology Sample S4 (Total Fluorine)

Lab. Code	S4 TF Method	S4 TF Instrument	Reference Method
7	Ion Chromatographic Method	IC	
11	Ion Chromatographic Method	IC	
29	Ion Chromatographic Method	Combustion IC	

APPENDIX 7 ACRONYMS AND ABBREVIATIONS

10:2FTOH	2-Perfluorodecyl ethanol
10:2FTS	1H, 1H, 2H, 2H-perfluorododecane sulfonate
11Cl-PF3OUdS	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
3:3FTCA	3-perfluoropropyl propanoic acid, FPrPA
4:2FTS	1H, 1H, 2H, 2H-perfluorohexane sulfonate
5:3FTCA	2H, 2H, 3H, 3H-perfluorooctanoic acid
6:2diPAP	Bis[2-(perfluorohexyl)ethyl]phosphate
6:2FTOH	2-Perfluorohexyl ethanol
6:2FTS	1H, 1H, 2H, 2H-perfluorooctane sulfonate
7:3FTCA	3-perfluoroheptyl propanoic acid, FHpPA
8:2diPAP	Bis[2-(perfluorooctyl)ethyl]phosphate, Fluorotelomer phosphate diester
8:2FTOH	2-Perfluorooctyl ethanol
8:2FTS	1H, 1H, 2H, 2H-perfluorodecane sulfonate
9Cl-PF3ONS	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid
ACN	Acetonitrile
ADONA	Ammonium 4,8-dioxa-3H-perfluorononanoate
AV	Assigned Value
CITAC	Cooperation on International Traceability in Analytical Chemistry
CRM	Certified Reference Material
CV	Coefficient of Variation
DI	Direct Injection
EPA	Environment Protection Authority
EtFOSA	N-Ethyl perfluorooctane sulfonamide
EtFOSAA	N-Ethyl perfluorooctane sulfonamido acetic acid
EtFOSE	N-Ethyl perfluorooctane sulfonamidoethanol
FOUEA	2H-Perfluoro-2-decenoic acid (8:2 FTUCA)
FOSA	Perfluoro-1-octanesulfonamide
GenX	Ammonium 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy) propanoate
GUM	Guide for Uncertainty Measurement
HV	Homogeneity Value
IDA	Isotope Dilution Analysis
IEC	International Electrotechnical Commission
ISO	International Standards Organisation
ISTD	Internal Standard
LC	Liquid Chromatography
LLE	Liquid-Liquid Extraction
LOR	Limit of Reporting
Max	Maximum

Md	Median
MeFOSA	N-Methyl perfluorooctane sulfonamide
MeFOSAA	N-Methyl perfluorooctane sulfonamidoacetic acid
MeFOSE	N-Methyl perfluorooctane sulfonamidoethanol
MeOH	Methanol
MeOH/Base	Base modified methanol
Min	Minimum
MS	Mass Spectrometry
MSMS	Tandem Mass Spectrometry
MU	Measurement Uncertainty
N	Number of numeric results
NATA	National Association of Testing Authorities, Australia
NFDHA	Perfluoro-3,6-dioxaheptanoic acid
NMIA	National Measurement Institute Australia
NR	Not Reported
NS	Not Supplied
NT	Not Tested
PCV	Performance Coefficient of Variation
PFAA	Perfluoroalkyl acids
PFAS	Per- and poly fluorinated alkyl substances
PFBA	Perfluoro-n-butanoic acid
PFBS	Potassium perfluoro-1-butanesulfonate
PFCA	Perfluorinated carboxylic acids
PFDA	Perfluoro-n-decanoic acid
PFDoA	Perfluorododecanoic acid
PFDoS	Perfluorododecane sulfonate
PFDS	Perfluorodecane sulfonate
PFECA	Perfluoroalkyl ether carboxylic acid
PFECHS	Potassium perfluoro-4-ethylcyclohexanesulfonate
PFEESA	Potassium perfluoro(2-ethoxyethane)sulfonate
PFESA	Polyfluorinated ether sulfonic acid
PFEtS	Sodium perfluoroethanesulfonate
PFHpA	Perfluoro-n-heptanoic acid
PFHpS	Perfluoroheptane sulfonate
PFHxA	Perfluoro-n-hexanoic acid
PFHxDA	Perfluorohexadecanoic acid
PFHxS	Potassium perfluorohexanesulfonate
PFHxS_L	Potassium perfluorohexanesulfonate linear
PFMBA	Perfluoro-5-oxahexanoic acid
PFMPA	Perfluoro-4-oxapentanoic acid

PFNA	Perfluoro-n-nonanoic acid
PFNS	Perfluorononane sulfonate
PFOA	Perfluorooctanoic acid
PFODA	Perfluorooctadecanoic acid
PFOS	Perfluorooctane sulfonate
PFOS_L	Perfluorooctane sulfonate linear
PFOSA	Perfluoro-1-octanesulfonamide
PFPeA	Perfluoro-n-pentanoic acid
PFPeS	Perfluoropentane sulfonate
PFPrA	Perfluoropropanoic acid
PFPrS	Sodium perfluoro-1-propanesulfonate
PFSA	Perfluorosulfonic acid
PFTeDA	Perfluorotetradecanoic acid
PFTrDA	Perfluorotridecanoic acid
PFTrDS	Perfluorotridecane sulfonate
PFUdA	Perfluoroundecanoic acid
PFUdS	Perfluoroundecane sulfonate
PT	Proficiency Test
PTFE	Polytetrafluoroethylene
Q	Quadrupole mass analyser
QC	Quality Control
QQQ	Triple Quadrupole (mass spectrometry)
QuEChERS	Quick, Easy, Cheap, Effective, Rugged and Safe extraction method
RA	Robust Average
RM	Reference Material
Robust CV	Robust Coefficient of Variation
Robust SD	Robust Standard Deviation
SD	Standard Deviation
SLE	Solid-Liquid Extraction
SPE	Solid Phase Extraction
SS	Spiked Samples
SV	Spiked or formulated concentration of a PT sample (Spike Value)
SDPA	Standard Deviation for Proficiency Assessment
TFA	Trifluoroacetic acid
USEPA	United States Environmental Protection Agency

END OF REPORT