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National Measurement Institute

Proficiency Test Final Report
AQA 22-13
PFAS in Soil and Water

February 2023

ACKNOWLEDGMENTS

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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.

The assistance of the following NMI staff members in the planning, conduct and reporting of the study is acknowledged.

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NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17043

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SUMMARY

This report presents the results of the proficiency test AQA 22-13 PFAS in Soil and Water. This study is focused on the measurement of 32 per- and polyfluorinated alkyl substances (PFAS): PFBS, PFPeS, PFHxS, PFHpS, PFOS, PFNS, PFDS, PFDoS, PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFNA, PFDA, PFUdA, PFDoA, PFTrDA, PFTeDA, PFOSA, MeFOSA, EtFOSA, MeFOSE, EtFOSE, 6:2 FTS, 8:2 FTS, GenX, ADONA, 9Cl-PF3ONS and 11Cl-PF3OUdS in soil and water. The measurement of PFOS total and PFOS linear (PFOS_L) as well as of PFHxS total and PFHxS linear (PFHxS_L) were also included in the program.

Thirty-eight laboratories participated and thirty-six submitted results.

Four test samples were prepared at the NMI North Ryde laboratory and consisted of:

- two soil samples: Sample S1 with incurred PFAS contaminants, and Sample S2 spiked with 27 individual PFAS components; and
- two water samples: Sample S3 with incurred PFAS contaminants, and Sample S4 spiked with 28 individual PFAS components.

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

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

i. compare the performances of participant laboratories and to assess their accuracy in the measurement of PFAS in soil and water;

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

Of 2006 z-scores, 1833 (91%) returned $|z| \leq 2.0$, indicating a satisfactory performance.

Of 2006 E_n-scores, 1620 (81%) returned $|E_n| \leq 1.0$, indicating agreement of the participant's result with the assigned value within their respective expanded uncertainties.

No laboratories reported results for all of the analytes for which z-scores were calculated (80). Laboratory **27** returned the highest number of satisfactory z-scores (78 out of 79). All results reported by laboratories **18** (75), **6** (75), **37** (74), **16** (62), **19** (59), **35** (55), **20** (55), **31** (54), **24** (45), **17** (34), **4** (34), **2** (27), **7** (18) and **25** (2) returned satisfactory z-scores.

Laboratory **27** had the highest number of satisfactory E_n-scores (76 out of 79). Laboratories **2**, **3**, **7**, **18**, **19**, **25** and **35** returned satisfactory E_n-scores for all analytes reported.

ii. evaluate the laboratories' methods for PFAS in soil and water analysis;

Calculation errors and/or problems with standard or sample preparation procedure are an important cause of unsatisfactory results

Four laboratories reported at least one PFAS analyte that was not spiked into the test samples by the study coordinator.

The measurement of PFNS and PFDS in soil samples with high PFOS content presents difficulties to laboratories who use PFOS as their mass-labelled internal standard for these tests.

Althought a limited number of laboratories have the capability to measure PFDoS in water, the results reported were in good agreement with each other, with a between-laboratory CV of only 10%.

Due to the limited amount of data and wide variety of analytical methods used, no significant trends in extraction or sample preparation procedures could be identified.

iii. compare the performance of participant laboratories with their past performance;

Over the last 7 years, laboratories have developed methods for the analysis of a wide spectrum of PFAS contaminants and in general the reported results have been compatible with each other. Over this period, the average proportion of satisfactory scores was 88% for z-scores and 77% for E_n-scores.

iv. develop the practical application of traceability and measurement uncertainty and provide participants with information that will be useful in assessing their uncertainty estimates.

Of 2078 numerical results, 1992 (96%) were reported with an associated estimate of expanded measurement uncertainty.

A large number of laboratories still report potentially unrealistically small or large relative uncertainties for routine PFAS. The magnitude of the reported expanded uncertainties was within the range 0% to 262% of the reported value. Additionally, some laboratories are still reporting numeric estimates of uncertainties for non-numeric results

v. 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.

A reference material for PFAS analytes in soil (MX019) is also available for sale from NMI.

1 INTRODUCTION

1.1 NMI Proficiency Testing Program

The National Measurement Institute (NMI) 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 comparison.'[1] NMI PT studies target chemical testing in areas of high public significance such as trade, environment, law enforcement and food safety. NMI offers studies in:

- pesticide residues in fruit and vegetables, soil and water;
- petroleum hydrocarbons in soil and water;
- PFAS in soil, water, biota and food;
- inorganic analytes in soil, water, food and pharmaceuticals; and
- controlled drug assay.

1.2 Study Aims

The aims of the study were to:

- compare the performances of participant laboratories and assess their accuracy in the measurement of PFAS in soil and water matrices;
- evaluate the laboratories' test methods;
- develop the practical application of traceability and measurement uncertainty and provide participants with information that will be useful in assessing their uncertainty estimates; and
- produce materials that can be used in method validation and as control samples.

1.3 Study Conduct

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

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

2 STUDY INFORMATION

2.1 Study Timetable

The timetable of the study was:

Invitation issued	8 August 2022
Samples dispatched	30 August 2022
Results due	21 October 2022
Interim report issued	28 October 2022

2.2 Test Material Preparation

Four test samples were provided for analysis.

- Two soil samples S1 and S2 each containing 20 g:
    - Sample S1 containing incurred PFAS contaminants; and

    - Sample S2 spiked with 27 individual PFAS components.
- Two water samples S3 and S4 each containing 2 x 50 mL:
    - Sample S3 containing incurred PFAS contaminants; and
    - Sample S4 milli-Q water spiked with 28 individual PFAS components.
- The bulk water sample S4 was spiked with 20 analytes using a composite solution that was then mixed and dispensed into 65 mL HDPE bottles. Each bottle was then further spiked with a composite solution containing PFUdA, PFDoA, PFTrDA, PFTeDA, PFDoS, and PFOSA, with the aim of minimising the loss of these analytes during preparation (see details in Appendix 1).
- The analytical standards used for spiking these samples were purchased from HPC Standards GmbH, Toronto Research Chemicals, Wellington Laboratories Canada and Sigm-Aldrich.
- Details of the spiked analytes and levels are presented in Table 1 and sample preparation details in Appendix 1.

Table 1 Formulated concentrations of test samples

PFAS	S2 Soil (Spiked) µg/kg	S4 Water (Spiked) µg/L
PFBS*	15.0	0.0504
PFPeS*	16.0	0.0327
PFHxS*	7.27	0.0378
PFHxS_L*	7.27	0.0378
PFHpS*	6.94	0.0248
PFOS*	2.87	0.0334
PFOS_L*	2.87	0.0334
PFNS*	0.960	0.0288
PFDS*	Not Spiked	0.0817
PFDoS*	Not Spiked	0.0774
PFBA	11.1	0.0696
PFPeA	7.20	0.0298
PFHxA	8.98	0.0401
PFHpA	1.02	0.0374
PFOA	10.1	0.0250
PFNA	4.14	0.400
PFDA	15.1	0.00993
PFUdA	Not Spiked	0.0795
PFDoA	15.1	0.0500
PFTrDA	Not Spiked	0.151
PFTeDA	15.0	0.100
PFOSA	6.02	0.0813
MeFOSA	5.00	Not Spiked
EtFOSA	7.00	Not Spiked
MeFOSE	15.1	Not Spiked
EtFOSE	10.0	Not Spiked

PFAS	S2 Soil (Spiked) µg/kg	S4 Water (Spiked) µg/L
6:2 FTS*	4.74	0.0758
8:2 FTS*	Not Spiked	0.0766
GenX	15.1	0.0600
ADONA*	28.4	0.0754
9Cl-PF3ONS*	9.36	0.0931
11Cl-PF3OUdS*	24.9	0.0941

* Values for these analytes are the anion concentration.

2.3 Participation

Thirty-eight laboratories participated in this study, and thirty-six submitted results. Laboratory **36** did not report results and Laboratory **12** cancelled their participation.

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 soil and water samples. These samples were prepared and packaged using a process that has been demonstrated to produce homogeneous and stable samples in previous NMI PFAS PTs. Participants' results gave no reason to question the homogeneity and stability of the previously used analytes.

However, there were stability issues in this study with regards to GenX in S2. Possible reasons for the instability of this analyte are presented in section 6.7. Althought the results reported for GenX in S2 were compatible with each other no assigned value was set for this test because the robust average of participants' results was only 38% of the spiked value.

A low recover of the spiked value was also noticed for 11Cl-PF3OUdS in S4, of only 48% , indicating possible stability issue. However no relationship between the reported results and the the date when the sample was received or analysed was evident. The reported results were variable and no assigned value was set for this analyte either.

2.5 Sample Storage, Dispatch and Receipt

Prior to dispatch, soil and water samples were refrigerated at 4ºC.

Participants were sent 20 g soil in Greiner tubes for each of Samples S1 and S2, and two 50 mL water in HDPE bottles for each of Samples S3 and S4. The samples were packed in a foam box with a cooler brick and sent by courier on 30 August 2022.

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 e-mailed to 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/kg on an as received basis for PFAS in soil samples S1 and S2, and in units of µg/L for PFAS water Samples S3 and S4.
- For water samples S3 and S4, use the entire content of the bottle for analysis. The second bottle is provided for repeat analysis.

- 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).
- The analytes range for PFAS in S1 is 0-5000 µg/kg, in S2 is 0-200 µg/kg, in S3 is 0-25 µg/L, and in S4 is 0-50 µg/L.
- 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 (e.g. 0.50 ± 0.02 µg/kg), 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 estimates as required by the results sheet.
- If determined, report your internal standard percentage recovery. This will be presented in the report for information only.
- Return the completed results sheet by e-mail (proficiency@measurement.gov.au) by 7 October 2022. Late results may not be included in the study report.

Due to the exceptional international circumstances occurring over the course of this study, the results due date was extended to 21 October 2022 for all participants.

2.7 Interim Report

An interim report was emailed to all participants on 28 October 2022.

3 PARTICIPANT LABORATORY INFORMATION

3.1 Test Methods Reported by Participants

Participants were requested to provide methodology information. Responses are presented in Appendix 5 for soil and Appendix 6 for water. The study coordinator thanks participants for completing the questionnaire.

3.2 Basis of Participants' Measurement Uncertainty Estimates

Participants were requested to provide information about their basis of measurement uncertainty (MU). Responses are presented in Tables 2 and 3.

Table 2 Basis of Participants' Uncertainty Estimate

Lab. Code	Approach to Estimating MU	Information Sources for MU Estimation*		Guide Document for Estimating MU
		Precision	Method Bias	
1	Top Down - precision and estimates of the method and laboratory bias	Control samples - CRM Duplicate analysis Instrument calibration	CRM Instrument calibration	Eurachem/CITAC Guide
2	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS	Laboratory bias from PT studies Recoveries of SS	Eurachem/CITAC Guide
3	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS	Recoveries of SS	NATA - Estimating and reporting MU of chemical test results.
4	Standard deviation of replicate analyses multiplied by 2 or 3	Duplicate analysis	Recoveries of SS	Eurachem/CITAC Guide
5	Standard deviation of replicate analyses multiplied by 2 or 3	Duplicate analysis Instrument calibration	CRM Instrument calibration Laboratory bias from PT studies Recoveries of SS Standard purity	ISO/GUM
6[a]	Standard deviation of replicate analyses multiplied by 2 or 3	Control samples - SS	Recoveries of SS	USEPA SW-846
7		Control samples - SS	CRM Recoveries of SS	NMI Uncertainty Course
8[a]	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS Duplicate analysis	Laboratory bias from PT studies Recoveries of SS	CMA/6/B (Soil) and WAC/VI/A/002 (Water)
9	Bottom Up (ISO/GUM, fish bone/cause and effect diagram)	Duplicate analysis	CRM	ISO/GUM
10[a]	Standard deviation of replicate analyses multiplied by 2 or 3	Control samples - SS		
11[a]	Top Down - precision and estimates of the method and laboratory bias	Control samples Duplicate analysis Instrument calibration	CRM Instrument calibration Laboratory bias from PT studies	

Lab. Code	Approach to Estimating MU	Information Sources for MU Estimation*		Guide Document for Estimating MU
		Precision	Method Bias	
			Recoveries of SS Standard purity	
13	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS Duplicate analysis Instrument calibration	CRM Instrument calibration Recoveries of SS	ISO/GUM
14		Control samples - CRM	CRM Recoveries of SS	ASTM E2254-13
15[a]	Professional judgment	Control samples - SS Duplicate analysis	CRM Recoveries of SS	
16	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS Duplicate analysis Instrument calibration	CRM	NMI Uncertainty Course
17	Top Down - reproducibility (standard deviation) from PT studies used directly	Control samples - SS	Instrument calibration	
18	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS		NATA - Estimating and reporting MU of chemical test results.
19	Top Down - precision and estimates of the method and laboratory bias	Control samples - RM Duplicate analysis		Eurachem/CITAC Guide
20[a]	Standard deviation of replicate analyses multiplied by 2 or 3	Control samples - SS		ISO/GUM
21	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS Duplicate analysis	Instrument calibration Recoveries of SS	ISO/GUM
22	Professional judgment	Control samples - RM Duplicate analysis Instrument calibration	Instrument calibration Laboratory bias from PT studies Recoveries of SS	
23	Bottom Up (ISO/GUM, fish bone/cause and effect diagram)	Control samples Duplicate analysis Instrument calibration	CRM Instrument calibration Recoveries of SS	Eurachem/CITAC Guide
24[a]	Standard deviation of replicate analyses multiplied by 2 or 3	Control samples - SS Duplicate analysis Instrument calibration	CRM Instrument calibration Recoveries of SS Standard purity	NATA GAG Estimating and Reporting MU
25	Bottom Up (ISO/GUM, fish bone/cause and effect diagram)	Duplicate analysis Instrument calibration	Instrument calibration Recoveries of SS	ISO/GUM
26	Top Down - precision and estimates of the method and laboratory bias	Control samples Duplicate analysis Instrument calibration	Instrument calibration Laboratory bias from PT studies	

Lab. Code	Approach to Estimating MU	Information Sources for MU Estimation*		Guide Document for Estimating MU
		Precision	Method Bias	
27[a]	Top Down - precision and estimates of the method and laboratory bias	Control samples - CRM Duplicate analysis Instrument calibration	CRM Instrument calibration Recoveries of SS	
28	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS Duplicate analysis Instrument calibration	Instrument calibration Recoveries of SS Standard purity	Eurachem/CITAC Guide
29	Standard deviation of replicate analyses multiplied by 2 or 3			NATA GAG Estimating and Reporting MU (replaced Technical Note 33)
30	Standard deviation of replicate analyses multiplied by 2 or 3	Duplicate analysis	Recoveries of SS	ISO/GUM
31	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS Duplicate analysis	CRM Recoveries of SS	Eurachem/CITAC Guide
32	Top Down - precision and estimates of the method and laboratory bias	Control samples - CRM	CRM	ISO/GUM
33	Standard deviation of replicate analyses multiplied by 2 or 3	Standard deviation from PT studies only		Eurachem/CITAC Guide
		Control samples - SS Duplicate analysis Instrument calibration	Instrument calibration Recoveries of SS	
34	Standard deviation of replicate analyses multiplied by 2 or 3	Standard deviation from PT studies only		ISO/GUM
35[a]	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS Duplicate analysis	Instrument calibration Laboratory bias from PT studies Recoveries of SS	Eurachem/CITAC Guide
37[a]	Standard deviation of replicate analyses multiplied by 2 or 3	Control samples - Spiked blank matrix (LCS)		SW846
38	Standard deviation of replicate analyses multiplied by 2 or 3	Duplicate analysis	Recoveries of SS	Nordtest Report TR537

*SS = Spiked Samples, RM = Reference Material, CRM = Certified Reference Material. [a]Additional Information in Table 3

Table 3 Uncertainty Estimate Comments

Lab Code	Approach to Estimating MU
6	Standard Practice for laboratories utilizing US EPA's SW-846 document.
8	Measurement uncertainty for water samples is not reported because a re-validation of the method is ongoing.
10	Measurement Uncertainty (U) estimated from the standard deviation (u) of replicate recovery samples using the expression U = 2 x u. Procedure as set out in Statistics and Chemometrics for Analytical Chemistry, Miller and Miller, 5th Edition
11	NATA GAG Estimating and Reporting MU (replaced Technical Note 33)

15	NEN 7777, Environment and food - Performance characteristics of measurement methods
20	The expanded measurement uncertainty values were calculated using a coverage factor (K) value of 2.00 and at the 95% confidence limit.
24	Recovery and uncerainty data given for analytes at method limit of reporting.
27	Control Charts
35	MU is calculated based on historic QC data
37	Standard practice for laboratories utilizing US EPA's SW-846 document.

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 4, along with the study coordinator's response where appropriate.

Table 4 Participants' Comments

Lab Code	Participants' Comments	Study manager's response
10	It would be great to have AQA NMI proficiency for dairy products.	Thank you for your feedback

4 PRESENTATION OF RESULTS AND STATISTICAL ANALYSIS

4.1 Results Summary

Participant results are listed in Tables 5 to 88 with resultant summary statistics: robust average, median, maximum, minimum, robust standard deviation (SDrob) and robust coefficient of variation (CVrob). Bar charts of results and performance scores are presented in Figures 2 to 85. An example chart with interpretation guide is shown in Figure 1.

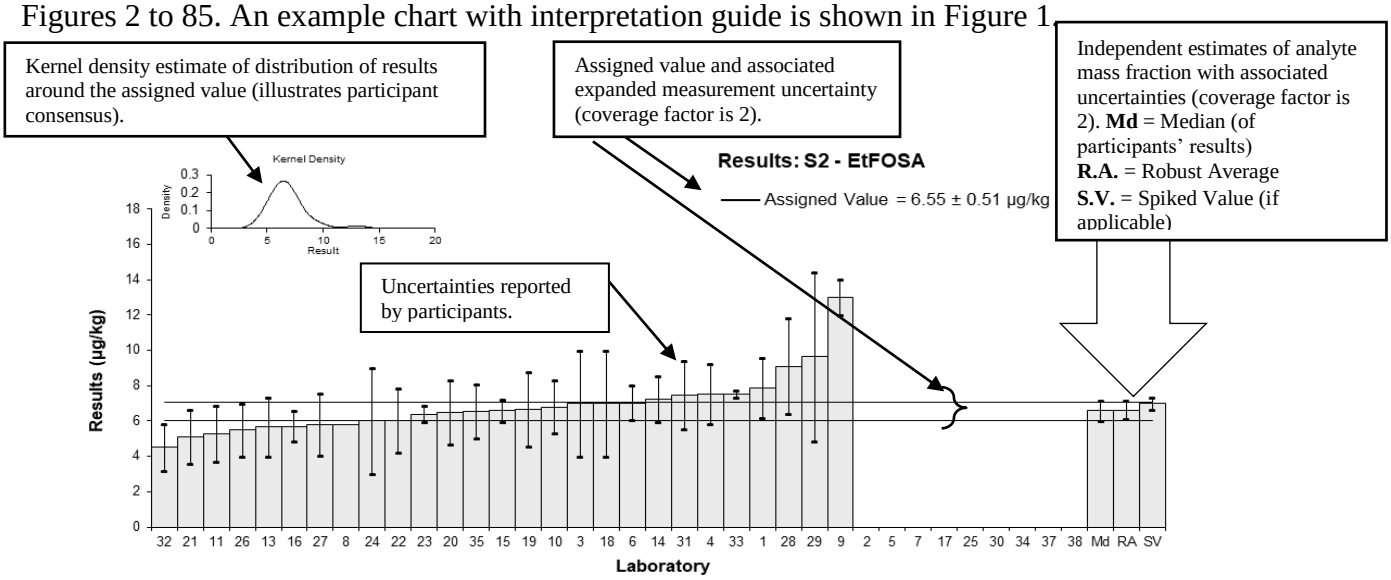


Figure 1 Guide to Presentation of Results

4.2 Outliers and Extreme Outliers

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

4.3 Assigned Value

An example of the assigned value calculation using data from the present study is given in Appendix 2. The assigned value is defined as 'the value attributed to a particular property of a proficiency test item'.[1] In this study the property is the mass concentration of analyte. Assigned values were the robust average of participants' results; the expanded uncertainties were estimated from the associated robust standard deviations. [4, 5.]

4.4 Robust Average and Robust Standard Deviation

The robust averages and associated expanded measurement uncertainties and robust standard deviations (a measure of the variability of participants' results) were calculated using the procedure described in ISO13528:2022.[5]

4.5 Target Standard Deviation for Proficiency Assessment and Performance Coefficient of Variation (PCV)

The target standard deviation for proficiency assessment (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 laboratory deviation from the assigned value.

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

It is important to note that the PCV is a fixed value and is not the standard deviation of participants' results. The fixed 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 target standard deviation.

A z-score with absolute value (|z|):

- $|z| \leq 2.0$ is satisfactory;
- $2.0 < |z| < 3.0$ is questionable;
- $|z| \geq 3.0$ is unsatisfactory.

To account for potential low bias in the consensus value due to inefficient methodologies, a number of scores were adjusted for a 'maximum acceptable concentration'. Results lower than the maximum acceptable concentration but with a z-score greater than 2.0 had their z-score adjusted to 2.0. Additional information is given in Section 6.4.

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.

An E_n-score with absolute value ($|E_n|$):

- $|E_n| \leq 1.0$ is satisfactory;
- $|E_n| > 1.0$ is unsatisfactory.

4.8 Traceability and Measurement Uncertainty

Laboratories accredited to ISO/IEC Standard 17025:2018 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 5

Sample Details

Sample No.	S1
Matrix	Soil
Analyte	PFBS
Unit	µg/kg

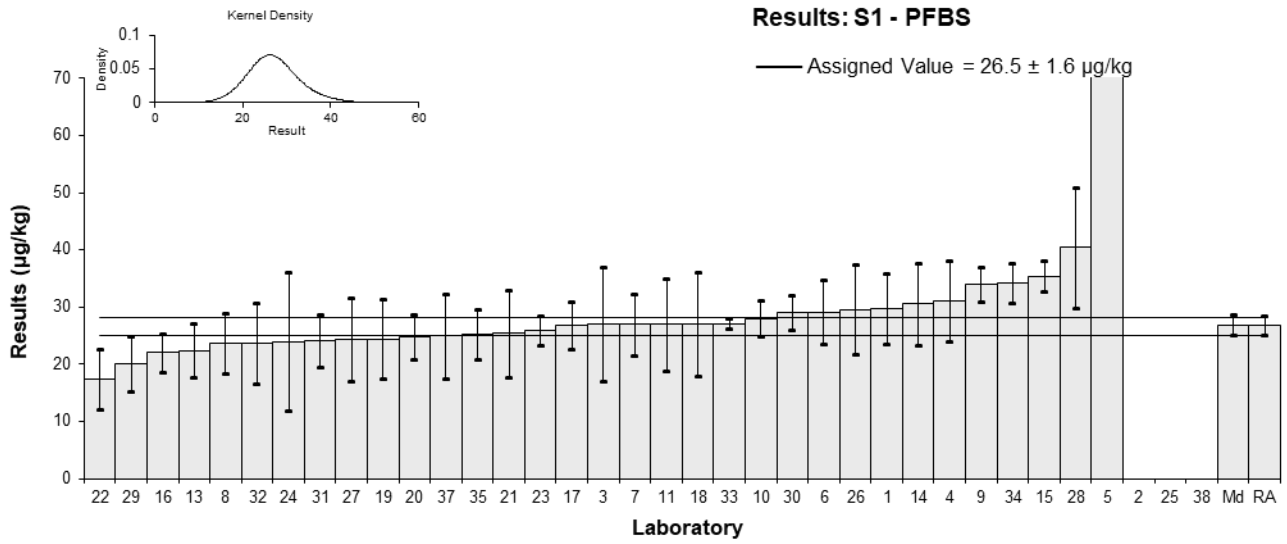
Participant Results

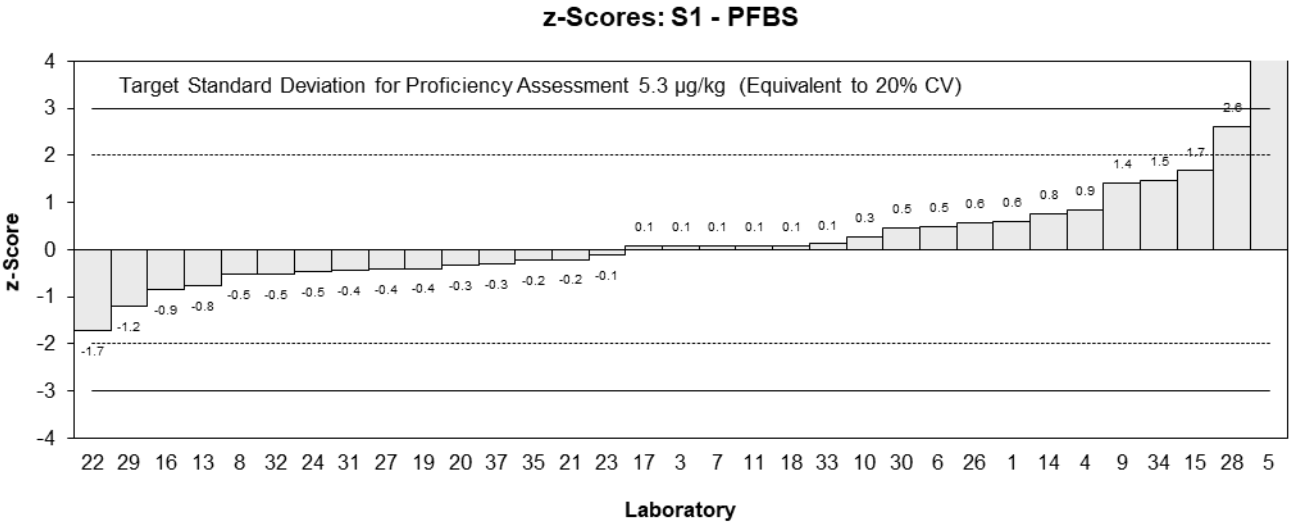
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	29.7	6.1	101.19	0.60	0.51
2	NS	NS	NS		
3	27	10	88	0.09	0.05
4	31	7.1	NT	0.85	0.62
5**	2887.18987666	1449.20679175	NR	539.75	1.97
6	29.1	5.63	66	0.49	0.44
7	27	5.4	NR	0.09	0.09
8	23.665	5.21	69	-0.53	-0.52
9	34	3	96	1.42	2.21
10	28	3.1	104	0.28	0.43
11	27.0	8.1	79	0.09	0.06
13	22.4	4.760	125	-0.77	-0.82
14	30.541	7.24	122	0.76	0.54
15	35.3557	2.706	87	1.67	2.82
16	22	3.3	136	-0.85	-1.23
17	26.89	4.14	NR	0.07	0.09
18	27	9	94	0.09	0.05
19	24.4	7	107	-0.40	-0.29
20	24.7	3.95	109	-0.34	-0.42
21	25.39	7.62	NR	-0.21	-0.14
22	17.4	5.22	69	-1.72	-1.67
23	25.9	2.59	92.61	-0.11	-0.20
24	24	12	94	-0.47	-0.21
25	NR	NR	NR		
26	29.6	7.9	86	0.58	0.38
27	24.34	7.302	114	-0.41	-0.29
28*	40.4	10.5	82	2.62	1.31
29	20.10	4.78	140.8	-1.21	-1.27
30	29	3	NR	0.47	0.74
31	24.17	4.6	101.67	-0.44	-0.48
32	23.7	7.1	70	-0.53	-0.38
33	27.11	0.92	106	0.12	0.33
34	34.27	3.469	82	1.47	2.03
35	25.32	4.37	98	-0.22	-0.25
37	24.9	7.47	78	-0.30	-0.21
38	NS	NS	NS		

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	26.5	1.6
Spike Value	Not Spiked	
Robust Average	26.8	1.7
Median	26.9	1.7
Mean	27.0	
N	32	
Max	40.4	
Min	17.4	
Robust SD	3.9	
Robust CV	15%	


Results: S1 - PFBS
Kernel Density
Density
Result
Assigned Value = 26.5 ± 1.6 µg/kg
Results (µg/kg)
Laboratory
22 29 16 13 8 32 24 31 27 19 20 37 35 21 23 17 3 7 11 18 33 10 30 6 26 1 14 4 9 34 15 28 5 2 25 38 Md RA


z-Scores: S1 - PFBS
Target Standard Deviation for Proficiency Assessment 5.3 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 29 16 13 8 32 24 31 27 19 20 37 35 21 23 17 3 7 11 18 33 10 30 6 26 1 14 4 9 34 15 28 5

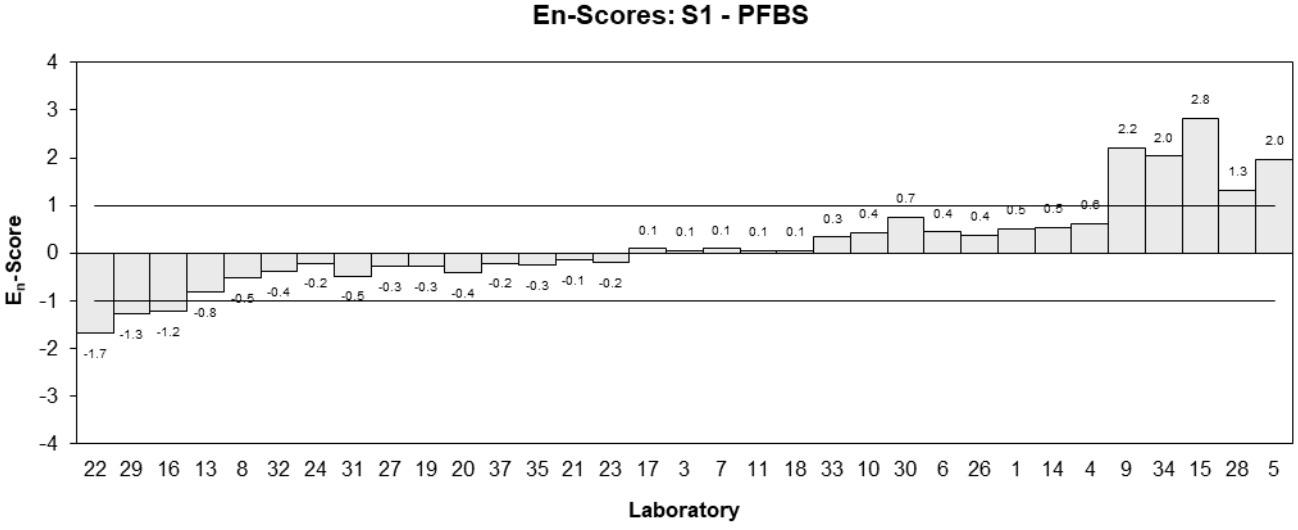

En-Scores: S1 - PFBS
En-Score
Laboratory
22 29 16 13 8 32 24 31 27 19 20 37 35 21 23 17 3 7 11 18 33 10 30 6 26 1 14 4 9 34 15 28 5

Figure 2

Table 6

Sample Details

Sample No.	S1
Matrix	Soil
Analyte	PFPeS
Unit	µg/kg

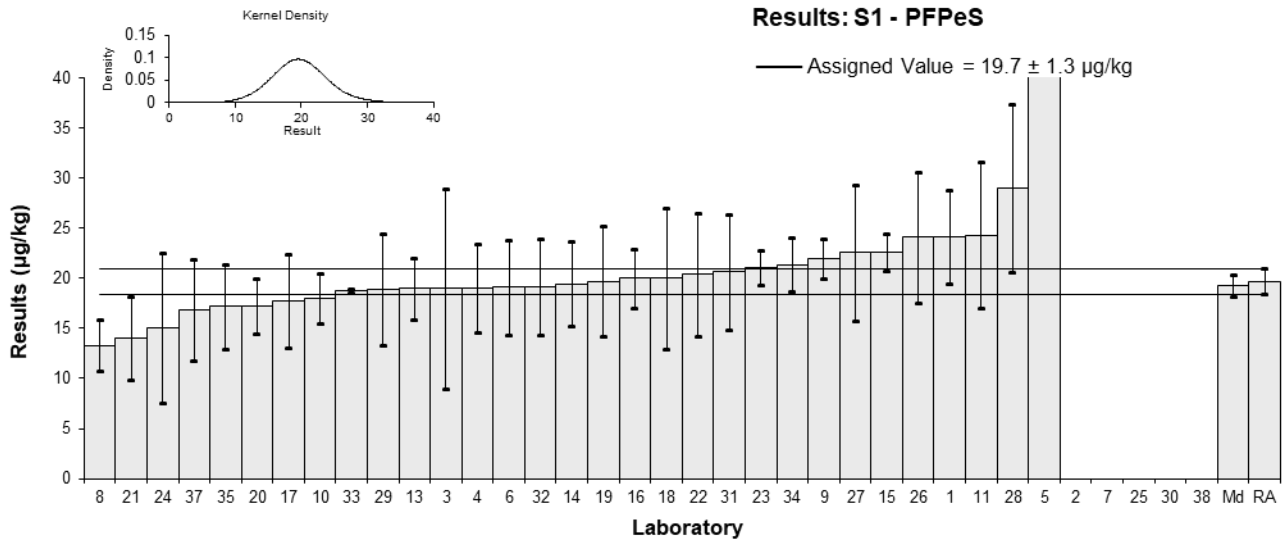
Participant Results

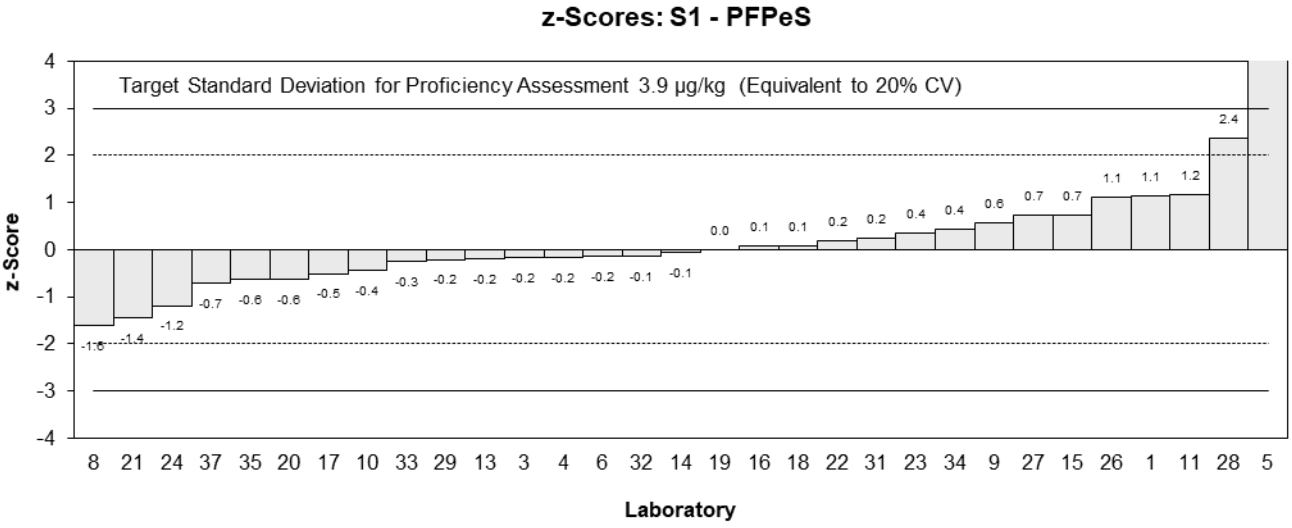
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	24.2	4.7	98.88	1.14	0.92
2	NS	NS	NS		
3	19	10	94	-0.18	-0.07
4	19	4.4	NT	-0.18	-0.15
5**	4251.65816666	712.794446270	NR	1,074.10	5.94
6	19.1	4.77	66	-0.15	-0.12
7	NR	NR	NR		
8	13.313	2.52	69	-1.62	-2.25
9	22	2	NT	0.58	0.96
10	18	2.5	100	-0.43	-0.60
11	24.3	7.3	83	1.17	0.62
13	18.97	3.120	NR	-0.19	-0.22
14	19.44	4.24	113	-0.07	-0.06
15	22.6316	1.906	94	0.74	1.27
16	20	3.0	136	0.08	0.09
17	17.71	4.68	NR	-0.51	-0.41
18	20	7	91	0.08	0.04
19	19.7	5.5	107	0.00	0.00
20	17.2	2.75	107	-0.63	-0.82
21	14.04	4.21	NR	-1.44	-1.28
22	20.4	6.12	69	0.18	0.11
23	21.1	1.75	81.61	0.36	0.64
24	15	7.5	NR	-1.19	-0.62
25	NR	NR	NR		
26	24.1	6.5	84	1.12	0.66
27	22.56	6.768	NR	0.73	0.41
28	29	8.4	82	2.36	1.09
29	18.86	5.59	NR	-0.21	-0.15
30	NT	NT	NT		
31	20.64	5.82	98.82	0.24	0.16
32	19.2	4.8	52	-0.13	-0.10
33	18.72	0.19	101	-0.25	-0.75
34	21.393	2.717	82	0.43	0.56
35	17.18	4.21	101	-0.64	-0.57
37	16.9	5.07	77	-0.71	-0.53
38	NS	NS	NS		

** Gross Error, see Section 4.2

Statistics

Assigned Value	19.7	1.3
Spike Value	Not Spiked	
Robust Average	19.7	1.3
Median	19.3	1.1
Mean	19.8	
N	30	
Max	29	
Min	13.313	
Robust SD	2.9	
Robust CV	15%	


Kernel Density
Density
Result
Results: S1 - PFPeS
Assigned Value = 19.7 ± 1.3 µg/kg
Results (µg/kg)
Laboratory
8 21 24 37 35 20 17 10 33 29 13 3 4 6 32 14 19 16 18 22 31 23 34 9 27 15 26 1 11 28 5 2 7 25 30 38 Md RA


z-Scores: S1 - PFPeS
Target Standard Deviation for Proficiency Assessment 3.9 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
8 21 24 37 35 20 17 10 33 29 13 3 4 6 32 14 19 16 18 22 31 23 34 9 27 15 26 1 11 28 5

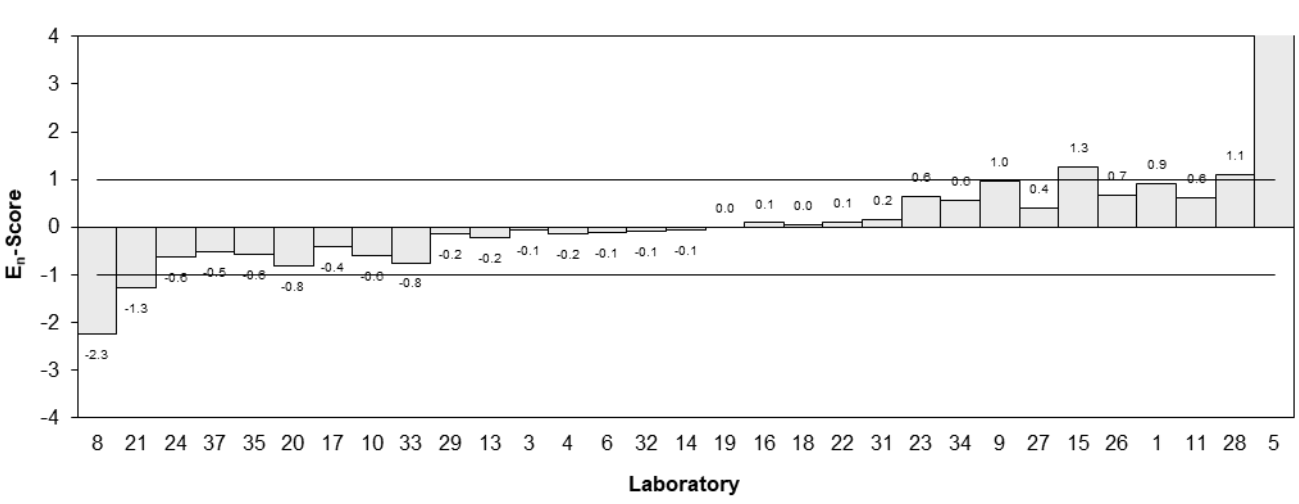

En-Scores: S1 - PFPeS
En-Score
Laboratory
8 21 24 37 35 20 17 10 33 29 13 3 4 6 32 14 19 16 18 22 31 23 34 9 27 15 26 1 11 28 5

Figure 3

Table 7

Sample Details

Sample No.	S1
Matrix	Soil
Analyte	PFHxS
Unit	µg/kg

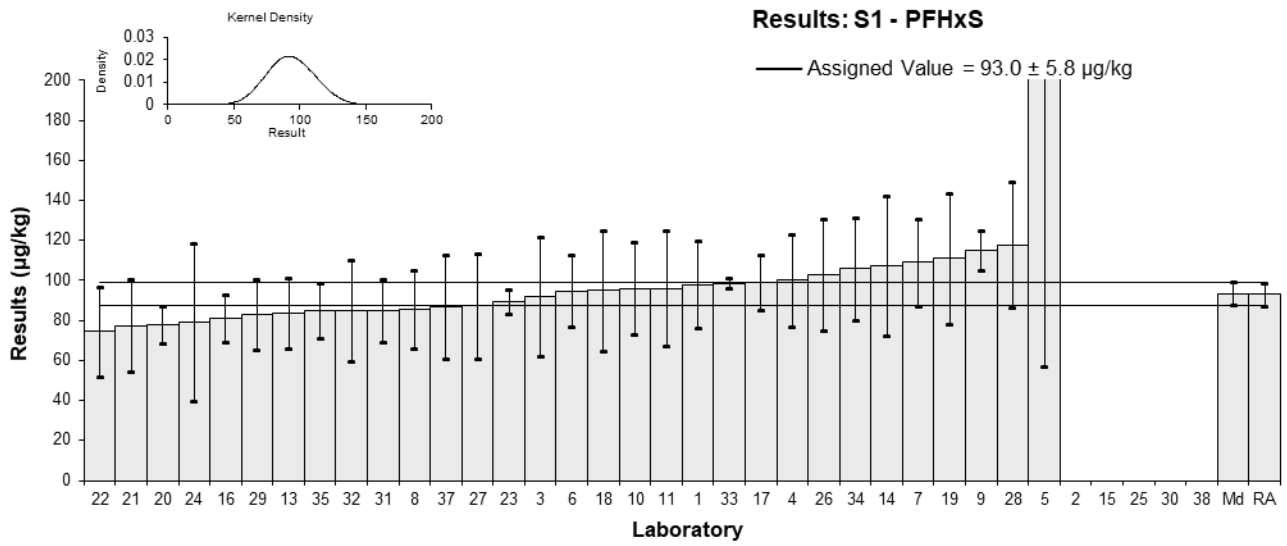
Participant Results

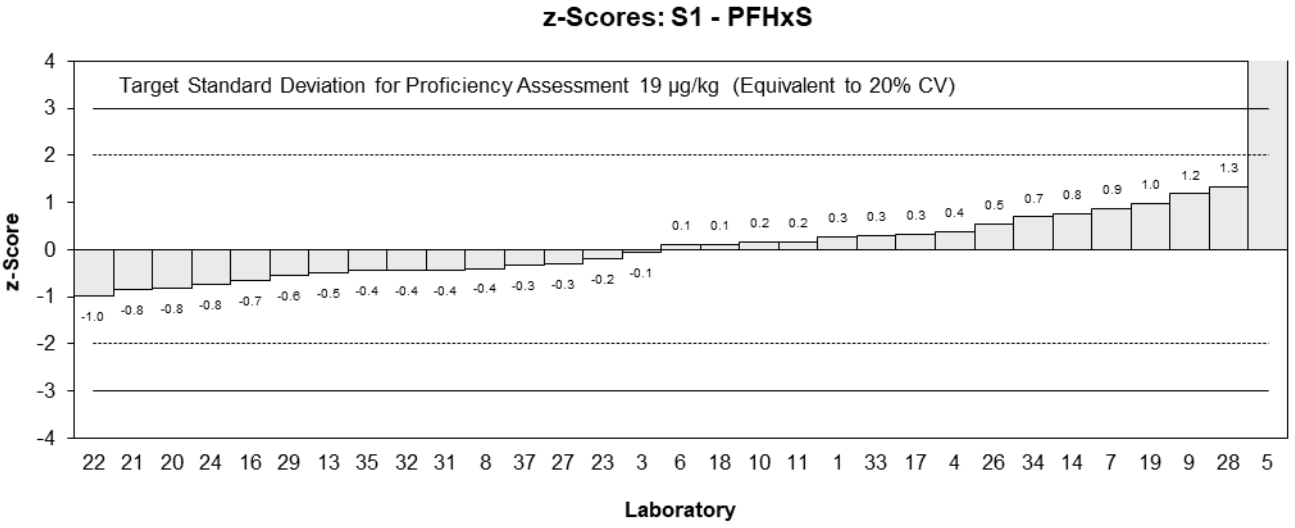
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	98.0	21.6	98.88	0.27	0.22
2	NS	NS	NS		
3	92	30	94	-0.05	-0.03
4	100	23	NT	0.38	0.30
5**	3757.26925	3700.14234860	NR	197.00	0.99
6	94.8	17.8	71	0.10	0.10
7	109	21.8	NR	0.86	0.71
8	85.594	19.7	69	-0.40	-0.36
9	115	10	NT	1.18	1.90
10	96	23	105	0.16	0.13
11	96.0	29	75	0.16	0.10
13	83.8	17.570	91	-0.49	-0.50
14	107.201	35.05	161	0.76	0.40
15	NT	NT	NT		
16	81	12	71	-0.65	-0.90
17	98.92	13.85	NR	0.32	0.39
18	95	30	91	0.11	0.07
19	111	32.8	104	0.97	0.54
20	77.7	9.33	107	-0.82	-1.39
21	77.46	23.24	NR	-0.84	-0.65
22	74.5	22.4	63	-0.99	-0.80
23	89.2	6.2	NR	-0.20	-0.45
24	79	39.5	93	-0.75	-0.35
25	NR	NR	NR		
26	103	28	91	0.54	0.35
27	87.17	26.15	99	-0.31	-0.22
28	117.8	31.2	56	1.33	0.78
29	82.86	17.46	115.2	-0.55	-0.55
30	NT	NT	NT		
31	85.01	15.65	98.82	-0.43	-0.48
32	84.9	25.5	52	-0.44	-0.31
33	98.6	2.53	101	0.30	0.88
34	105.8	25.565	82	0.69	0.49
35	84.8	13.8	101	-0.44	-0.55
37	86.6	25.98	77	-0.34	-0.24
38	NS	NS	NS		

** Gross Error, see Section 4.2

Statistics

Assigned Value	93.0	5.8
Spike Value	Not Spiked	
Robust Average	93.0	5.8
Median	93.4	5.8
Mean	93.3	
N	30	
Max	117.8	
Min	74.5	
Robust SD	13	
Robust CV	14%	


Kernel Density
Density
Result
Results: S1 - PFHxS
Assigned Value = 93.0 ± 5.8 µg/kg
Results (µg/kg)
Laboratory
22 21 20 24 16 29 13 35 32 31 8 37 27 23 3 6 18 10 11 1 33 17 4 26 34 14 7 19 9 28 5 2 15 25 30 38 Md RA


z-Scores: S1 - PFHxS
Target Standard Deviation for Proficiency Assessment 19 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 21 20 24 16 29 13 35 32 31 8 37 27 23 3 6 18 10 11 1 33 17 4 26 34 14 7 19 9 28 5

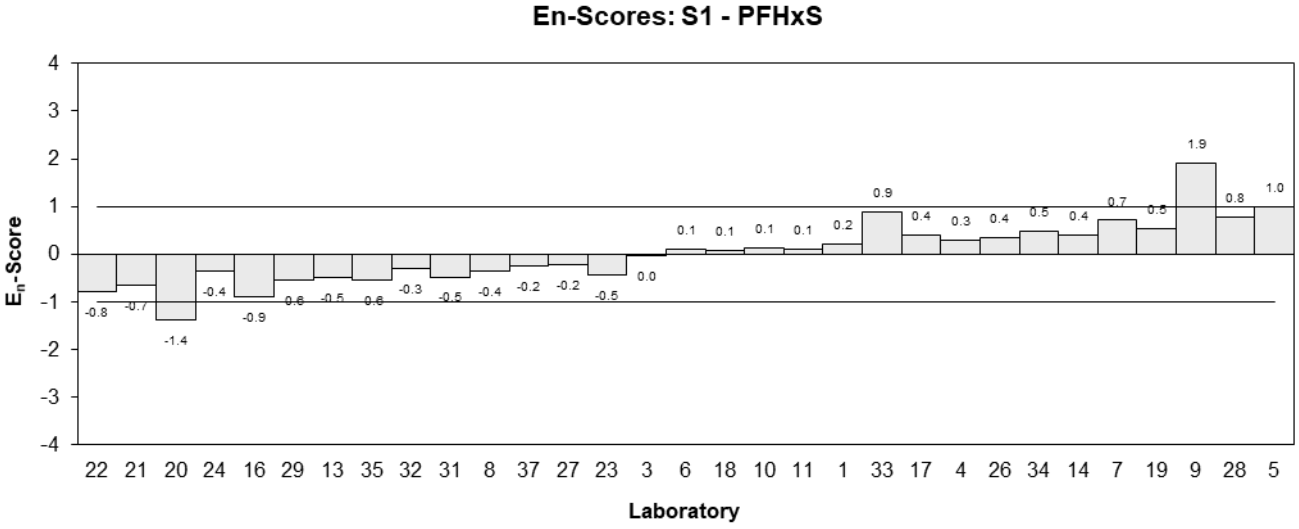

En-Scores: S1 - PFHxS
En-Score
Laboratory
22 21 20 24 16 29 13 35 32 31 8 37 27 23 3 6 18 10 11 1 33 17 4 26 34 14 7 19 9 28 5

Figure 4

Table 8

Sample Details

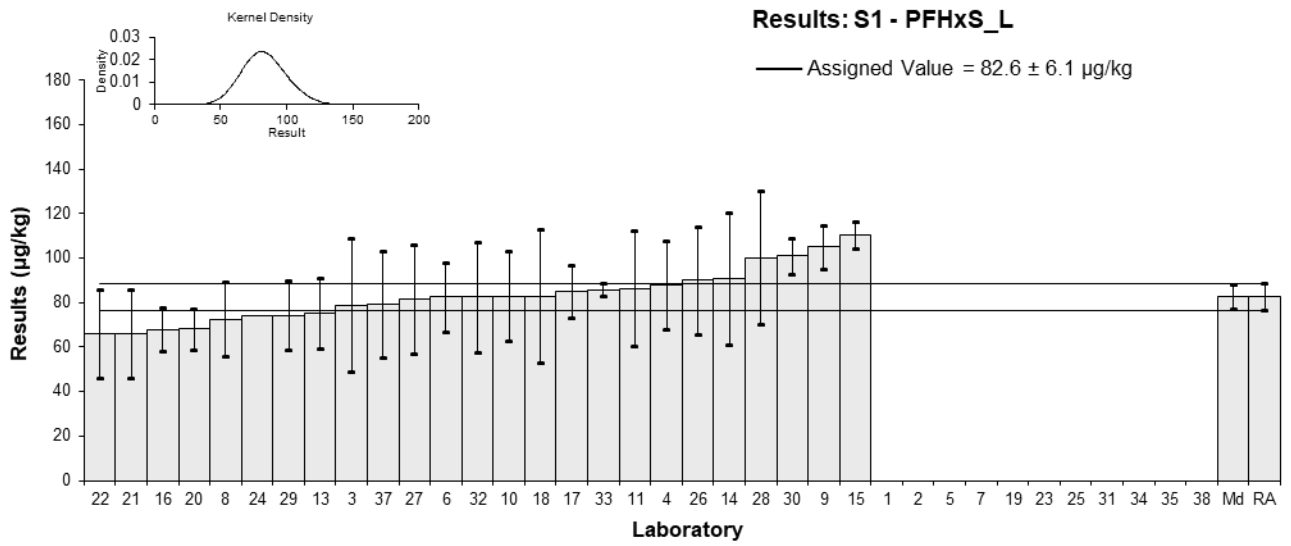
Sample No.	S1
Matrix	Soil
Analyte	PFHxS_L
Unit	µg/kg

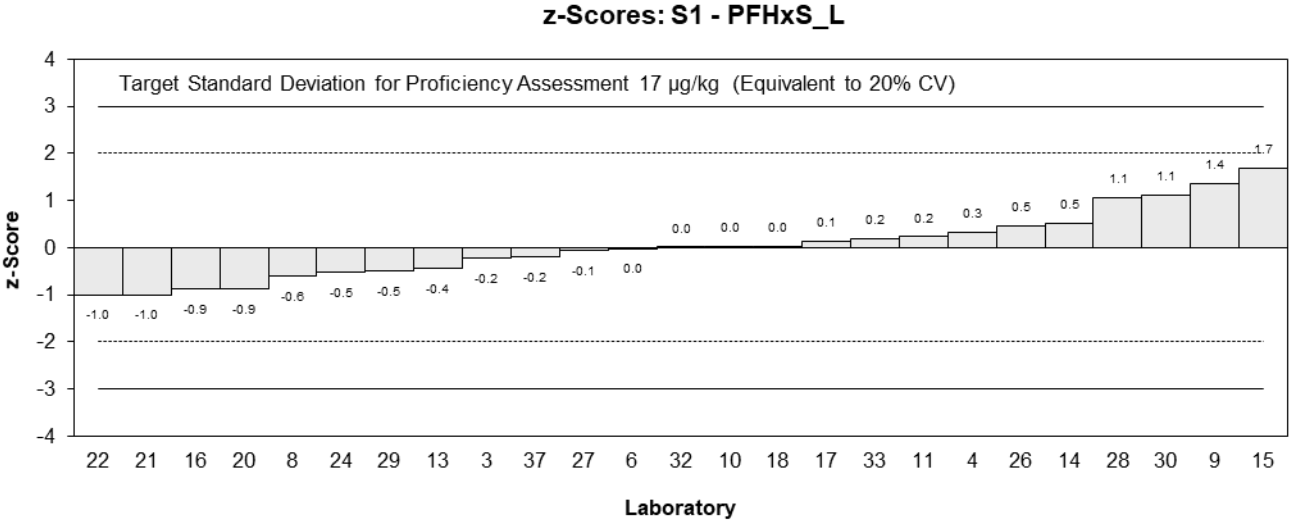
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NS	NS	NS		
3	79	30	94	-0.22	-0.12
4	88	20	NT	0.33	0.26
5	NR	NR	NR		
6	82.5	15.5	71	-0.01	-0.01
7	NR	NR	NR		
8	72.479	16.7	69	-0.61	-0.57
9	105	10	NT	1.36	1.91
10	83	20	105	0.02	0.02
11	86.4	26	75	0.23	0.14
13	75.4	15.790	91	-0.44	-0.43
14	90.97	29.75	161	0.51	0.28
15	110.4313	6.145	95	1.68	3.21
16	68	10	71	-0.88	-1.25
17	84.90	11.89	NR	0.14	0.17
18	83	30	91	0.02	0.01
19	NT	NT	NT		
20	68.1	9.33	107	-0.88	-1.30
21	66.14	19.84	NR	-1.00	-0.79
22	66	19.8	63	-1.00	-0.80
23	NT	NT	NT		
24	74	NR	NR	-0.52	-1.41
25	NR	NR	NR		
26	90	24.3	91	0.45	0.30
27	81.84	24.55	99	-0.05	-0.03
28	100.1	30	56	1.06	0.57
29	74.34	15.66	115.2	-0.50	-0.49
30	101	8	NR	1.11	1.83
31	NT	NT	NT		
32	82.7	24.8	52	0.01	0.00
33	85.78	2.91	101	0.19	0.47
34	NR	NR	NR		
35	NT	NT	NT		
37	79.5	23.85	77	-0.19	-0.13
38	NS	NS	NS		

Statistics

Assigned Value	82.6	6.1
Spike Value	Not Spiked	
Robust Average	82.6	6.1
Median	82.7	5.4
Mean	83.1	
N	25	
Max	110.4313	
Min	66	
Robust SD	12	
Robust CV	15%	


Kernel Density
Density
Result
Results: S1 - PFHxS_L
Assigned Value = 82.6 ± 6.1 µg/kg
Results (µg/kg)
Laboratory
22 21 16 20 8 24 29 13 3 37 27 6 32 10 18 17 33 11 4 26 14 28 30 9 15 1 2 5 7 19 23 25 31 34 35 38 Md RA


z-Scores: S1 - PFHxS_L
Target Standard Deviation for Proficiency Assessment 17 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 21 16 20 8 24 29 13 3 37 27 6 32 10 18 17 33 11 4 26 14 28 30 9 15

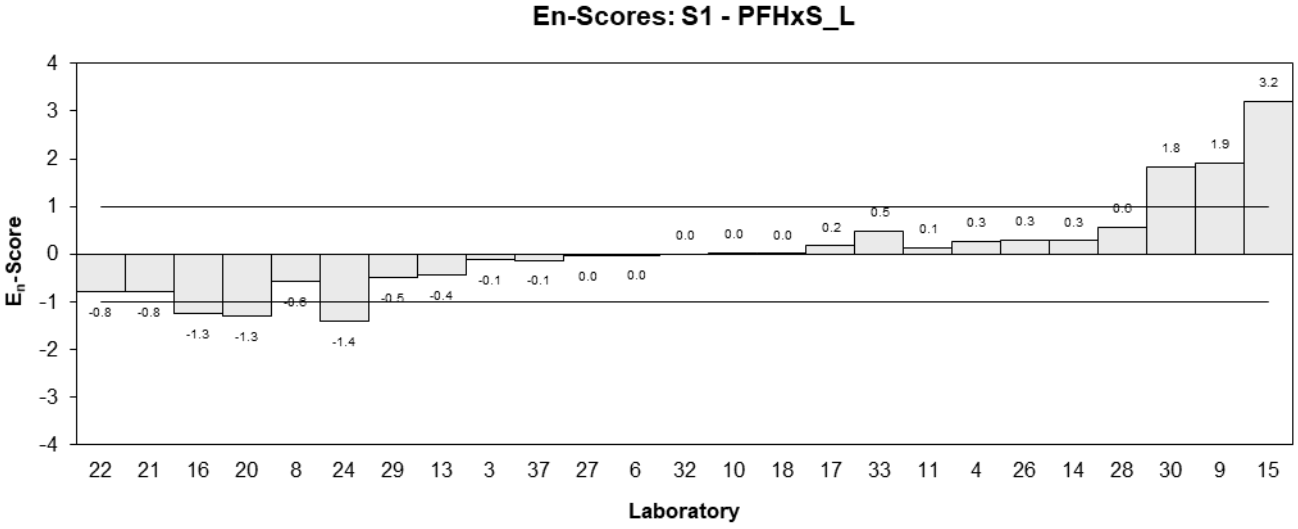

En-Scores: S1 - PFHxS_L
En-Score
Laboratory
22 21 16 20 8 24 29 13 3 37 27 6 32 10 18 17 33 11 4 26 14 28 30 9 15

Figure 5

Table 9

Sample Details

Sample No.	S1
Matrix	Soil
Analyte	PFHpS
Unit	µg/kg

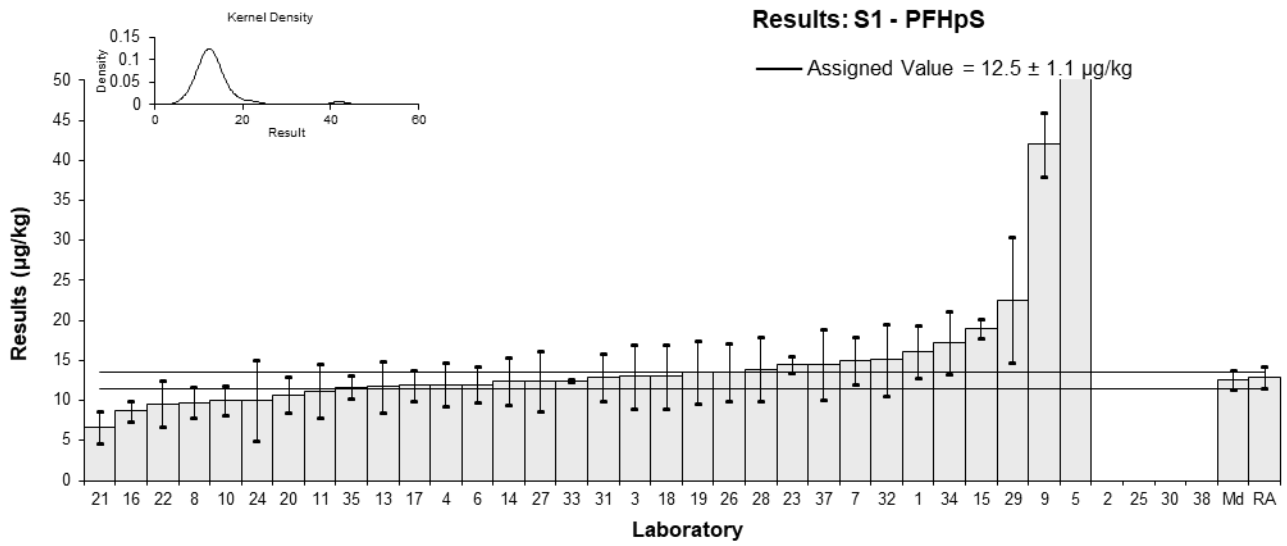
Participant Results

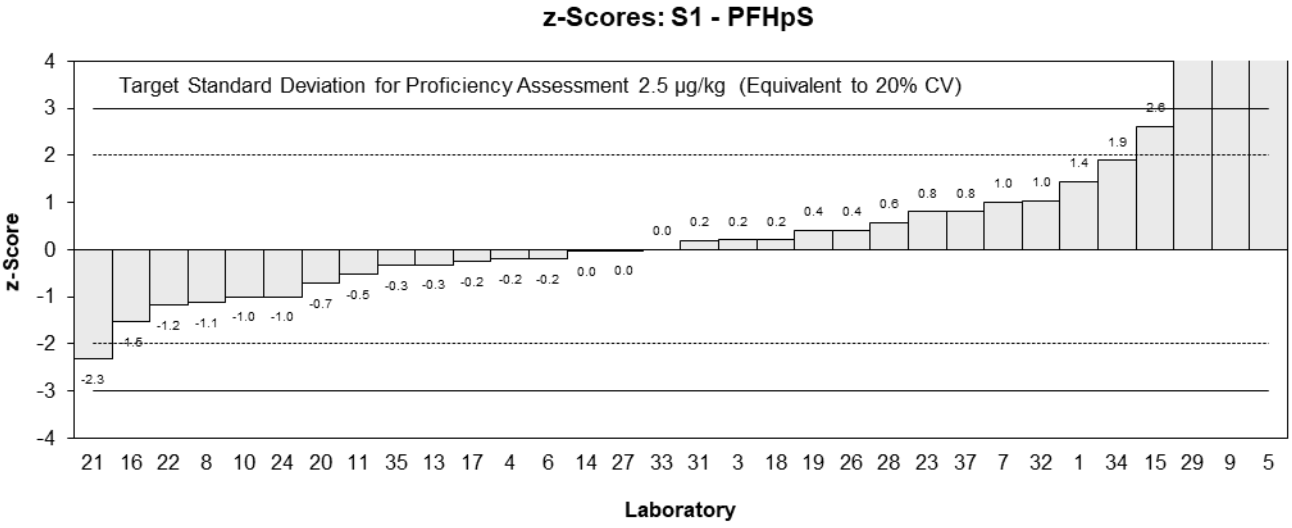
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	16.1	3.3	98.88	1.44	1.03
2	NS	NS	NS		
3	13	4	94	0.20	0.12
4	12	2.7	NT	-0.20	-0.17
5**	2946.01272666	460.079163695	NR	1,173.41	6.38
6	12	2.25	62	-0.20	-0.20
7	15	3	NR	1.00	0.78
8	9.736	1.95	69	-1.11	-1.23
9*	42	4	NT	11.80	7.11
10	10	1.8	105	-1.00	-1.19
11	11.2	3.4	81	-0.52	-0.36
13	11.7	3.170	NR	-0.32	-0.24
14	12.4	2.94	153	-0.04	-0.03
15	18.9976	1.183	54	2.60	4.02
16	8.7	1.3	67	-1.52	-2.23
17	11.90	1.95	NR	-0.24	-0.27
18	13	4	91	0.20	0.12
19	13.5	3.9	92	0.40	0.25
20	10.7	2.24	104	-0.72	-0.72
21	6.7	2.01	NR	-2.32	-2.53
22	9.55	2.87	63	-1.18	-0.96
23	14.5	1	81.61	0.80	1.35
24	10	5	NR	-1.00	-0.49
25	NR	NR	NR		
26	13.5	3.6	83	0.40	0.27
27	12.46	3.738	NR	-0.02	-0.01
28	13.9	4	56	0.56	0.34
29*	22.559	7.84	NR	4.02	1.27
30	NT	NT	NT		
31	12.96	2.98	100.1	0.18	0.14
32	15.1	4.5	52	1.04	0.56
33	12.49	0.16	101	0.00	-0.01
34	17.226	3.96	82	1.89	1.15
35	11.68	1.49	101	-0.33	-0.44
37	14.5	4.35	55	0.80	0.45
38	NS	NS	NS		

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	12.5	1.1
Spike Value	Not Spiked	
Robust Average	12.9	1.3
Median	12.5	1.2
Mean	13.8	
N	31	
Max	42	
Min	6.7	
Robust SD	2.8	
Robust CV	22%	


Kernel Density
Density
Result
Results: S1 - PFHpS
Assigned Value = 12.5 ± 1.1 µg/kg
Results (µg/kg)
Laboratory
21 16 22 8 10 24 20 11 35 13 17 4 6 14 27 33 31 3 18 19 26 28 23 37 7 32 1 34 15 29 9 5 2 25 30 38 Md RA


z-Scores: S1 - PFHpS
Target Standard Deviation for Proficiency Assessment 2.5 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
21 16 22 8 10 24 20 11 35 13 17 4 6 14 27 33 31 3 18 19 26 28 23 37 7 32 1 34 15 29 9 5

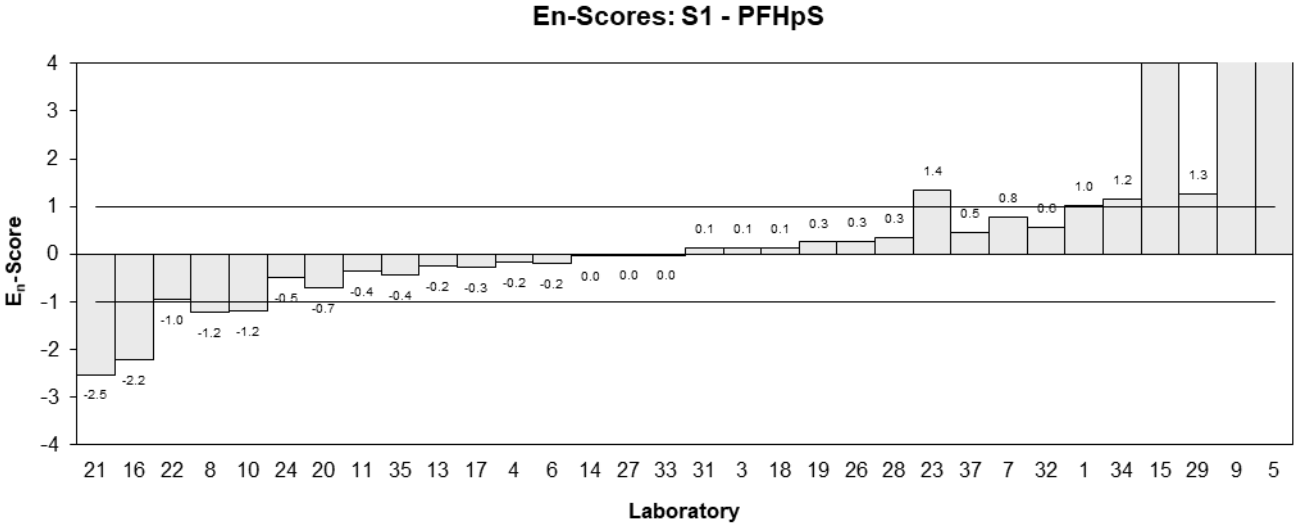

En-Scores: S1 - PFHpS
En-Score
Laboratory
21 16 22 8 10 24 20 11 35 13 17 4 6 14 27 33 31 3 18 19 26 28 23 37 7 32 1 34 15 29 9 5

Figure 6

Table 10

Sample Details

Sample No.	S1
Matrix	Soil
Analyte	PFOS
Unit	µg/kg

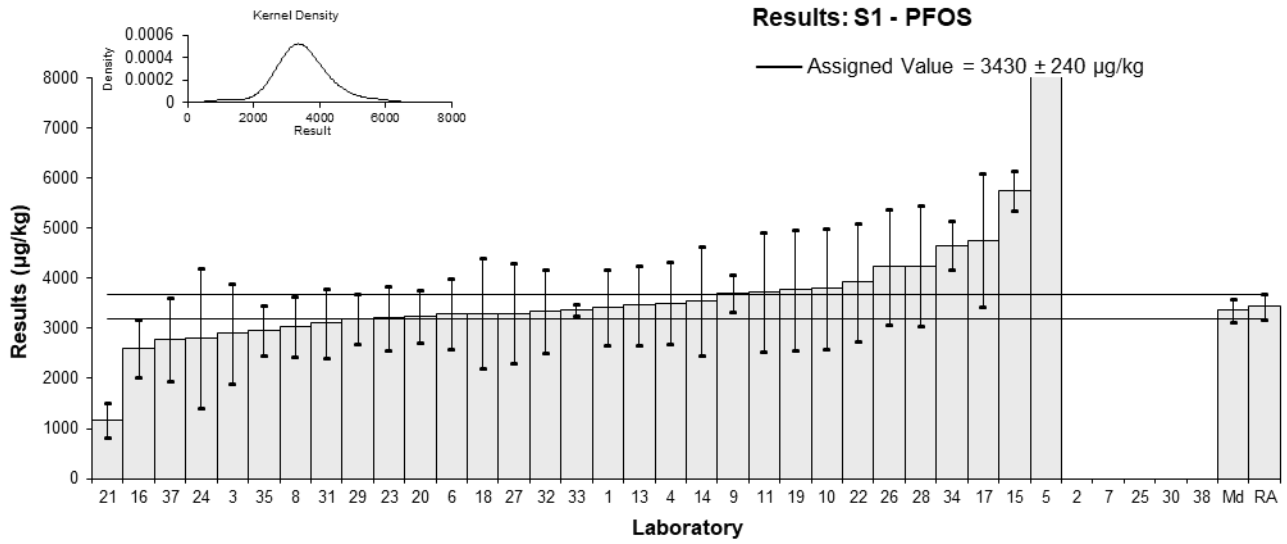
Participant Results

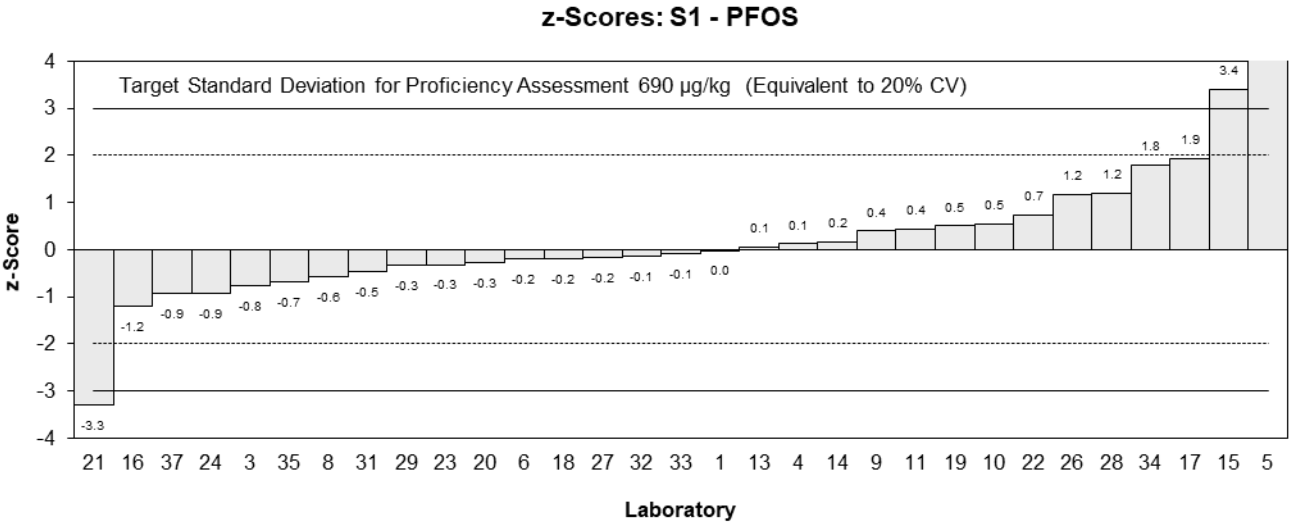
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	3420	746	106.94	-0.01	-0.01
2	NS	NS	NS		
3	2900	1000	97	-0.77	-0.52
4	3512	808	NT	0.12	0.10
5**	1072825.08730	154659.183409	NR	1,558.88	6.91
6	3290	700	62	-0.20	-0.19
7	NR	NR	NR		
8	3033.953	606	23	-0.58	-0.61
9	3700	370	96	0.39	0.61
10	3800	1200	84	0.54	0.30
11	3730	1200	56	0.44	0.25
13	3463.56	802.160	85	0.05	0.04
14	3548.01	1082.50	153	0.17	0.11
15*	5758.53	397.1	65	3.39	5.02
16	2600	570	67	-1.21	-1.34
17	4764	1324	NR	1.94	0.99
18	3300	1100	96	-0.19	-0.12
19	3770	1198.8	92	0.50	0.28
20	3246	519	104	-0.27	-0.32
21*	1172.85	351.86	NR	-3.29	-5.30
22	3930	1179	46	0.73	0.42
23	3210	642	93.58	-0.32	-0.32
24	2800	1400	112	-0.92	-0.44
25	NR	NR	NR		
26	4230	1142	94	1.17	0.69
27	3305	991.4	90	-0.18	-0.12
28	4250	1200	90	1.20	0.67
29	3196.3	502.1	102.4	-0.34	-0.42
30	NT	NT	NT		
31	3110	696	100.1	-0.47	-0.43
32	3340	840	67	-0.13	-0.10
33	3378.2	118.9	112	-0.08	-0.19
34	4660.105	481.467	120	1.79	2.29
35	2955.3	492.9	100	-0.69	-0.87
37	2790	837	84	-0.93	-0.74
38	NS	NS	NS		

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	3430	240
Spike Value	Not Spiked	
Robust Average	3440	260
Median	3360	240
Mean	3470	
N	30	
Max	5758.53	
Min	1172.85	
Robust SD	580	
Robust CV	17%	


Results: S1 - PFOS
Assigned Value = 3430 ± 240 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
21 16 37 24 3 35 8 31 29 23 20 6 18 27 32 33 1 13 4 14 9 11 19 10 22 26 28 34 17 15 5 2 7 25 30 38 Md RA


z-Scores: S1 - PFOS
Target Standard Deviation for Proficiency Assessment 690 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
21 16 37 24 3 35 8 31 29 23 20 6 18 27 32 33 1 13 4 14 9 11 19 10 22 26 28 34 17 15 5

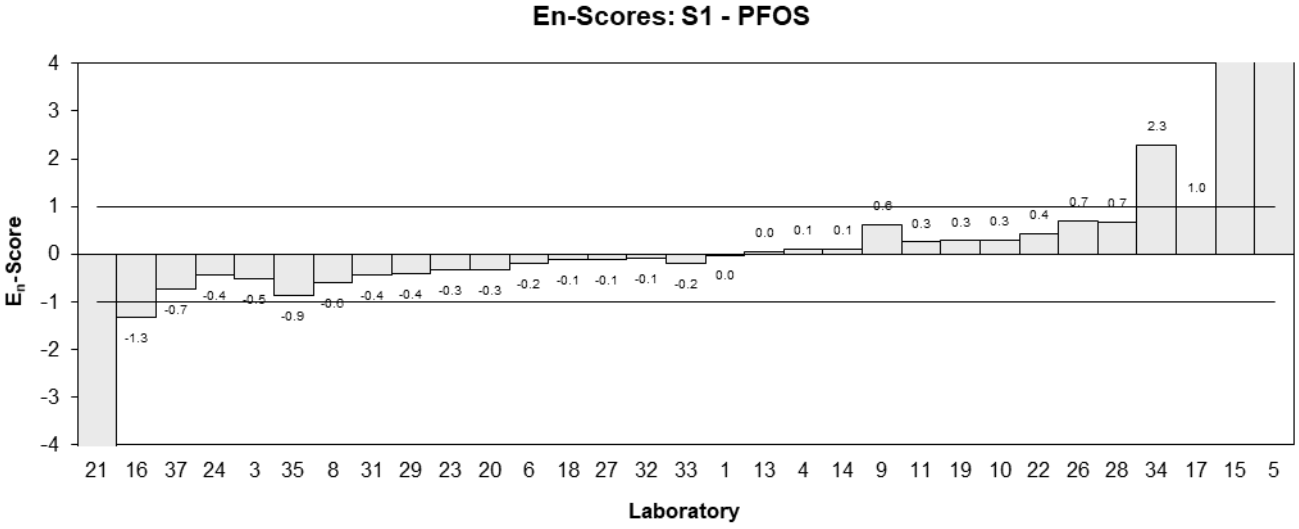

En-Scores: S1 - PFOS
En-Score
Laboratory
21 16 37 24 3 35 8 31 29 23 20 6 18 27 32 33 1 13 4 14 9 11 19 10 22 26 28 34 17 15 5

Figure 7

Table 11

Sample Details

Sample No.	S1
Matrix	Soil
Analyte	PFOS_L
Unit	µg/kg

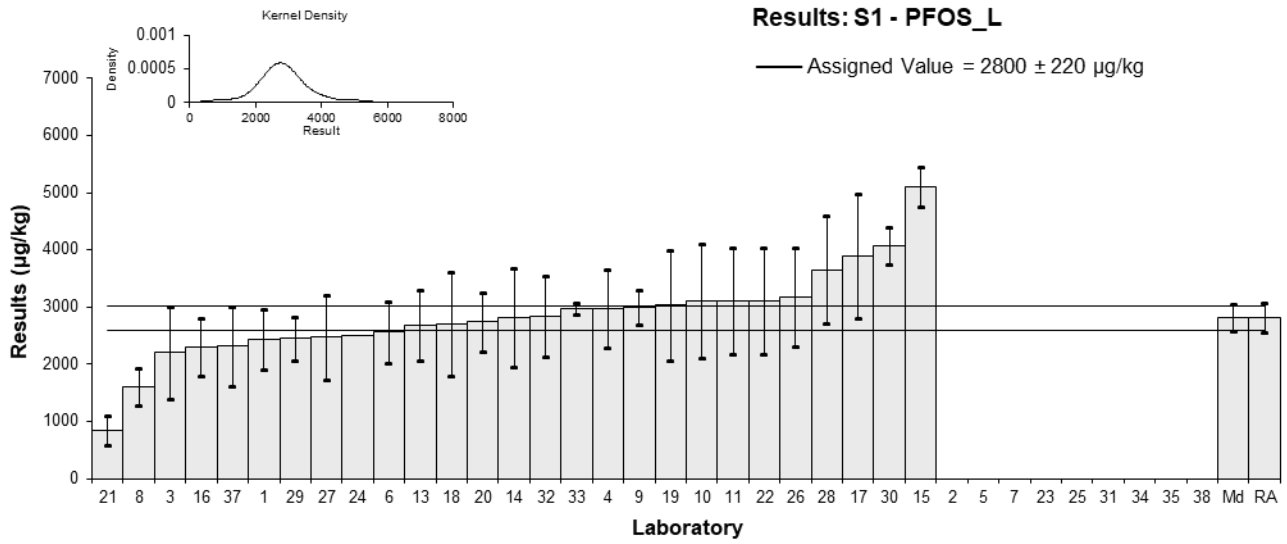
Participant Results

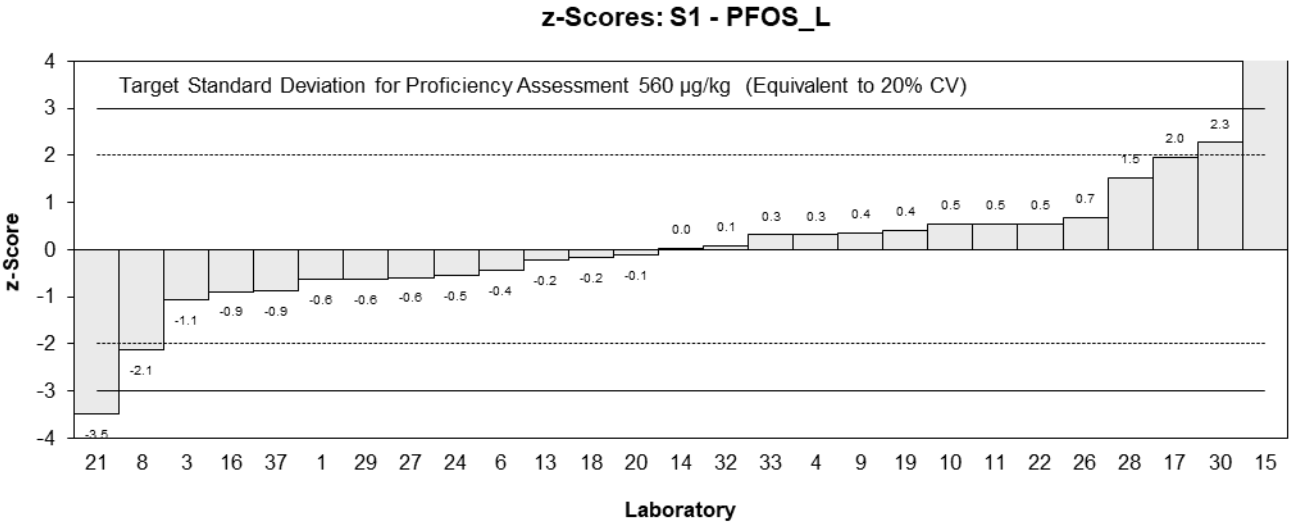
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	2440	532	106.94	-0.64	-0.63
2	NS	NS	NS		
3	2200	800	97	-1.07	-0.72
4	2972	683	111	0.31	0.24
5	NR	NR	NR		
6	2560	545	62	-0.43	-0.41
7	NR	NR	NR		
8	1610.195	322	23	-2.12	-3.05
9	3000	300	NT	0.36	0.54
10	3100	1000	84	0.54	0.29
11	3100	930	56	0.54	0.31
13	2678.04	620.220	85	-0.22	-0.19
14	2817.11	859.50	153	0.03	0.02
15*	5104.20	351.9	65	4.11	5.55
16	2300	500	67	-0.89	-0.92
17	3892	1082	NR	1.95	0.99
18	2700	900	96	-0.18	-0.11
19	3029	963.2	92	0.41	0.23
20	2738	519	104	-0.11	-0.11
21*	849.64	254.89	NR	-3.48	-5.79
22	3100	930	46	0.54	0.31
23	NT	NT	NT		
24	2500	NR	NR	-0.54	-1.36
25	NR	NR	NR		
26	3173	856	94	0.67	0.42
27	2472	741.7	90	-0.59	-0.42
28	3655	950	NR	1.53	0.88
29	2452.0	385.1	102.4	-0.62	-0.78
30	4070	330	NR	2.27	3.20
31	NT	NT	NT		
32	2840	710	67	0.07	0.05
33	2970.8	108.3	112	0.31	0.70
34	NR	NR	NR		
35	NT	NT	NT		
37	2312	693.6	55	-0.87	-0.67
38	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	2800	220
Spike Value	Not Spiked	
Robust Average	2810	260
Median	2820	230
Mean	2840	
N	27	
Max	5104.2	
Min	849.64	
Robust SD	540	
Robust CV	19%	


Kernel Density
Density
Result
Results: S1 - PFOS_L
Assigned Value = 2800 ± 220 µg/kg
Results (µg/kg)
Laboratory
21 8 3 16 37 1 29 27 24 6 13 18 20 14 32 33 4 9 19 10 11 22 26 28 17 30 15 2 5 7 23 25 31 34 35 38 Md RA


z-Scores: S1 - PFOS_L
Target Standard Deviation for Proficiency Assessment 560 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
21 8 3 16 37 1 29 27 24 6 13 18 20 14 32 33 4 9 19 10 11 22 26 28 17 30 15

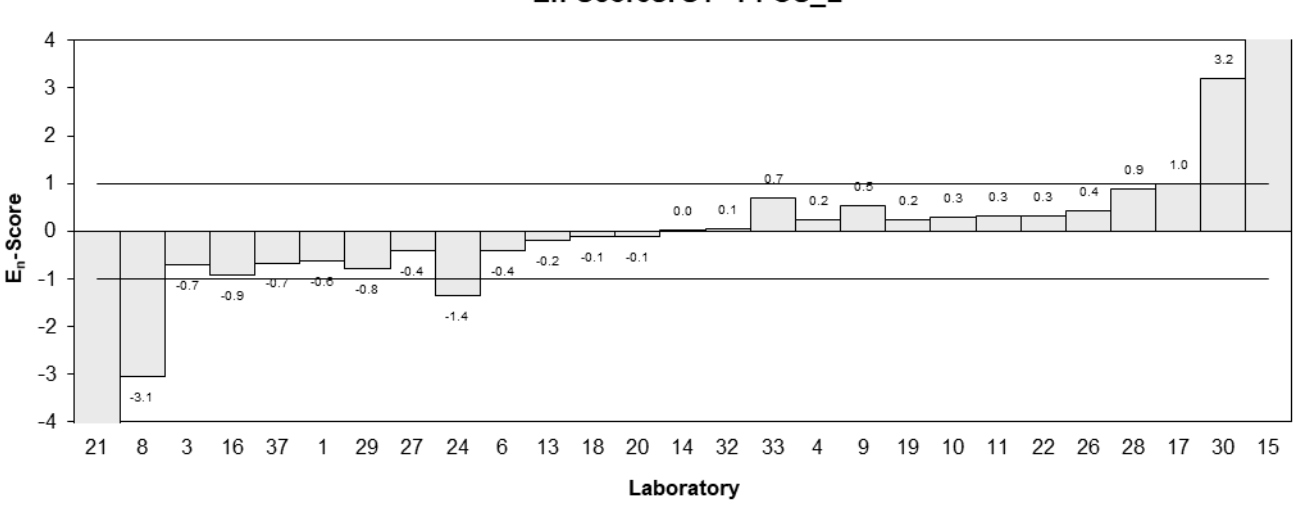

En-Scores: S1 - PFOS_L
En-Score
Laboratory
21 8 3 16 37 1 29 27 24 6 13 18 20 14 32 33 4 9 19 10 11 22 26 28 17 30 15

Figure 8

Table 12

Sample Details

Sample No.	S1
Matrix	Soil
Analyte	PFNS
Unit	µg/kg

Participant Results

Lab. Code	Result	Uncertainty	Rec
1	NT	NT	NT
2	NS	NS	NS
3	NT	NT	NT
4	5.8	1.3	NT
5	NT	NT	NT
6	5.32	0.941	62
7	NR	NR	NR
8	12.292	3.07	23
9	16	2	NT
10	3.0	0.48	84
11	26.0	7.8	79
13	24.36	8.526	NR
14	6.69	2.28	140
15	5.5298	0.406	71
16	7.9	1.2	NR
17	NT	NT	NT
18	40	13	104
19	NT	NT	NT
20	4.57	1.05	104
21	<50	NR	NR
22	NT	NT	NT
23	NT	NT	NT
24	17	8.5	NR
25	NR	NR	NR
26	28.8	7.7	85
27	21.34	6.402	NR
28	59.8	18.5	90
29	147.7	68.32	NR
30	NT	NT	NT
31	NT	NT	NT
32	NT	NT	NT
33	67.18	7.43	112
34	NR	NR	NR
35	NT	NT	NT
37	6.13	1.839	55
38	NS	NS	NS

Statistics

Assigned Value	Not Set	
Spike Value	Not Spiked	
Robust Average	18.2	8.7
Median	16.0	8.7
Mean	27	
N	19	
Max	147.7	
Min	3	
Robust SD	15	
Robust CV	83%	

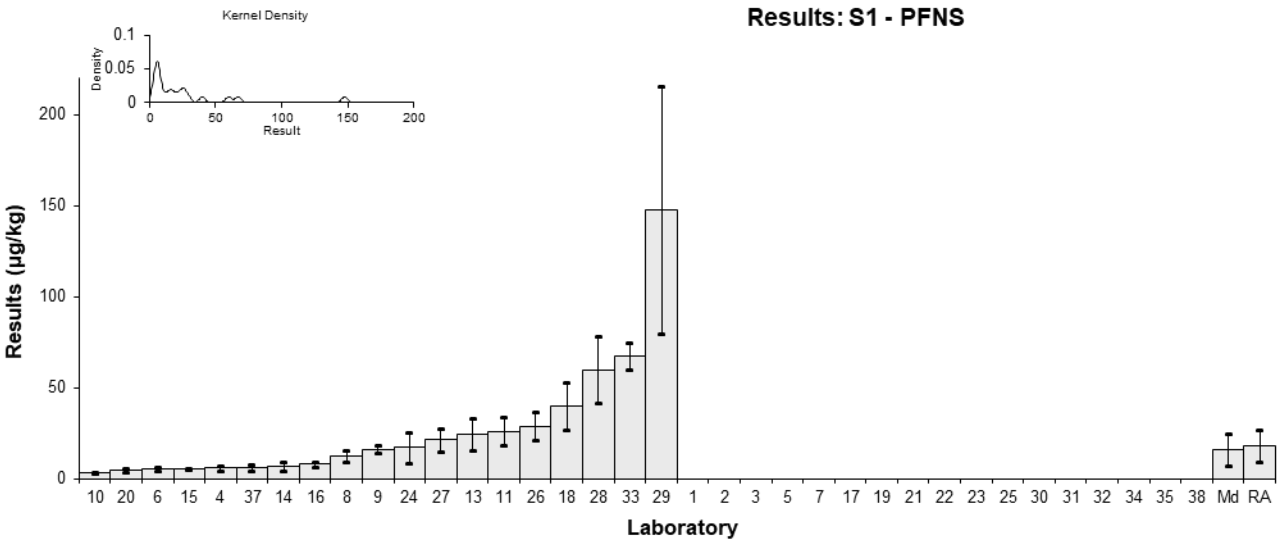

Results: S1 - PFNS
Kernel Density
Density
0.1
0.05
0
0
50
100
150
200
Result
Results (µg/kg)
200
150
100
50
0
10 20 6 15 4 37 14 16 8 9 24 27 13 11 26 18 28 33 29 1 2 3 5 7 17 19 21 22 23 25 30 31 32 34 35 38 Md RA
Laboratory

Figure 9

Table 13

Sample Details

Sample No.	S1
Matrix	Soil
Analyte	PFDS
Unit	µg/kg

Participant Results

Lab. Code	Result	Uncertainty	Rec
1	16.1	3.2	118.9
2	NS	NS	NS
3	14	4	92
4	2.2	0.50	NT
5	NT	NT	NT
6	2.37	0.561	62
7	NR	NR	NR
8	4.629	1.11	23
9	7.0	0.7	NT
10	1.6	0.39	84
11	8.06	2.4	75
13	3.86	1.410	NR
14	<5	NR	140
15	3.2987	0.191	54
16	3.2	0.48	NR
17	2.951	0.620	NR
18	16	5	104
19	14.8	4.8	92
20	2.24	0.783	104
21	<50	NR	NR
22	<1.34	NR	93
23	10.7	1.16	96.97
24	13	6.5	NR
25	NR	NR	NR
26	8.8	2.4	88
27	9.552	2.866	NR
28	38.6	11.2	90
29	9.52	3.72	NR
30	11.3	1.3	NR
31	13.11	2.99	100.1
32	<0.4	NR	67
33	3.38	0.15	112
34	NR	NR	NR
35	19.93	3.29	100
37	2.35	0.705	55
38	NS	NS	NS

Statistics

Assigned Value	Not Set	
Spike Value	Not Spiked	
Robust Average	8.5	3.1
Median	8.4	3.8
Mean	9.3	
N	26	
Max	38.6	
Min	1.6	
Robust SD	6.3	
Robust CV	74%	

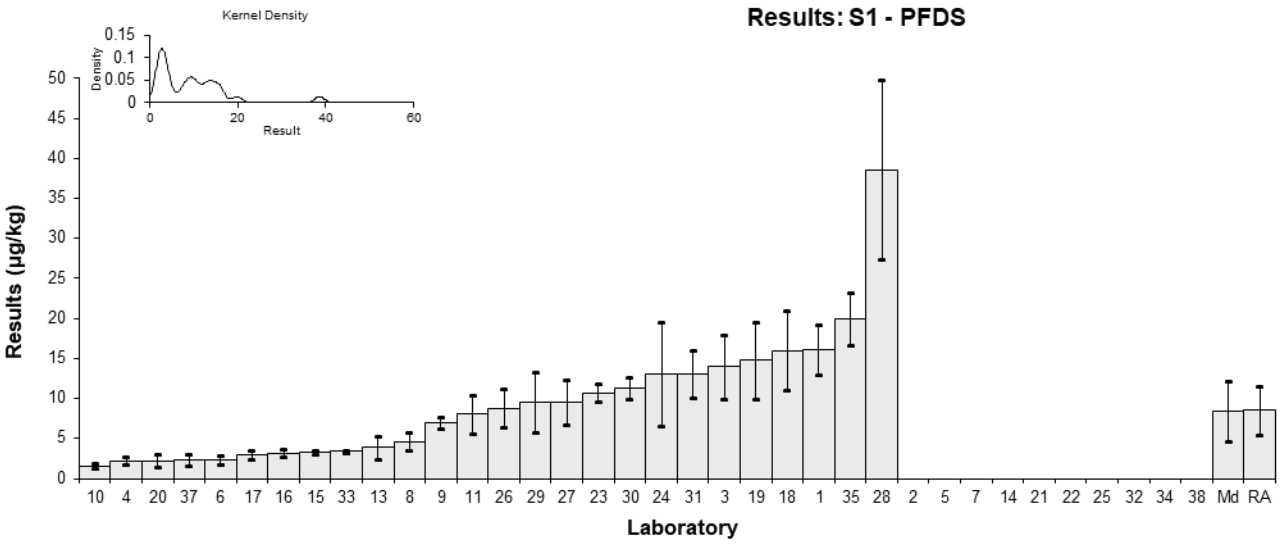

Results: S1 - PFDS
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
10 4 20 37 6 17 16 15 33 13 8 9 11 26 29 27 23 30 24 31 3 19 18 1 35 28 2 5 7 14 21 22 25 32 34 38 Md RA

Figure 10

Table 14

Sample Details

Sample No.	S1
Matrix	Soil
Analyte	PFBA
Unit	µg/kg

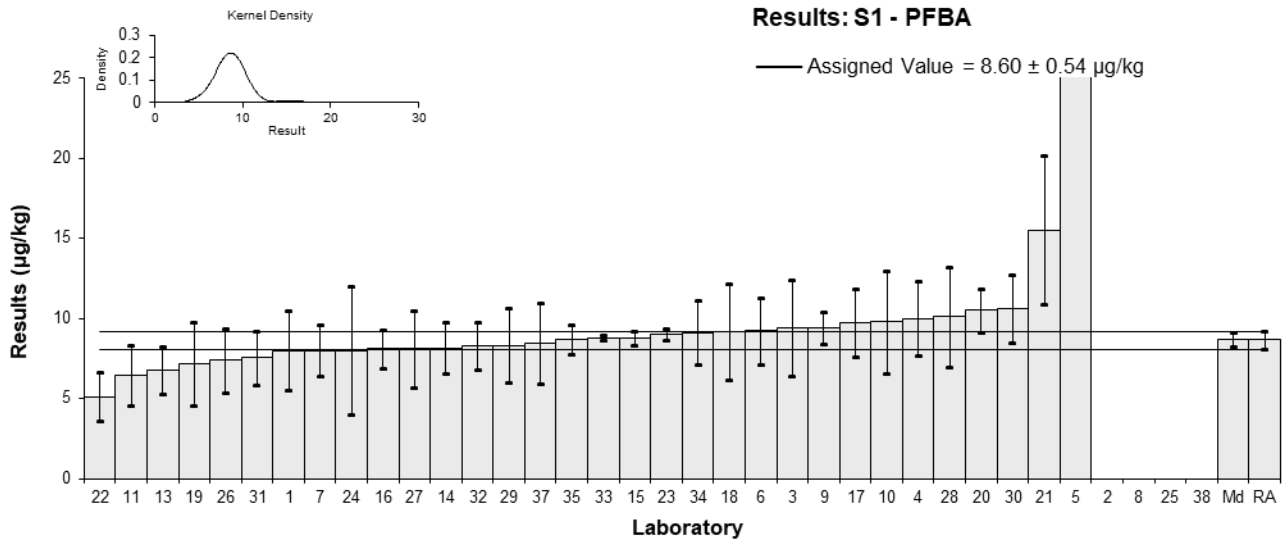
Participant Results

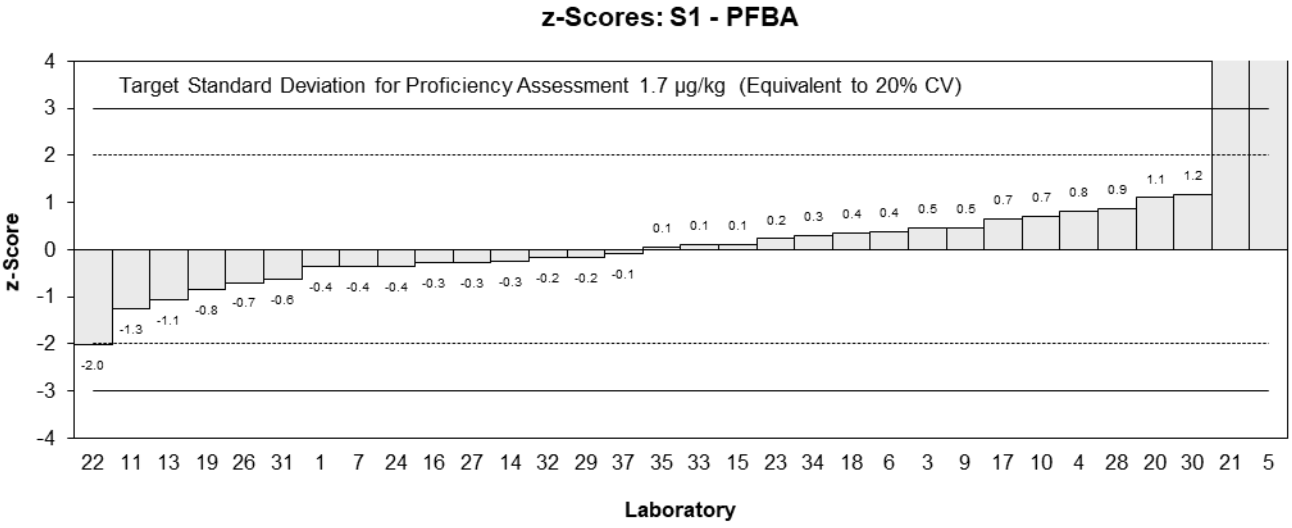
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	8	2.5	109.07	-0.35	-0.23
2	NS	NS	NS		
3	9.4	3	90	0.47	0.26
4	10	2.3	NT	0.81	0.59
5**	1350.29835666	101.812110180	NR	780.06	13.18
6	9.23	2.06	66	0.37	0.30
7	8	1.6	NR	-0.35	-0.36
8	NT	NT	13		
9	9.4	1	NT	0.47	0.70
10	9.8	3.2	111	0.70	0.37
11	6.44	1.9	77	-1.26	-1.09
13	6.78	1.490	104	-1.06	-1.15
14	8.17	1.59	125	-0.25	-0.26
15	8.7942	0.441	92	0.11	0.28
16	8.1	1.2	72	-0.29	-0.38
17	9.732	2.122	NR	0.66	0.52
18	9.2	3	94	0.35	0.20
19	7.15	2.6	148	-0.84	-0.55
20	10.5	1.37	102	1.10	1.29
21*	15.53	4.66	NR	4.03	1.48
22	5.1	1.53	63	-2.03	-2.16
23	9	0.387	90.58	0.23	0.60
24	8	4	99	-0.35	-0.15
25	NR	NR	NR		
26	7.4	2.0	81	-0.70	-0.58
27	8.102	2.431	98	-0.29	-0.20
28	10.1	3.1	110	0.87	0.48
29	8.31	2.32	88.4	-0.17	-0.12
30	10.6	2.1	NR	1.16	0.92
31	7.54	1.67	123.86	-0.62	-0.60
32	8.30	1.49	118	-0.17	-0.19
33	8.79	0.177	101	0.11	0.33
34	9.105	1.995	87	0.29	0.24
35	8.7	0.9	112	0.06	0.10
37	8.44	2.532	77	-0.09	-0.06
38	NS	NS	NS		

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	8.60	0.54
Spike Value	Not Spiked	
Robust Average	8.67	0.57
Median	8.70	0.47
Mean	8.76	
N	31	
Max	15.53	
Min	5.1	
Robust SD	1.3	
Robust CV	15%	


Kernel Density
Density
Result
Results: S1 - PFBA
Assigned Value = 8.60 ± 0.54 µg/kg
Results (µg/kg)
Laboratory
22 11 13 19 26 31 1 7 24 16 27 14 32 29 37 35 33 15 23 34 18 6 3 9 17 10 4 28 20 30 21 5 2 8 25 38 Md RA


z-Scores: S1 - PFBA
Target Standard Deviation for Proficiency Assessment 1.7 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 11 13 19 26 31 1 7 24 16 27 14 32 29 37 35 33 15 23 34 18 6 3 9 17 10 4 28 20 30 21 5

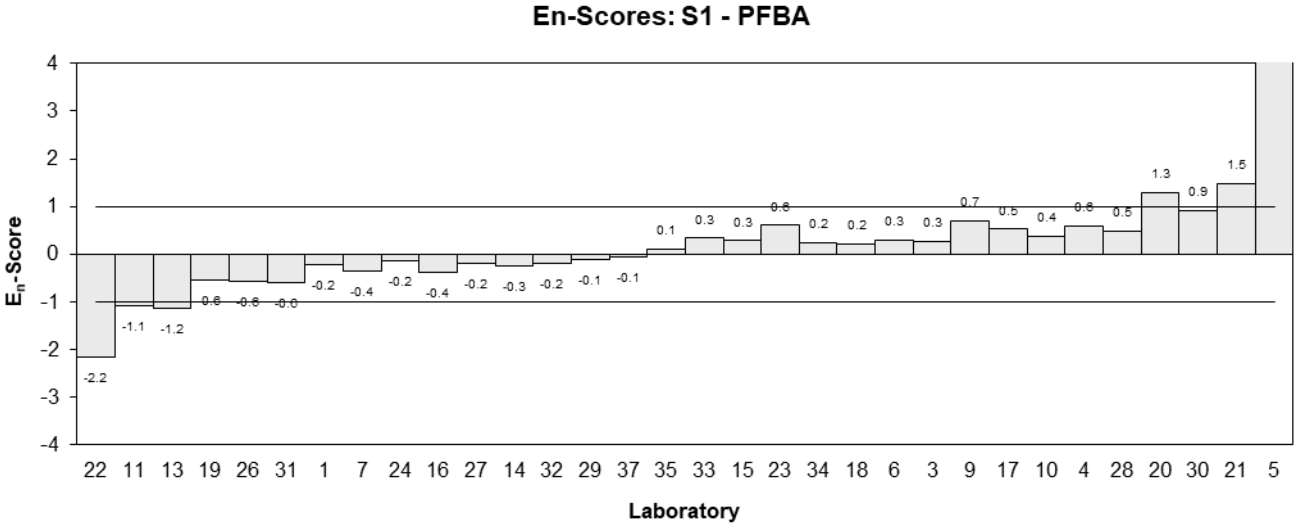

En-Scores: S1 - PFBA
En-Score
Laboratory
22 11 13 19 26 31 1 7 24 16 27 14 32 29 37 35 33 15 23 34 18 6 3 9 17 10 4 28 20 30 21 5

Figure 11

Table 15

Sample Details

Sample No.	S1
Matrix	Soil
Analyte	PFPeA
Unit	µg/kg

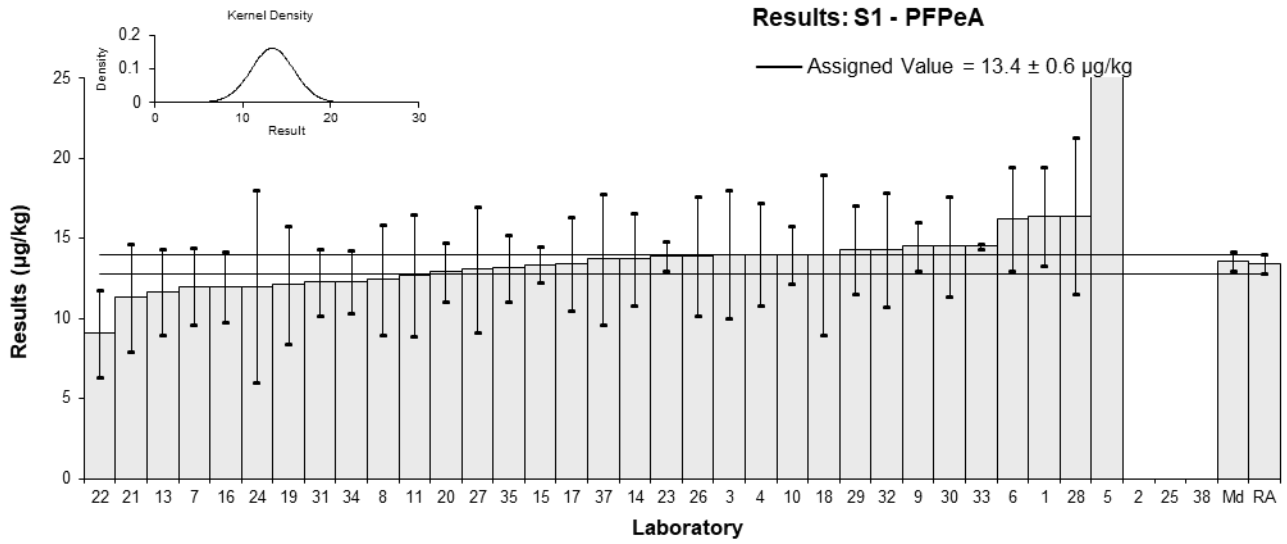
Participant Results

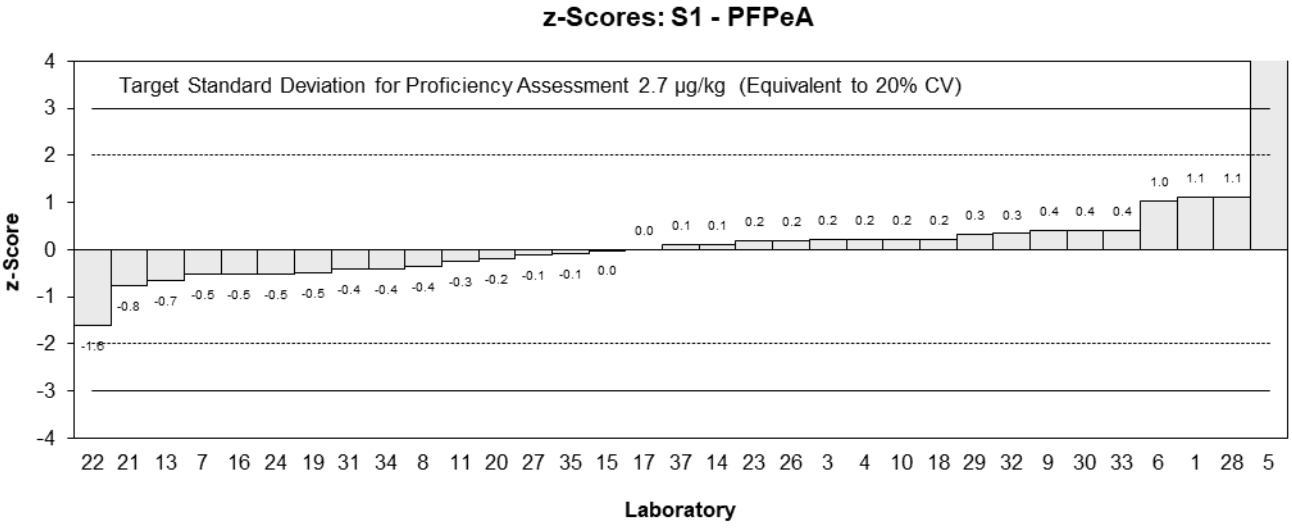
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	16.4	3.1	104.07	1.12	0.95
2	NS	NS	NS		
3	14	4	89	0.22	0.15
4	14	3.2	NT	0.22	0.18
5**	1269.02697666	436.216889977	NR	468.52	2.88
6	16.2	3.23	74	1.04	0.85
7	12	2.4	NR	-0.52	-0.57
8	12.418	3.48	48	-0.37	-0.28
9	14.5	1.5	NT	0.41	0.68
10	14	1.8	115	0.22	0.32
11	12.7	3.8	79	-0.26	-0.18
13	11.64	2.660	97	-0.66	-0.65
14	13.705	2.90	130	0.11	0.10
15	13.349	1.110	71	-0.02	-0.04
16	12	2.2	72	-0.52	-0.61
17	13.40	2.92	NR	0.00	0.00
18	14	5	96	0.22	0.12
19	12.1	3.7	121	-0.49	-0.35
20	12.9	1.81	118	-0.19	-0.26
21	11.3	3.39	NR	-0.78	-0.61
22	9.08	2.72	63	-1.61	-1.55
23	13.9	0.9	92.93	0.19	0.46
24	12	6	99	-0.52	-0.23
25	NR	NR	NR		
26	13.9	3.7	85	0.19	0.13
27	13.09	3.927	103	-0.12	-0.08
28	16.4	4.9	112	1.12	0.61
29	14.29	2.77	76	0.33	0.31
30	14.5	3.1	NR	0.41	0.35
31	12.27	2.06	104.15	-0.42	-0.53
32	14.3	3.6	110	0.34	0.25
33	14.5	0.14	104	0.41	1.79
34	12.312	1.98	87	-0.41	-0.53
35	13.15	2.06	88	-0.09	-0.12
37	13.7	4.11	76	0.11	0.07
38	NS	NS	NS		

** Gross Error, see Section 4.2

Statistics

Assigned Value	13.4	0.6
Spike Value	Not Spiked	
Robust Average	13.4	0.6
Median	13.6	0.6
Mean	13.4	
N	32	
Max	16.4	
Min	9.08	
Robust SD	1.3	
Robust CV	10%	


Kernel Density
Density
Result
Results: S1 - PFPeA
Assigned Value = 13.4 ± 0.6 µg/kg
Results (µg/kg)
Laboratory
22 21 13 7 16 24 19 31 34 8 11 20 27 35 15 17 37 14 23 26 3 4 10 18 29 32 9 30 33 6 1 28 5 2 25 38 Md RA


z-Scores: S1 - PFPeA
Target Standard Deviation for Proficiency Assessment 2.7 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 21 13 7 16 24 19 31 34 8 11 20 27 35 15 17 37 14 23 26 3 4 10 18 29 32 9 30 33 6 1 28 5

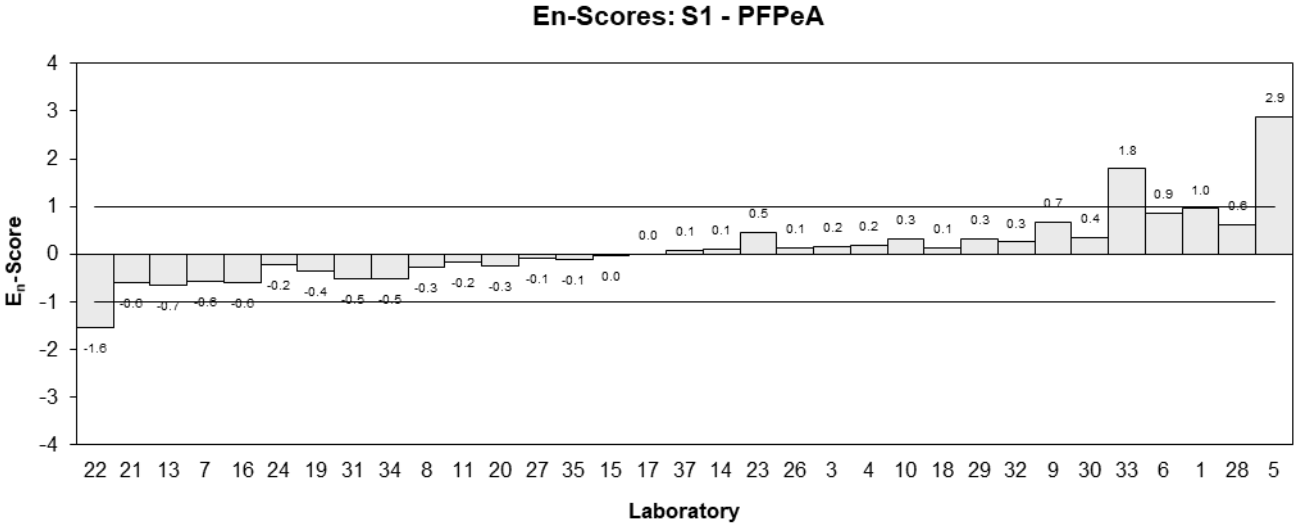

En-Scores: S1 - PFPeA
En-Score
Laboratory
22 21 13 7 16 24 19 31 34 8 11 20 27 35 15 17 37 14 23 26 3 4 10 18 29 32 9 30 33 6 1 28 5

Figure 12

Table 16

Sample Details

Sample No.	S1
Matrix	Soil
Analyte	PFHxA
Unit	µg/kg

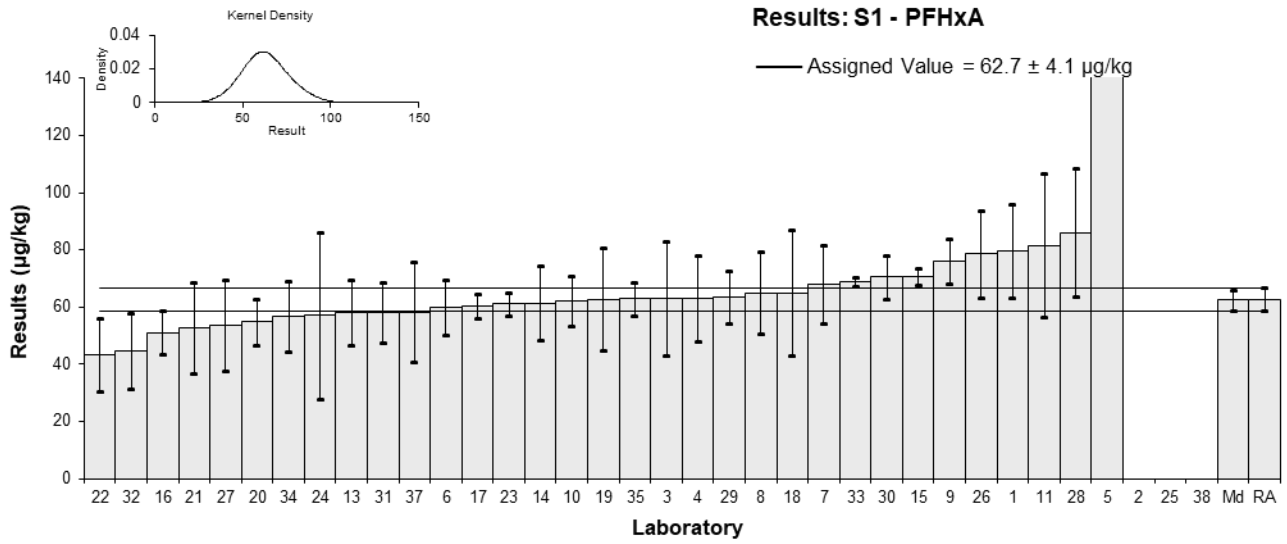
Participant Results

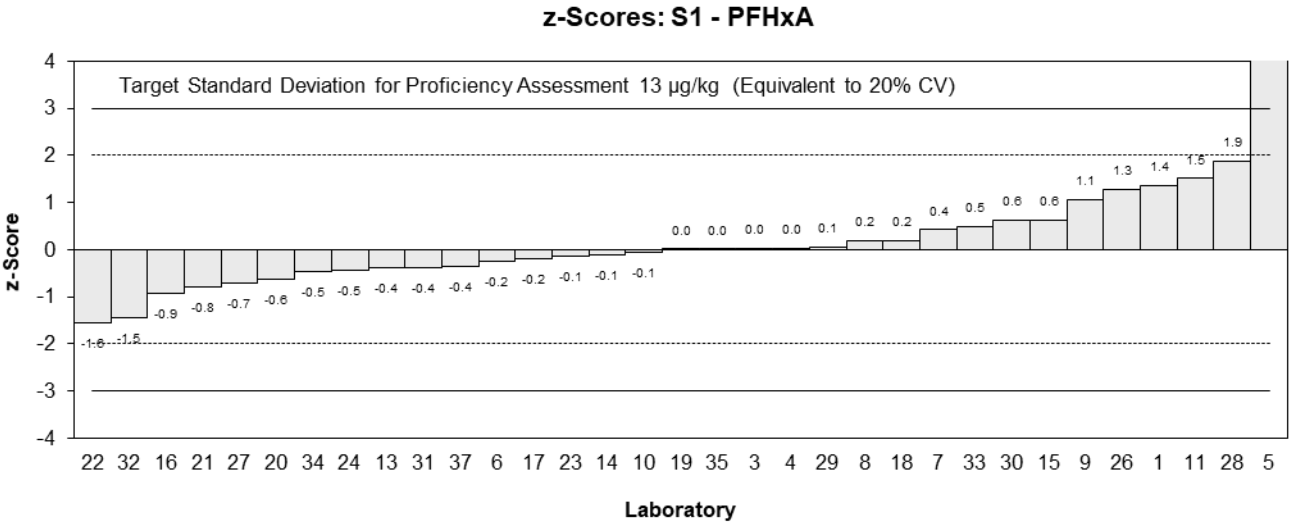
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	79.7	16.3	109.53	1.36	1.01
2	NS	NS	NS		
3	63	20	95	0.02	0.01
4	63	15	NT	0.02	0.02
5**	4353.75006333	343.257962156	NR	342.19	12.50
6	59.7	9.66	77	-0.24	-0.29
7	68	13.6	NR	0.42	0.37
8	64.919	14.3	29	0.18	0.15
9	76	8	NT	1.06	1.48
10	62	8.7	100	-0.06	-0.07
11	81.6	25	81	1.51	0.75
13	57.92	11.480	114	-0.38	-0.39
14	61.35	12.97	121	-0.11	-0.10
15	70.604	2.968	86	0.63	1.56
16	51	7.6	69	-0.93	-1.35
17	60.28	4.34	NR	-0.19	-0.41
18	65	22	95	0.18	0.10
19	62.8	18	121	0.01	0.01
20	54.8	8.22	98.9	-0.63	-0.86
21	52.78	15.83	NR	-0.79	-0.61
22	43.3	13	66	-1.55	-1.42
23	61.1	3.91	86.65	-0.13	-0.28
24	57	29	99	-0.45	-0.19
25	NR	NR	NR		
26	78.6	15.2	96	1.27	1.01
27	53.63	16.090	105	-0.72	-0.55
28	86.1	22.4	92	1.87	1.03
29	63.51	9.38	82.2	0.06	0.08
30	70.5	7.5	NR	0.62	0.91
31	57.94	10.53	104.92	-0.38	-0.42
32	44.5	13.3	88	-1.45	-1.31
33	68.81	1.48	103	0.49	1.40
34	56.75	12.245	101	-0.47	-0.46
35	62.88	5.89	120	0.01	0.03
37	58.3	17.49	75	-0.35	-0.24
38	NS	NS	NS		

** Gross Error, see Section 4.2

Statistics

Assigned Value	62.7	4.1
Spike Value	Not Spiked	
Robust Average	62.7	4.1
Median	62.4	3.6
Mean	63.0	
N	32	
Max	86.1	
Min	43.3	
Robust SD	9.3	
Robust CV	15%	


Kernel Density
Density
Result
Results: S1 - PFHxA
Assigned Value = 62.7 ± 4.1 µg/kg
Results (µg/kg)
Laboratory
22 32 16 21 27 20 34 24 13 31 37 6 17 23 14 10 19 35 3 4 29 8 18 7 33 30 15 9 26 1 11 28 5 2 25 38 Md RA


z-Scores: S1 - PFHxA
Target Standard Deviation for Proficiency Assessment 13 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 32 16 21 27 20 34 24 13 31 37 6 17 23 14 10 19 35 3 4 29 8 18 7 33 30 15 9 26 1 11 28 5

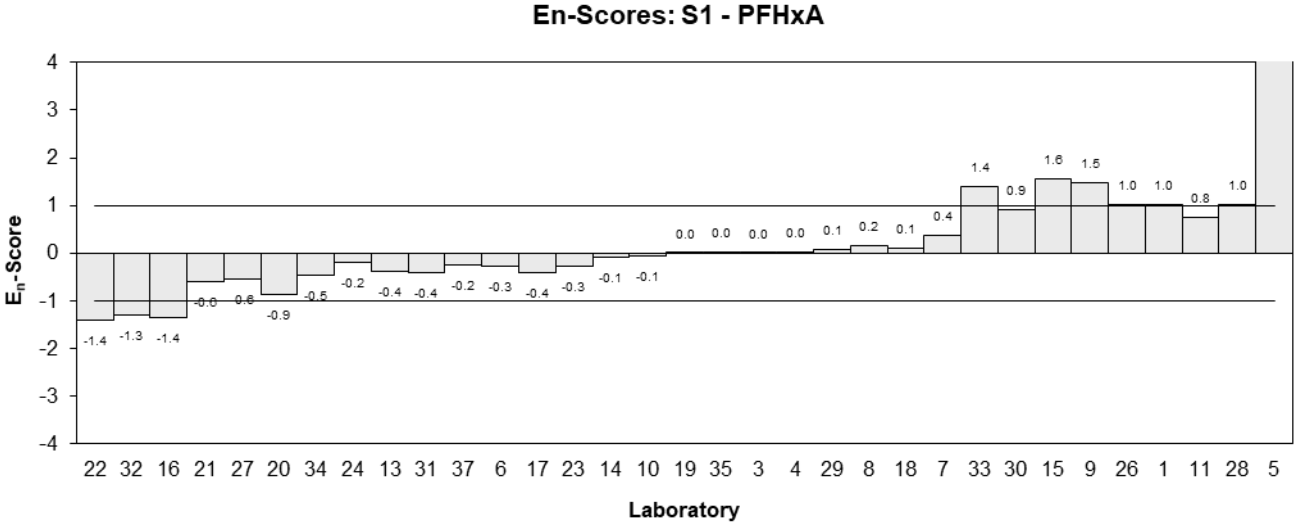

En-Scores: S1 - PFHxA
En-Score
Laboratory
22 32 16 21 27 20 34 24 13 31 37 6 17 23 14 10 19 35 3 4 29 8 18 7 33 30 15 9 26 1 11 28 5

Figure 13

Table 17

Sample Details

Sample No.	S1
Matrix	Soil
Analyte	PFHpA
Unit	µg/kg

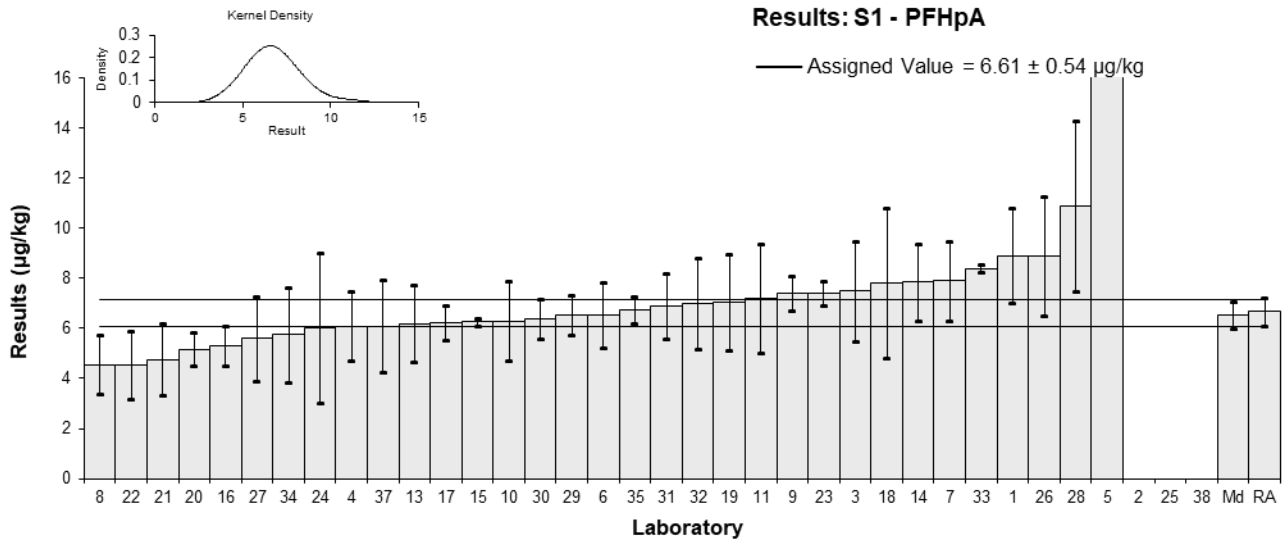
Participant Results

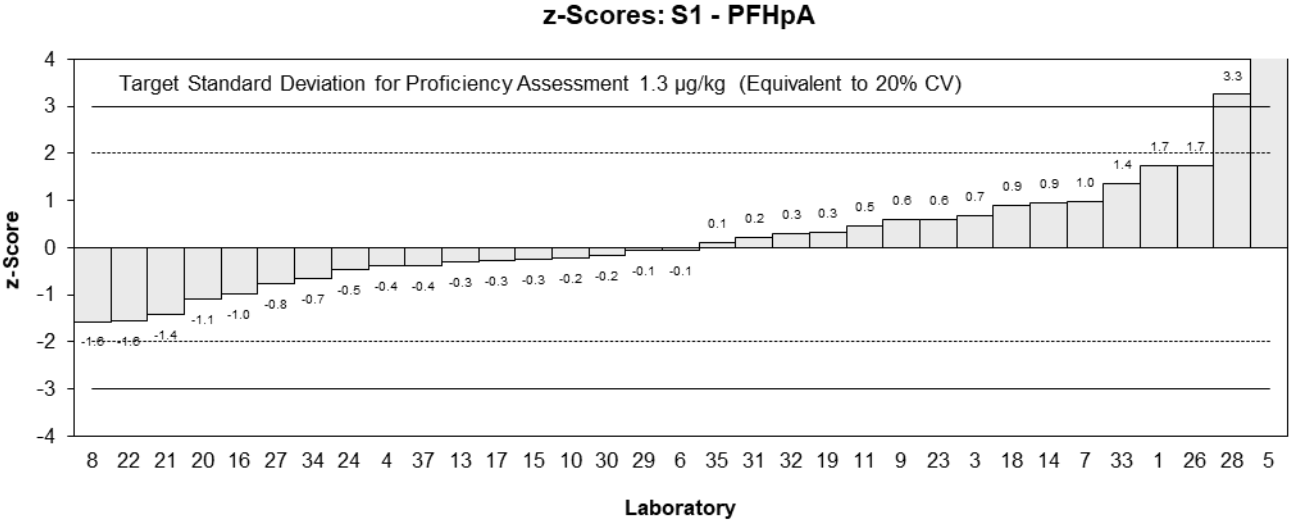
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	8.9	1.9	108.31	1.73	1.16
2	NS	NS	NS		
3	7.5	2	79	0.67	0.43
4	6.1	1.4	NT	-0.39	-0.34
5**	475.891636666	79.9506505377	NR	354.98	5.87
6	6.53	1.3	74	-0.06	-0.06
7	7.9	1.58	NR	0.98	0.77
8	4.54	1.18	65	-1.57	-1.60
9	7.4	0.7	NT	0.60	0.89
10	6.3	1.6	113	-0.23	-0.18
11	7.20	2.2	85	0.45	0.26
13	6.2	1.540	104	-0.31	-0.25
14	7.85	1.52	125	0.94	0.77
15	6.2610	0.136	89	-0.26	-0.63
16	5.3	0.79	72	-0.99	-1.37
17	6.233	0.686	NR	-0.29	-0.43
18	7.8	3	91	0.90	0.39
19	7.05	1.9	111	0.33	0.22
20	5.16	0.671	101	-1.10	-1.68
21	4.75	1.43	NR	-1.41	-1.22
22	4.55	1.37	70	-1.56	-1.40
23	7.4	0.481	80.31	0.60	1.09
24	6	3	96	-0.46	-0.20
25	NR	NR	NR		
26	8.9	2.4	94	1.73	0.93
27	5.598	1.679	101	-0.77	-0.57
28*	10.9	3.4	71	3.25	1.25
29	6.52	0.80	73.3	-0.07	-0.09
30	6.37	0.8	NR	-0.18	-0.25
31	6.89	1.3	104.72	0.21	0.20
32	7.00	1.8	114	0.30	0.21
33	8.39	0.15	89	1.35	3.18
34	5.752	1.902	101	-0.65	-0.43
35	6.74	0.56	121	0.10	0.17
37	6.10	1.83	75	-0.39	-0.27
38	NS	NS	NS		

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	6.61	0.54
Spike Value	Not Spiked	
Robust Average	6.67	0.57
Median	6.53	0.54
Mean	6.75	
N	32	
Max	10.9	
Min	4.54	
Robust SD	1.3	
Robust CV	19%	


Kernel Density
Density
Result
Results: S1 - PFHpA
Assigned Value = 6.61 ± 0.54 µg/kg
Results (µg/kg)
Laboratory
8 22 21 20 16 27 34 24 4 37 13 17 15 10 30 29 6 35 31 32 19 11 9 23 3 18 14 7 33 1 26 28 5 2 25 38 Md RA


z-Scores: S1 - PFHpA
Target Standard Deviation for Proficiency Assessment 1.3 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
8 22 21 20 16 27 34 24 4 37 13 17 15 10 30 29 6 35 31 32 19 11 9 23 3 18 14 7 33 1 26 28 5

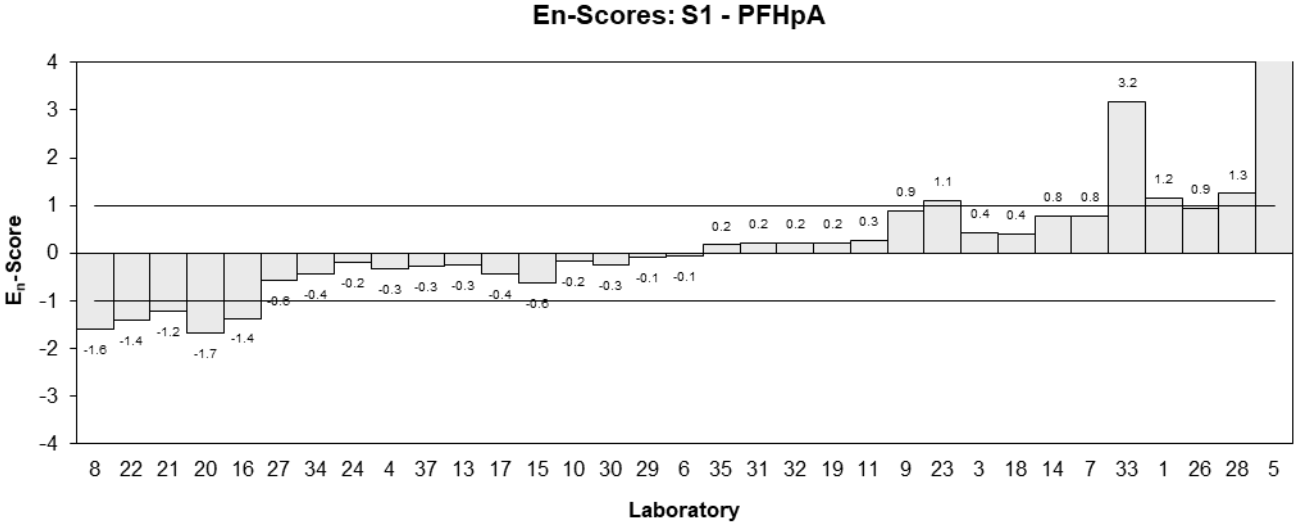

En-Scores: S1 - PFHpA
En-Score
Laboratory
8 22 21 20 16 27 34 24 4 37 13 17 15 10 30 29 6 35 31 32 19 11 9 23 3 18 14 7 33 1 26 28 5

Figure 14

Table 18

Sample Details

Sample No.	S1
Matrix	Soil
Analyte	PFOA
Unit	µg/kg

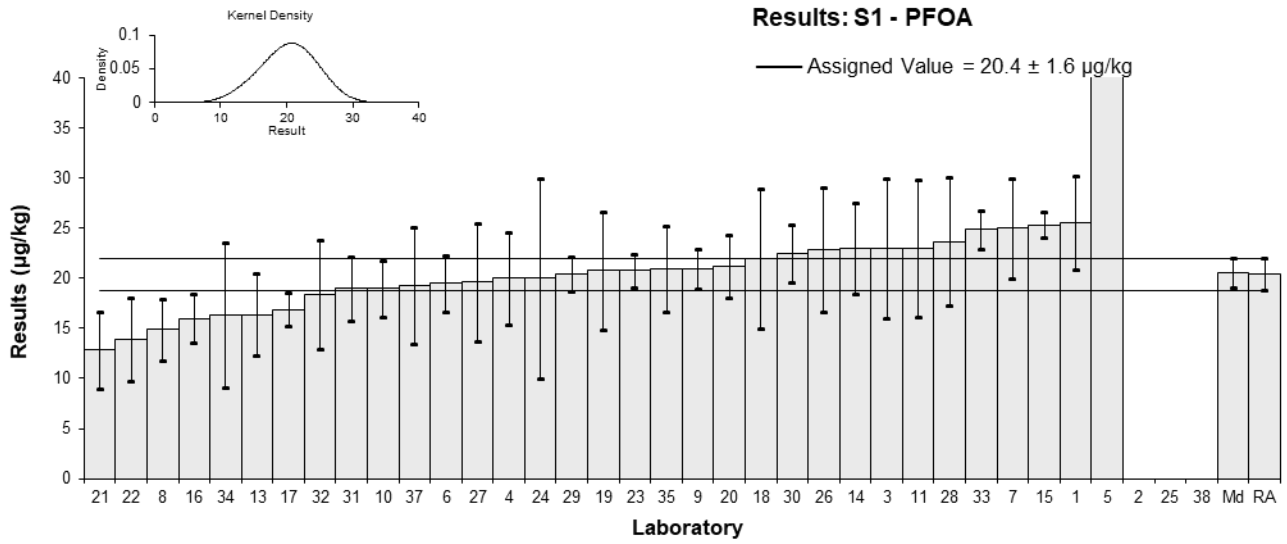
Participant Results

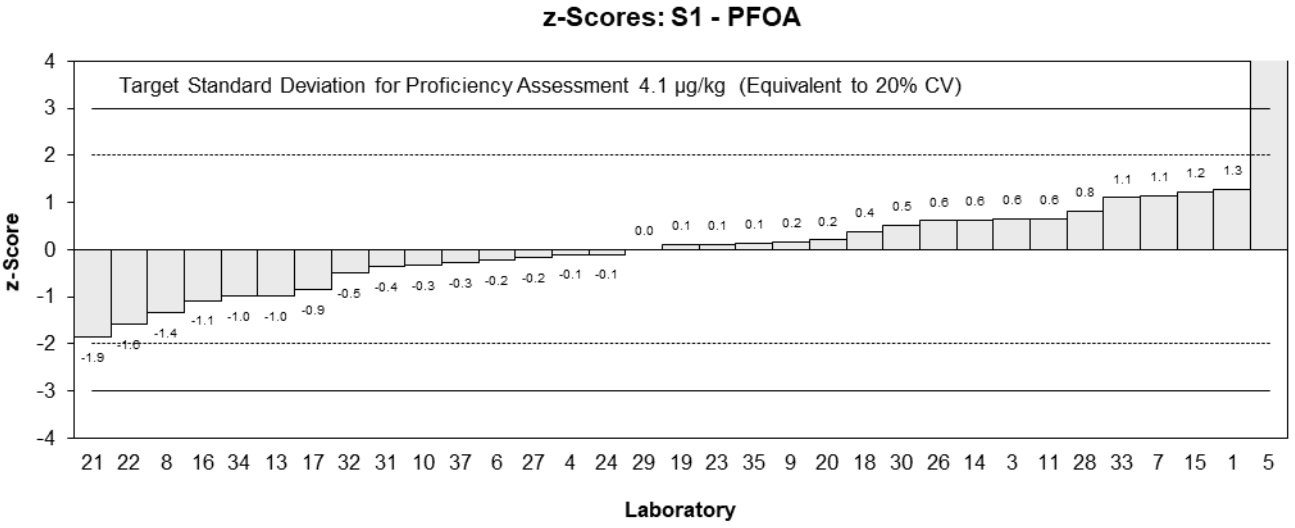
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	25.6	4.7	101.56	1.27	1.05
2	NS	NS	NS		
3	23	7	84	0.64	0.36
4	20	4.6	115	-0.10	-0.08
5**	7641.44657	3141.43350853	NR	1,867.90	2.43
6	19.5	2.8	79	-0.22	-0.28
7	25	5	NR	1.13	0.88
8	14.872	3.12	83	-1.35	-1.58
9	21	2	91	0.15	0.23
10	19	2.8	105	-0.34	-0.43
11	23.0	6.9	86	0.64	0.37
13	16.4	4.060	104	-0.98	-0.92
14	22.99	4.59	123	0.63	0.53
15	25.360	1.307	96	1.22	2.40
16	16	2.4	72	-1.08	-1.53
17	16.90	1.66	NR	-0.86	-1.52
18	22	7	95	0.39	0.22
19	20.8	5.9	108	0.10	0.07
20	21.2	3.18	101	0.20	0.22
21	12.85	3.86	NR	-1.85	-1.81
22	13.9	4.17	81	-1.59	-1.46
23	20.8	1.66	93.53	0.10	0.17
24	20	10	99	-0.10	-0.04
25	NR	NR	NR		
26	22.9	6.2	89	0.61	0.39
27	19.66	5.899	114	-0.18	-0.12
28	23.7	6.4	59	0.81	0.50
29	20.40	1.72	110.6	0.00	0.00
30	22.5	2.9	NR	0.51	0.63
31	18.99	3.18	112.58	-0.35	-0.40
32	18.4	5.5	102	-0.49	-0.35
33	24.88	1.92	95	1.10	1.79
34	16.39	7.254	103	-0.98	-0.54
35	20.97	4.27	99	0.14	0.13
37	19.3	5.79	78	-0.27	-0.18
38	NS	NS	NS		

** Gross Error, see Section 4.2

Statistics

Assigned Value	20.4	1.6
Spike Value	Not Spiked	
Robust Average	20.4	1.6
Median	20.6	1.5
Mean	20.3	
N	32	
Max	25.6	
Min	12.85	
Robust SD	3.5	
Robust CV	17%	


Kernel Density
Density
Result
Results: S1 - PFOA
Assigned Value = 20.4 ± 1.6 µg/kg
Results (µg/kg)
Laboratory
21 22 8 16 34 13 17 32 31 10 37 6 27 4 24 29 19 23 35 9 20 18 30 26 14 3 11 28 33 7 15 1 5 2 25 38 Md RA


z-Scores: S1 - PFOA
Target Standard Deviation for Proficiency Assessment 4.1 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
21 22 8 16 34 13 17 32 31 10 37 6 27 4 24 29 19 23 35 9 20 18 30 26 14 3 11 28 33 7 15 1 5

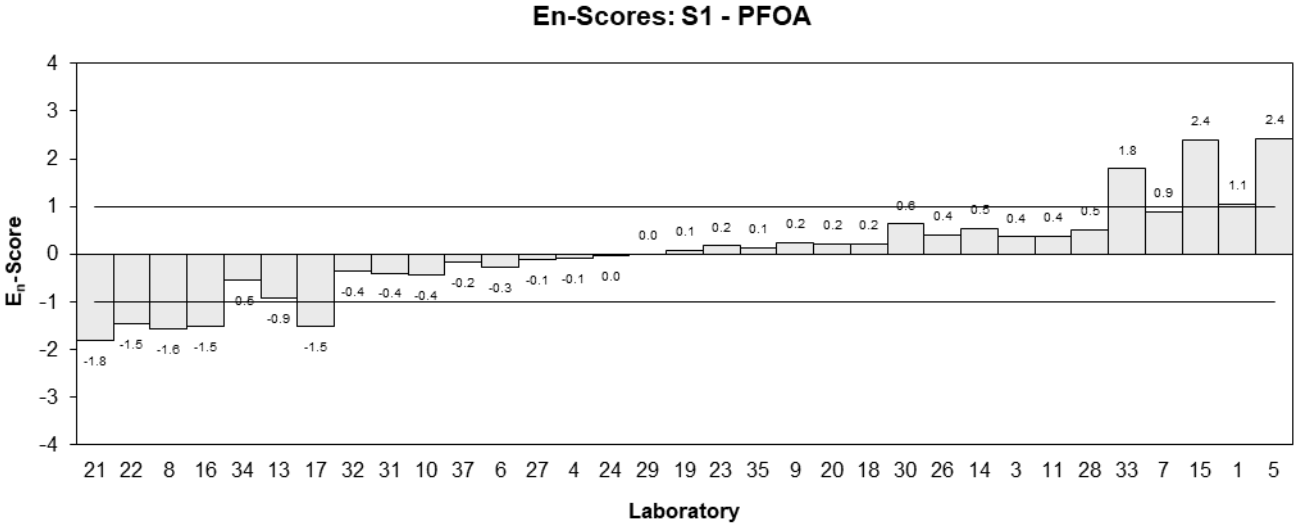

En-Scores: S1 - PFOA
En-Score
Laboratory
21 22 8 16 34 13 17 32 31 10 37 6 27 4 24 29 19 23 35 9 20 18 30 26 14 3 11 28 33 7 15 1 5

Figure 15

Table 19

Sample Details

Sample No.	S1
Matrix	Soil
Analyte	PFNA
Unit	µg/kg

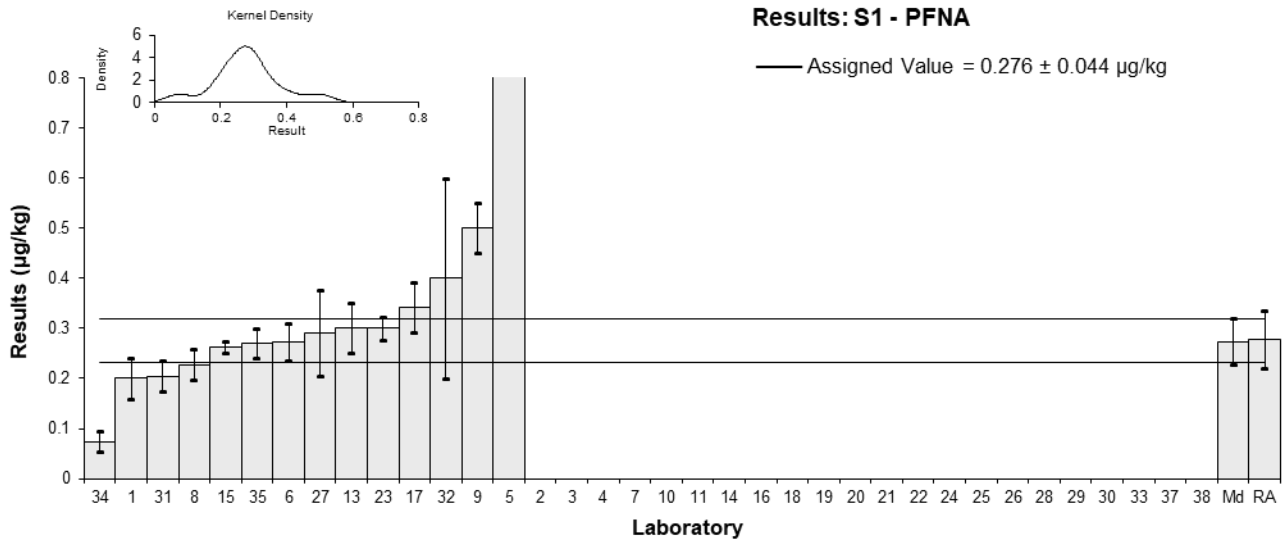
Participant Results

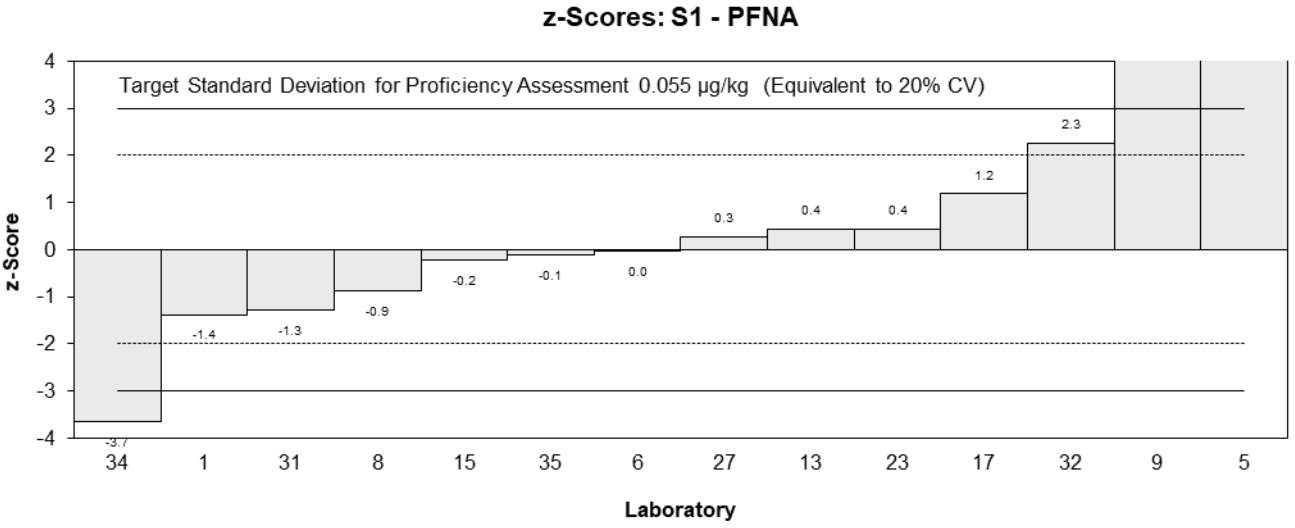
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.2	0.04	91.63	-1.38	-1.28
2	NS	NS	NS		
3	<1	NR	52		
4	< 1	NR	NT		
5**	23.6983433333	12.3740967645	NR	424.32	1.89
6	0.274	0.037	65	-0.04	-0.03
7	NR	NR	NR		
8	0.228	0.03	73	-0.87	-0.90
9*	0.50	0.05	NT	4.06	3.36
10	< 1.0	NR	57		
11	<0.5	NR	78		
13	0.3	0.050	109	0.43	0.36
14	<5	NR	134		
15	0.2632	0.011	67	-0.23	-0.28
16	NR	NR	NR		
17	0.3412	0.0498	NR	1.18	0.98
18	<1	NR	60		
19	<0.5	NR	97		
20	<1.93	0.27	106		
21	<50	NR	NR		
22	<1.34	NR	47		
23	0.3	0.022	29.3	0.43	0.49
24	< 1	0.5	117		
25	NR	NR	NR		
26	<0.5	NR	88		
27	0.291	0.087	103	0.27	0.15
28	<2	NR	54		
29	NR	NR	79.8		
30	<1	NR	NR		
31	0.205	0.03	90.4	-1.29	-1.33
32	0.40	0.20	95	2.25	0.61
33	< 0.2	NR	38		
34*	0.074	0.021	103	-3.66	-4.14
35	0.27	0.03	99	-0.11	-0.11
37	<1.95	0.585	48		
38	NS	NS	NS		

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.276	0.044
Spike Value	Not Spiked	
Robust Average	0.279	0.058
Median	0.274	0.047
Mean	0.280	
N	13	
Max	0.5	
Min	0.074	
Robust SD	0.084	
Robust CV	30%	


Kernel Density
Density
Result
Results: S1 - PFNA
Assigned Value = 0.276 ± 0.044 µg/kg
Results (µg/kg)
Laboratory
34 1 31 8 15 35 6 27 13 23 17 32 9 5 2 3 4 7 10 11 14 16 18 19 20 21 22 24 25 26 28 29 30 33 37 38 Md RA


z-Scores: S1 - PFNA
Target Standard Deviation for Proficiency Assessment 0.055 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
34 1 31 8 15 35 6 27 13 23 17 32 9 5
-3.7 -1.4 -1.3 -0.9 -0.2 -0.1 0.0 0.3 0.4 0.4 1.2 2.3

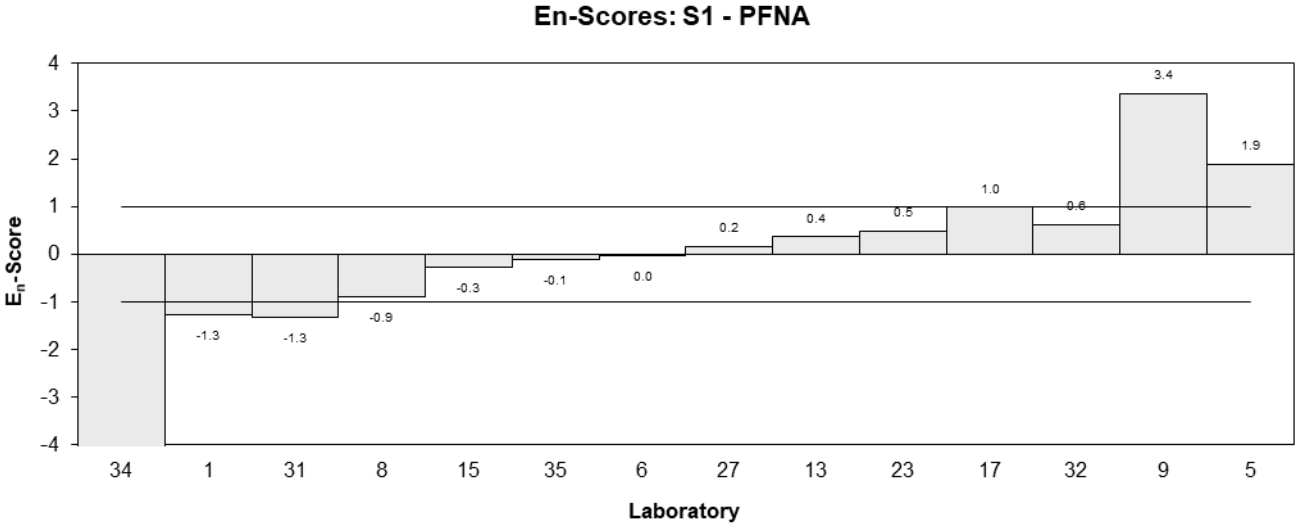

En-Scores: S1 - PFNA
En-Score
Laboratory
34 1 31 8 15 35 6 27 13 23 17 32 9 5
-1.3 -1.3 -0.9 -0.3 -0.1 0.0 0.2 0.4 0.5 1.0 0.6 3.4 1.9

Figure 16

Table 20

Sample Details

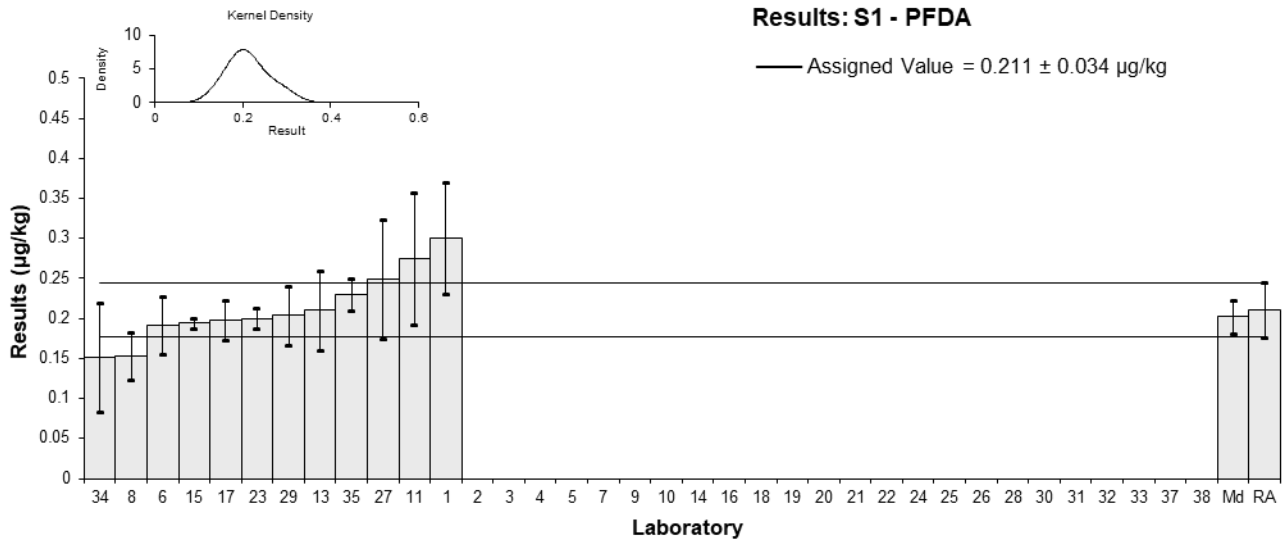
Sample No.	S1
Matrix	Soil
Analyte	PFDA
Unit	µg/kg

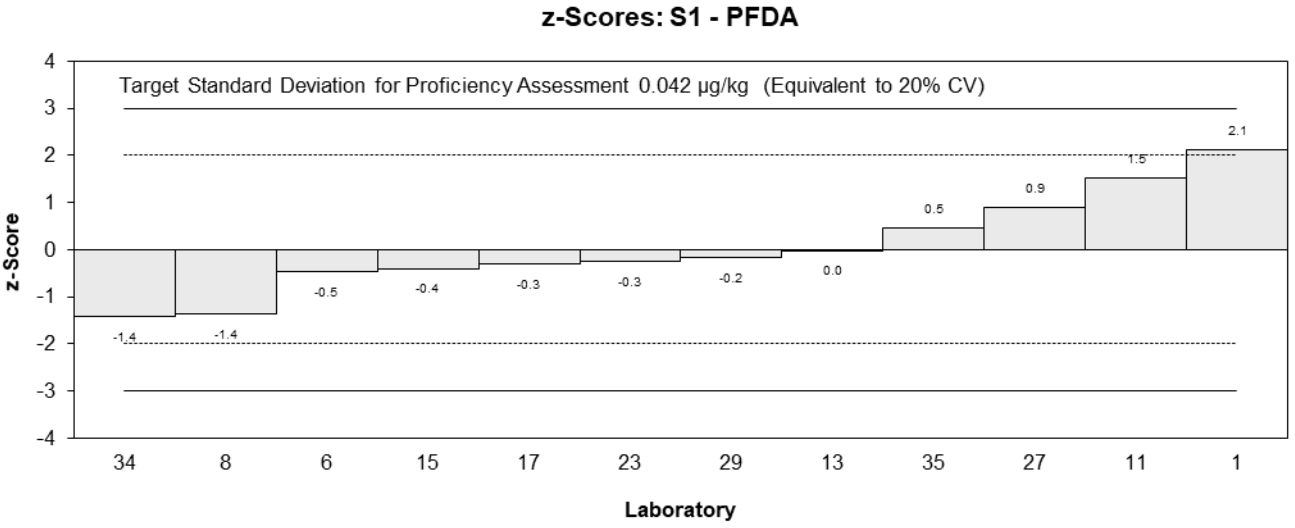
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.3	0.07	118.9	2.11	1.14
2	NS	NS	NS		
3	<0.5	NR	92		
4	< 1	NR	NT		
5	NR	NR	NR		
6	0.191	0.036	74	-0.47	-0.40
7	NR	NR	NR		
8	0.153	0.03	74	-1.37	-1.28
9	<1	NR	80		
10	< 1.0	NR	120		
11	0.275	0.083	80	1.52	0.71
13	0.21	0.050	79	-0.02	-0.02
14	<5	NR	128		
15	0.1940	0.007	83	-0.40	-0.49
16	NR	NR	NR		
17	0.1983	0.0246	NR	-0.30	-0.30
18	<0.5	NR	98		
19	<0.5	NR	104		
20	<1.93	0.327	97.7		
21	<50	NR	NR		
22	<1.34	NR	82		
23	0.2	0.013	106.84	-0.26	-0.30
24	< 1	0.5	100		
25	NR	NR	NR		
26	<0.5	NR	97		
27	0.249	0.075	94	0.90	0.46
28	<2	NR	94		
29	0.204	0.037	117	-0.17	-0.14
30	<1	NR	NR		
31	<0.2	NR	115.99		
32	<0.4	NR	106		
33	< 0.2	NR	89		
34	0.151	0.068	144	-1.42	-0.79
35	0.23	0.02	120	0.45	0.48
37	<1.95	0.585	73		
38	NS	NS	NS		

Statistics

Assigned Value	0.211	0.034
Spike Value	Not Spiked	
Robust Average	0.211	0.034
Median	0.202	0.021
Mean	0.213	
N	12	
Max	0.3	
Min	0.151	
Robust SD	0.047	
Robust CV	22%	


Kernel Density
Density
Result
Results: S1 - PFDA
Assigned Value = 0.211 ± 0.034 µg/kg
Results (µg/kg)
Laboratory
34 8 6 15 17 23 29 13 35 27 11 1 2 3 4 5 7 9 10 14 16 18 19 20 21 22 24 25 26 28 30 31 32 33 37 38 Md RA


z-Scores: S1 - PFDA
Target Standard Deviation for Proficiency Assessment 0.042 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
34 8 6 15 17 23 29 13 35 27 11 1
-1.4 -1.4 -0.5 -0.4 -0.3 -0.3 -0.2 0.0 0.5 0.9 1.5 2.1

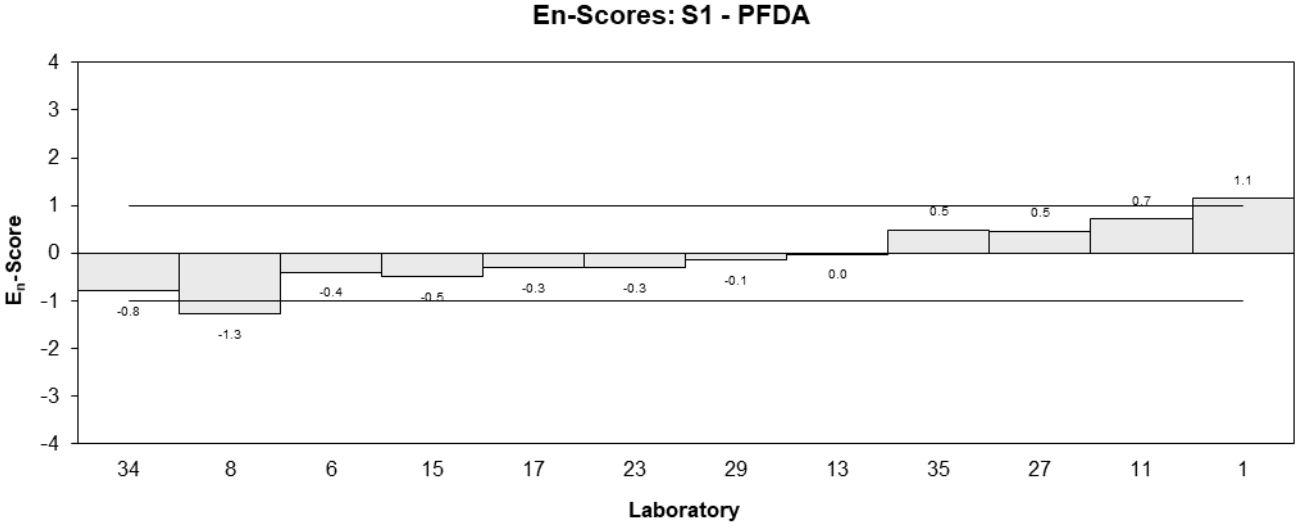

En-Scores: S1 - PFDA
En-Score
Laboratory
34 8 6 15 17 23 29 13 35 27 11 1
-0.8 -1.3 -0.4 -0.5 -0.3 -0.3 -0.1 0.0 0.5 0.5 0.7 1.1

Figure 17

Table 21

Sample Details

Sample No.	S1
Matrix	Soil
Analyte	PFOSA
Unit	µg/kg

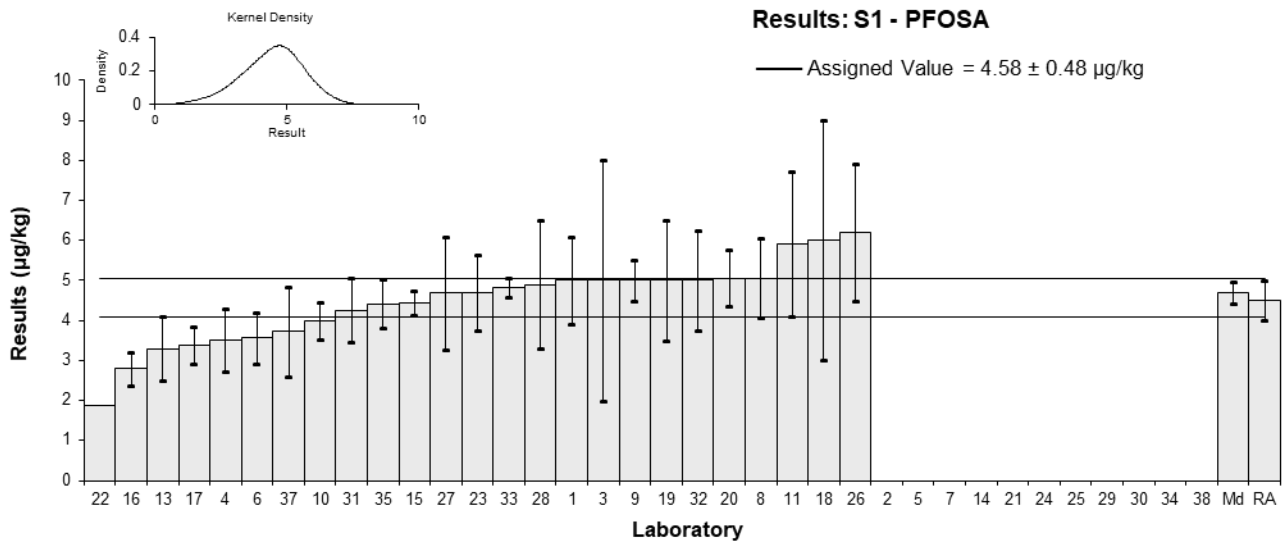
Participant Results

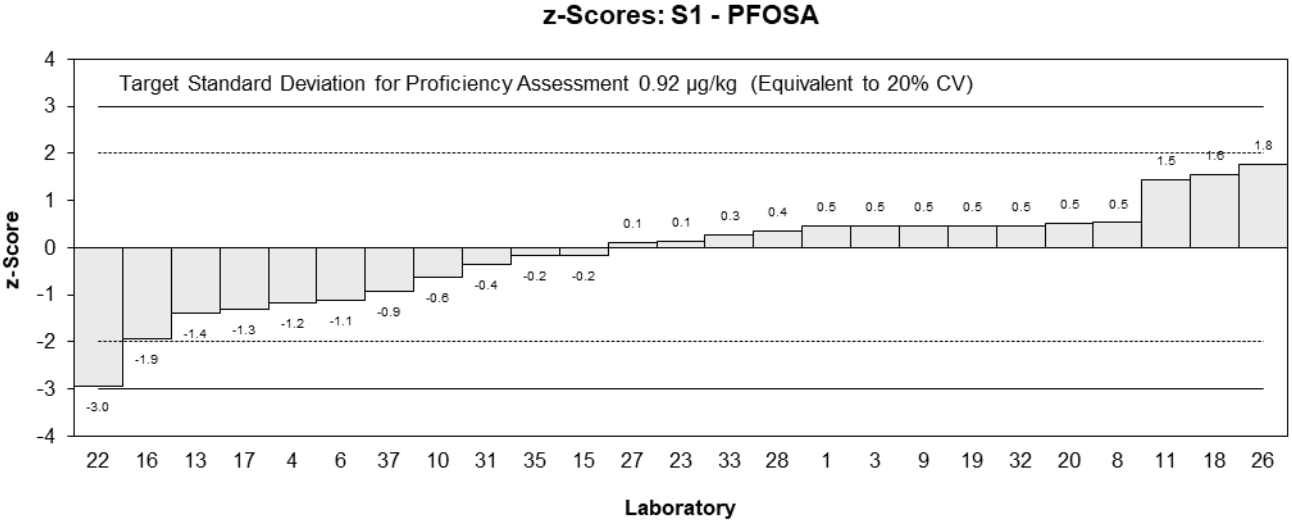
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	5.0	1.1	93.17	0.46	0.35
2	NS	NS	NS		
3	5	3	91	0.46	0.14
4	3.5	0.79	NT	-1.18	-1.17
5	NT	NT	NT		
6	3.56	0.647	78	-1.11	-1.27
7	NR	NR	NR		
8	5.061	1	72	0.53	0.43
9	5	0.5	NT	0.46	0.61
10	4.0	0.47	113	-0.63	-0.86
11	5.91	1.8	81	1.45	0.71
13	3.3	0.800	117	-1.40	-1.37
14	<5	NR	132		
15	4.4340	0.3083	81	-0.16	-0.26
16	2.8	0.42	67	-1.94	-2.79
17	3.383	0.467	NR	-1.31	-1.79
18	6	3	102	1.55	0.47
19	5	1.5	92	0.46	0.27
20	5.06	0.708	118	0.52	0.56
21	<50	NR	NR		
22*	1.88	NR	79	-2.95	-5.63
23	4.7	0.94	94.33	0.13	0.11
24	< 10	5	81		
25	NR	NR	NR		
26	6.2	1.7	100	1.77	0.92
27	4.684	1.405	107	0.11	0.07
28	4.9	1.6	61	0.35	0.19
29	NR	NR	91.2		
30	NT	NT	NT		
31	4.26	0.79	103.74	-0.35	-0.35
32	5.00	1.25	59	0.46	0.31
33	4.82	0.227	77	0.26	0.45
34	NR	NR	NR		
35	4.42	0.61	101	-0.17	-0.21
37	3.73	1.119	76	-0.93	-0.70
38	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	4.58	0.48
Spike Value	Not Spiked	
Robust Average	4.51	0.50
Median	4.70	0.27
Mean	4.46	
N	25	
Max	6.2	
Min	1.88	
Robust SD	1.0	
Robust CV	22%	


Results: S1 - PFOSA
Kernel Density
Density
Result
Assigned Value = 4.58 ± 0.48 µg/kg
Results (µg/kg)
22 16 13 17 4 6 37 10 31 35 15 27 23 33 28 1 3 9 19 32 20 8 11 18 26 2 5 7 14 21 24 25 29 30 34 38 Md RA
Laboratory


z-Scores: S1 - PFOSA
Target Standard Deviation for Proficiency Assessment 0.92 µg/kg (Equivalent to 20% CV)
z-Score
-3.0 -1.9 -1.4 -1.3 -1.2 -1.1 -0.9 -0.6 -0.4 -0.2 -0.2 0.1 0.1 0.3 0.4 0.5 0.5 0.5 0.5 0.5 0.5 0.5 1.5 1.6 1.8
22 16 13 17 4 6 37 10 31 35 15 27 23 33 28 1 3 9 19 32 20 8 11 18 26
Laboratory

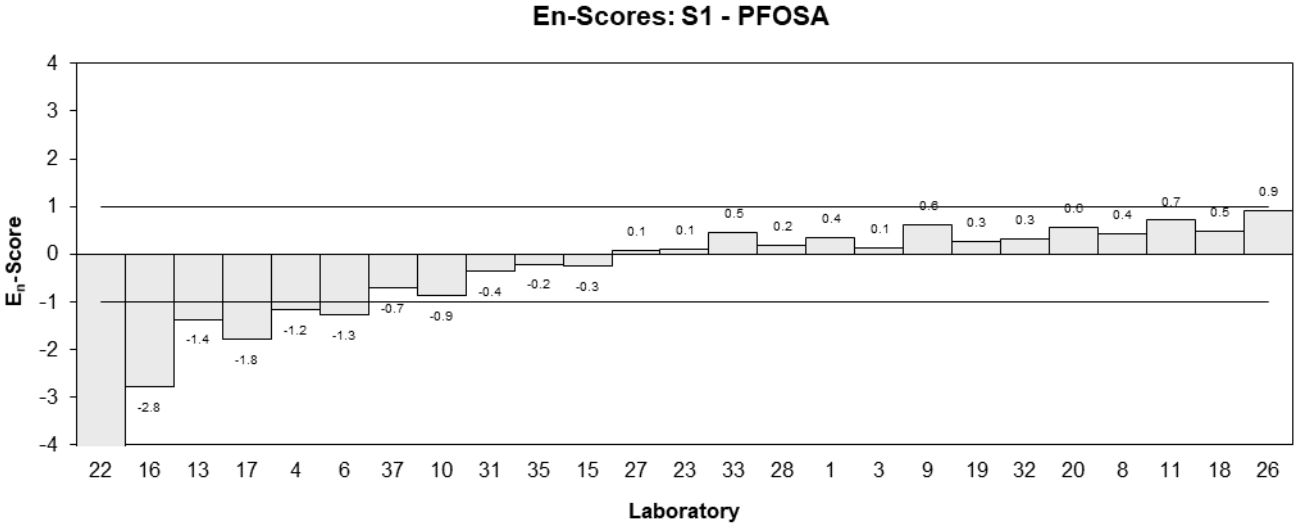

En-Scores: S1 - PFOSA
En-Score
-2.8 -1.4 -1.8 -1.2 -1.3 -0.7 -0.9 -0.4 -0.2 -0.3 0.1 0.1 0.5 0.2 0.4 0.1 0.6 0.3 0.3 0.6 0.4 0.7 0.5 0.9
22 16 13 17 4 6 37 10 31 35 15 27 23 33 28 1 3 9 19 32 20 8 11 18 26
Laboratory

Figure 18

Table 22

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	PFBS
Unit	µg/kg

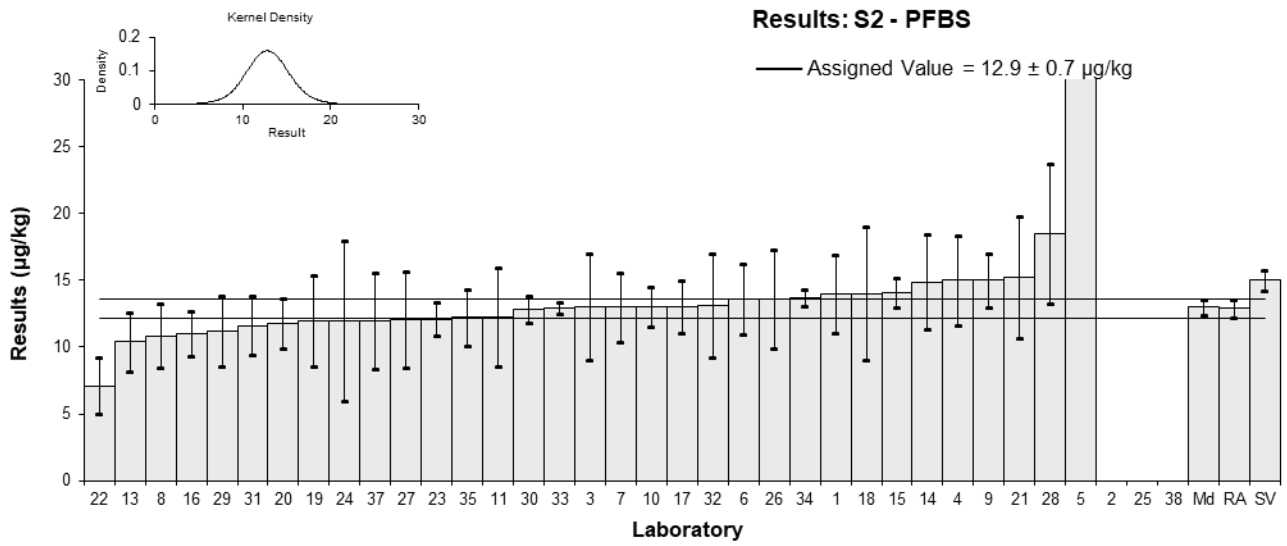
Participant Results

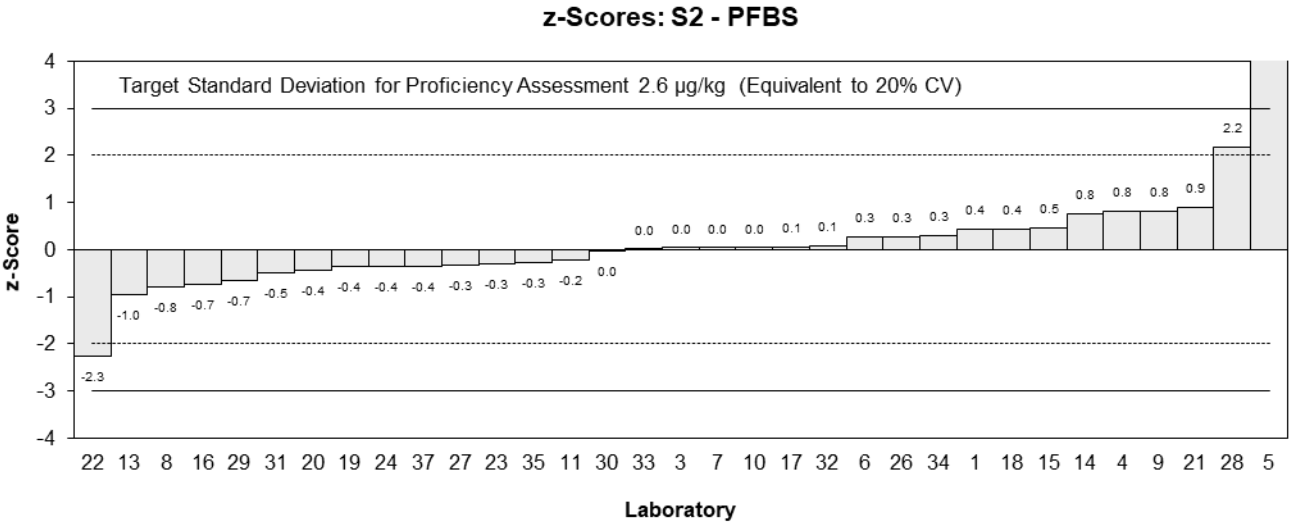
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	14.0	2.9	107.02	0.43	0.37
2	NS	NS	NS		
3	13	4	94	0.04	0.02
4	15	3.4	NT	0.81	0.60
5**	1318.88064666	635.836745462	NR	506.19	2.05
6	13.6	2.63	81	0.27	0.26
7	13	2.6	NR	0.04	0.04
8	10.859	2.38	79	-0.79	-0.82
9	15	2	88	0.81	0.99
10	13	1.5	97	0.04	0.06
11	12.3	3.7	82	-0.23	-0.16
13	10.4	2.211	92	-0.97	-1.08
14	14.88	3.53	126	0.77	0.55
15	14.0835	1.0780	93	0.46	0.92
16	11	1.7	138	-0.74	-1.03
17	13.03	2.01	NR	0.05	0.06
18	14	5	94	0.43	0.22
19	12	3.4	109	-0.35	-0.26
20	11.8	1.88	106	-0.43	-0.55
21	15.23	4.57	90	0.90	0.50
22	7.08	2.12	62	-2.26	-2.61
23	12.1	1.23	88.71	-0.31	-0.57
24	12	6	92	-0.35	-0.15
25	NR	NR	NR		
26	13.6	3.7	84	0.27	0.19
27	12.040	3.612	78	-0.33	-0.23
28	18.5	5.2	97	2.17	1.07
29	11.20	2.66	119	-0.66	-0.62
30	12.8	1	NR	-0.04	-0.08
31	11.6	2.2	96.71	-0.50	-0.56
32	13.1	3.9	68	0.08	0.05
33	12.93	0.45	84	0.01	0.04
34	13.672	0.619	85	0.30	0.83
35	12.21	2.11	97	-0.27	-0.31
37	12.0	3.6	84	-0.35	-0.25
38	NS	NS	NS		

** Gross Error, see Section 4.2

Statistics

Assigned Value	12.9	0.7
Spike Value	15.0	0.8
Robust Average	12.9	0.7
Median	13.0	0.6
Mean	12.8	
N	32	
Max	18.5	
Min	7.08	
Robust SD	1.5	
Robust CV	12%	


Kernel Density
Density
Result
Results: S2 - PFBS
Assigned Value = 12.9 ± 0.7 µg/kg
Results (µg/kg)
Laboratory
22 13 8 16 29 31 20 19 24 37 27 23 35 11 30 33 3 7 10 17 32 6 26 34 1 18 15 14 4 9 21 28 5 2 25 38 Md RA SV


z-Scores: S2 - PFBS
Target Standard Deviation for Proficiency Assessment 2.6 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 13 8 16 29 31 20 19 24 37 27 23 35 11 30 33 3 7 10 17 32 6 26 34 1 18 15 14 4 9 21 28 5

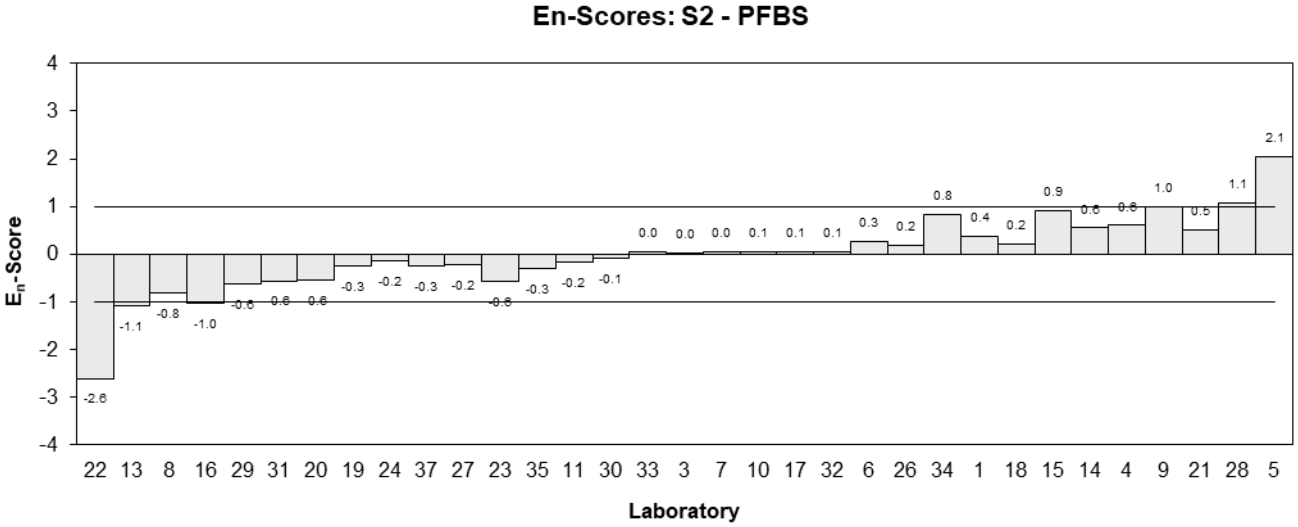

En-Scores: S2 - PFBS
En-Score
Laboratory
22 13 8 16 29 31 20 19 24 37 27 23 35 11 30 33 3 7 10 17 32 6 26 34 1 18 15 14 4 9 21 28 5

Figure 19

Table 23

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	PFPeS
Unit	µg/kg

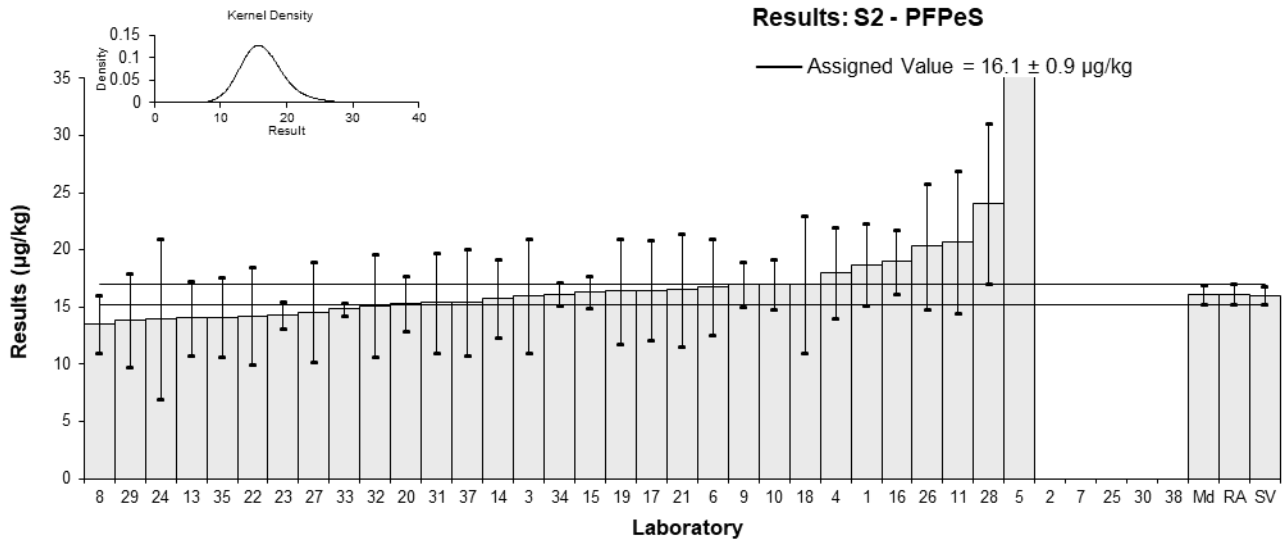
Participant Results

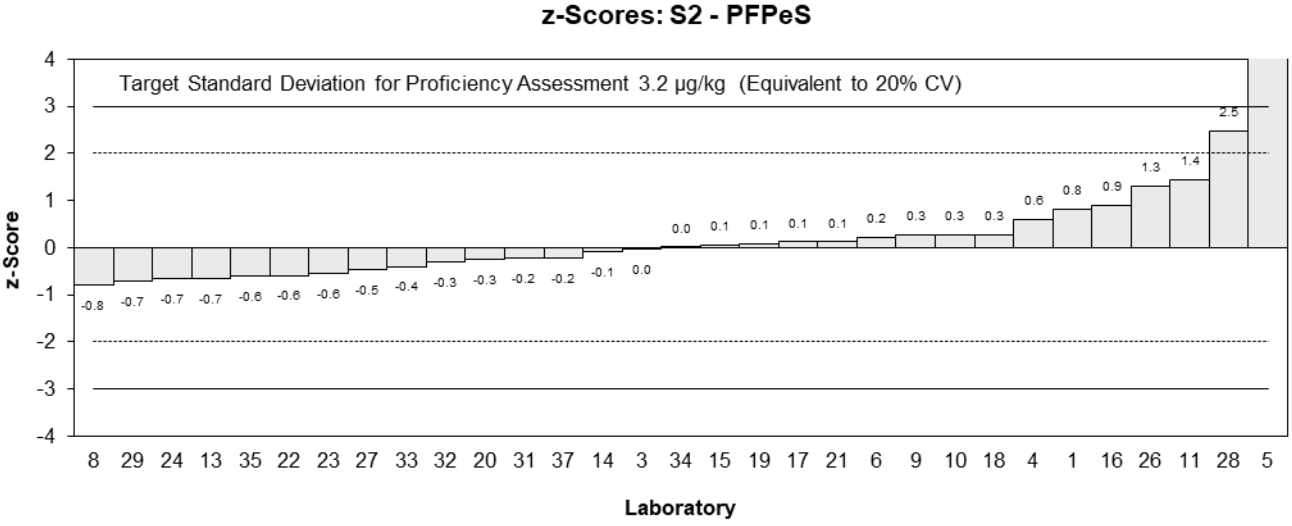
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	18.7	3.6	112.32	0.81	0.70
2	NS	NS	NS		
3	16	5	92	-0.03	-0.02
4	18	4.0	NT	0.59	0.46
5**	4294.50439166	538.723222842	NR	1,328.70	7.94
6	16.8	4.19	81	0.22	0.16
7	NR	NR	NR		
8	13.518	2.56	85	-0.80	-0.95
9	17	2	NT	0.28	0.41
10	17	2.2	98	0.28	0.38
11	20.7	6.2	85	1.43	0.73
13	14.02	3.256	NR	-0.65	-0.62
14	15.79	3.44	125	-0.10	-0.09
15	16.2992	1.3729	94	0.06	0.12
16	19	2.8	138	0.90	0.99
17	16.48	4.35	NR	0.12	0.09
18	17	6	96	0.28	0.15
19	16.4	4.6	109	0.09	0.06
20	15.3	2.45	102	-0.25	-0.31
21	16.5	4.95	90	0.12	0.08
22	14.2	4.26	62	-0.59	-0.44
23	14.3	1.19	93.55	-0.56	-1.21
24	14	7	NR	-0.65	-0.30
25	NR	NR	NR		
26	20.3	5.5	82	1.30	0.75
27	14.550	4.365	NR	-0.48	-0.35
28	24.1	7	NR	2.48	1.13
29	13.80	4.09	NR	-0.71	-0.55
30	NT	NT	NT		
31	15.37	4.33	104.79	-0.23	-0.17
32	15.1	4.5	62	-0.31	-0.22
33	14.81	0.53	84	-0.40	-1.24
34	16.137	1.028	85	0.01	0.03
35	14.13	3.46	94	-0.61	-0.55
37	15.4	4.62	81	-0.22	-0.15
38	NS	NS	NS		

** Gross Error, see Section 4.2

Statistics

Assigned Value	16.1	0.9
Spike Value	16.0	0.8
Robust Average	16.1	0.9
Median	16.1	0.8
Mean	16.4	
N	30	
Max	24.1	
Min	13.518	
Robust SD	1.9	
Robust CV	12%	


Kernel Density
Density
Result
Results: S2 - PFPeS
Assigned Value = 16.1 ± 0.9 µg/kg
Results (µg/kg)
8 29 24 13 35 22 23 27 33 32 20 31 37 14 3 34 15 19 17 21 6 9 10 18 4 1 16 26 11 28 5 2 7 25 30 38 Md RA SV
Laboratory


z-Scores: S2 - PFPeS
Target Standard Deviation for Proficiency Assessment 3.2 µg/kg (Equivalent to 20% CV)
z-Score
-0.8 -0.7 -0.7 -0.7 -0.6 -0.6 -0.6 -0.5 -0.4 -0.3 -0.3 -0.2 -0.2 -0.1 0.0 0.0 0.1 0.1 0.1 0.1 0.2 0.3 0.3 0.3 0.6 0.8 0.9 1.3 1.4 2.5
8 29 24 13 35 22 23 27 33 32 20 31 37 14 3 34 15 19 17 21 6 9 10 18 4 1 16 26 11 28 5
Laboratory

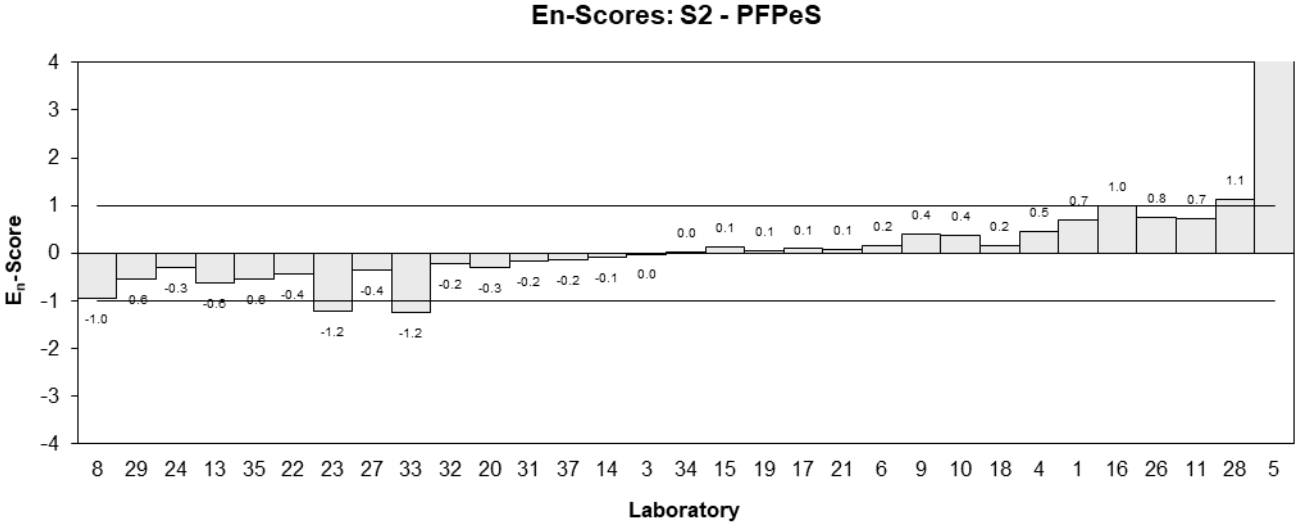

En-Scores: S2 - PFPeS
En-Score
-1.0 -0.6 -0.3 -0.6 -0.6 -0.4 -1.2 -0.4 -1.2 -0.2 -0.3 -0.2 -0.2 -0.1 0.0 0.0 0.1 0.1 0.1 0.1 0.2 0.4 0.4 0.2 0.5 0.7 1.0 0.8 0.7 1.1
8 29 24 13 35 22 23 27 33 32 20 31 37 14 3 34 15 19 17 21 6 9 10 18 4 1 16 26 11 28 5
Laboratory

Figure 20

Table 24

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	PFHxS
Unit	µg/kg

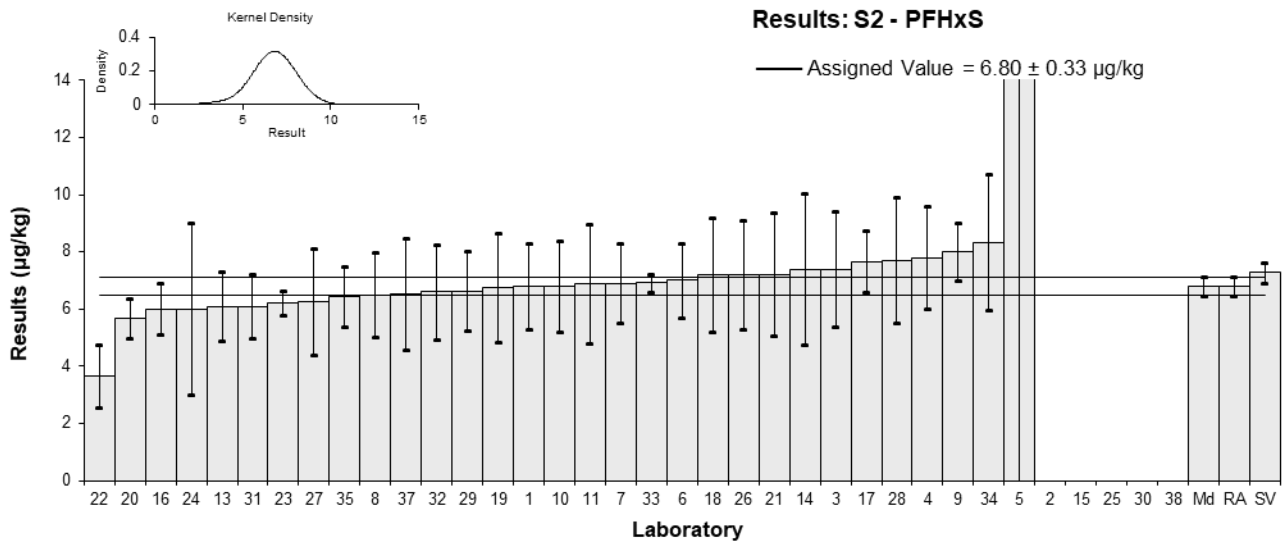
Participant Results

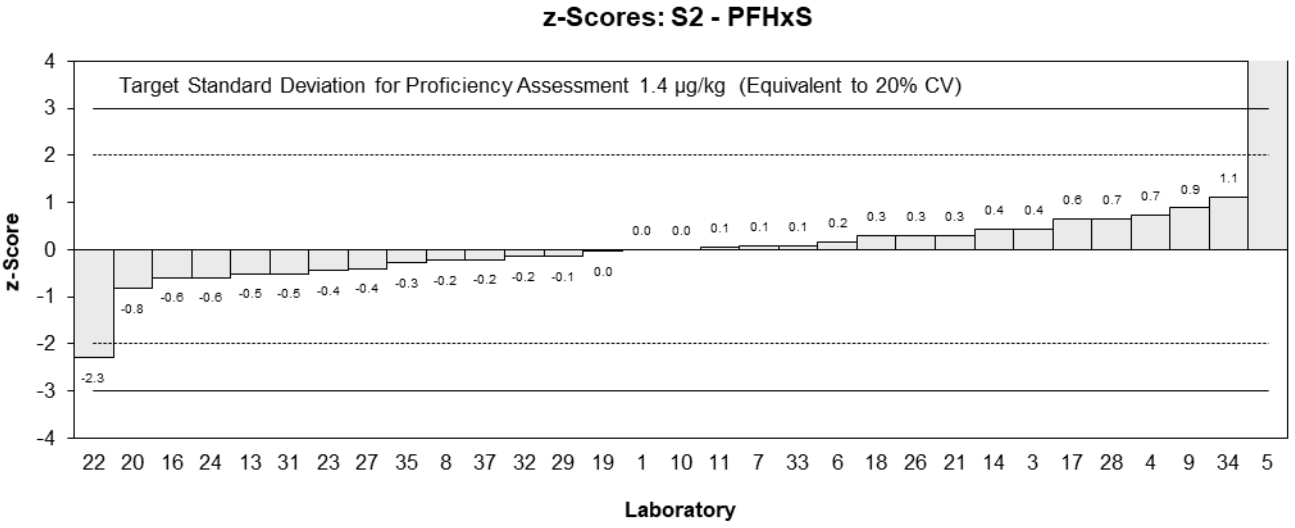
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	6.8	1.5	112.32	0.00	0.00
2	NS	NS	NS		
3	7.4	2	92	0.44	0.30
4	7.8	1.8	NT	0.74	0.55
5**	288.212673333	370.192647507	NR	206.92	0.76
6	7	1.31	79	0.15	0.15
7	6.9	1.38	NR	0.07	0.07
8	6.497	1.49	85	-0.22	-0.20
9	8.0	1	NT	0.88	1.14
10	6.8	1.6	103	0.00	0.00
11	6.88	2.1	81	0.06	0.04
13	6.1	1.229	122	-0.51	-0.55
14	7.386	2.64	125	0.43	0.22
15	NT	NT	NT		
16	6.0	0.90	72	-0.59	-0.83
17	7.664	1.073	NR	0.64	0.77
18	7.2	2	96	0.29	0.20
19	6.75	1.9	104	-0.04	-0.03
20	5.68	0.681	102	-0.82	-1.48
21	7.21	2.16	84	0.30	0.19
22	3.67	1.1	63	-2.30	-2.73
23	6.2	0.43	93.55	-0.44	-1.11
24	6	3	95	-0.59	-0.27
25	NR	NR	NR		
26	7.2	1.9	89	0.29	0.21
27	6.262	1.879	78	-0.40	-0.28
28	7.7	2.2	111	0.66	0.40
29	6.62	1.39	95.3	-0.13	-0.13
30	NT	NT	NT		
31	6.1	1.12	104.79	-0.51	-0.60
32	6.60	1.65	62	-0.15	-0.12
33	6.91	0.333	84	0.08	0.23
34	8.327	2.372	85	1.12	0.64
35	6.42	1.05	94	-0.28	-0.35
37	6.52	1.956	81	-0.21	-0.14
38	NS	NS	NS		

** Gross Error, see Section 4.2

Statistics

Assigned Value	6.80	0.33
Spike Value	7.27	0.36
Robust Average	6.80	0.33
Median	6.80	0.32
Mean	6.75	
N	30	
Max	8.327	
Min	3.67	
Robust SD	0.72	
Robust CV	11%	


Kernel Density
Density
Result
Results: S2 - PFHxS
Assigned Value = 6.80 ± 0.33 µg/kg
Results (µg/kg)
22 20 16 24 13 31 23 27 35 8 37 32 29 19 1 10 11 7 33 6 18 26 21 14 3 17 28 4 9 34 5 2 15 25 30 38 Md RA SV
Laboratory


z-Scores: S2 - PFHxS
Target Standard Deviation for Proficiency Assessment 1.4 µg/kg (Equivalent to 20% CV)
z-Score
-2.3 -0.8 -0.6 -0.6 -0.5 -0.5 -0.4 -0.4 -0.3 -0.2 -0.2 -0.2 -0.1 0.0 0.0 0.0 0.1 0.1 0.1 0.2 0.3 0.3 0.3 0.4 0.4 0.6 0.7 0.7 0.9 1.1
22 20 16 24 13 31 23 27 35 8 37 32 29 19 1 10 11 7 33 6 18 26 21 14 3 17 28 4 9 34 5
Laboratory

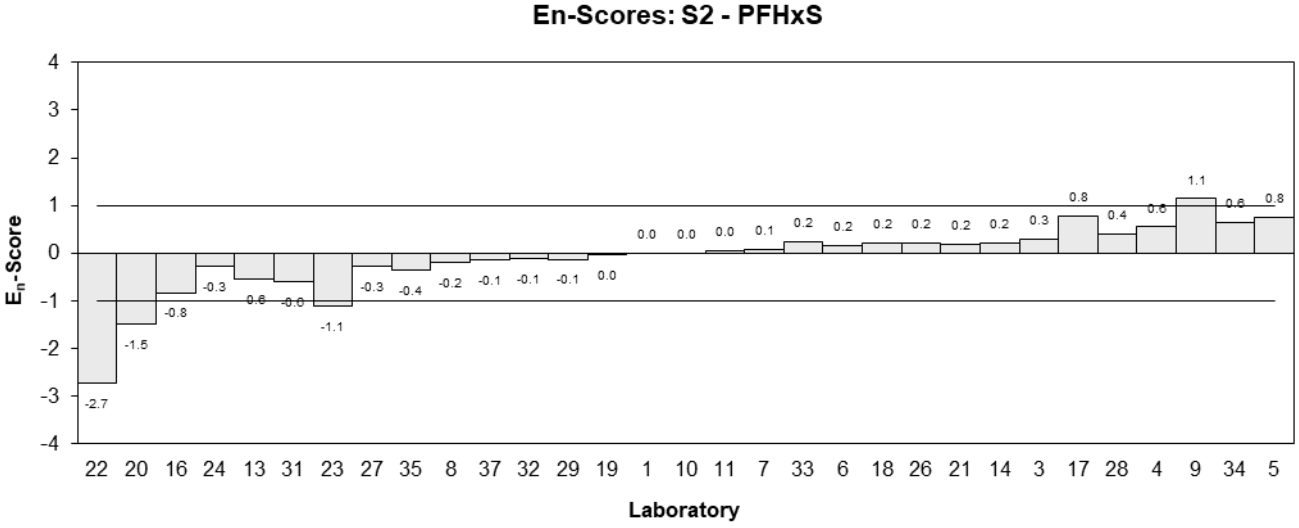

En-Scores: S2 - PFHxS
En-Score
-2.7 -1.5 -0.8 -0.3 -0.6 -0.6 -1.1 -0.3 -0.4 -0.2 -0.1 -0.1 -0.1 0.0 0.0 0.0 0.0 0.1 0.2 0.2 0.2 0.2 0.2 0.2 0.3 0.8 0.4 0.6 1.1 0.6 0.8
22 20 16 24 13 31 23 27 35 8 37 32 29 19 1 10 11 7 33 6 18 26 21 14 3 17 28 4 9 34 5
Laboratory

Figure 21

Table 25

Sample Details

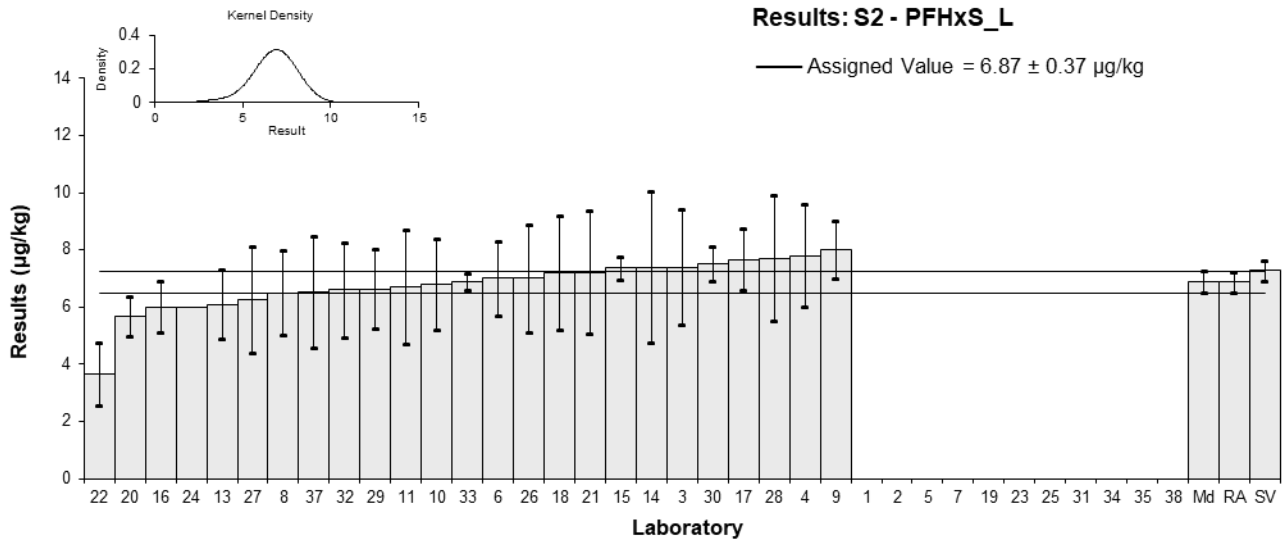
Sample No.	S2
Matrix	Soil
Analyte	PFHxS_L
Unit	µg/kg

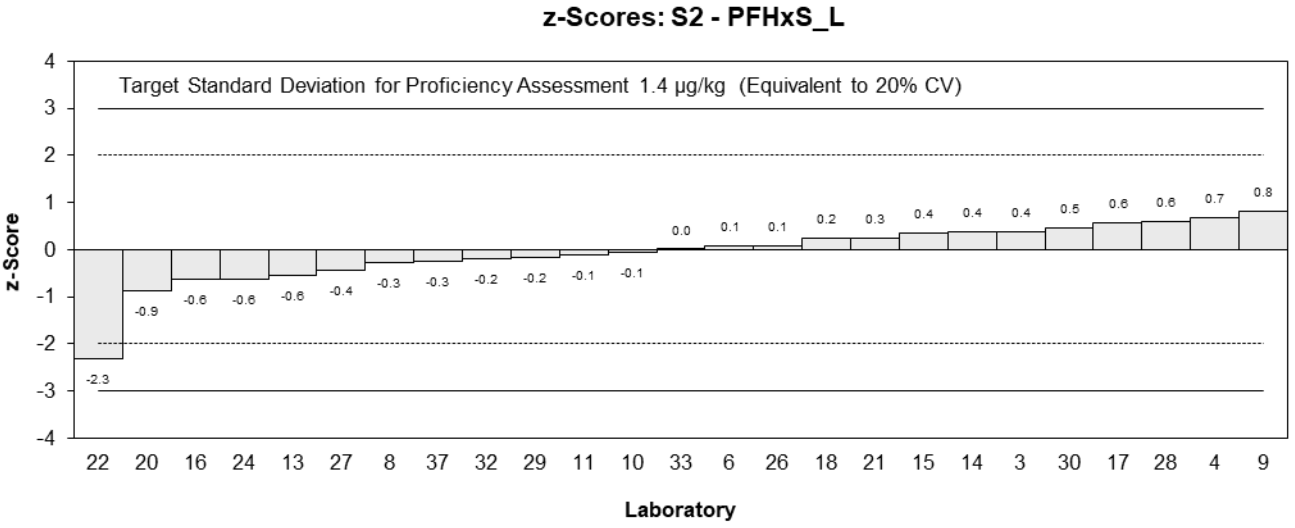
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NS	NS	NS		
3	7.4	2	92	0.39	0.26
4	7.8	1.8	NT	0.68	0.51
5	NR	NR	NR		
6	7	1.31	79	0.09	0.10
7	NR	NR	NR		
8	6.497	1.49	85	-0.27	-0.24
9	8.0	1	NT	0.82	1.06
10	6.8	1.6	103	-0.05	-0.04
11	6.70	2.0	81	-0.12	-0.08
13	6.1	1.229	122	-0.56	-0.60
14	7.386	2.64	125	0.38	0.19
15	7.3674	0.4100	94	0.36	0.90
16	6.0	0.90	72	-0.63	-0.89
17	7.664	1.073	NR	0.58	0.70
18	7.2	2	96	0.24	0.16
19	NT	NT	NT		
20	5.68	0.681	102	-0.87	-1.54
21	7.21	2.16	84	0.25	0.16
22	3.67	1.1	63	-2.33	-2.76
23	NT	NT	NT		
24	6	NR	NR	-0.63	-2.35
25	NR	NR	NR		
26	7	1.9	89	0.09	0.07
27	6.262	1.879	78	-0.44	-0.32
28	7.7	2.2	NR	0.60	0.37
29	6.62	1.39	95.3	-0.18	-0.17
30	7.52	0.6	NR	0.47	0.92
31	NT	NT	NT		
32	6.60	1.65	62	-0.20	-0.16
33	6.89	0.302	84	0.01	0.04
34	NR	NR	NR		
35	NT	NT	NT		
37	6.52	1.956	81	-0.25	-0.18
38	NS	NS	NS		

Statistics

Assigned Value	6.87	0.37
Spike Value	7.27	0.36
Robust Average	6.87	0.37
Median	6.89	0.37
Mean	6.78	
N	25	
Max	8	
Min	3.67	
Robust SD	0.74	
Robust CV	11%	


Kernel Density
Density
Result
Results: S2 - PFHxS_L
Assigned Value = 6.87 ± 0.37 µg/kg
Results (µg/kg)
Laboratory
22 20 16 24 13 27 8 37 32 29 11 10 33 6 26 18 21 15 14 3 30 17 28 4 9 1 2 5 7 19 23 25 31 34 35 38 Md RA SV


z-Scores: S2 - PFHxS_L
Target Standard Deviation for Proficiency Assessment 1.4 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 20 16 24 13 27 8 37 32 29 11 10 33 6 26 18 21 15 14 3 30 17 28 4 9

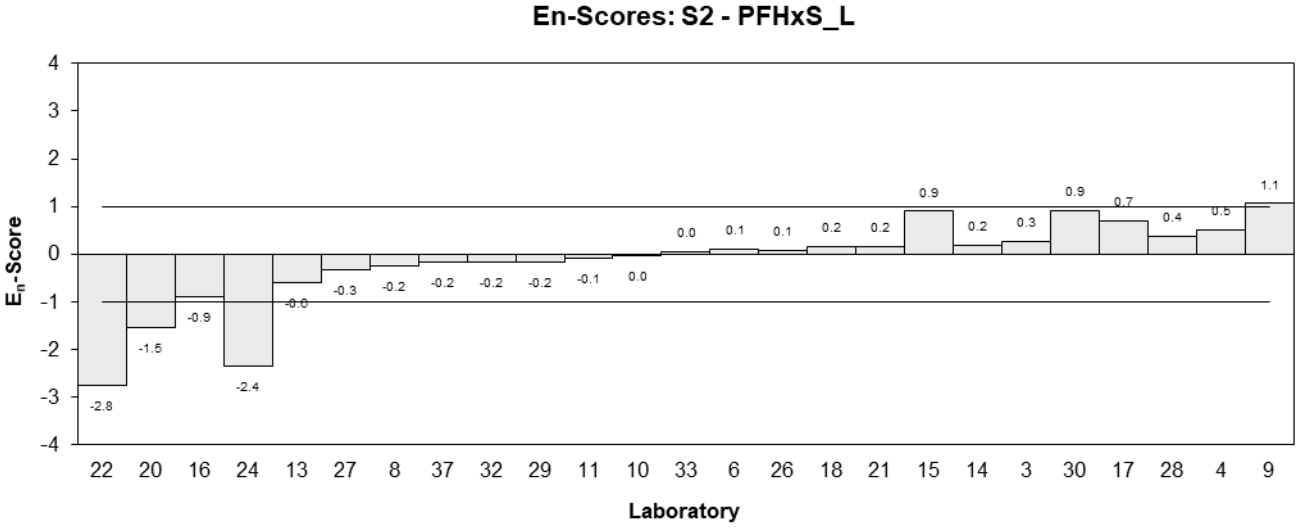

En-Scores: S2 - PFHxS_L
En-Score
Laboratory
22 20 16 24 13 27 8 37 32 29 11 10 33 6 26 18 21 15 14 3 30 17 28 4 9

Figure 22

Table 26

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	PFHpS
Unit	µg/kg

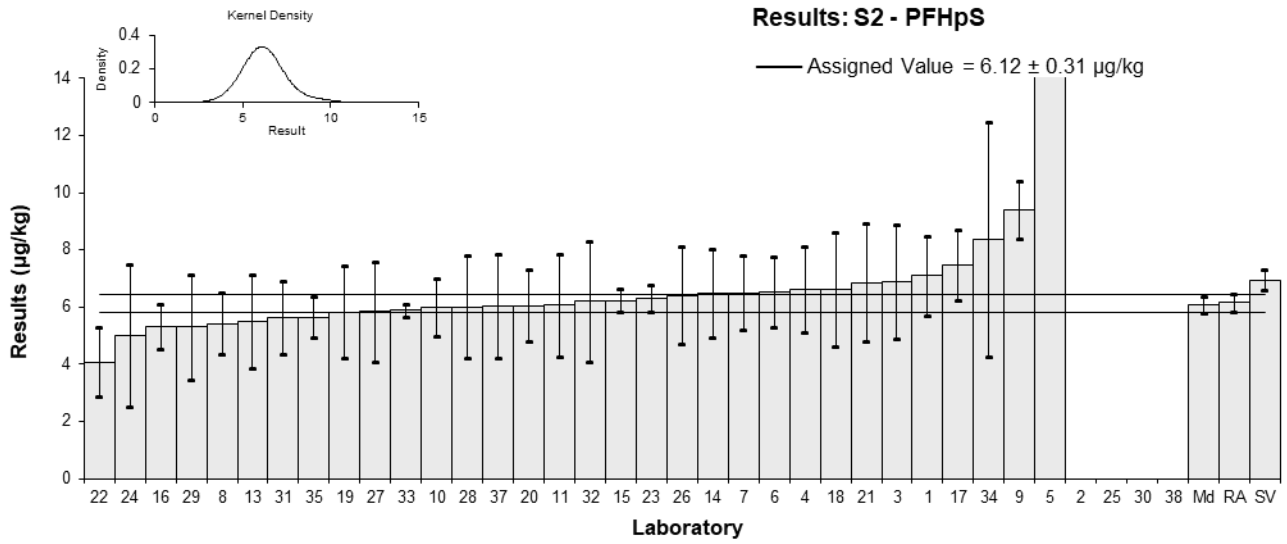
Participant Results

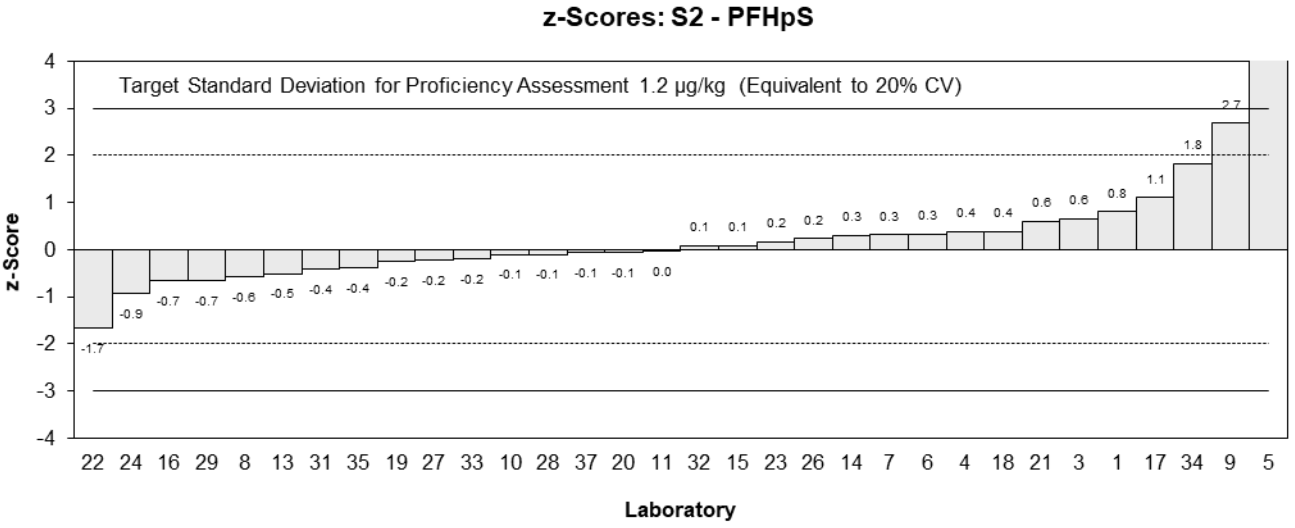
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	7.1	1.4	112.32	0.80	0.68
2	NS	NS	NS		
3	6.9	2	92	0.64	0.39
4	6.6	1.5	NT	0.39	0.31
5**	2164.83373166	321.019830332	NR	1,763.66	6.72
6	6.52	1.22	78	0.33	0.32
7	6.5	1.3	NR	0.31	0.28
8	5.415	1.08	85	-0.58	-0.63
9*	9.4	1	NT	2.68	3.13
10	6.0	1.0	103	-0.10	-0.11
11	6.07	1.8	80	-0.04	-0.03
13	5.49	1.621	NR	-0.51	-0.38
14	6.49	1.54	127	0.30	0.24
15	6.2312	0.3882	89	0.09	0.22
16	5.3	0.79	138	-0.67	-0.97
17	7.468	1.225	NR	1.10	1.07
18	6.6	2	96	0.39	0.24
19	5.83	1.6	109	-0.24	-0.18
20	6.05	1.27	99.8	-0.06	-0.05
21	6.85	2.06	71	0.60	0.35
22	4.08	1.22	63	-1.67	-1.62
23	6.3	0.49	93.55	0.15	0.31
24	5	2.5	NR	-0.92	-0.44
25	NR	NR	NR		
26	6.4	1.7	81	0.23	0.16
27	5.844	1.753	NR	-0.23	-0.16
28	6	1.8	NR	-0.10	-0.07
29	5.30	1.84	NR	-0.67	-0.44
30	NT	NT	NT		
31	5.62	1.29	106.3	-0.41	-0.38
32	6.20	2.10	62	0.07	0.04
33	5.88	0.238	84	-0.20	-0.61
34	8.365	4.11	85	1.83	0.54
35	5.64	0.72	94	-0.39	-0.61
37	6.03	1.809	78	-0.07	-0.05
38	NS	NS	NS		

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	6.12	0.31
Spike Value	6.94	0.35
Robust Average	6.16	0.32
Median	6.07	0.30
Mean	6.24	
N	31	
Max	9.4	
Min	4.08	
Robust SD	0.71	
Robust CV	12%	


Kernel Density
Density
Result
Results: S2 - PFHpS
Assigned Value = 6.12 ± 0.31 µg/kg
Results (µg/kg)
Laboratory
22 24 16 29 8 13 31 35 19 27 33 10 28 37 20 11 32 15 23 26 14 7 6 4 18 21 3 1 17 34 9 5 2 25 30 38 Md RA SV


z-Scores: S2 - PFHpS
Target Standard Deviation for Proficiency Assessment 1.2 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 24 16 29 8 13 31 35 19 27 33 10 28 37 20 11 32 15 23 26 14 7 6 4 18 21 3 1 17 34 9 5

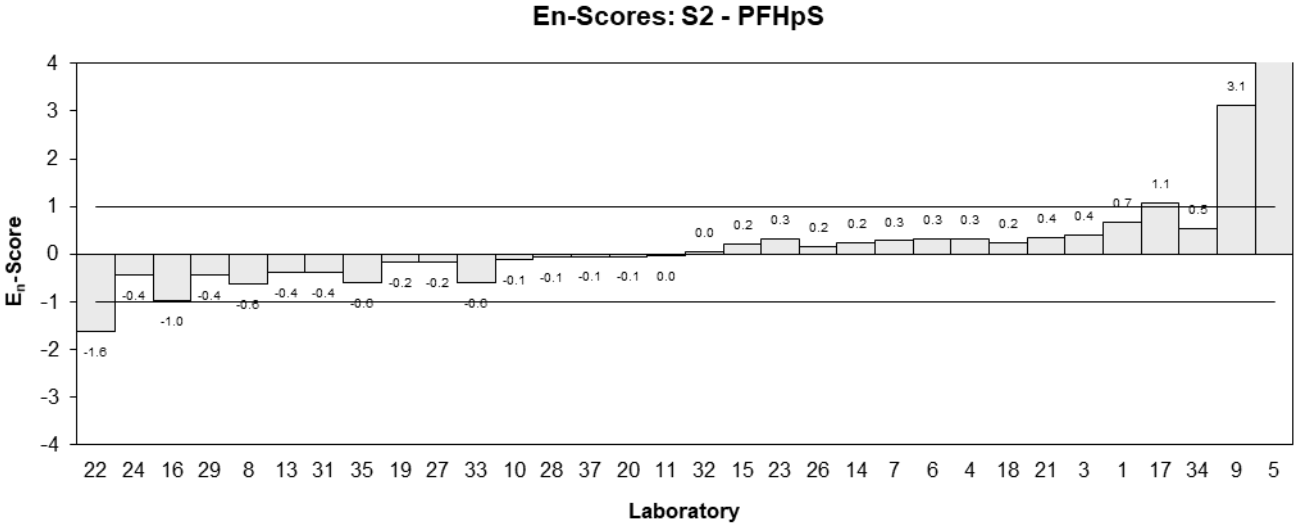

En-Scores: S2 - PFHpS
En-Score
Laboratory
22 24 16 29 8 13 31 35 19 27 33 10 28 37 20 11 32 15 23 26 14 7 6 4 18 21 3 1 17 34 9 5

Figure 23

Table 27

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	PFOS
Unit	µg/kg

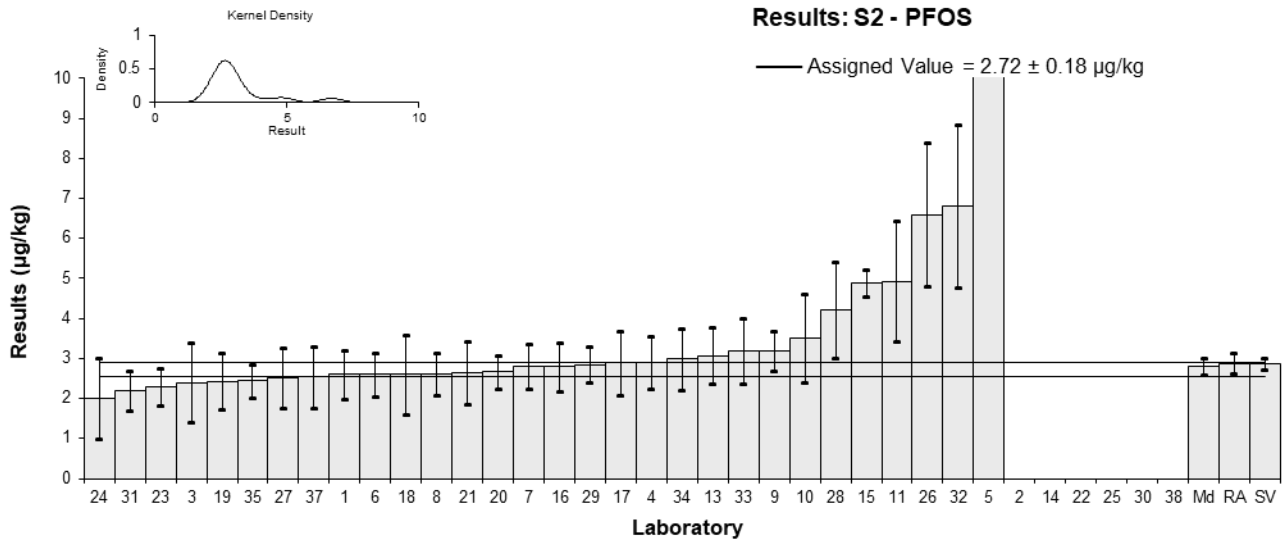
Participant Results

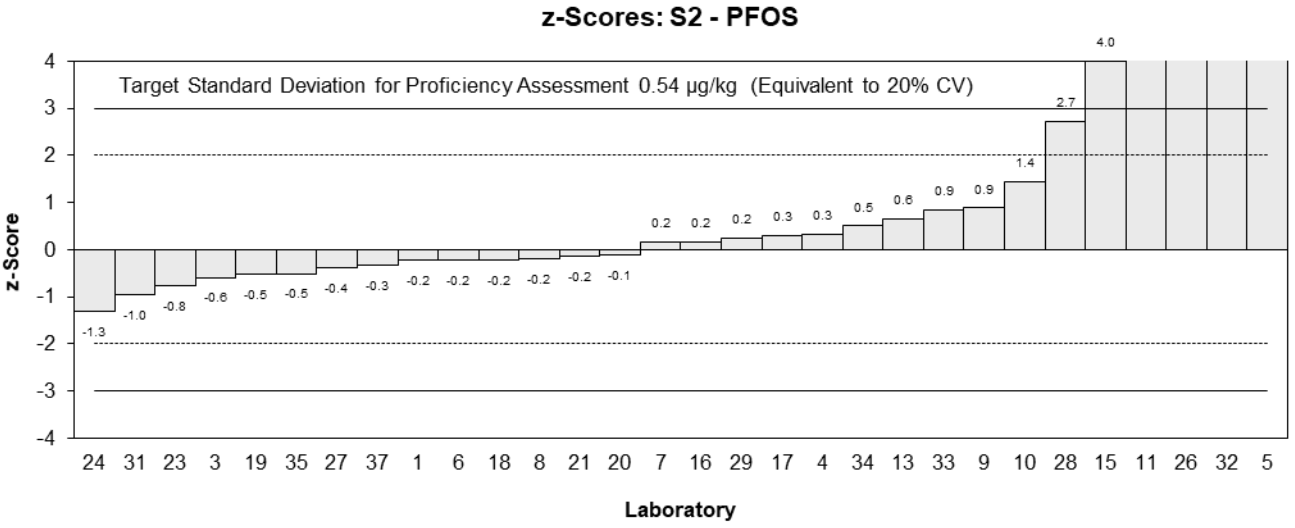
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	2.6	0.6	112.35	-0.22	-0.19
2	NS	NS	NS		
3	2.4	1	98	-0.59	-0.31
4	2.9	0.67	NT	0.33	0.26
5**	622.332183333	64.6533342253	NR	1,138.99	9.58
6	2.6	0.553	78	-0.22	-0.21
7	2.8	0.56	NR	0.15	0.14
8	2.617	0.52	80	-0.19	-0.19
9	3.2	0.5	87	0.88	0.90
10	3.5	1.1	101	1.43	0.70
11*	4.93	1.5	86	4.06	1.46
13	3.07	0.711	138	0.64	0.48
14	<5	NR	127		
15*	4.8923	0.3373	89	3.99	5.68
16	2.8	0.61	72	0.15	0.13
17	2.885	0.802	NR	0.30	0.20
18	2.6	1	104	-0.22	-0.12
19	2.43	0.7	109	-0.53	-0.40
20	2.66	0.425	99.8	-0.11	-0.13
21	2.64	0.79	71	-0.15	-0.10
22	<3.44	NR	49		
23	2.3	0.46	95.21	-0.77	-0.85
24	2	1	100	-1.32	-0.71
25	NR	NR	NR		
26*	6.6	1.8	92	7.13	2.14
27	2.508	0.752	78	-0.39	-0.27
28	4.2	1.2	157	2.72	1.22
29	2.85	0.45	84.7	0.24	0.27
30	NT	NT	NT		
31	2.2	0.49	106.3	-0.96	-1.00
32*	6.80	2.04	67	7.50	1.99
33	3.18	0.82	78	0.85	0.55
34	2.99	0.768	128	0.50	0.34
35	2.44	0.41	95	-0.51	-0.63
37	2.54	0.762	78	-0.33	-0.23
38	NS	NS	NS		

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	2.72	0.18
Spike Value	2.87	0.14
Robust Average	2.88	0.26
Median	2.80	0.20
Mean	3.18	
N	29	
Max	6.8	
Min	2	
Robust SD	0.57	
Robust CV	20%	


Kernel Density
Density
Result
Results: S2 - PFOS
Assigned Value = 2.72 ± 0.18 µg/kg
Results (µg/kg)
24 31 23 3 19 35 27 37 1 6 18 8 21 20 7 16 29 17 4 34 13 33 9 10 28 15 11 26 32 5 2 14 22 25 30 38 Md RA SV
Laboratory


z-Scores: S2 - PFOS
Target Standard Deviation for Proficiency Assessment 0.54 µg/kg (Equivalent to 20% CV)
z-Score
24 31 23 3 19 35 27 37 1 6 18 8 21 20 7 16 29 17 4 34 13 33 9 10 28 15 11 26 32 5
Laboratory

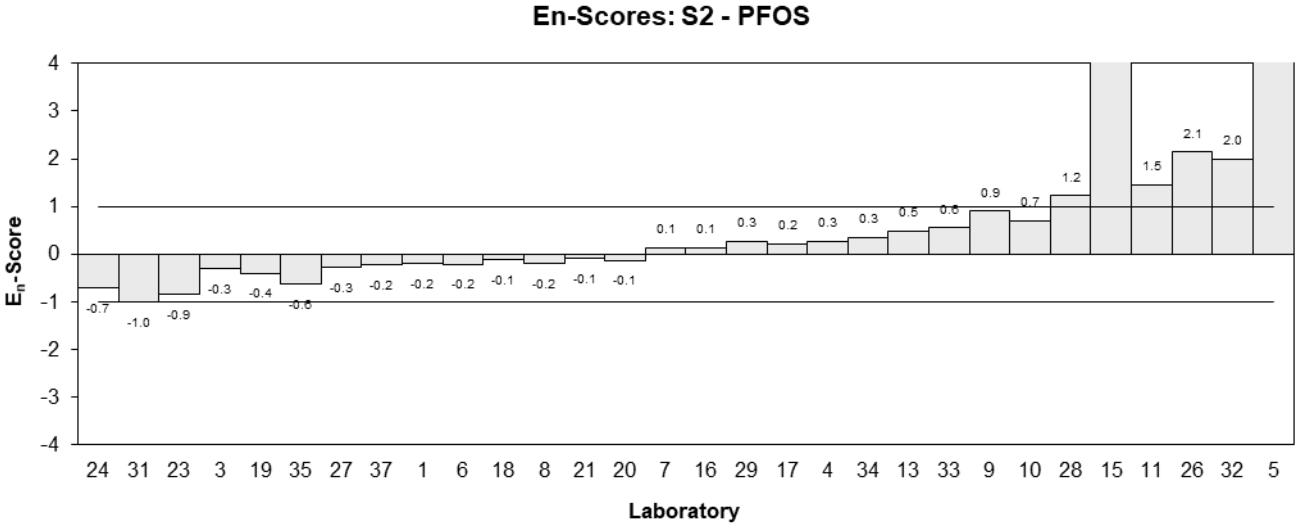

En-Scores: S2 - PFOS
En-Score
24 31 23 3 19 35 27 37 1 6 18 8 21 20 7 16 29 17 4 34 13 33 9 10 28 15 11 26 32 5
Laboratory

Figure 24

Table 28

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	PFOS_L
Unit	µg/kg

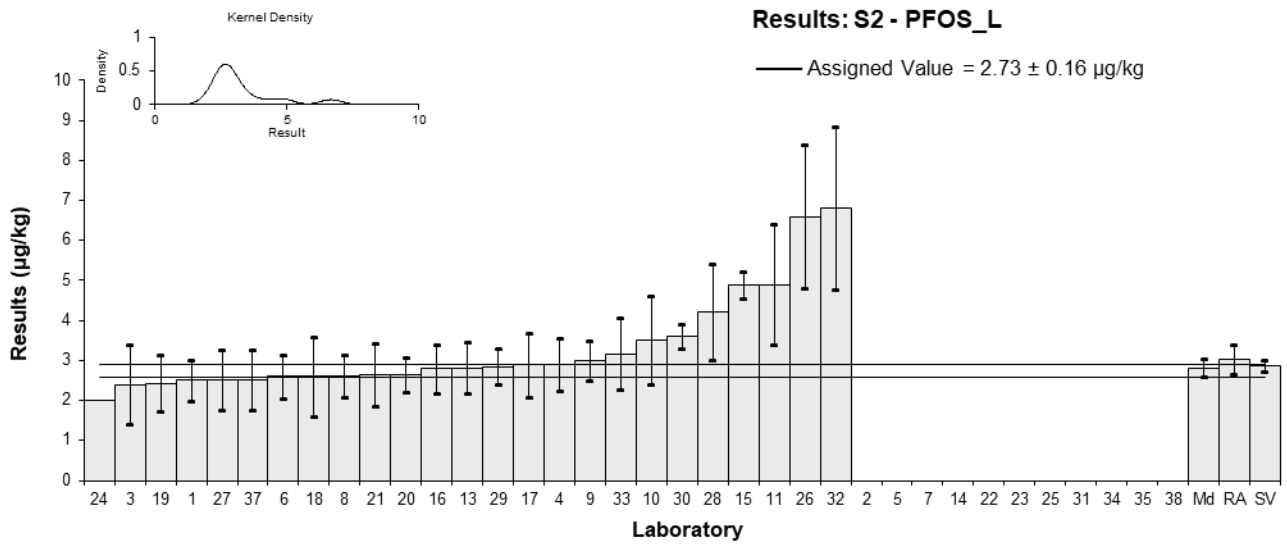
Participant Results

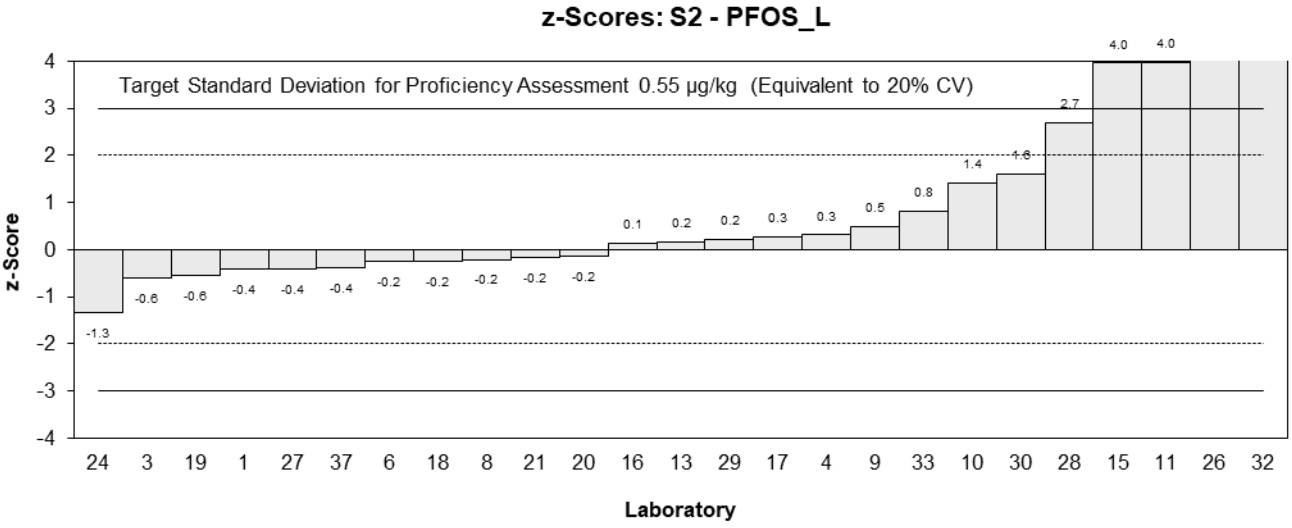
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	2.5	0.5	112.35	-0.42	-0.44
2	NS	NS	NS		
3	2.4	1	98	-0.60	-0.33
4	2.9	0.67	112	0.31	0.25
5	NR	NR	NR		
6	2.6	0.553	78	-0.24	-0.23
7	NR	NR	NR		
8	2.617	0.52	80	-0.21	-0.21
9	3.0	0.5	NT	0.49	0.51
10	3.5	1.1	101	1.41	0.69
11*	4.90	1.5	86	3.97	1.44
13	2.82	0.653	138	0.16	0.13
14	<5	NR	127		
15*	4.8923	0.3373	89	3.96	5.79
16	2.8	0.61	72	0.13	0.11
17	2.885	0.802	NR	0.28	0.19
18	2.6	1	104	-0.24	-0.13
19	2.43	0.7	109	-0.55	-0.42
20	2.65	0.425	99.8	-0.15	-0.18
21	2.64	0.79	71	-0.16	-0.11
22	<3.44	NR	49		
23	NT	NT	NT		
24	2	NR	NR	-1.34	-4.56
25	NR	NR	NR		
26*	6.6	1.8	92	7.09	2.14
27	2.508	0.752	78	-0.41	-0.29
28	4.2	1.2	NR	2.69	1.21
29	2.85	0.45	84.7	0.22	0.25
30	3.61	0.3	NR	1.61	2.59
31	NT	NT	NT		
32*	6.80	2.04	67	7.45	1.99
33	3.17	0.904	78	0.81	0.48
34	NR	NR	NR		
35	NT	NT	NT		
37	2.52	0.756	78	-0.38	-0.27
38	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	2.73	0.16
Spike Value	2.87	0.14
Robust Average	3.03	0.38
Median	2.82	0.23
Mean	3.30	
N	25	
Max	6.8	
Min	2	
Robust SD	0.76	
Robust CV	25%	


Kernel Density
Density
Result
Results: S2 - PFOS_L
Assigned Value = 2.73 ± 0.16 µg/kg
Results (µg/kg)
24 3 19 1 27 37 6 18 8 21 20 16 13 29 17 4 9 33 10 30 28 15 11 26 32 2 5 7 14 22 23 25 31 34 35 38 Md RA SV
Laboratory


z-Scores: S2 - PFOS_L
Target Standard Deviation for Proficiency Assessment 0.55 µg/kg (Equivalent to 20% CV)
z-Score
-1.3 -0.6 -0.6 -0.4 -0.4 -0.4 -0.2 -0.2 -0.2 -0.2 -0.2 0.1 0.2 0.2 0.3 0.3 0.5 0.8 1.4 1.6 2.7 4.0 4.0
24 3 19 1 27 37 6 18 8 21 20 16 13 29 17 4 9 33 10 30 28 15 11 26 32
Laboratory

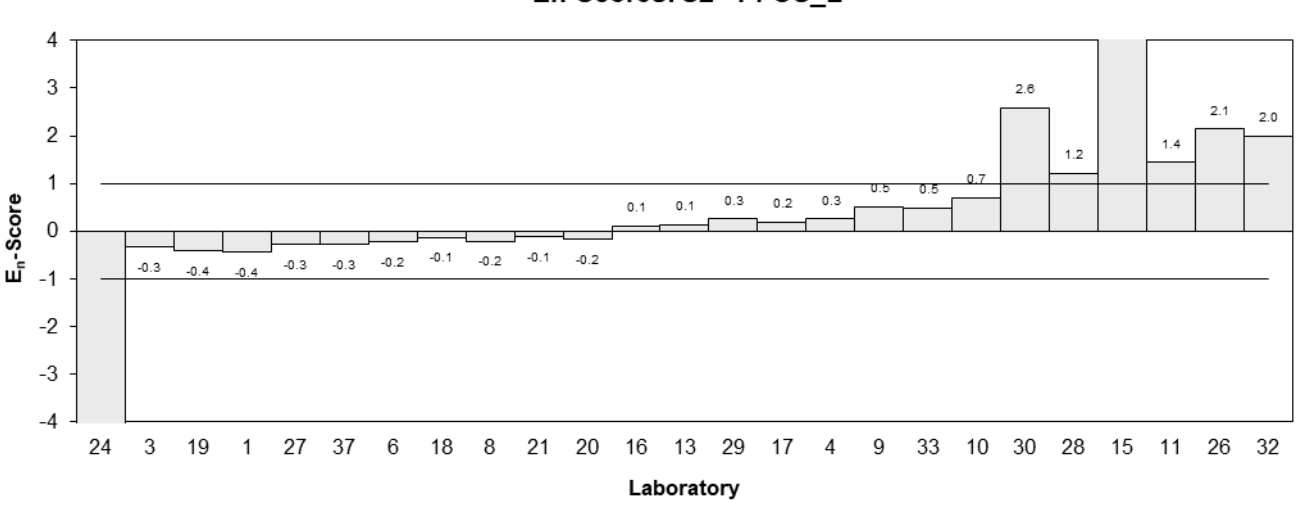

En-Scores: S2 - PFOS_L
En-Score
-0.3 -0.4 -0.4 -0.3 -0.3 -0.2 -0.1 -0.2 -0.1 -0.2 0.1 0.1 0.3 0.2 0.3 0.5 0.5 0.7 2.6 1.2 1.4 2.1 2.0
24 3 19 1 27 37 6 18 8 21 20 16 13 29 17 4 9 33 10 30 28 15 11 26 32
Laboratory

Figure 25

Table 29

Sample Details

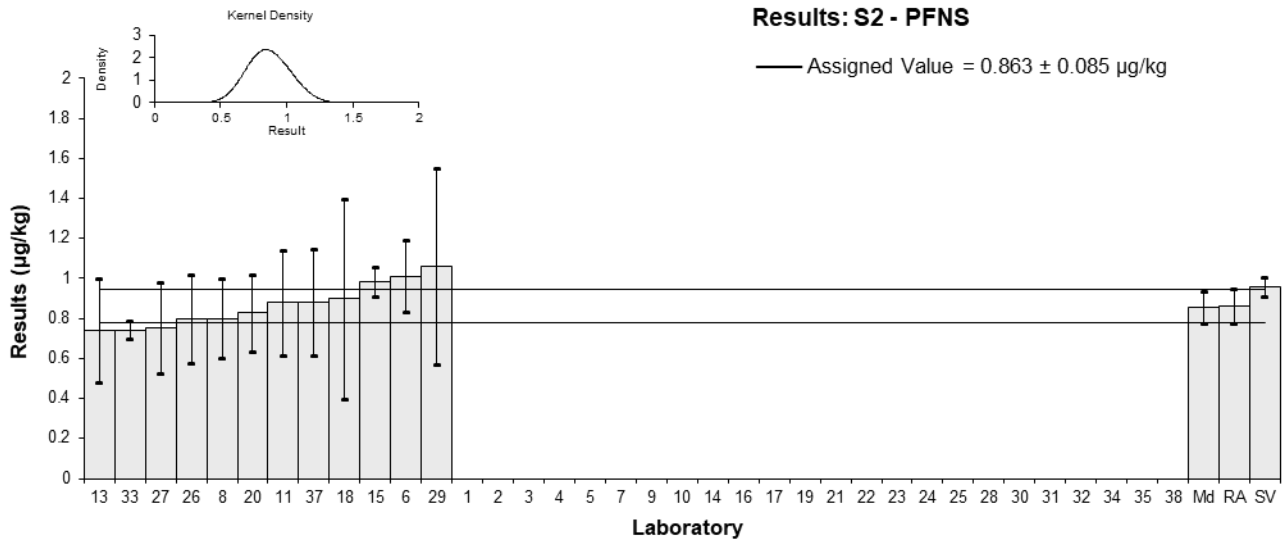
Sample No.	S2
Matrix	Soil
Analyte	PFNS
Unit	µg/kg

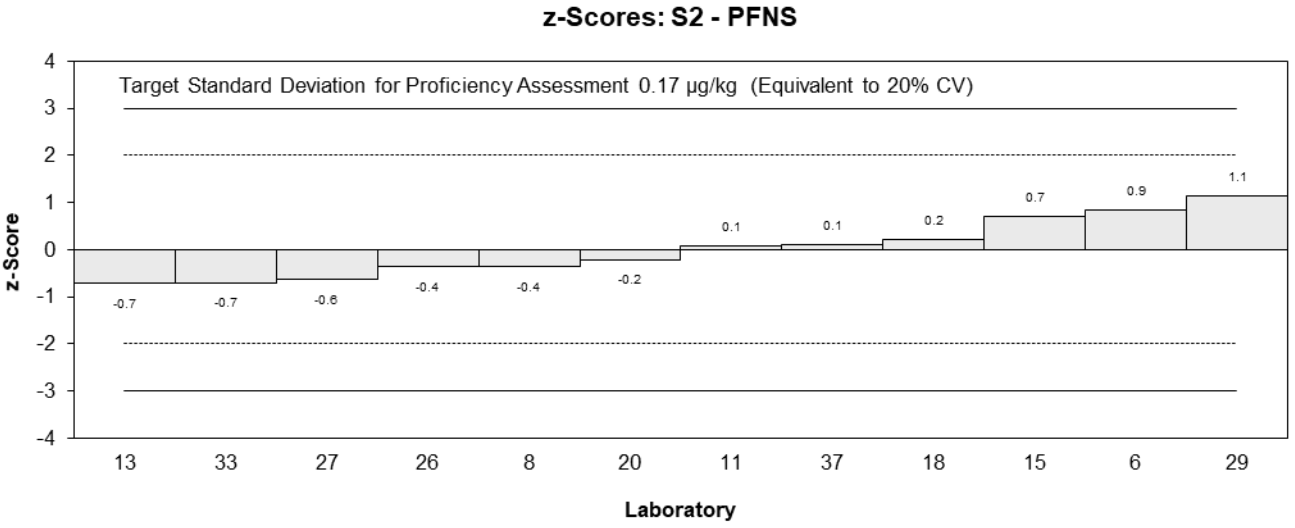
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NS	NS	NS		
3	NT	NT	NT		
4	< 1	NR	NT		
5	NT	NT	NT		
6	1.01	0.179	78	0.85	0.74
7	NR	NR	NR		
8	0.801	0.2	80	-0.36	-0.29
9	<1	NR	NT		
10	< 1.0	NR	101		
11	0.878	0.26	82	0.09	0.05
13	0.74	0.260	NR	-0.71	-0.45
14	<5	NR	122		
15	0.9837	0.0723	87	0.70	1.08
16	NR	NR	NR		
17	NT	NT	NT		
18	0.9	0.5	104	0.21	0.07
19	NT	NT	NT		
20	0.827	0.19	99.8	-0.21	-0.17
21	<0.5	NR	71		
22	NT	NT	NT		
23	NT	NT	NT		
24	< 1	0.5	NR		
25	NR	NR	NR		
26	0.8	0.22	83	-0.37	-0.27
27	0.755	0.227	NR	-0.63	-0.45
28	<2	NR	NR		
29	1.06	0.49	NR	1.14	0.40
30	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	0.743	0.043	78	-0.70	-1.26
34	NR	NR	NR		
35	NT	NT	NT		
37	0.882	0.2646	78	0.11	0.07
38	NS	NS	NS		

Statistics

Assigned Value	0.863	0.085
Spike Value	0.960	0.048
Robust Average	0.863	0.085
Median	0.853	0.080
Mean	0.865	
N	12	
Max	1.06	
Min	0.74	
Robust SD	0.12	
Robust CV	14%	


Results: S2 - PFNS
Assigned Value = 0.863 ± 0.085 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
13 33 27 26 8 20 11 37 18 15 6 29 1 2 3 4 5 7 9 10 14 16 17 19 21 22 23 24 25 28 30 31 32 34 35 38 Md RA SV
Laboratory


z-Scores: S2 - PFNS
Target Standard Deviation for Proficiency Assessment 0.17 µg/kg (Equivalent to 20% CV)
z-Score
-0.7 -0.7 -0.6 -0.4 -0.4 -0.2 0.1 0.1 0.2 0.7 0.9 1.1
13 33 27 26 8 20 11 37 18 15 6 29
Laboratory

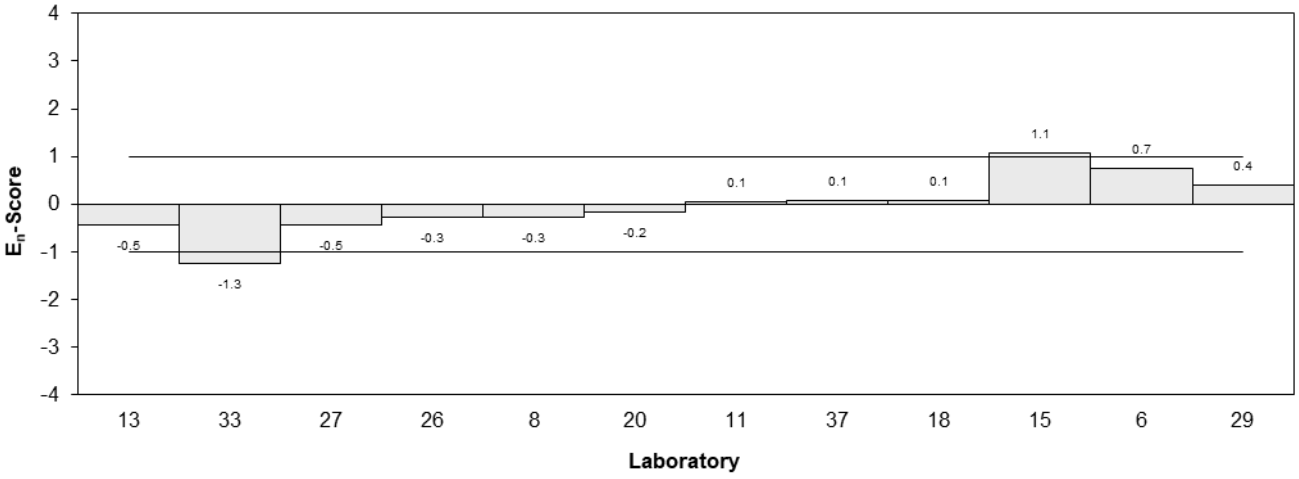

En-Scores: S2 - PFNS
En-Score
-0.5 -1.3 -0.5 -0.3 -0.3 -0.2 0.1 0.1 0.1 1.1 0.7 0.4
13 33 27 26 8 20 11 37 18 15 6 29
Laboratory

Figure 26

Table 30

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	PFBA
Unit	µg/kg

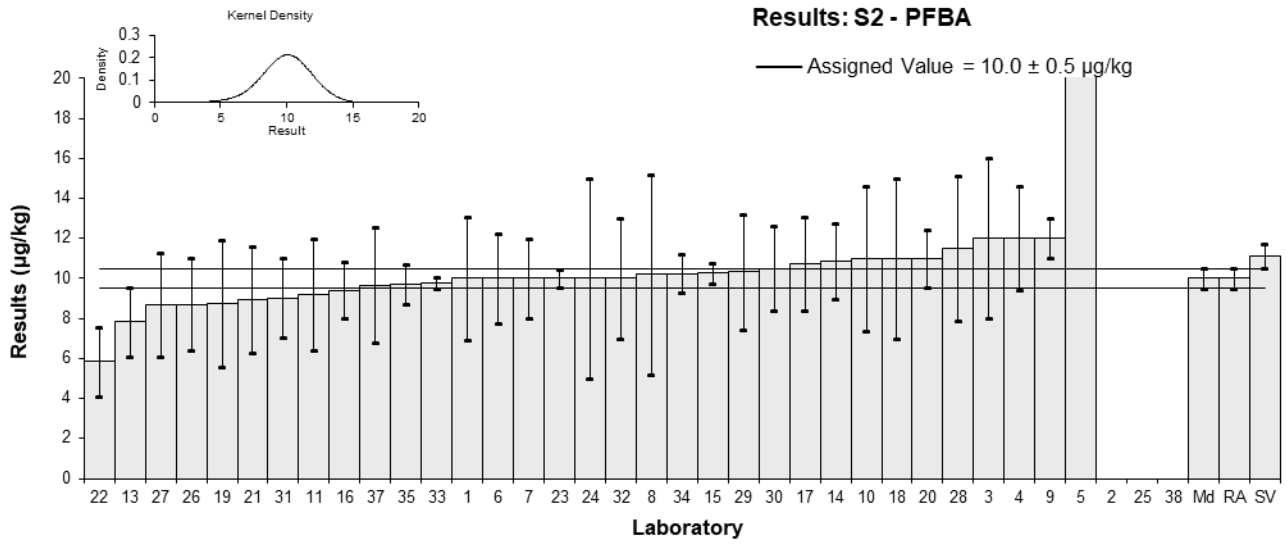
Participant Results

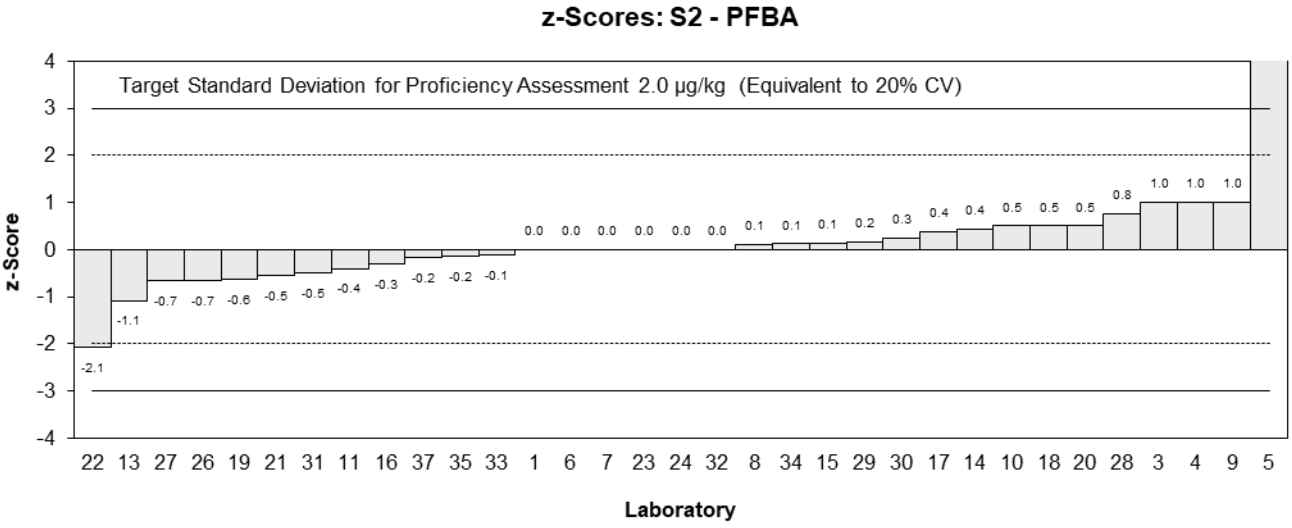
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	10	3.1	116.35	0.00	0.00
2	NS	NS	NS		
3	12	4	91	1.00	0.50
4	12	2.6	NT	1.00	0.76
5**	1583.416095	195.330974967	NR	786.71	8.06
6	10	2.23	61	0.00	0.00
7	10	2	NR	0.00	0.00
8	10.218	5	65	0.11	0.04
9	12	1	NT	1.00	1.79
10	11	3.6	105	0.50	0.28
11	9.20	2.8	81	-0.40	-0.28
13	7.83	1.723	96	-1.08	-1.21
14	10.87	1.88	123	0.43	0.45
15	10.2580	0.5144	97	0.13	0.36
16	9.4	1.4	71	-0.30	-0.40
17	10.75	2.34	NR	0.38	0.31
18	11	4	103	0.50	0.25
19	8.75	3.2	154	-0.62	-0.39
20	11	1.43	99.5	0.50	0.66
21	8.93	2.68	46	-0.54	-0.39
22	5.84	1.75	49	-2.08	-2.29
23	10	0.43	130.87	0.00	0.00
24	10	5	101	0.00	0.00
25	NR	NR	NR		
26	8.7	2.3	79	-0.65	-0.55
27	8.665	2.599	68	-0.67	-0.50
28	11.5	3.6	111	0.75	0.41
29	10.33	2.88	74.5	0.17	0.11
30	10.5	2.1	NR	0.25	0.23
31	9.02	2	85.95	-0.49	-0.48
32	10.0	3.0	134	0.00	0.00
33	9.77	0.27	87	-0.12	-0.40
34	10.243	0.973	79	0.12	0.22
35	9.7	1.0	110	-0.15	-0.27
37	9.67	2.901	94	-0.17	-0.11
38	NS	NS	NS		

** Gross Error, see Section 4.2

Statistics

Assigned Value	10.0	0.5
Spike Value	11.1	0.6
Robust Average	10.0	0.5
Median	10.0	0.5
Mean	9.97	
N	32	
Max	12	
Min	5.84	
Robust SD	1.1	
Robust CV	11%	


Kernel Density
Density
Result
Results: S2 - PFBA
Assigned Value = 10.0 ± 0.5 µg/kg
Results (µg/kg)
22 13 27 26 19 21 31 11 16 37 35 33 1 6 7 23 24 32 8 34 15 29 30 17 14 10 18 20 28 3 4 9 5 2 25 38 Md RA SV
Laboratory


z-Scores: S2 - PFBA
Target Standard Deviation for Proficiency Assessment 2.0 µg/kg (Equivalent to 20% CV)
z-Score
22 13 27 26 19 21 31 11 16 37 35 33 1 6 7 23 24 32 8 34 15 29 30 17 14 10 18 20 28 3 4 9 5
Laboratory

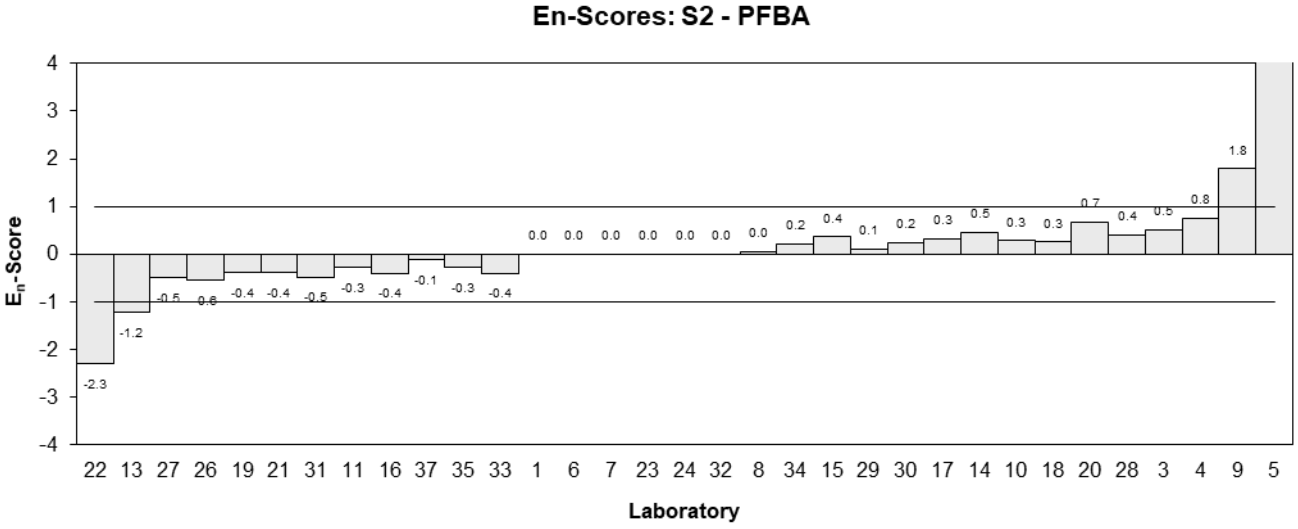

En-Scores: S2 - PFBA
En-Score
22 13 27 26 19 21 31 11 16 37 35 33 1 6 7 23 24 32 8 34 15 29 30 17 14 10 18 20 28 3 4 9 5
Laboratory

Figure 27

Table 31

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	PFPeA
Unit	µg/kg

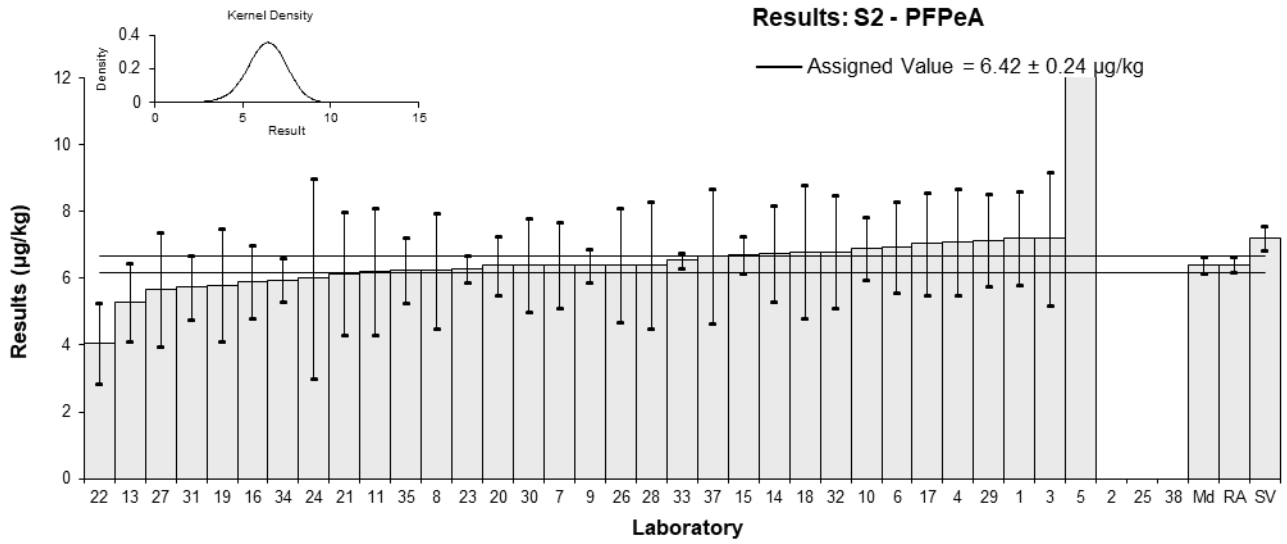
Participant Results

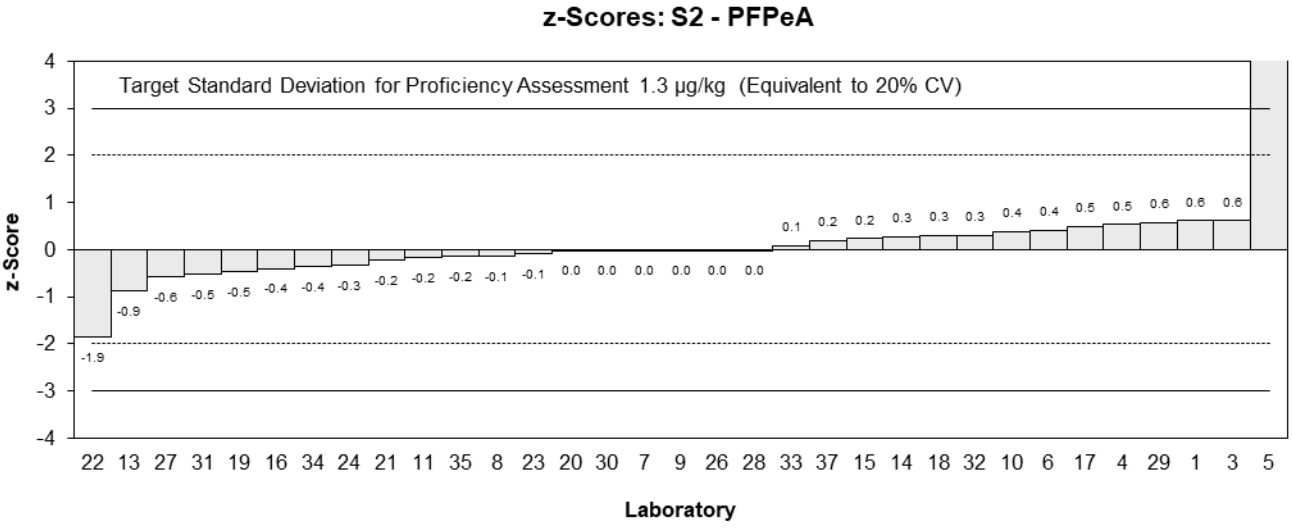
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	7.2	1.4	107.29	0.61	0.55
2	NS	NS	NS		
3	7.2	2	93	0.61	0.39
4	7.1	1.6	NT	0.53	0.42
5**	624.368483333	166.473369407	NR	481.27	3.71
6	6.94	1.38	85	0.40	0.37
7	6.4	1.28	NR	-0.02	-0.02
8	6.237	1.74	73	-0.14	-0.10
9	6.4	0.5	NT	-0.02	-0.04
10	6.9	0.93	107	0.37	0.50
11	6.20	1.9	85	-0.17	-0.11
13	5.29	1.169	97	-0.88	-0.95
14	6.748	1.43	136	0.26	0.23
15	6.7190	0.5588	77	0.23	0.49
16	5.9	1.1	73	-0.40	-0.46
17	7.044	1.536	NR	0.49	0.40
18	6.8	2	101	0.30	0.19
19	5.8	1.7	112	-0.48	-0.36
20	6.39	0.894	114	-0.02	-0.03
21	6.14	1.84	33	-0.22	-0.15
22	4.04	1.21	50	-1.85	-1.93
23	6.3	0.4	90.2	-0.09	-0.26
24	6	3	94	-0.33	-0.14
25	NR	NR	NR		
26	6.4	1.7	83	-0.02	-0.01
27	5.672	1.702	72	-0.58	-0.44
28	6.4	1.9	120	-0.02	-0.01
29	7.14	1.38	64.6	0.56	0.51
30	6.39	1.4	NR	-0.02	-0.02
31	5.74	0.96	65.27	-0.53	-0.69
32	6.80	1.70	108	0.30	0.22
33	6.54	0.23	88	0.09	0.36
34	5.957	0.655	79	-0.36	-0.66
35	6.23	0.98	119	-0.15	-0.19
37	6.67	2.001	92	0.19	0.12
38	NS	NS	NS		

** Gross Error, see Section 4.2

Statistics

Assigned Value	6.42	0.24
Spike Value	7.20	0.36
Robust Average	6.42	0.24
Median	6.40	0.26
Mean	6.37	
N	32	
Max	7.2	
Min	4.04	
Robust SD	0.55	
Robust CV	8.6%	


Results: S2 - PFPeA
Kernel Density
Density
Result
Assigned Value = 6.42 ± 0.24 µg/kg
Results (µg/kg)
Laboratory
22 13 27 31 19 16 34 24 21 11 35 8 23 20 30 7 9 26 28 33 37 15 14 18 32 10 6 17 4 29 1 3 5 2 25 38 Md RA SV


z-Scores: S2 - PFPeA
Target Standard Deviation for Proficiency Assessment 1.3 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 13 27 31 19 16 34 24 21 11 35 8 23 20 30 7 9 26 28 33 37 15 14 18 32 10 6 17 4 29 1 3 5

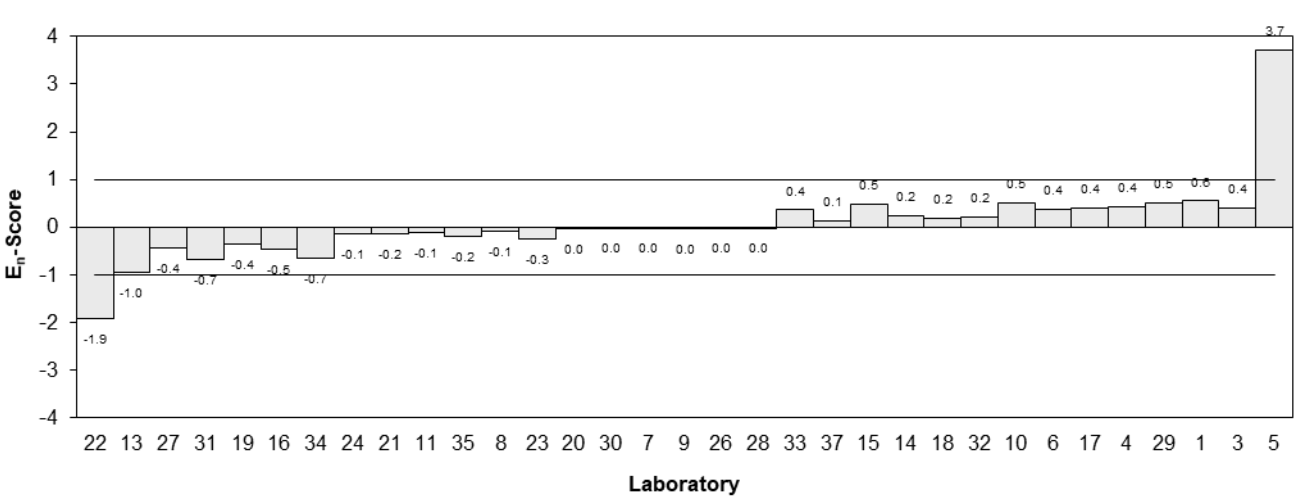

En-Scores: S2 - PFPeA
En-Score
Laboratory
22 13 27 31 19 16 34 24 21 11 35 8 23 20 30 7 9 26 28 33 37 15 14 18 32 10 6 17 4 29 1 3 5

Figure 28

Table 32

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	PFHxA
Unit	µg/kg

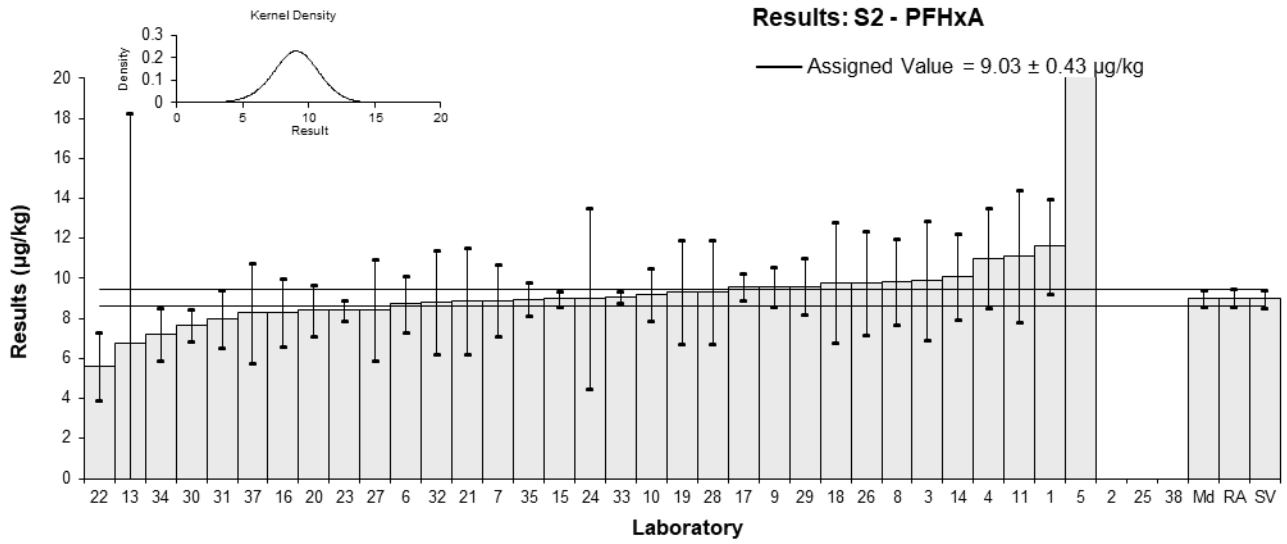
Participant Results

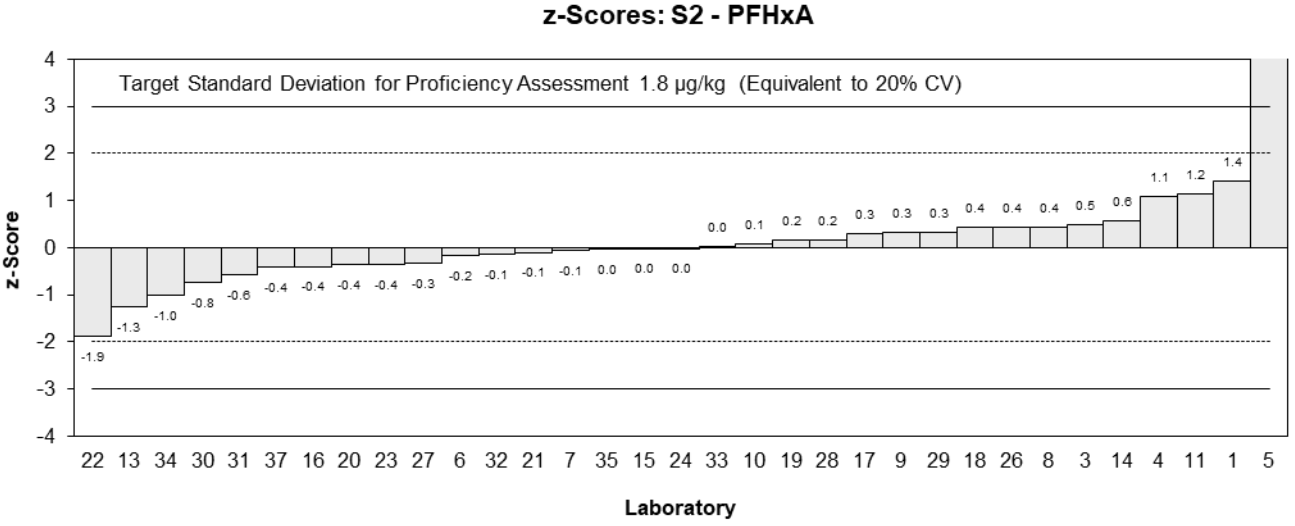
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	11.6	2.4	109.2	1.42	1.05
2	NS	NS	NS		
3	9.9	3	90	0.48	0.29
4	11	2.5	NT	1.09	0.78
5**	825.305926666	64.0999514851	NR	451.98	12.73
6	8.73	1.41	85	-0.17	-0.20
7	8.9	1.78	NR	-0.07	-0.07
8	9.823	2.16	51	0.44	0.36
9	9.6	1	NT	0.32	0.52
10	9.2	1.3	98	0.09	0.12
11	11.1	3.3	90	1.15	0.62
13	6.78	11.510	114	-1.25	-0.20
14	10.08	2.13	126	0.58	0.48
15	8.9880	0.3779	86	-0.02	-0.07
16	8.3	1.7	67	-0.40	-0.42
17	9.579	0.690	NR	0.30	0.68
18	9.8	3	100	0.43	0.25
19	9.3	2.6	112	0.15	0.10
20	8.4	1.26	97	-0.35	-0.47
21	8.85	2.66	34	-0.10	-0.07
22	5.61	1.68	53	-1.89	-1.97
23	8.4	0.54	86.11	-0.35	-0.91
24	9	4.5	92	-0.02	-0.01
25	NR	NR	NR		
26	9.8	2.6	94	0.43	0.29
27	8.431	2.529	73	-0.33	-0.23
28	9.3	2.6	100	0.15	0.10
29	9.61	1.42	66.2	0.32	0.39
30	7.67	0.81	NR	-0.75	-1.48
31	8	1.45	102.3	-0.57	-0.68
32	8.80	2.60	104	-0.13	-0.09
33	9.06	0.27	90	0.02	0.06
34	7.199	1.298	98	-1.01	-1.34
35	8.97	0.84	120	-0.03	-0.06
37	8.27	2.481	92	-0.42	-0.30
38	NS	NS	NS		

** Gross Error, see Section 4.2

Statistics

Assigned Value	9.03	0.43
Spike Value	8.98	0.45
Robust Average	9.03	0.43
Median	8.99	0.40
Mean	9.00	
N	32	
Max	11.6	
Min	5.61	
Robust SD	0.98	
Robust CV	11%	


Kernel Density
Density
Result
Results: S2 - PFHxA
Assigned Value = 9.03 ± 0.43 µg/kg
Results (µg/kg)
22 13 34 30 31 37 16 20 23 27 6 32 21 7 35 15 24 33 10 19 28 17 9 29 18 26 8 3 14 4 11 1 5 2 25 38 Md RA SV
Laboratory


z-Scores: S2 - PFHxA
Target Standard Deviation for Proficiency Assessment 1.8 µg/kg (Equivalent to 20% CV)
z-Score
-1.9 -1.3 -1.0 -0.8 -0.6 -0.4 -0.4 -0.4 -0.4 -0.3 -0.2 -0.1 -0.1 -0.1 0.0 0.0 0.0 0.0 0.1 0.2 0.2 0.3 0.3 0.3 0.4 0.4 0.4 0.5 0.6 1.1 1.2 1.4
22 13 34 30 31 37 16 20 23 27 6 32 21 7 35 15 24 33 10 19 28 17 9 29 18 26 8 3 14 4 11 1 5
Laboratory

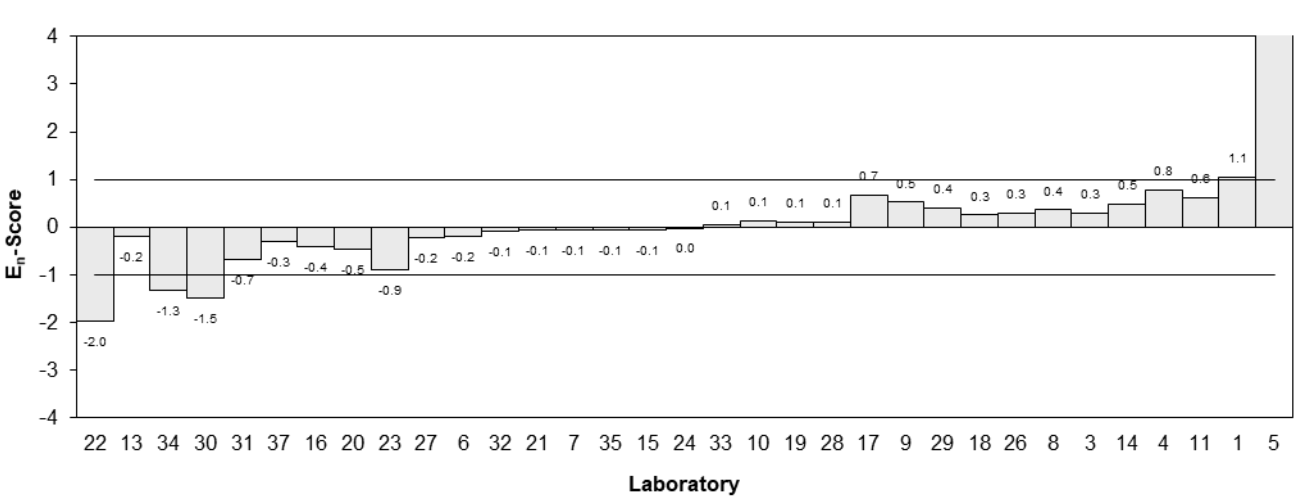

En-Scores: S2 - PFHxA
En-Score
-2.0 -0.2 -1.3 -1.5 -0.7 -0.3 -0.4 -0.5 -0.9 -0.2 -0.2 -0.1 -0.1 -0.1 -0.1 -0.1 0.0 0.1 0.1 0.1 0.1 0.7 0.5 0.4 0.3 0.3 0.4 0.3 0.5 0.8 0.6 1.1
22 13 34 30 31 37 16 20 23 27 6 32 21 7 35 15 24 33 10 19 28 17 9 29 18 26 8 3 14 4 11 1 5
Laboratory

Figure 29

Table 33

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	PFHpA
Unit	µg/kg

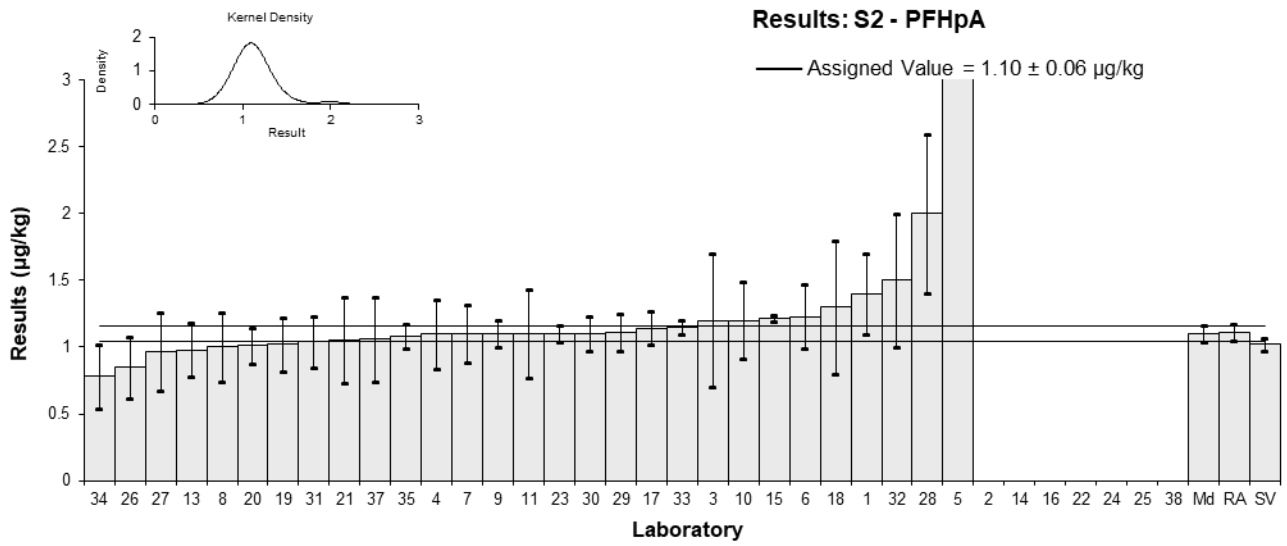
Participant Results

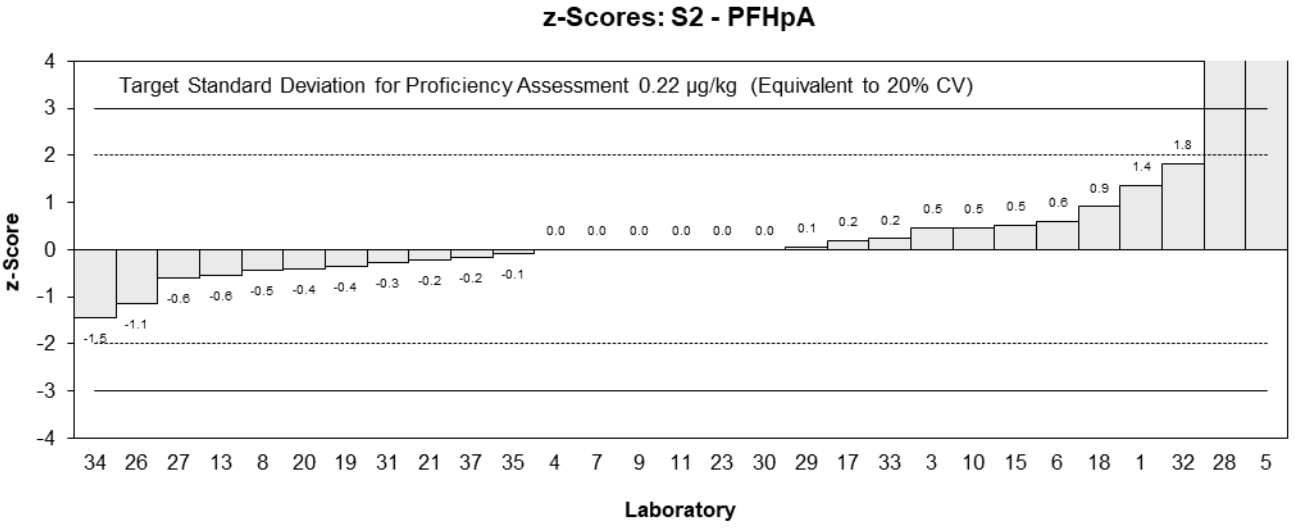
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	1.4	0.3	112.86	1.36	0.98
2	NS	NS	NS		
3	1.2	0.5	95	0.45	0.20
4	1.1	0.26	NT	0.00	0.00
5**	125.548683333	34.8449081045	NR	565.68	3.57
6	1.23	0.244	82	0.59	0.52
7	1.1	0.22	NR	0.00	0.00
8	1.002	0.26	85	-0.45	-0.37
9	1.1	0.1	NT	0.00	0.00
10	1.2	0.29	105	0.45	0.34
11	1.10	0.33	91	0.00	0.00
13	0.98	0.202	131	-0.55	-0.57
14	<5	NR	121		
15	1.2140	0.0264	92	0.52	1.74
16	NR	NR	NR		
17	1.140	0.125	NR	0.18	0.29
18	1.3	0.5	99	0.91	0.40
19	1.02	0.2	103	-0.36	-0.38
20	1.01	0.132	98	-0.41	-0.62
21	1.05	0.32	34	-0.23	-0.15
22	<1.60	NR	58		
23	1.1	0.065	94.11	0.00	0.00
24	< 1	0.5	94		
25	NR	NR	NR		
26	0.85	0.23	92	-1.14	-1.05
27	0.967	0.290	68	-0.60	-0.45
28*	2	0.6	119	4.09	1.49
29	1.11	0.14	79	0.05	0.07
30	1.1	0.13	NR	0.00	0.00
31	1.04	0.19	109.97	-0.27	-0.30
32	1.50	0.50	117	1.82	0.79
33	1.15	0.05	82	0.23	0.64
34	0.781	0.239	98	-1.45	-1.29
35	1.08	0.09	105	-0.09	-0.18
37	1.06	0.318	91	-0.18	-0.12
38	NS	NS	NS		

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	1.10	0.06
Spike Value	1.02	0.05
Robust Average	1.11	0.06
Median	1.10	0.06
Mean	1.14	
N	28	
Max	2	
Min	0.781	
Robust SD	0.13	
Robust CV	11%	


Results: S2 - PFHpA
Assigned Value = 1.10 ± 0.06 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
34 26 27 13 8 20 19 31 21 37 35 4 7 9 11 23 30 29 17 33 3 10 15 6 18 1 32 28 5 2 14 16 22 24 25 38 Md RA SV


z-Scores: S2 - PFHpA
Target Standard Deviation for Proficiency Assessment 0.22 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
34 26 27 13 8 20 19 31 21 37 35 4 7 9 11 23 30 29 17 33 3 10 15 6 18 1 32 28 5

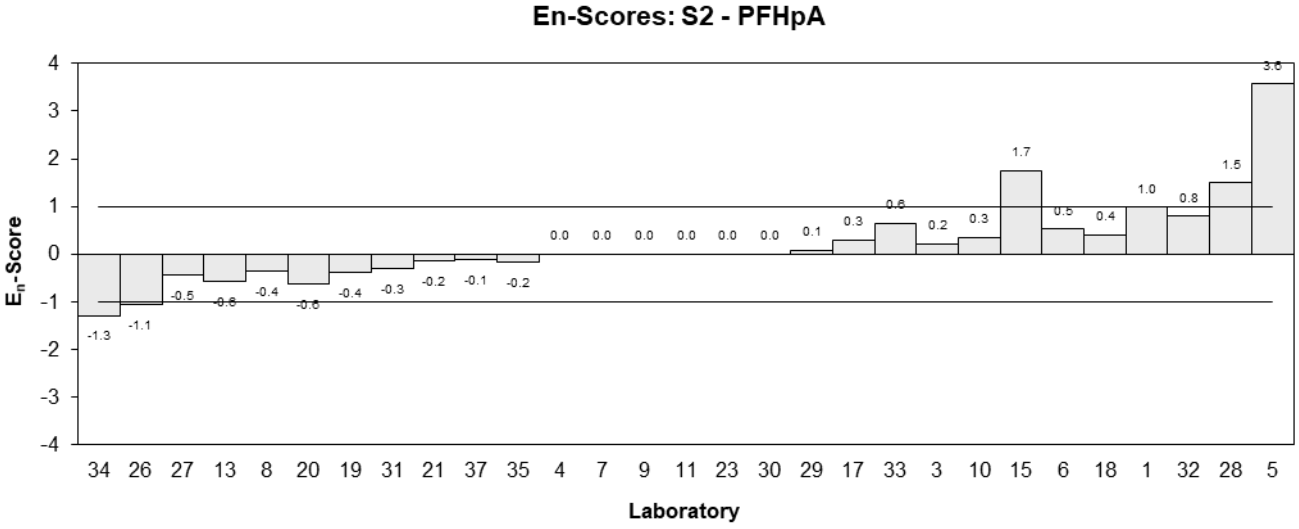

En-Scores: S2 - PFHpA
En-Score
Laboratory
34 26 27 13 8 20 19 31 21 37 35 4 7 9 11 23 30 29 17 33 3 10 15 6 18 1 32 28 5

Figure 30

Table 34

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	PFOA
Unit	µg/kg

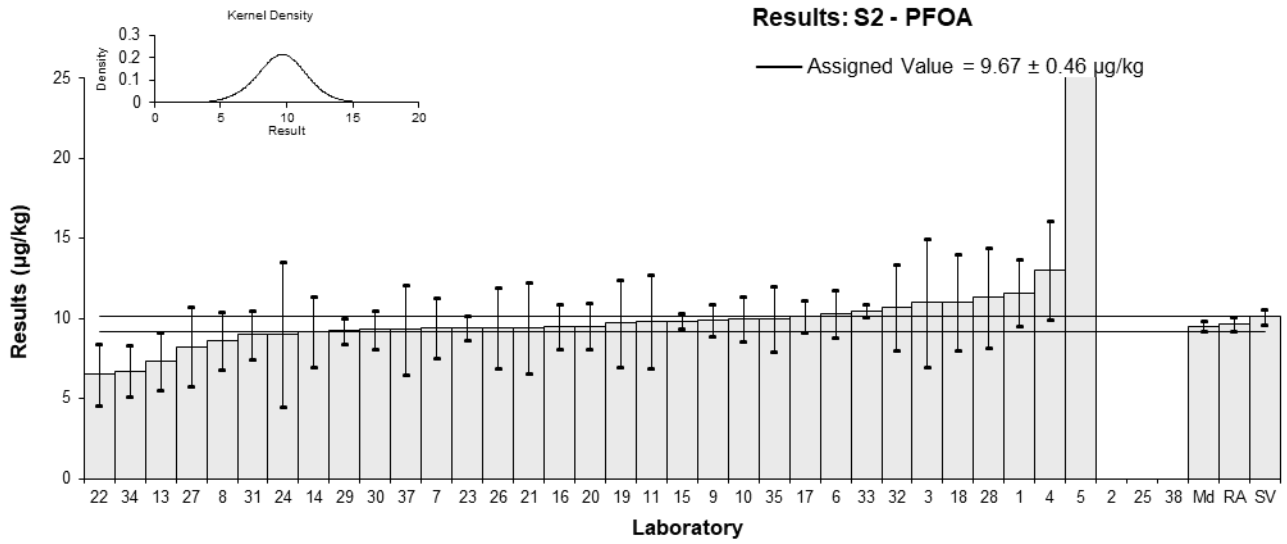
Participant Results

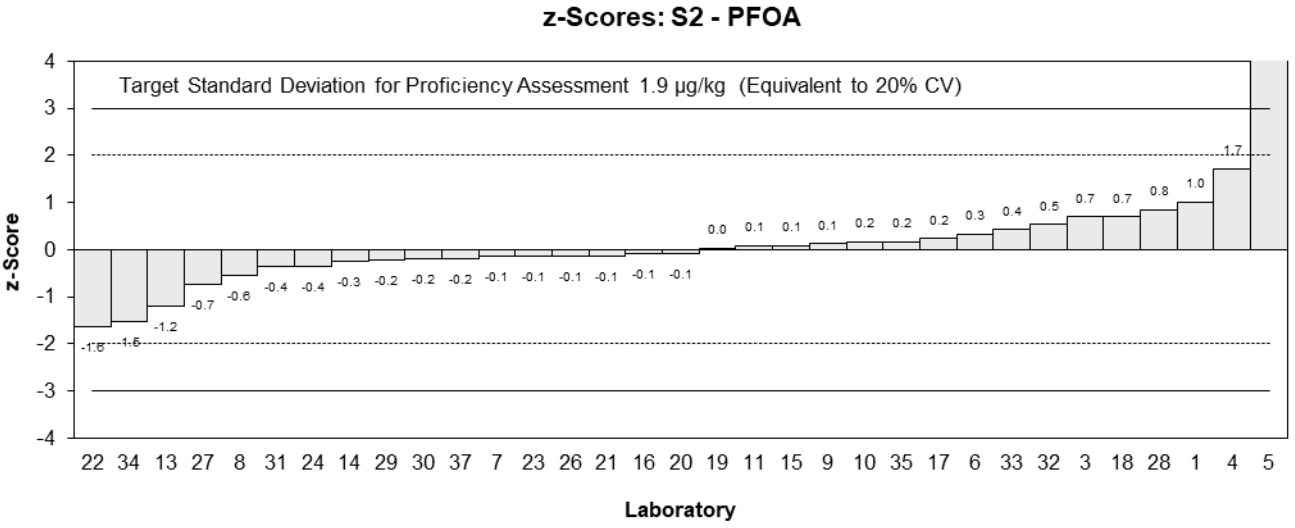
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	11.6	2.1	106.76	1.00	0.90
2	NS	NS	NS		
3	11	4	92	0.69	0.33
4	13	3.1	116	1.72	1.06
5**	4372.36607166	4044.24987223	NR	2,255.79	1.08
6	10.3	1.48	81	0.33	0.41
7	9.4	1.88	NR	-0.14	-0.14
8	8.59	1.8	82	-0.56	-0.58
9	9.9	1	84	0.12	0.21
10	10	1.4	102	0.17	0.22
11	9.82	2.9	96	0.08	0.05
13	7.34	1.823	107	-1.20	-1.24
14	9.177	2.19	119	-0.25	-0.22
15	9.8409	0.5073	96	0.09	0.25
16	9.5	1.4	70	-0.09	-0.12
17	10.11	0.99	NR	0.23	0.40
18	11	3	101	0.69	0.44
19	9.71	2.7	118	0.02	0.01
20	9.52	1.43	97.7	-0.08	-0.10
21	9.41	2.82	31	-0.13	-0.09
22	6.5	1.95	60	-1.64	-1.58
23	9.4	0.75	93.11	-0.14	-0.31
24	9	4.5	101	-0.35	-0.15
25	NR	NR	NR		
26	9.4	2.5	87	-0.14	-0.11
27	8.235	2.470	77	-0.74	-0.57
28	11.3	3.1	119	0.84	0.52
29	9.22	0.78	99.3	-0.23	-0.50
30	9.3	1.2	NR	-0.19	-0.29
31	8.99	1.5	110.05	-0.35	-0.43
32	10.7	2.7	100	0.53	0.38
33	10.49	0.423	82	0.42	1.31
34	6.694	1.6	98	-1.54	-1.79
35	10.00	2.04	115	0.17	0.16
37	9.30	2.79	90	-0.19	-0.13
38	NS	NS	NS		

** Gross Error, see Section 4.2

Statistics

Assigned Value	9.67	0.46
Spike Value	10.1	0.5
Robust Average	9.67	0.46
Median	9.51	0.33
Mean	9.62	
N	32	
Max	13	
Min	6.5	
Robust SD	1.0	
Robust CV	11%	


Kernel Density
Density
Result
Results: S2 - PFOA
Assigned Value = 9.67 ± 0.46 µg/kg
Results (µg/kg)
Laboratory
22 34 13 27 8 31 24 14 29 30 37 7 23 26 21 16 20 19 11 15 9 10 35 17 6 33 32 3 18 28 1 4 5 2 25 38 Md RA SV


z-Scores: S2 - PFOA
Target Standard Deviation for Proficiency Assessment 1.9 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 34 13 27 8 31 24 14 29 30 37 7 23 26 21 16 20 19 11 15 9 10 35 17 6 33 32 3 18 28 1 4 5

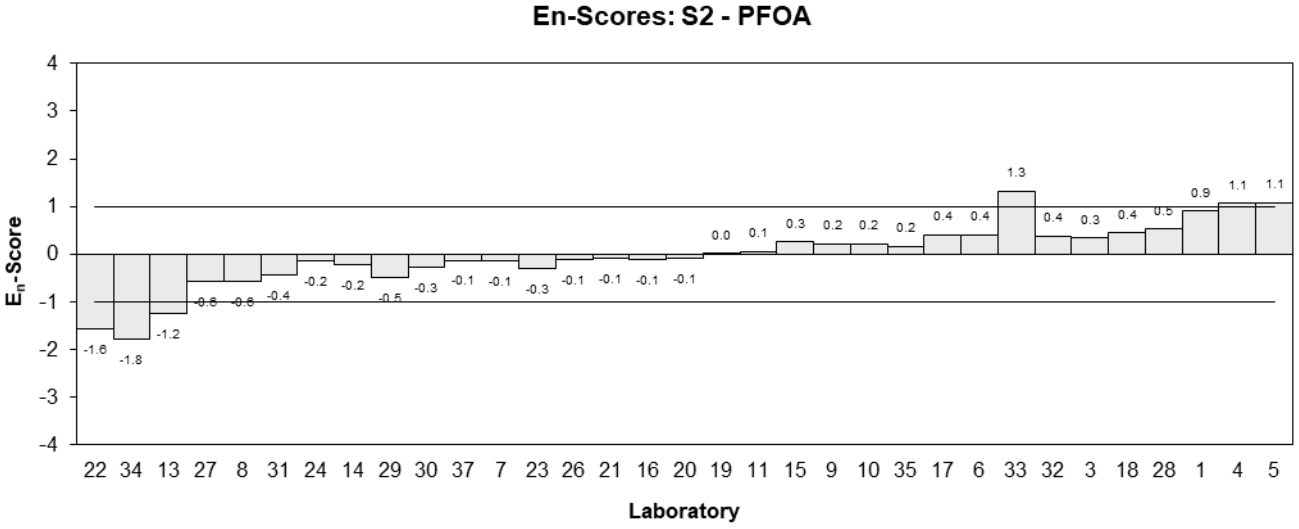

En-Scores: S2 - PFOA
En-Score
Laboratory
22 34 13 27 8 31 24 14 29 30 37 7 23 26 21 16 20 19 11 15 9 10 35 17 6 33 32 3 18 28 1 4 5

Figure 31

Table 35

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	PFNA
Unit	µg/kg

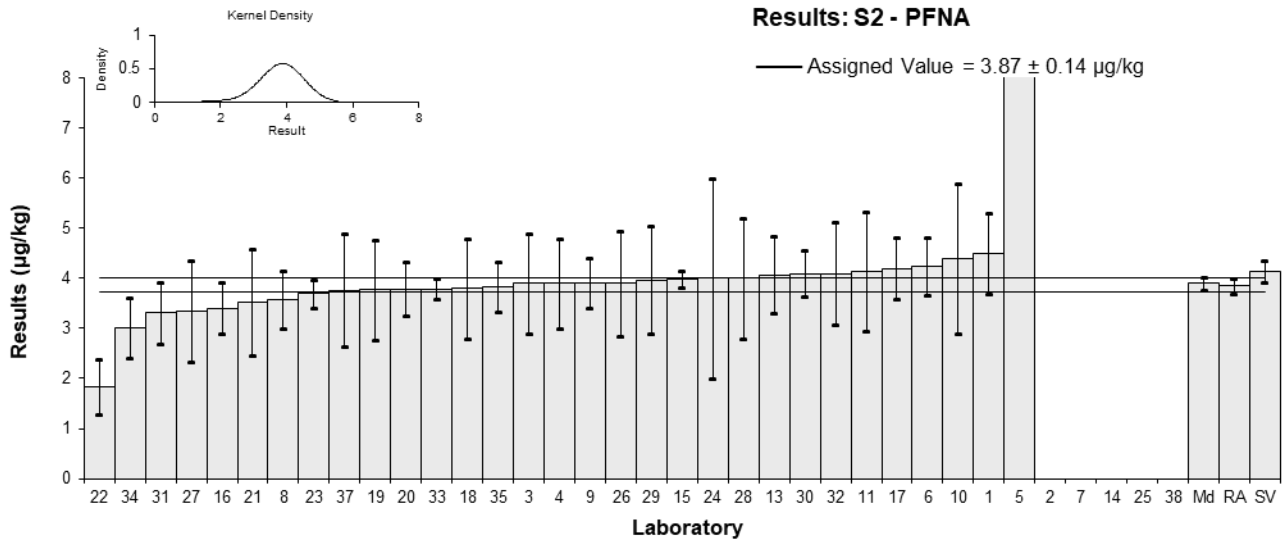
Participant Results

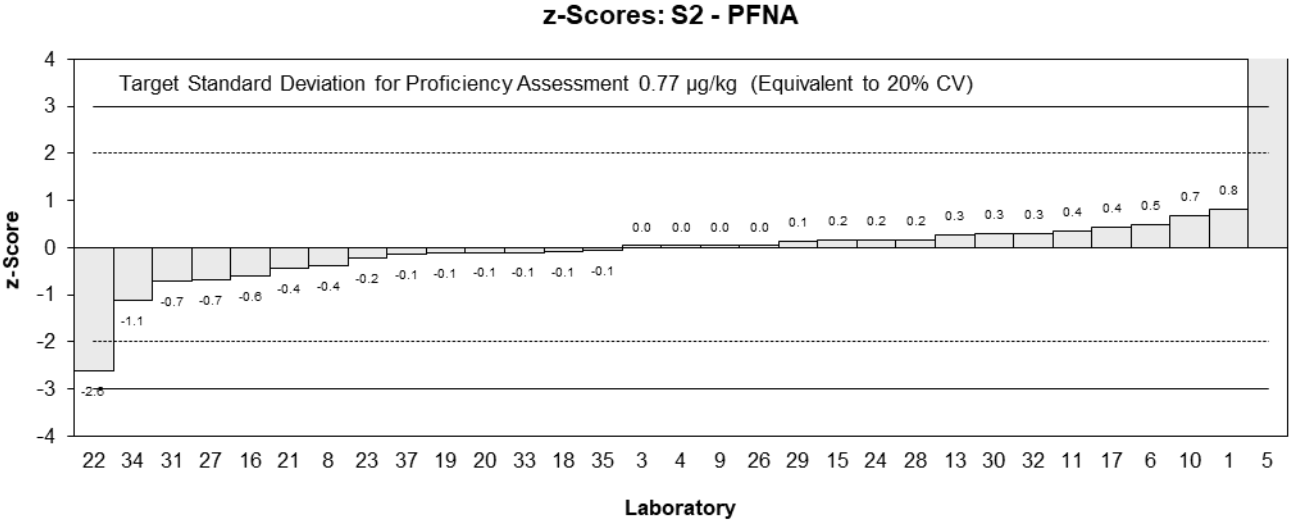
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	4.5	0.8	116.34	0.81	0.78
2	NS	NS	NS		
3	3.9	1	95	0.04	0.03
4	3.9	0.90	NT	0.04	0.03
5**	1250.789355	810.026438031	NR	1,611.01	1.54
6	4.24	0.578	83	0.48	0.62
7	NR	NR	NR		
8	3.573	0.57	79	-0.38	-0.51
9	3.9	0.5	NT	0.04	0.06
10	4.4	1.5	104	0.68	0.35
11	4.14	1.2	88	0.35	0.22
13	4.07	0.764	126	0.26	0.26
14	<5	NR	134		
15	3.9860	0.1643	95	0.15	0.54
16	3.4	0.51	69	-0.61	-0.89
17	4.202	0.614	NR	0.43	0.53
18	3.8	1	102	-0.09	-0.07
19	3.78	1	113	-0.12	-0.09
20	3.79	0.53	97.1	-0.10	-0.15
21	3.53	1.06	29	-0.44	-0.32
22*	1.84	0.552	61	-2.62	-3.56
23	3.7	0.28	101.99	-0.22	-0.54
24	4	2	104	0.17	0.06
25	NR	NR	NR		
26	3.9	1.05	86	0.04	0.03
27	3.347	1.004	69	-0.68	-0.52
28	4	1.2	145	0.17	0.11
29	3.97	1.07	105.7	0.13	0.09
30	4.1	0.45	NR	0.30	0.49
31	3.31	0.62	122.82	-0.72	-0.88
32	4.10	1.03	116	0.30	0.22
33	3.79	0.199	86	-0.10	-0.33
34	3.009	0.599	98	-1.11	-1.40
35	3.83	0.49	120	-0.05	-0.08
37	3.76	1.128	85	-0.14	-0.10
38	NS	NS	NS		

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	3.87	0.14
Spike Value	4.14	0.21
Robust Average	3.85	0.15
Median	3.90	0.13
Mean	3.79	
N	30	
Max	4.5	
Min	1.84	
Robust SD	0.34	
Robust CV	8.8%	


Results: S2 - PFNA
Kernel Density
Density
Result
Assigned Value = 3.87 ± 0.14 µg/kg
Results (µg/kg)
22 34 31 27 16 21 8 23 37 19 20 33 18 35 3 4 9 26 29 15 24 28 13 30 32 11 17 6 10 1 5 2 7 14 25 38 Md RA SV
Laboratory


z-Scores: S2 - PFNA
Target Standard Deviation for Proficiency Assessment 0.77 µg/kg (Equivalent to 20% CV)
z-Score
22 34 31 27 16 21 8 23 37 19 20 33 18 35 3 4 9 26 29 15 24 28 13 30 32 11 17 6 10 1 5
Laboratory

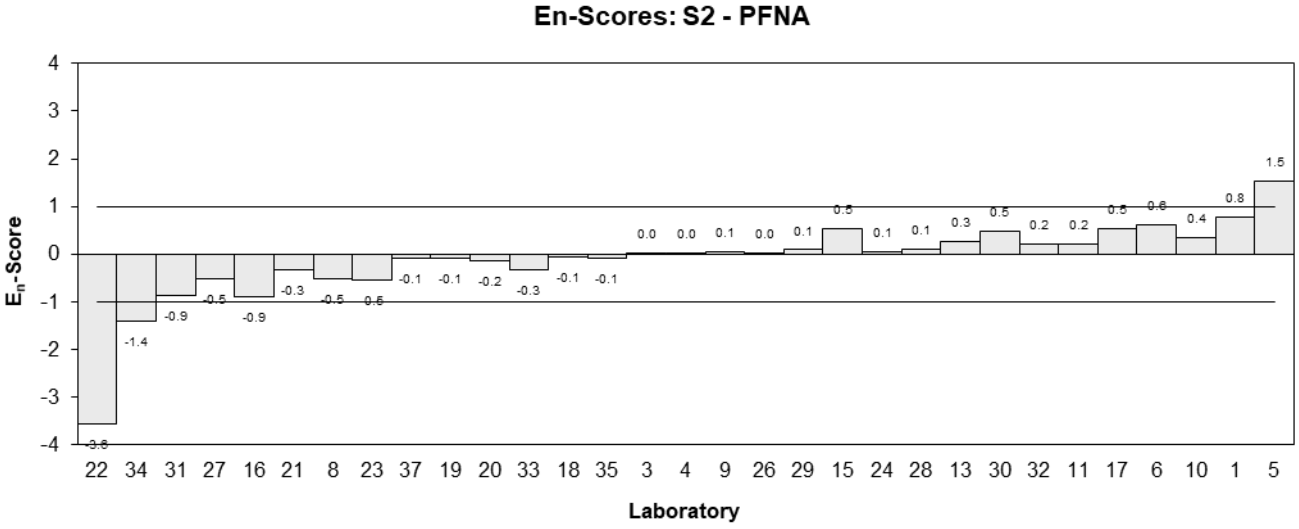

En-Scores: S2 - PFNA
En-Score
22 34 31 27 16 21 8 23 37 19 20 33 18 35 3 4 9 26 29 15 24 28 13 30 32 11 17 6 10 1 5
Laboratory

Figure 32

Table 36

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	PFDA
Unit	µg/kg

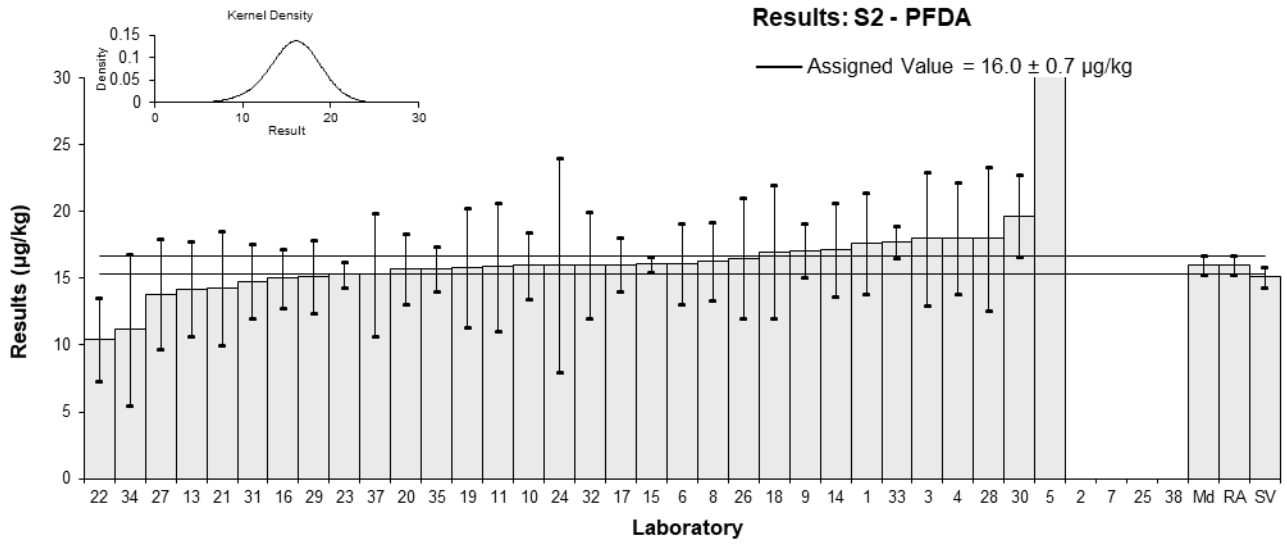
Participant Results

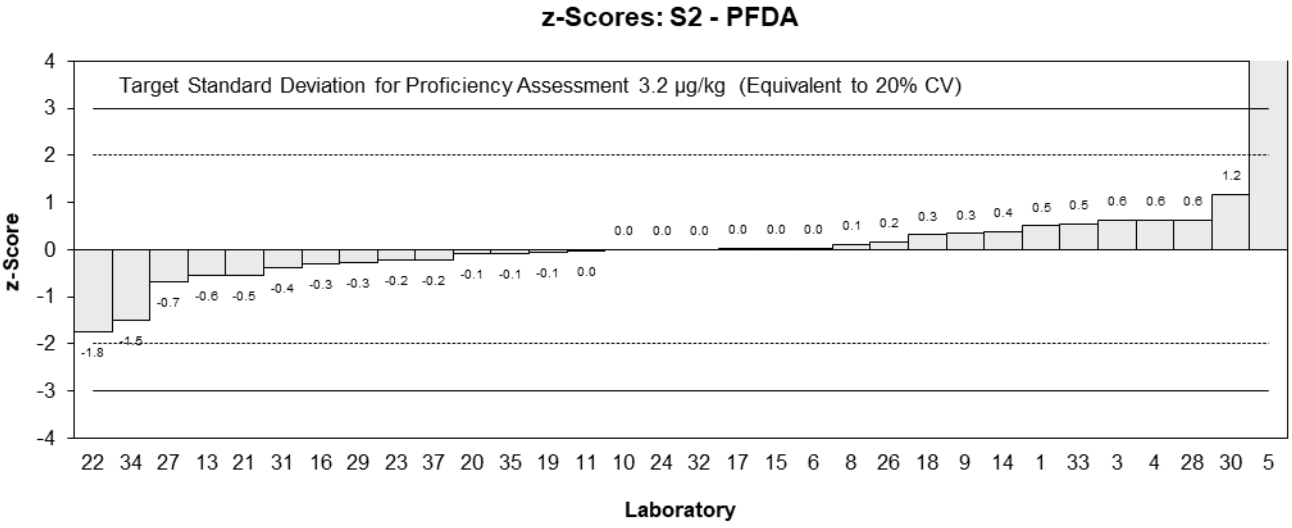
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	17.6	3.8	118.28	0.50	0.41
2	NS	NS	NS		
3	18	5	91	0.62	0.40
4	18	4.2	NT	0.62	0.47
5**	1025.75566833	399.630382872	NR	315.55	2.53
6	16.1	3	81	0.03	0.03
7	NR	NR	NR		
8	16.311	2.93	68	0.10	0.10
9	17.1	2	80	0.34	0.52
10	16	2.5	119	0.00	0.00
11	15.9	4.8	82	-0.03	-0.02
13	14.2	3.565	102	-0.56	-0.50
14	17.17	3.53	155	0.37	0.33
15	16.0790	0.5846	96	0.02	0.09
16	15	2.2	71	-0.31	-0.43
17	16.05	1.99	NR	0.02	0.02
18	17	5	104	0.31	0.20
19	15.8	4.5	113	-0.06	-0.04
20	15.7	2.67	101	-0.09	-0.11
21	14.27	4.28	22	-0.54	-0.40
22	10.4	3.12	64	-1.75	-1.75
23	15.3	0.99	96.75	-0.22	-0.58
24	16	8	101	0.00	0.00
25	NR	NR	NR		
26	16.52	4.5	95	0.16	0.11
27	13.829	4.149	71	-0.68	-0.52
28	18	5.4	162	0.62	0.37
29	15.13	2.76	101.2	-0.27	-0.31
30	19.7	3.1	NR	1.16	1.16
31	14.76	2.79	110.38	-0.39	-0.43
32	16.0	4.0	109	0.00	0.00
33	17.74	1.2	76	0.54	1.25
34	11.155	5.633	134	-1.51	-0.85
35	15.74	1.70	120	-0.08	-0.14
37	15.3	4.59	82	-0.22	-0.15
38	NS	NS	NS		

** Gross Error, see Section 4.2

Statistics

Assigned Value	16.0	0.7
Spike Value	15.1	0.8
Robust Average	16.0	0.7
Median	16.0	0.7
Mean	15.9	
N	31	
Max	19.7	
Min	10.4	
Robust SD	1.5	
Robust CV	9.3%	


Kernel Density
Density
Result
Results: S2 - PFDA
Assigned Value = 16.0 ± 0.7 µg/kg
Results (µg/kg)
Laboratory
22 34 27 13 21 31 16 29 23 37 20 35 19 11 10 24 32 17 15 6 8 26 18 9 14 1 33 3 4 28 30 5 2 7 25 38 Md RA SV


z-Scores: S2 - PFDA
Target Standard Deviation for Proficiency Assessment 3.2 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 34 27 13 21 31 16 29 23 37 20 35 19 11 10 24 32 17 15 6 8 26 18 9 14 1 33 3 4 28 30 5

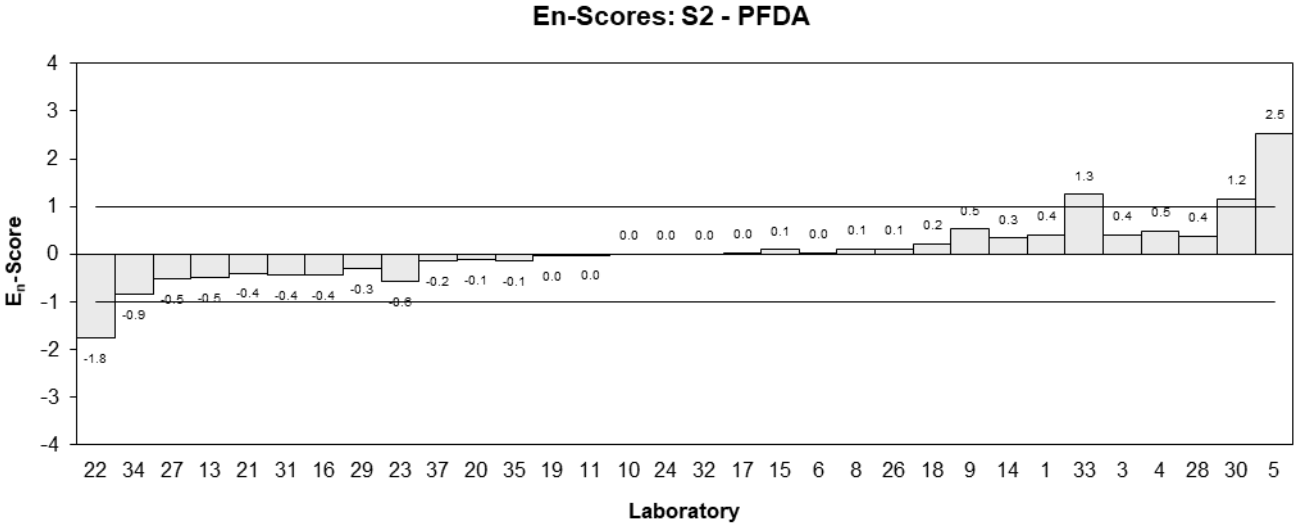

En-Scores: S2 - PFDA
En-Score
Laboratory
22 34 27 13 21 31 16 29 23 37 20 35 19 11 10 24 32 17 15 6 8 26 18 9 14 1 33 3 4 28 30 5

Figure 33

Table 37

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	PFDoA
Unit	µg/kg

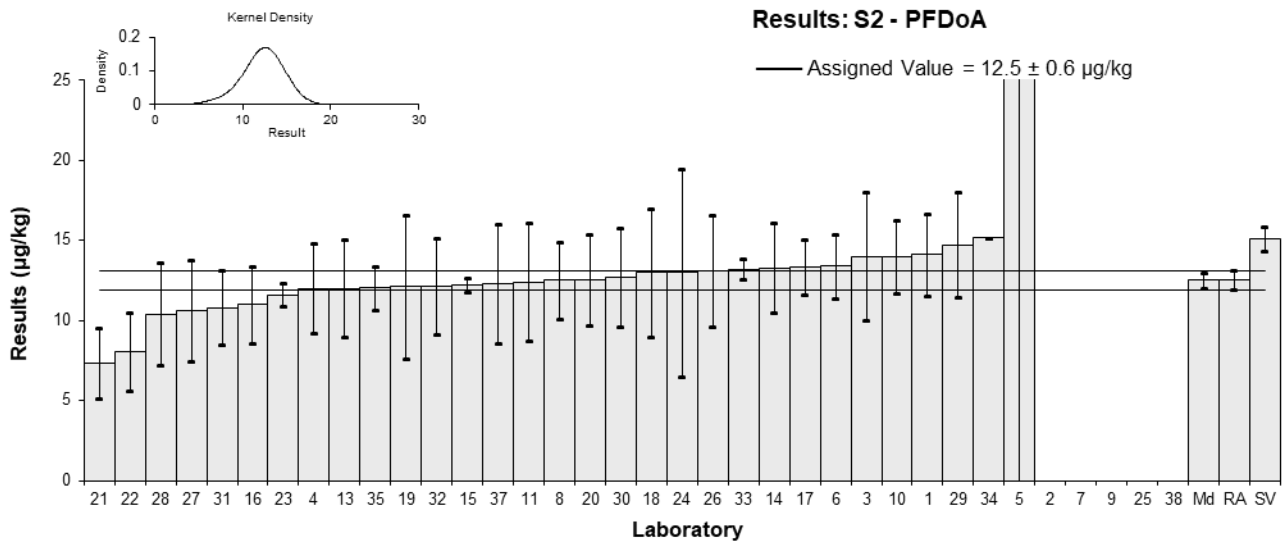
Participant Results

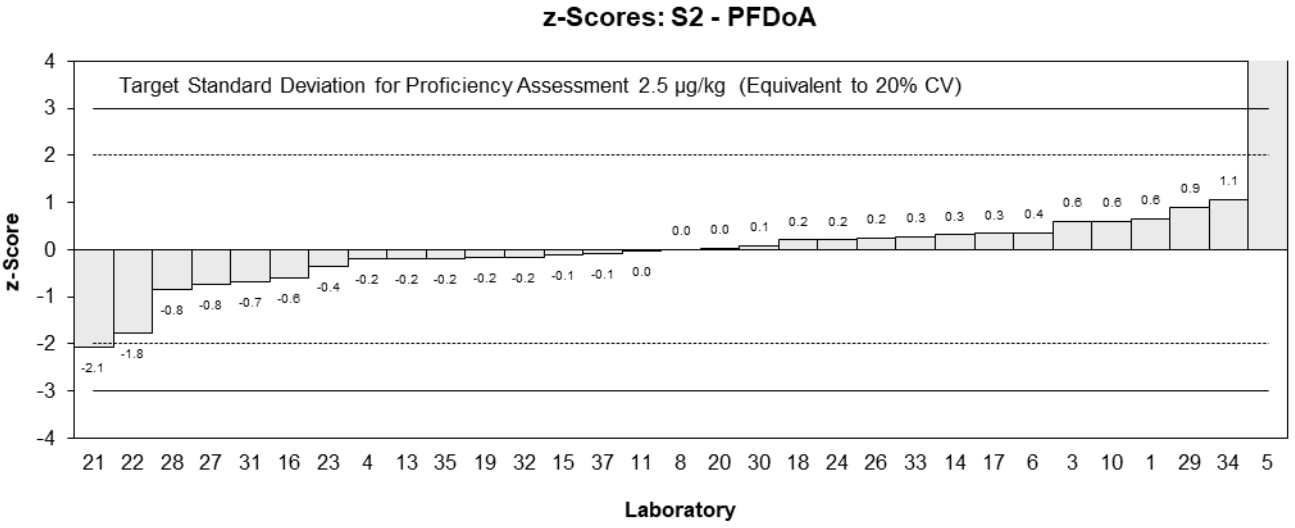
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	14.1	2.6	119.06	0.64	0.60
2	NS	NS	NS		
3	14	4	95	0.60	0.37
4	12	2.8	NT	-0.20	-0.17
5**	296.438928333	319.126927433	NR	113.58	0.89
6	13.4	2.02	85	0.36	0.43
7	NR	NR	NR		
8	12.5	2.37	67	0.00	0.00
9	<1	NR	NT		
10	14	2.3	108	0.60	0.63
11	12.4	3.7	78	-0.04	-0.03
13	12.01	3.030	120	-0.20	-0.16
14	13.28	2.81	145	0.31	0.27
15	12.1910	0.4403	92	-0.12	-0.42
16	11	2.4	78	-0.60	-0.61
17	13.34	1.71	NR	0.34	0.46
18	13	4	106	0.20	0.12
19	12.1	4.5	109	-0.16	-0.09
20	12.54	2.88	87.6	0.02	0.01
21	7.31	2.19	15	-2.08	-2.29
22	8.06	2.42	61	-1.78	-1.78
23	11.6	0.73	97.19	-0.36	-0.95
24	13	6.5	85	0.20	0.08
25	NR	NR	NR		
26	13.1	3.5	102	0.24	0.17
27	10.619	3.186	73	-0.75	-0.58
28	10.4	3.2	112	-0.84	-0.65
29	14.73	3.27	86.2	0.89	0.67
30	12.7	3.1	NR	0.08	0.06
31	10.81	2.35	111.77	-0.68	-0.70
32	12.1	3.0	102	-0.16	-0.13
33	13.19	0.647	50	0.28	0.78
34	15.145	0.007	134	1.06	4.41
35	12.03	1.37	127	-0.19	-0.31
37	12.3	3.69	76	-0.08	-0.05
38	NS	NS	NS		

** Gross Error, see Section 4.2

Statistics

Assigned Value	12.5	0.6
Spike Value	15.1	0.8
Robust Average	12.5	0.6
Median	12.5	0.5
Mean	12.3	
N	30	
Max	15.145	
Min	7.31	
Robust SD	1.4	
Robust CV	11%	


Kernel Density
Density
Result
Results: S2 - PFDoA
Assigned Value = 12.5 ± 0.6 µg/kg
Results (µg/kg)
Laboratory
21 22 28 27 31 16 23 4 13 35 19 32 15 37 11 8 20 30 18 24 26 33 14 17 6 3 10 1 29 34 5 2 7 9 25 38 Md RA SV


z-Scores: S2 - PFDoA
Target Standard Deviation for Proficiency Assessment 2.5 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
21 22 28 27 31 16 23 4 13 35 19 32 15 37 11 8 20 30 18 24 26 33 14 17 6 3 10 1 29 34 5

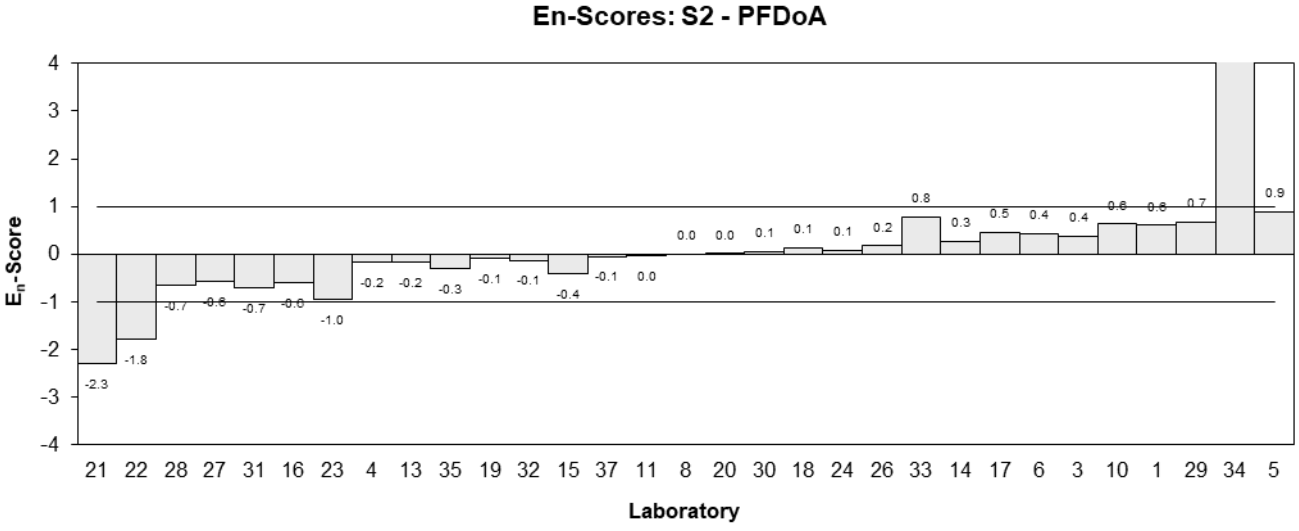

En-Scores: S2 - PFDoA
En-Score
Laboratory
21 22 28 27 31 16 23 4 13 35 19 32 15 37 11 8 20 30 18 24 26 33 14 17 6 3 10 1 29 34 5

Figure 34

Table 38

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	PFTeDA
Unit	µg/kg

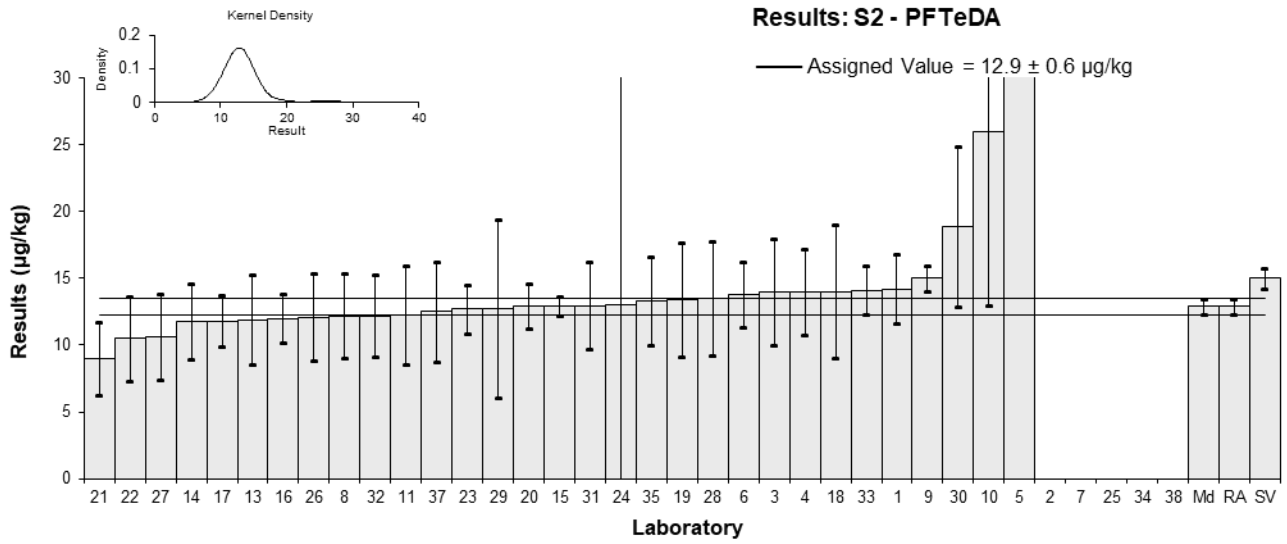
Participant Results

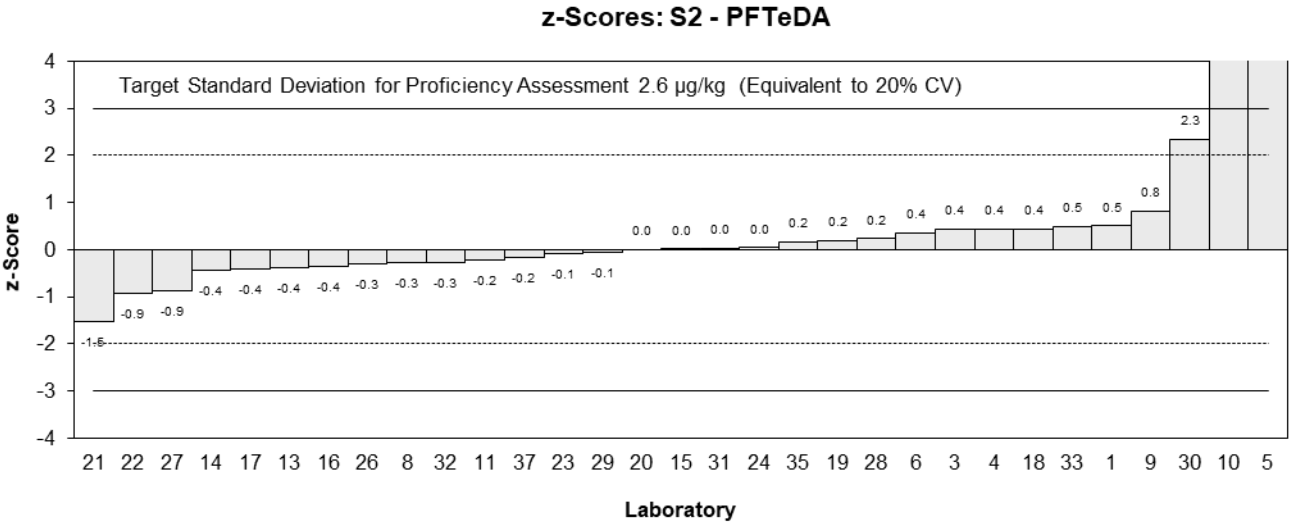
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	14.2	2.6	100.59	0.50	0.49
2	NS	NS	NS		
3	14	4	116	0.43	0.27
4	14	3.2	NT	0.43	0.34
5**	1990.25909	265.667474077	NR	766.42	7.44
6	13.8	2.43	82	0.35	0.36
7	NR	NR	NR		
8	12.175	3.16	48	-0.28	-0.23
9	15	1	NT	0.81	1.80
10*	26	13	38	5.08	1.01
11	12.3	3.7	78	-0.23	-0.16
13	11.89	3.348	114	-0.39	-0.30
14	11.768	2.81	137	-0.44	-0.39
15	12.9353	0.6907	103	0.01	0.04
16	12	1.8	74	-0.35	-0.47
17	11.81	1.89	NR	-0.42	-0.55
18	14	5	116	0.43	0.22
19	13.4	4.3	123	0.19	0.12
20	12.9	1.67	81.2	0.00	0.00
21	8.99	2.70	49	-1.52	-1.41
22	10.5	3.15	64	-0.93	-0.75
23	12.7	1.8	89.57	-0.08	-0.11
24	13	34	91	0.04	0.00
25	NR	NR	NR		
26	12.1	3.3	105	-0.31	-0.24
27	10.628	3.189	77	-0.88	-0.70
28	13.5	4.3	102	0.23	0.14
29	12.74	6.72	78.5	-0.06	-0.02
30	18.9	6.0	NR	2.33	1.00
31	12.95	3.26	117.92	0.02	0.02
32	12.2	3.1	52	-0.27	-0.22
33	14.13	1.83	7	0.48	0.64
34	NR	NR	NR		
35	13.32	3.29	130	0.16	0.13
37	12.5	3.75	59	-0.16	-0.11
38	NS	NS	NS		

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	12.9	0.6
Spike Value	15.0	0.8
Robust Average	12.9	0.6
Median	12.9	0.6
Mean	13.3	
N	30	
Max	26	
Min	8.99	
Robust SD	1.3	
Robust CV	10%	


Kernel Density
Density
Result
Results: S2 - PFTeDA
Assigned Value = 12.9 ± 0.6 µg/kg
Results (µg/kg)
Laboratory
21 22 27 14 17 13 16 26 8 32 11 37 23 29 20 15 31 24 35 19 28 6 3 4 18 33 1 9 30 10 5 2 7 25 34 38 Md RA SV


z-Scores: S2 - PFTeDA
Target Standard Deviation for Proficiency Assessment 2.6 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
21 22 27 14 17 13 16 26 8 32 11 37 23 29 20 15 31 24 35 19 28 6 3 4 18 33 1 9 30 10 5

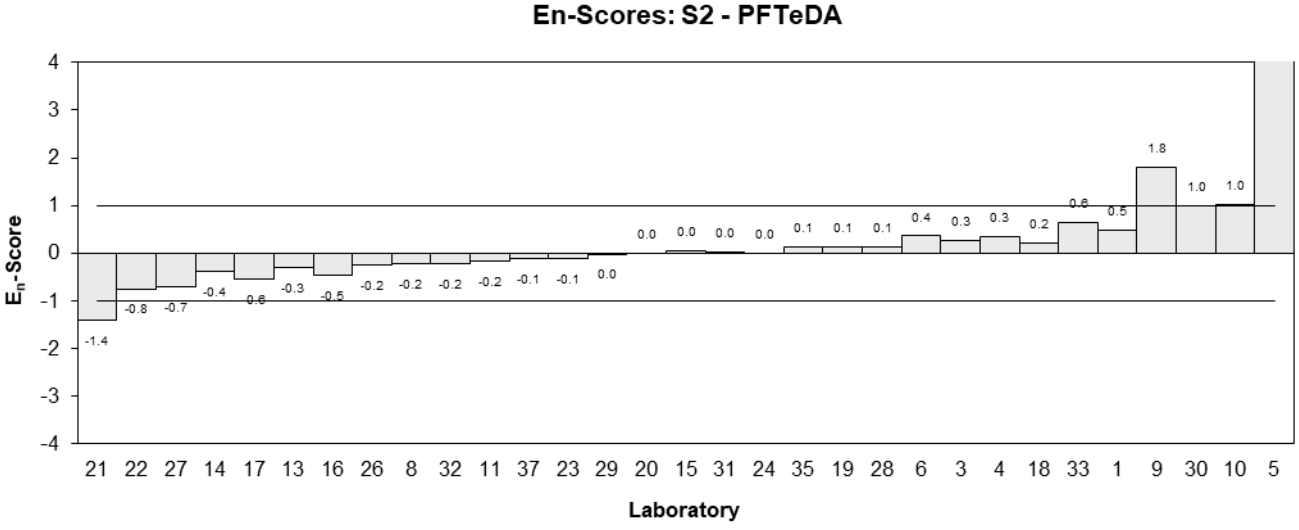

En-Scores: S2 - PFTeDA
En-Score
Laboratory
21 22 27 14 17 13 16 26 8 32 11 37 23 29 20 15 31 24 35 19 28 6 3 4 18 33 1 9 30 10 5

Figure 35

Table 39

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	PFOSA
Unit	µg/kg

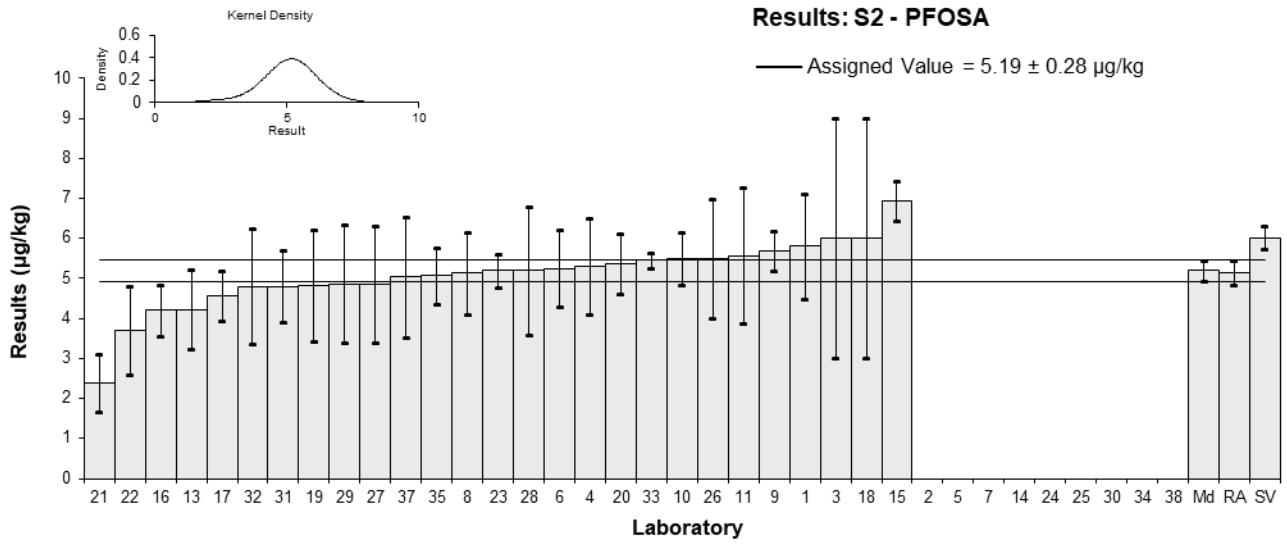
Participant Results

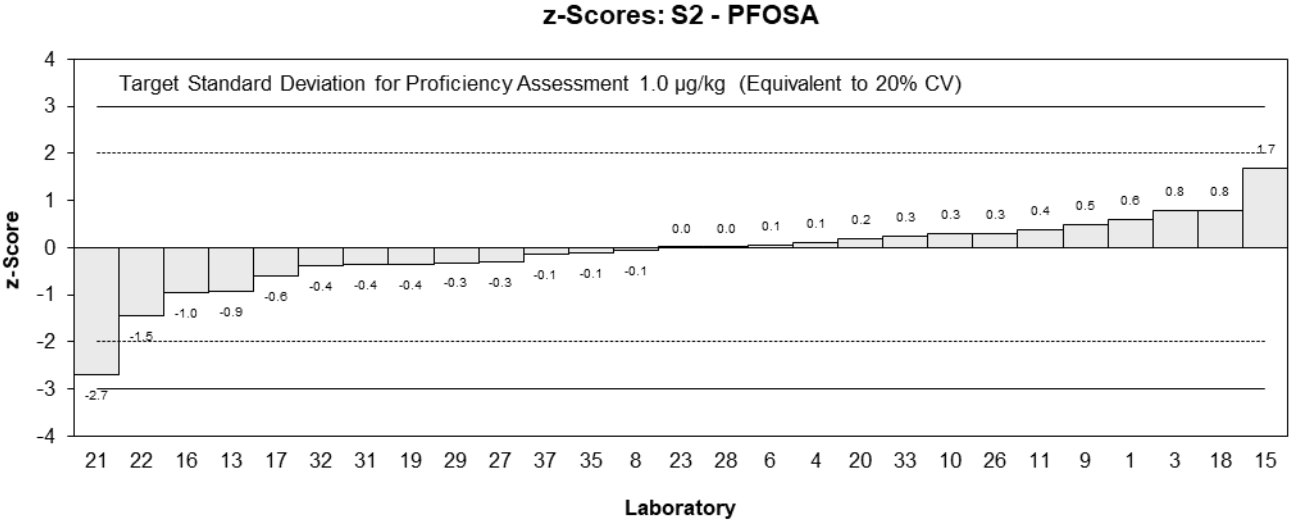
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	5.8	1.3	109.15	0.59	0.46
2	NS	NS	NS		
3	6	3	99	0.78	0.27
4	5.3	1.2	NT	0.11	0.09
5	NT	NT	NT		
6	5.25	0.954	85	0.06	0.06
7	NR	NR	NR		
8	5.135	1.03	75	-0.05	-0.05
9	5.7	0.5	NT	0.49	0.89
10	5.5	0.65	110	0.30	0.44
11	5.57	1.7	82	0.37	0.22
13	4.22	0.990	127	-0.93	-0.94
14	<5	NR	126		
15	6.9368	0.4823	83	1.68	3.13
16	4.2	0.63	71	-0.95	-1.44
17	4.562	0.630	NR	-0.61	-0.91
18	6	3	105	0.78	0.27
19	4.82	1.4	103	-0.36	-0.26
20	5.38	0.753	101	0.18	0.24
21*	2.39	0.72	71	-2.70	-3.62
22	3.69	1.11	55	-1.45	-1.31
23	5.2	0.42	93.35	0.01	0.02
24	< 10	5	73		
25	NR	NR	NR		
26	5.5	1.5	98	0.30	0.20
27	4.866	1.460	84	-0.31	-0.22
28	5.2	1.6	NR	0.01	0.01
29	4.86	1.47	703	-0.32	-0.22
30	NT	NT	NT		
31	4.805	0.892	105.41	-0.37	-0.41
32	4.80	1.44	89	-0.38	-0.27
33	5.45	0.194	82	0.25	0.76
34	NR	NR	NR		
35	5.07	0.70	105	-0.12	-0.16
37	5.04	1.512	82	-0.14	-0.10
38	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	5.19	0.28
Spike Value	6.02	0.30
Robust Average	5.14	0.31
Median	5.20	0.26
Mean	5.08	
N	27	
Max	6.9368	
Min	2.39	
Robust SD	0.64	
Robust CV	12%	


Kernel Density
Density
Result
Results: S2 - PFOSA
Assigned Value = 5.19 ± 0.28 µg/kg
Results (µg/kg)
21 22 16 13 17 32 31 19 29 27 37 35 8 23 28 6 4 20 33 10 26 11 9 1 3 18 15 2 5 7 14 24 25 30 34 38 Md RA SV
Laboratory


z-Scores: S2 - PFOSA
Target Standard Deviation for Proficiency Assessment 1.0 µg/kg (Equivalent to 20% CV)
z-Score
21 22 16 13 17 32 31 19 29 27 37 35 8 23 28 6 4 20 33 10 26 11 9 1 3 18 15
Laboratory

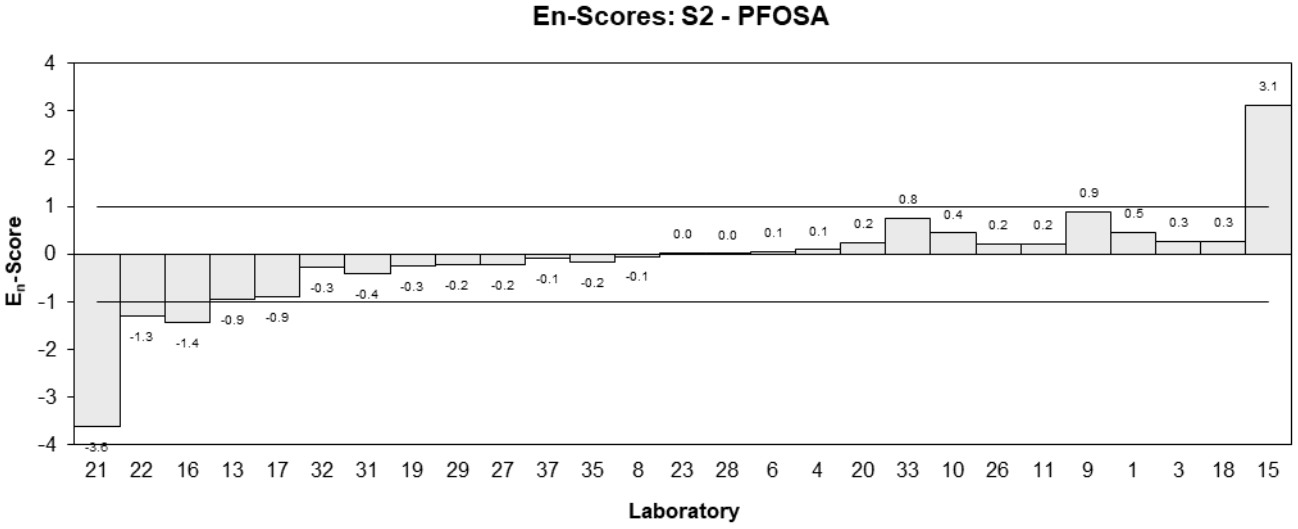

En-Scores: S2 - PFOSA
En-Score
21 22 16 13 17 32 31 19 29 27 37 35 8 23 28 6 4 20 33 10 26 11 9 1 3 18 15
Laboratory

Figure 36

Table 40

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	MeFOSA
Unit	µg/kg

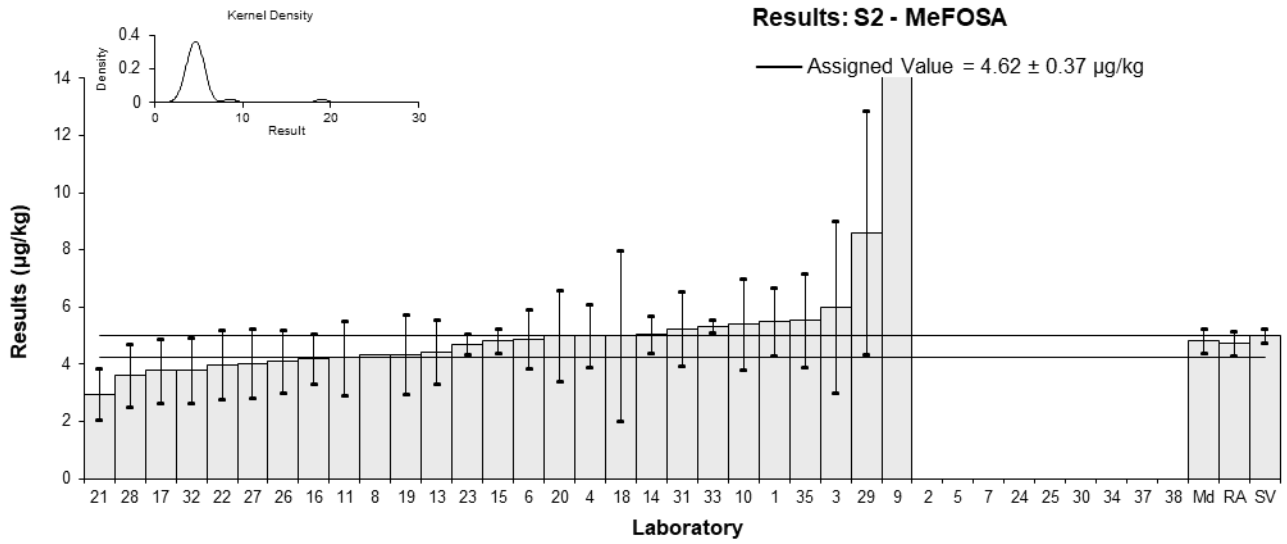
Participant Results

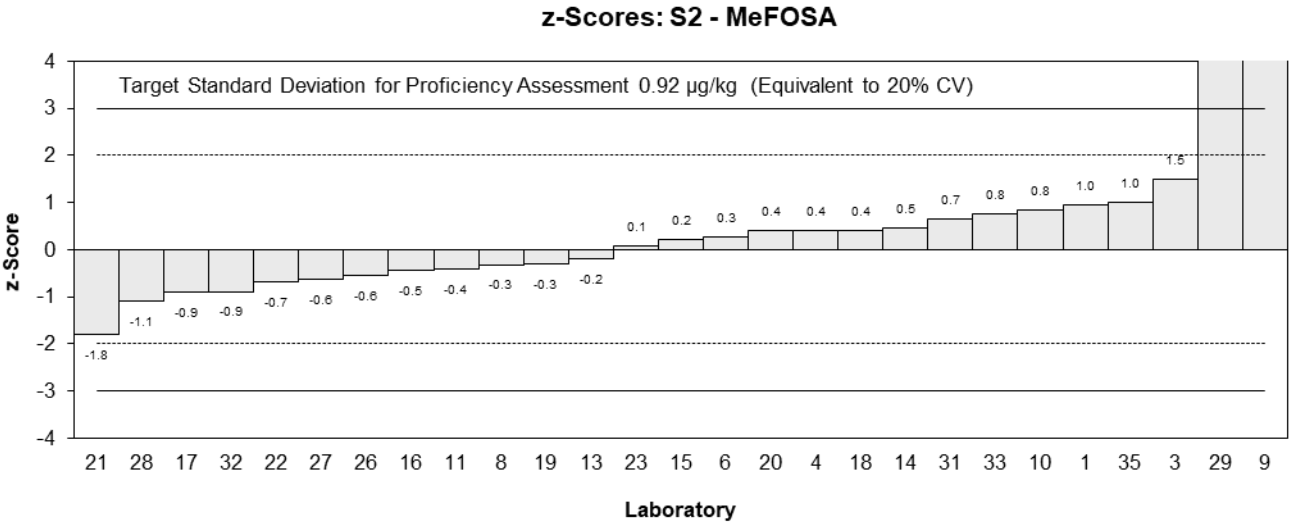
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	5.5	1.2	109.71	0.95	0.70
2	NS	NS	NS		
3	6	3	95	1.49	0.46
4	5.0	1.1	NT	0.41	0.33
5	NT	NT	NT		
6	4.88	1.04	91	0.28	0.24
7	NR	NR	NR		
8	4.325	NR	126	-0.32	-0.80
9*	19	2	NT	15.56	7.07
10	5.4	1.6	109	0.84	0.47
11	4.23	1.3	77	-0.42	-0.29
13	4.44	1.101	121	-0.19	-0.15
14	5.04	0.64	129	0.45	0.57
15	4.8134	0.4320	95	0.21	0.34
16	4.2	0.87	72	-0.45	-0.44
17	3.781	1.112	NR	-0.91	-0.72
18	5	3	102	0.41	0.13
19	4.34	1.4	98	-0.30	-0.19
20	4.99	1.6	67.5	0.40	0.23
21	2.96	0.89	39	-1.80	-1.72
22	3.99	1.2	51	-0.68	-0.50
23	4.7	0.36	90.7	0.09	0.15
24	< 5	2.5	42		
25	NR	NR	NR		
26	4.1	1.1	87	-0.56	-0.45
27	4.028	1.208	117	-0.64	-0.47
28	3.6	1.1	NR	-1.10	-0.88
29*	8.61	4.27	89.8	4.32	0.93
30	NT	NT	NT		
31	5.23	1.3	111.36	0.66	0.45
32	3.80	1.14	123	-0.89	-0.68
33	5.33	0.232	28	0.77	1.63
34	NR	NR	NR		
35	5.55	1.64	96	1.01	0.55
37	NT	NT	NT		
38	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	4.62	0.37
Spike Value	5.00	0.25
Robust Average	4.73	0.41
Median	4.81	0.42
Mean	5.3	
N	27	
Max	19	
Min	2.96	
Robust SD	0.85	
Robust CV	18%	


Results: S2 - MeFOSA
Assigned Value = 4.62 ± 0.37 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
21 28 17 32 22 27 26 16 11 8 19 13 23 15 6 20 4 18 14 31 33 10 1 35 3 29 9 2 5 7 24 25 30 34 37 38 Md RA SV


z-Scores: S2 - MeFOSA
Target Standard Deviation for Proficiency Assessment 0.92 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
21 28 17 32 22 27 26 16 11 8 19 13 23 15 6 20 4 18 14 31 33 10 1 35 3 29 9

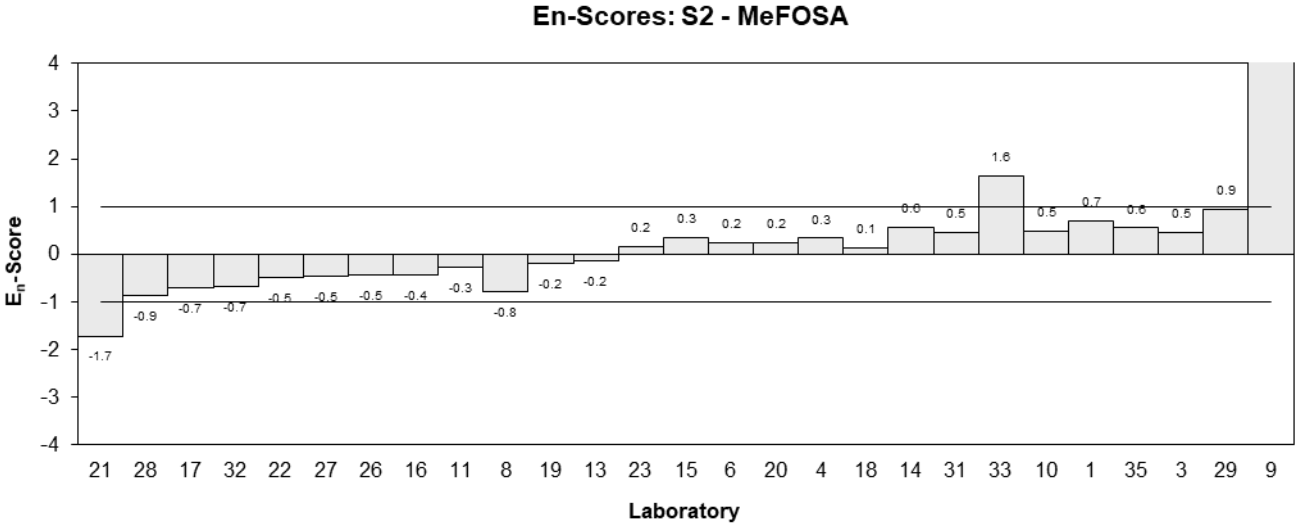

En-Scores: S2 - MeFOSA
En-Score
Laboratory
21 28 17 32 22 27 26 16 11 8 19 13 23 15 6 20 4 18 14 31 33 10 1 35 3 29 9

Figure 37

Table 41

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	EtFOSA
Unit	µg/kg

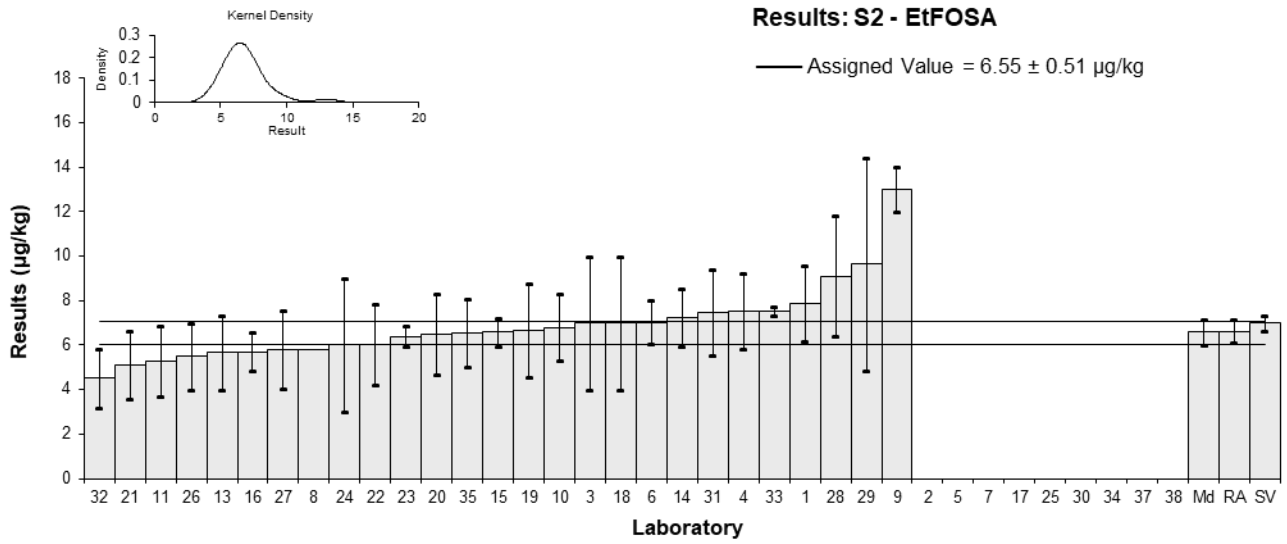
Participant Results

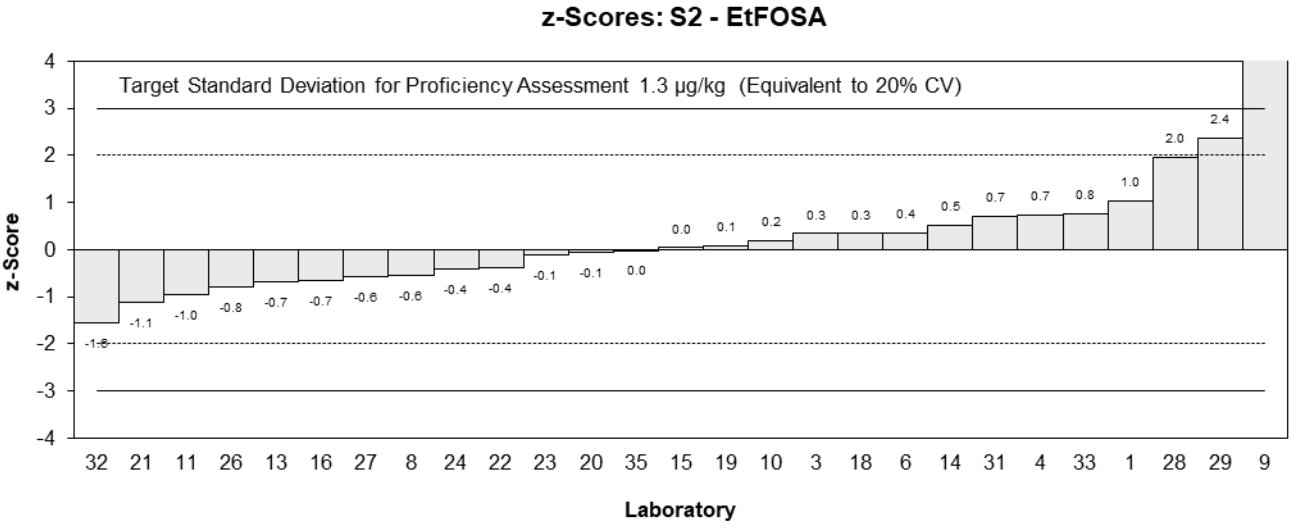
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	7.9	1.7	99.77	1.03	0.76
2	NS	NS	NS		
3	7	3	95	0.34	0.15
4	7.5	1.7	NT	0.73	0.54
5	NT	NT	NT		
6	7.02	0.985	92	0.36	0.42
7	NR	NR	NR		
8	5.813	NR	142	-0.56	-1.45
9*	13	1	NT	4.92	5.75
10	6.8	1.5	106	0.19	0.16
11	5.28	1.6	72	-0.97	-0.76
13	5.66	1.689	99	-0.68	-0.50
14	7.22	1.29	133	0.51	0.48
15	6.6029	0.6344	98	0.04	0.06
16	5.7	0.86	69	-0.65	-0.85
17	NT	NT	NT		
18	7	3	106	0.34	0.15
19	6.66	2.1	104	0.08	0.05
20	6.47	1.81	50.4	-0.06	-0.04
21	5.09	1.53	39	-1.11	-0.91
22	6.05	1.82	49	-0.38	-0.26
23	6.4	0.44	98.43	-0.11	-0.22
24	6	3	44	-0.42	-0.18
25	NR	NR	NR		
26	5.5	1.5	83	-0.80	-0.66
27	5.796	1.739	128	-0.58	-0.42
28	9.1	2.7	126	1.95	0.93
29	9.64	4.77	74.7	2.36	0.64
30	NT	NT	NT		
31	7.47	1.94	113.63	0.70	0.46
32	4.50	1.35	123	-1.56	-1.42
33	7.53	0.224	17	0.75	1.76
34	NR	NR	NR		
35	6.54	1.53	110	-0.01	-0.01
37	NT	NT	NT		
38	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	6.55	0.51
Spike Value	7.00	0.35
Robust Average	6.63	0.54
Median	6.60	0.58
Mean	6.86	
N	27	
Max	13	
Min	4.5	
Robust SD	1.1	
Robust CV	17%	


Kernel Density
Density
Result
Results: S2 - EtFOSA
Assigned Value = 6.55 ± 0.51 µg/kg
Results (µg/kg)
Laboratory
32 21 11 26 13 16 27 8 24 22 23 20 35 15 19 10 3 18 6 14 31 4 33 1 28 29 9 2 5 7 17 25 30 34 37 38 Md RA SV


z-Scores: S2 - EtFOSA
Target Standard Deviation for Proficiency Assessment 1.3 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
32 21 11 26 13 16 27 8 24 22 23 20 35 15 19 10 3 18 6 14 31 4 33 1 28 29 9

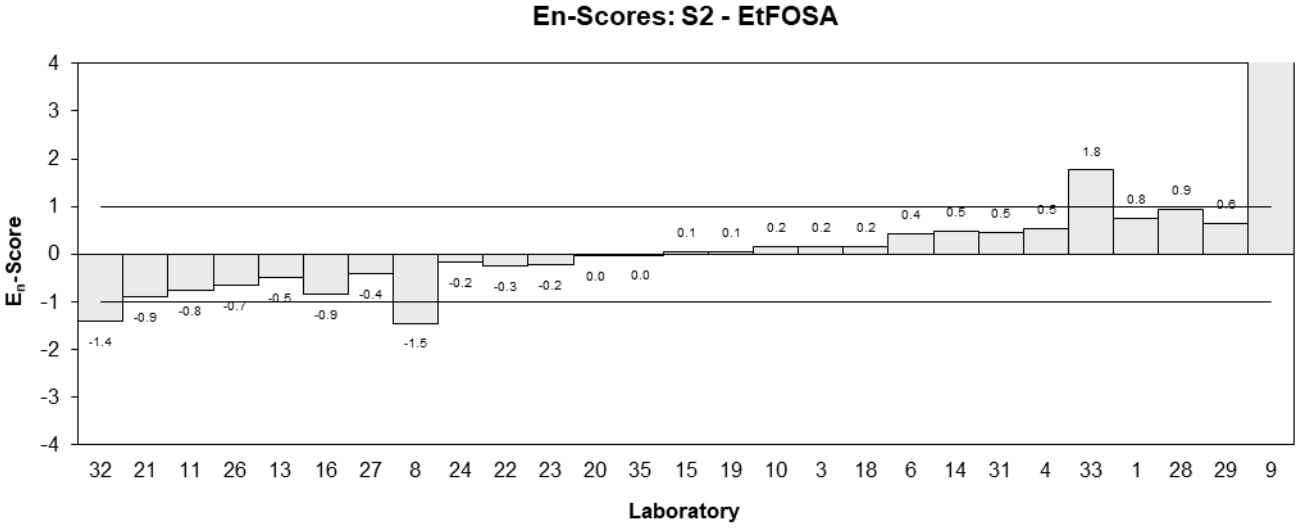

En-Scores: S2 - EtFOSA
En-Score
Laboratory
32 21 11 26 13 16 27 8 24 22 23 20 35 15 19 10 3 18 6 14 31 4 33 1 28 29 9

Figure 38

Table 42

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	MeFOSE
Unit	µg/kg

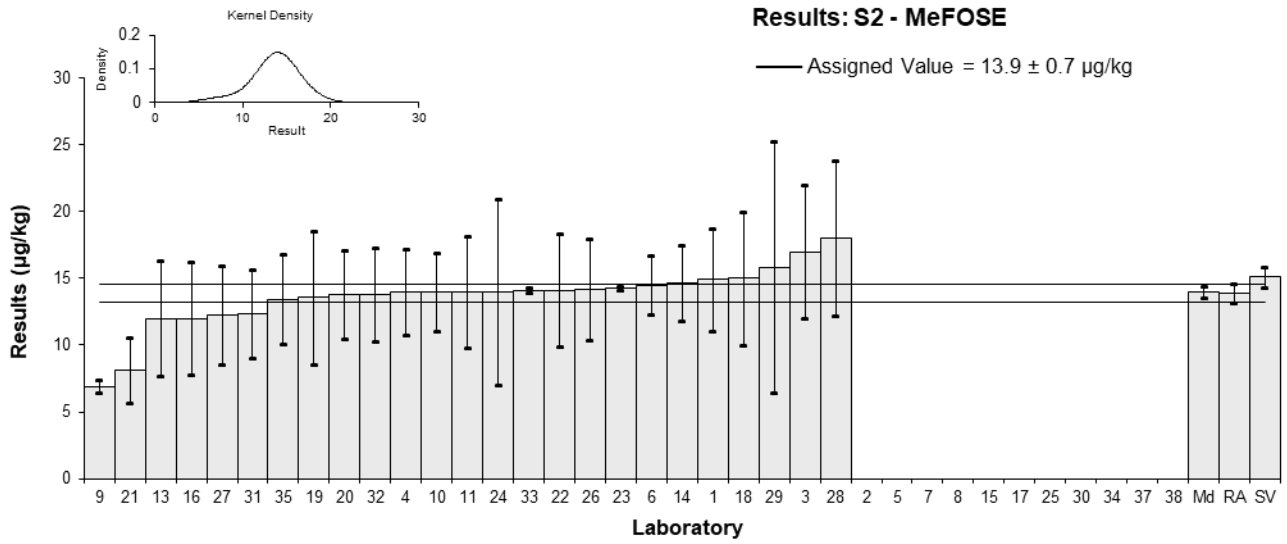
Participant Results

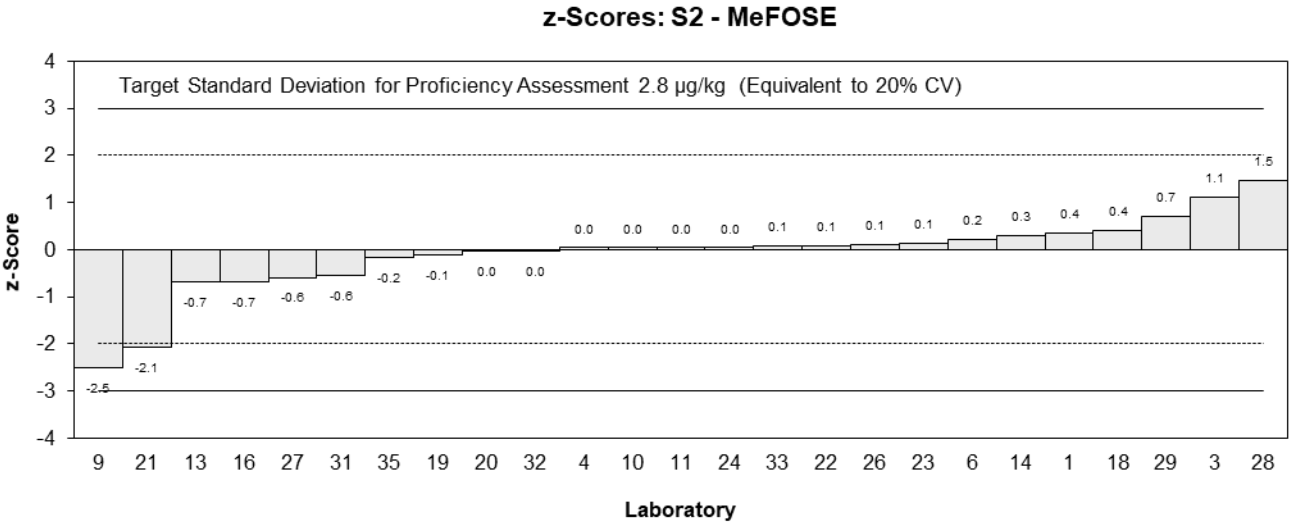
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	14.9	3.8	114.04	0.36	0.26
2	NS	NS	NS		
3	17	5	87	1.12	0.61
4	14	3.2	NT	0.04	0.03
5	NT	NT	NT		
6	14.5	2.18	89	0.22	0.26
7	NR	NR	NR		
8	NT	NT	NT		
9*	6.9	0.5	NT	-2.52	-8.14
10	14	2.9	102	0.04	0.03
11	14.0	4.2	69	0.04	0.02
13	12	4.311	109	-0.68	-0.44
14	14.7	2.84	122	0.29	0.27
15	NT	NT	95		
16	12	4.2	69	-0.68	-0.45
17	NT	NT	NT		
18	15	5	103	0.40	0.22
19	13.6	5	112	-0.11	-0.06
20	13.8	3.31	91	-0.04	-0.03
21	8.15	2.45	39	-2.07	-2.26
22	14.1	4.23	52	0.07	0.05
23	14.3	0.16	96.62	0.14	0.56
24	14	7	72	0.04	0.01
25	NR	NR	NR		
26	14.2	3.8	89	0.11	0.08
27	12.260	3.678	92	-0.59	-0.44
28	18	5.8	NR	1.47	0.70
29	15.85	9.42	67.8	0.70	0.21
30	NT	NT	NT		
31	12.36	3.28	114.22	-0.55	-0.46
32	13.8	3.5	123	-0.04	-0.03
33	14.09	0.192	63	0.07	0.26
34	NR	NR	NR		
35	13.44	3.35	98	-0.17	-0.13
37	NT	NT	NT		
38	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	13.9	0.7
Spike Value	15.1	0.8
Robust Average	13.9	0.7
Median	14.0	0.4
Mean	13.6	
N	25	
Max	18	
Min	6.9	
Robust SD	1.4	
Robust CV	10%	


Results: S2 - MeFOSE
Assigned Value = 13.9 ± 0.7 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
9 21 13 16 27 31 35 19 20 32 4 10 11 24 33 22 26 23 6 14 1 18 29 3 28 2 5 7 8 15 17 25 30 34 37 38 Md RA SV


z-Scores: S2 - MeFOSE
Target Standard Deviation for Proficiency Assessment 2.8 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
9 21 13 16 27 31 35 19 20 32 4 10 11 24 33 22 26 23 6 14 1 18 29 3 28

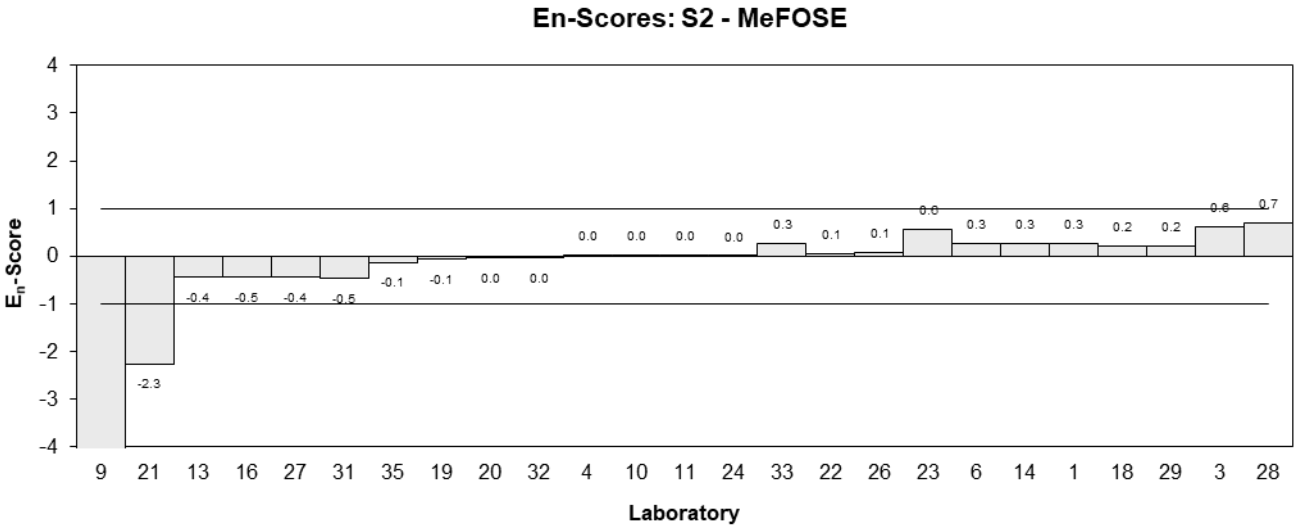

En-Scores: S2 - MeFOSE
En-Score
Laboratory
9 21 13 16 27 31 35 19 20 32 4 10 11 24 33 22 26 23 6 14 1 18 29 3 28

Figure 39

Table 43

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	EtFOSE
Unit	µg/kg

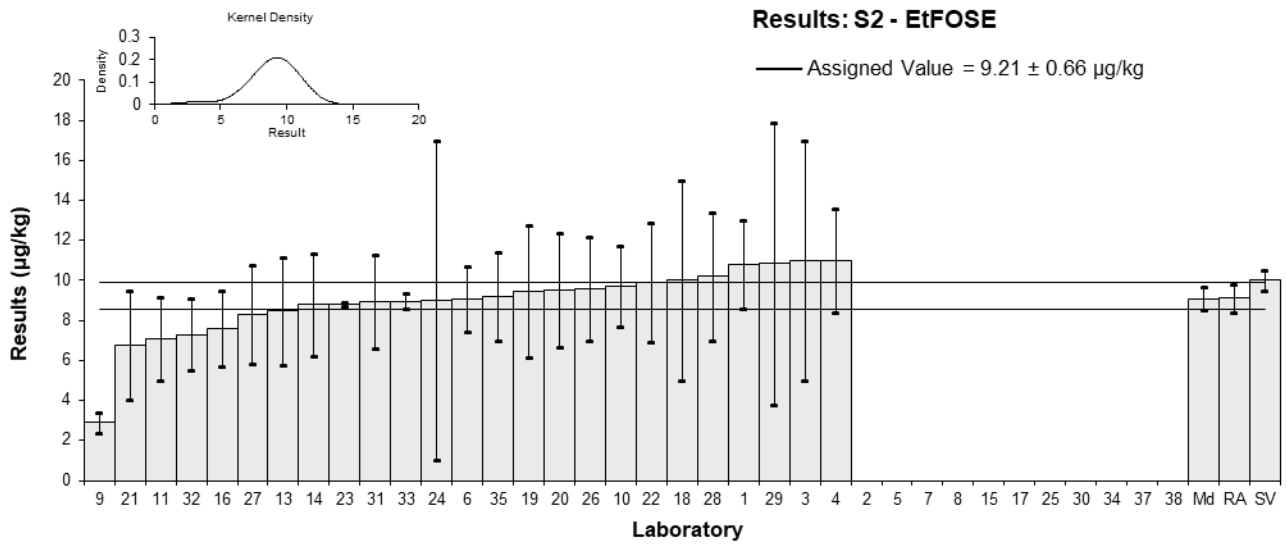
Participant Results

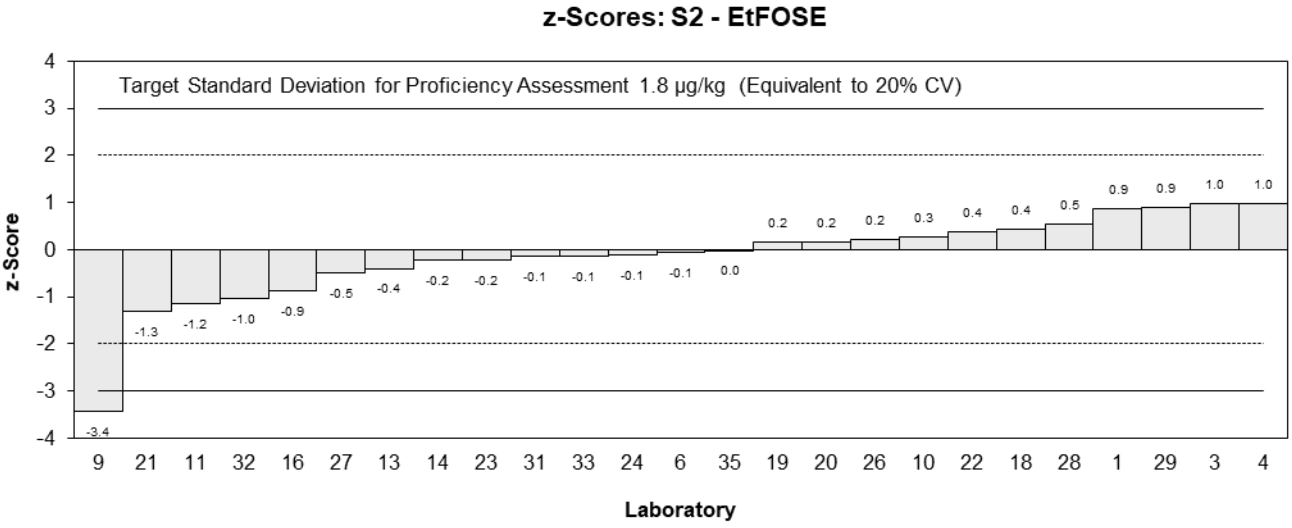
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	10.8	2.2	105.91	0.86	0.69
2	NS	NS	NS		
3	11	6	95	0.97	0.30
4	11	2.6	NT	0.97	0.67
5	NT	NT	NT		
6	9.09	1.64	100	-0.07	-0.07
7	NR	NR	NR		
8	NT	NT	NT		
9*	2.9	0.5	NT	-3.43	-7.62
10	9.7	2.0	104	0.27	0.23
11	7.09	2.1	71	-1.15	-0.96
13	8.47	2.709	98	-0.40	-0.27
14	8.795	2.56	102	-0.23	-0.16
15	NT	NT	NT		
16	7.6	1.9	74	-0.87	-0.80
17	NT	NT	NT		
18	10	5	104	0.43	0.16
19	9.48	3.3	129	0.15	0.08
20	9.51	2.85	85.3	0.16	0.10
21	6.77	2.71	39	-1.32	-0.87
22	9.91	2.97	57	0.38	0.23
23	8.8	0.1	97.6	-0.22	-0.61
24	9	8	75	-0.11	-0.03
25	NR	NR	NR		
26	9.6	2.6	87	0.21	0.15
27	8.295	2.488	94	-0.50	-0.36
28	10.2	3.2	81	0.54	0.30
29	10.85	7.04	68.2	0.89	0.23
30	NT	NT	NT		
31	8.95	2.33	118.72	-0.14	-0.11
32	7.30	1.8	123	-1.04	-1.00
33	8.96	0.377	50	-0.14	-0.33
34	NR	NR	NR		
35	9.19	2.2	102	-0.01	-0.01
37	NT	NT	NT		
38	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	9.21	0.66
Spike Value	10.0	0.5
Robust Average	9.11	0.70
Median	9.09	0.59
Mean	8.93	
N	25	
Max	11	
Min	2.9	
Robust SD	1.4	
Robust CV	15%	


Results: S2 - EtFOSE
Kernel Density
Density
Result
Assigned Value = 9.21 ± 0.66 µg/kg
Results (µg/kg)
Laboratory
9 21 11 32 16 27 13 14 23 31 33 24 6 35 19 20 26 10 22 18 28 1 29 3 4 2 5 7 8 15 17 25 30 34 37 38 Md RA SV


z-Scores: S2 - EtFOSE
Target Standard Deviation for Proficiency Assessment 1.8 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
9 21 11 32 16 27 13 14 23 31 33 24 6 35 19 20 26 10 22 18 28 1 29 3 4

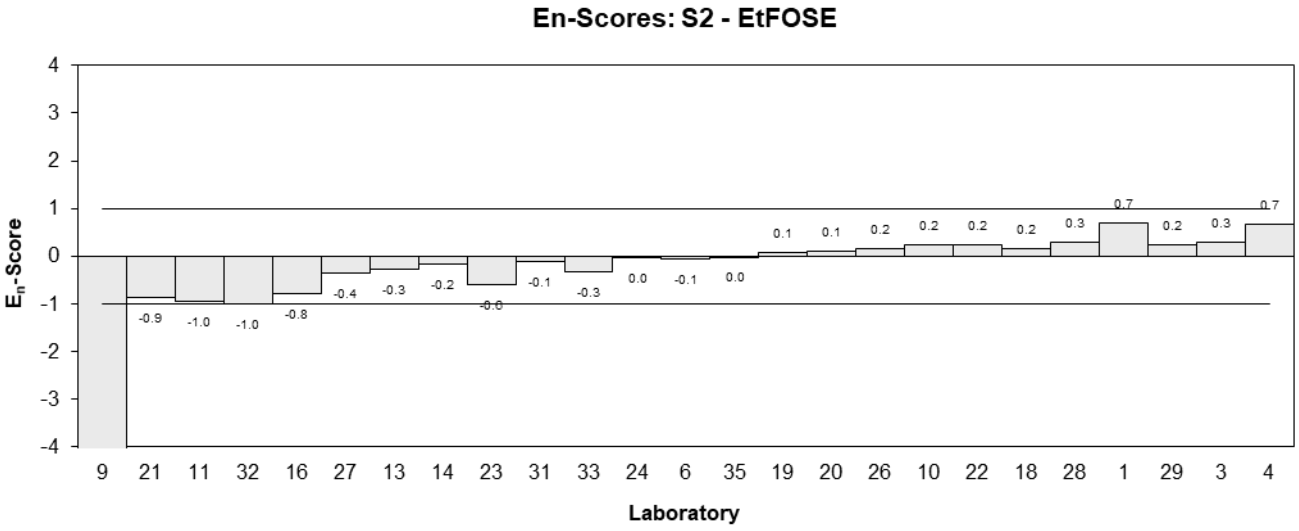

En-Scores: S2 - EtFOSE
En-Score
Laboratory
9 21 11 32 16 27 13 14 23 31 33 24 6 35 19 20 26 10 22 18 28 1 29 3 4

Figure 40

Table 44

Sample Details

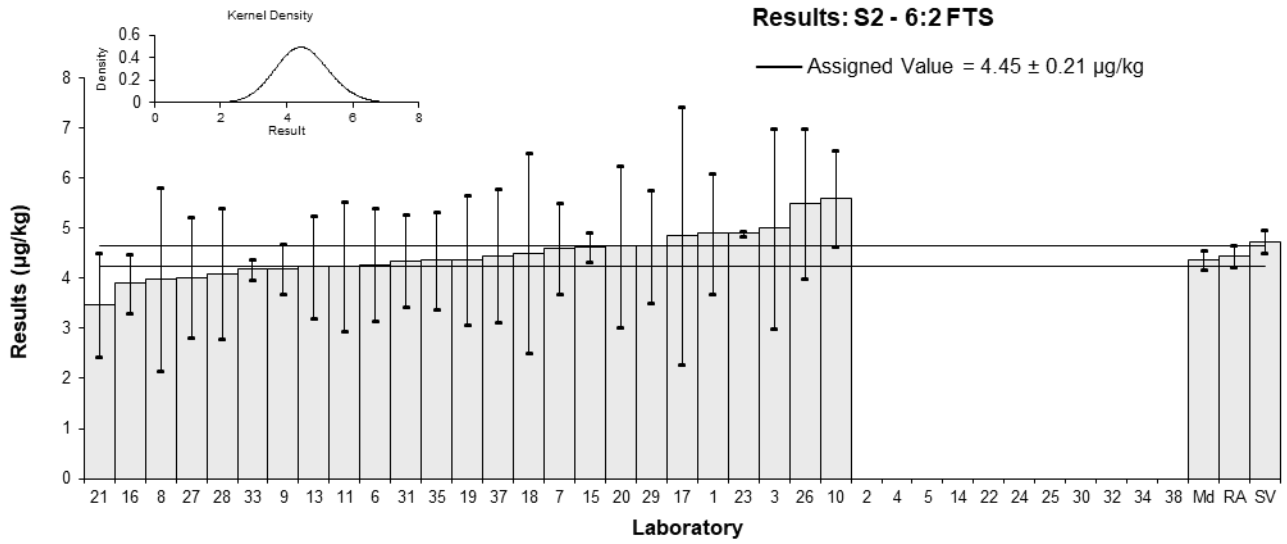
Sample No.	S2
Matrix	Soil
Analyte	6:2 FTS
Unit	µg/kg

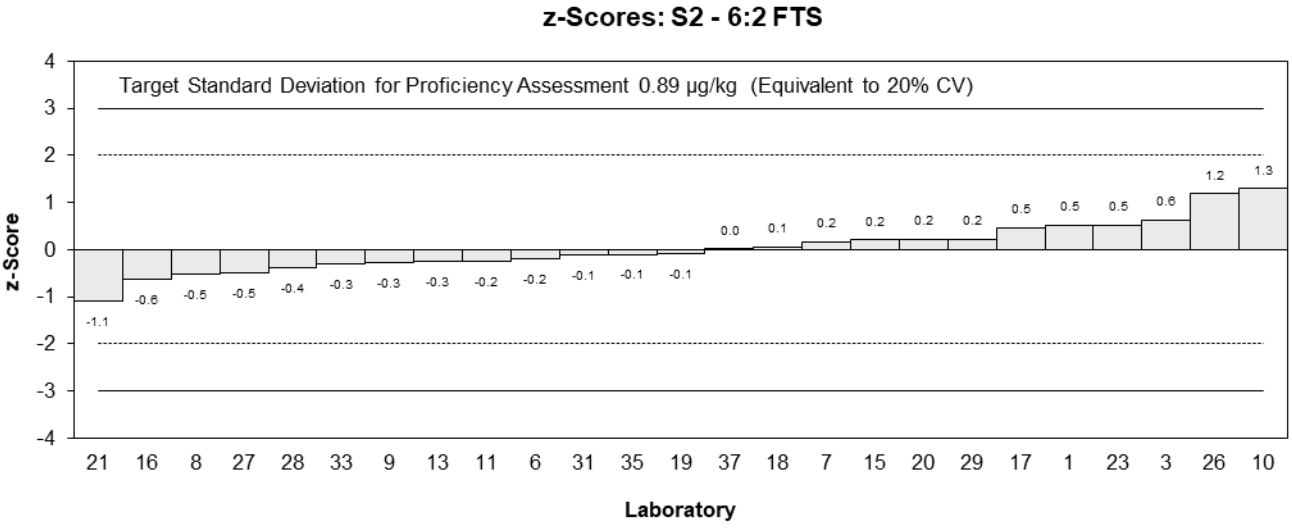
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	4.9	1.2	123.44	0.51	0.37
2	NS	NS	NS		
3	5.0	2	94	0.62	0.27
4	< 5	NR	NT		
5	NT	NT	NT		
6	4.28	1.12	53	-0.19	-0.15
7	4.6	0.92	NR	0.17	0.16
8	3.988	1.83	80	-0.52	-0.25
9	4.2	0.5	NT	-0.28	-0.46
10	5.6	0.97	81	1.29	1.16
11	4.24	1.3	82	-0.24	-0.16
13	4.23	1.023	115	-0.25	-0.21
14	<5	NR	119		
15	4.6310	0.2972	97	0.20	0.50
16	3.9	0.59	61	-0.62	-0.88
17	4.860	2.576	NR	0.46	0.16
18	4.5	2	103	0.06	0.02
19	4.37	1.3	201	-0.09	-0.06
20	4.64	1.62	99.1	0.21	0.12
21	3.48	1.04	41	-1.09	-0.91
22	NT	NT	NT		
23	4.9	0.045	92.3	0.51	2.10
24	< 20	10	109		
25	NR	NR	NR		
26	5.5	1.5	65	1.18	0.69
27	4.018	1.205	96	-0.49	-0.35
28	4.1	1.3	219	-0.39	-0.27
29	4.64	1.12	145.4	0.21	0.17
30	NT	NT	NT		
31	4.35	0.92	135.92	-0.11	-0.11
32	<0.4	NR	129		
33	4.18	0.214	87	-0.30	-0.90
34	NR	NR	NR		
35	4.36	0.97	183	-0.10	-0.09
37	4.46	1.338	73	0.01	0.01
38	NS	NS	NS		

Statistics

Assigned Value	4.45	0.21
Spike Value	4.74	0.24
Robust Average	4.45	0.21
Median	4.37	0.20
Mean	4.48	
N	25	
Max	5.6	
Min	3.48	
Robust SD	0.42	
Robust CV	9.5%	


Results: S2 - 6:2 FTS
Assigned Value = 4.45 ± 0.21 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
21 16 8 27 28 33 9 13 11 6 31 35 19 37 18 7 15 20 29 17 1 23 3 26 10 2 4 5 14 22 24 25 30 32 34 38 Md RA SV
Laboratory


z-Scores: S2 - 6:2 FTS
Target Standard Deviation for Proficiency Assessment 0.89 µg/kg (Equivalent to 20% CV)
z-Score
-1.1 -0.6 -0.5 -0.5 -0.4 -0.3 -0.3 -0.3 -0.2 -0.2 -0.1 -0.1 -0.1 0.0 0.1 0.2 0.2 0.2 0.2 0.5 0.5 0.5 0.6 1.2 1.3
21 16 8 27 28 33 9 13 11 6 31 35 19 37 18 7 15 20 29 17 1 23 3 26 10
Laboratory

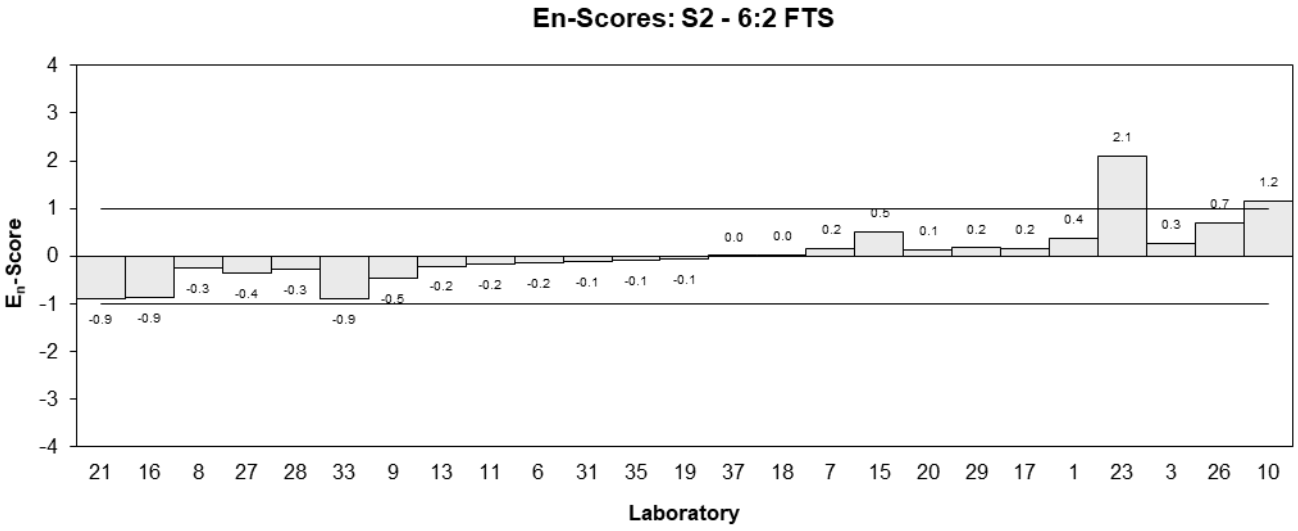

En-Scores: S2 - 6:2 FTS
En-Score
-0.9 -0.9 -0.3 -0.4 -0.3 -0.9 -0.5 -0.2 -0.2 -0.2 -0.1 -0.1 -0.1 0.0 0.0 0.2 0.5 0.1 0.2 0.2 0.4 2.1 0.3 0.7 1.2
21 16 8 27 28 33 9 13 11 6 31 35 19 37 18 7 15 20 29 17 1 23 3 26 10
Laboratory

Figure 41

Table 45

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	GenX
Unit	µg/kg

Participant Results

Lab. Code	Result	Uncertainty	Rec
1	NT	NT	NT
2	NS	NS	NS
3	NT	NT	NT
4	6.2	1.4	NT
5	NT	NT	NT
6	6.31	1.21	83
7	NR	NR	NR
8	NT	NT	NT
9	<1	NR	NT
10	5.9	0.60	98
11	4.76	1.4	78
13	4.06	2.741	98
14	NT	NT	NT
15	6.4773	0.6684	106
16	NR	NR	NR
17	NT	NT	NT
18	6	3	106
19	NT	NT	NT
20	6.9	1.45	91.4
21	5.69	2.28	60
22	NT	NT	NT
23	NT	NT	NT
24	NT	NT	NT
25	NR	NR	NR
26	4.8	1.3	86
27	4.542	1.363	69
28	17	5.6	128
29	6.67	2.12	63.2
30	NT	NT	NT
31	NT	NT	NT
32	NT	NT	NT
33	5.44	0.409	82
34	NR	NR	NR
35	NT	NT	NT
37	5.55	1.665	94
38	NS	NS	NS

Statistics

Assigned Value	Not Set	
Spike Value	15.1	0.8
Robust Average	5.79	0.66
Median	5.90	0.55
Mean	6.4	
N	15	
Max	17	
Min	4.06	
Robust SD	1.0	
Robust CV	18%	

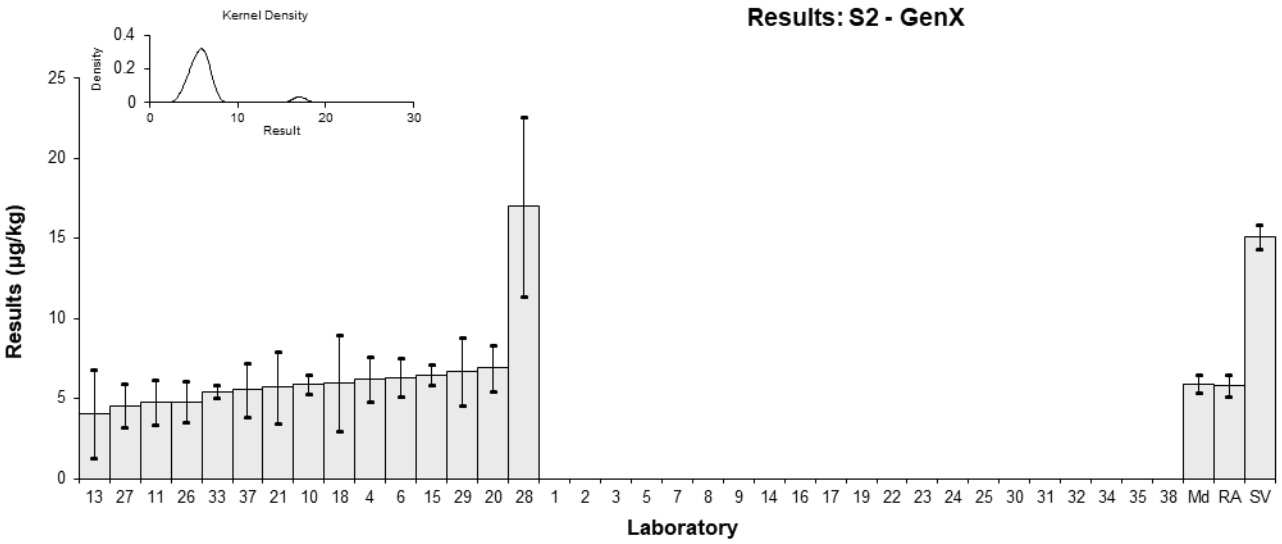

Results: S2 - GenX
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
13 27 11 26 33 37 21 10 18 4 6 15 29 20 28 1 2 3 5 7 8 9 14 16 17 19 22 23 24 25 30 31 32 34 35 38 Md RA SV

Figure 42

Table 46

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	ADONA
Unit	µg/kg

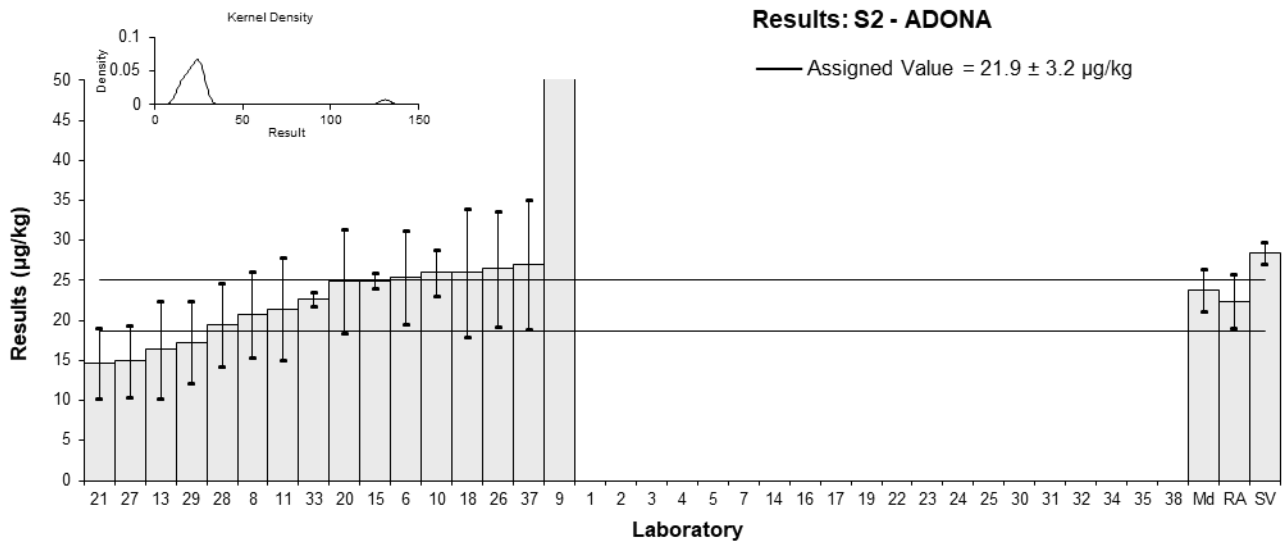
Participant Results

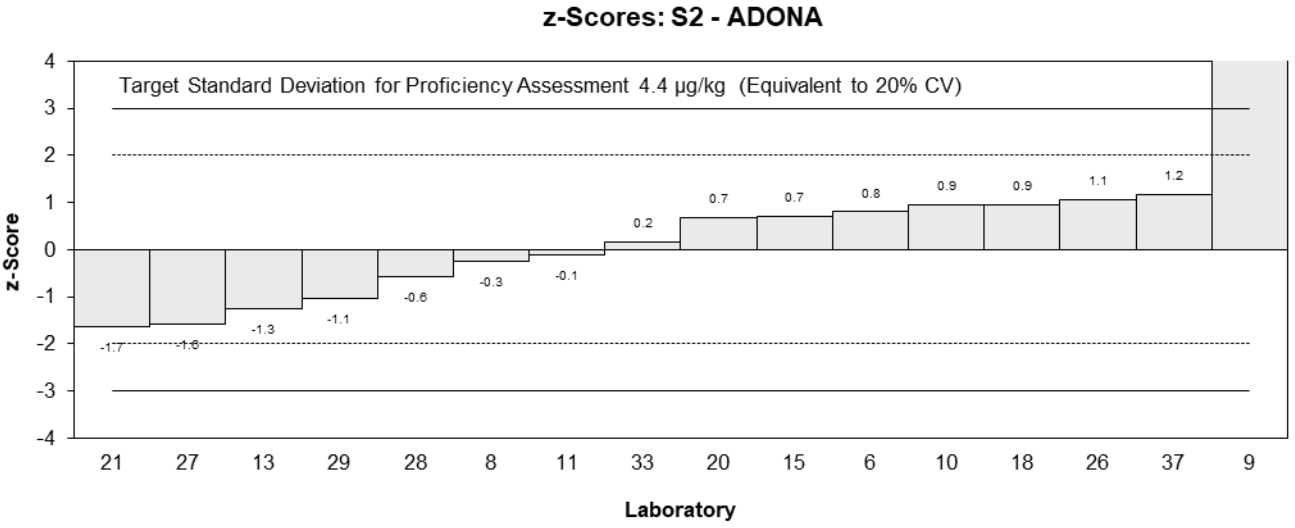
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NS	NS	NS		
3	NT	NT	NT		
4	NT	NT	NT		
5	NT	NT	NT		
6	25.4	5.91	82	0.80	0.52
7	NR	NR	NR		
8	20.778	5.4	82	-0.26	-0.18
9*	131	15	NT	24.91	7.11
10	26	2.9	105	0.94	0.95
11	21.4	6.4	82	-0.11	-0.07
13	16.38	6.117	NR	-1.26	-0.80
14	NT	NT	NT		
15	24.9528	0.9319	96	0.70	0.92
16	NR	NR	NR		
17	NT	NT	NT		
18	26	8	104	0.94	0.48
19	NT	NT	NT		
20	24.9	6.46	91.4	0.68	0.42
21	14.67	4.40	33	-1.65	-1.33
22	NT	NT	NT		
23	NT	NT	NT		
24	NT	NT	NT		
25	NR	NR	NR		
26	26.5	7.2	97	1.05	0.58
27	14.961	4.488	NR	-1.58	-1.26
28	19.4	5.2	128	-0.57	-0.41
29	17.29	5.14	NR	-1.05	-0.76
30	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	22.62	0.893	82	0.16	0.22
34	NR	NR	NR		
35	NT	NT	NT		
37	27	8.1	74	1.16	0.59
38	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	21.9	3.2
Spike Value	28.4	1.4
Robust Average	22.4	3.4
Median	23.8	2.7
Mean	29	
N	16	
Max	131	
Min	14.67	
Robust SD	5.4	
Robust CV	24%	


Results: S2 - ADONA
Assigned Value = 21.9 ± 3.2 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
21 27 13 29 28 8 11 33 20 15 6 10 18 26 37 9 1 2 3 4 5 7 14 16 17 19 22 23 24 25 30 31 32 34 35 38 Md RA SV


z-Scores: S2 - ADONA
Target Standard Deviation for Proficiency Assessment 4.4 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
21 27 13 29 28 8 11 33 20 15 6 10 18 26 37 9
-1.7 -1.6 -1.3 -1.1 -0.6 -0.3 -0.1 0.2 0.7 0.7 0.8 0.9 0.9 1.1 1.2

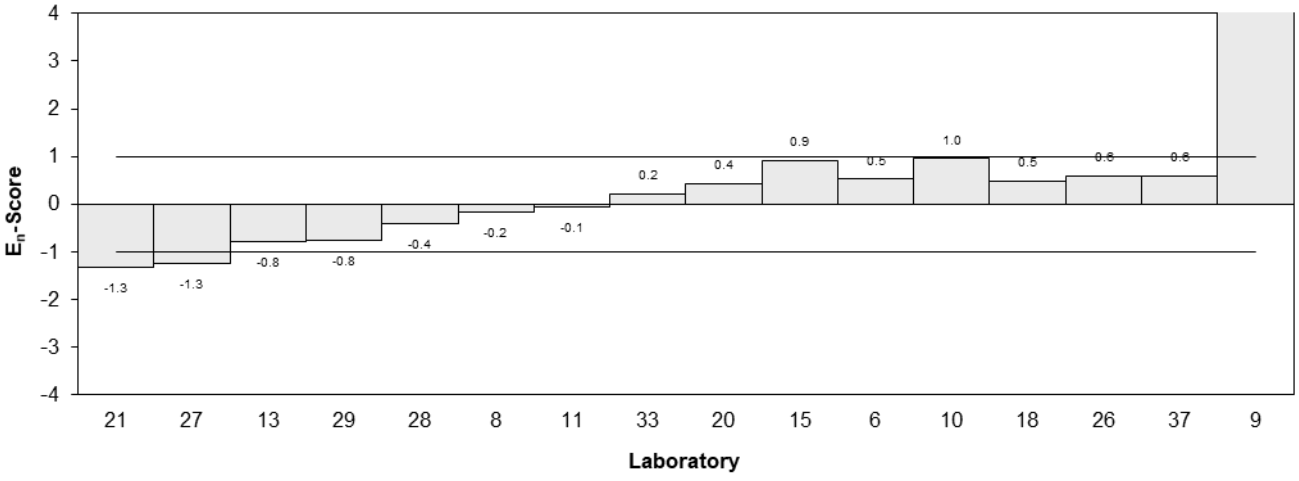

En-Scores: S2 - ADONA
En-Score
Laboratory
21 27 13 29 28 8 11 33 20 15 6 10 18 26 37 9
-1.3 -1.3 -0.8 -0.8 -0.4 -0.2 -0.1 0.2 0.4 0.9 0.5 1.0 0.5 0.6 0.6

Figure 43

Table 47

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	9Cl-PF3ONS
Unit	µg/kg

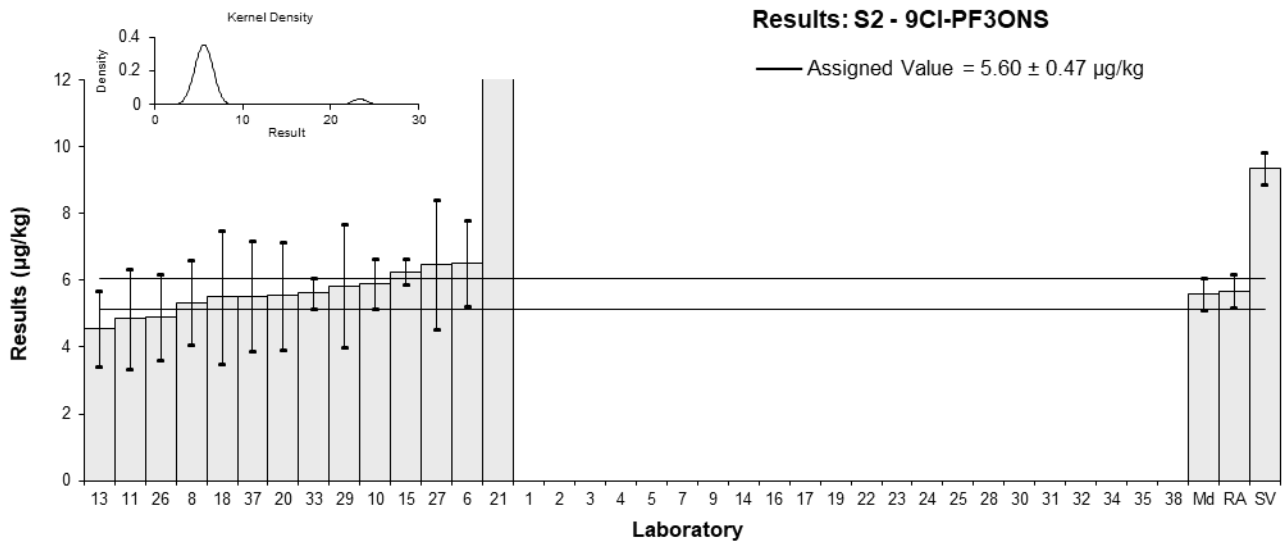
Participant Results

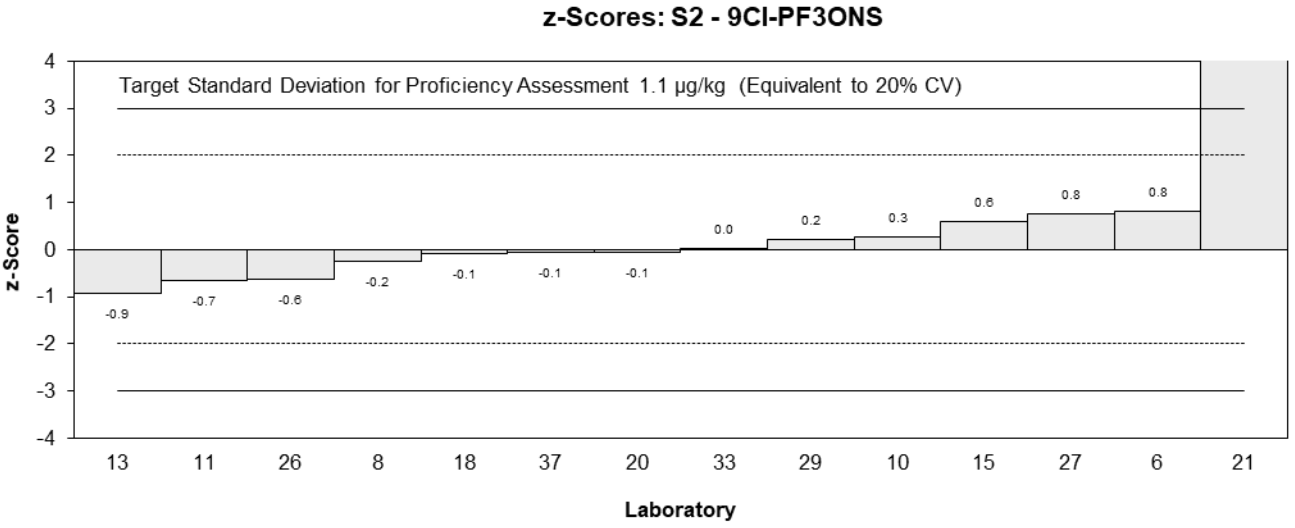
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NS	NS	NS		
3	NT	NT	NT		
4	NT	NT	NT		
5	NT	NT	NT		
6	6.52	1.28	78	0.82	0.67
7	NR	NR	NR		
8	5.333	1.27	80	-0.24	-0.20
9	NT	NT	NT		
10	5.9	0.75	101	0.27	0.34
11	4.86	1.5	85	-0.66	-0.47
13	4.55	1.129	NR	-0.94	-0.86
14	NT	NT	NT		
15	6.2584	0.3910	89	0.59	1.08
16	NR	NR	NR		
17	NT	NT	NT		
18	5.5	2	104	-0.09	-0.05
19	NT	NT	NT		
20	5.54	1.61	91.4	-0.05	-0.04
21*	23.33	7.00	13	15.83	2.53
22	NT	NT	NT		
23	NT	NT	NT		
24	NT	NT	NT		
25	NR	NR	NR		
26	4.9	1.3	86	-0.62	-0.51
27	6.464	1.939	NR	0.77	0.43
28	NT	NT	NT		
29	5.84	1.86	NR	0.21	0.13
30	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	5.63	0.459	78	0.03	0.05
34	NR	NR	NR		
35	NT	NT	NT		
37	5.53	1.659	78	-0.06	-0.04
38	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	5.60	0.47
Spike Value	9.36	0.47
Robust Average	5.69	0.50
Median	5.59	0.49
Mean	6.9	
N	14	
Max	23.33	
Min	4.55	
Robust SD	0.76	
Robust CV	13%	


Results: S2 - 9Cl-PF3ONS
Assigned Value = 5.60 ± 0.47 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
13 11 26 8 18 37 20 33 29 10 15 27 6 21 1 2 3 4 5 7 9 14 16 17 19 22 23 24 25 28 30 31 32 34 35 38 Md RA SV


z-Scores: S2 - 9Cl-PF3ONS
Target Standard Deviation for Proficiency Assessment 1.1 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
13 11 26 8 18 37 20 33 29 10 15 27 6 21
-0.9 -0.7 -0.6 -0.2 -0.1 -0.1 -0.1 0.0 0.2 0.3 0.6 0.8 0.8

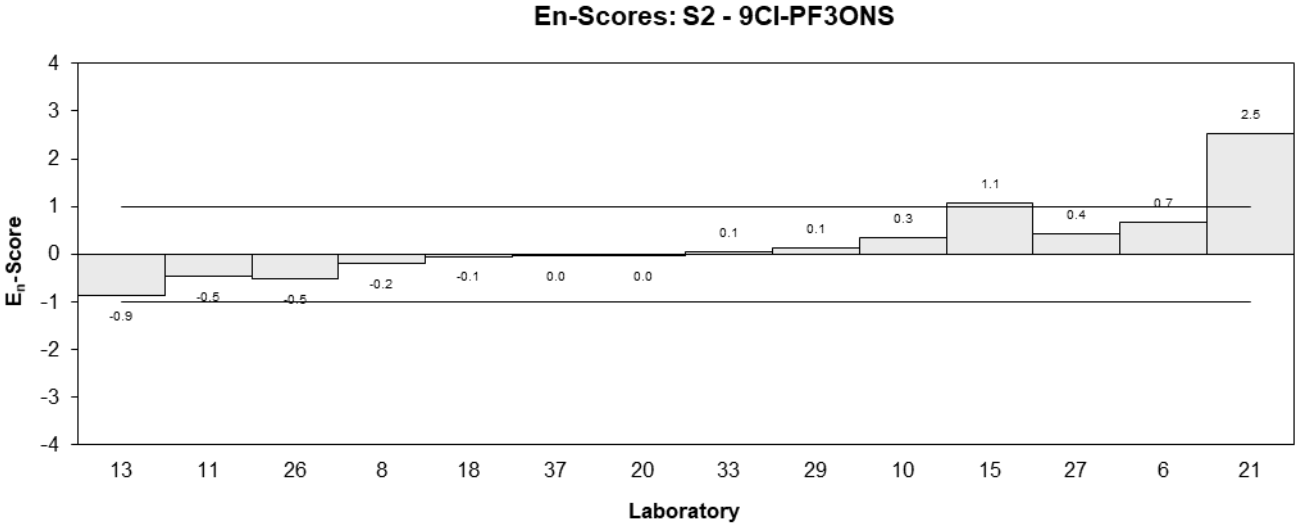

En-Scores: S2 - 9Cl-PF3ONS
En-Score
Laboratory
13 11 26 8 18 37 20 33 29 10 15 27 6 21
-0.9 -0.5 -0.5 -0.2 -0.1 0.0 0.0 0.1 0.1 0.3 1.1 0.4 0.7 2.5

Figure 44

Table 48

Sample Details

Sample No.	S2
Matrix	Soil
Analyte	11Cl-PF3OUdS
Unit	µg/kg

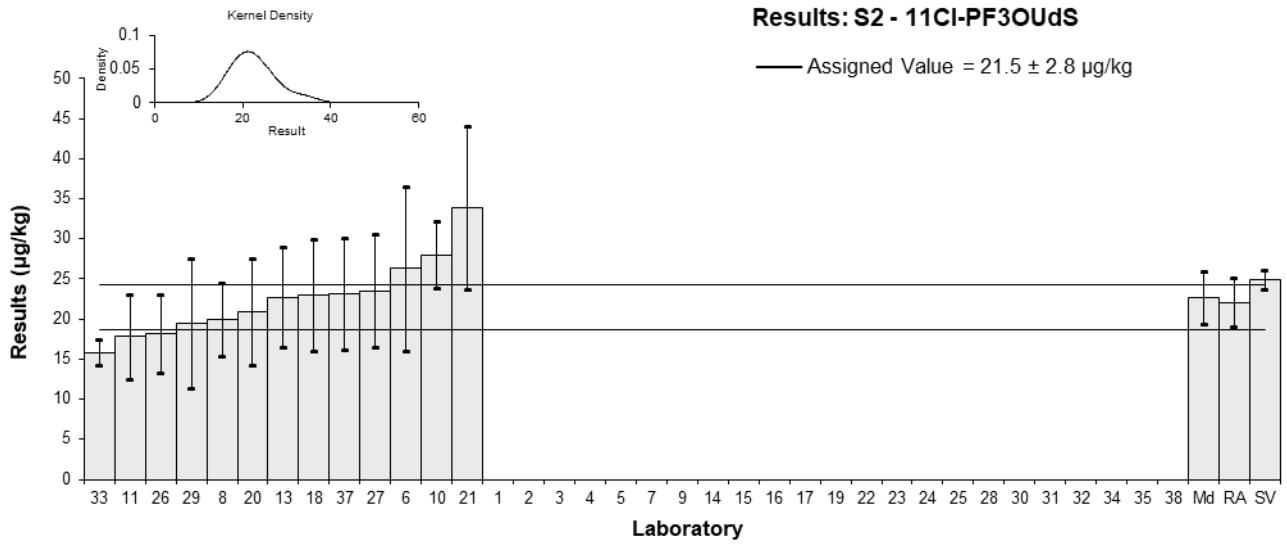
Participant Results

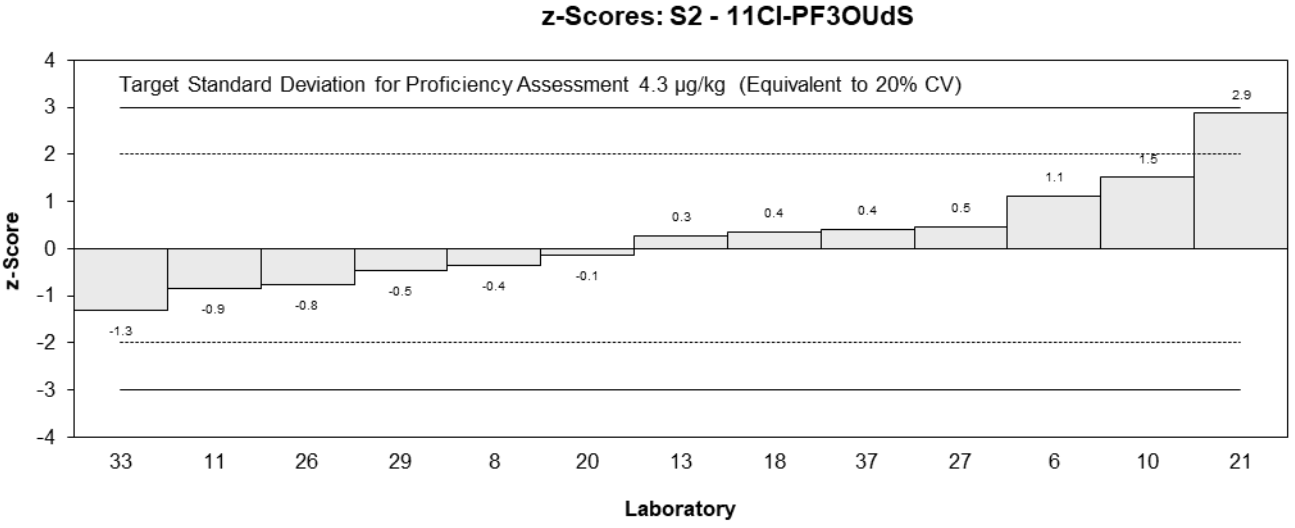
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NS	NS	NS		
3	NT	NT	NT		
4	NT	NT	NT		
5	NT	NT	NT		
6	26.3	10.3	82	1.12	0.45
7	NR	NR	NR		
8	19.893	4.57	80	-0.37	-0.30
9	NT	NT	NT		
10	28	4.2	108	1.51	1.29
11	17.8	5.3	85	-0.86	-0.62
13	22.7	6.231	NR	0.28	0.18
14	NT	NT	NT		
15	NT	NT	NT		
16	NR	NR	NR		
17	NT	NT	NT		
18	23	7	104	0.35	0.20
19	NT	NT	NT		
20	20.9	6.7	91.4	-0.14	-0.08
21*	33.84	10.15	15	2.87	1.17
22	NT	NT	NT		
23	NT	NT	NT		
24	NT	NT	NT		
25	NR	NR	NR		
26	18.2	4.9	98	-0.77	-0.58
27	23.501	7.050	NR	0.47	0.26
28	NT	NT	NT		
29	19.46	8.12	NR	-0.47	-0.24
30	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	15.84	1.56	78	-1.32	-1.77
34	NR	NR	NR		
35	NT	NT	NT		
37	23.2	6.96	74	0.40	0.23
38	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	21.5	2.8
Spike Value	24.9	1.2
Robust Average	22.1	3.1
Median	22.7	3.3
Mean	22.5	
N	13	
Max	33.84	
Min	15.84	
Robust SD	4.5	
Robust CV	20%	


Results: S2 - 11Cl-PF3OUdS
Assigned Value = 21.5 ± 2.8 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
33 11 26 29 8 20 13 18 37 27 6 10 21 1 2 3 4 5 7 9 14 15 16 17 19 22 23 24 25 28 30 31 32 34 35 38 Md RA SV


z-Scores: S2 - 11Cl-PF3OUdS
Target Standard Deviation for Proficiency Assessment 4.3 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
33 11 26 29 8 20 13 18 37 27 6 10 21
-1.3 -0.9 -0.8 -0.5 -0.4 -0.1 0.3 0.4 0.4 0.5 1.1 1.5 2.9

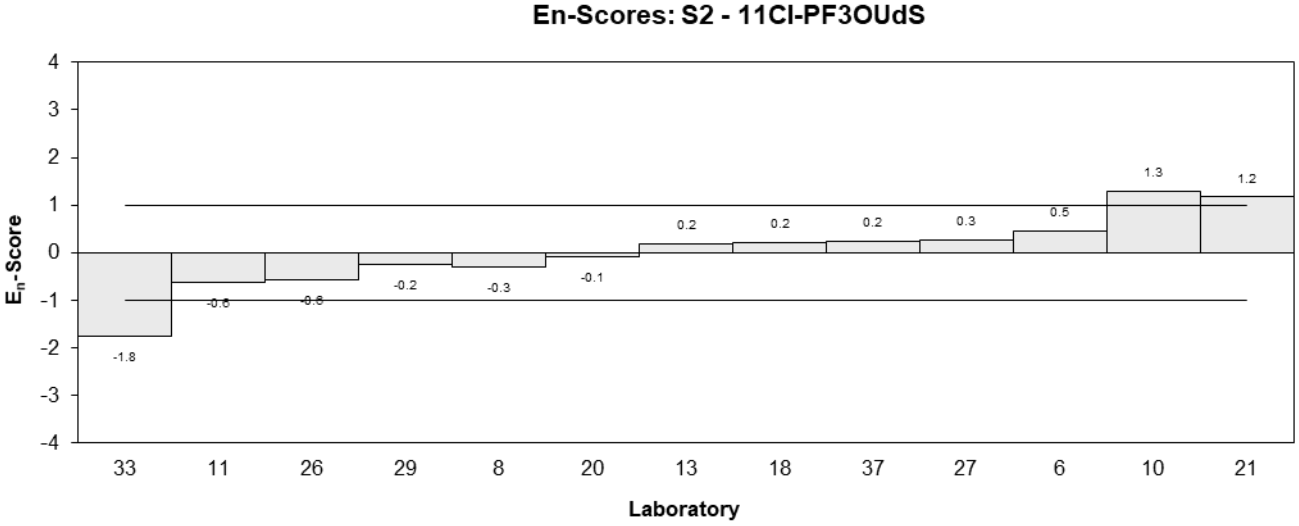

En-Scores: S2 - 11Cl-PF3OUdS
En-Score
Laboratory
33 11 26 29 8 20 13 18 37 27 6 10 21
-1.8 -0.6 -0.6 -0.2 -0.3 -0.1 0.2 0.2 0.2 0.3 0.5 1.3 1.2

Figure 45

Table 49

Sample Details

Sample No.	S3
Matrix	Water
Analyte	PFBS
Unit	µg/L

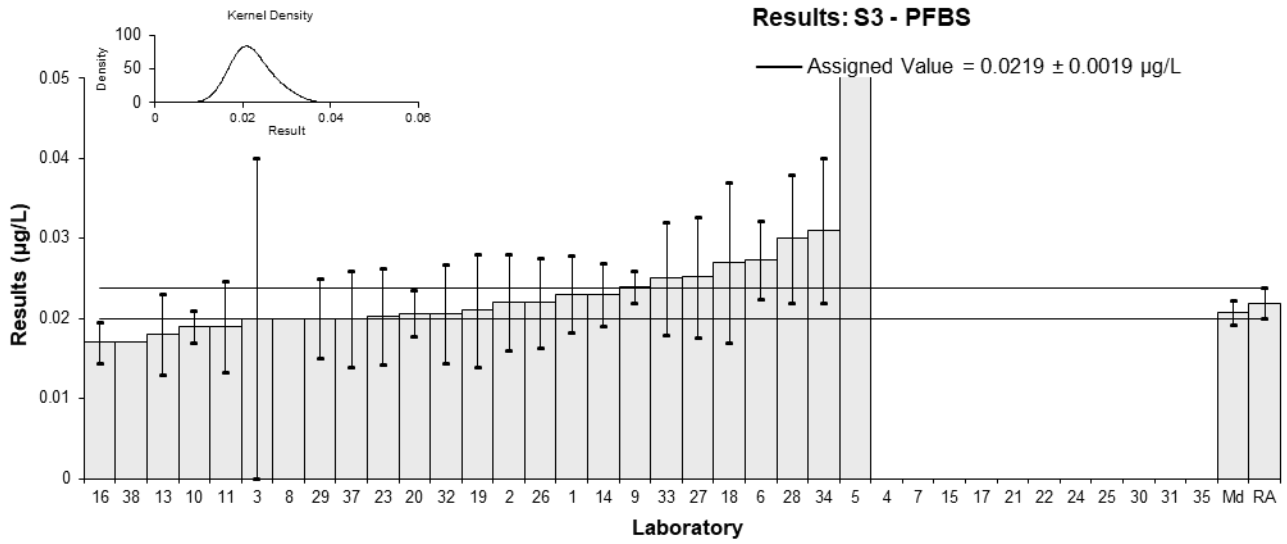
Participant Results

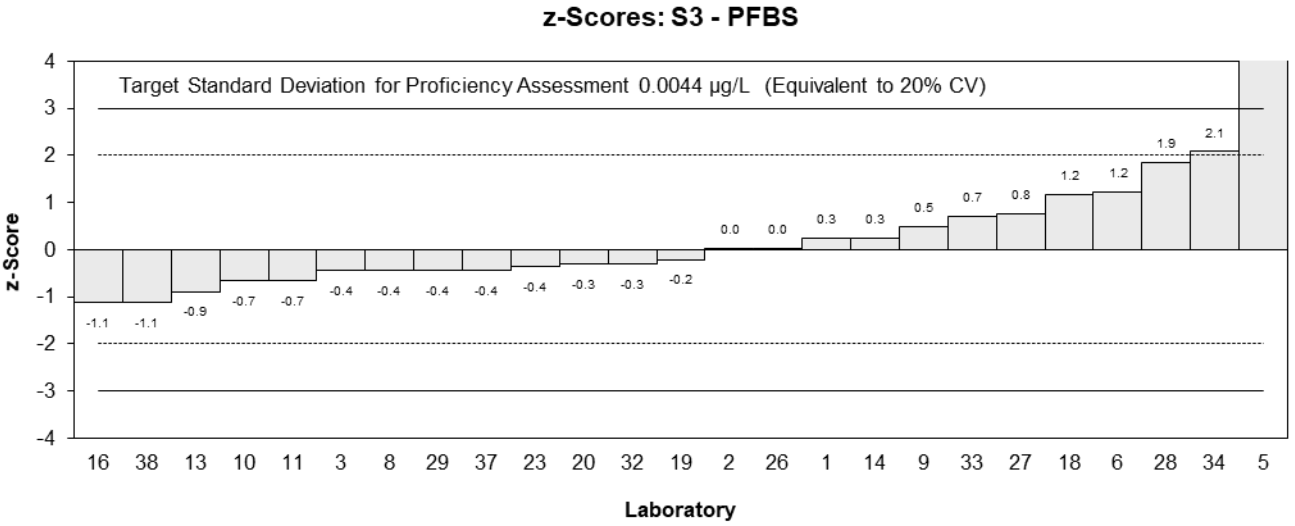
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0230	0.0048	68.7	0.25	0.21
2	0.022	0.006	NR	0.02	0.02
3	0.02	0.02	95	-0.43	-0.09
4	NT	NT	NT		
5**	14.118555	1.251805	NR	3,218.41	11.26
6	0.0273	0.00494	98	1.23	1.02
7	NS	NS	NS		
8	0.02	NR	77	-0.43	-1.00
9	0.024	0.002	70	0.48	0.76
10	0.019	0.0020	109	-0.66	-1.05
11	0.019	0.0057	82	-0.66	-0.48
13	0.018	0.005	104	-0.89	-0.73
14	0.023	0.0039	86	0.25	0.25
15	NS	NS	NS		
16	0.017	0.0025	123	-1.12	-1.56
17	NS	NS	NS		
18	0.027	0.01	56	1.16	0.50
19	0.021	0.007	102	-0.21	-0.12
20	0.0206	0.00288	84.8	-0.30	-0.38
21	NS	NS	NS		
22	<0.005	NR	191		
23	0.0203	0.006	71.34	-0.37	-0.25
24	< 0.02	0.01	104		
25	NR	NR	NR		
26	0.022	0.0056	101	0.02	0.02
27	0.0252	0.00756	89	0.75	0.42
28	0.03	0.008	144	1.85	0.99
29	0.020	0.005	122.6	-0.43	-0.36
30	NS	NS	NS		
31	<0.02	NR	100.96		
32	0.0206	0.0062	82	-0.30	-0.20
33	0.025	0.007	81	0.71	0.43
34	0.031	0.009	94	2.08	0.99
35	<0.02	NR	93		
37	0.0200	0.006	102	-0.43	-0.30
38	0.017	NR	NR	-1.12	-2.58

** Gross Error, see Section 4.2

Statistics

Assigned Value	0.0219	0.0019
Spike Value	Not Spiked	
Robust Average	0.0219	0.0019
Median	0.0208	0.0015
Mean	0.0222	
N	24	
Max	0.031	
Min	0.017	
Robust SD	0.0037	
Robust CV	17%	


Results: S3 - PFBS
Kernel Density
Density
Result
Assigned Value = 0.0219 ± 0.0019 µg/L
Results (µg/L)
Laboratory
16 38 13 10 11 3 8 29 37 23 20 32 19 2 26 1 14 9 33 27 18 6 28 34 5 4 7 15 17 21 22 24 25 30 31 35 Md RA


z-Scores: S3 - PFBS
Target Standard Deviation for Proficiency Assessment 0.0044 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
16 38 13 10 11 3 8 29 37 23 20 32 19 2 26 1 14 9 33 27 18 6 28 34 5

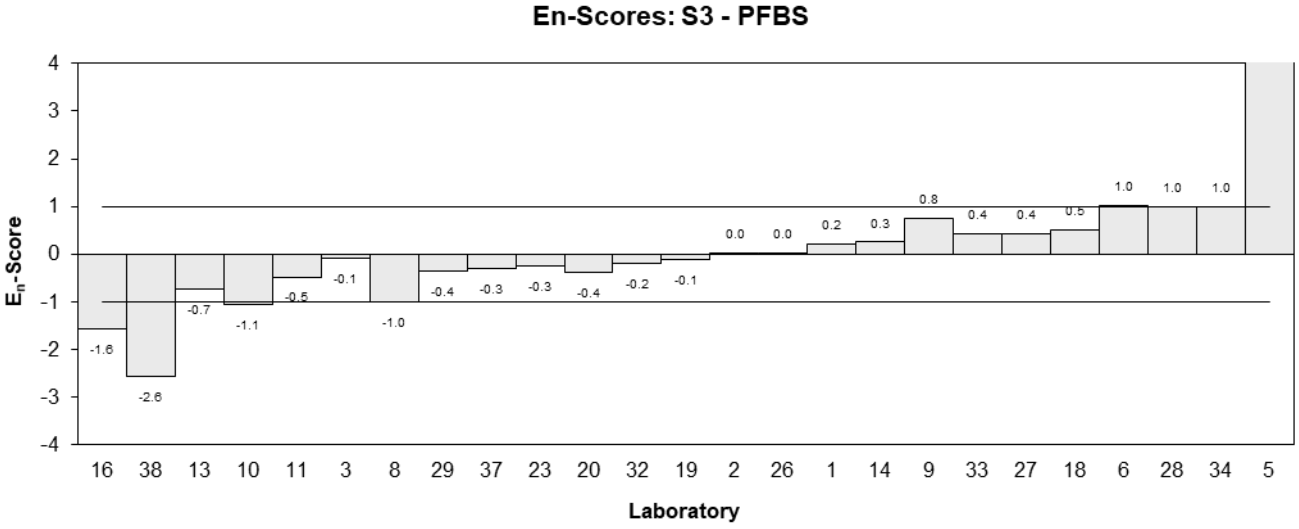

En-Scores: S3 - PFBS
En-Score
Laboratory
16 38 13 10 11 3 8 29 37 23 20 32 19 2 26 1 14 9 33 27 18 6 28 34 5

Figure 46

Table 50

Sample Details

Sample No.	S3
Matrix	Water
Analyte	PFPeS
Unit	µg/L

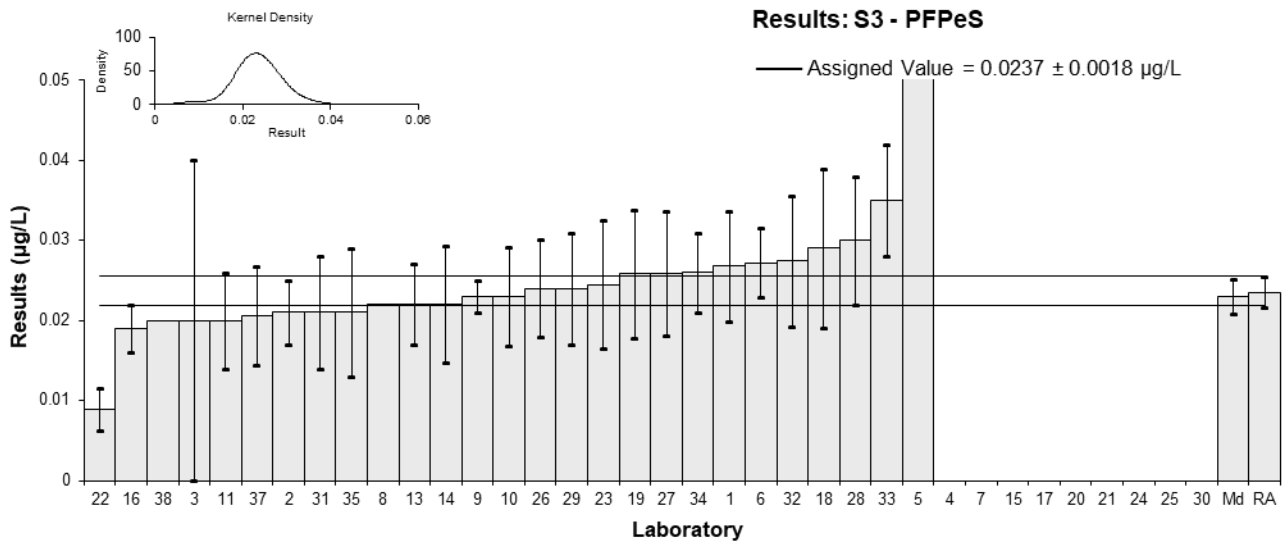
Participant Results

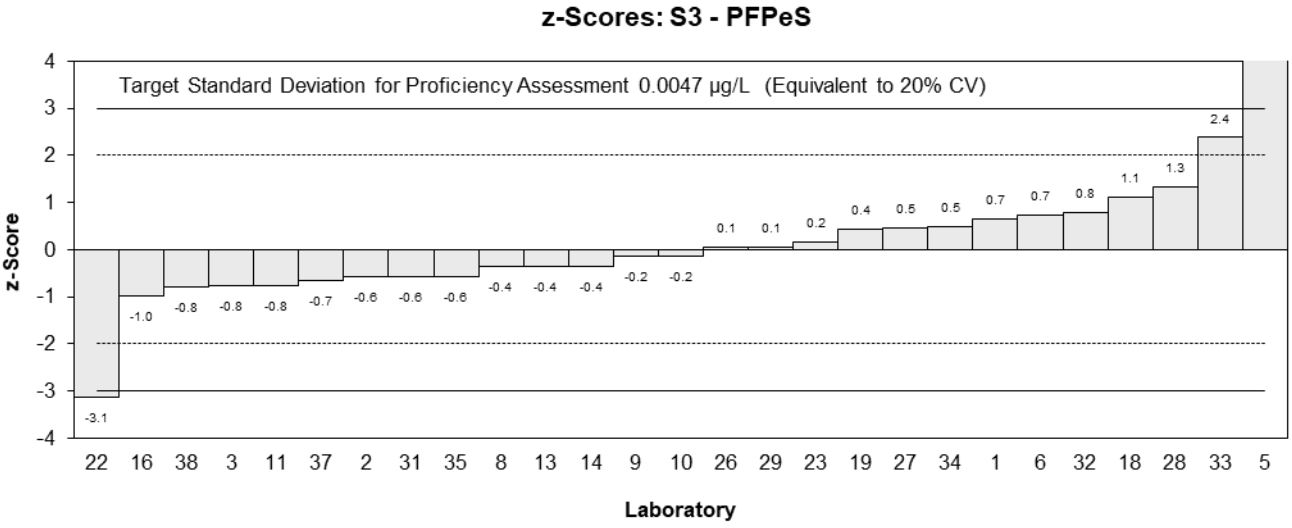
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0268	0.0069	78.22	0.65	0.43
2	0.021	0.004	NR	-0.57	-0.62
3	0.02	0.02	93	-0.78	-0.18
4	NT	NT	NT		
5**	31.5450833333	1.47141420527	NR	6,650.08	21.42
6	0.0272	0.00433	98	0.74	0.75
7	NS	NS	NS		
8	0.022	NR	77	-0.36	-0.94
9	0.023	0.002	NT	-0.15	-0.26
10	0.023	0.0062	89	-0.15	-0.11
11	0.020	0.0060	85	-0.78	-0.59
13	0.022	0.005	NR	-0.36	-0.32
14	0.022	0.0073	79	-0.36	-0.23
15	NS	NS	NS		
16	0.019	0.0029	123	-0.99	-1.38
17	NS	NS	NS		
18	0.029	0.01	89	1.12	0.52
19	0.0258	0.008	102	0.44	0.26
20	<0.0202	0.00283	85.5		
21	NS	NS	NS		
22*	0.00888	0.00266	191	-3.13	-4.61
23	0.0245	0.008	68.34	0.17	0.10
24	< 0.02	0.01	NR		
25	NR	NR	NR		
26	0.024	0.0061	97	0.06	0.05
27	0.0259	0.00777	NR	0.46	0.28
28	0.03	0.008	144	1.33	0.77
29	0.024	0.007	NR	0.06	0.04
30	NS	NS	NS		
31	0.021	0.007	107.48	-0.57	-0.37
32	0.0274	0.0082	76	0.78	0.44
33	0.035	0.007	71	2.38	1.56
34	0.026	0.005	94	0.49	0.43
35	0.021	0.008	101	-0.57	-0.33
37	0.0206	0.00618	104	-0.65	-0.48
38	0.0199	NR	NR	-0.80	-2.11

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.0237	0.0018
Spike Value	Not Spiked	
Robust Average	0.0235	0.0019
Median	0.0230	0.0021
Mean	0.0234	
N	26	
Max	0.035	
Min	0.00888	
Robust SD	0.0038	
Robust CV	16%	


Results: S3 - PFPeS
Kernel Density
Density
Result
Assigned Value = 0.0237 ± 0.0018 µg/L
Results (µg/L)
Laboratory
22 16 38 3 11 37 2 31 35 8 13 14 9 10 26 29 23 19 27 34 1 6 32 18 28 33 5 4 7 15 17 20 21 24 25 30 Md RA


z-Scores: S3 - PFPeS
Target Standard Deviation for Proficiency Assessment 0.0047 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 16 38 3 11 37 2 31 35 8 13 14 9 10 26 29 23 19 27 34 1 6 32 18 28 33 5

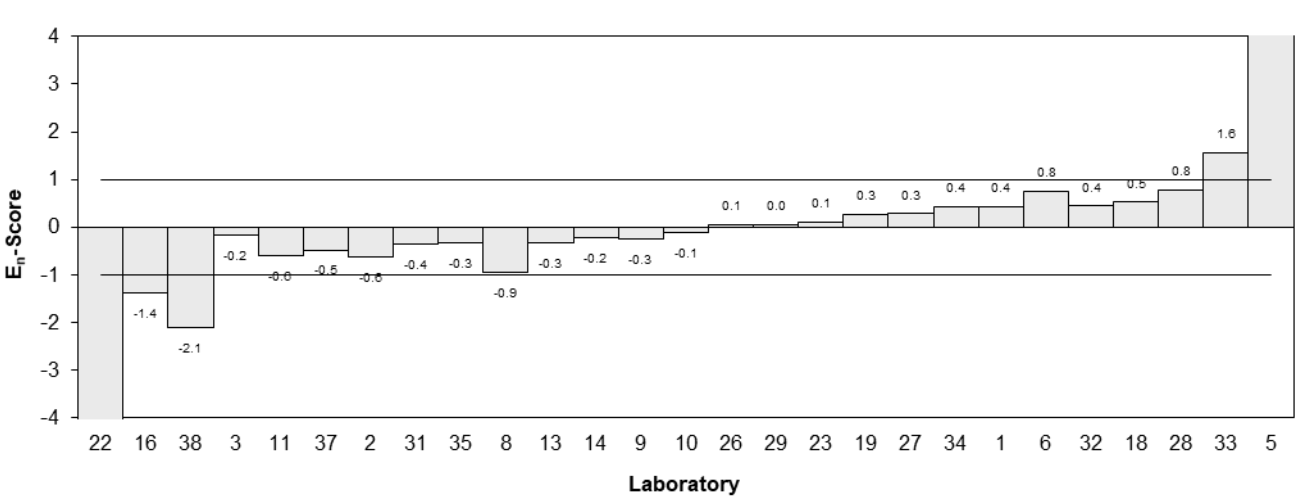

En-Scores: S3 - PFPeS
En-Score
Laboratory
22 16 38 3 11 37 2 31 35 8 13 14 9 10 26 29 23 19 27 34 1 6 32 18 28 33 5

Figure 47

Table 51

Sample Details

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

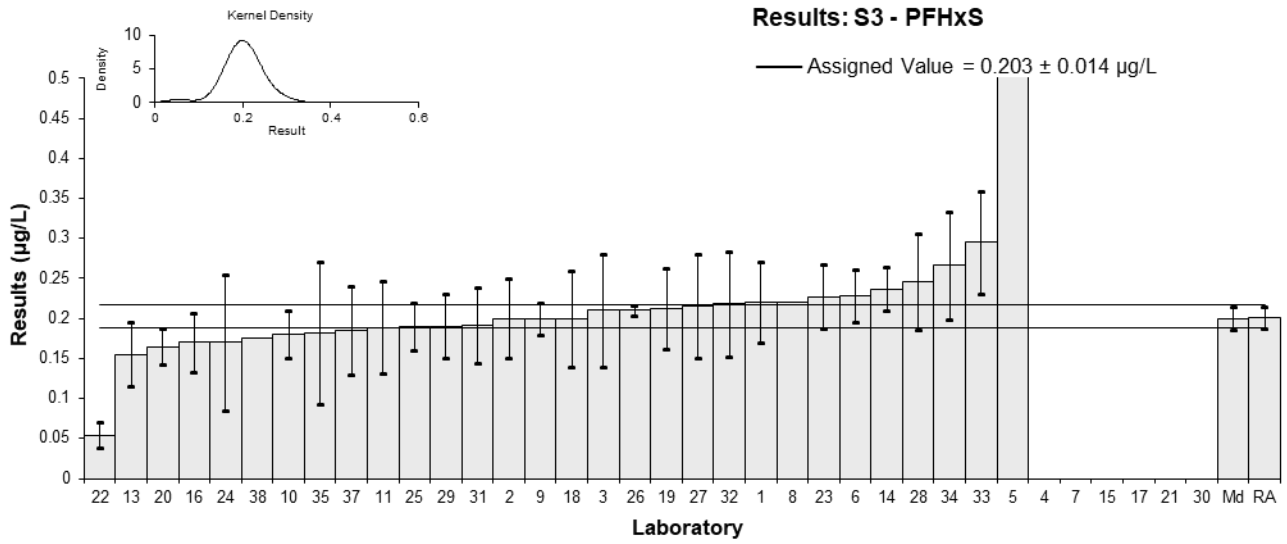
Participant Results

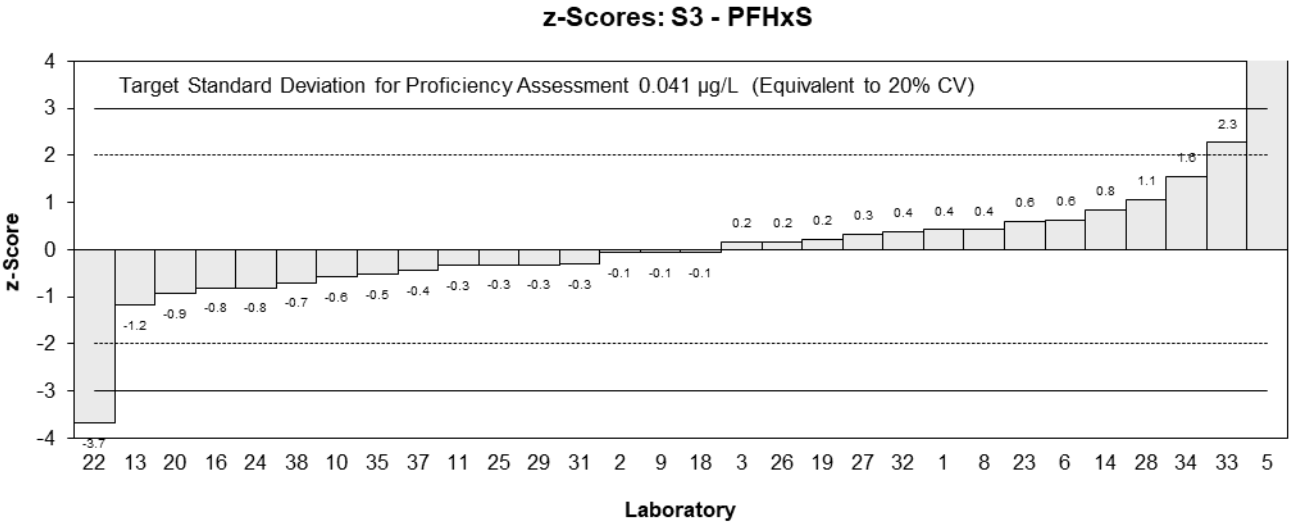
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.220	0.050	78.22	0.42	0.33
2	0.20	0.05	NR	-0.07	-0.06
3	0.21	0.07	93	0.17	0.10
4	NT	NT	NT		
5**	74.34251	36.3972027020	NR	1,826.10	2.04
6	0.228	0.0325	105	0.62	0.71
7	NS	NS	NS		
8	0.22	NR	77	0.42	1.21
9	0.20	0.02	NT	-0.07	-0.12
10	0.18	0.030	104	-0.57	-0.69
11	0.189	0.057	82	-0.34	-0.24
13	0.155	0.040	109	-1.18	-1.13
14	0.237	0.0273	79	0.84	1.11
15	NS	NS	NS		
16	0.17	0.037	128	-0.81	-0.83
17	NS	NS	NS		
18	0.20	0.06	100	-0.07	-0.05
19	0.212	0.05	80	0.22	0.17
20	0.165	0.02304	85.5	-0.94	-1.41
21	NS	NS	NS		
22*	0.0542	0.0163	177	-3.67	-6.93
23	0.227	0.04	68.34	0.59	0.57
24	0.17	0.085	101	-0.81	-0.38
25	0.19	0.03	98.1	-0.32	-0.39
26	0.21	0.0066	103	0.17	0.45
27	0.2162	0.06486	87	0.33	0.20
28	0.246	0.06	135	1.06	0.70
29	0.190	0.040	118	-0.32	-0.31
30	NS	NS	NS		
31	0.191	0.047	107.48	-0.30	-0.24
32	0.218	0.065	76	0.37	0.23
33	0.295	0.064	71	2.27	1.40
34	0.266	0.067	94	1.55	0.92
35	0.182	0.089	101	-0.52	-0.23
37	0.185	0.0555	104	-0.44	-0.31
38	0.1747	NR	NR	-0.70	-2.02

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.203	0.014
Spike Value	Not Spiked	
Robust Average	0.201	0.014
Median	0.200	0.014
Mean	0.200	
N	29	
Max	0.295	
Min	0.0542	
Robust SD	0.030	
Robust CV	15%	


Results: S3 - PFHxS
Assigned Value = 0.203 ± 0.014 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
22 13 20 16 24 38 10 35 37 11 25 29 31 2 9 18 3 26 19 27 32 1 8 23 6 14 28 34 33 5 4 7 15 17 21 30 Md RA


z-Scores: S3 - PFHxS
Target Standard Deviation for Proficiency Assessment 0.041 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 13 20 16 24 38 10 35 37 11 25 29 31 2 9 18 3 26 19 27 32 1 8 23 6 14 28 34 33 5

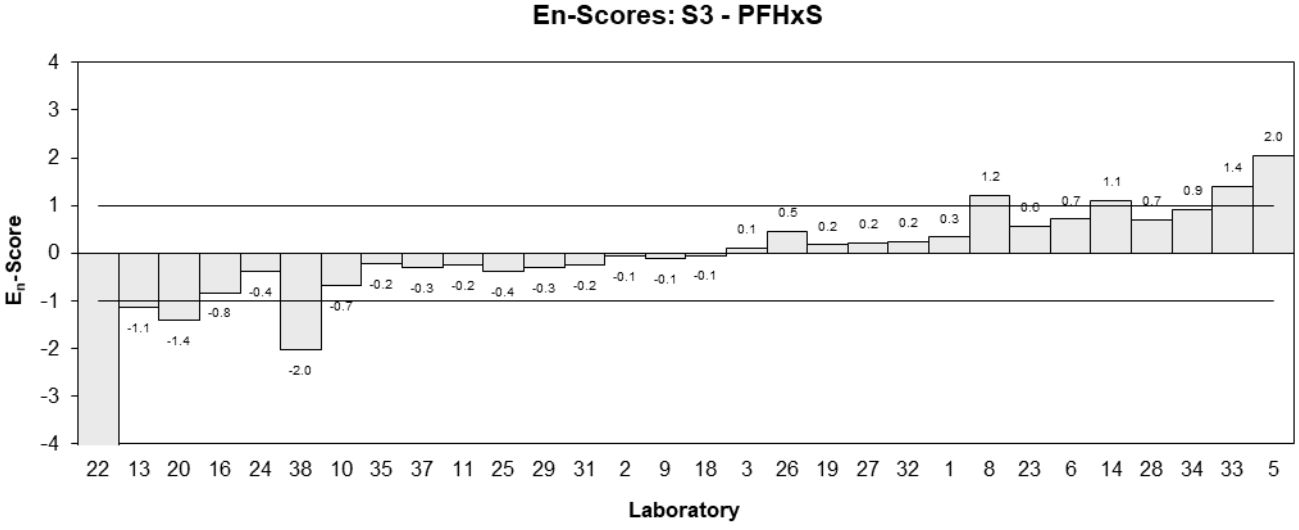

En-Scores: S3 - PFHxS
En-Score
Laboratory
22 13 20 16 24 38 10 35 37 11 25 29 31 2 9 18 3 26 19 27 32 1 8 23 6 14 28 34 33 5

Figure 48

Table 52

Sample Details

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

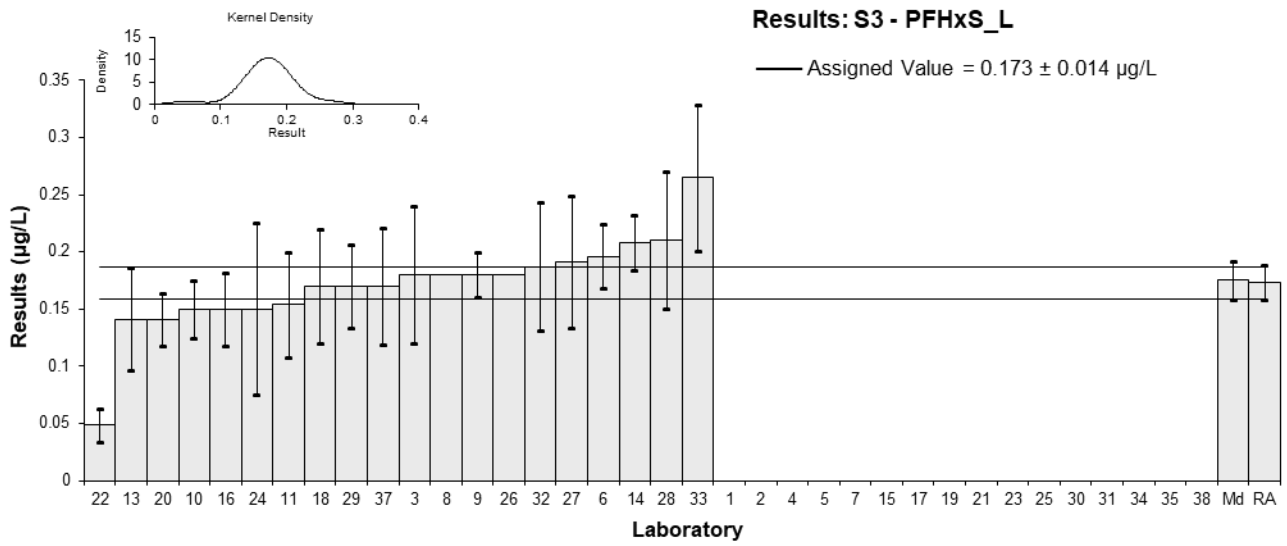
Participant Results

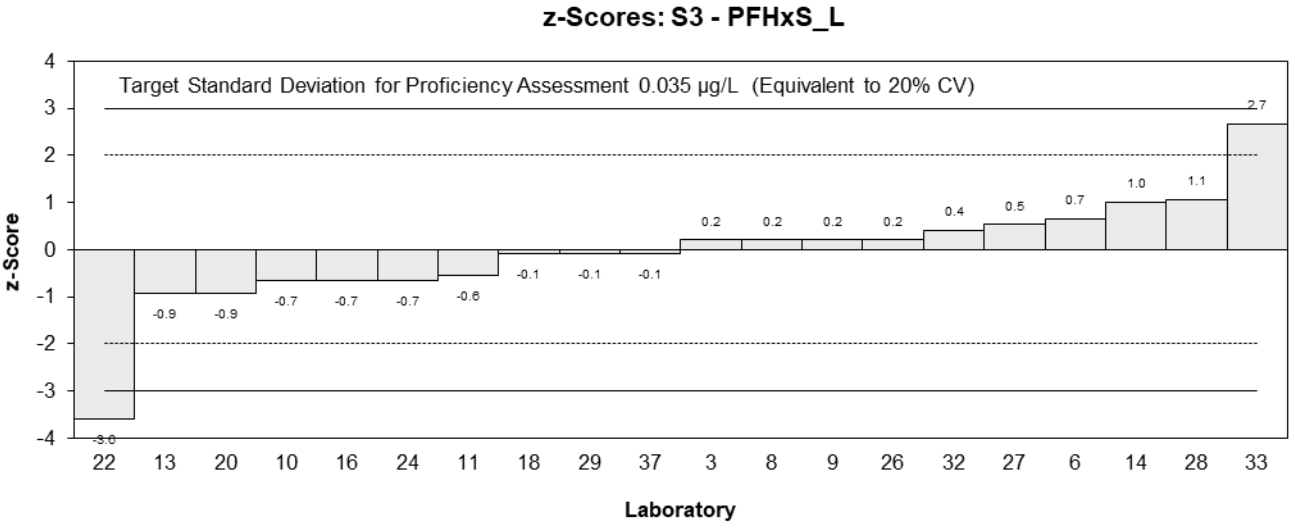
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NT	NT	NT		
3	0.18	0.06	93	0.20	0.11
4	NT	NT	NT		
5	NR	NR	NR		
6	0.196	0.028	105	0.66	0.73
7	NS	NS	NS		
8	0.18	NR	77	0.20	0.50
9	0.18	0.02	NT	0.20	0.29
10	0.15	0.025	104	-0.66	-0.80
11	0.154	0.046	82	-0.55	-0.40
13	0.141	0.045	109	-0.92	-0.68
14	0.208	0.0239	79	1.01	1.26
15	NS	NS	NS		
16	0.15	0.032	128	-0.66	-0.66
17	NS	NS	NS		
18	0.17	0.05	100	-0.09	-0.06
19	NT	NT	NT		
20	0.141	0.02304	85.5	-0.92	-1.19
21	NS	NS	NS		
22*	0.0485	0.0146	177	-3.60	-6.15
23	NT	NT	NT		
24	0.15	0.075	NR	-0.66	-0.30
25	NR	NR	NR		
26	0.18	NR	103	0.20	0.50
27	0.1913	0.05739	87	0.53	0.31
28	0.21	0.06	NR	1.07	0.60
29	0.170	0.036	118	-0.09	-0.08
30	NS	NS	NS		
31	NT	NT	NT		
32	0.187	0.056	76	0.40	0.24
33*	0.265	0.064	71	2.66	1.40
34	NR	NR	NR		
35	NT	NT	NT		
37	0.17	0.051	104	-0.09	-0.06
38	NR	NR	NR		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.173	0.014
Spike Value	Not Spiked	
Robust Average	0.173	0.015
Median	0.175	0.017
Mean	0.171	
N	20	
Max	0.265	
Min	0.0485	
Robust SD	0.028	
Robust CV	16%	


Kernel Density
Density
Result
Results: S3 - PFHxS_L
Assigned Value = 0.173 ± 0.014 µg/L
Results (µg/L)
Laboratory
22 13 20 10 16 24 11 18 29 37 3 8 9 26 32 27 6 14 28 33 1 2 4 5 7 15 17 19 21 23 25 30 31 34 35 38 Md RA


z-Scores: S3 - PFHxS_L
Target Standard Deviation for Proficiency Assessment 0.035 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 13 20 10 16 24 11 18 29 37 3 8 9 26 32 27 6 14 28 33

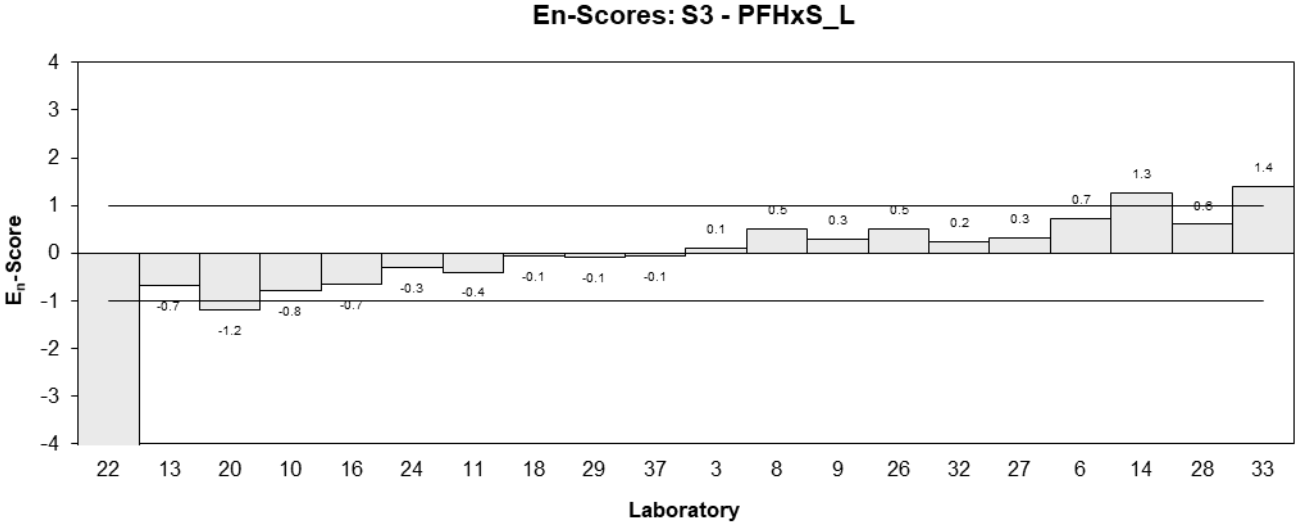

En-Scores: S3 - PFHxS_L
En-Score
Laboratory
22 13 20 10 16 24 11 18 29 37 3 8 9 26 32 27 6 14 28 33

Figure 49

Table 53

Sample Details

Sample No.	S3
Matrix	Water
Analyte	PFHpS
Unit	µg/L

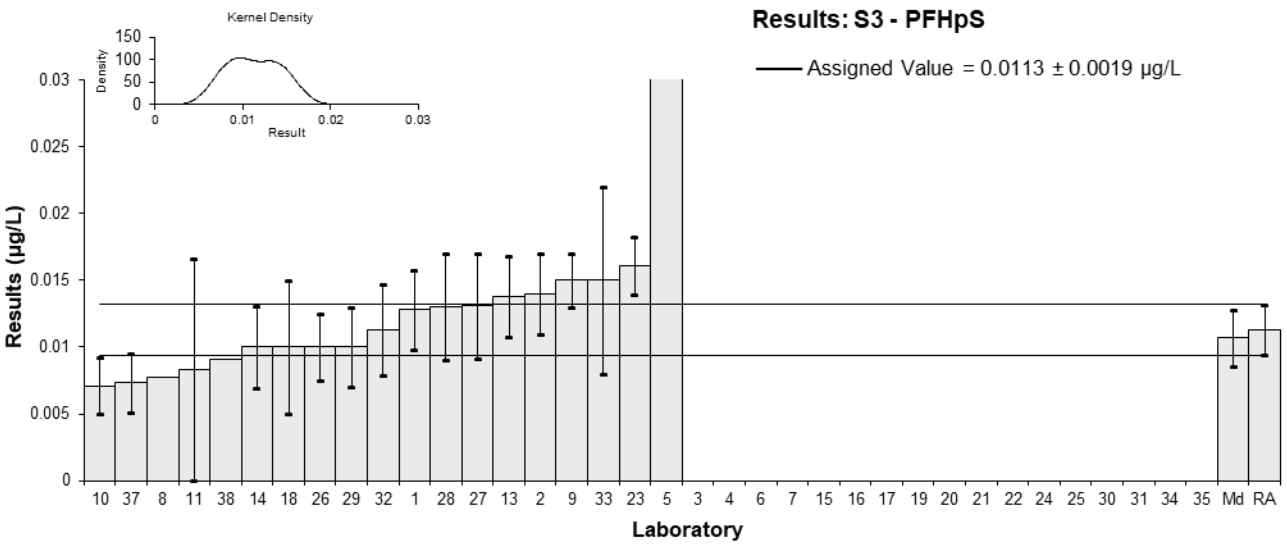
Participant Results

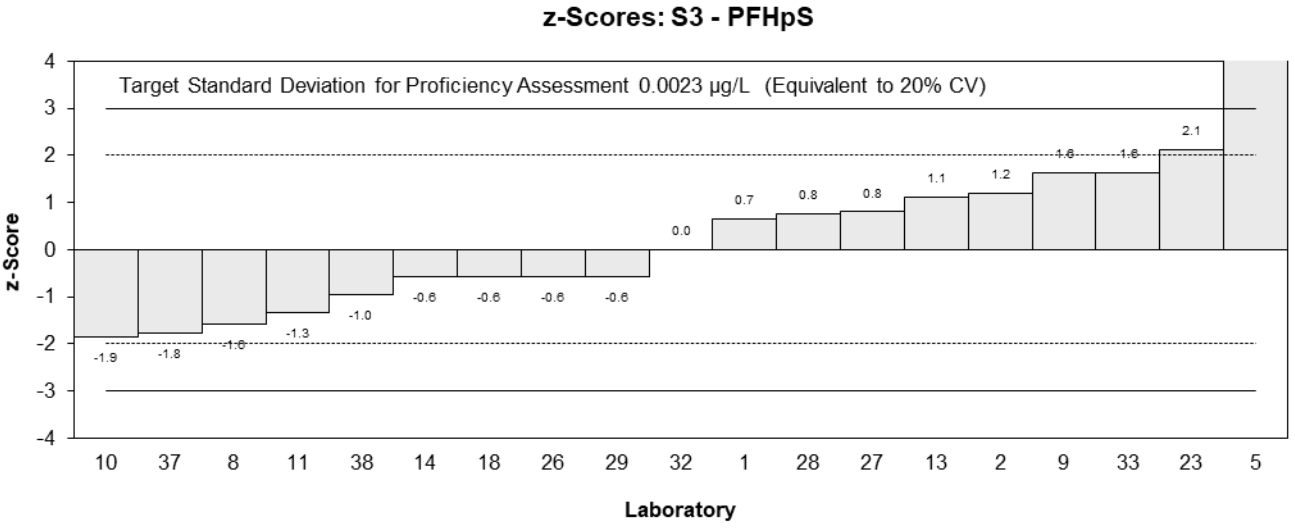
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0128	0.0030	78.22	0.66	0.42
2	0.014	0.003	NR	1.19	0.76
3	<0.01	NR	93		
4	NT	NT	NT		
5**	11.9041566666	0.32082674039	NR	5,262.33	37.07
6	< 0.01	NR	103		
7	NS	NS	NS		
8	0.0077	NR	77	-1.59	-1.89
9	0.015	0.002	NT	1.64	1.34
10	0.0071	0.0021	104	-1.86	-1.48
11	0.0083	0.0083	81	-1.33	-0.35
13	0.0138	0.003	NR	1.11	0.70
14	0.01	0.0031	75	-0.58	-0.36
15	NS	NS	NS		
16	NR	NR	NR		
17	NS	NS	NS		
18	0.010	0.005	89	-0.58	-0.24
19	<0.02	NR	95		
20	<0.0201	0.0365	89.1		
21	NS	NS	NS		
22	<0.005	NR	177		
23	0.0161	0.0022	68.34	2.12	1.65
24	< 0.02	0.01	NR		
25	NR	NR	NR		
26	0.01	0.0025	95	-0.58	-0.41
27	0.0131	0.00393	NR	0.80	0.41
28	0.013	0.004	135	0.75	0.38
29	0.010	0.003	NR	-0.58	-0.37
30	NS	NS	NS		
31	<0.02	NR	111.85		
32	0.0113	0.0034	76	0.00	0.00
33	0.015	0.007	71	1.64	0.51
34	NR	NR	94		
35	<0.02	NR	101		
37	0.00731	0.002193	110	-1.77	-1.38
38	0.0091	NR	NR	-0.97	-1.16

** Gross Error, see Section 4.2

Statistics

Assigned Value	0.0113	0.0019
Spike Value	Not Spiked	
Robust Average	0.0113	0.0019
Median	0.0107	0.0021
Mean	0.0113	
N	18	
Max	0.0161	
Min	0.0071	
Robust SD	0.0032	
Robust CV	29%	


Results: S3 - PFHpS
Assigned Value = 0.0113 ± 0.0019 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
10 37 8 11 38 14 18 26 29 32 1 28 27 13 2 9 33 23 5 3 4 6 7 15 16 17 19 20 21 22 24 25 30 31 34 35 Md RA


z-Scores: S3 - PFHpS
Target Standard Deviation for Proficiency Assessment 0.0023 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
10 37 8 11 38 14 18 26 29 32 1 28 27 13 2 9 33 23 5

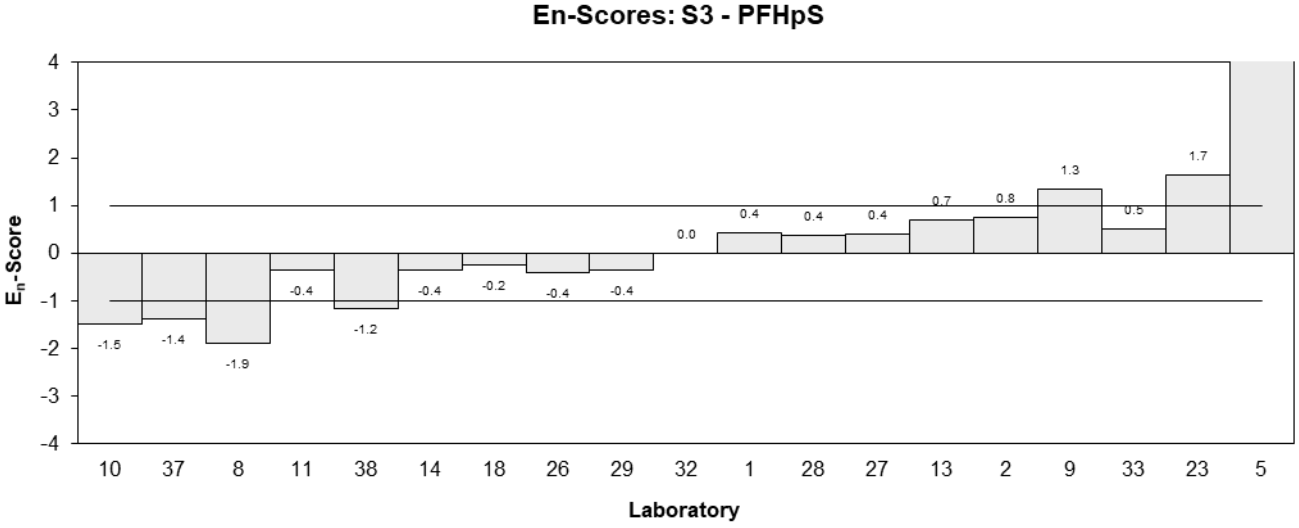

En-Scores: S3 - PFHpS
En-Score
Laboratory
10 37 8 11 38 14 18 26 29 32 1 28 27 13 2 9 33 23 5

Figure 50

Table 54

Sample Details

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

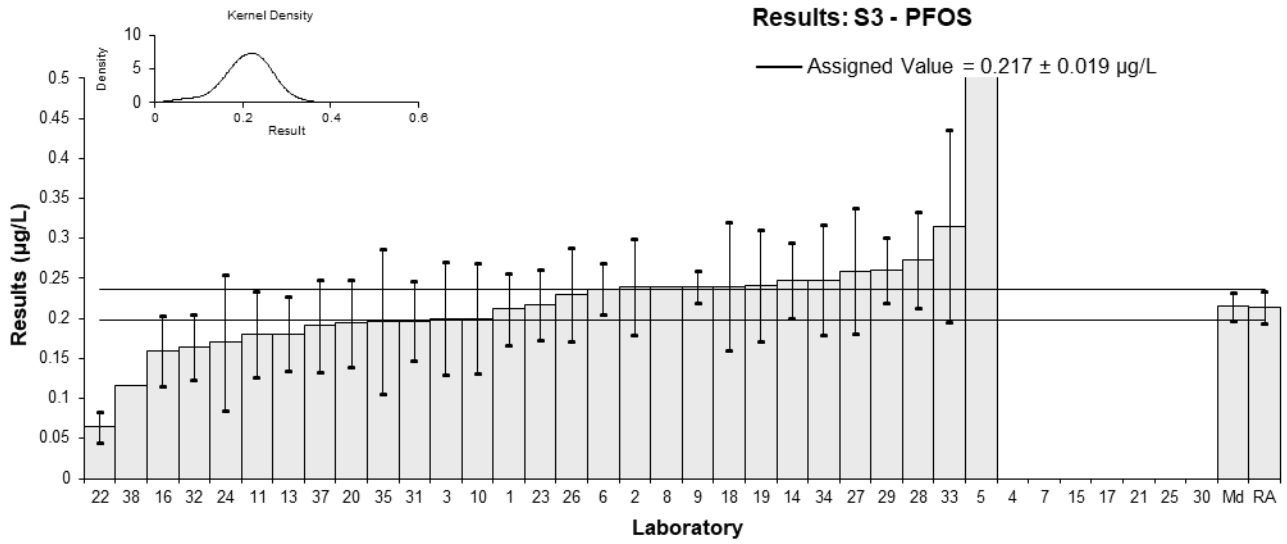
Participant Results

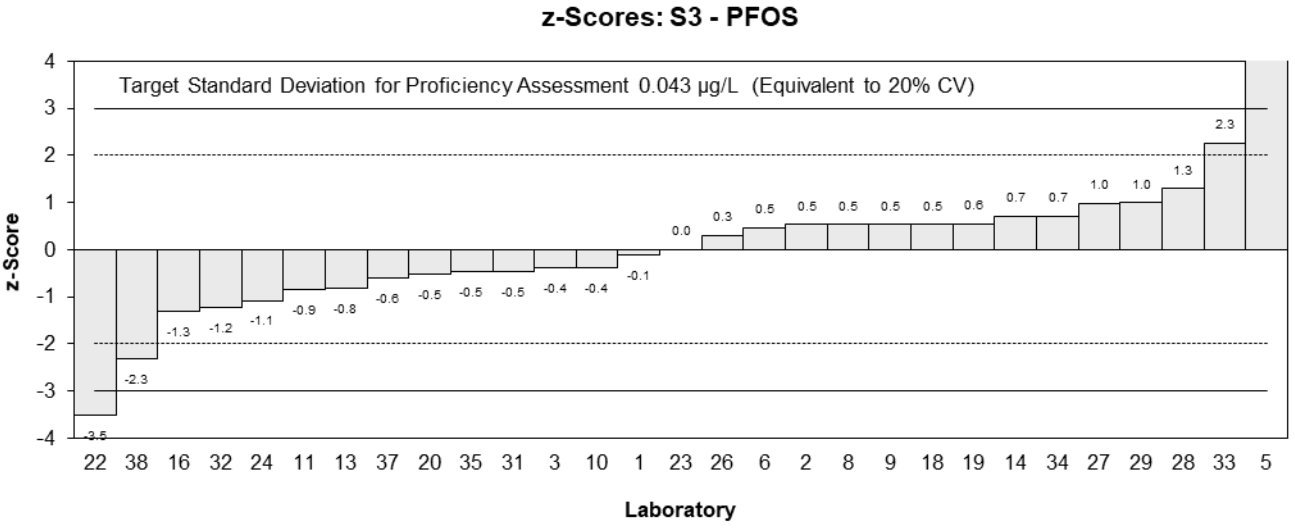
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.212	0.045	75.82	-0.12	-0.10
2	0.24	0.06	97	0.53	0.37
3	0.2	0.07	97	-0.39	-0.23
4	NT	NT	NT		
5**	91.70008	15.3780787526	NR	2,107.91	5.95
6	0.237	0.0319	103	0.46	0.54
7	NS	NS	NS		
8	0.24	NR	67	0.53	1.21
9	0.24	0.02	80	0.53	0.83
10	0.20	0.069	94	-0.39	-0.24
11	0.180	0.054	78	-0.85	-0.65
13	0.181	0.046	91	-0.83	-0.72
14	0.248	0.0475	78	0.71	0.61
15	NS	NS	NS		
16	0.16	0.044	127	-1.31	-1.19
17	NS	NS	NS		
18	0.24	0.08	98	0.53	0.28
19	0.241	0.07	95	0.55	0.33
20	0.194	0.0544	89.1	-0.53	-0.40
21	NS	NS	NS		
22*	0.0642	0.0193	169	-3.52	-5.64
23	0.217	0.0434	92.51	0.00	0.00
24	0.17	0.085	96	-1.08	-0.54
25	NR	NR	NR		
26	0.23	0.058	68	0.30	0.21
27	0.2595	0.07785	76	0.98	0.53
28	0.273	0.06	122	1.29	0.89
29	0.260	0.041	123	0.99	0.95
30	NS	NS	NS		
31	0.197	0.05	111.85	-0.46	-0.37
32	0.164	0.041	92	-1.22	-1.17
33	0.315	0.12	76	2.26	0.81
34	0.248	0.069	95	0.71	0.43
35	0.196	0.091	84	-0.48	-0.23
37	0.191	0.0573	110	-0.60	-0.43
38	0.1161	NR	NR	-2.32	-5.31

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.217	0.019
Spike Value	Not Spiked	
Robust Average	0.214	0.020
Median	0.215	0.018
Mean	0.211	
N	28	
Max	0.315	
Min	0.0642	
Robust SD	0.042	
Robust CV	20%	


Results: S3 - PFOS
Kernel Density
Density
Result
Assigned Value = 0.217 ± 0.019 µg/L
Results (µg/L)
Laboratory
22 38 16 32 24 11 13 37 20 35 31 3 10 1 23 26 6 2 8 9 18 19 14 34 27 29 28 33 5 4 7 15 17 21 25 30 Md RA


z-Scores: S3 - PFOS
Target Standard Deviation for Proficiency Assessment 0.043 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 38 16 32 24 11 13 37 20 35 31 3 10 1 23 26 6 2 8 9 18 19 14 34 27 29 28 33 5

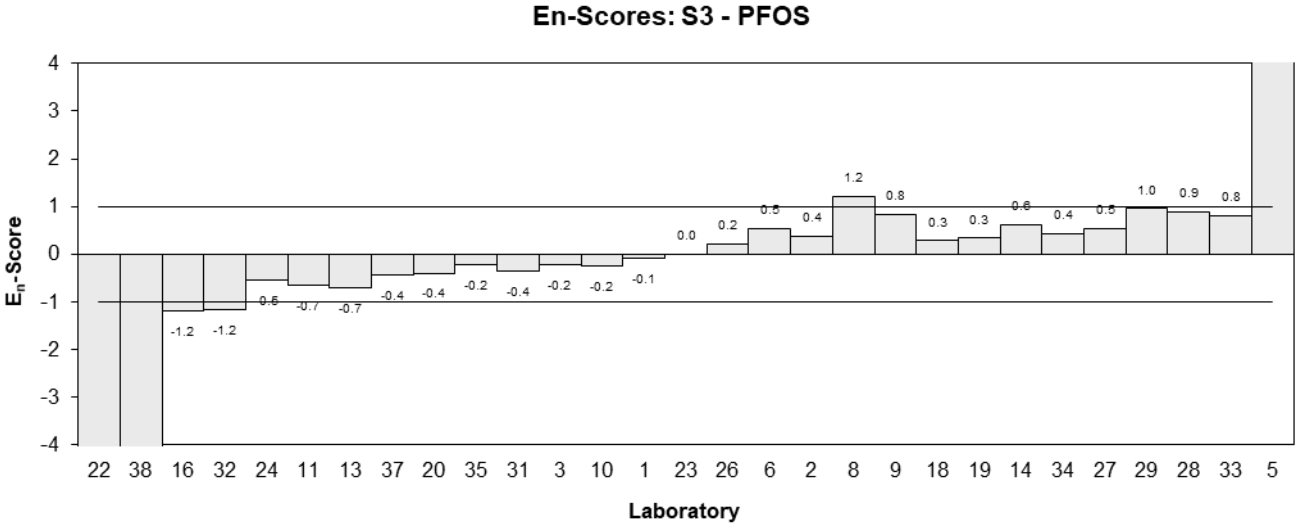

En-Scores: S3 - PFOS
En-Score
Laboratory
22 38 16 32 24 11 13 37 20 35 31 3 10 1 23 26 6 2 8 9 18 19 14 34 27 29 28 33 5

Figure 51

Table 55

Sample Details

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

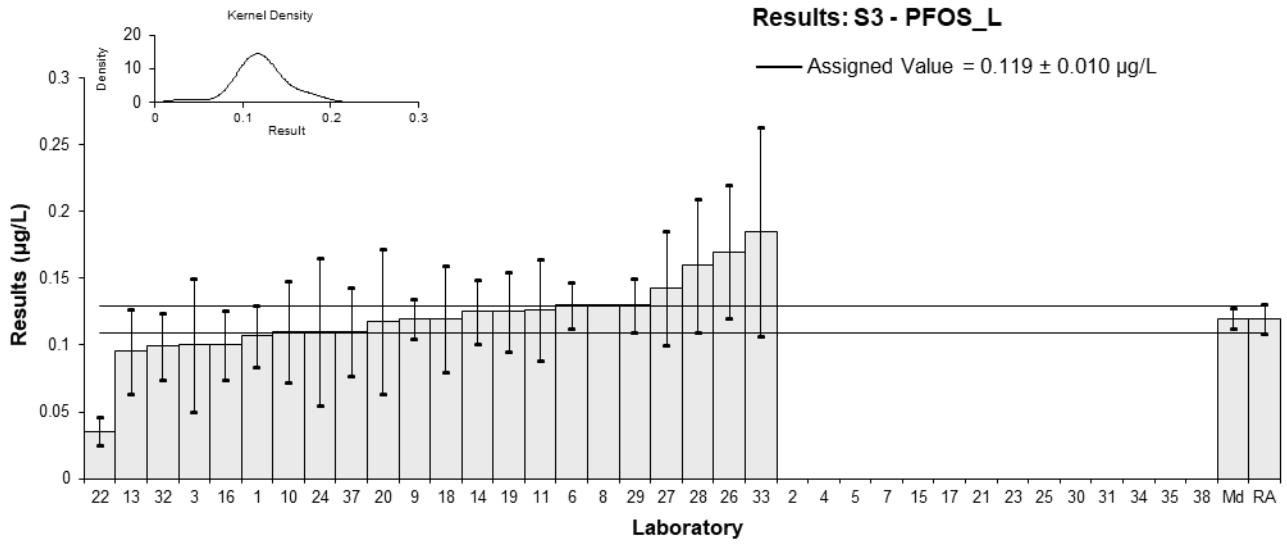
Participant Results

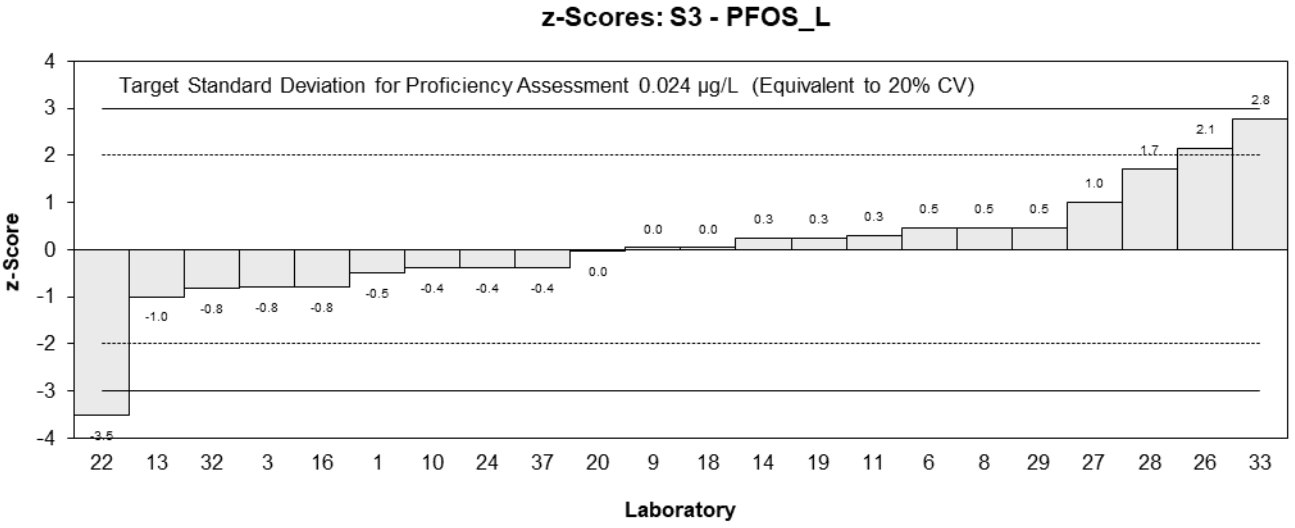
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.107	0.023	75.82	-0.50	-0.48
2	NT	NT	NT		
3	0.1	0.05	97	-0.80	-0.37
4	NT	NT	NT		
5	NR	NR	NR		
6	0.13	0.0175	103	0.46	0.55
7	NS	NS	NS		
8	0.13	NR	67	0.46	1.10
9	0.12	0.015	NT	0.04	0.06
10	0.11	0.038	94	-0.38	-0.23
11	0.126	0.038	78	0.29	0.18
13	0.0952	0.032	91	-1.00	-0.71
14	0.125	0.0239	75	0.25	0.23
15	NS	NS	NS		
16	0.10	0.026	127	-0.80	-0.68
17	NS	NS	NS		
18	0.12	0.04	98	0.04	0.02
19	0.125	0.03	95	0.25	0.19
20	0.118	0.0544	89.1	-0.04	-0.02
21	NS	NS	NS		
22*	0.0354	0.0106	159	-3.51	-5.74
23	NT	NT	NT		
24	0.11	0.055	NR	-0.38	-0.16
25	NR	NR	NR		
26	0.17	0.05	68	2.14	1.00
27	0.1428	0.04284	76	1.00	0.54
28	0.16	0.05	NR	1.72	0.80
29	0.130	0.020	123	0.46	0.49
30	NS	NS	NS		
31	NT	NT	NT		
32	0.0994	0.0249	92	-0.82	-0.73
33*	0.185	0.078	76	2.77	0.84
34	NR	NR	NR		
35	NT	NT	NT		
37	0.11	0.033	110	-0.38	-0.26
38	NR	NR	NR		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.119	0.010
Spike Value	Not Spiked	
Robust Average	0.120	0.011
Median	0.120	0.008
Mean	0.120	
N	22	
Max	0.185	
Min	0.0354	
Robust SD	0.021	
Robust CV	17%	


Results: S3 - PFOS_L
Assigned Value = 0.119 ± 0.010 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
22 13 32 3 16 1 10 24 37 20 9 18 14 19 11 6 8 29 27 28 26 33 2 4 5 7 15 17 21 23 25 30 31 34 35 38 Md RA


z-Scores: S3 - PFOS_L
Target Standard Deviation for Proficiency Assessment 0.024 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 13 32 3 16 1 10 24 37 20 9 18 14 19 11 6 8 29 27 28 26 33

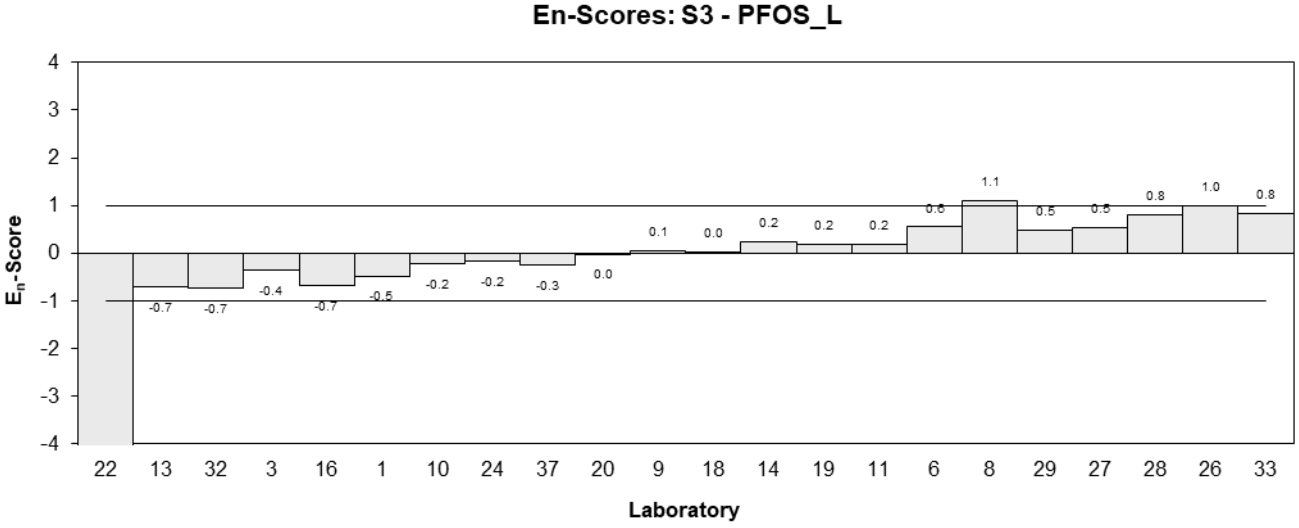

En-Scores: S3 - PFOS_L
En-Score
Laboratory
22 13 32 3 16 1 10 24 37 20 9 18 14 19 11 6 8 29 27 28 26 33

Figure 52

Table 56

Sample Details

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

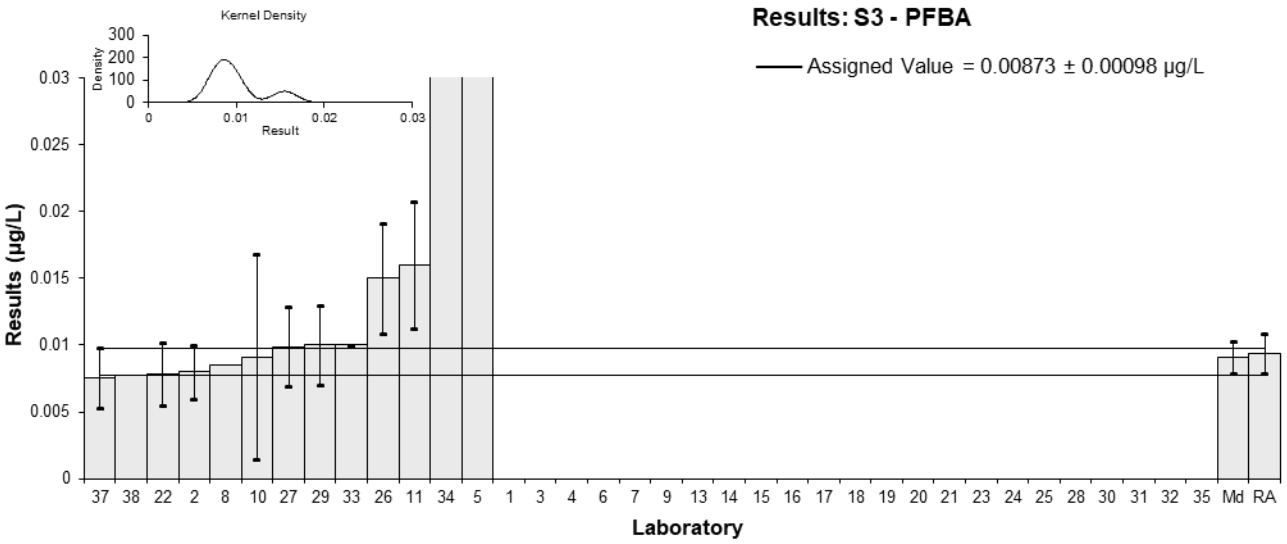
Participant Results

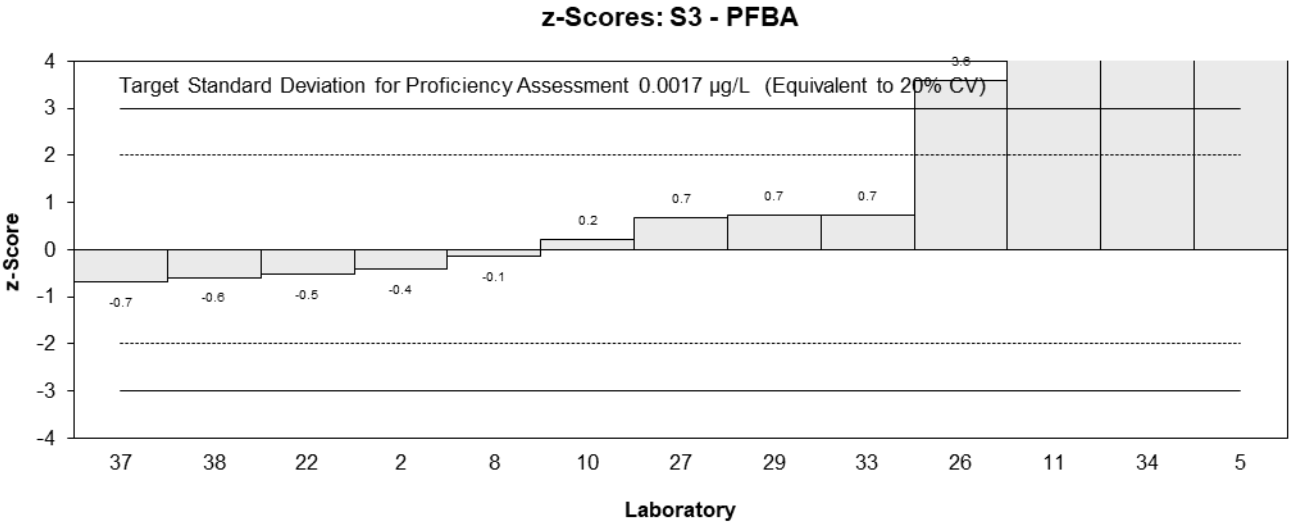
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	<0.006	NR	57.08		
2	0.008	0.002	NR	-0.42	-0.33
3	<0.02	NR	89		
4	NT	NT	NT		
5**	15.1540333333	5.70345009574	NR	8,674.29	2.66
6	<0.250	NR	87		
7	NS	NS	NS		
8	0.0085	NR	55	-0.13	-0.23
9	<0.1	NR	NT		
10	0.0091	0.0077	61	0.21	0.05
11*	0.016	0.0048	85	4.16	1.48
13	<0.005	NR	84		
14	<0.05	NR	63		
15	NS	NS	NS		
16	NR	NR	NR		
17	NS	NS	NS		
18	<0.02	NR	91		
19	<0.5	NR	89		
20	<0.0805	0.00885	86.3		
21	NS	NS	NS		
22	0.00783	0.00235	172	-0.52	-0.35
23	<0.01	0.0021	19.89		
24	< 0.05	0.025	138		
25	NR	NR	NR		
26*	0.015	0.0041	92	3.59	1.49
27	0.0099	0.00297	62	0.67	0.37
28	<0.002	NR	102		
29	0.010	0.003	106.3	0.73	0.40
30	NS	NS	NS		
31	<0.1	NR	100.38		
32	<0.008	NR	124		
33	0.01	0	72	0.73	1.30
34**	0.159	0.031	90	86.07	4.84
35	<0.1	NR	96		
37	0.00755	0.002265	93	-0.68	-0.48
38	0.0077	NR	NR	-0.59	-1.05

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.00873	0.00098
Spike Value	Not Spiked	
Robust Average	0.0094	0.0015
Median	0.0091	0.0012
Mean	0.0100	
N	11	
Max	0.016	
Min	0.00755	
Robust SD	0.0019	
Robust CV	21%	


Results: S3 - PFBA
Assigned Value = 0.00873 ± 0.00098 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
37 38 22 2 8 10 27 29 33 26 11 34 5 1 3 4 6 7 9 13 14 15 16 17 18 19 20 21 23 24 25 28 30 31 32 35 Md RA


z-Scores: S3 - PFBA
Target Standard Deviation for Proficiency Assessment 0.0017 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
37 38 22 2 8 10 27 29 33 26 11 34 5
-0.7 -0.6 -0.5 -0.4 -0.1 0.2 0.7 0.7 0.7 3.6

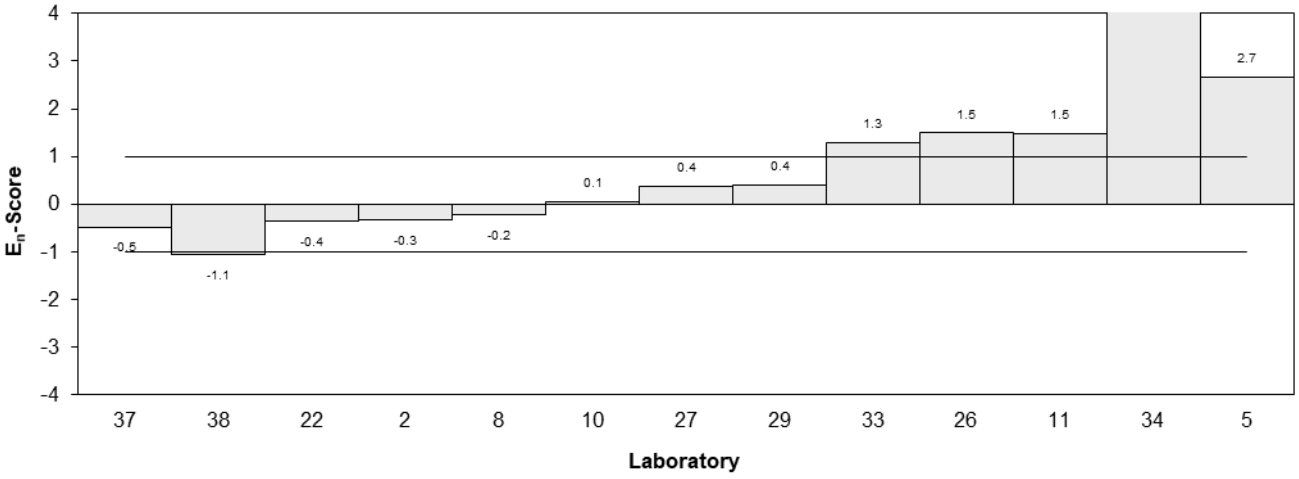

En-Scores: S3 - PFBA
En-Score
Laboratory
37 38 22 2 8 10 27 29 33 26 11 34 5
-0.5 -1.1 -0.4 -0.3 -0.2 0.1 0.4 0.4 1.3 1.5 1.5 2.7

Figure 53

Table 57

Sample Details

Sample No.	S3
Matrix	Water
Analyte	PFPeA
Unit	µg/L

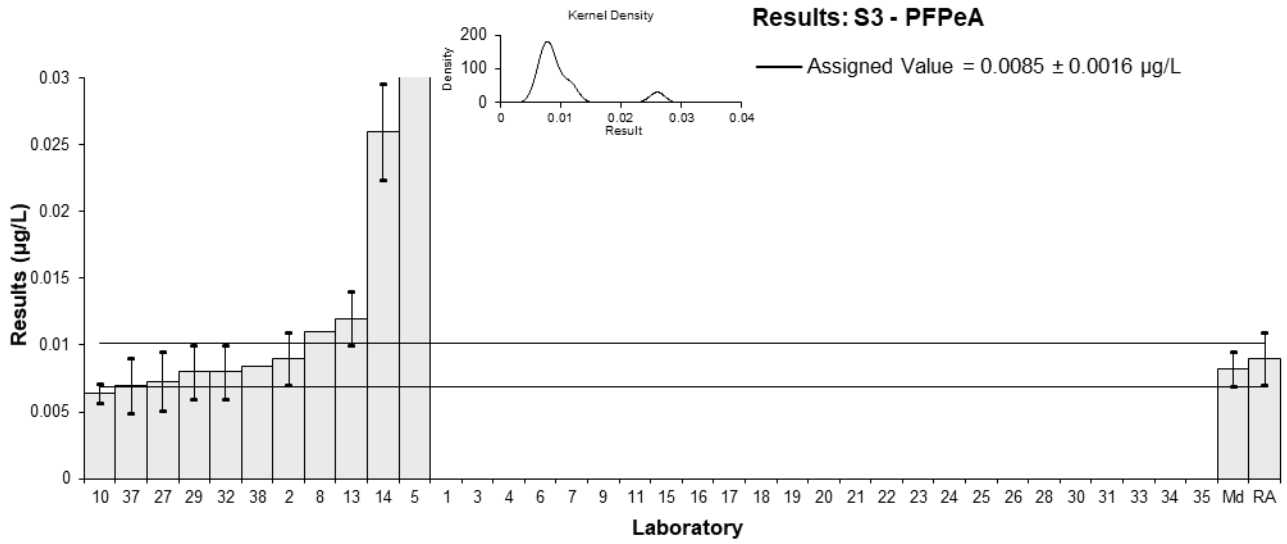
Participant Results

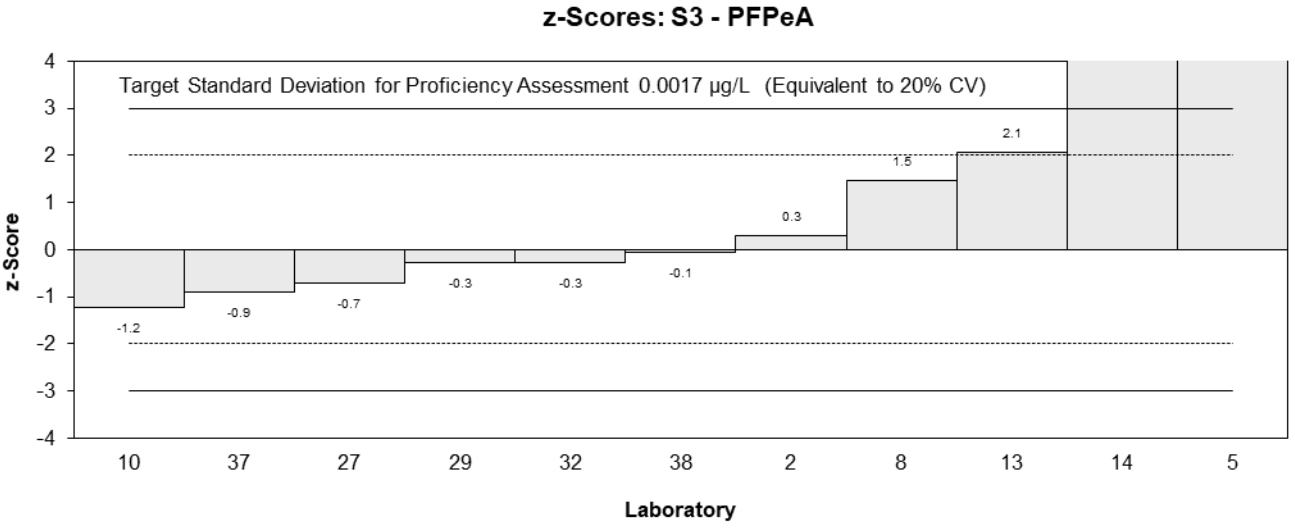
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	<0.0011	NR	55.91		
2	0.009	0.002	NR	0.29	0.20
3	<0.02	NR	99		
4	NT	NT	NT		
5**	6.04729	3.10852308458	NR	3,552.23	1.94
6	< 0.01	NR	99		
7	NS	NS	NS		
8	0.011	NR	62	1.47	1.56
9	<0.1	NR	NT		
10	0.0064	0.00069	82	-1.24	-1.21
11	<0.01	NR	79		
13	0.012	0.002	92	2.06	1.37
14*	0.026	0.0036	61	10.29	4.44
15	NS	NS	NS		
16	NR	NR	NR		
17	NS	NS	NS		
18	<0.02	NR	102		
19	<0.02	NR	81		
20	<0.0402	0.00483	99.2		
21	NS	NS	NS		
22	<0.005	NR	202		
23	<0.015	0.0026	43.11		
24	< 0.03	0.015	124		
25	NR	NR	NR		
26	<0.01	NR	115		
27	0.0073	0.00219	65	-0.71	-0.44
28	<0.002	NR	108		
29	0.008	0.002	103.3	-0.29	-0.20
30	NS	NS	NS		
31	<0.2	NR	68.63		
32	0.0080	0.0020	140	-0.29	-0.20
33	< 0.001	NR	72		
34	NR	NR	90		
35	<0.02	NR	81		
37	0.00696	0.002088	94	-0.91	-0.59
38	0.0084	NR	NR	-0.06	-0.06

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.0085	0.0016
Spike Value	Not Spiked	
Robust Average	0.0090	0.0020
Median	0.0082	0.0013
Mean	0.0103	
N	10	
Max	0.026	
Min	0.0064	
Robust SD	0.0025	
Robust CV	27%	


Results: S3 - PFPeA
Assigned Value = 0.0085 ± 0.0016 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
10 37 27 29 32 38 2 8 13 14 5 1 3 4 6 7 9 11 15 16 17 18 19 20 21 22 23 24 25 26 28 30 31 33 34 35 Md RA


z-Scores: S3 - PFPeA
Target Standard Deviation for Proficiency Assessment 0.0017 µg/L (Equivalent to 20% CV)
z-Score
-1.2 -0.9 -0.7 -0.3 -0.3 -0.1 0.3 1.5 2.1
Laboratory
10 37 27 29 32 38 2 8 13 14 5

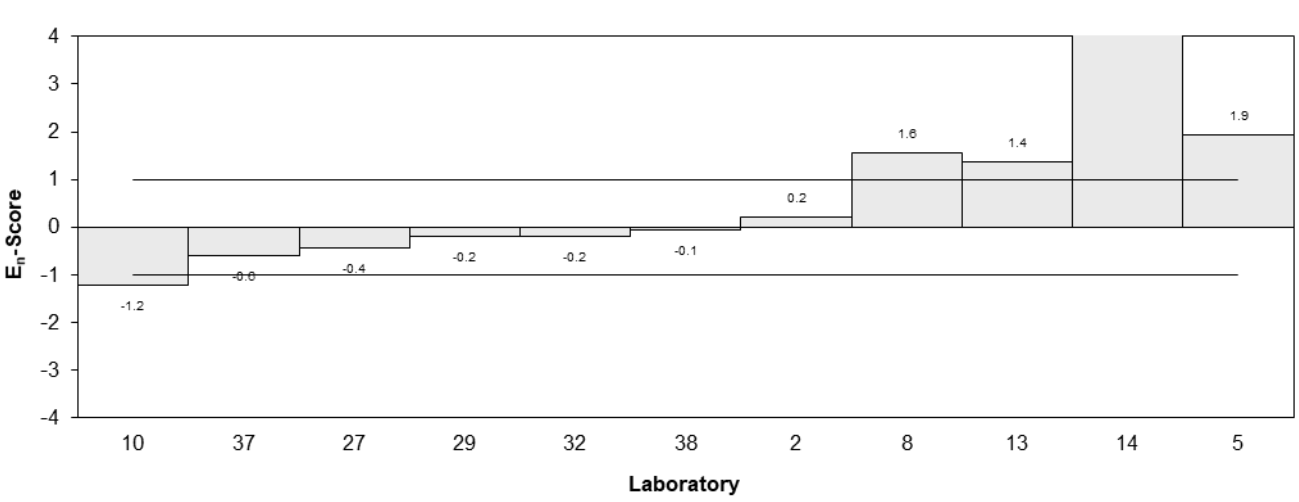

En-Scores: S3 - PFPeA
En-Score
-1.2 -0.6 -0.4 -0.2 -0.2 -0.1 0.2 1.6 1.4 1.9
Laboratory
10 37 27 29 32 38 2 8 13 14 5

Figure 54

Table 58

Sample Details

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

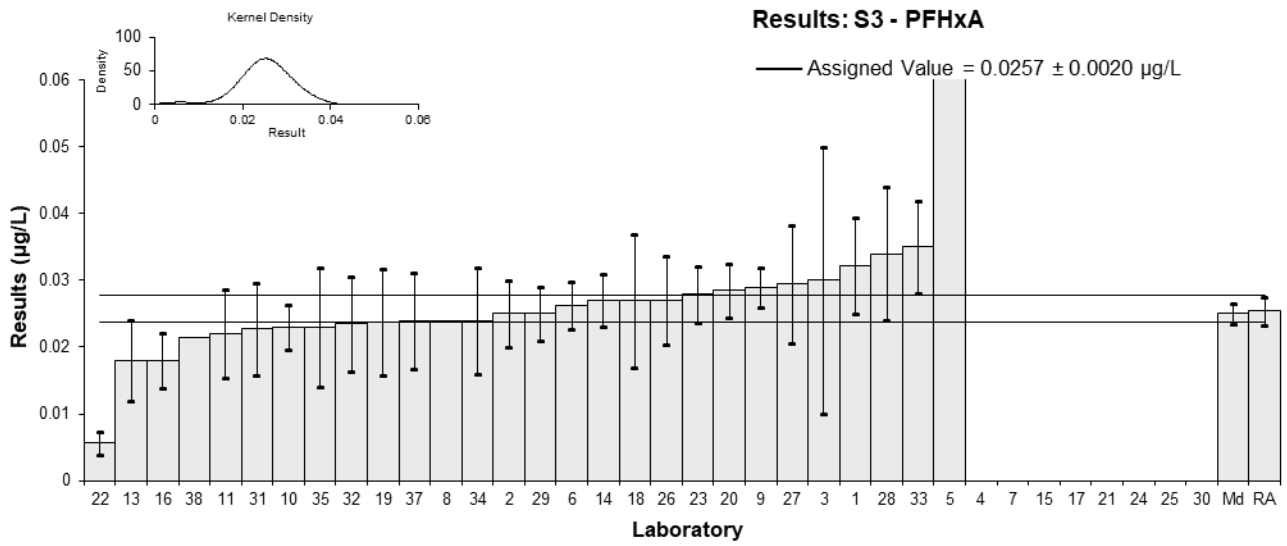
Participant Results

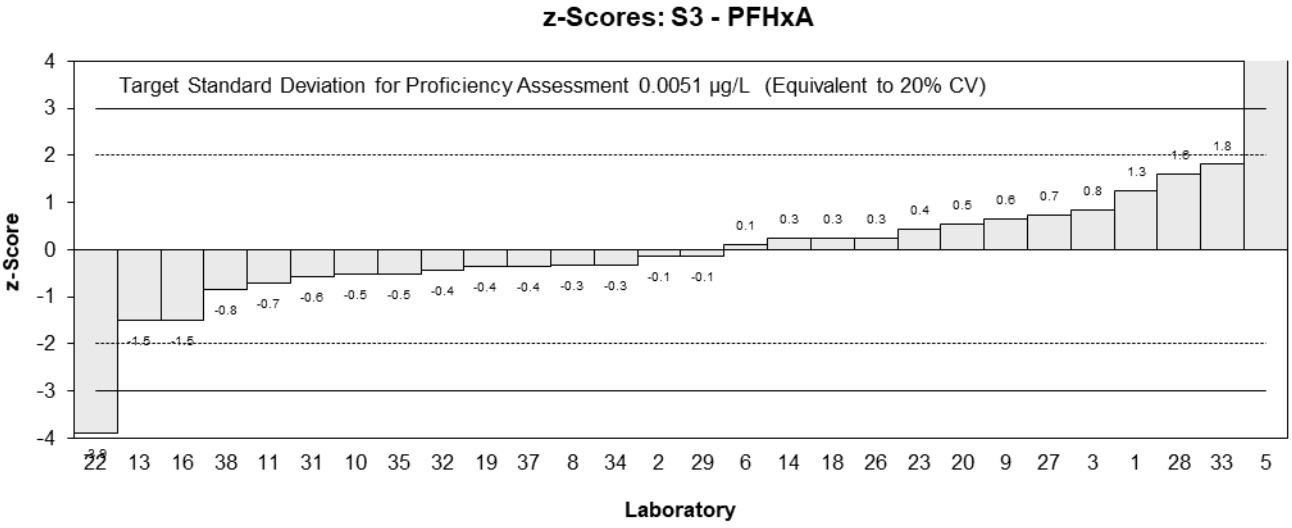
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0322	0.0073	77.79	1.26	0.86
2	0.025	0.005	NR	-0.14	-0.13
3	0.03	0.02	96	0.84	0.21
4	NT	NT	NT		
5**	10.9076066666	0.67688221212	NR	2,117.10	16.08
6	0.0262	0.00355	101	0.10	0.12
7	NS	NS	NS		
8	0.024	NR	81	-0.33	-0.85
9	0.029	0.003	NT	0.64	0.92
10	0.023	0.0034	89	-0.53	-0.68
11	0.022	0.0066	82	-0.72	-0.54
13	0.018	0.006	109	-1.50	-1.22
14	0.027	0.0040	66	0.25	0.29
15	NS	NS	NS		
16	0.018	0.0041	119	-1.50	-1.69
17	NS	NS	NS		
18	0.027	0.01	83	0.25	0.13
19	0.0238	0.008	93	-0.37	-0.23
20	0.0285	0.00399	84.6	0.54	0.63
21	NS	NS	NS		
22*	0.00563	0.00169	190	-3.90	-7.66
23	0.0279	0.0043	48.34	0.43	0.46
24	< 0.02	0.02	102		
25	NR	NR	NR		
26	0.027	0.0067	103	0.25	0.19
27	0.0295	0.00885	80	0.74	0.42
28	0.034	0.01	140	1.61	0.81
29	0.025	0.004	113.7	-0.14	-0.16
30	NS	NS	NS		
31	0.0227	0.007	85.34	-0.58	-0.41
32	0.0235	0.0071	136	-0.43	-0.30
33	0.035	0.007	77	1.81	1.28
34	0.024	0.008	95	-0.33	-0.21
35	0.023	0.009	90	-0.53	-0.29
37	0.0239	0.00717	98	-0.35	-0.24
38	0.0214	NR	NR	-0.84	-2.15

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.0257	0.0020
Spike Value	Not Spiked	
Robust Average	0.0254	0.0021
Median	0.0250	0.0016
Mean	0.0250	
N	27	
Max	0.035	
Min	0.00563	
Robust SD	0.0045	
Robust CV	18%	


Results: S3 - PFHxA
Kernel Density
Density
Result
Assigned Value = 0.0257 ± 0.0020 µg/L
Results (µg/L)
Laboratory
22 13 16 38 11 31 10 35 32 19 37 8 34 2 29 6 14 18 26 23 20 9 27 3 1 28 33 5 4 7 15 17 21 24 25 30 Md RA


z-Scores: S3 - PFHxA
Target Standard Deviation for Proficiency Assessment 0.0051 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 13 16 38 11 31 10 35 32 19 37 8 34 2 29 6 14 18 26 23 20 9 27 3 1 28 33 5

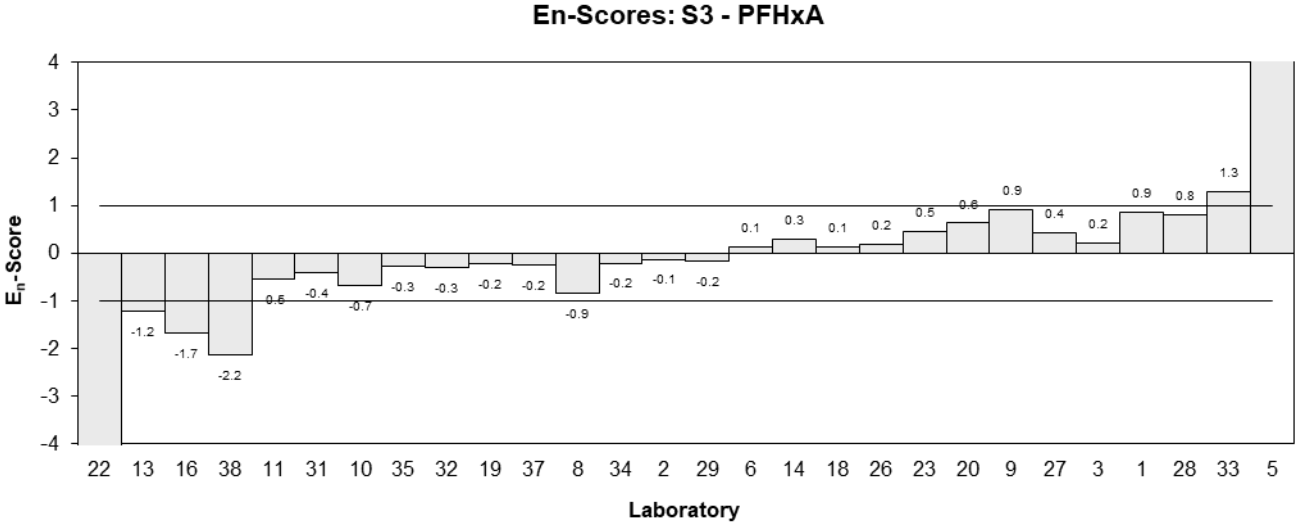

En-Scores: S3 - PFHxA
En-Score
Laboratory
22 13 16 38 11 31 10 35 32 19 37 8 34 2 29 6 14 18 26 23 20 9 27 3 1 28 33 5

Figure 55

Table 59

Sample Details

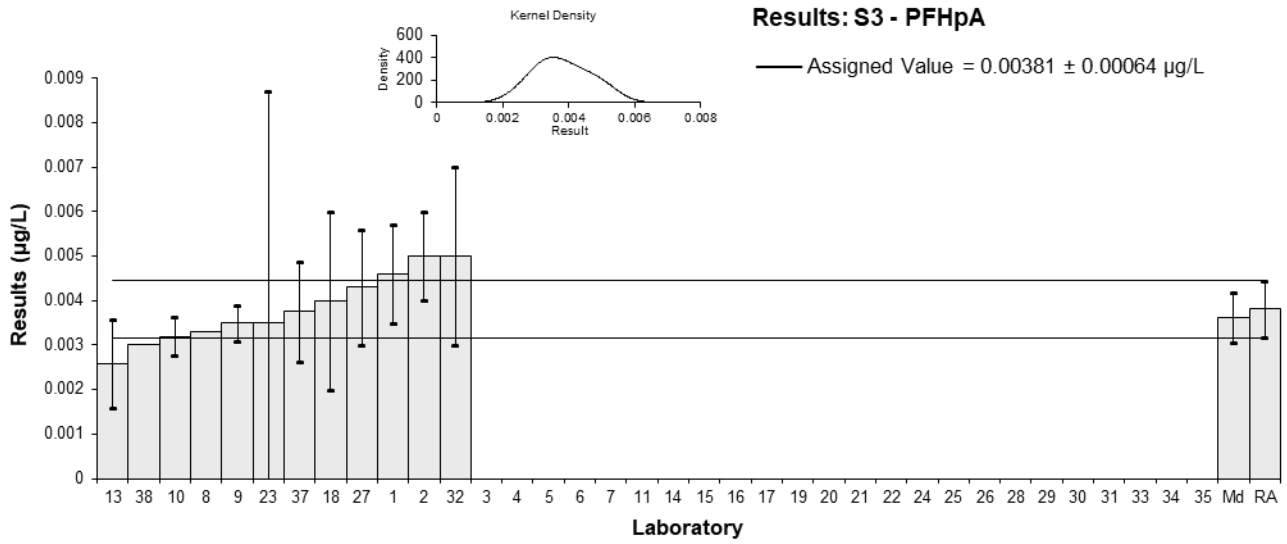
Sample No.	S3
Matrix	Water
Analyte	PFHpA
Unit	µg/L

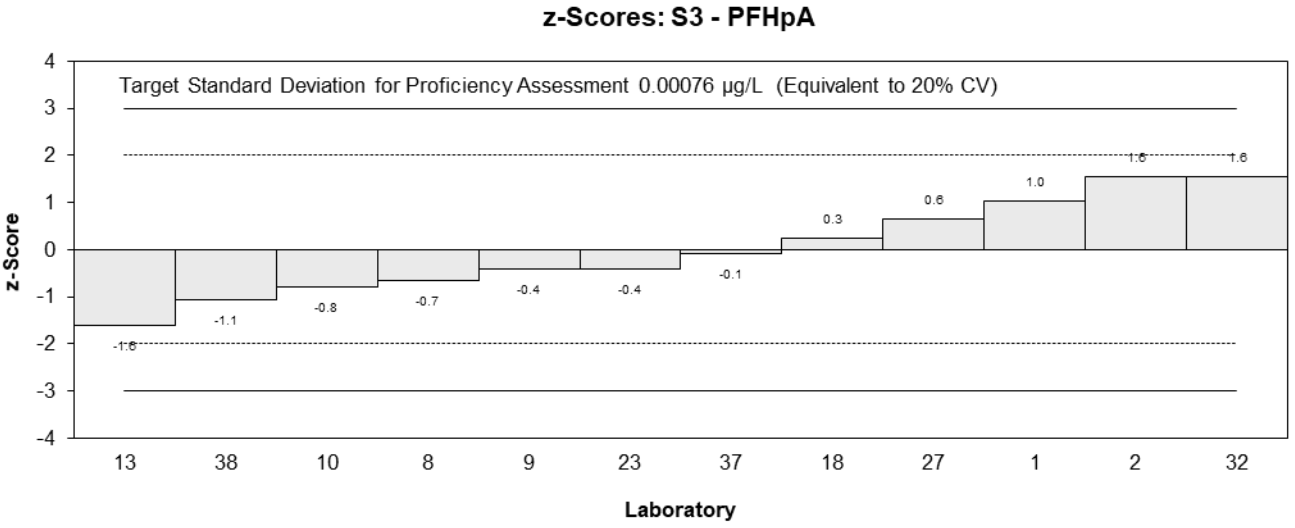
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0046	0.0011	87.35	1.04	0.62
2	0.005	0.001	NR	1.56	1.00
3	<0.01	NR	101		
4	NT	NT	NT		
5	NR	NR	NR		
6	< 0.01	NR	99		
7	NS	NS	NS		
8	0.0033	NR	82	-0.67	-0.80
9	0.0035	0.0004	NT	-0.41	-0.41
10	0.0032	0.00044	97	-0.80	-0.79
11	<0.01	NR	81		
13	0.00259	0.001	50	-1.60	-1.03
14	<0.01	NR	64		
15	NS	NS	NS		
16	NR	NR	NR		
17	NS	NS	NS		
18	0.004	0.002	91	0.25	0.09
19	<0.02	NR	69		
20	<0.0201	0.00282	87.5		
21	NS	NS	NS		
22	<0.005	NR	188		
23	0.0035	0.005215	59.88	-0.41	-0.06
24	< 0.02	0.01	99		
25	NR	NR	NR		
26	<0.01	NR	95		
27	0.0043	0.00129	93	0.64	0.34
28	<0.002	NR	136		
29	NR	NR	111.8		
30	NS	NS	NS		
31	<0.2	NR	96.19		
32	0.0050	0.0020	140	1.56	0.57
33	< 0.001	NR	58		
34	NR	NR	95		
35	<0.02	NR	95		
37	0.00375	0.001125	100	-0.08	-0.05
38	0.003	NR	NR	-1.06	-1.27

Statistics

Assigned Value	0.00381	0.00064
Spike Value	Not Spiked	
Robust Average	0.00381	0.00064
Median	0.00363	0.00056
Mean	0.00381	
N	12	
Max	0.005	
Min	0.00259	
Robust SD	0.00089	
Robust CV	23%	


Results: S3 - PFHpA
Assigned Value = 0.00381 ± 0.00064 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
13 38 10 8 9 23 37 18 27 1 2 32 3 4 5 6 7 11 14 15 16 17 19 20 21 22 24 25 26 28 29 30 31 33 34 35 Md RA


z-Scores: S3 - PFHpA
Target Standard Deviation for Proficiency Assessment 0.00076 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
13 38 10 8 9 23 37 18 27 1 2 32
-1.6 -1.1 -0.8 -0.7 -0.4 -0.4 -0.1 0.3 0.6 1.0 1.6 1.6

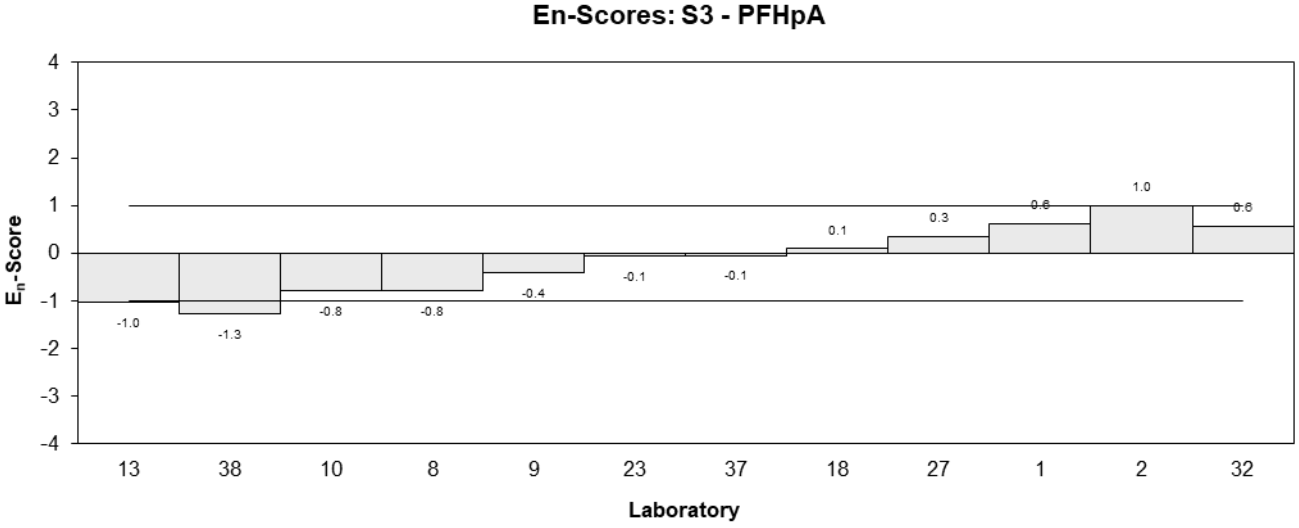

En-Scores: S3 - PFHpA
En-Score
Laboratory
13 38 10 8 9 23 37 18 27 1 2 32
-1.0 -1.3 -0.8 -0.8 -0.4 -0.1 -0.1 0.1 0.3 0.6 1.0 0.6

Figure 56

Table 60

Sample Details

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

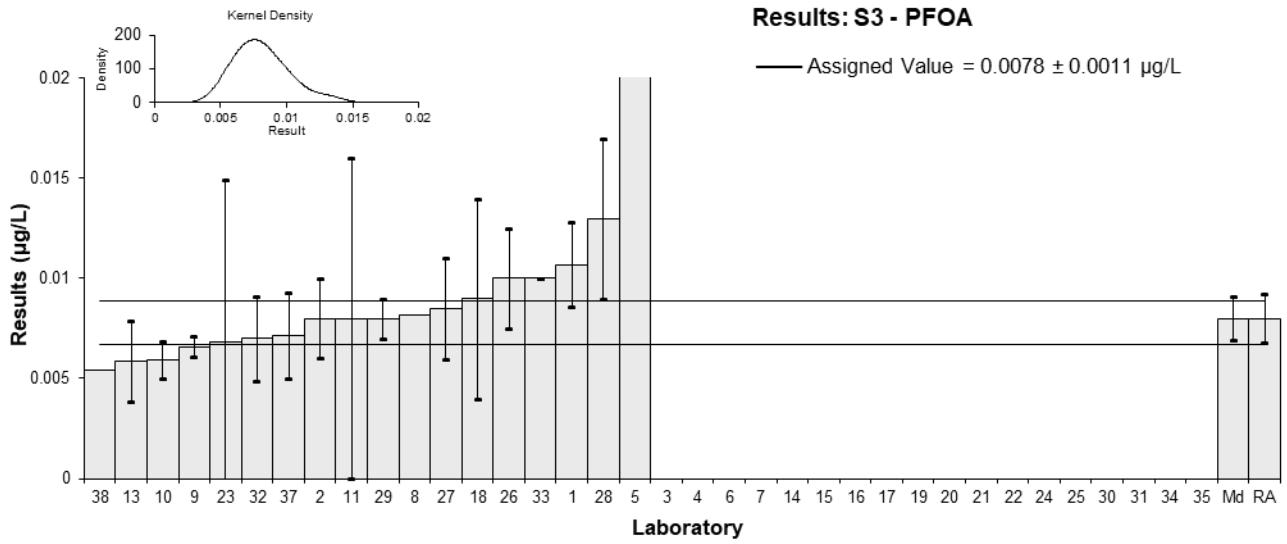
Participant Results

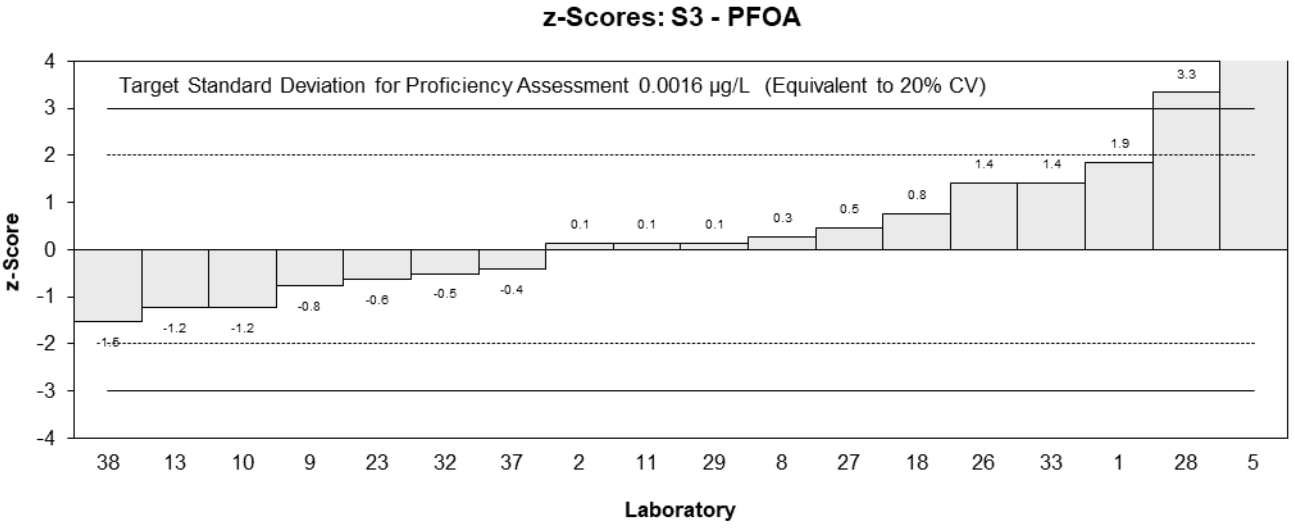
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0107	0.0021	71.9	1.86	1.22
2	0.008	0.002	101	0.13	0.09
3	<0.01	NR	102		
4	NT	NT	NT		
5**	9.66497	1.80930389875	NR	6,190.49	5.34
6	< 0.01	NR	102		
7	NS	NS	NS		
8	0.0082	NR	84	0.26	0.36
9	0.0066	0.0005	88	-0.77	-0.99
10	0.0059	0.00093	97	-1.22	-1.32
11	0.0080	0.0080	78	0.13	0.02
13	0.00586	0.002	101	-1.24	-0.85
14	<0.01	NR	65		
15	NS	NS	NS		
16	NR	NR	NR		
17	NS	NS	NS		
18	0.009	0.005	106	0.77	0.23
19	<0.01	NR	107		
20	<0.0201	0.00322	85.9		
21	NS	NS	NS		
22	<0.005	NR	197		
23	0.0068	0.0081	78.54	-0.64	-0.12
24	< 0.03	0.03	94		
25	NR	NR	NR		
26	0.01	0.0025	93	1.41	0.81
27	0.0085	0.00255	80	0.45	0.25
28*	0.013	0.004	105	3.33	1.25
29	0.008	0.001	116	0.13	0.13
30	NS	NS	NS		
31	<0.01	NR	112.12		
32	0.0070	0.0021	129	-0.51	-0.34
33	0.01	0	74	1.41	2.00
34	NR	NR	98		
35	<0.01	NR	99		
37	0.00715	0.002145	104	-0.42	-0.27
38	0.0054	NR	NR	-1.54	-2.18

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.0078	0.0011
Spike Value	Not Spiked	
Robust Average	0.0080	0.0012
Median	0.00800	0.0011
Mean	0.00812	
N	17	
Max	0.013	
Min	0.0054	
Robust SD	0.0019	
Robust CV	24%	


Results: S3 - PFOA
Assigned Value = 0.0078 ± 0.0011 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
38 13 10 9 23 32 37 2 11 29 8 27 18 26 33 1 28 5 3 4 6 7 14 15 16 17 19 20 21 22 24 25 30 31 34 35 Md RA


z-Scores: S3 - PFOA
Target Standard Deviation for Proficiency Assessment 0.0016 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
38 13 10 9 23 32 37 2 11 29 8 27 18 26 33 1 28 5

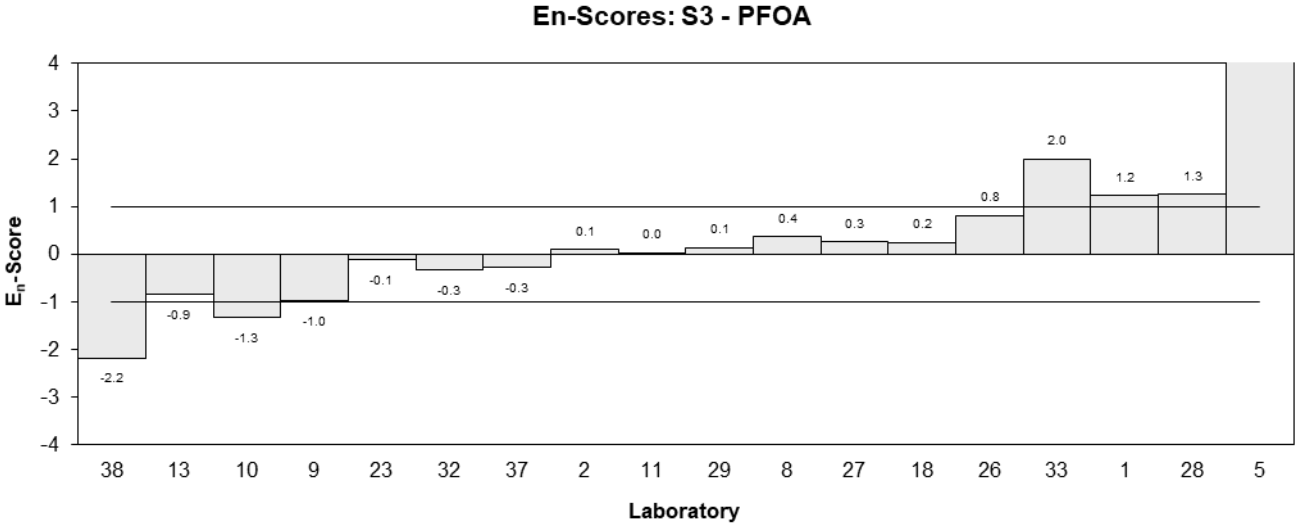

En-Scores: S3 - PFOA
En-Score
Laboratory
38 13 10 9 23 32 37 2 11 29 8 27 18 26 33 1 28 5

Figure 57

Table 61

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFBS
Unit	µg/L

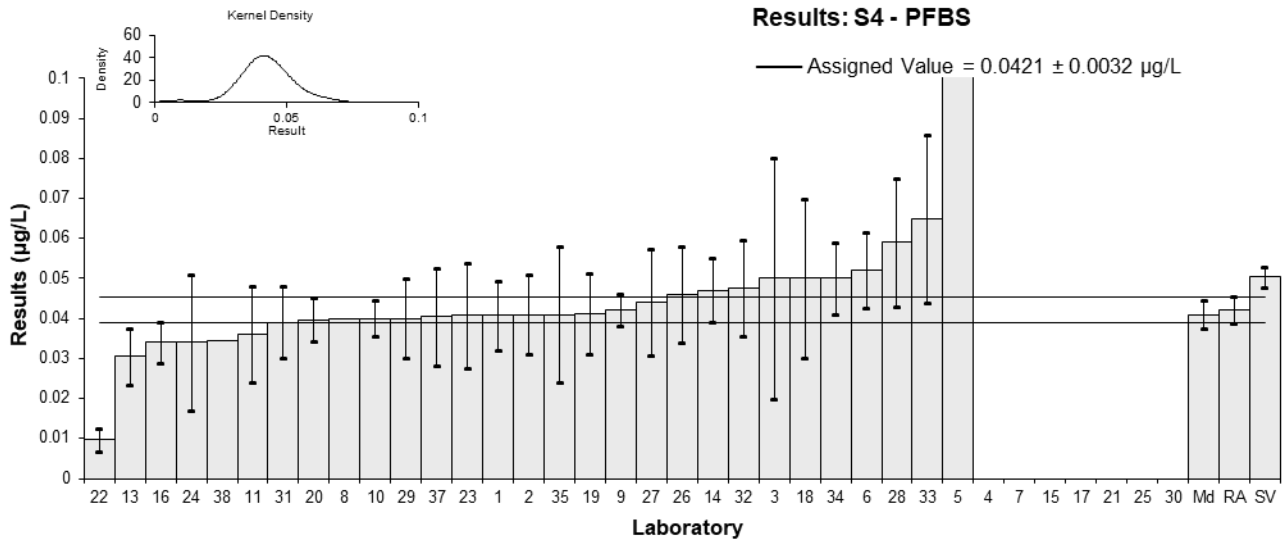
Participant Results

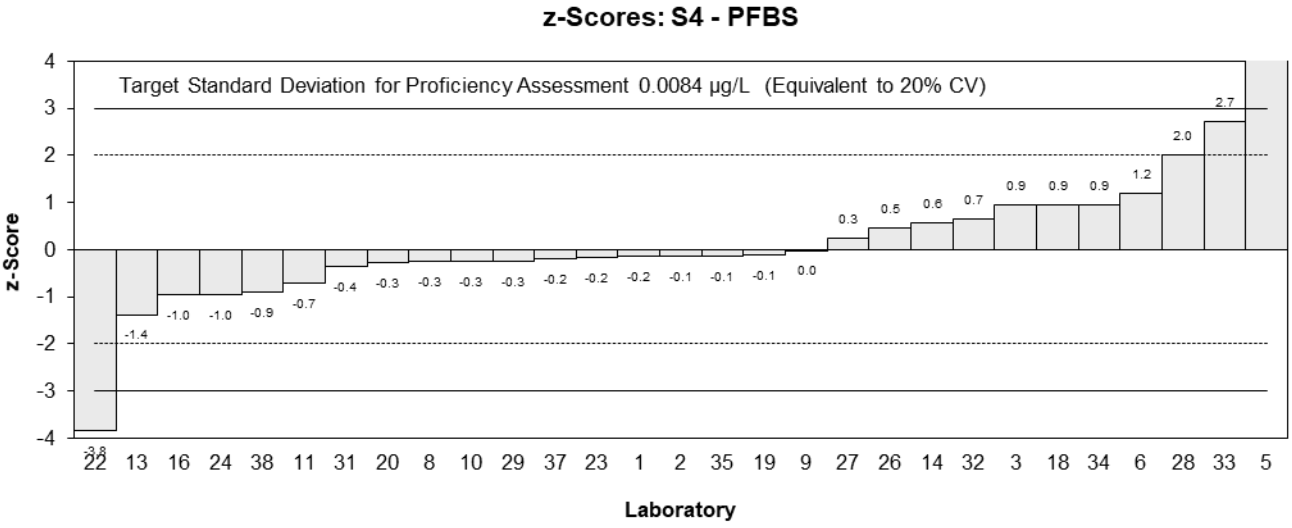
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0408	0.0086	112.2	-0.15	-0.14
2	0.041	0.01	NR	-0.13	-0.10
3	0.05	0.03	86	0.94	0.26
4	NT	NT	NT		
5**	28.3378116666	8.18481092124	NR	3,360.54	3.46
6	0.0522	0.00945	94	1.20	1.01
7	NS	NS	NS		
8	0.040	NR	84	-0.25	-0.66
9	0.042	0.004	86	-0.01	-0.02
10	0.040	0.0044	103	-0.25	-0.39
11	0.036	0.012	83	-0.72	-0.49
13	0.0305	0.007	104	-1.38	-1.51
14	0.047	0.008	126	0.58	0.57
15	NS	NS	NS		
16	0.034	0.0051	126	-0.96	-1.35
17	NS	NS	NS		
18	0.05	0.02	74	0.94	0.39
19	0.0412	0.01	117	-0.11	-0.09
20	0.0397	0.00556	88.7	-0.29	-0.37
21	NS	NS	NS		
22*	0.00973	0.00292	208	-3.84	-7.47
23	0.0407	0.013	99.48	-0.17	-0.10
24	0.034	0.017	100	-0.96	-0.47
25	NR	NR	NR		
26	0.046	0.012	98	0.46	0.31
27	0.0442	0.0133	104	0.25	0.15
28	0.059	0.016	137	2.01	1.04
29	0.040	0.010	117.6	-0.25	-0.20
30	NS	NS	NS		
31	0.039	0.009	108.13	-0.37	-0.32
32	0.0476	0.0119	80	0.65	0.45
33*	0.065	0.021	77	2.72	1.08
34	0.05	0.009	92	0.94	0.83
35	0.041	0.017	95	-0.13	-0.06
37	0.0404	0.01212	102	-0.20	-0.14
38	0.0344	NR	NR	-0.91	-2.41

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.0421	0.0032
Spike Value	0.0504	0.0025
Robust Average	0.0421	0.0034
Median	0.0409	0.0035
Mean	0.0420	
N	28	
Max	0.065	
Min	0.00973	
Robust SD	0.0072	
Robust CV	17%	


Results: S4 - PFBS
Kernel Density
Density
Result
Assigned Value = 0.0421 ± 0.0032 µg/L
Results (µg/L)
Laboratory
22 13 16 24 38 11 31 20 8 10 29 37 23 1 2 35 19 9 27 26 14 32 3 18 34 6 28 33 5 4 7 15 17 21 25 30 Md RA SV


z-Scores: S4 - PFBS
Target Standard Deviation for Proficiency Assessment 0.0084 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 13 16 24 38 11 31 20 8 10 29 37 23 1 2 35 19 9 27 26 14 32 3 18 34 6 28 33 5

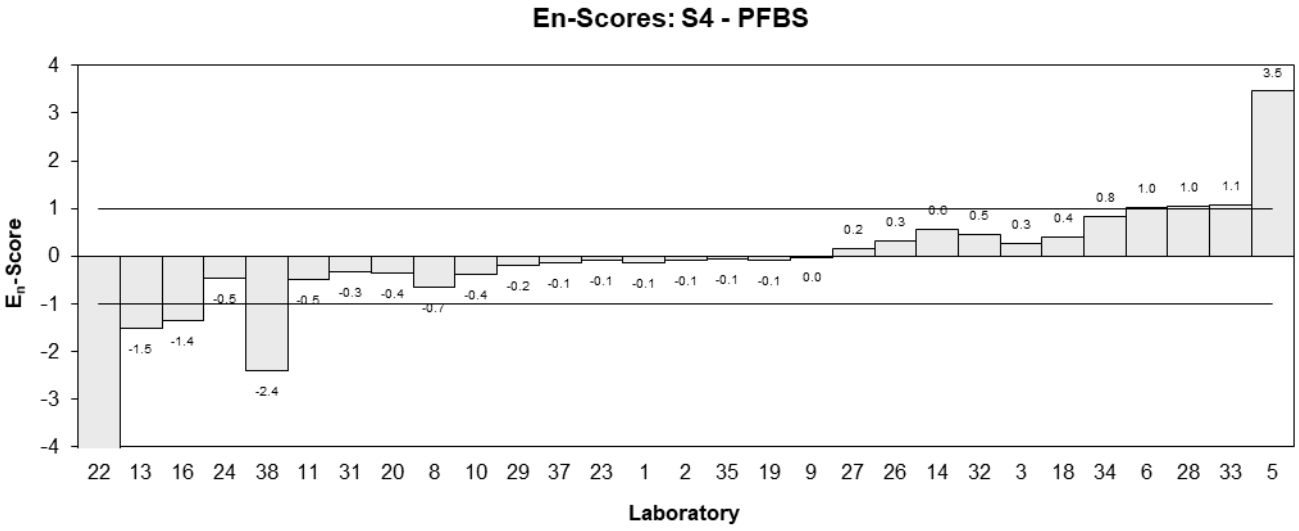

En-Scores: S4 - PFBS
En-Score
Laboratory
22 13 16 24 38 11 31 20 8 10 29 37 23 1 2 35 19 9 27 26 14 32 3 18 34 6 28 33 5

Figure 58

Table 62

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFPeS
Unit	µg/L

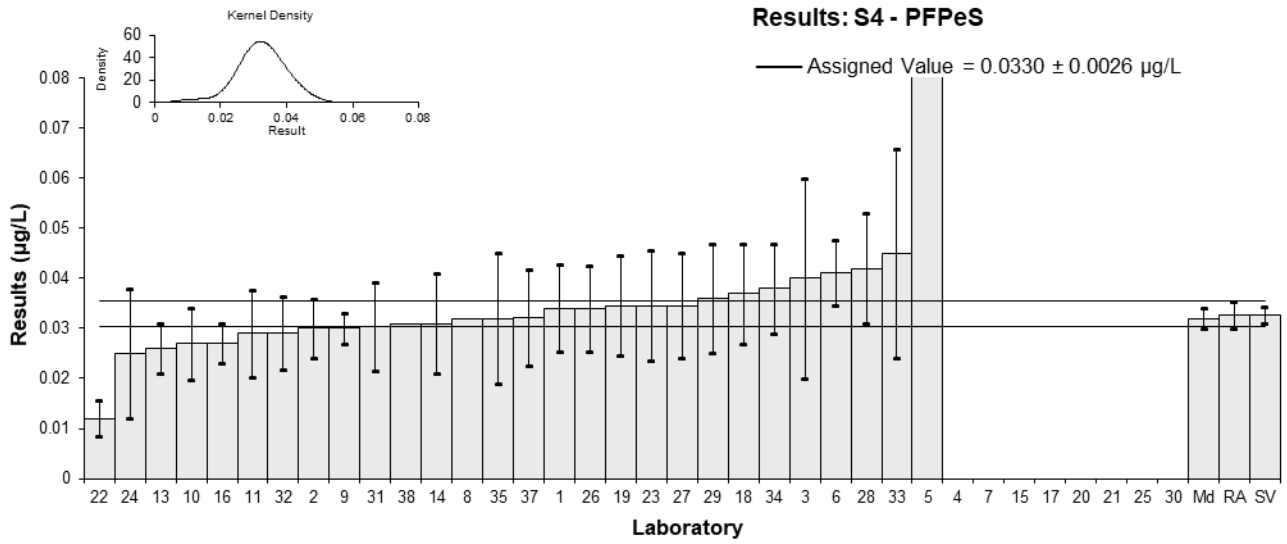
Participant Results

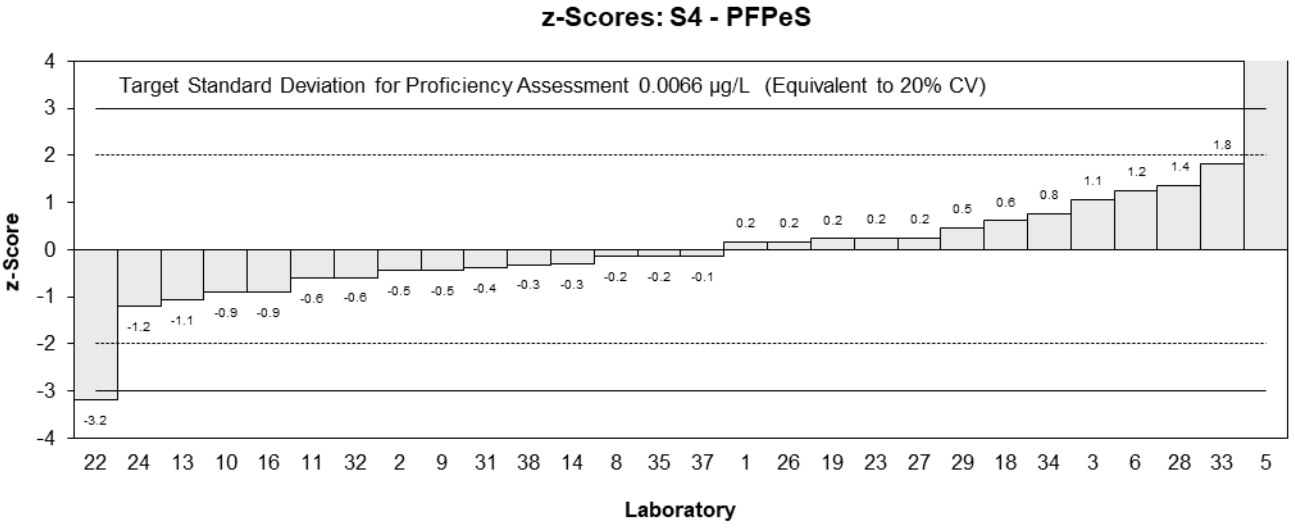
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0340	0.0087	103.88	0.15	0.11
2	0.030	0.006	NR	-0.45	-0.46
3	0.04	0.02	88	1.06	0.35
4	NT	NT	NT		
5**	42.846485	3.77234663008	NR	6,486.89	11.35
6	0.0412	0.00656	94	1.24	1.16
7	NS	NS	NS		
8	0.032	NR	87	-0.15	-0.38
9	0.030	0.003	NT	-0.45	-0.76
10	0.027	0.0072	107	-0.91	-0.78
11	0.029	0.0087	85	-0.61	-0.44
13	0.026	0.005	NR	-1.06	-1.24
14	0.031	0.010	120	-0.30	-0.19
15	NS	NS	NS		
16	0.027	0.0040	126	-0.91	-1.26
17	NS	NS	NS		
18	0.037	0.01	106	0.61	0.39
19	0.0345	0.01	117	0.23	0.15
20	<0.0367	0.00514	87.7		
21	NS	NS	NS		
22*	0.012	0.0036	208	-3.18	-4.73
23	0.0346	0.011	83.76	0.24	0.14
24	0.025	0.013	NR	-1.21	-0.60
25	NR	NR	NR		
26	0.034	0.0085	100	0.15	0.11
27	0.0346	0.0104	NR	0.24	0.15
28	0.042	0.011	NR	1.36	0.80
29	0.036	0.011	NR	0.45	0.27
30	NS	NS	NS		
31	0.0304	0.0089	108.5	-0.39	-0.28
32	0.0291	0.0073	79	-0.59	-0.50
33	0.045	0.021	71	1.82	0.57
34	0.038	0.009	92	0.76	0.53
35	0.032	0.013	93	-0.15	-0.08
37	0.0321	0.00963	103	-0.14	-0.09
38	0.0309	NR	NR	-0.32	-0.81

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.0330	0.0026
Spike Value	0.0327	0.0016
Robust Average	0.0326	0.0027
Median	0.0320	0.0021
Mean	0.0324	
N	27	
Max	0.045	
Min	0.012	
Robust SD	0.0055	
Robust CV	17%	


Results: S4 - PFPeS
Assigned Value = 0.0330 ± 0.0026 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
22 24 13 10 16 11 32 2 9 31 38 14 8 35 37 1 26 19 23 27 29 18 34 3 6 28 33 5 4 7 15 17 20 21 25 30 Md RA SV


z-Scores: S4 - PFPeS
Target Standard Deviation for Proficiency Assessment 0.0066 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 24 13 10 16 11 32 2 9 31 38 14 8 35 37 1 26 19 23 27 29 18 34 3 6 28 33 5

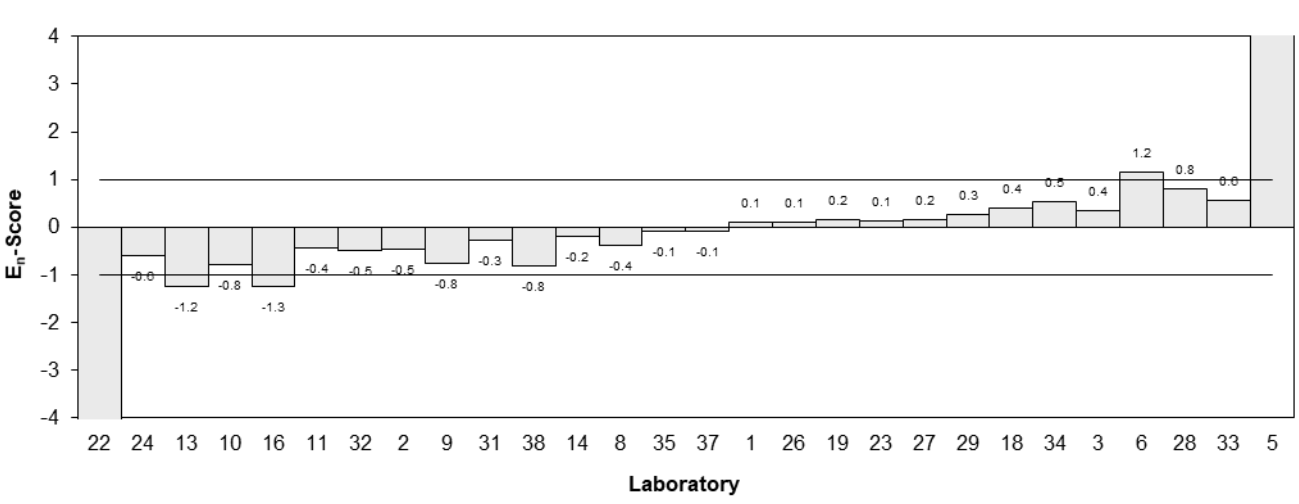

En-Scores: S4 - PFPeS
En-Score
Laboratory
22 24 13 10 16 11 32 2 9 31 38 14 8 35 37 1 26 19 23 27 29 18 34 3 6 28 33 5

Figure 59

Table 63

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFHxS
Unit	µg/L

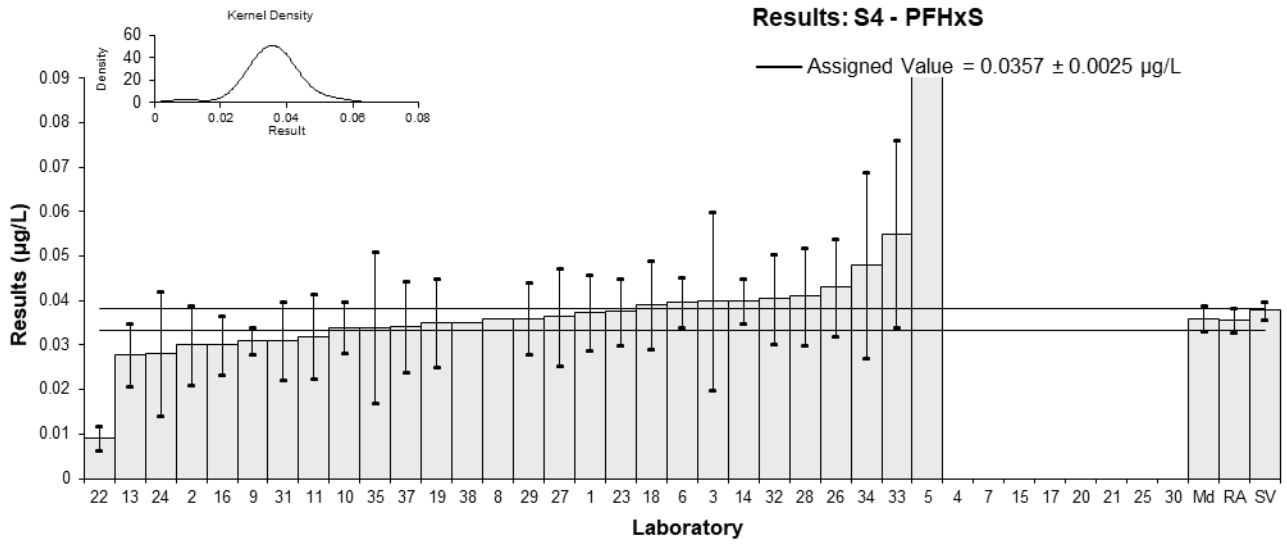
Participant Results

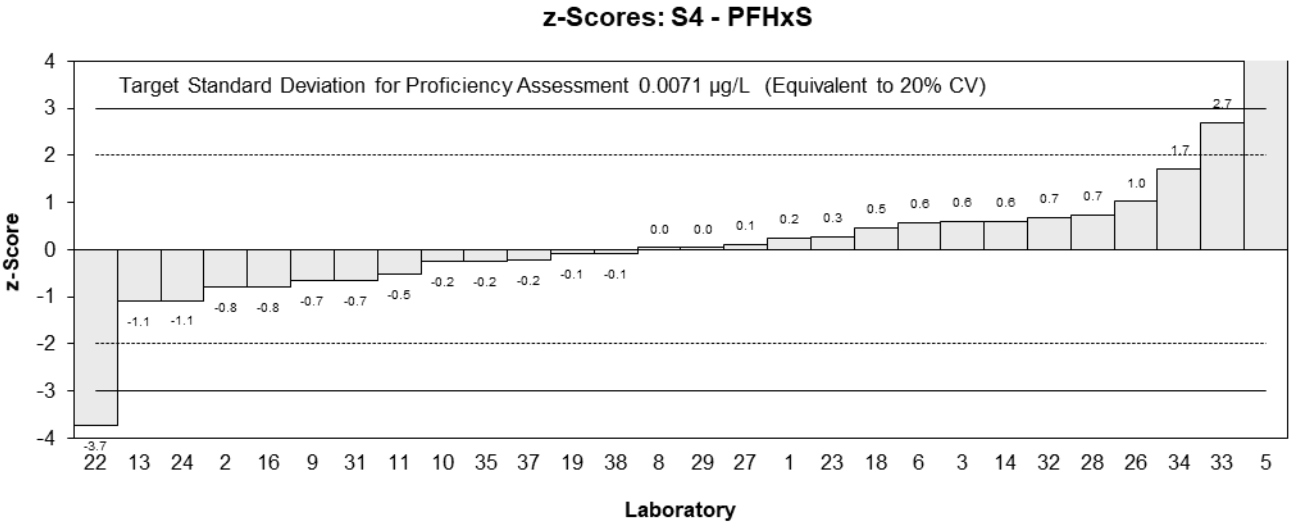
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0374	0.0085	103.88	0.24	0.19
2	0.03	0.009	97	-0.80	-0.61
3	0.04	0.02	88	0.60	0.21
4	NT	NT	NT		
5**	14.50722	14.1441022995	NR	2,026.82	1.02
6	0.0397	0.00567	102	0.56	0.65
7	NS	NS	NS		
8	0.036	NR	87	0.04	0.12
9	0.031	0.003	NT	-0.66	-1.20
10	0.034	0.0057	95	-0.24	-0.27
11	0.032	0.0096	96	-0.52	-0.37
13	0.0279	0.007	114	-1.09	-1.05
14	0.04	0.005	120	0.60	0.77
15	NS	NS	NS		
16	0.030	0.0065	126	-0.80	-0.82
17	NS	NS	NS		
18	0.039	0.01	106	0.46	0.32
19	0.0351	0.01	114	-0.08	-0.06
20	<0.0365	0.00511	87.7		
21	NS	NS	NS		
22*	0.00904	0.00271	190	-3.73	-7.23
23	0.0376	0.0075	83.76	0.27	0.24
24	0.028	0.014	104	-1.08	-0.54
25	NR	NR	NR		
26	0.043	0.011	95	1.02	0.65
27	0.0364	0.0109	106	0.10	0.06
28	0.041	0.011	133	0.74	0.47
29	0.036	0.008	112	0.04	0.04
30	NS	NS	NS		
31	0.031	0.0088	108.5	-0.66	-0.51
32	0.0405	0.0101	79	0.67	0.46
33*	0.055	0.021	71	2.70	0.91
34	0.048	0.021	92	1.72	0.58
35	0.034	0.017	93	-0.24	-0.10
37	0.0341	0.01023	103	-0.22	-0.15
38	0.0351	NR	NR	-0.08	-0.24

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.0357	0.0025
Spike Value	0.0378	0.0019
Robust Average	0.0357	0.0027
Median	0.0360	0.0029
Mean	0.0356	
N	27	
Max	0.055	
Min	0.00904	
Robust SD	0.0056	
Robust CV	16%	


Results: S4 - PFHxS
Assigned Value = 0.0357 ± 0.0025 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
22 13 24 2 16 9 31 11 10 35 37 19 38 8 29 27 1 23 18 6 3 14 32 28 26 34 33 5 4 7 15 17 20 21 25 30 Md RA SV


z-Scores: S4 - PFHxS
Target Standard Deviation for Proficiency Assessment 0.0071 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 13 24 2 16 9 31 11 10 35 37 19 38 8 29 27 1 23 18 6 3 14 32 28 26 34 33 5

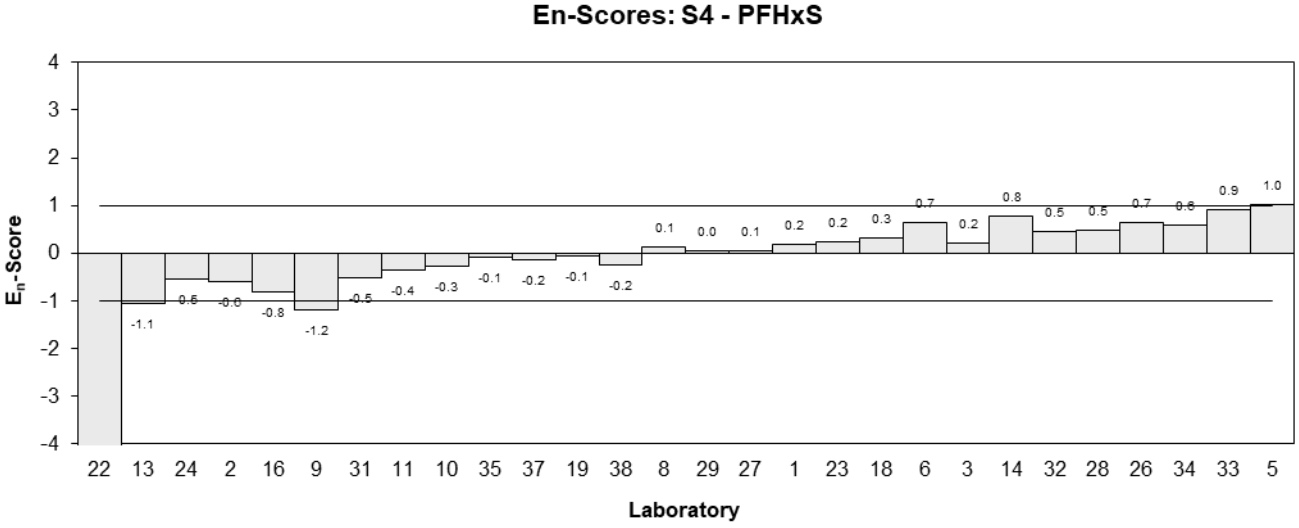

En-Scores: S4 - PFHxS
En-Score
Laboratory
22 13 24 2 16 9 31 11 10 35 37 19 38 8 29 27 1 23 18 6 3 14 32 28 26 34 33 5

Figure 60

Table 64

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFHxS_L
Unit	µg/L

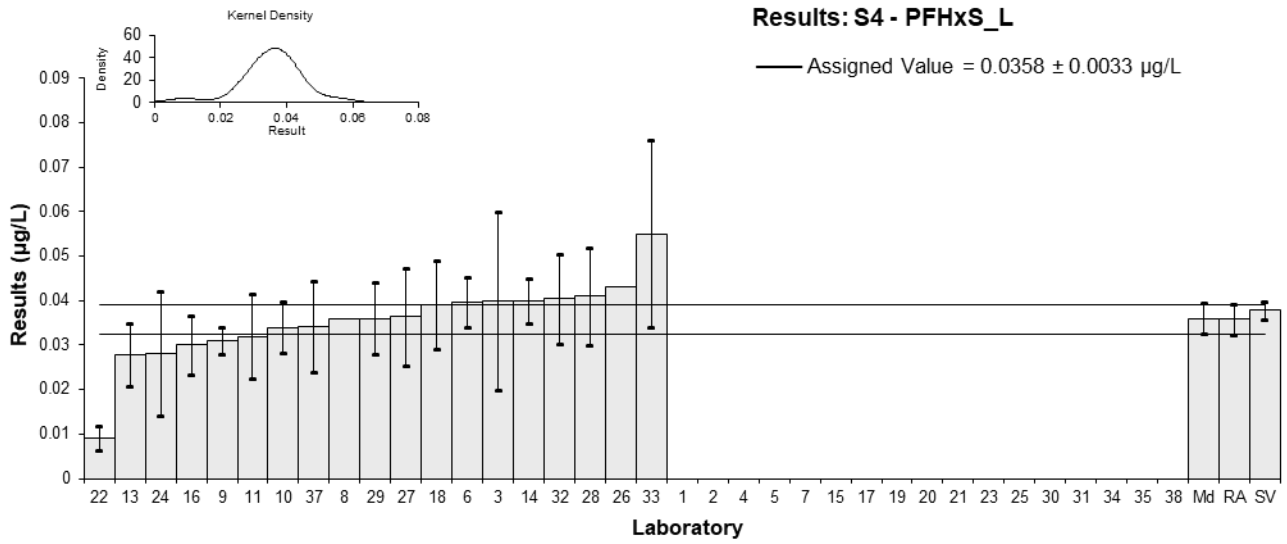
Participant Results

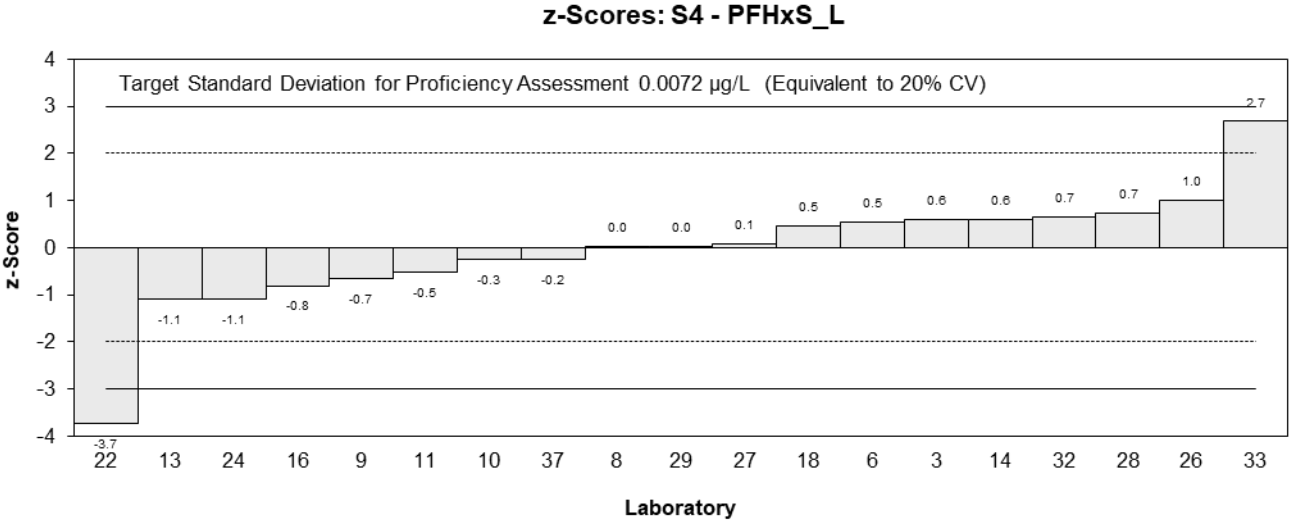
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NT	NT	NT		
3	0.04	0.02	88	0.59	0.21
4	NT	NT	NT		
5	NR	NR	NR		
6	0.0397	0.00567	102	0.54	0.59
7	NS	NS	NS		
8	0.036	NR	87	0.03	0.06
9	0.031	0.003	NT	-0.67	-1.08
10	0.034	0.0057	95	-0.25	-0.27
11	0.032	0.0096	96	-0.53	-0.37
13	0.0279	0.007	NR	-1.10	-1.02
14	0.04	0.005	120	0.59	0.70
15	NS	NS	NS		
16	0.030	0.0065	126	-0.81	-0.80
17	NS	NS	NS		
18	0.039	0.01	106	0.45	0.30
19	NT	NT	NT		
20	<0.0365	0.00511	87.7		
21	NS	NS	NS		
22*	0.00904	0.00271	190	-3.74	-6.27
23	NT	NT	NT		
24	0.028	0.014	NR	-1.09	-0.54
25	NR	NR	NR		
26	0.043	NR	85	1.01	2.18
27	0.0364	0.0109	106	0.08	0.05
28	0.041	0.011	NR	0.73	0.45
29	0.036	0.008	112	0.03	0.02
30	NS	NS	NS		
31	NT	NT	NT		
32	0.0405	0.0101	79	0.66	0.44
33*	0.055	0.021	71	2.68	0.90
34	NR	NR	NR		
35	NT	NT	NT		
37	0.0341	0.01023	103	-0.24	-0.16
38	NR	NR	NR		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0358	0.0033
Spike Value	0.0378	0.0019
Robust Average	0.0358	0.0035
Median	0.0360	0.0034
Mean	0.0354	
N	19	
Max	0.055	
Min	0.00904	
Robust SD	0.0062	
Robust CV	17%	


Results: S4 - PFHxS_L
Assigned Value = 0.0358 ± 0.0033 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
22 13 24 16 9 11 10 37 8 29 27 18 6 3 14 32 28 26 33 1 2 4 5 7 15 17 19 20 21 23 25 30 31 34 35 38 Md RA SV


z-Scores: S4 - PFHxS_L
Target Standard Deviation for Proficiency Assessment 0.0072 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 13 24 16 9 11 10 37 8 29 27 18 6 3 14 32 28 26 33
-3.7 -1.1 -1.1 -0.8 -0.7 -0.5 -0.3 -0.2 0.0 0.0 0.1 0.5 0.5 0.6 0.6 0.7 0.7 1.0 2.7

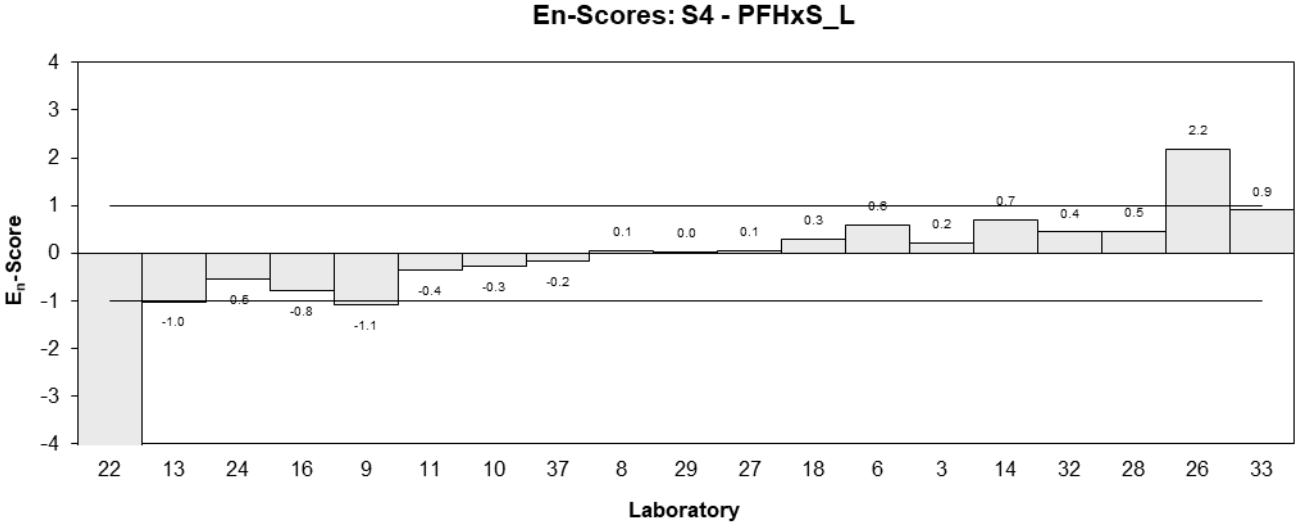

En-Scores: S4 - PFHxS_L
En-Score
Laboratory
22 13 24 16 9 11 10 37 8 29 27 18 6 3 14 32 28 26 33
-1.0 -0.6 -0.8 -1.1 -0.4 -0.3 -0.2 0.1 0.0 0.1 0.3 0.6 0.2 0.7 0.4 0.5 2.2 0.9

Figure 61

Table 65

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFHpS
Unit	µg/L

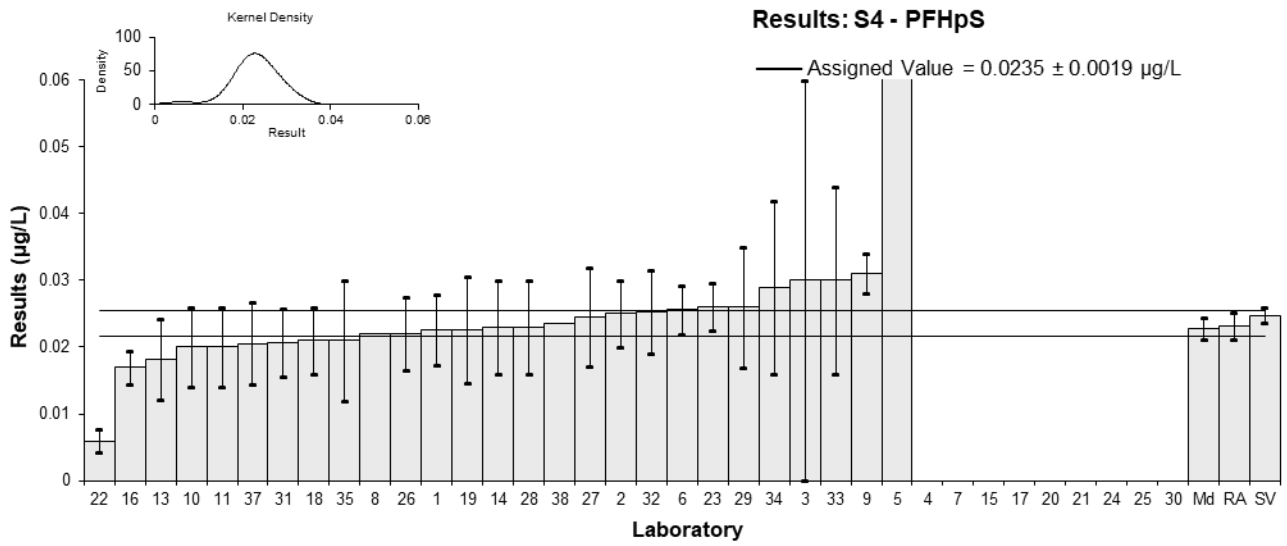
Participant Results

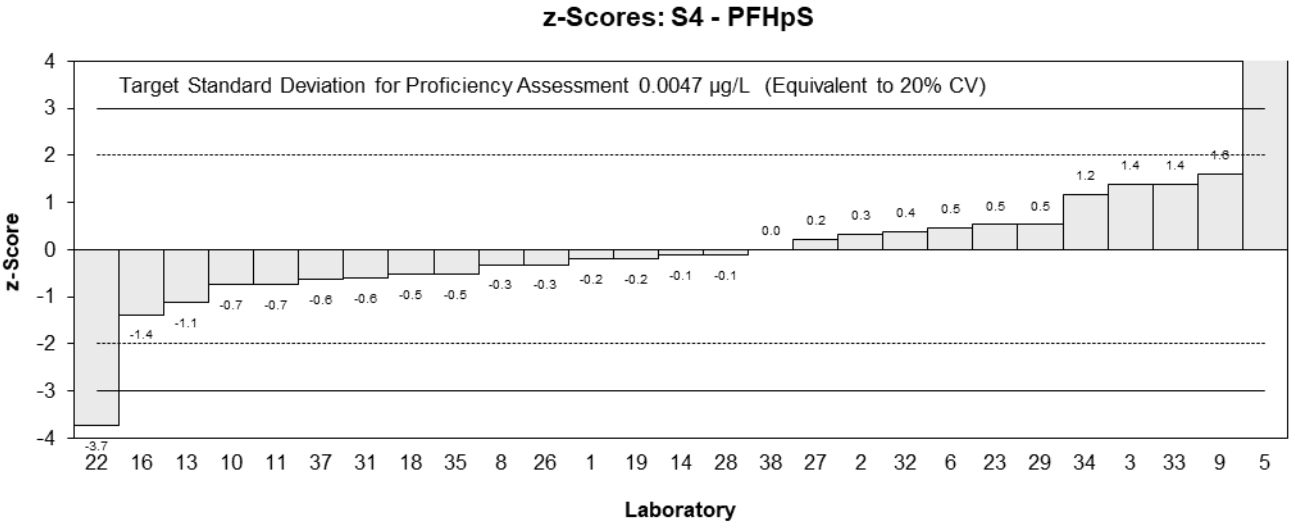
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0226	0.0052	103.88	-0.19	-0.16
2	0.025	0.005	NR	0.32	0.28
3	0.03	0.03	88	1.38	0.22
4	NT	NT	NT		
5**	29.6249583333	1.30911883007	NR	6,298.18	22.61
6	0.0256	0.00371	98	0.45	0.50
7	NS	NS	NS		
8	0.022	NR	87	-0.32	-0.79
9	0.031	0.003	NT	1.60	2.11
10	0.020	0.0060	95	-0.74	-0.56
11	0.020	0.0060	88	-0.74	-0.56
13	0.0182	0.006	NR	-1.13	-0.84
14	0.023	0.007	116	-0.11	-0.07
15	NS	NS	NS		
16	0.017	0.0025	124	-1.38	-2.07
17	NS	NS	NS		
18	0.021	0.005	106	-0.53	-0.47
19	0.0226	0.008	111	-0.19	-0.11
20	<0.0365	0.00584	90.5		
21	NS	NS	NS		
22*	0.00592	0.00178	190	-3.74	-6.75
23	0.026	0.0036	83.76	0.53	0.61
24	< 0.02	0.01	NR		
25	NR	NR	NR		
26	0.022	0.0055	102	-0.32	-0.26
27	0.0245	0.0074	NR	0.21	0.13
28	0.023	0.007	NR	-0.11	-0.07
29	0.026	0.009	NR	0.53	0.27
30	NS	NS	NS		
31	0.0207	0.0051	109.77	-0.60	-0.51
32	0.0253	0.0063	79	0.38	0.27
33	0.03	0.014	71	1.38	0.46
34	0.029	0.013	92	1.17	0.42
35	0.021	0.009	93	-0.53	-0.27
37	0.0205	0.00615	107	-0.64	-0.47
38	0.0235	NR	NR	0.00	0.00

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.0235	0.0019
Spike Value	0.0248	0.0012
Robust Average	0.0232	0.0020
Median	0.0228	0.0017
Mean	0.0229	
N	26	
Max	0.031	
Min	0.00592	
Robust SD	0.0041	
Robust CV	18%	


Results: S4 - PFHpS
Kernel Density
Density
Result
Assigned Value = 0.0235 ± 0.0019 µg/L
Results (µg/L)
Laboratory
22 16 13 10 11 37 31 18 35 8 26 1 19 14 28 38 27 2 32 6 23 29 34 3 33 9 5 4 7 15 17 20 21 24 25 30 Md RA SV


z-Scores: S4 - PFHpS
Target Standard Deviation for Proficiency Assessment 0.0047 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 16 13 10 11 37 31 18 35 8 26 1 19 14 28 38 27 2 32 6 23 29 34 3 33 9 5

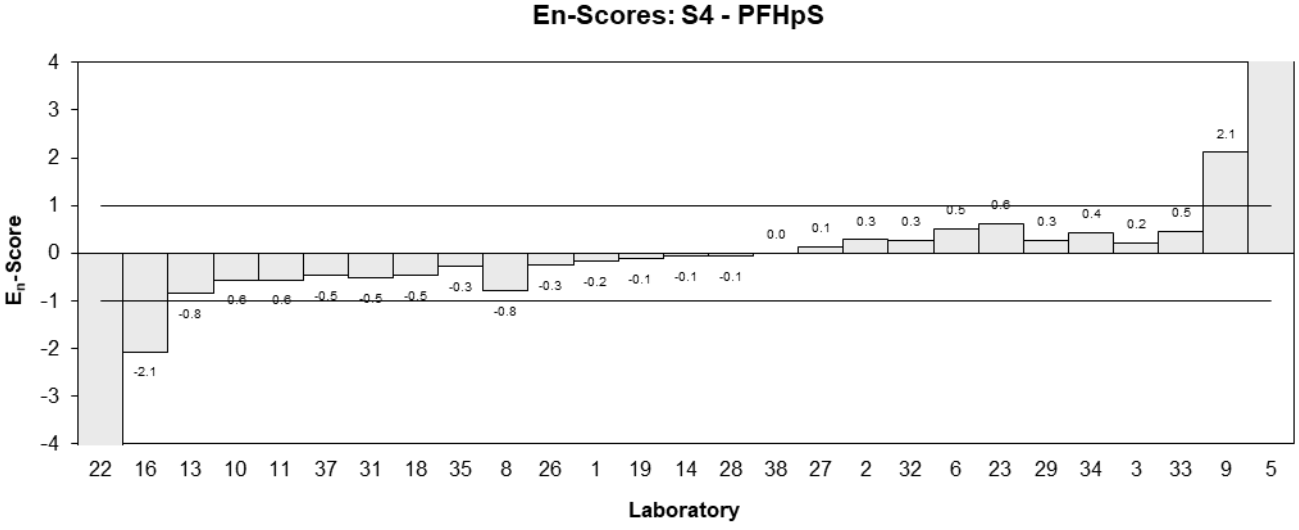

En-Scores: S4 - PFHpS
En-Score
Laboratory
22 16 13 10 11 37 31 18 35 8 26 1 19 14 28 38 27 2 32 6 23 29 34 3 33 9 5

Figure 62

Table 66

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFOS
Unit	µg/L

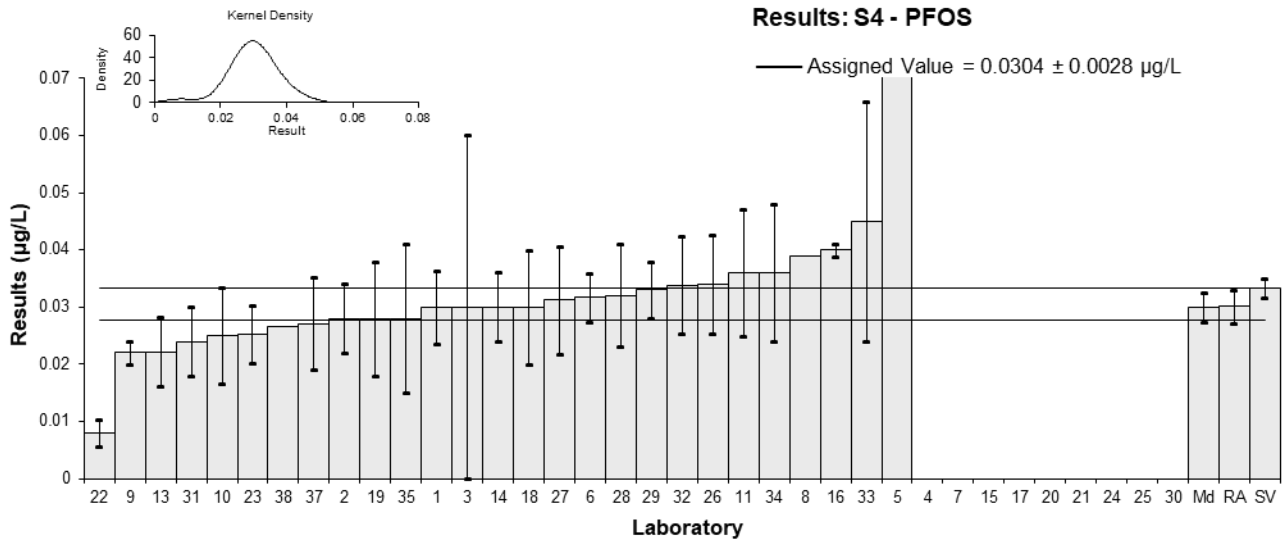
Participant Results

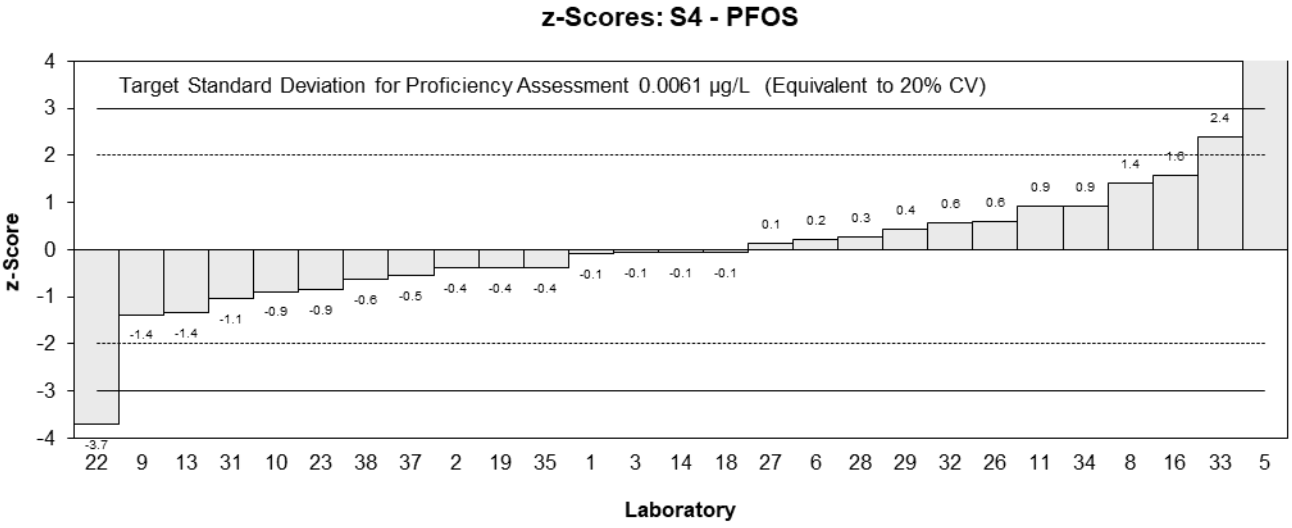
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0299	0.0064	99.48	-0.08	-0.07
2	0.028	0.006	NR	-0.39	-0.36
3	0.03	0.03	88	-0.07	-0.01
4	NT	NT	NT		
5**	12.3720766666	3.25601531209	NR	2,029.88	3.79
6	0.0317	0.00427	98	0.21	0.25
7	NS	NS	NS		
8	0.039	NR	83	1.41	3.07
9	0.022	0.002	67	-1.38	-2.44
10	0.025	0.0084	98	-0.89	-0.61
11	0.036	0.011	85	0.92	0.49
13	0.0222	0.006	113	-1.35	-1.24
14	0.03	0.006	116	-0.07	-0.06
15	NS	NS	NS		
16	0.040	0.0011	124	1.58	3.19
17	NS	NS	NS		
18	0.030	0.01	99	-0.07	-0.04
19	0.028	0.01	111	-0.39	-0.23
20	<0.0365	0.0102	90.5		
21	NS	NS	NS		
22*	0.00788	0.00236	187	-3.70	-6.15
23	0.0252	0.00504	98.96	-0.86	-0.90
24	< 0.02	0.01	108		
25	NR	NR	NR		
26	0.034	0.0086	97	0.59	0.40
27	0.0312	0.0094	91	0.13	0.08
28	0.032	0.009	121	0.26	0.17
29	0.033	0.005	111	0.43	0.45
30	NS	NS	NS		
31	0.024	0.006	109.77	-1.05	-0.97
32	0.0338	0.0085	88	0.56	0.38
33	0.045	0.021	73	2.40	0.69
34	0.036	0.012	90	0.92	0.45
35	0.028	0.013	83	-0.39	-0.18
37	0.0271	0.00813	107	-0.54	-0.38
38	0.0266	NR	NR	-0.63	-1.36

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.0304	0.0028
Spike Value	0.0334	0.0017
Robust Average	0.0301	0.0029
Median	0.0300	0.0026
Mean	0.0298	
N	26	
Max	0.045	
Min	0.00788	
Robust SD	0.0059	
Robust CV	20%	


Results: S4 - PFOS
Assigned Value = 0.0304 ± 0.0028 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
22 9 13 31 10 23 38 37 2 19 35 1 3 14 18 27 6 28 29 32 26 11 34 8 16 33 5 4 7 15 17 20 21 24 25 30 Md RA SV


z-Scores: S4 - PFOS
Target Standard Deviation for Proficiency Assessment 0.0061 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 9 13 31 10 23 38 37 2 19 35 1 3 14 18 27 6 28 29 32 26 11 34 8 16 33 5

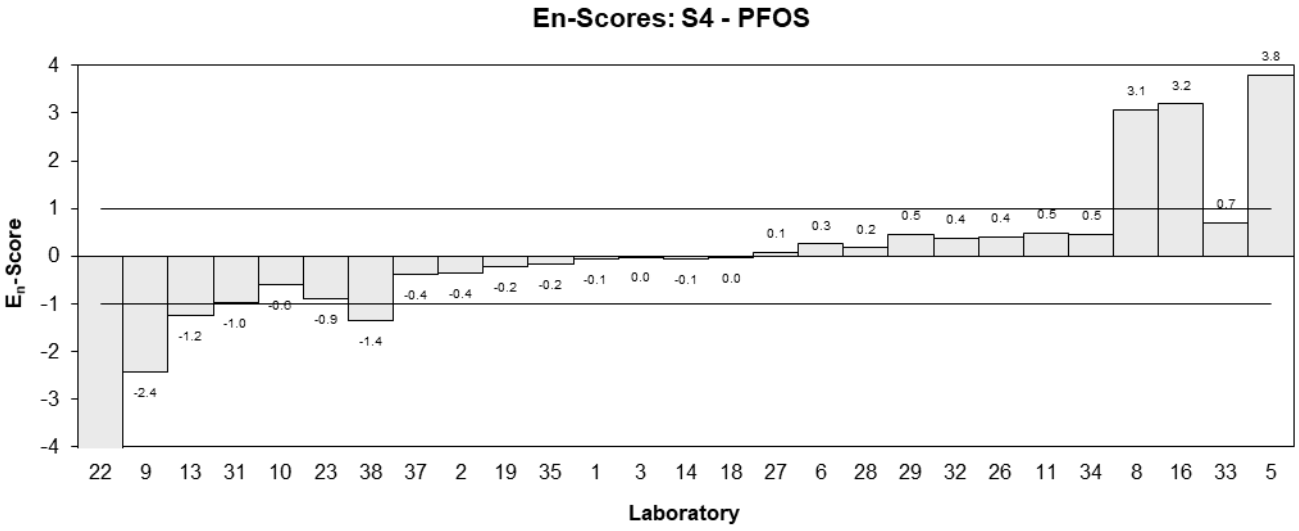

En-Scores: S4 - PFOS
En-Score
Laboratory
22 9 13 31 10 23 38 37 2 19 35 1 3 14 18 27 6 28 29 32 26 11 34 8 16 33 5

Figure 63

Table 67

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFOS_L
Unit	µg/L

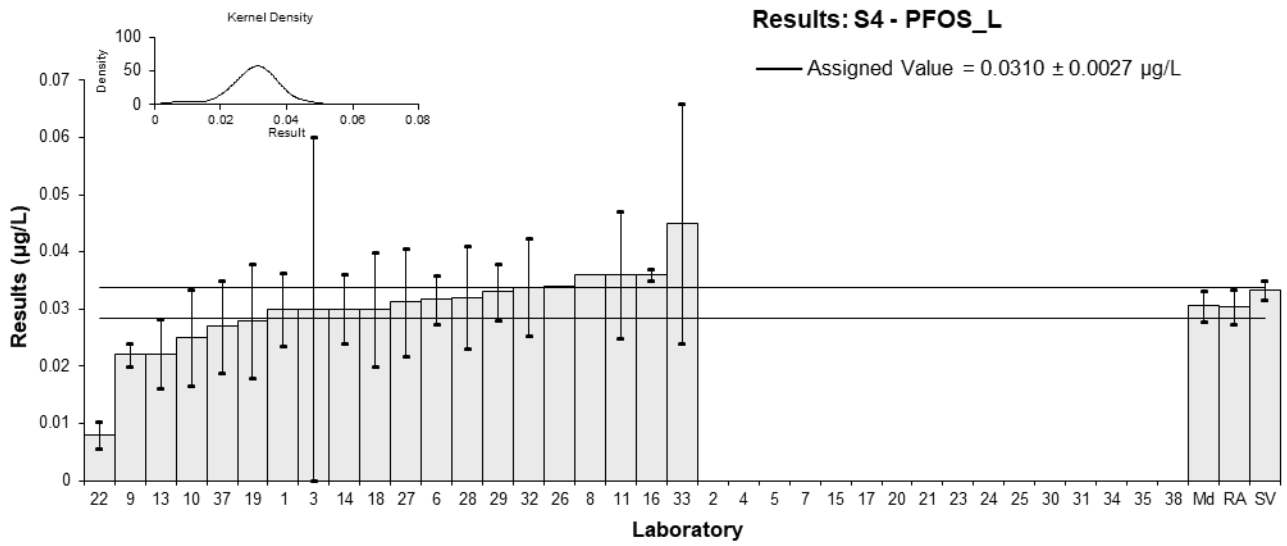
Participant Results

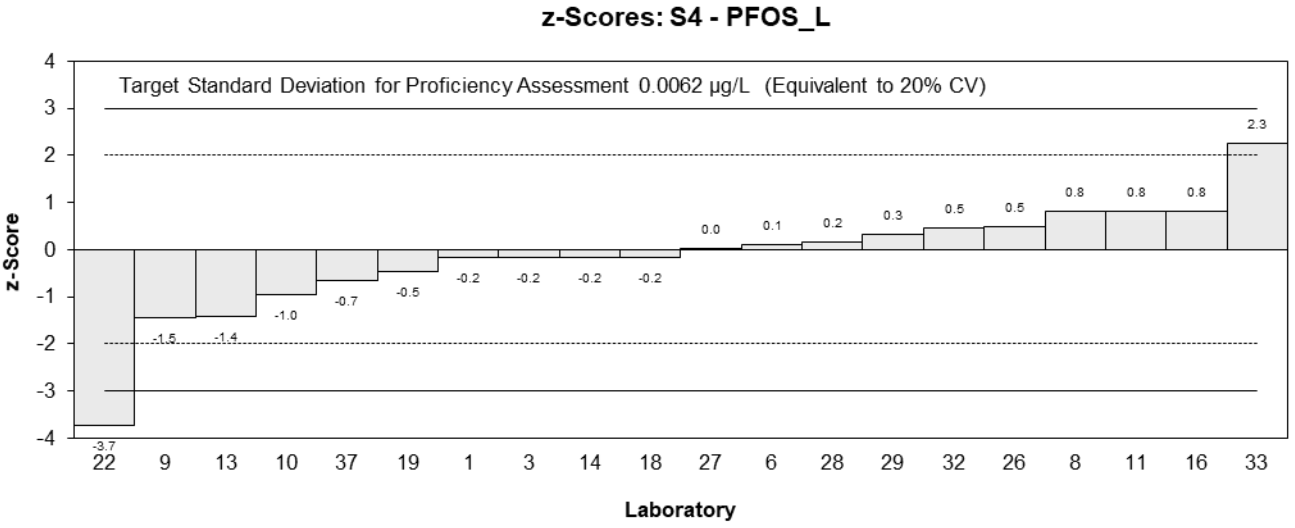
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0299	0.0064	99.48	-0.18	-0.16
2	NT	NT	NT		
3	0.03	0.03	88	-0.16	-0.03
4	NT	NT	NT		
5	NR	NR	NR		
6	0.0317	0.00427	98	0.11	0.14
7	NS	NS	NS		
8	0.036	NR	83	0.81	1.85
9	0.022	0.002	NT	-1.45	-2.68
10	0.025	0.0084	98	-0.97	-0.68
11	0.036	0.011	85	0.81	0.44
13	0.0222	0.006	NR	-1.42	-1.34
14	0.03	0.006	116	-0.16	-0.15
15	NS	NS	NS		
16	0.036	0.0010	124	0.81	1.74
17	NS	NS	NS		
18	0.030	0.01	99	-0.16	-0.10
19	0.028	0.01	111	-0.48	-0.29
20	<0.0365	0.0102	90.5		
21	NS	NS	NS		
22*	0.00788	0.00236	187	-3.73	-6.45
23	NT	NT	NT		
24	< 0.02	0.01	NR		
25	NR	NR	NR		
26	0.034	NR	97	0.48	1.11
27	0.0312	0.0094	91	0.03	0.02
28	0.032	0.009	NR	0.16	0.11
29	0.033	0.005	111	0.32	0.35
30	NS	NS	NS		
31	NT	NT	NT		
32	0.0338	0.0085	88	0.45	0.31
33	0.045	0.021	73	2.26	0.66
34	NR	NR	NR		
35	NT	NT	NT		
37	0.027	0.0081	107	-0.65	-0.47
38	NR	NR	NR		

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0310	0.0027
Spike Value	0.0334	0.0017
Robust Average	0.0304	0.0031
Median	0.0306	0.0027
Mean	0.0300	
N	20	
Max	0.045	
Min	0.00788	
Robust SD	0.0055	
Robust CV	18%	


Results: S4 - PFOS_L
Assigned Value = 0.0310 ± 0.0027 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
22 9 13 10 37 19 1 3 14 18 27 6 28 29 32 26 8 11 16 33 2 4 5 7 15 17 20 21 23 24 25 30 31 34 35 38 Md RA SV


z-Scores: S4 - PFOS_L
Target Standard Deviation for Proficiency Assessment 0.0062 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 9 13 10 37 19 1 3 14 18 27 6 28 29 32 26 8 11 16 33

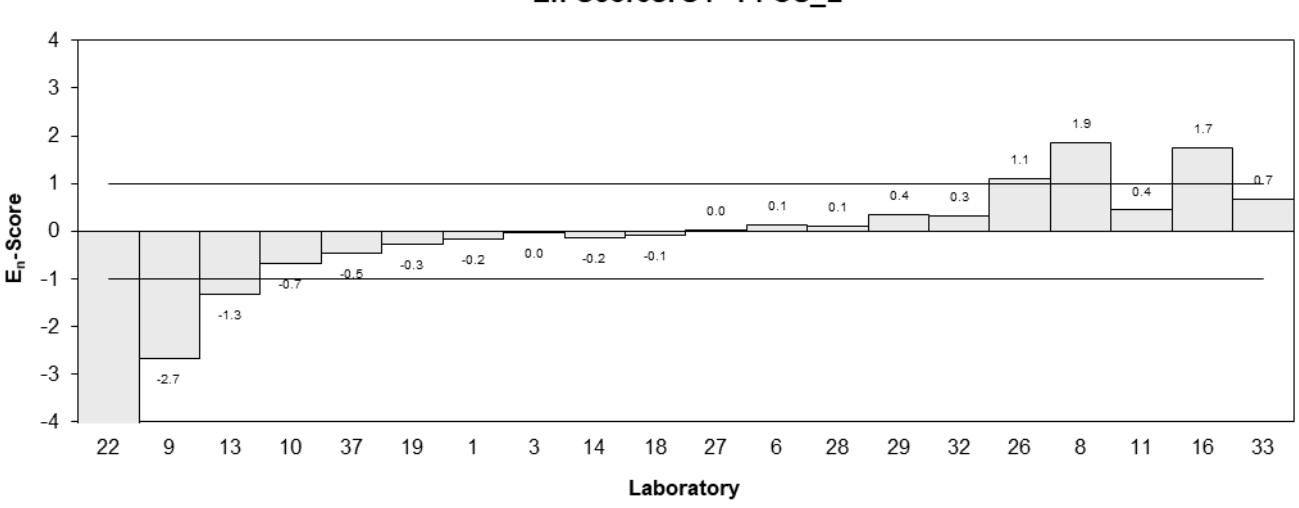

En-Scores: S4 - PFOS_L
En-Score
Laboratory
22 9 13 10 37 19 1 3 14 18 27 6 28 29 32 26 8 11 16 33

Figure 64

Table 68

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFNS
Unit	µg/L

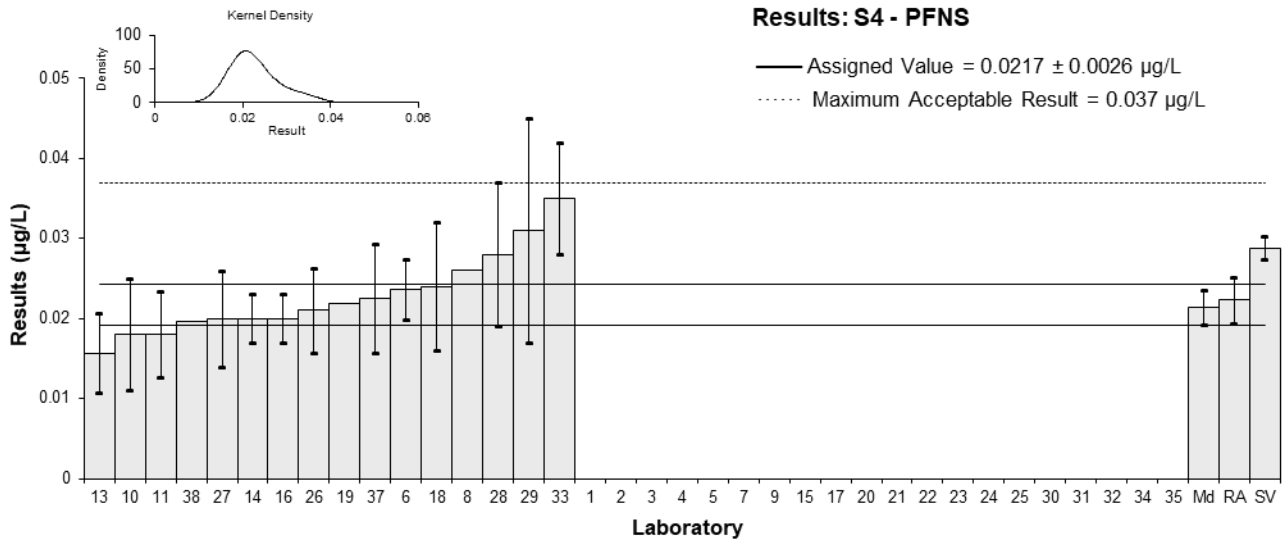
Participant Results

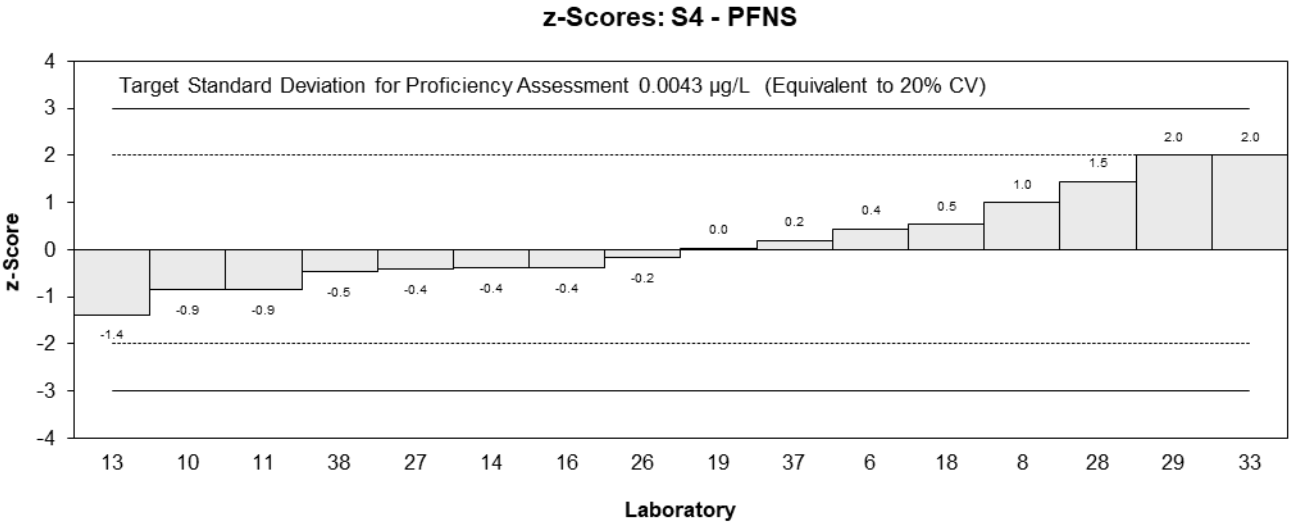
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NT	NT	NT		
3	NT	NT	NT		
4	NT	NT	NT		
5	NT	NT	NT		
6	0.0236	0.00374	98	0.44	0.42
7	NS	NS	NS		
8	0.026	NR	83	0.99	1.65
9	<0.05	NR	NT		
10	0.018	0.0070	98	-0.85	-0.50
11	0.018	0.0054	86	-0.85	-0.62
13	0.0157	0.005	NR	-1.38	-1.06
14	0.02	0.003	419	-0.39	-0.43
15	NS	NS	NS		
16	0.020	0.0030	124	-0.39	-0.43
17	NS	NS	NS		
18	0.024	0.008	99	0.53	0.27
19	0.0218	NR	NR	0.02	0.04
20	<0.0365	0.00694	90.5		
21	NS	NS	NS		
22	NT	NT	NT		
23	NT	NT	NT		
24	< 0.02	0.01	NR		
25	NR	NR	NR		
26	0.021	0.0053	105	-0.16	-0.12
27	0.0199	0.0060	NR	-0.41	-0.28
28	0.028	0.009	NR	1.45	0.67
29	0.031	0.014	NR	2.00▼	0.65
30	NS	NS	NS		
31	NT	NT	NT		
32	NT	NT	NT		
33*	0.035	0.007	73	2.00▼	1.00▼
34	NR	NR	NR		
35	NT	NT	NT		
37	0.0225	0.00675	107	0.18	0.11
38	0.0196	NR	NR	-0.48	-0.81

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

Statistics

Assigned Value	0.0217	0.0026
Spike Value	0.0288	0.0014
Robust Average	0.0223	0.0029
Max Acceptable Result	0.037	
Median	0.0214	0.0022
Mean	0.0228	
N	16	
Max	0.035	
Min	0.0157	
Robust SD	0.0047	
Robust CV	21%	


Results: S4 - PFNS
Assigned Value = 0.0217 ± 0.0026 µg/L
Maximum Acceptable Result = 0.037 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
13 10 11 38 27 14 16 26 19 37 6 18 8 28 29 33 1 2 3 4 5 7 9 15 17 20 21 22 23 24 25 30 31 32 34 35 Md RA SV


z-Scores: S4 - PFNS
Target Standard Deviation for Proficiency Assessment 0.0043 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
13 10 11 38 27 14 16 26 19 37 6 18 8 28 29 33
-1.4 -0.9 -0.9 -0.5 -0.4 -0.4 -0.4 -0.2 0.0 0.2 0.4 0.5 1.0 1.5 2.0 2.0

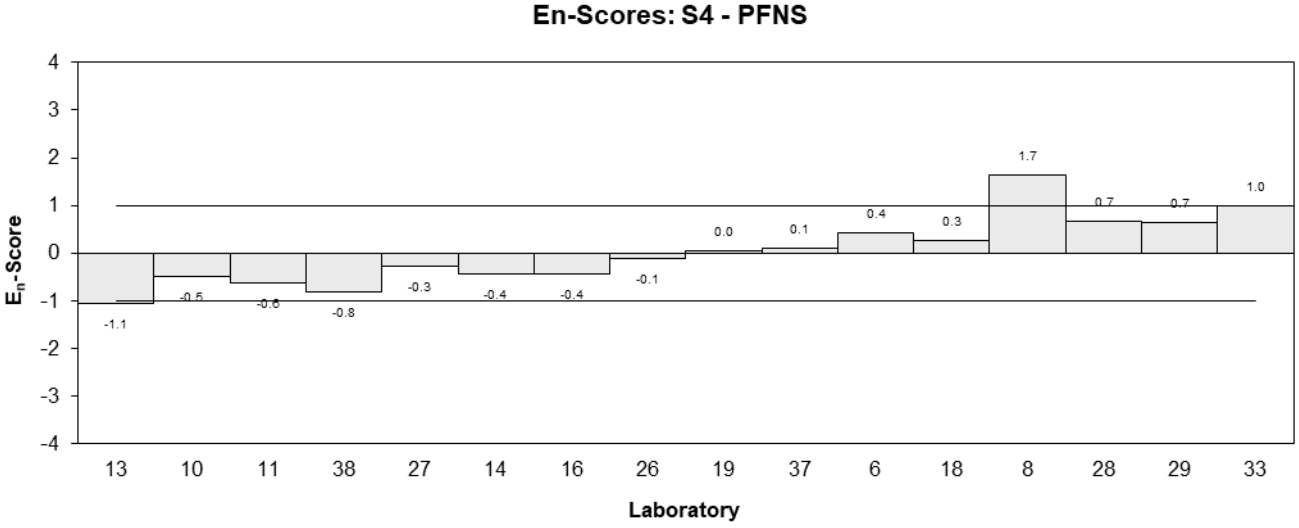

En-Scores: S4 - PFNS
En-Score
Laboratory
13 10 11 38 27 14 16 26 19 37 6 18 8 28 29 33
-1.1 -0.5 -0.6 -0.8 -0.3 -0.4 -0.4 -0.1 0.0 0.1 0.4 0.3 1.7 0.7 0.7 1.0

Figure 65

Table 69

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFDS
Unit	µg/L

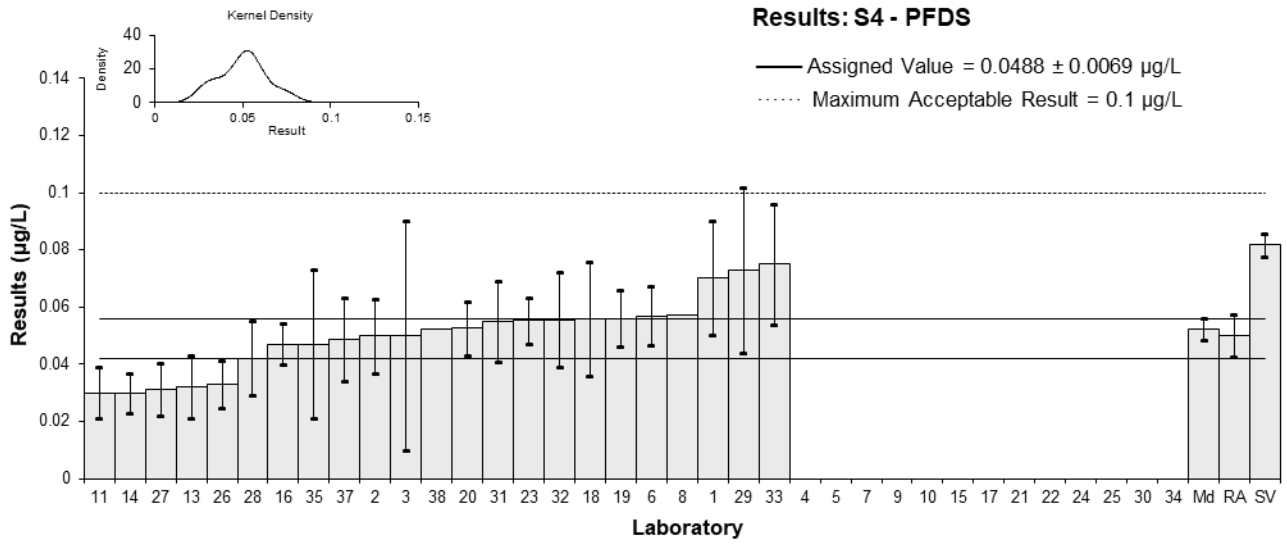
Participant Results

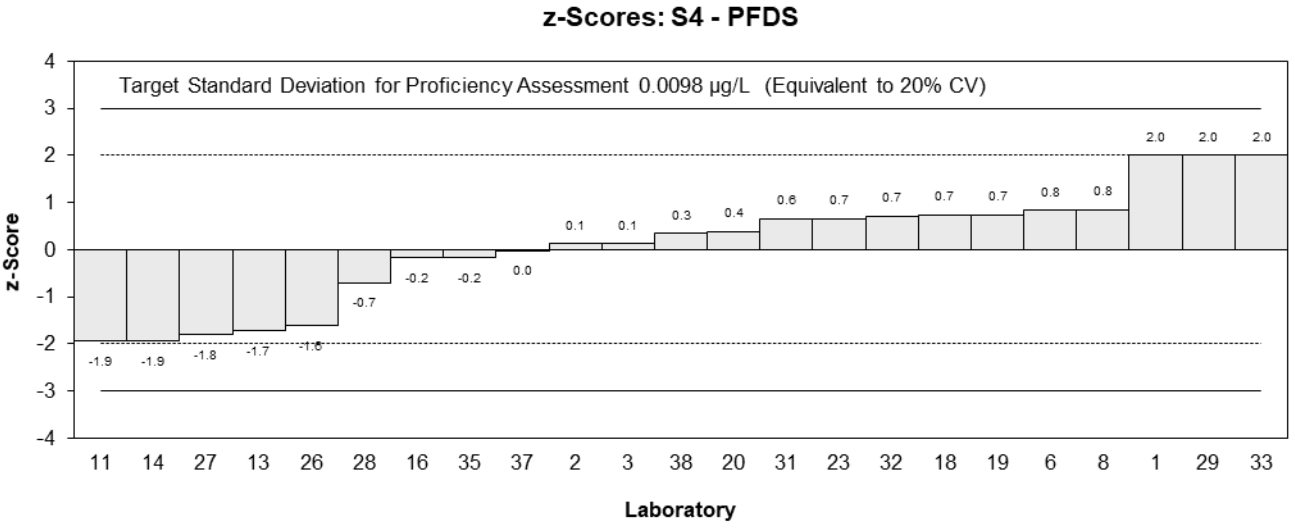
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0702	0.0199	99.48	2.00▼	1.00▼
2	0.050	0.013	NR	0.12	0.08
3	0.05	0.04	91	0.12	0.03
4	NT	NT	NT		
5	NT	NT	NT		
6	0.0569	0.0104	98	0.83	0.65
7	NS	NS	NS		
8	0.057	NR	83	0.84	1.19
9	<0.05	NR	NT		
10	NR	NR	98		
11	0.030	0.0090	93	-1.93	-1.66
13	0.0321	0.011	NR	-1.71	-1.29
14	0.03	0.007	419	-1.93	-1.91
15	NS	NS	NS		
16	0.047	0.0071	124	-0.18	-0.18
17	NS	NS	NS		
18	0.056	0.02	99	0.74	0.34
19	0.056	0.01	111	0.74	0.59
20	0.0526	0.00947	90.5	0.39	0.32
21	NS	NS	NS		
22	<0.005	NR	141		
23	0.0552	0.0082	98.96	0.66	0.60
24	< 0.09	0.045	NR		
25	NR	NR	NR		
26	0.033	0.0082	103	-1.62	-1.47
27	0.0312	0.0094	NR	-1.80	-1.51
28	0.042	0.013	NR	-0.70	-0.46
29	0.073	0.029	NR	2.00▼	0.81
30	NS	NS	NS		
31	0.055	0.014	109.77	0.64	0.40
32	0.0556	0.0167	88	0.70	0.38
33*	0.075	0.021	76	2.00▼	1.00▼
34	NR	NR	NR		
35	0.047	0.026	83	-0.18	-0.07
37	0.0487	0.01461	107	-0.01	-0.01
38	0.0521	NR	NR	0.34	0.48

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

Statistics

Assigned Value	0.0488	0.0069
Spike Value	0.0817	0.0041
Robust Average	0.0500	0.0074
Max Acceptable Result	0.10	
Median	0.0521	0.0038
Mean	0.0502	
N	23	
Max	0.075	
Min	0.03	
Robust SD	0.014	
Robust CV	28%	


Kernel Density
Density
Result
Results: S4 - PFDS
Assigned Value = 0.0488 ± 0.0069 µg/L
Maximum Acceptable Result = 0.1 µg/L
Results (µg/L)
Laboratory
11 14 27 13 26 28 16 35 37 2 3 38 20 31 23 32 18 19 6 8 1 29 33 4 5 7 9 10 15 17 21 22 24 25 30 34 Md RA SV


z-Scores: S4 - PFDS
Target Standard Deviation for Proficiency Assessment 0.0098 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
11 14 27 13 26 28 16 35 37 2 3 38 20 31 23 32 18 19 6 8 1 29 33

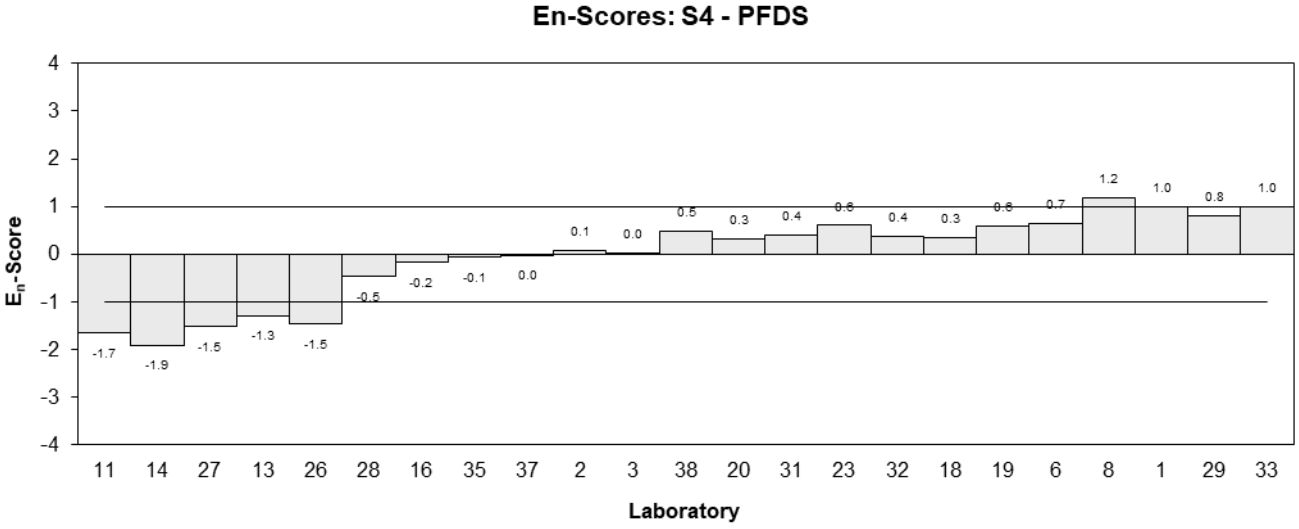

En-Scores: S4 - PFDS
En-Score
Laboratory
11 14 27 13 26 28 16 35 37 2 3 38 20 31 23 32 18 19 6 8 1 29 33

Figure 66

Table 70

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFDoS
Unit	µg/L

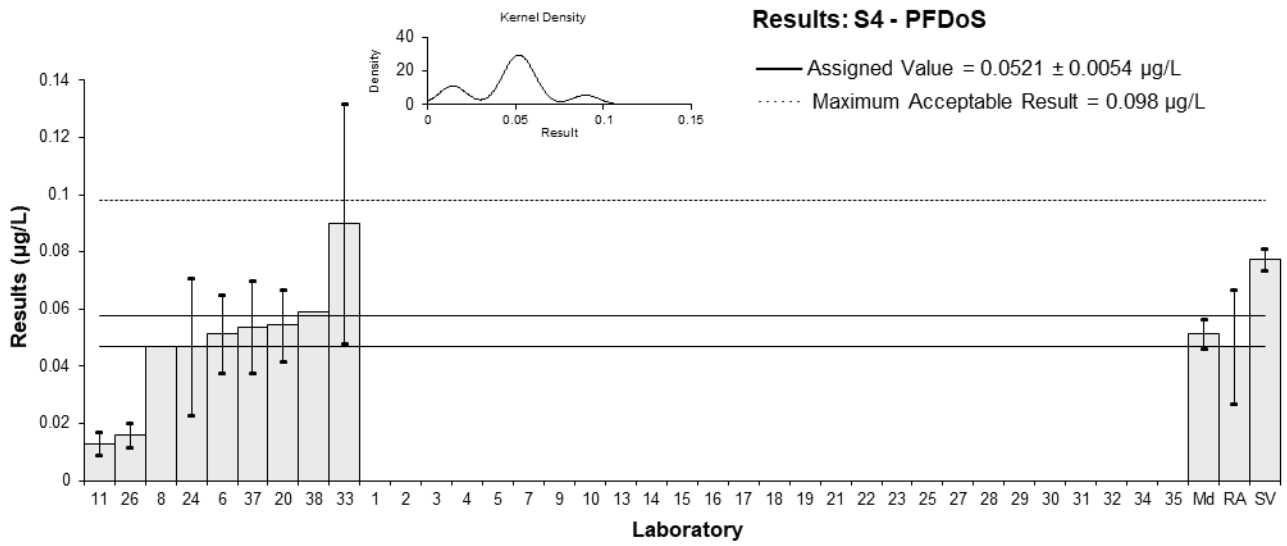
Participant Results

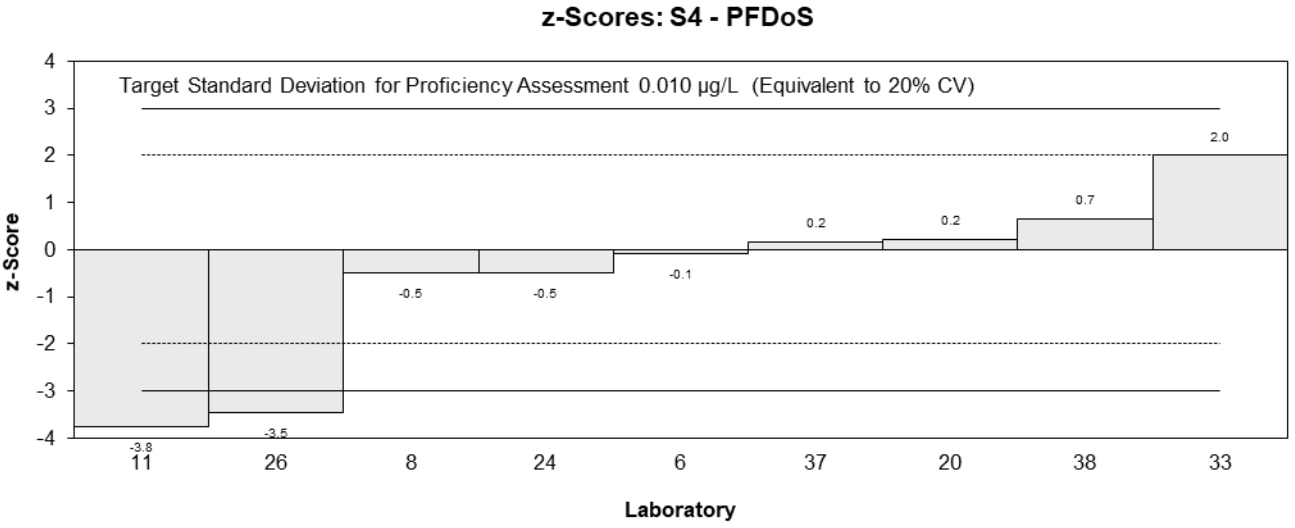
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NT	NT	NT		
3	NT	NT	NT		
4	NT	NT	NT		
5	NT	NT	NT		
6	0.0513	0.0137	98	-0.08	-0.05
7	NS	NS	NS		
8	0.047	NR	83	-0.49	-0.94
9	<0.05	NR	NT		
10	NT	NT	NT		
11*	0.013	0.0039	82	-3.75	-5.87
13	NT	NT	NT		
14	NT	NT	NT		
15	NS	NS	NS		
16	NR	NR	NR		
17	NS	NS	NS		
18	NT	NT	NT		
19	NT	NT	NT		
20	0.0544	0.0125	90.5	0.22	0.17
21	NS	NS	NS		
22	NT	NT	NT		
23	NT	NT	NT		
24	0.047	0.024	NR	-0.49	-0.21
25	NR	NR	NR		
26*	0.016	0.0043	98	-3.46	-5.23
27	NT	NT	NT		
28	NT	NT	NT		
29	NT	NT	NT		
30	NS	NS	NS		
31	NT	NT	NT		
32	NT	NT	NT		
33*	0.09	0.042	53	2.00▼	0.90
34	NR	NR	NR		
35	NT	NT	NT		
37	0.0537	0.01611	107	0.15	0.09
38	0.059	NR	NR	0.66	1.28

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

Statistics

Assigned Value	0.0521	0.0054
Spike Value	0.0774	0.0039
Robust Average	0.047	0.020
Max Acceptable Result	0.098	
Median	0.0513	0.0053
Mean	0.048	
N	9	
Max	0.09	
Min	0.013	
Robust SD	0.025	
Robust CV	52%	


Results: S4 - PFDoS
Kernel Density
Density
Result
Assigned Value = 0.0521 ± 0.0054 µg/L
Maximum Acceptable Result = 0.098 µg/L
Results (µg/L)
Laboratory
11 26 8 24 6 37 20 38 33 1 2 3 4 5 7 9 10 13 14 15 16 17 18 19 21 22 23 25 27 28 29 30 31 32 34 35 Md RA SV


z-Scores: S4 - PFDoS
Target Standard Deviation for Proficiency Assessment 0.010 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
-3.8
-3.5
-0.5
-0.5
-0.1
0.2
0.2
0.7
2.0
11 26 8 24 6 37 20 38 33

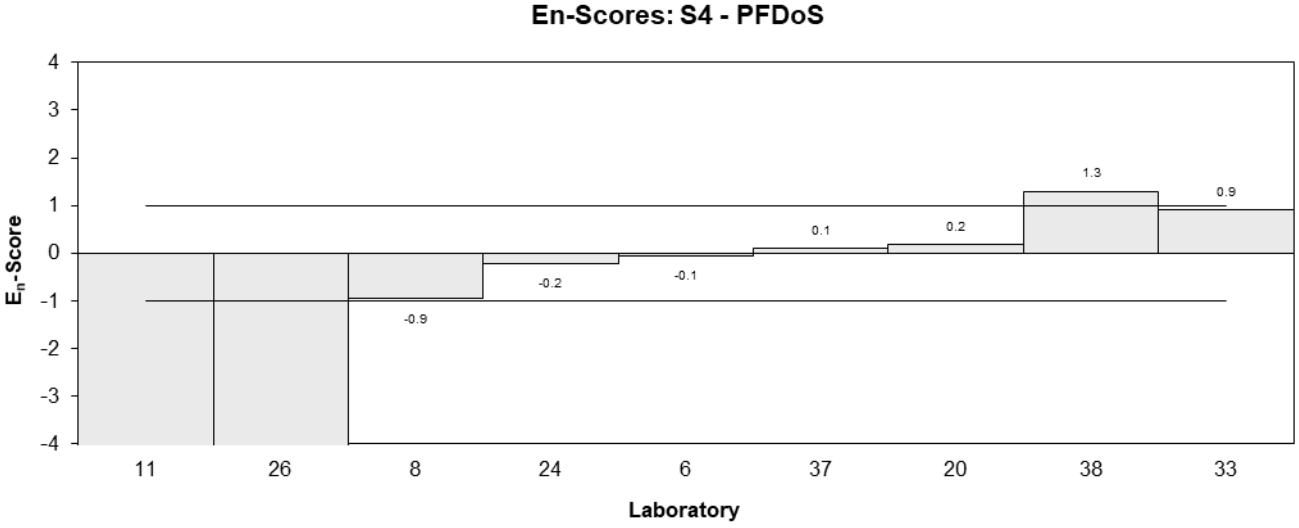

En-Scores: S4 - PFDoS
En-Score
Laboratory
-0.9
-0.2
-0.1
0.1
0.2
1.3
0.9
11 26 8 24 6 37 20 38 33

Figure 67

Table 71

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFBA
Unit	µg/L

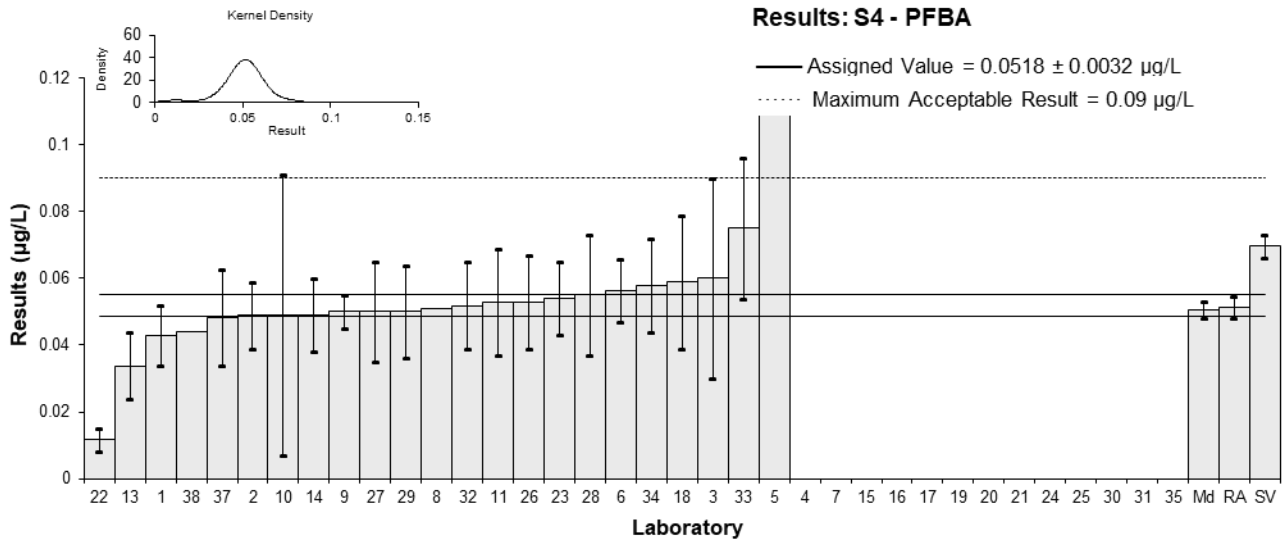
Participant Results

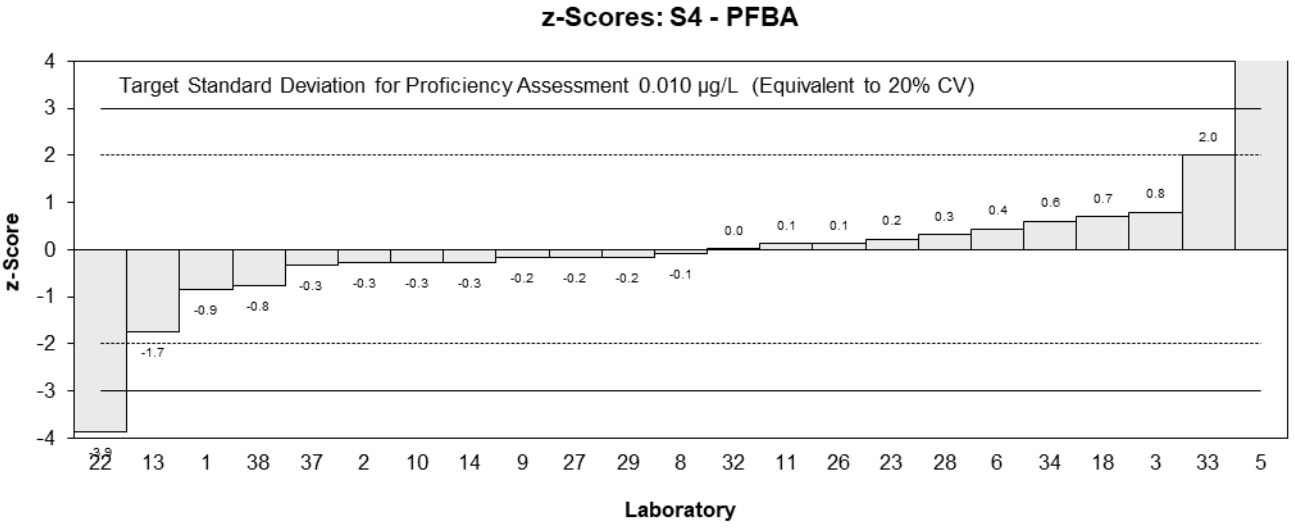
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.043	0.009	128.62	-0.85	-0.92
2	0.049	0.01	NR	-0.27	-0.27
3	0.06	0.03	94	0.79	0.27
4	NT	NT	NT		
5**	47.32131	4.46722621930	NR	4,562.69	10.58
6	0.0563	0.00947	92	0.43	0.45
7	NS	NS	NS		
8	0.051	NR	90	-0.08	-0.25
9	0.05	0.005	NT	-0.17	-0.30
10	0.049	0.042	97	-0.27	-0.07
11	0.053	0.016	81	0.12	0.07
13	0.0338	0.010	101	-1.74	-1.71
14	0.049	0.011	100	-0.27	-0.24
15	NS	NS	NS		
16	NR	NR	NR		
17	NS	NS	NS		
18	0.059	0.02	108	0.69	0.36
19	<0.5	NR	164		
20	<0.146	0.0161	88.3		
21	NS	NS	NS		
22*	0.0116	0.00348	231	-3.88	-8.50
23	0.054	0.011	104.6	0.21	0.19
24	< 0.05	0.025	89		
25	NR	NR	NR		
26	0.053	0.014	94	0.12	0.08
27	0.05	0.0150	91	-0.17	-0.12
28	0.055	0.018	127	0.31	0.18
29	0.050	0.014	113.5	-0.17	-0.13
30	NS	NS	NS		
31	<0.1	NR	59.94		
32	0.0519	0.0130	120	0.01	0.01
33	0.075	0.021	70	2.00▼	1.00▼
34	0.058	0.014	92	0.60	0.43
35	<0.1	NR	101		
37	0.0483	0.01449	98	-0.34	-0.24
38	0.0439	NR	NR	-0.76	-2.47

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

Statistics

Assigned Value	0.0518	0.0032
Spike Value	0.0696	0.0035
Robust Average	0.0513	0.0034
Max Acceptable Result	0.090	
Median	0.0505	0.0024
Mean	0.0502	
N	22	
Max	0.075	
Min	0.0116	
Robust SD	0.0063	
Robust CV	12%	


Results: S4 - PFBA
Kernel Density
Density
Result
Assigned Value = 0.0518 ± 0.0032 µg/L
Maximum Acceptable Result = 0.09 µg/L
Results (µg/L)
Laboratory
22 13 1 38 37 2 10 14 9 27 29 8 32 11 26 23 28 6 34 18 3 33 5 4 7 15 16 17 19 20 21 24 25 30 31 35 Md RA SV


z-Scores: S4 - PFBA
Target Standard Deviation for Proficiency Assessment 0.010 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 13 1 38 37 2 10 14 9 27 29 8 32 11 26 23 28 6 34 18 3 33 5

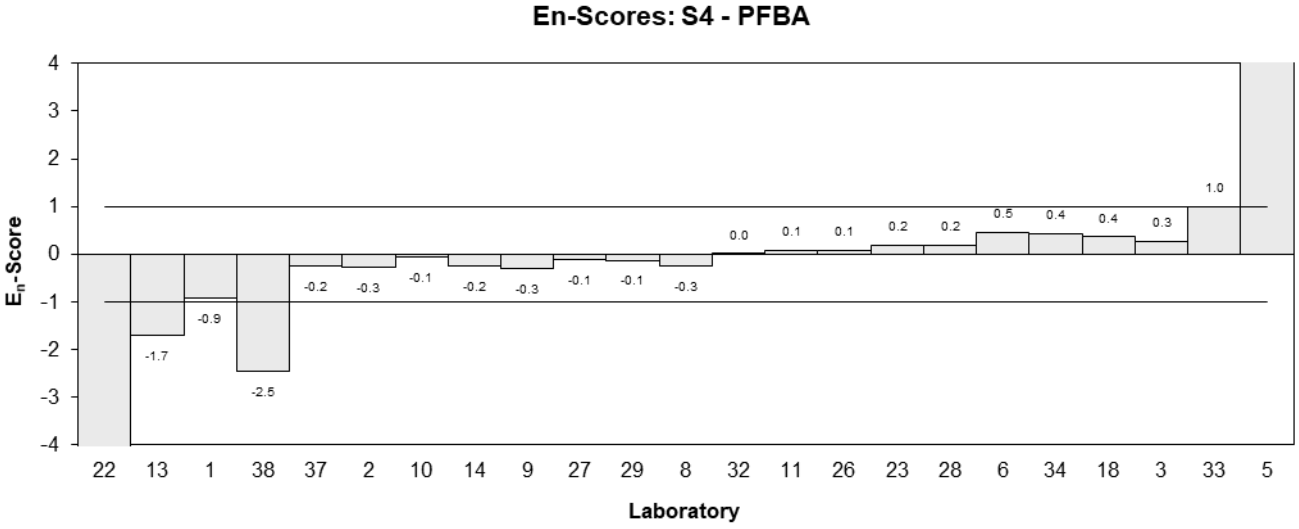

En-Scores: S4 - PFBA
En-Score
Laboratory
22 13 1 38 37 2 10 14 9 27 29 8 32 11 26 23 28 6 34 18 3 33 5

Figure 68

Table 72

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFPeA
Unit	µg/L

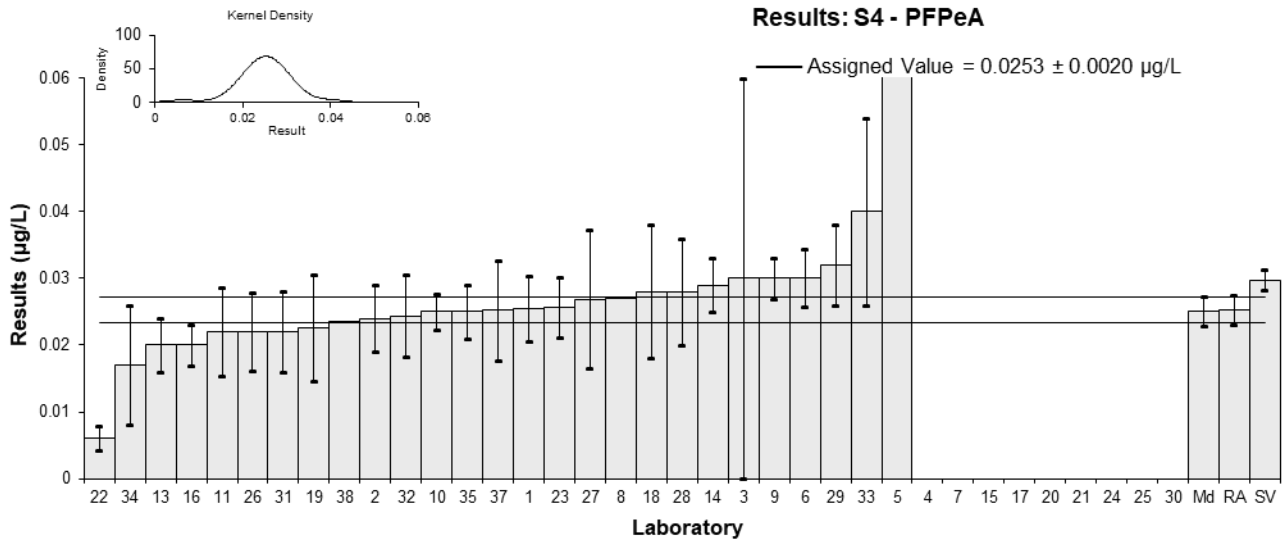
Participant Results

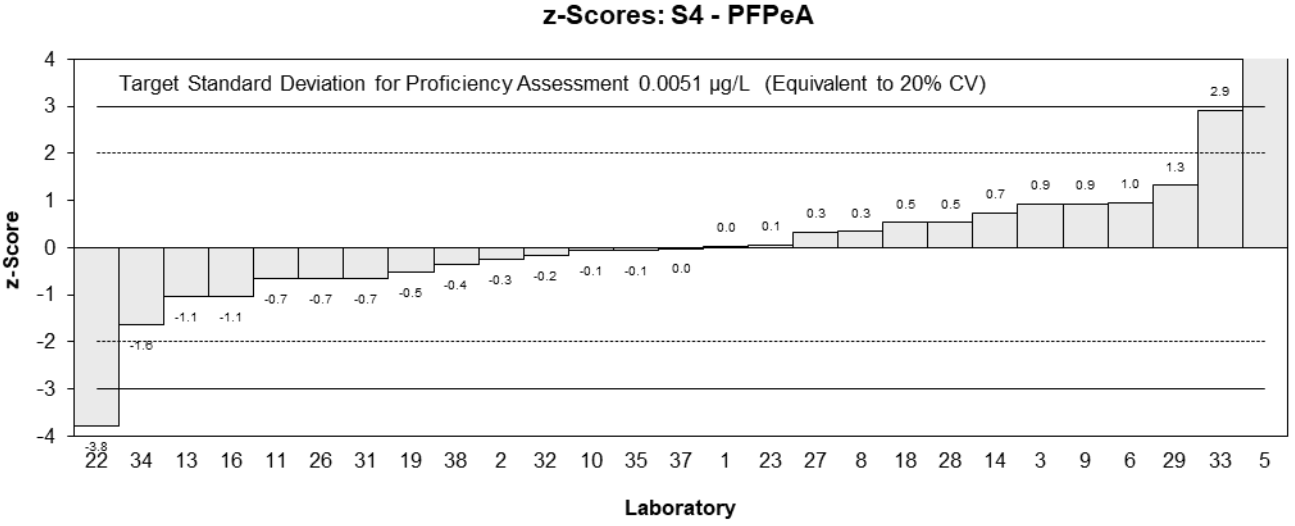
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0254	0.0049	111.67	0.02	0.02
2	0.024	0.005	NR	-0.26	-0.24
3	0.03	0.03	93	0.93	0.16
4	NT	NT	NT		
5**	12.18394	7.30746383724	NR	2,402.89	1.66
6	0.0301	0.0044	98	0.95	0.99
7	NS	NS	NS		
8	0.027	NR	87	0.34	0.85
9	0.03	0.003	NT	0.93	1.30
10	0.025	0.0027	97	-0.06	-0.09
11	0.022	0.0066	86	-0.65	-0.48
13	0.02	0.004	126	-1.05	-1.19
14	0.029	0.004	104	0.73	0.83
15	NS	NS	NS		
16	0.020	0.0031	125	-1.05	-1.44
17	NS	NS	NS		
18	0.028	0.01	113	0.53	0.26
19	0.0226	0.008	118	-0.53	-0.33
20	<0.0730	0.00876	97.3		
21	NS	NS	NS		
22*	0.00606	0.00182	235	-3.80	-7.12
23	0.0256	0.0045	109.12	0.06	0.06
24	< 0.03	0.015	90		
25	NR	NR	NR		
26	0.022	0.0059	108	-0.65	-0.53
27	0.0269	0.0104	99	0.32	0.15
28	0.028	0.008	134	0.53	0.33
29	0.032	0.006	99.6	1.32	1.06
30	NS	NS	NS		
31	0.022	0.006	94.85	-0.65	-0.52
32	0.0244	0.0061	145	-0.18	-0.14
33*	0.04	0.014	70	2.91	1.04
34	0.017	0.009	92	-1.64	-0.90
35	0.025	0.004	97	-0.06	-0.07
37	0.0252	0.00756	97	-0.02	-0.01
38	0.0235	NR	NR	-0.36	-0.90

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.0253	0.0020
Spike Value	0.0298	0.0015
Robust Average	0.0253	0.0022
Median	0.0251	0.0022
Mean	0.0250	
N	26	
Max	0.04	
Min	0.00606	
Robust SD	0.0044	
Robust CV	17%	


Kernel Density
Density
Result
Results: S4 - PFPeA
Assigned Value = 0.0253 ± 0.0020 µg/L
Results (µg/L)
Laboratory
22 34 13 16 11 26 31 19 38 2 32 10 35 37 1 23 27 8 18 28 14 3 9 6 29 33 5 4 7 15 17 20 21 24 25 30 Md RA SV


z-Scores: S4 - PFPeA
Target Standard Deviation for Proficiency Assessment 0.0051 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 34 13 16 11 26 31 19 38 2 32 10 35 37 1 23 27 8 18 28 14 3 9 6 29 33 5

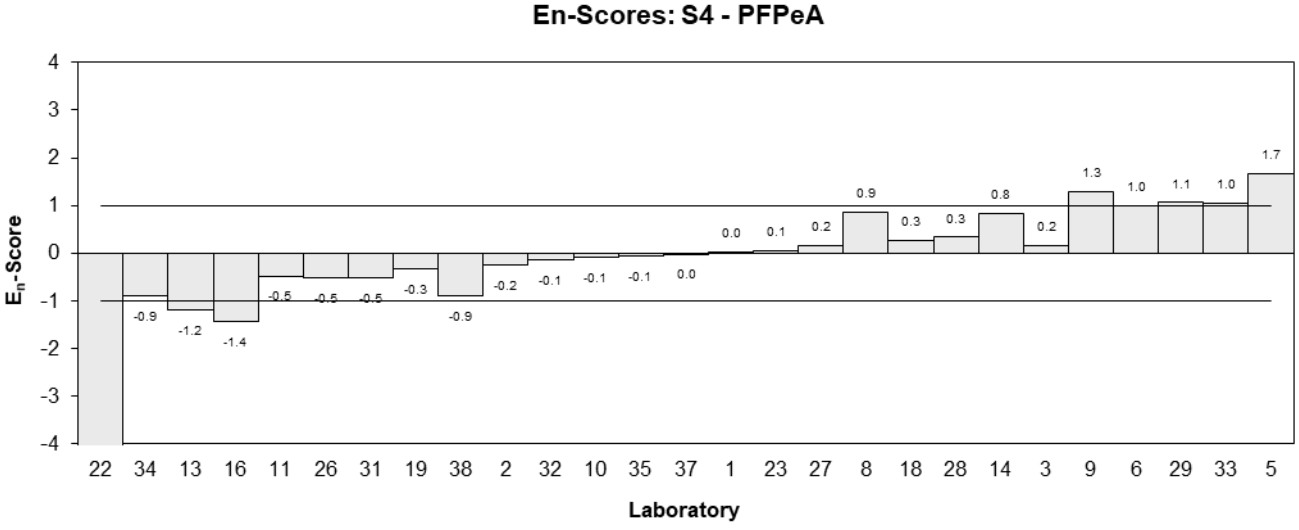

En-Scores: S4 - PFPeA
En-Score
Laboratory
22 34 13 16 11 26 31 19 38 2 32 10 35 37 1 23 27 8 18 28 14 3 9 6 29 33 5

Figure 69

Table 73

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFHxA
Unit	µg/L

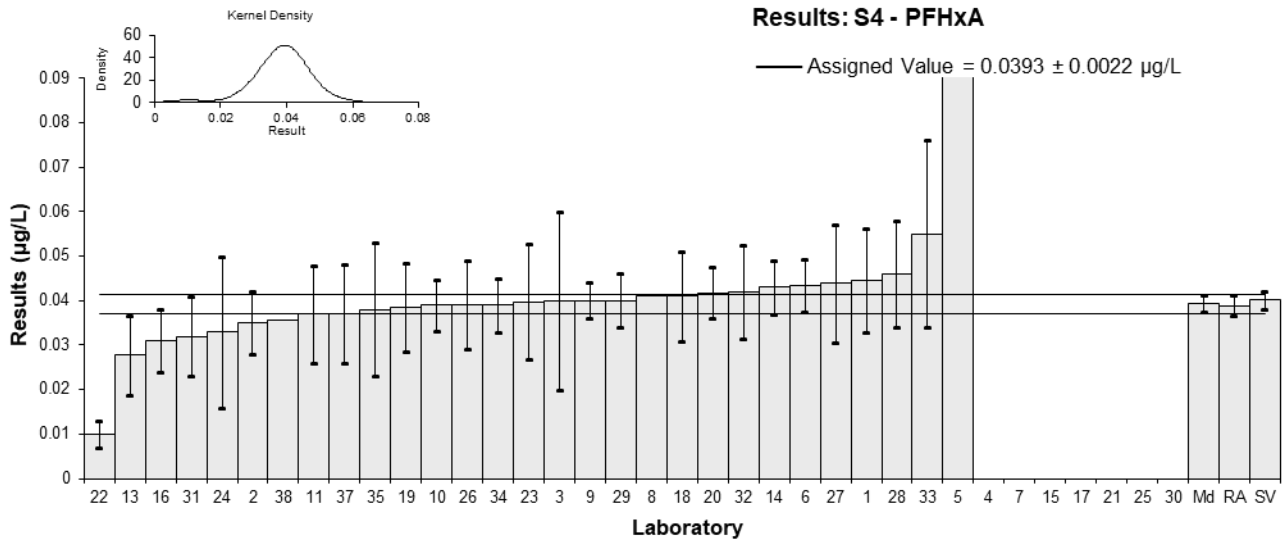
Participant Results

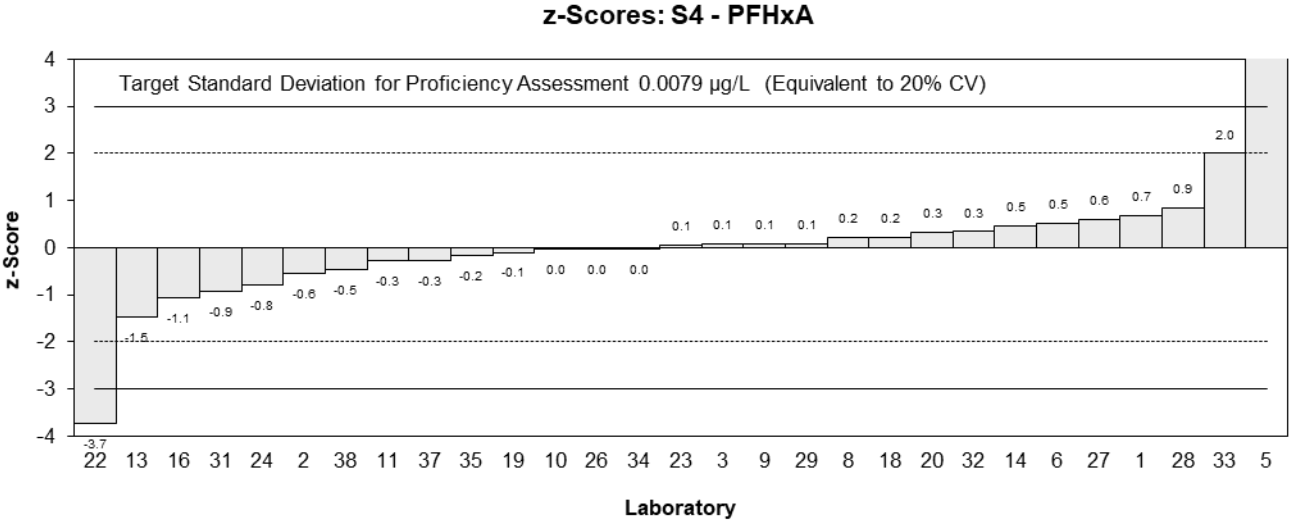
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0446	0.0116	122.8	0.67	0.45
2	0.035	0.007	NR	-0.55	-0.59
3	0.04	0.02	90	0.09	0.03
4	NT	NT	NT		
5**	18.94214	1.71973593741	NR	2,404.94	10.99
6	0.0434	0.00588	96	0.52	0.65
7	NS	NS	NS		
8	0.041	NR	87	0.22	0.77
9	0.04	0.004	NT	0.09	0.15
10	0.039	0.0058	107	-0.04	-0.05
11	0.037	0.011	80	-0.29	-0.21
13	0.0277	0.009	144	-1.48	-1.25
14	0.043	0.006	100	0.47	0.58
15	NS	NS	NS		
16	0.031	0.0071	131	-1.06	-1.12
17	NS	NS	NS		
18	0.041	0.01	117	0.22	0.17
19	0.0385	0.01	120	-0.10	-0.08
20	0.0418	0.00585	82.1	0.32	0.40
21	NS	NS	NS		
22*	0.00997	0.00299	206	-3.73	-7.90
23	0.0397	0.013	89.72	0.05	0.03
24	0.033	0.017	93	-0.80	-0.37
25	NR	NR	NR		
26	0.039	0.01	95	-0.04	-0.03
27	0.0439	0.0132	105	0.59	0.34
28	0.046	0.012	126	0.85	0.55
29	0.040	0.006	109.1	0.09	0.11
30	NS	NS	NS		
31	0.032	0.009	99.79	-0.93	-0.79
32	0.0420	0.0105	120	0.34	0.25
33	0.055	0.021	65	2.00	0.74
34	0.039	0.006	94	-0.04	-0.05
35	0.038	0.015	94	-0.17	-0.09
37	0.0370	0.0111	98	-0.29	-0.20
38	0.0356	NR	NR	-0.47	-1.68

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.0393	0.0022
Spike Value	0.0401	0.0020
Robust Average	0.0389	0.0023
Median	0.0394	0.0018
Mean	0.0383	
N	28	
Max	0.055	
Min	0.00997	
Robust SD	0.0049	
Robust CV	13%	


Results: S4 - PFHxA
Kernel Density
Density
Result
Assigned Value = 0.0393 ± 0.0022 µg/L
Results (µg/L)
Laboratory
22 13 16 31 24 2 38 11 37 35 19 10 26 34 23 3 9 29 8 18 20 32 14 6 27 1 28 33 5 4 7 15 17 21 25 30 Md RA SV


z-Scores: S4 - PFHxA
Target Standard Deviation for Proficiency Assessment 0.0079 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 13 16 31 24 2 38 11 37 35 19 10 26 34 23 3 9 29 8 18 20 32 14 6 27 1 28 33 5

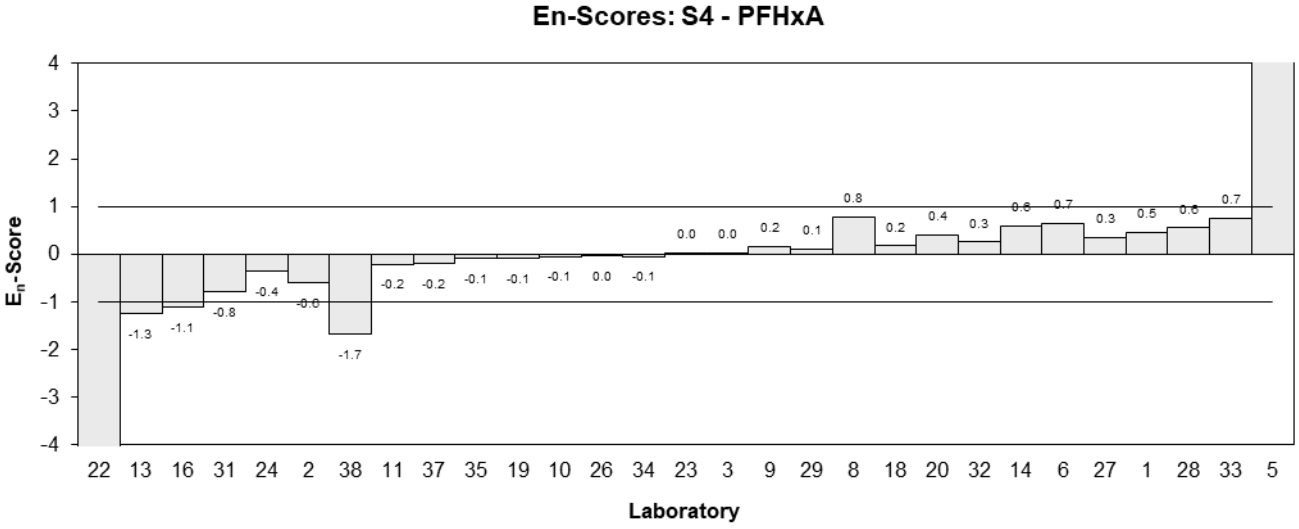

En-Scores: S4 - PFHxA
En-Score
Laboratory
22 13 16 31 24 2 38 11 37 35 19 10 26 34 23 3 9 29 8 18 20 32 14 6 27 1 28 33 5

Figure 70

Table 74

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFHpA
Unit	µg/L

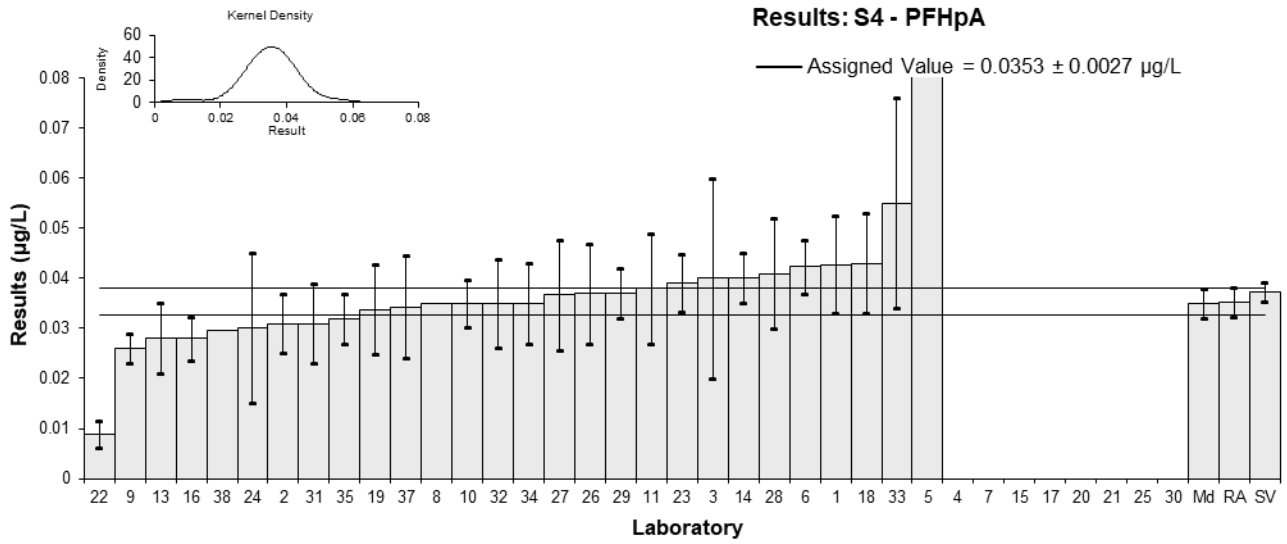
Participant Results

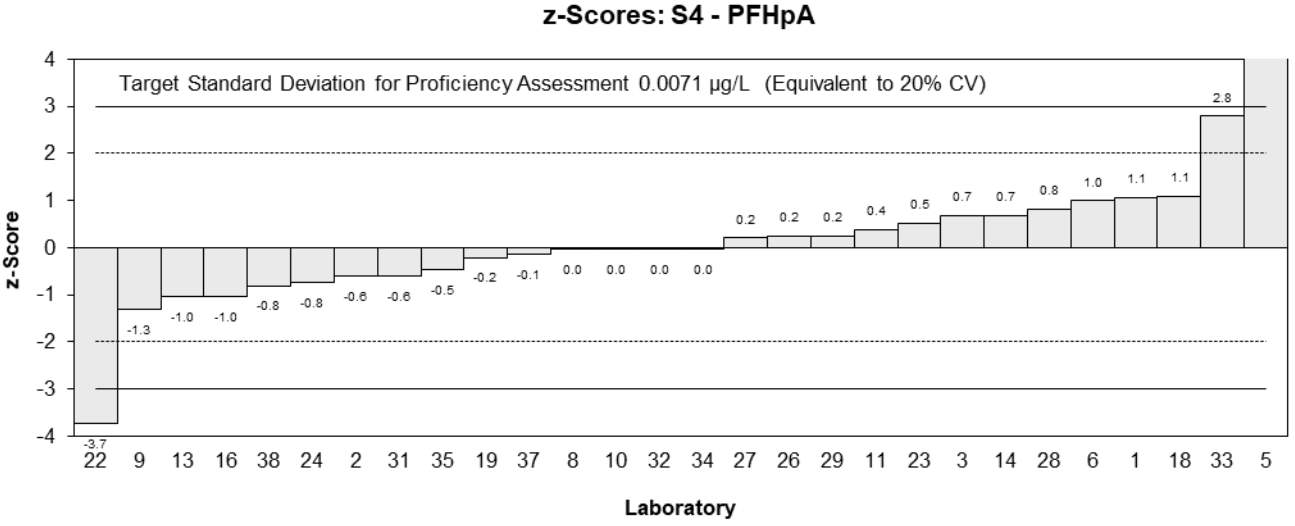
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0428	0.0098	107.89	1.06	0.74
2	0.031	0.006	NR	-0.61	-0.65
3	0.04	0.02	91	0.67	0.23
4	NT	NT	NT		
5**	28.778916666667	6.13988118379075	NR	4,071.33	4.68
6	0.0423	0.00538	97	0.99	1.16
7	NS	NS	NS		
8	0.035	NR	88	-0.04	-0.11
9	0.026	0.003	NT	-1.32	-2.30
10	0.035	0.0048	99	-0.04	-0.05
11	0.038	0.011	75	0.38	0.24
13	0.028	0.007	138	-1.03	-0.97
14	0.04	0.005	91	0.67	0.83
15	NS	NS	NS		
16	0.028	0.0043	125	-1.03	-1.44
17	NS	NS	NS		
18	0.043	0.01	110	1.09	0.74
19	0.0338	0.009	117	-0.21	-0.16
20	<0.0365	0.00511	86.1		
21	NS	NS	NS		
22*	0.0089	0.00267	202	-3.74	-6.95
23	0.039	0.0058	84.67	0.52	0.58
24	0.03	0.015	97	-0.75	-0.35
25	NR	NR	NR		
26	0.037	0.01	95	0.24	0.16
27	0.0367	0.0110	103	0.20	0.12
28	0.041	0.011	107	0.81	0.50
29	0.037	0.005	110.2	0.24	0.30
30	NS	NS	NS		
31	0.031	0.008	104.35	-0.61	-0.51
32	0.0350	0.0088	145	-0.04	-0.03
33*	0.055	0.021	64	2.79	0.93
34	0.035	0.008	94	-0.04	-0.04
35	0.032	0.005	97	-0.47	-0.58
37	0.0343	0.01029	99	-0.14	-0.09
38	0.0296	NR	NR	-0.81	-2.11

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.0353	0.0027
Spike Value	0.0374	0.0019
Robust Average	0.0352	0.0029
Median	0.0350	0.0029
Mean	0.0350	
N	27	
Max	0.055	
Min	0.0089	
Robust SD	0.0060	
Robust CV	17%	


Results: S4 - PFHpA
Kernel Density
Density
Result
Assigned Value = 0.0353 ± 0.0027 µg/L
Results (µg/L)
Laboratory
22 9 13 16 38 24 2 31 35 19 37 8 10 32 34 27 26 29 11 23 3 14 28 6 1 18 33 5 4 7 15 17 20 21 25 30 Md RA SV


z-Scores: S4 - PFHpA
Target Standard Deviation for Proficiency Assessment 0.0071 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 9 13 16 38 24 2 31 35 19 37 8 10 32 34 27 26 29 11 23 3 14 28 6 1 18 33 5

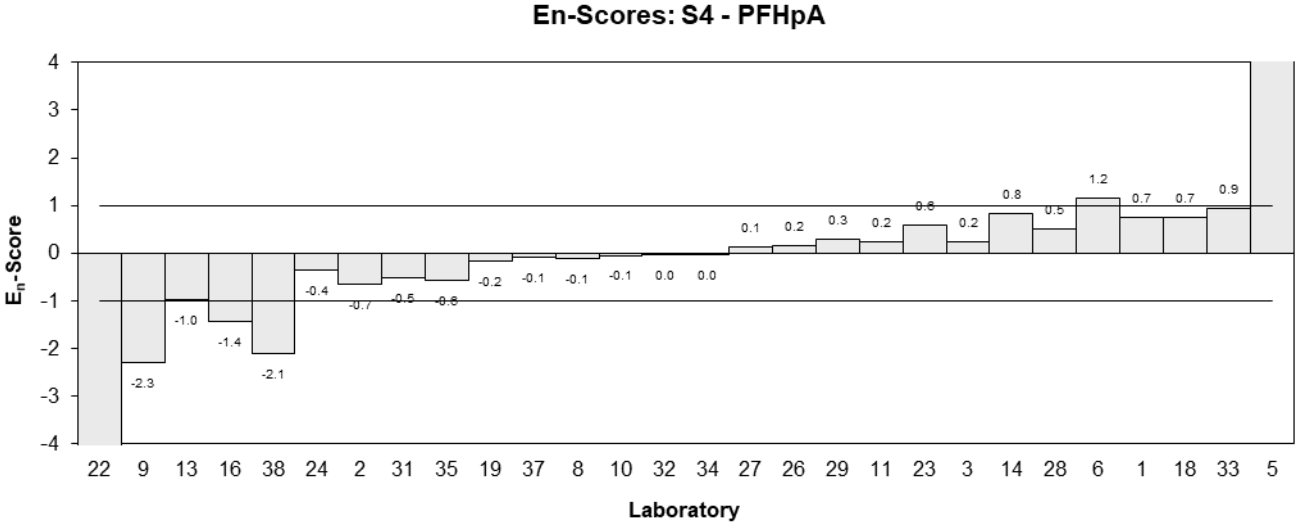

En-Scores: S4 - PFHpA
En-Score
Laboratory
22 9 13 16 38 24 2 31 35 19 37 8 10 32 34 27 26 29 11 23 3 14 28 6 1 18 33 5

Figure 71

Table 75

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFOA
Unit	µg/L

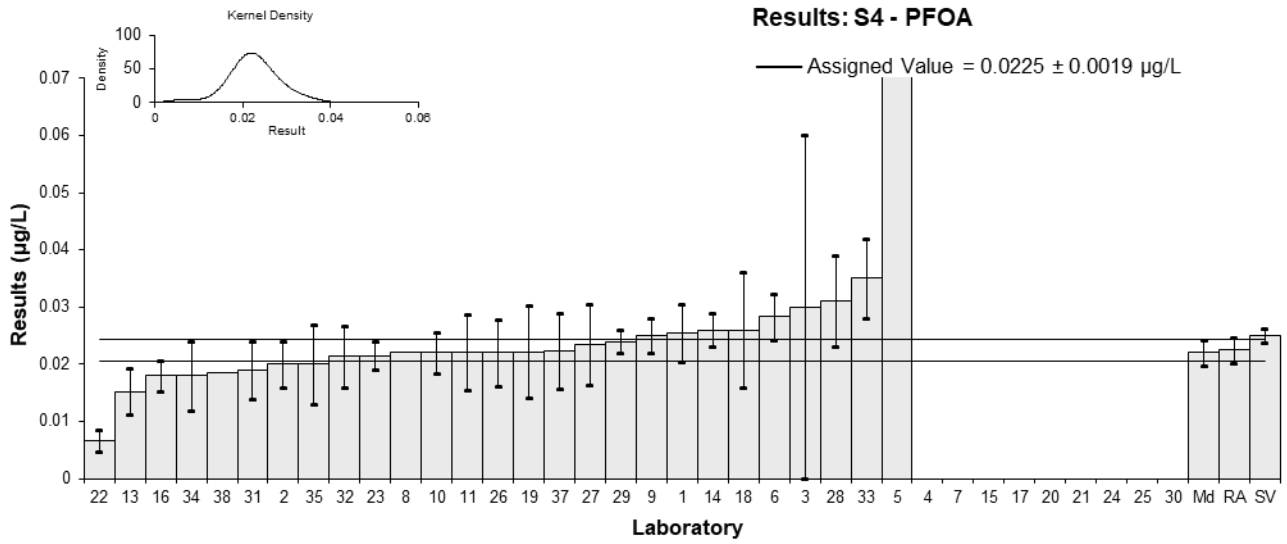
Participant Results

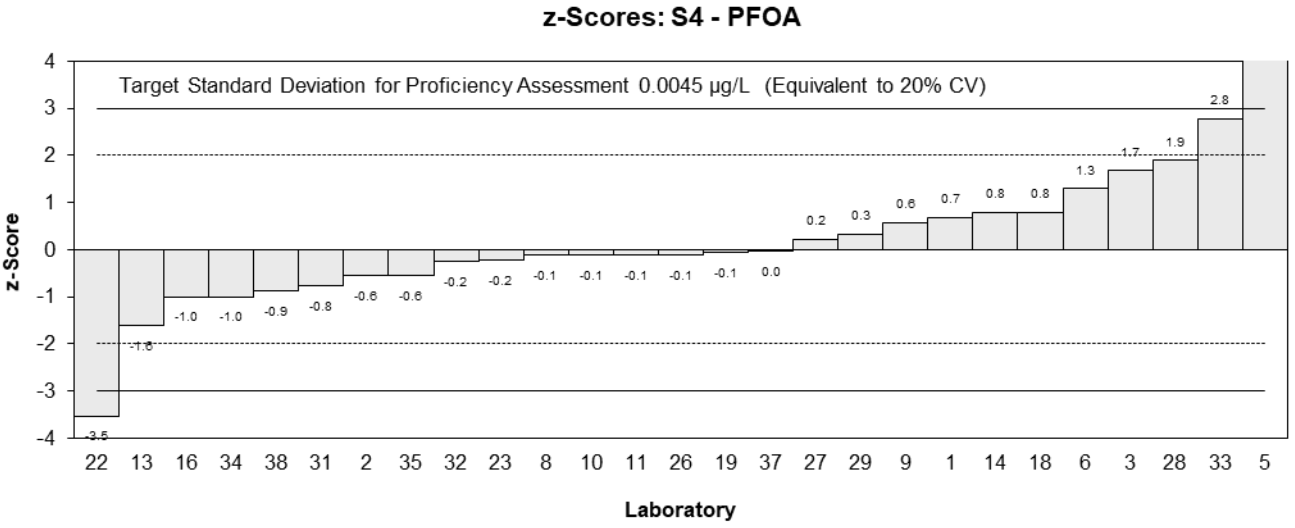
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0255	0.0051	106.69	0.67	0.55
2	0.020	0.004	100	-0.56	-0.56
3	0.03	0.03	92	1.67	0.25
4	NT	NT	NT		
5**	27.1040133333	9.22168485956	NR	6,018.11	2.94
6	0.0283	0.00397	97	1.29	1.32
7	NS	NS	NS		
8	0.022	NR	89	-0.11	-0.26
9	0.025	0.003	76	0.56	0.70
10	0.022	0.0035	103	-0.11	-0.13
11	0.022	0.0066	82	-0.11	-0.07
13	0.0152	0.004	126	-1.62	-1.65
14	0.026	0.003	95	0.78	0.99
15	NS	NS	NS		
16	0.018	0.0027	127	-1.00	-1.36
17	NS	NS	NS		
18	0.026	0.01	122	0.78	0.34
19	0.0222	0.008	117	-0.07	-0.04
20	<0.0365	0.00584	83.8		
21	NS	NS	NS		
22*	0.00661	0.00198	200	-3.53	-5.79
23	0.0215	0.0025	99.19	-0.22	-0.32
24	< 0.03	0.03	96		
25	NR	NR	NR		
26	0.022	0.0059	94	-0.11	-0.08
27	0.0235	0.0071	110	0.22	0.14
28	0.031	0.008	143	1.89	1.03
29	0.024	0.002	106	0.33	0.54
30	NS	NS	NS		
31	0.019	0.005	116.65	-0.78	-0.65
32	0.0214	0.0054	100	-0.24	-0.19
33*	0.035	0.007	75	2.78	1.72
34	0.018	0.006	94	-1.00	-0.72
35	0.02	0.007	100	-0.56	-0.34
37	0.0223	0.00669	99	-0.04	-0.03
38	0.0186	NR	NR	-0.87	-2.05

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.0225	0.0019
Spike Value	0.0250	0.0013
Robust Average	0.0225	0.0022
Median	0.0220	0.0022
Mean	0.0225	
N	26	
Max	0.035	
Min	0.00661	
Robust SD	0.0044	
Robust CV	20%	


Results: S4 - PFOA
Kernel Density
Density
Result
Assigned Value = 0.0225 ± 0.0019 µg/L
Results (µg/L)
Laboratory
22 13 16 34 38 31 2 35 32 23 8 10 11 26 19 37 27 29 9 1 14 18 6 3 28 33 5 4 7 15 17 20 21 24 25 30 Md RA SV


z-Scores: S4 - PFOA
Target Standard Deviation for Proficiency Assessment 0.0045 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 13 16 34 38 31 2 35 32 23 8 10 11 26 19 37 27 29 9 1 14 18 6 3 28 33 5

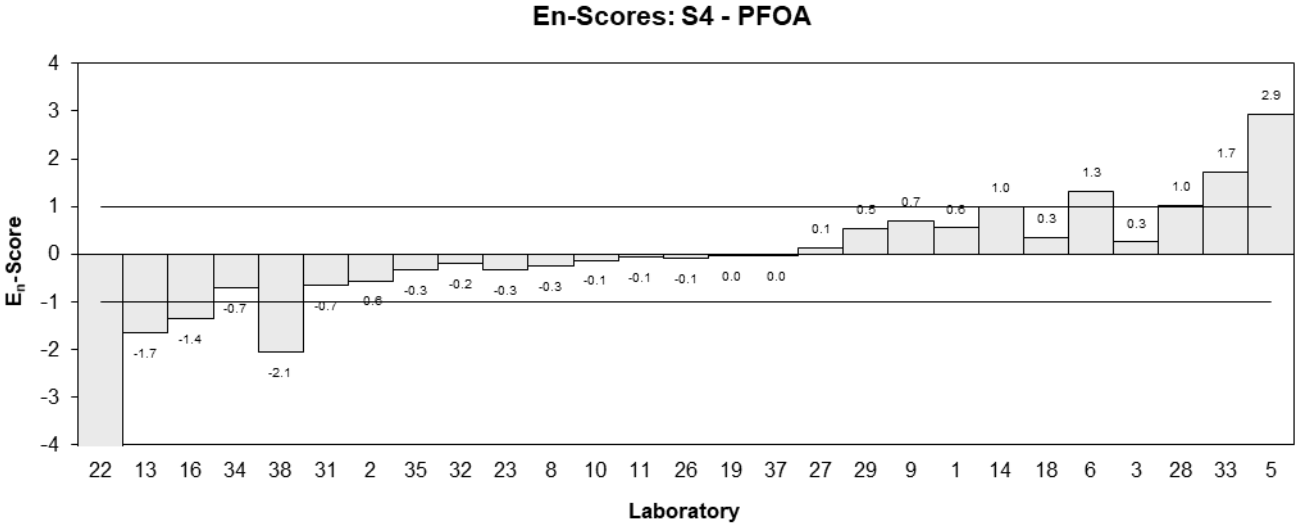

En-Scores: S4 - PFOA
En-Score
Laboratory
22 13 16 34 38 31 2 35 32 23 8 10 11 26 19 37 27 29 9 1 14 18 6 3 28 33 5

Figure 72

Table 76

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFNA
Unit	µg/L

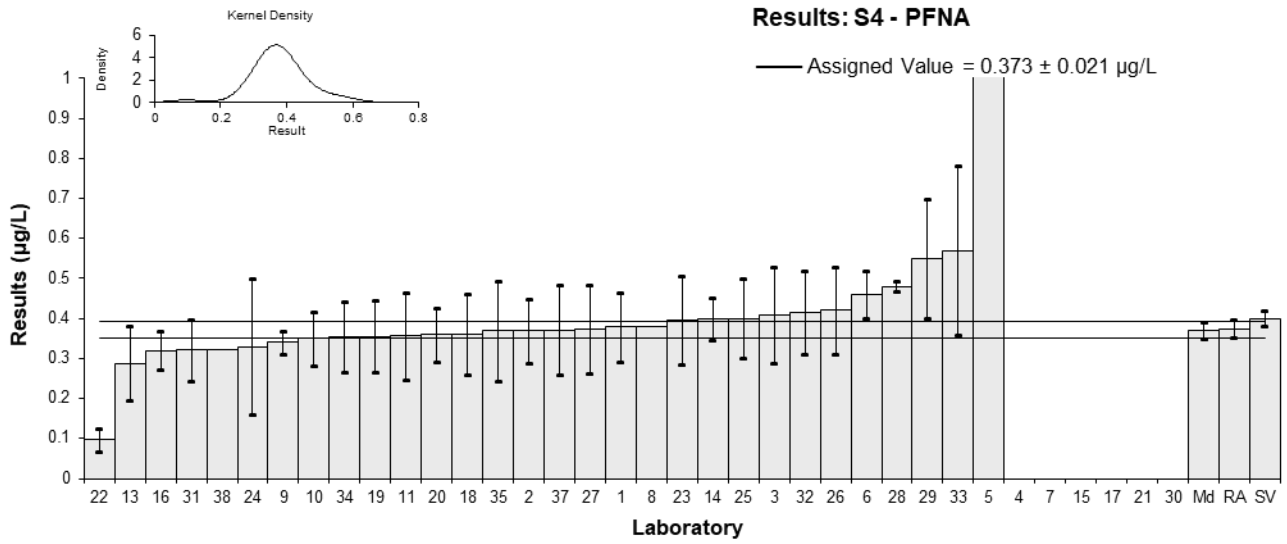
Participant Results

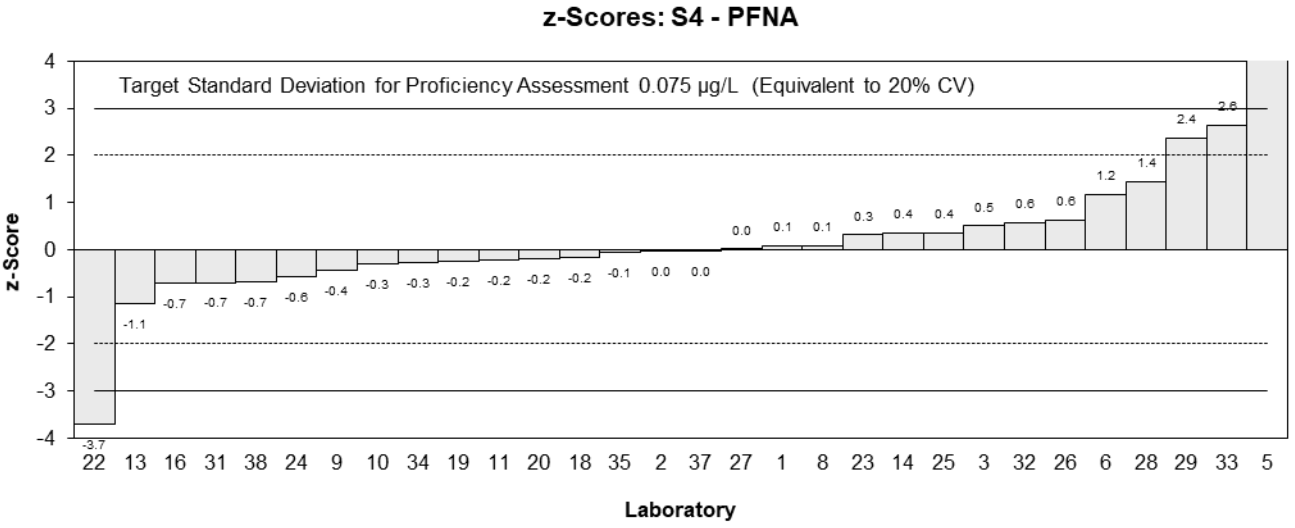
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.379	0.086	109.85	0.08	0.07
2	0.37	0.08	NR	-0.04	-0.04
3	0.41	0.12	93	0.50	0.30
4	NT	NT	NT		
5**	355.847405	73.4772133961	NR	4,765.07	4.84
6	0.46	0.0581	99	1.17	1.41
7	NS	NS	NS		
8	0.38	NR	78	0.09	0.33
9	0.34	0.03	NT	-0.44	-0.90
10	0.35	0.068	101	-0.31	-0.32
11	0.356	0.11	76	-0.23	-0.15
13	0.288	0.092	97	-1.14	-0.90
14	0.399	0.052	89	0.35	0.46
15	NS	NS	NS		
16	0.32	0.048	128	-0.71	-1.01
17	NS	NS	NS		
18	0.36	0.1	108	-0.17	-0.13
19	0.355	0.09	115	-0.24	-0.19
20	0.359	0.0682	92.6	-0.19	-0.20
21	NS	NS	NS		
22*	0.0968	0.029	197	-3.70	-7.71
23	0.396	0.111	84.87	0.31	0.20
24	0.33	0.17	94	-0.58	-0.25
25	0.4	0.1	100	0.36	0.26
26	0.42	0.11	108	0.63	0.42
27	0.3734	0.1120	86	0.01	0.00
28	0.48	0.012	122	1.43	4.42
29	0.550	0.149	90.8	2.37	1.18
30	NS	NS	NS		
31	0.321	0.076	110.62	-0.70	-0.66
32	0.416	0.104	117	0.58	0.41
33*	0.57	0.212	65	2.64	0.92
34	0.353	0.088	94	-0.27	-0.22
35	0.369	0.126	86	-0.05	-0.03
37	0.371	0.1113	94	-0.03	-0.02
38	0.3213	NR	NR	-0.69	-2.46

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.373	0.021
Spike Value	0.400	0.020
Robust Average	0.374	0.023
Median	0.370	0.021
Mean	0.376	
N	29	
Max	0.57	
Min	0.0968	
Robust SD	0.050	
Robust CV	13%	


Kernel Density
Density
Result
Results: S4 - PFNA
Assigned Value = 0.373 ± 0.021 µg/L
Results (µg/L)
22 13 16 31 38 24 9 10 34 19 11 20 18 35 2 37 27 1 8 23 14 25 3 32 26 6 28 29 33 5 4 7 15 17 21 30 Md RA SV
Laboratory


z-Scores: S4 - PFNA
Target Standard Deviation for Proficiency Assessment 0.075 µg/L (Equivalent to 20% CV)
z-Score
22 13 16 31 38 24 9 10 34 19 11 20 18 35 2 37 27 1 8 23 14 25 3 32 26 6 28 29 33 5
Laboratory

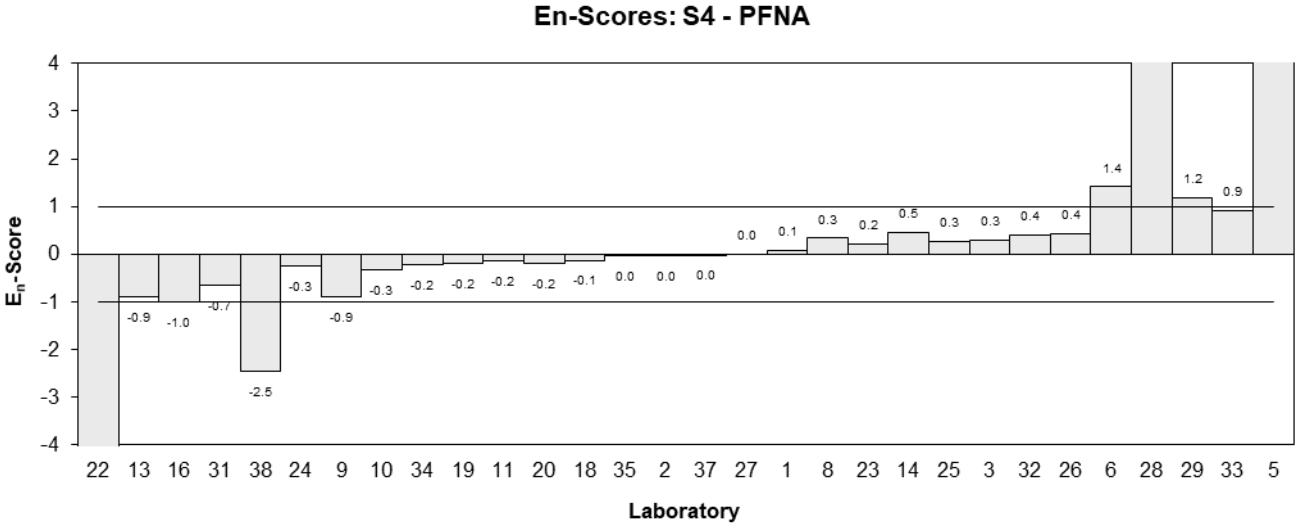

En-Scores: S4 - PFNA
En-Score
22 13 16 31 38 24 9 10 34 19 11 20 18 35 2 37 27 1 8 23 14 25 3 32 26 6 28 29 33 5
Laboratory

Figure 73

Table 77

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFDA
Unit	µg/L

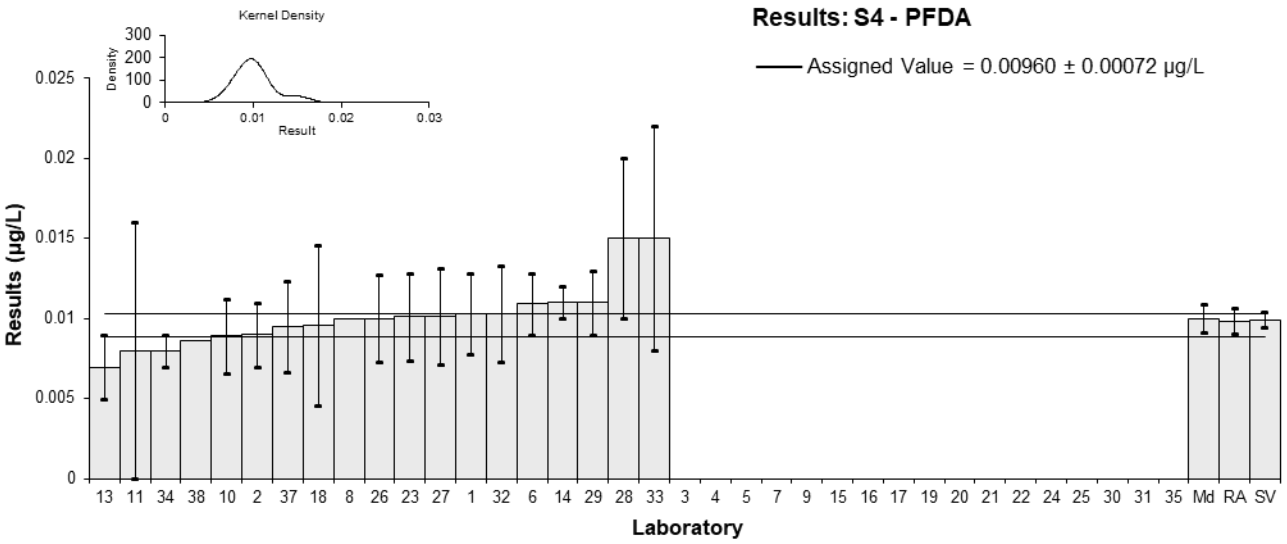
Participant Results

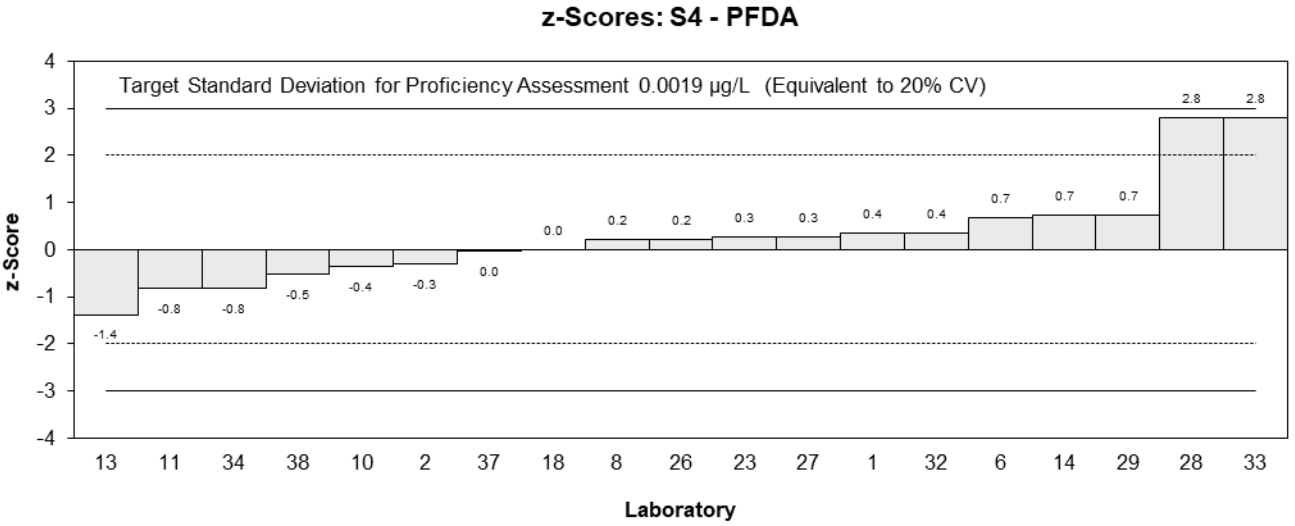
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0103	0.0025	119.01	0.36	0.27
2	0.009	0.002	NR	-0.31	-0.28
3	<0.02	NR	92		
4	NT	NT	NT		
5	NR	NR	NR		
6	0.0109	0.00195	97	0.68	0.63
7	NS	NS	NS		
8	0.010	NR	85	0.21	0.56
9	<0.05	NR	60		
10	0.0089	0.0023	106	-0.36	-0.29
11	0.0080	0.008	78	-0.83	-0.20
13	0.00695	0.002	118	-1.38	-1.25
14	0.011	0.001	103	0.73	1.14
15	NS	NS	NS		
16	NR	NR	NR		
17	NS	NS	NS		
18	0.0096	0.005	130	0.00	0.00
19	<0.02	NR	110		
20	<0.0365	0.00584	89.6		
21	NS	NS	NS		
22	<0.005	NR	179		
23	0.0101	0.0027	96.78	0.26	0.18
24	< 0.05	0.03	97		
25	NR	NR	NR		
26	0.01	0.0027	100	0.21	0.14
27	0.0101	0.0030	100	0.26	0.16
28*	0.015	0.005	106	2.81	1.07
29	0.011	0.002	121.6	0.73	0.66
30	NS	NS	NS		
31	<0.02	NR	115.57		
32	0.0103	0.0030	142	0.36	0.23
33*	0.015	0.007	74	2.81	0.77
34	0.008	0.001	96	-0.83	-1.30
35	<0.02	NR	75		
37	0.00952	0.002856	91	-0.04	-0.03
38	0.0086	NR	NR	-0.52	-1.39

* Outlier, see Section 4.2

Statistics

Assigned Value	0.00960	0.00072
Spike Value	0.00993	0.00050
Robust Average	0.00984	0.00081
Median	0.0100	0.0009
Mean	0.0101	
N	19	
Max	0.015	
Min	0.00695	
Robust SD	0.0014	
Robust CV	14%	


Results: S4 - PFDA
Assigned Value = 0.00960 ± 0.00072 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
13 11 34 38 10 2 37 18 8 26 23 27 1 32 6 14 29 28 33 3 4 5 7 9 15 16 17 19 20 21 22 24 25 30 31 35 Md RA SV


z-Scores: S4 - PFDA
Target Standard Deviation for Proficiency Assessment 0.0019 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
13 11 34 38 10 2 37 18 8 26 23 27 1 32 6 14 29 28 33

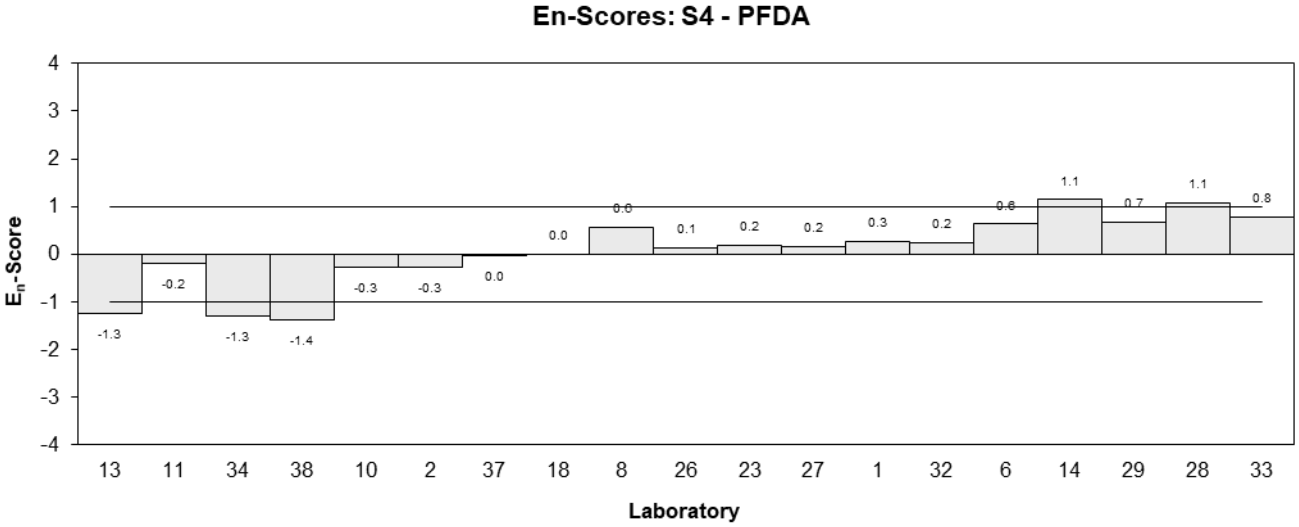

En-Scores: S4 - PFDA
En-Score
Laboratory
13 11 34 38 10 2 37 18 8 26 23 27 1 32 6 14 29 28 33

Figure 74

Table 78

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFUdA
Unit	µg/L

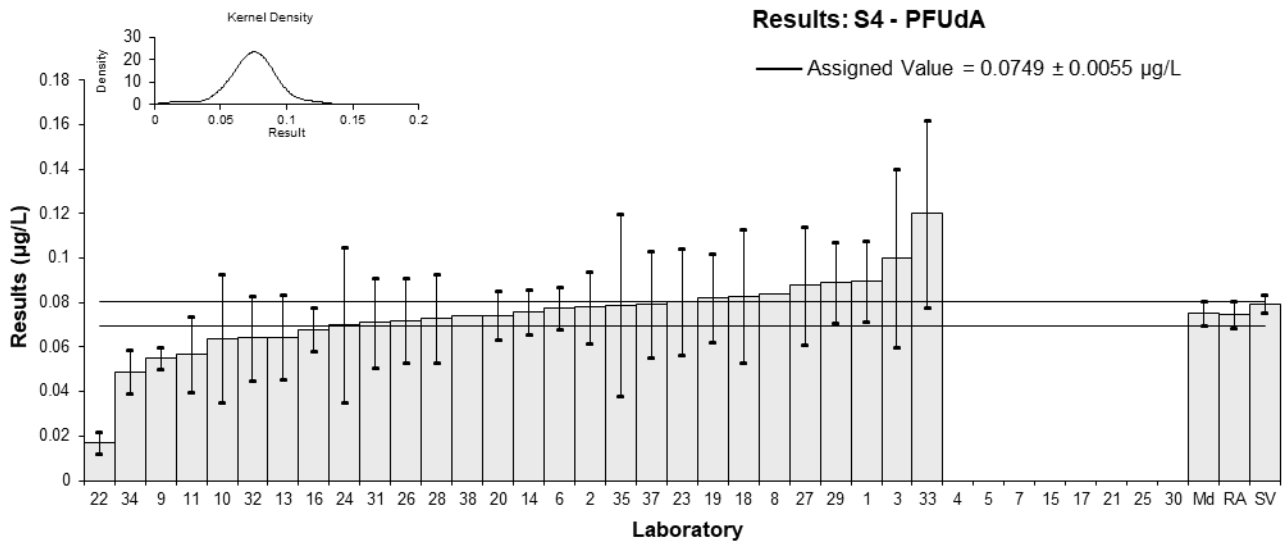
Participant Results

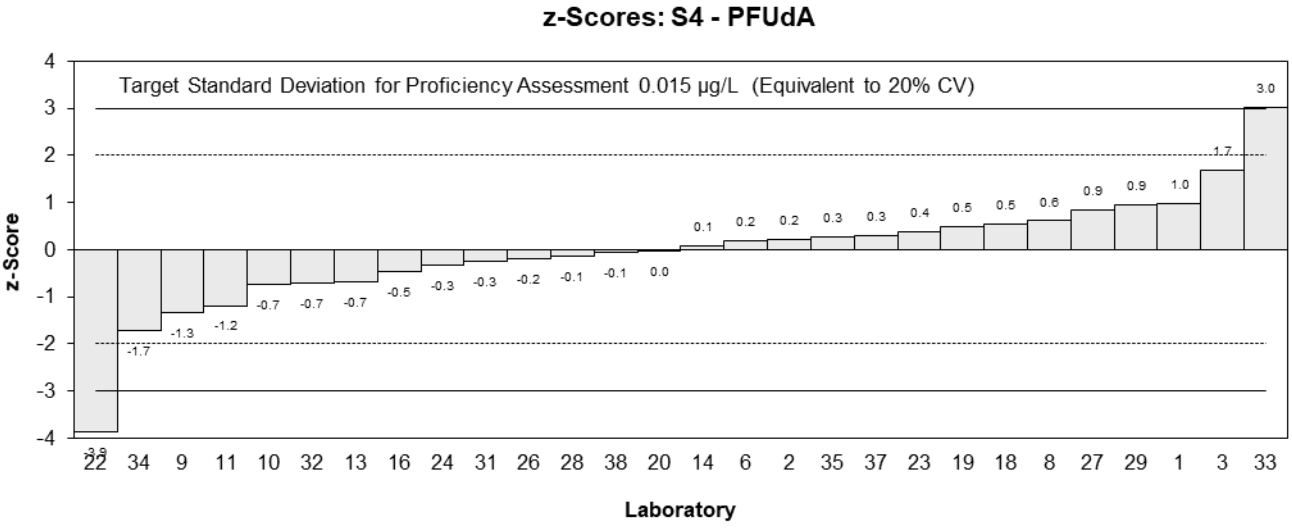
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0896	0.0183	117.25	0.98	0.77
2	0.078	0.016	NR	0.21	0.18
3	0.1	0.04	91	1.68	0.62
4	NT	NT	NT		
5	NR	NR	NR		
6	0.0776	0.00967	96	0.18	0.24
7	NS	NS	NS		
8	0.084	NR	79	0.61	1.65
9	0.055	0.005	NT	-1.33	-2.68
10	0.064	0.029	118	-0.73	-0.37
11	0.057	0.017	91	-1.19	-1.00
13	0.0645	0.019	109	-0.69	-0.53
14	0.076	0.010	102	0.07	0.10
15	NS	NS	NS		
16	0.068	0.010	129	-0.46	-0.60
17	NS	NS	NS		
18	0.083	0.03	112	0.54	0.27
19	0.0823	0.02	111	0.49	0.36
20	0.0744	0.0112	85.5	-0.03	-0.04
21	NS	NS	NS		
22*	0.017	0.0051	141	-3.87	-7.72
23	0.0805	0.024	97	0.37	0.23
24	0.07	0.035	88	-0.33	-0.14
25	NR	NR	NR		
26	0.072	0.019	106	-0.19	-0.15
27	0.0877	0.0263	76	0.85	0.48
28	0.073	0.02	97	-0.13	-0.09
29	0.089	0.018	111.7	0.94	0.75
30	NS	NS	NS		
31	0.071	0.02	117.1	-0.26	-0.19
32	0.0641	0.0192	142	-0.72	-0.54
33*	0.12	0.042	63	3.01	1.06
34	0.049	0.01	96	-1.73	-2.27
35	0.079	0.041	75	0.27	0.10
37	0.0793	0.02379	97	0.29	0.18
38	0.074	NR	NR	-0.06	-0.16

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0749	0.0055
Spike Value	0.0795	0.0040
Robust Average	0.0747	0.0061
Median	0.0752	0.0053
Mean	0.0743	
N	28	
Max	0.12	
Min	0.017	
Robust SD	0.013	
Robust CV	17%	


Kernel Density
Density
Result
Results: S4 - PFUdA
Assigned Value = 0.0749 ± 0.0055 µg/L
Results (µg/L)
Laboratory
22 34 9 11 10 32 13 16 24 31 26 28 38 20 14 6 2 35 37 23 19 18 8 27 29 1 3 33 4 5 7 15 17 21 25 30 Md RA SV


z-Scores: S4 - PFUdA
Target Standard Deviation for Proficiency Assessment 0.015 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 34 9 11 10 32 13 16 24 31 26 28 38 20 14 6 2 35 37 23 19 18 8 27 29 1 3 33

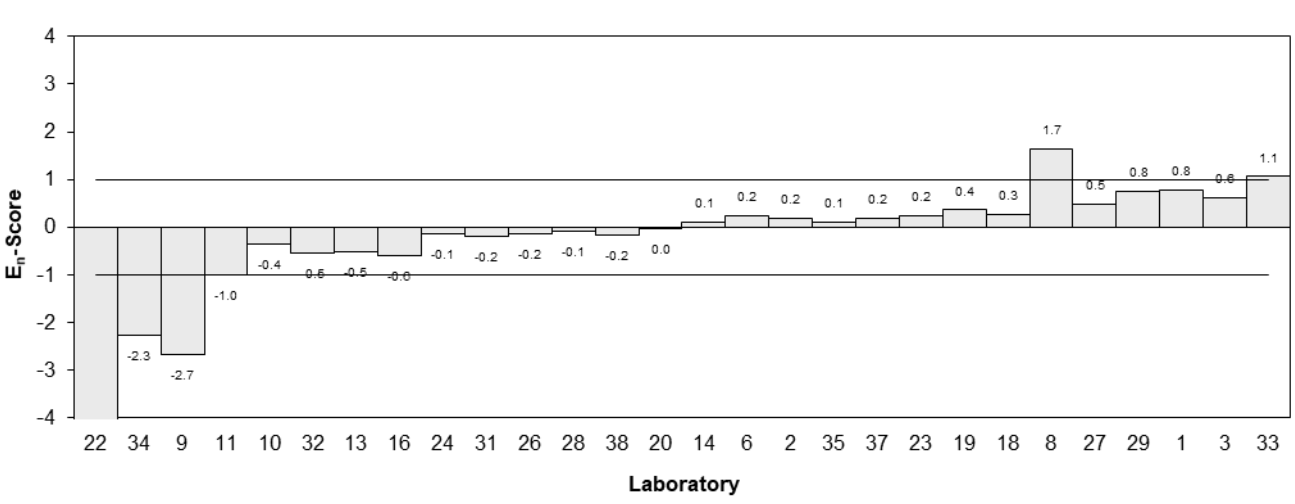

En-Scores: S4 - PFUdA
En-Score
Laboratory
22 34 9 11 10 32 13 16 24 31 26 28 38 20 14 6 2 35 37 23 19 18 8 27 29 1 3 33

Figure 75

Table 79

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFDoA
Unit	µg/L

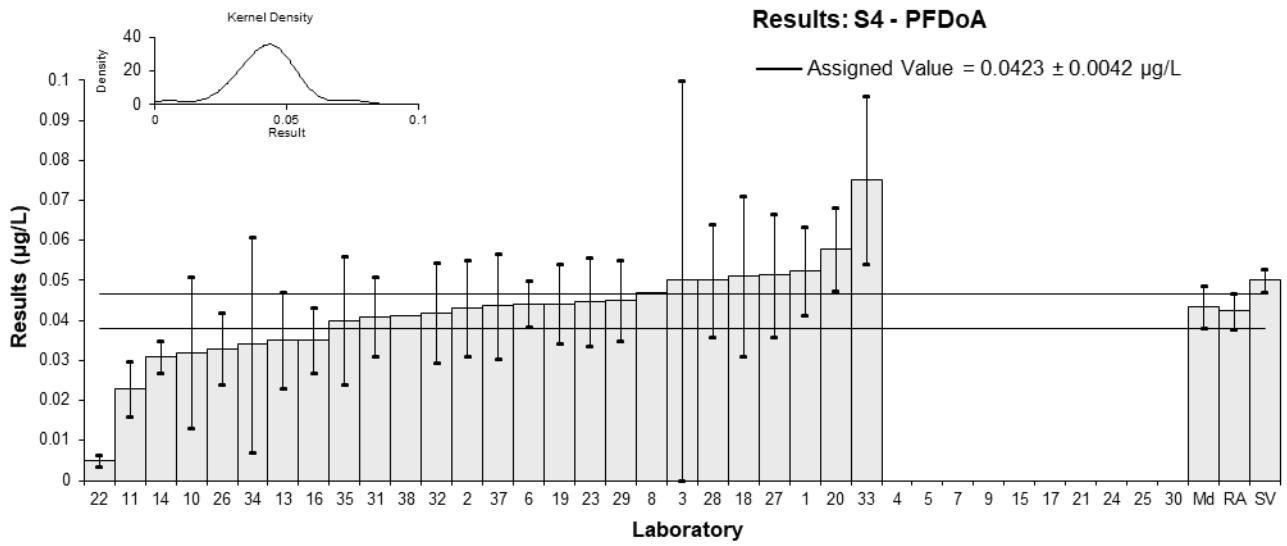
Participant Results

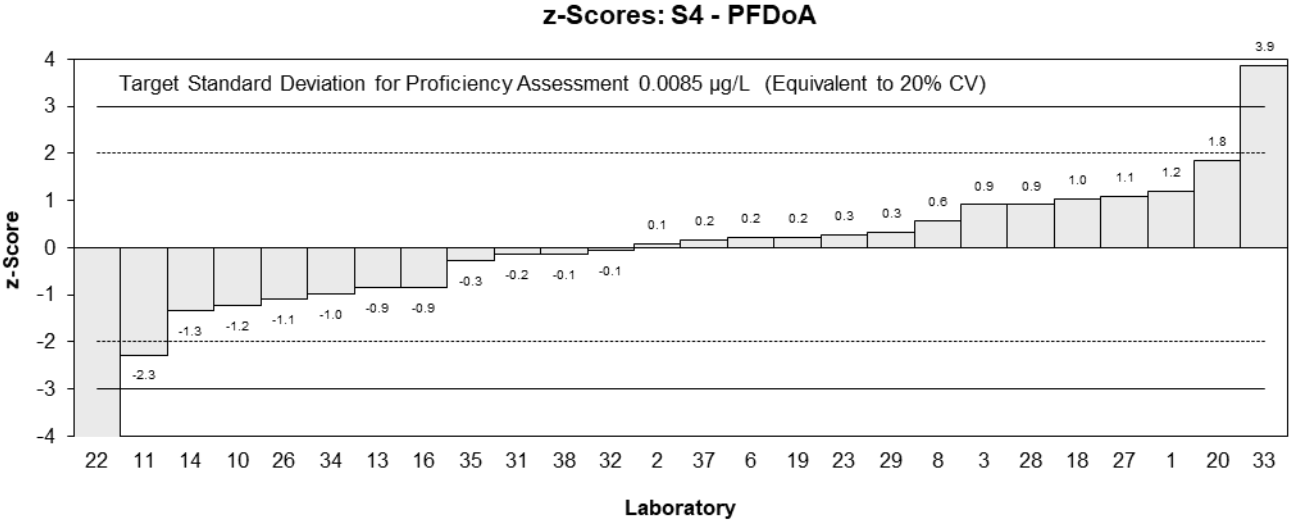
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0524	0.0111	107.95	1.19	0.85
2	0.043	0.012	NR	0.08	0.06
3	0.05	0.05	93	0.91	0.15
4	NT	NT	NT		
5	NR	NR	NR		
6	0.0441	0.00578	93	0.21	0.25
7	NS	NS	NS		
8	0.047	NR	74	0.56	1.12
9	<0.05	NR	NT		
10	0.032	0.019	112	-1.22	-0.53
11	0.023	0.0069	82	-2.28	-2.39
13	0.035	0.012	107	-0.86	-0.57
14	0.031	0.004	93	-1.34	-1.95
15	NS	NS	NS		
16	0.035	0.0081	125	-0.86	-0.80
17	NS	NS	NS		
18	0.051	0.02	100	1.03	0.43
19	0.0442	0.01	109	0.22	0.18
20	0.0579	0.0104	77.1	1.84	1.39
21	NS	NS	NS		
22*	0.00502	0.00151	81	-4.41	-8.35
23	0.0447	0.011	97.69	0.28	0.20
24	< 0.09	0.05	83		
25	NR	NR	NR		
26	0.033	0.0089	105	-1.10	-0.95
27	0.0514	0.0154	66	1.08	0.57
28	0.05	0.014	51	0.91	0.53
29	0.045	0.010	133.1	0.32	0.25
30	NS	NS	NS		
31	0.041	0.01	106.26	-0.15	-0.12
32	0.0419	0.0125	117	-0.05	-0.03
33*	0.075	0.021	53	3.87	1.53
34	0.034	0.027	96	-0.98	-0.30
35	0.040	0.016	76	-0.27	-0.14
37	0.0437	0.01311	93	0.17	0.10
38	0.0412	NR	NR	-0.13	-0.26

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0423	0.0042
Spike Value	0.0500	0.0030
Robust Average	0.0423	0.0046
Median	0.0434	0.0052
Mean	0.0420	
N	26	
Max	0.075	
Min	0.00502	
Robust SD	0.0094	
Robust CV	22%	


Results: S4 - PFDoA
Kernel Density
Density
Result
Assigned Value = 0.0423 ± 0.0042 µg/L
Results (µg/L)
Laboratory
22 11 14 10 26 34 13 16 35 31 38 32 2 37 6 19 23 29 8 3 28 18 27 1 20 33 4 5 7 9 15 17 21 24 25 30 Md RA SV


z-Scores: S4 - PFDoA
Target Standard Deviation for Proficiency Assessment 0.0085 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 11 14 10 26 34 13 16 35 31 38 32 2 37 6 19 23 29 8 3 28 18 27 1 20 33

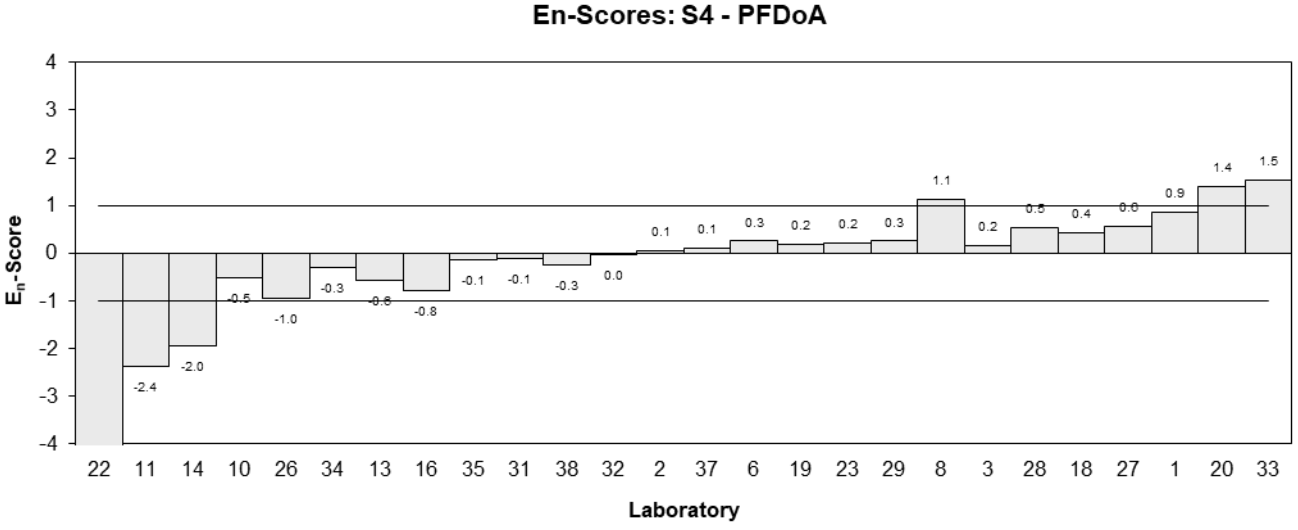

En-Scores: S4 - PFDoA
En-Score
Laboratory
22 11 14 10 26 34 13 16 35 31 38 32 2 37 6 19 23 29 8 3 28 18 27 1 20 33

Figure 76

Table 80

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFTrDA
Unit	µg/L

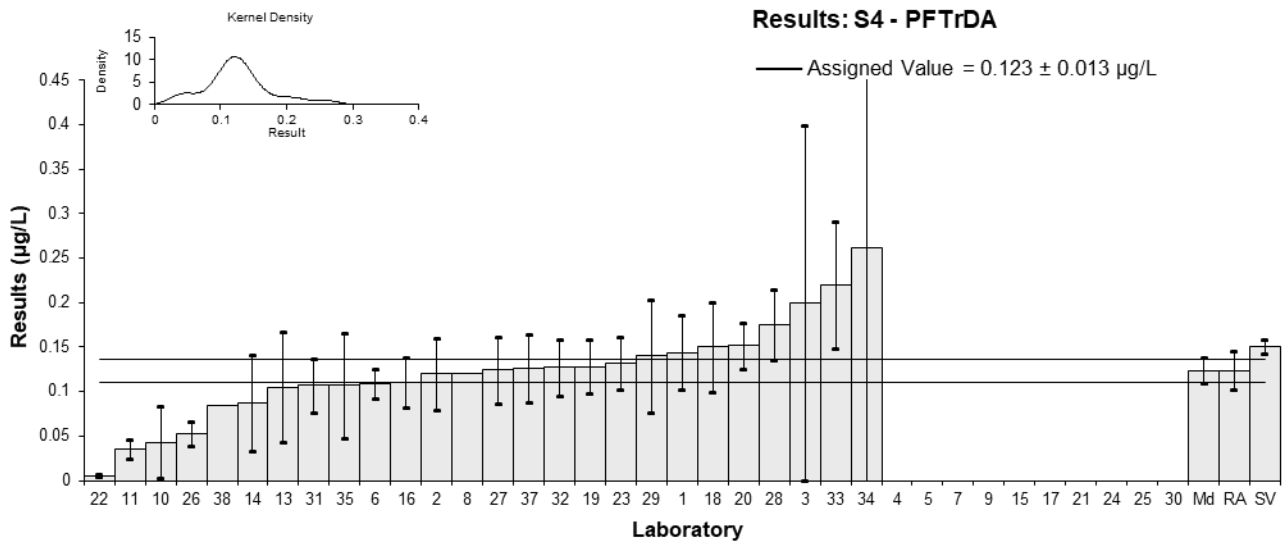
Participant Results

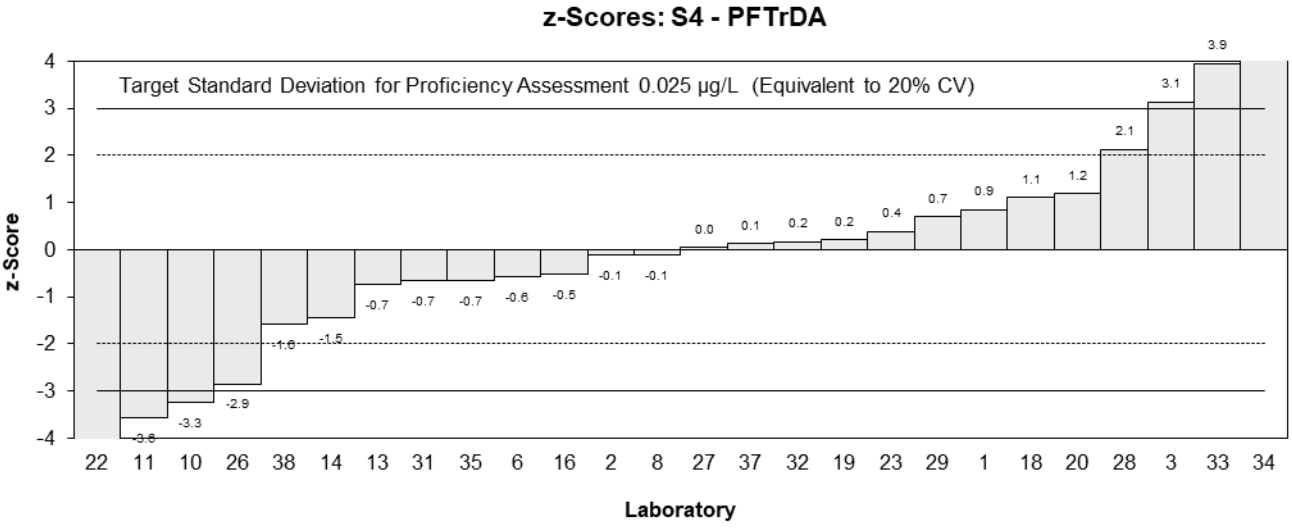
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.144	0.042	107.95	0.85	0.48
2	0.12	0.04	NR	-0.12	-0.07
3*	0.2	0.2	93	3.13	0.38
4	NT	NT	NT		
5	NR	NR	NR		
6	0.109	0.0171	93	-0.57	-0.65
7	NS	NS	NS		
8	0.12	NR	74	-0.12	-0.23
9	<0.05	NR	NT		
10*	0.043	0.040	112	-3.25	-1.90
11*	0.035	0.011	82	-3.58	-5.17
13	0.105	0.062	NR	-0.73	-0.28
14	0.087	0.054	71	-1.46	-0.65
15	NS	NS	NS		
16	0.11	0.028	125	-0.53	-0.42
17	NS	NS	NS		
18	0.15	0.05	100	1.10	0.52
19	0.128	0.03	NR	0.20	0.15
20	0.152	0.0259	74.7	1.18	1.00
21	NS	NS	NS		
22**	0.00552	0.00166	79	-4.78	-8.96
23	0.132	0.029	97.69	0.37	0.28
24	< 0.23	0.15	NR		
25	NR	NR	NR		
26*	0.053	0.014	88	-2.85	-3.66
27	0.1241	0.0372	NR	0.04	0.03
28	0.175	0.04	NR	2.11	1.24
29	0.140	0.063	NR	0.69	0.26
30	NS	NS	NS		
31	0.107	0.03	121.36	-0.65	-0.49
32	0.127	0.032	117	0.16	0.12
33*	0.22	0.071	47	3.94	1.34
34*	0.262	0.468	144	5.65	0.30
35	0.107	0.059	76	-0.65	-0.26
37	0.126	0.0378	93	0.12	0.08
38	0.0841	NR	NR	-1.58	-2.99

* Outlier, ** Gross Error, see Section 4.2

Statistics

Assigned Value	0.123	0.013
Spike Value	0.151	0.008
Robust Average	0.124	0.021
Median	0.124	0.014
Mean	0.126	
N	25	
Max	0.262	
Min	0.035	
Robust SD	0.042	
Robust CV	34%	


Kernel Density
Density
Result
Results: S4 - PFTrDA
Assigned Value = 0.123 ± 0.013 µg/L
Results (µg/L)
Laboratory
22 11 10 26 38 14 13 31 35 6 16 2 8 27 37 32 19 23 29 1 18 20 28 3 33 34 4 5 7 9 15 17 21 24 25 30 Md RA SV


z-Scores: S4 - PFTrDA
Target Standard Deviation for Proficiency Assessment 0.025 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 11 10 26 38 14 13 31 35 6 16 2 8 27 37 32 19 23 29 1 18 20 28 3 33 34

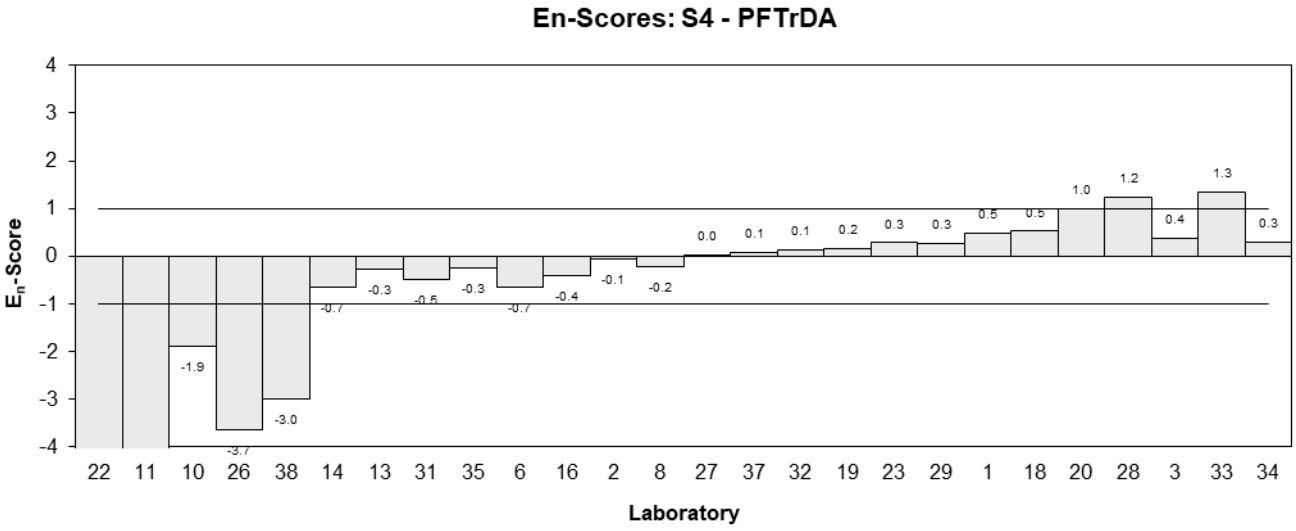

En-Scores: S4 - PFTrDA
En-Score
Laboratory
22 11 10 26 38 14 13 31 35 6 16 2 8 27 37 32 19 23 29 1 18 20 28 3 33 34

Figure 77

Table 81

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFTeDA
Unit	µg/L

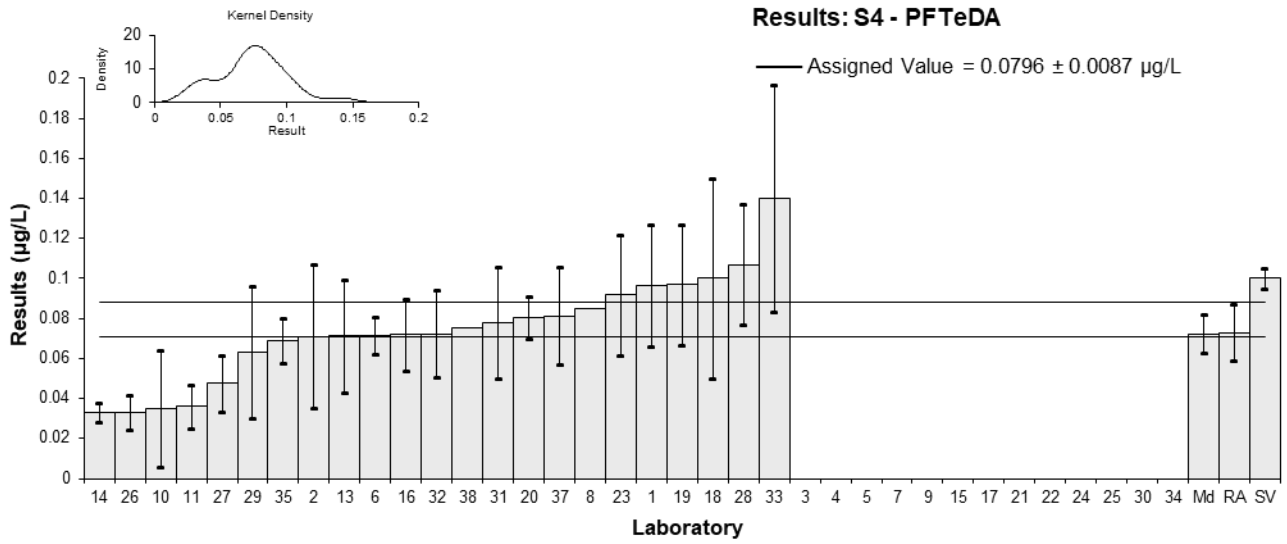
Participant Results

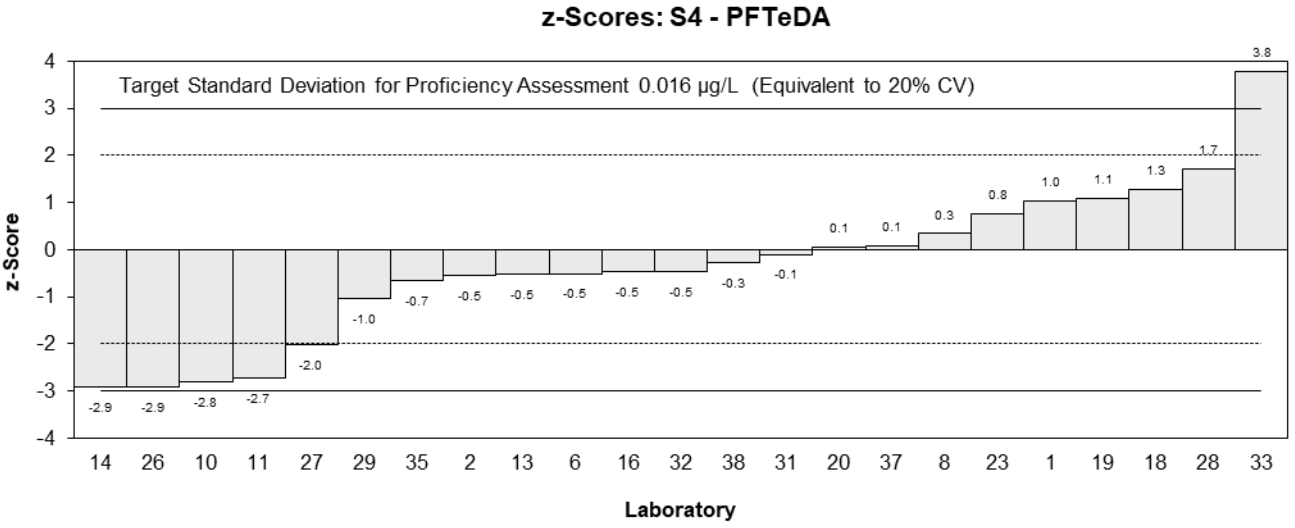
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0962	0.0304	79.63	1.04	0.52
2	0.071	0.036	NR	-0.54	-0.23
3	<0.5	NR	85		
4	NT	NT	NT		
5	NR	NR	NR		
6	0.0715	0.00921	93	-0.51	-0.64
7	NS	NS	NS		
8	0.085	NR	44	0.34	0.62
9	<0.1	NR	NT		
10*	0.035	0.029	190	-2.80	-1.47
11*	0.036	0.011	82	-2.74	-3.11
13	0.0712	0.028	69	-0.53	-0.29
14*	0.033	0.005	71	-2.93	-4.64
15	NS	NS	NS		
16	0.072	0.018	122	-0.48	-0.38
17	NS	NS	NS		
18	0.1	0.05	94	1.28	0.40
19	0.0968	0.03	100	1.08	0.55
20	0.0804	0.0105	72.3	0.05	0.06
21	NS	NS	NS		
22	<0.01	NR	79		
23	0.0917	0.03	92.61	0.76	0.39
24	< 0.09	0.05	87		
25	NR	NR	NR		
26*	0.033	0.0089	105	-2.93	-3.74
27	0.0475	0.0143	54	-2.02	-1.92
28	0.107	0.03	39	1.72	0.88
29	0.063	0.033	144	-1.04	-0.49
30	NS	NS	NS		
31	0.078	0.028	121.36	-0.10	-0.05
32	0.0723	0.0216	78	-0.46	-0.31
33*	0.14	0.057	47	3.79	1.05
34	NR	NR	143		
35	0.069	0.011	86	-0.67	-0.76
37	0.0811	0.02433	88	0.09	0.06
38	0.075	NR	NR	-0.29	-0.53

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0796	0.0087
Spike Value	0.100	0.005
Robust Average	0.073	0.014
Median	0.0723	0.0098
Mean	0.074	
N	23	
Max	0.14	
Min	0.033	
Robust SD	0.026	
Robust CV	36%	


Results: S4 - PFTeDA
Assigned Value = 0.0796 ± 0.0087 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
14 26 10 11 27 29 35 2 13 6 16 32 38 31 20 37 8 23 1 19 18 28 33 3 4 5 7 9 15 17 21 22 24 25 30 34 Md RA SV


z-Scores: S4 - PFTeDA
Target Standard Deviation for Proficiency Assessment 0.016 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
14 26 10 11 27 29 35 2 13 6 16 32 38 31 20 37 8 23 1 19 18 28 33

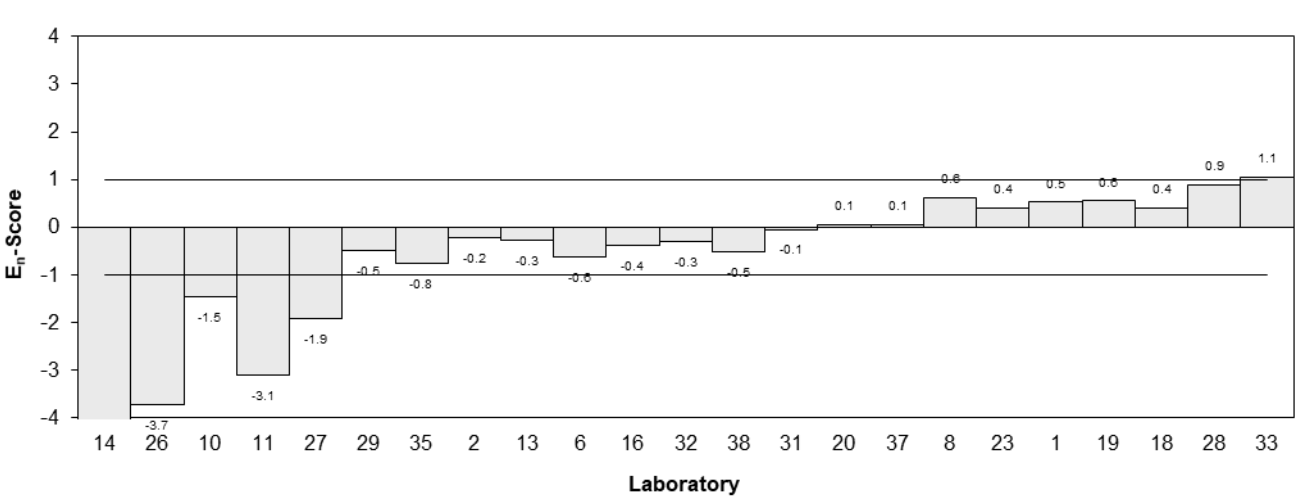

En-Scores: S4 - PFTeDA
En-Score
Laboratory
14 26 10 11 27 29 35 2 13 6 16 32 38 31 20 37 8 23 1 19 18 28 33

Figure 78

Table 82

Sample Details

Sample No.	S4
Matrix	Water
Analyte	PFOSA
Unit	µg/L

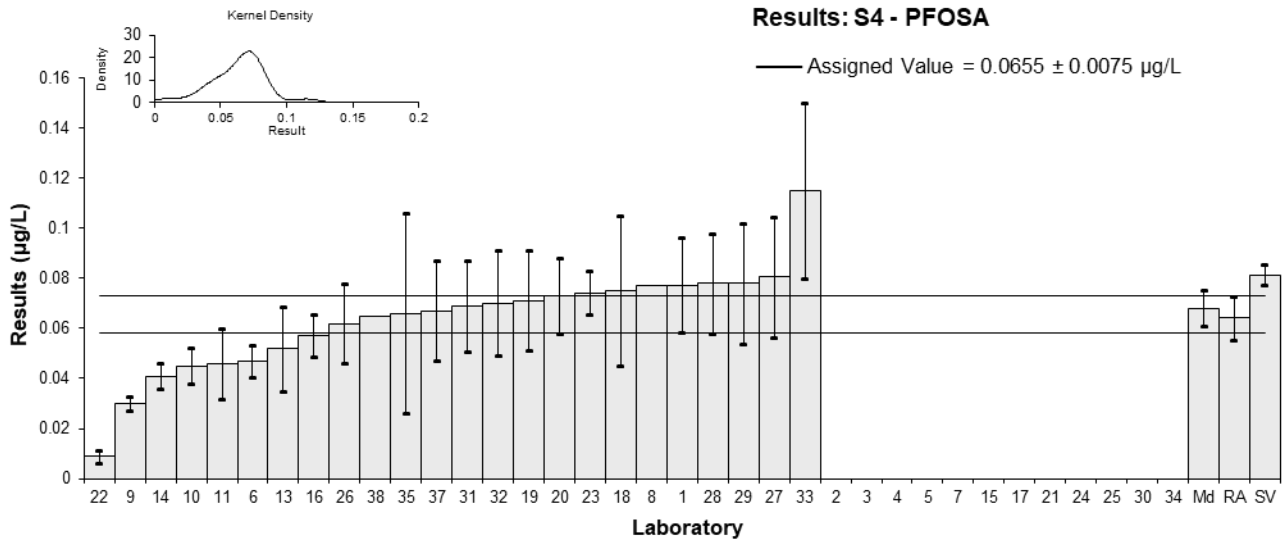
Participant Results

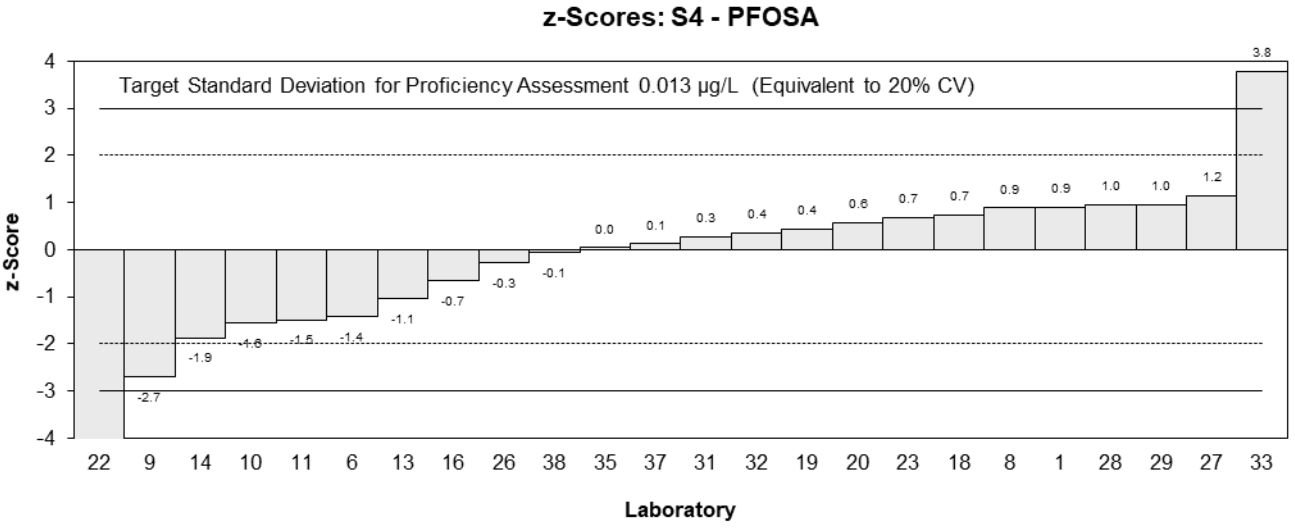
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.0773	0.0189	100.1	0.90	0.58
2	NT	NT	NT		
3	<0.1	NR	100		
4	NT	NT	NT		
5	NT	NT	NT		
6	0.0469	0.00652	89	-1.42	-1.87
7	NS	NS	NS		
8	0.077	NR	73	0.88	1.53
9*	0.03	0.003	NT	-2.71	-4.39
10	0.045	0.0071	70	-1.56	-1.98
11	0.046	0.014	73	-1.49	-1.23
13	0.0518	0.017	87	-1.05	-0.74
14	0.041	0.005	69	-1.87	-2.72
15	NS	NS	NS		
16	0.057	0.0085	112	-0.65	-0.75
17	NS	NS	NS		
18	0.075	0.03	85	0.73	0.31
19	0.0712	0.02	94	0.44	0.27
20	0.073	0.0153	90.9	0.57	0.44
21	NS	NS	NS		
22*	0.00875	0.00263	84	-4.33	-7.14
23	0.0743	0.0088	97.51	0.67	0.76
24	< 0.18	0.1	78		
25	NR	NR	NR		
26	0.062	0.016	96	-0.27	-0.20
27	0.0805	0.0242	52	1.15	0.59
28	0.078	0.02	NR	0.95	0.59
29	0.078	0.024	104.1	0.95	0.50
30	NS	NS	NS		
31	0.069	0.018	102.23	0.27	0.18
32	0.0701	0.0210	107	0.35	0.21
33*	0.115	0.035	64	3.78	1.38
34	NR	NR	NR		
35	0.066	0.040	75	0.04	0.01
37	0.0671	0.02013	86	0.12	0.07
38	0.0647	NR	NR	-0.06	-0.11

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0655	0.0075
Spike Value	0.0813	0.0041
Robust Average	0.0641	0.0086
Median	0.0681	0.0073
Mean	0.0635	
N	24	
Max	0.115	
Min	0.00875	
Robust SD	0.017	
Robust CV	26%	


Kernel Density
Density
Result
Results: S4 - PFOSA
Assigned Value = 0.0655 ± 0.0075 µg/L
Results (µg/L)
Laboratory
22 9 14 10 11 6 13 16 26 38 35 37 31 32 19 20 23 18 8 1 28 29 27 33 2 3 4 5 7 15 17 21 24 25 30 34 Md RA SV


z-Scores: S4 - PFOSA
Target Standard Deviation for Proficiency Assessment 0.013 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 9 14 10 11 6 13 16 26 38 35 37 31 32 19 20 23 18 8 1 28 29 27 33

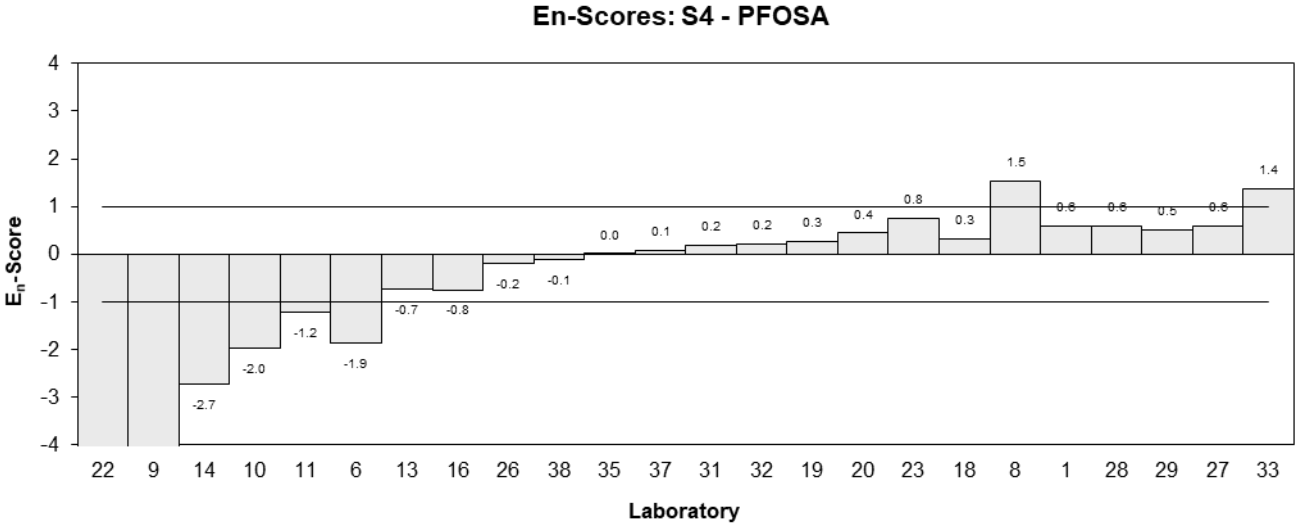

En-Scores: S4 - PFOSA
En-Score
Laboratory
22 9 14 10 11 6 13 16 26 38 35 37 31 32 19 20 23 18 8 1 28 29 27 33

Figure 79

Table 83

Sample Details

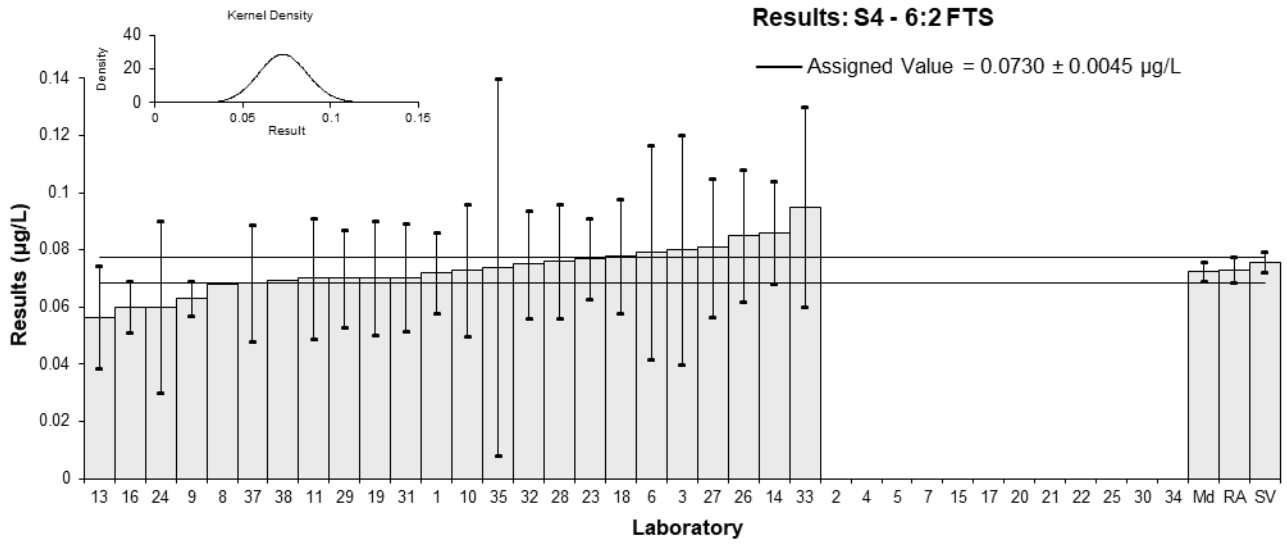
Sample No.	S4
Matrix	Water
Analyte	6:2 FTS
Unit	µg/L

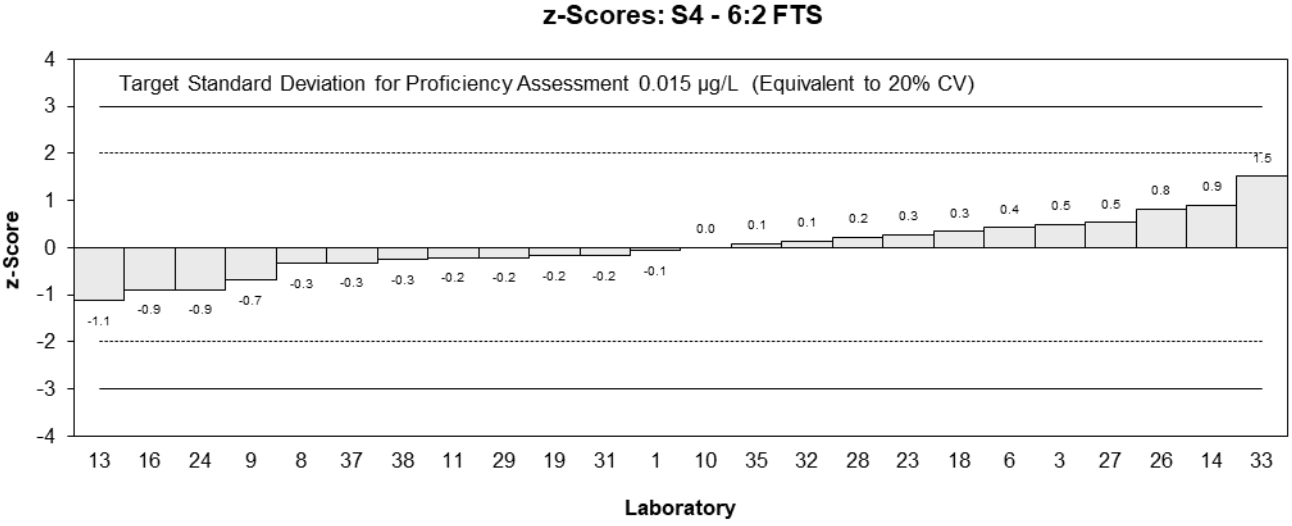
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.072	0.014	115.11	-0.07	-0.07
2	NT	NT	NT		
3	0.08	0.04	90	0.48	0.17
4	NT	NT	NT		
5	NT	NT	NT		
6	0.0791	0.0376	98	0.42	0.16
7	NS	NS	NS		
8	0.068	NR	95	-0.34	-1.11
9	0.063	0.006	NT	-0.68	-1.33
10	0.073	0.023	115	0.00	0.00
11	0.070	0.021	89	-0.21	-0.14
13	0.0565	0.018	107	-1.13	-0.89
14	0.086	0.018	124	0.89	0.70
15	NS	NS	NS		
16	0.060	0.0090	120	-0.89	-1.29
17	NS	NS	NS		
18	0.078	0.02	104	0.34	0.24
19	0.0703	0.02	116	-0.18	-0.13
20	<0.132	0.0553	87.7		
21	NS	NS	NS		
22	NT	NT	NT		
23	0.077	0.014	175.75	0.27	0.27
24	0.06	0.03	109	-0.89	-0.43
25	NR	NR	NR		
26	0.085	0.023	100	0.82	0.51
27	0.0808	0.0242	133	0.53	0.32
28	0.076	0.02	NR	0.21	0.15
29	0.070	0.017	145.8	-0.21	-0.17
30	NS	NS	NS		
31	0.0703	0.0189	126.62	-0.18	-0.14
32	0.0751	0.0188	92	0.14	0.11
33	0.095	0.035	102	1.51	0.62
34	NR	NR	NR		
35	0.074	0.066	103	0.07	0.02
37	0.0684	0.02052	111	-0.32	-0.22
38	0.0693	NR	NR	-0.25	-0.82

Statistics

Assigned Value	0.0730	0.0045
Spike Value	0.0758	0.0038
Robust Average	0.0730	0.0045
Median	0.0725	0.0034
Mean	0.0732	
N	24	
Max	0.095	
Min	0.0565	
Robust SD	0.0088	
Robust CV	12%	


Results: S4 - 6:2 FTS
Kernel Density
Density
Result
Assigned Value = 0.0730 ± 0.0045 µg/L
Results (µg/L)
Laboratory
13 16 24 9 8 37 38 11 29 19 31 1 10 35 32 28 23 18 6 3 27 26 14 33 2 4 5 7 15 17 20 21 22 25 30 34 Md RA SV


z-Scores: S4 - 6:2 FTS
Target Standard Deviation for Proficiency Assessment 0.015 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
13 16 24 9 8 37 38 11 29 19 31 1 10 35 32 28 23 18 6 3 27 26 14 33

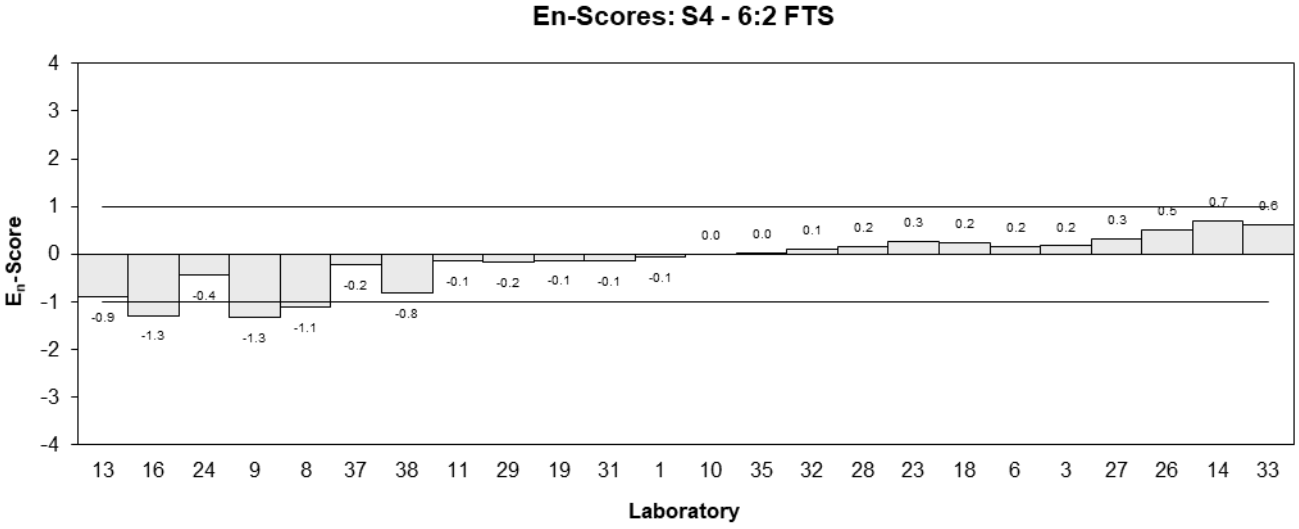

En-Scores: S4 - 6:2 FTS
En-Score
Laboratory
13 16 24 9 8 37 38 11 29 19 31 1 10 35 32 28 23 18 6 3 27 26 14 33

Figure 80

Table 84

Sample Details

Sample No.	S4
Matrix	Water
Analyte	8:2 FTS
Unit	µg/L

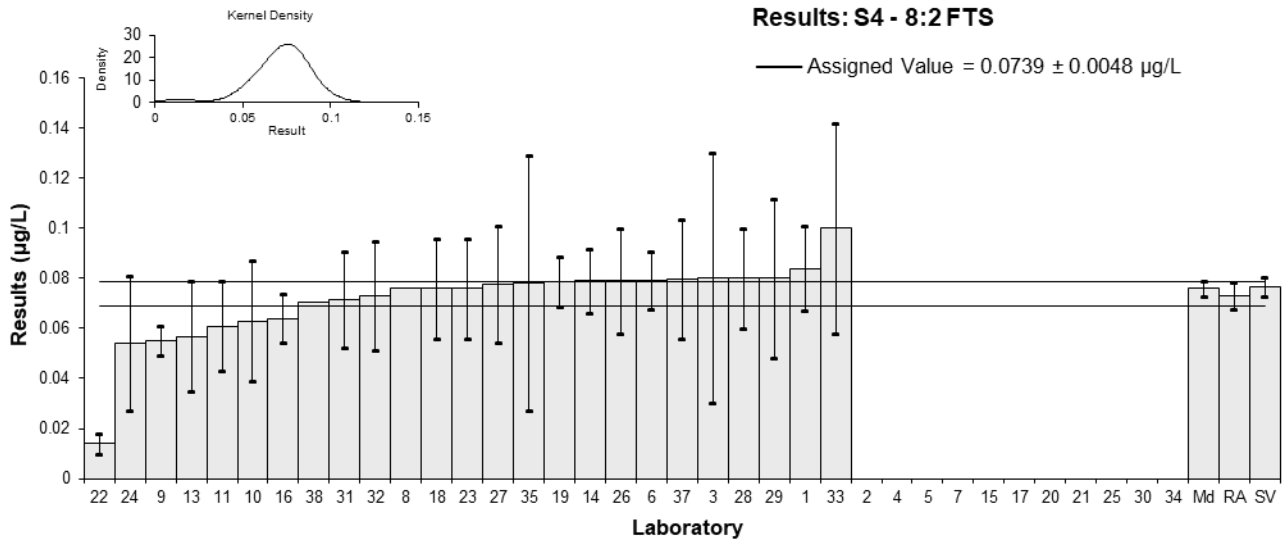
Participant Results

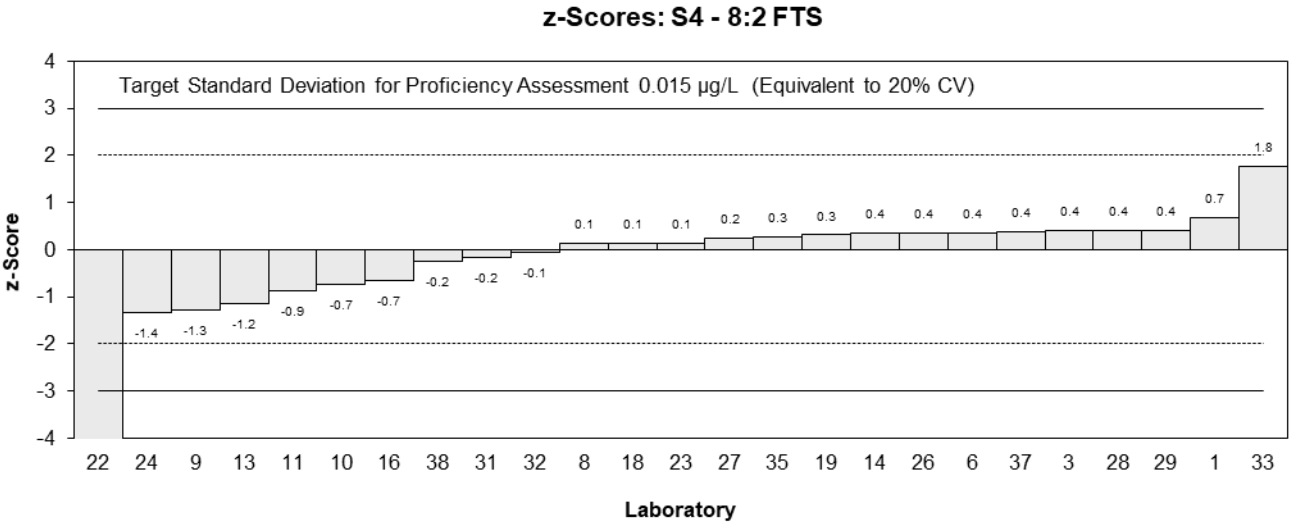
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.084	0.017	129.79	0.68	0.57
2	NT	NT	NT		
3	0.08	0.05	90	0.41	0.12
4	NT	NT	NT		
5	NT	NT	NT		
6	0.0792	0.0114	98	0.36	0.43
7	NS	NS	NS		
8	0.076	NR	286	0.14	0.44
9	0.055	0.006	NT	-1.28	-2.46
10	0.063	0.024	120	-0.74	-0.45
11	0.061	0.018	78	-0.87	-0.69
13	0.0568	0.022	72	-1.16	-0.76
14	0.079	0.013	122	0.35	0.37
15	NS	NS	NS		
16	0.064	0.0096	108	-0.67	-0.92
17	NS	NS	NS		
18	0.076	0.02	116	0.14	0.10
19	0.0785	0.01	118	0.31	0.41
20	<0.124	0.0248	75.5		
21	NS	NS	NS		
22*	0.0139	0.00417	274	-4.06	-9.44
23	0.076	0.02	108.4	0.14	0.10
24	0.054	0.027	106	-1.35	-0.73
25	NR	NR	NR		
26	0.079	0.021	100	0.35	0.24
27	0.0775	0.0233	126	0.24	0.15
28	0.08	0.02	127	0.41	0.30
29	0.080	0.032	122.8	0.41	0.19
30	NS	NS	NS		
31	0.0713	0.0192	130.08	-0.18	-0.13
32	0.0730	0.0218	122	-0.06	-0.04
33	0.1	0.042	118	1.77	0.62
34	NR	NR	NR		
35	0.078	0.051	98	0.28	0.08
37	0.0796	0.02388	109	0.39	0.23
38	0.0703	NR	NR	-0.24	-0.75

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0739	0.0048
Spike Value	0.0766	0.0038
Robust Average	0.0729	0.0054
Median	0.0760	0.0030
Mean	0.0714	
N	25	
Max	0.1	
Min	0.0139	
Robust SD	0.011	
Robust CV	15%	


Results: S4 - 8:2 FTS
Assigned Value = 0.0739 ± 0.0048 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
22 24 9 13 11 10 16 38 31 32 8 18 23 27 35 19 14 26 6 37 3 28 29 1 33 2 4 5 7 15 17 20 21 25 30 34 Md RA SV


z-Scores: S4 - 8:2 FTS
Target Standard Deviation for Proficiency Assessment 0.015 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
22 24 9 13 11 10 16 38 31 32 8 18 23 27 35 19 14 26 6 37 3 28 29 1 33

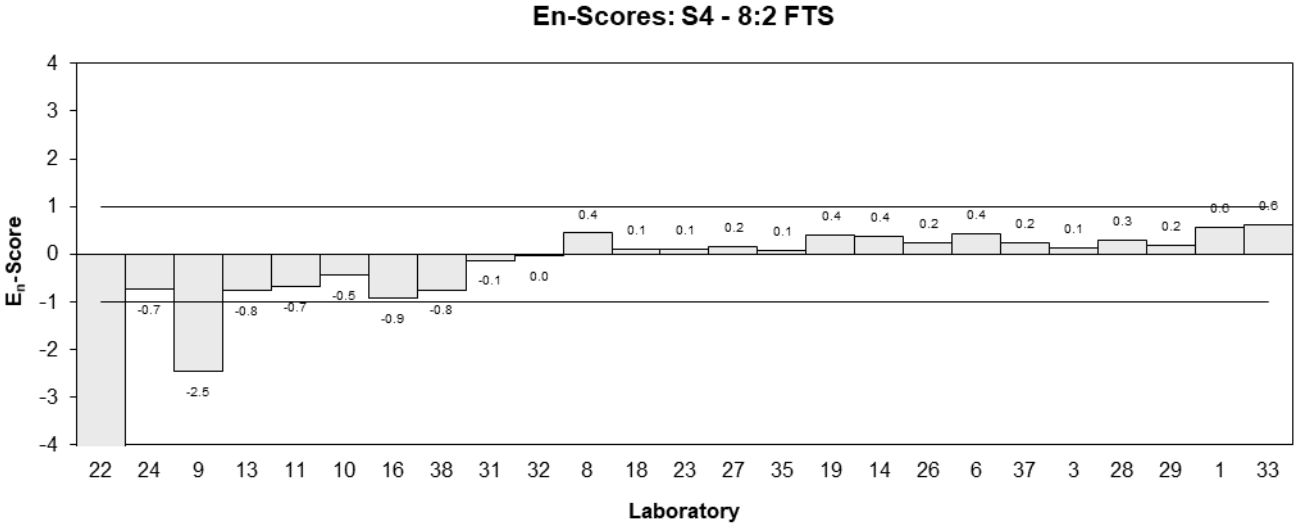

En-Scores: S4 - 8:2 FTS
En-Score
Laboratory
22 24 9 13 11 10 16 38 31 32 8 18 23 27 35 19 14 26 6 37 3 28 29 1 33

Figure 81

Table 85

Sample Details

Sample No.	S4
Matrix	Water
Analyte	GenX
Unit	µg/L

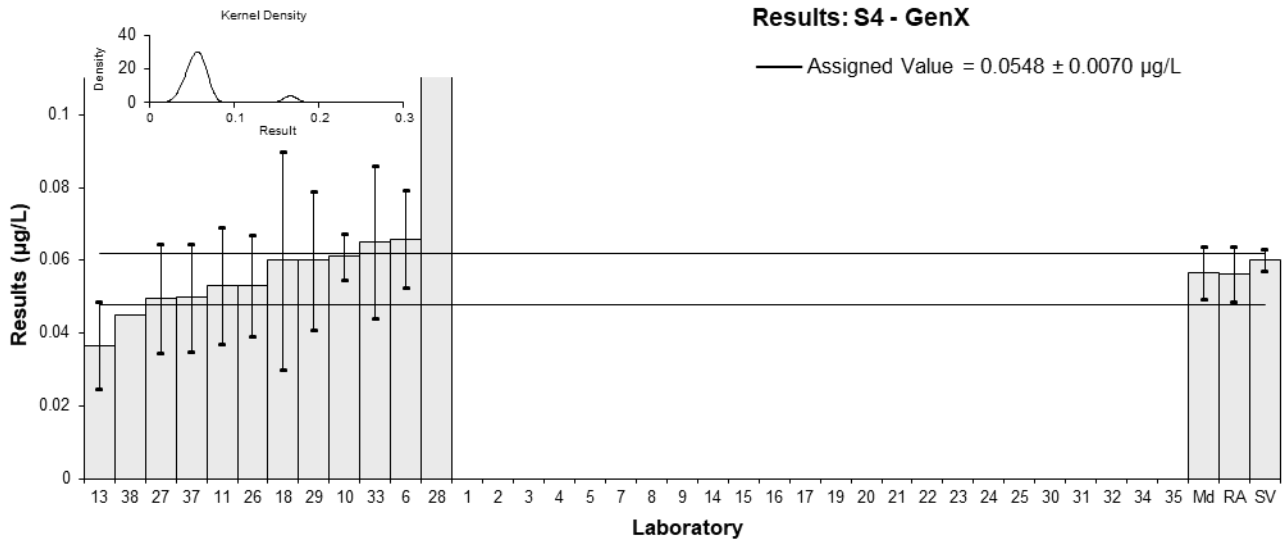
Participant Results

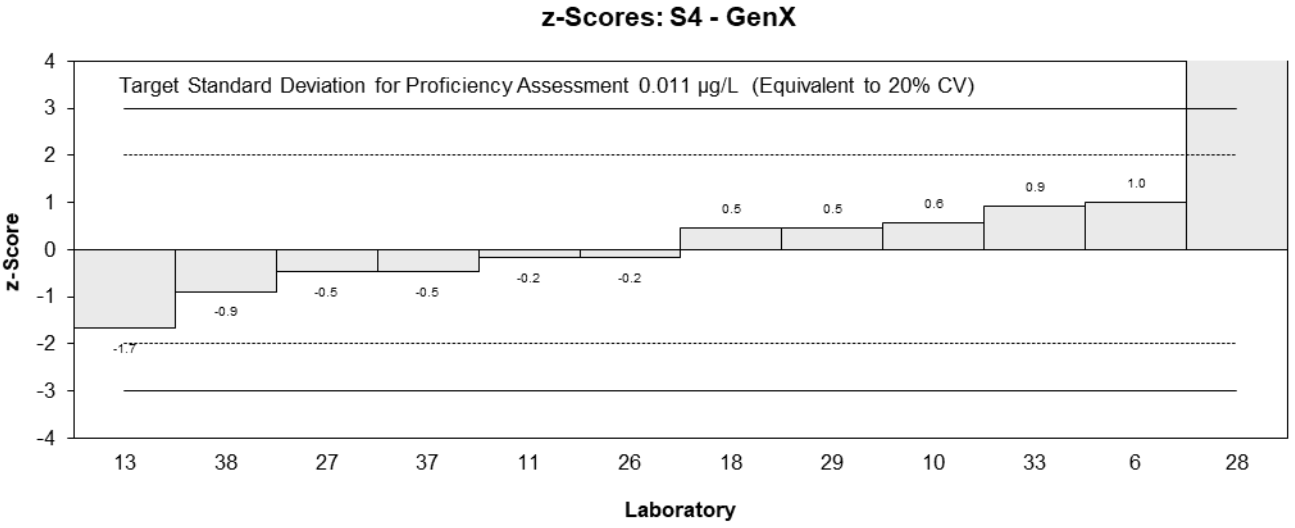
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NT	NT	NT		
3	NT	NT	NT		
4	NT	NT	NT		
5	NT	NT	NT		
6	0.0659	0.0133	93	1.01	0.74
7	NS	NS	NS		
8	NT	NT	NT		
9	<0.05	NR	NT		
10	0.061	0.0063	89	0.57	0.66
11	0.053	0.016	69	-0.16	-0.10
13	0.0366	0.012	78	-1.66	-1.31
14	NT	NT	NT		
15	NS	NS	NS		
16	NR	NR	NR		
17	NS	NS	NS		
18	0.06	0.03	78	0.47	0.17
19	NT	NT	NT		
20	<0.146	0.0321	78.5		
21	NS	NS	NS		
22	NT	NT	NT		
23	NT	NT	NT		
24	NT	NT	NT		
25	NR	NR	NR		
26	0.053	0.014	81	-0.16	-0.11
27	0.0496	0.0149	127	-0.47	-0.32
28*	0.166	0.055	85	10.15	2.01
29	0.060	0.019	107.7	0.47	0.26
30	NS	NS	NS		
31	NT	NT	NT		
32	NT	NT	NT		
33	0.065	0.021	75	0.93	0.46
34	NR	NR	NR		
35	NT	NT	NT		
37	0.0497	0.01491	92	-0.47	-0.31
38	0.0451	NR	NR	-0.89	-1.39

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0548	0.0070
Spike Value	0.0600	0.0030
Robust Average	0.0562	0.0076
Median	0.0565	0.0073
Mean	0.064	
N	12	
Max	0.166	
Min	0.0366	
Robust SD	0.011	
Robust CV	19%	


Results: S4 - GenX
Assigned Value = 0.0548 ± 0.0070 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
13 38 27 37 11 26 18 29 10 33 6 28 1 2 3 4 5 7 8 9 14 15 16 17 19 20 21 22 23 24 25 30 31 32 34 35 Md RA SV


z-Scores: S4 - GenX
Target Standard Deviation for Proficiency Assessment 0.011 µg/L (Equivalent to 20% CV)
z-Score
-1.7 -0.9 -0.5 -0.5 -0.2 -0.2 0.5 0.5 0.6 0.9 1.0
Laboratory
13 38 27 37 11 26 18 29 10 33 6 28

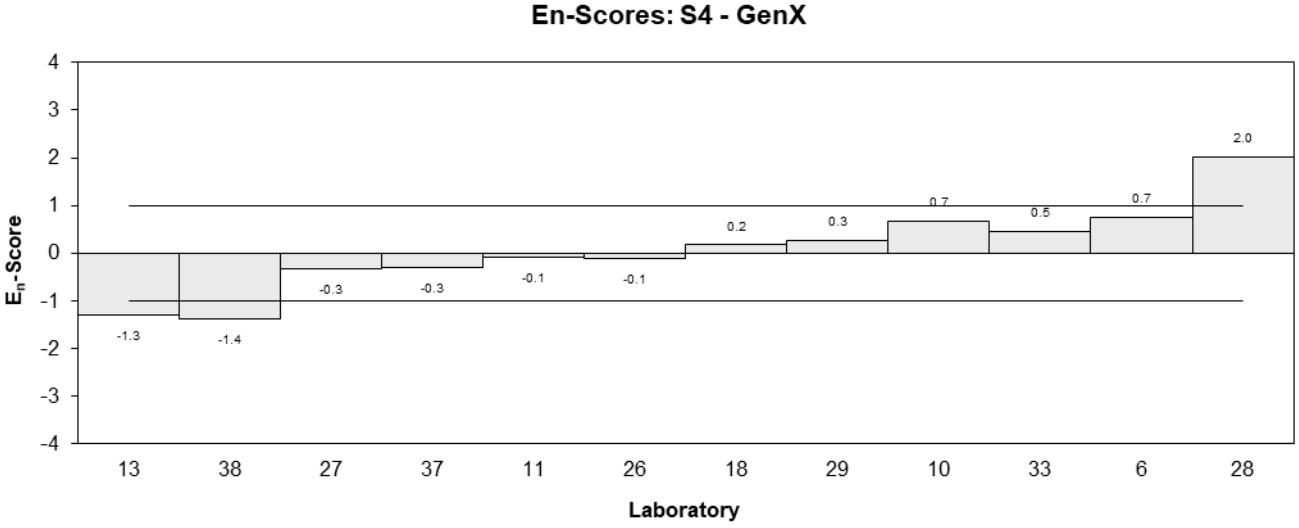

En-Scores: S4 - GenX
En-Score
-1.3 -1.4 -0.3 -0.3 -0.1 -0.1 0.2 0.3 0.7 0.5 0.7 2.0
Laboratory
13 38 27 37 11 26 18 29 10 33 6 28

Figure 82

Table 86

Sample Details

Sample No.	S4
Matrix	Water
Analyte	ADONA
Unit	µg/L

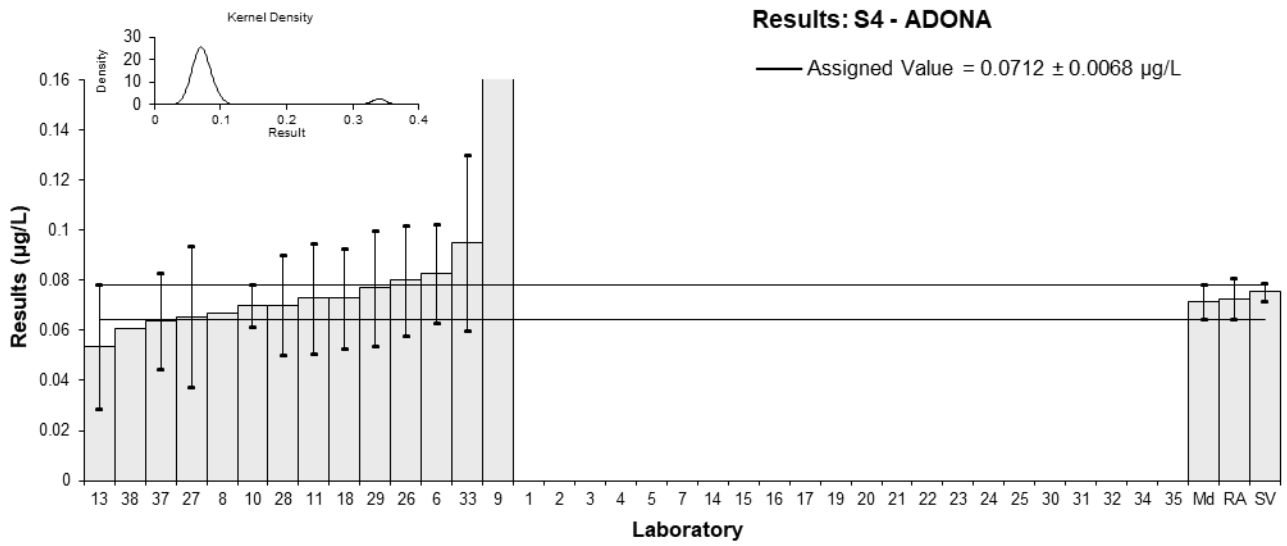
Participant Results

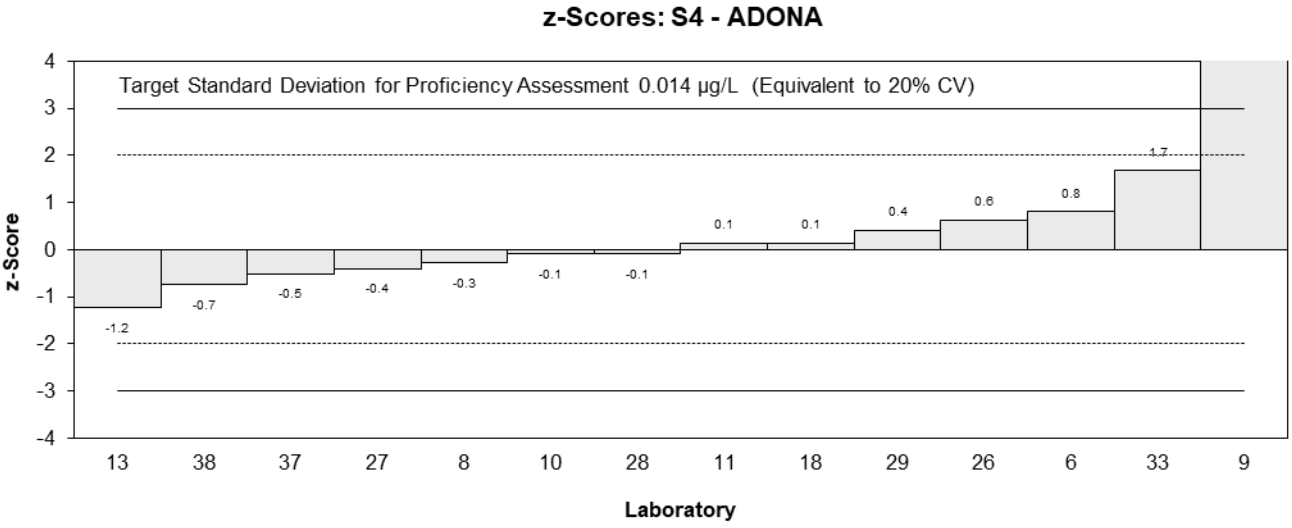
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NT	NT	NT		
3	NT	NT	NT		
4	NT	NT	NT		
5	NT	NT	NT		
6	0.0826	0.0197	98	0.80	0.55
7	NS	NS	NS		
8	0.067	NR	89	-0.29	-0.62
9*	0.34	0.03	NT	18.88	8.74
10	0.070	0.0085	99	-0.08	-0.11
11	0.073	0.022	79	0.13	0.08
13	0.0536	0.025	NR	-1.24	-0.68
14	NT	NT	NT		
15	NS	NS	NS		
16	NR	NR	NR		
17	NS	NS	NS		
18	0.073	0.02	99	0.13	0.09
19	NT	NT	NT		
20	<0.146	0.0424	78.5		
21	NS	NS	NS		
22	NT	NT	NT		
23	NT	NT	NT		
24	NT	NT	NT		
25	NR	NR	NR		
26	0.08	0.022	78	0.62	0.38
27	0.0655	0.0282	NR	-0.40	-0.20
28	0.07	0.02	NR	-0.08	-0.06
29	0.077	0.023	NR	0.41	0.24
30	NS	NS	NS		
31	NT	NT	NT		
32	NT	NT	NT		
33	0.095	0.035	75	1.67	0.67
34	NR	NR	NR		
35	NT	NT	NT		
37	0.0640	0.0192	107	-0.51	-0.35
38	0.0608	NR	NR	-0.73	-1.53

* Outlier, see Section 4.2

Statistics

Assigned Value	0.0712	0.0068
Spike Value	0.0754	0.0038
Robust Average	0.0728	0.0080
Median	0.0715	0.0067
Mean	0.091	
N	14	
Max	0.34	
Min	0.0536	
Robust SD	0.012	
Robust CV	16%	


Results: S4 - ADONA
Assigned Value = 0.0712 ± 0.0068 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
13 38 37 27 8 10 28 11 18 29 26 6 33 9 1 2 3 4 5 7 14 15 16 17 19 20 21 22 23 24 25 30 31 32 34 35 Md RA SV


z-Scores: S4 - ADONA
Target Standard Deviation for Proficiency Assessment 0.014 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
13 38 37 27 8 10 28 11 18 29 26 6 33 9
-1.2 -0.7 -0.5 -0.4 -0.3 -0.1 -0.1 0.1 0.1 0.4 0.6 0.8 1.7

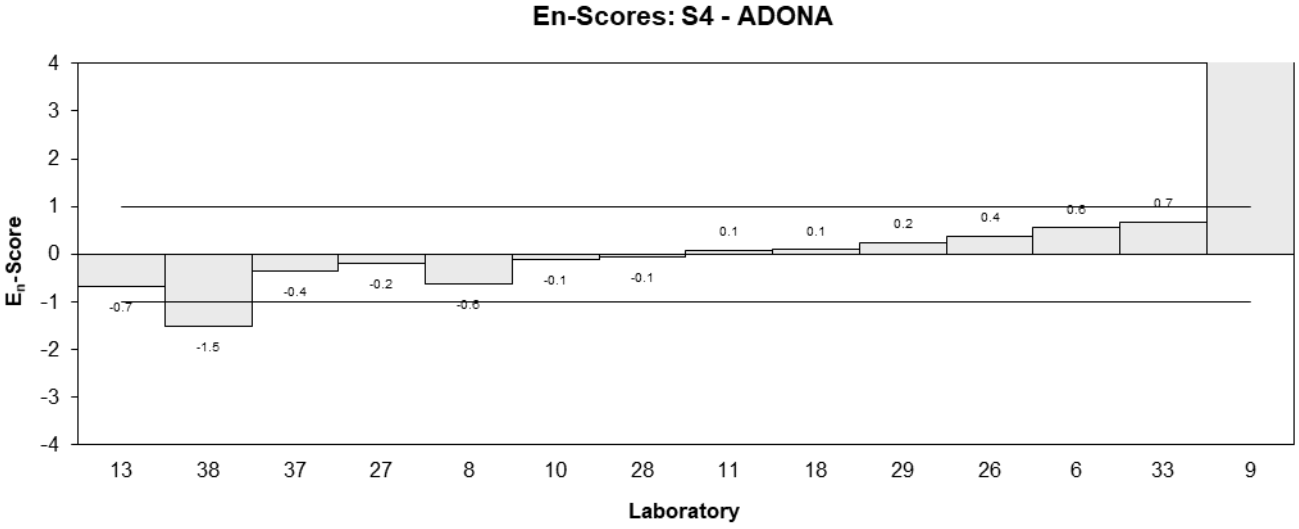

En-Scores: S4 - ADONA
En-Score
Laboratory
13 38 37 27 8 10 28 11 18 29 26 6 33 9
-0.7 -1.5 -0.4 -0.2 -0.6 -0.1 -0.1 0.1 0.1 0.2 0.4 0.6 0.7

Figure 83

Table 87

Sample Details

Sample No.	S4
Matrix	Water
Analyte	9Cl-PF3ONS
Unit	µg/L

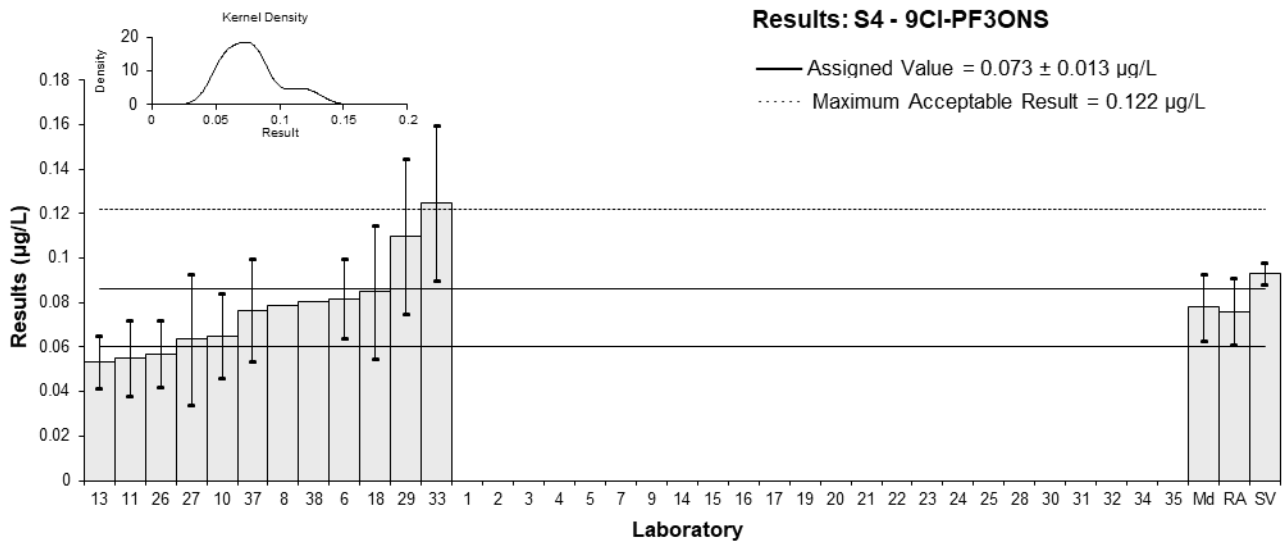
Participant Results

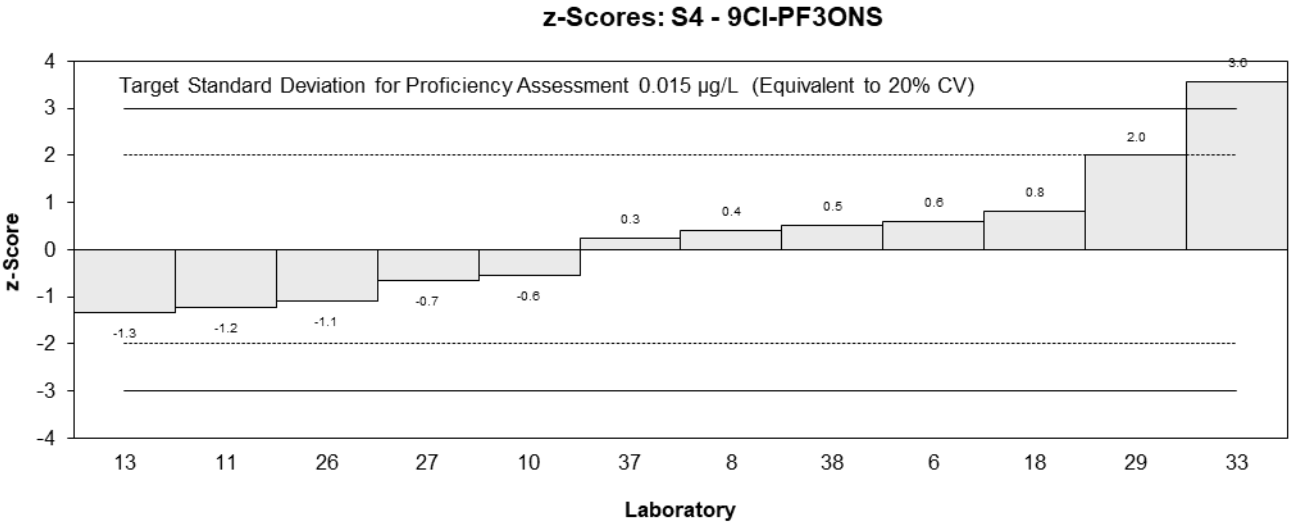
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NT	NT	NT		
3	NT	NT	NT		
4	NT	NT	NT		
5	NT	NT	NT		
6	0.0817	0.0179	98	0.60	0.39
7	NS	NS	NS		
8	0.079	NR	83	0.41	0.46
9	NT	NT	NT		
10	0.065	0.019	98	-0.55	-0.35
11	0.055	0.017	81	-1.23	-0.84
13	0.0534	0.012	NR	-1.34	-1.11
14	NT	NT	NT		
15	NS	NS	NS		
16	NR	NR	NR		
17	NS	NS	NS		
18	0.085	0.03	99	0.82	0.37
19	NT	NT	NT		
20	<0.147	0.041	78.5		
21	NS	NS	NS		
22	NT	NT	NT		
23	NT	NT	NT		
24	NT	NT	NT		
25	NR	NR	NR		
26	0.057	0.015	82	-1.10	-0.81
27	0.0635	0.0293	NR	-0.65	-0.30
28	NT	NT	NT		
29	0.110	0.035	NR	2.00▼	0.99
30	NS	NS	NS		
31	NT	NT	NT		
32	NT	NT	NT		
33*	0.125	0.035	73	3.56	1.39
34	NR	NR	NR		
35	NT	NT	NT		
37	0.0766	0.02298	107	0.25	0.14
38	0.0805	NR	NR	0.51	0.58

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

Statistics

Assigned Value	0.073	0.013
Spike Value	0.0931	0.0047
Robust Average	0.076	0.015
Max Acceptable Result	0.122	
Median	0.078	0.015
Mean	0.078	
N	12	
Max	0.125	
Min	0.0534	
Robust SD	0.021	
Robust CV	27%	


Results: S4 - 9Cl-PF3ONS
Assigned Value = 0.073 ± 0.013 µg/L
Maximum Acceptable Result = 0.122 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
13 11 26 27 10 37 8 38 6 18 29 33 1 2 3 4 5 7 9 14 15 16 17 19 20 21 22 23 24 25 28 30 31 32 34 35 Md RA SV


z-Scores: S4 - 9Cl-PF3ONS
Target Standard Deviation for Proficiency Assessment 0.015 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
13 11 26 27 10 37 8 38 6 18 29 33
-1.3 -1.2 -1.1 -0.7 -0.6 0.3 0.4 0.5 0.6 0.8 2.0 3.6

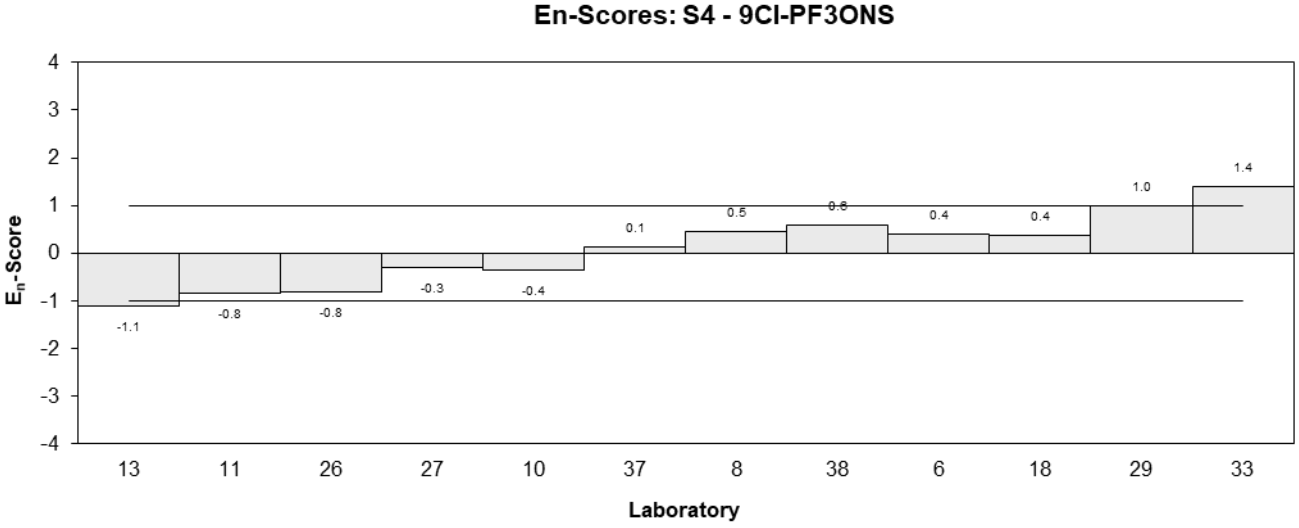

En-Scores: S4 - 9Cl-PF3ONS
En-Score
Laboratory
13 11 26 27 10 37 8 38 6 18 29 33
-1.1 -0.8 -0.8 -0.3 -0.4 0.1 0.5 0.6 0.4 0.4 1.0 1.4

Figure 84

Table 88

Sample Details

Sample No.	S4
Matrix	Water
Analyte	11Cl-PF3OUdS
Unit	µg/L

Participant Results

Lab. Code	Result	Uncertainty	Rec
1	NT	NT	NT
2	NT	NT	NT
3	NT	NT	NT
4	NT	NT	NT
5	NT	NT	NT
6	0.0528	0.0113	98
7	NS	NS	NS
8	0.058	NR	83
9	NT	NT	NT
10	0.040	0.012	112
11	0.017	0.0084	81
13	0.0255	0.012	NR
14	NT	NT	NT
15	NS	NS	NS
16	NR	NR	NR
17	NS	NS	NS
18	0.056	0.02	99
19	NT	NT	NT
20	<0.146	0.0439	78.5
21	NS	NS	NS
22	NT	NT	NT
23	NT	NT	NT
24	NT	NT	NT
25	NR	NR	NR
26	0.018	0.0049	84
27	0.0261	0.0098	NR
28	NT	NT	NT
29	0.091	0.038	NR
30	NS	NS	NS
31	NT	NT	NT
32	NT	NT	NT
33	0.07	0.014	73
34	NR	NR	NR
35	NT	NT	NT
37	0.0545	0.01635	107
38	0.0391	NR	NR

Statistics

Assigned Value	Not Set	
Spike Value	0.0941	0.0047
Robust Average	0.045	0.017
Median	0.046	0.017
Mean	0.046	
N	12	
Max	0.091	
Min	0.017	
Robust SD	0.023	
Robust CV	52%	

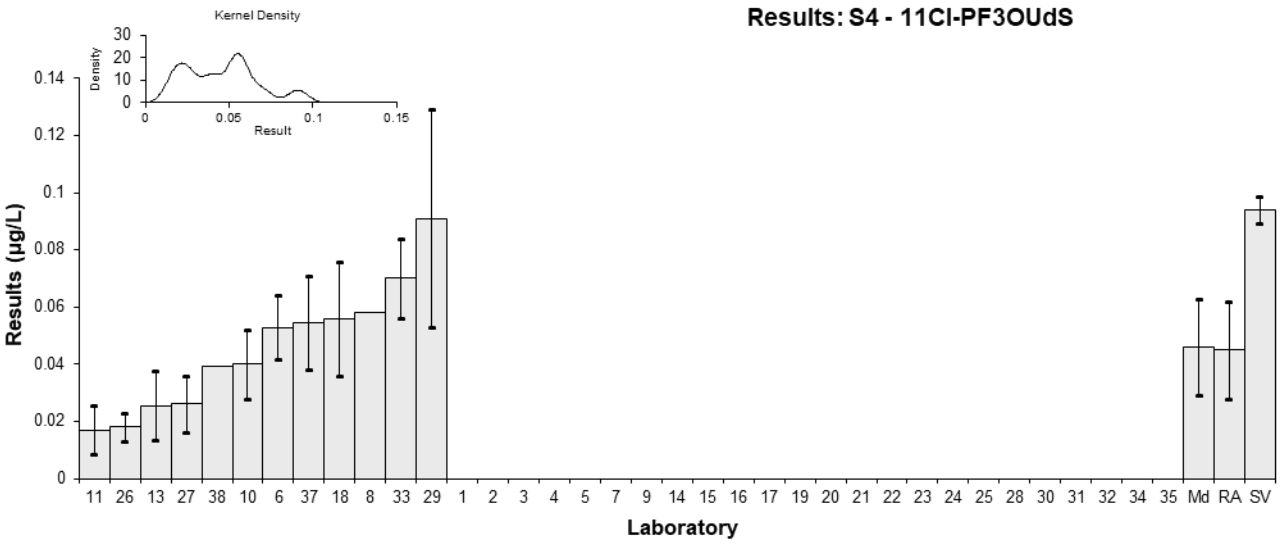

Results: S4 - 11Cl-PF3OUdS
Kernel Density
Density
Result
Results (µg/L)
Laboratory
11 26 13 27 38 10 6 37 18 8 33 29 1 2 3 4 5 7 9 14 15 16 17 19 20 21 22 23 24 25 28 30 31 32 34 35 Md RA SV

Figure 85

6 DISCUSSION OF RESULTS

6.1 Assigned Value

Assigned values for the tests in the study samples were the robust averages of participants' results. The robust averages and their associated expanded uncertainties were calculated using the procedures described in ISO 13528:2022. Results less than 50% or more than 150% of the robust average were removed before calculation of the assigned value.[8] Appendix 2 sets out the calculation for the expanded uncertainty of the robust average of PFDA in S2.

No assigned values were set for PFNS and PFDS in S1 and 11Cl-PF3OUdS in S4, because the reported results were too variable. No assigned value was set for GenX in S2 either because the robust average of participants' results was only 38% of the spiked value. A low recovery of spiked value was also noticed for 11Cl-PF3OUdS in S4, of only 48% , indicating possible stability issue. However no relationship between the reported results and the the date when the sample was received or analysed was evident.

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

The assigned values for the analytes spiked in Samples S2 and S4 were within the range 60% to 108% of the spiked concentration for that analyte (Table 89).

Table 89 Comparison of Assigned Value and Spiked Concentration.

Sample	Matrix	Analyte	Units	Spiked Concentration	Assigned Value	Assigned/ Spike (%)
S2	Soil	PFBS	µg/kg	15.0	12.9	86
S2	Soil	PFPeS	µg/kg	16.0	16.1	101
S2	Soil	PFHxS	µg/kg	7.27	6.80	94
S2	Soil	PFHxS_L	µg/kg	7.27	6.87	94
S2	Soil	PFHpS	µg/kg	6.94	6.12	88
S2	Soil	PFOS	µg/kg	2.87	2.72	95
S2	Soil	PFOS_L	µg/kg	2.87	2.73	95
S2	Soil	PFNS	µg/kg	0.960	0.863	90
S2	Soil	PFBA	µg/kg	11.1	10.0	90
S2	Soil	PFPeA	µg/kg	7.20	6.42	89
S2	Soil	PFHxA	µg/kg	8.98	9.03	101
S2	Soil	PFHpA	µg/kg	1.02	1.10	108
S2	Soil	PFOA	µg/kg	10.1	9.67	96
S2	Soil	PFNA	µg/kg	4.14	3.87	93
S2	Soil	PFDA	µg/kg	15.1	16.0	106
S2	Soil	PFDoA	µg/kg	15.1	12.5	83
S2	Soil	PFTeDA	µg/kg	15.0	12.9	86
S2	Soil	PFOSA	µg/kg	6.02	5.19	86
S2	Soil	MeFOSA	µg/kg	5.00	4.62	92
S2	Soil	EtFOSA	µg/kg	7.00	6.55	94

Sample	Matrix	Analyte	Units	Spiked Concentration	Assigned Value	Assigned/ Spike (%)
S2	Soil	MeFOSE	µg/kg	15.1	13.9	92
S2	Soil	EtFOSE	µg/kg	10.0	9.21	92
S2	Soil	6:2 FTS	µg/kg	4.74	4.45	94
S2	Soil	GenX	µg/kg	15.1	5.79*	38
S2	Soil	ADONA	µg/kg	28.4	21.9	77
S2	Soil	9Cl-PF3ONS	µg/kg	9.36	5.60	60
S2	Soil	11Cl-PF3OUdS	µg/kg	24.9	21.5	86
S4	Water	PFBS	µg/L	0.0504	0.0421	84
S4	Water	PFPeS	µg/L	0.0327	0.0330	101
S4	Water	PFHxS	µg/L	0.0378	0.0357	94
S4	Water	PFHxS_L	µg/L	0.0378	0.0358	95
S4	Water	PFHpS	µg/L	0.0248	0.0235	95
S4	Water	PFOS	µg/L	0.0334	0.0304	91
S4	Water	PFOS_L	µg/L	0.0334	0.0310	93
S4	Water	PFNS	µg/L	0.0288	0.0217	75
S4	Water	PFDS	µg/L	0.0817	0.0488	60
S4	Water	PFDoS	µg/L	0.0774	0.0521	67
S4	Water	PFBA	µg/L	0.0696	0.0518	74
S4	Water	PFPeA	µg/L	0.0298	0.0253	85
S4	Water	PFHxA	µg/L	0.0401	0.0393	98
S4	Water	PFHpA	µg/L	0.0374	0.0353	94
S4	Water	PFOA	µg/L	0.0250	0.0225	90
S4	Water	PFNA	µg/L	0.400	0.373	93
S4	Water	PFDA	µg/L	0.00993	0.00960	97
S4	Water	PFUdA	µg/L	0.0795	0.0749	94
S4	Water	PFDoA	µg/L	0.0500	0.0423	85
S4	Water	PFTrDA	µg/L	0.151	0.123	81
S4	Water	PFTeDA	µg/L	0.100	0.0796	80
S4	Water	PFOSA	µg/L	0.0813	0.0655	81
S4	Water	6:2 FTS	µg/L	0.0758	0.0730	96
S4	Water	8:2 FTS	µg/L	0.0766	0.0739	96
S4	Water	GenX	µg/L	0.0600	0.0548	91
S4	Water	ADONA	µg/L	0.0754	0.0712	94
S4	Water	9Cl-PF3ONS	µg/L	0.0931	0.073	78
S4	Water	11Cl-PF3OUdS	µg/L	0.0941	0.0447*	48

*Robust Average (Assigned value not set)

6.2 Measurement Uncertainty Reported by Participants

Participants were asked to report an estimate of the expanded measurement uncertainty associated with their results. Of 2880 numerical results, 1992 (96%) were reported with an expanded measurement uncertainty, indicating that not all laboratories have addressed this requirement of ISO 17025.[7] The magnitude of the reported expanded uncertainties was within the range 0% to 262% of the reported value. The participants used a wide variety of procedures to estimate expanded measurement uncertainty. These are presented in Tables 2 and 3.

Participation in proficiency testing programs allows participants to check how reasonable their estimates of uncertainty are. Results and the expanded MU are presented in the bar charts for each analyte in this study (Figures 2 to 85).

Laboratories 15 and 33 should review their procedure for estimating measurement uncertainty as most of the uncertainties they reported were less than 10% relative, which the study coordinator believes is unrealistically small for a routine PFAS measurement.

Alternatively laboratories which reported estimates of uncertainty larger than 50% should also review their procedure as it might not be fit-for-purpose.

Results that returned a satisfactory z-score but an unsatisfactory E_n-score may have the uncertainty underestimated.

Laboratories 20, 23, 24 and 37 attached an estimate of the expanded measurement uncertainty to a result reported as being less than their limit of reporting. An estimate of uncertainty expressed as a numerical value cannot be attached to a result expressed as a range.[8]

In some cases results were reported with an inappropriate number of significant figures. 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 a results of "12.808 ± 2.818 µg/L", should instead be expressed as "12.8 ± 2.8 µg/L").[8]

Laboratory 5 reported results and uncertainties with up to 12 significant figures. Although all significant figures were used for results assessment (z and E_n- score calculation), the last 2 or 3 digits were omitted for some of these results presented in Tables and Figures chapter 5.

6.3 z-Score

The z-score compares the participant's deviation from the assigned value with the target standard deviation set for proficiency assessment.

A target standard deviation equivalent to 20% coefficient of variation (CV) was used to calculate z-scores. Unlike the standard deviation based on between-laboratories CV, setting the target standard deviation as a realistic set value enables z-scores to be used as fixed reference value points for assessment of laboratory performance, independent of group performance.

The between-laboratory coefficient of variation predicted by the modified Horwitz equation[6] and the between-laboratories CV are presented for comparison in Table 90.

To account for possible bias in the consensus values due to laboratories using inefficient analytical/extraction techniques, z-scores were adjusted for PFNS, PFDS, PFDoS, PFBA and 9Cl-PF3ONS in Sample S4. Where the assigned value is less than 80% of the spiked value, a maximum acceptable concentration is set to two target standard deviations more than the spiked level and z-scores greater than 2 are adjusted to a value of 2 and E_n-scores greater than 1.0 were also set to 1.0. When the results are higher than the maximum acceptable concentration, z-scores were not adjusted. This approach ensures that laboratories reporting

results close to the spiked concentration were not penalised. z-Scores of less than 2 were left unaltered.

The dispersal of participants' z-scores is graphically presented by laboratory in Figures 86 and 88 and by analyte in Figures 87 and 89.

Of the 2006 results for which z-scores were calculated, 1833 (91%) returned a satisfactory z-score of $|z| \leq 2.0$ and 59 (3%) were questionable with a 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 laboratory bias.

Table 90 Performance Target standard deviation, modified Horwitz values and between laboratories CV

Sample	Analyte	Assigned value	Unit	Target SD (as PCV, %)	Modified Horwitz CV (%)	Between laboratories' CV* (%)
S1	PFBS	26.5	µg/kg	20	22	14
S1	PFPeS	19.7	µg/kg	20	22	15
S1	PFHxS	93.0	µg/kg	20	22	14
S1	PFHxS_L	82.6	µg/kg	20	22	15
S1	PFHpS	12.5	µg/kg	20	22	19
S1	PFOS	3430	µg/kg	20	13	15
S1	PFOS_L	2800	µg/kg	20	14	16
S1	PFNS	Not Set	µg/kg	Not Set	NA	83
S1	PFDS	Not Set	µg/kg	Not Set	NA	74
S1	PFBA	8.60	µg/kg	20	22	14
S1	PFPeA	13.4	µg/kg	20	22	10
S1	PFHxA	62.7	µg/kg	20	22	15
S1	PFHpA	6.61	µg/kg	20	22	18
S1	PFOA	20.4	µg/kg	20	22	17
S1	PFNA	0.276	µg/kg	20	22	21
S1	PFDA	0.211	µg/kg	20	22	22
S1	PFOSA	4.58	µg/kg	20	22	21
S2	PFBS	12.9	µg/kg	20	22	12
S2	PFPeS	16.1	µg/kg	20	22	12
S2	PFHxS	6.80	µg/kg	20	22	11
S2	PFHxS_L	6.87	µg/kg	20	22	11
S2	PFHpS	6.12	µg/kg	20	22	11
S2	PFOS	2.72	µg/kg	20	22	13
S2	PFOS_L	2.73	µg/kg	20	22	11
S2	PFNS	0.863	µg/kg	20	22	14
S2	PFBA	10.0	µg/kg	20	22	11

Sample	Analyte	Assigned value	Unit	Target SD (as PCV, %)	Modified Horwitz CV (%)	Between laboratories' CV* (%)
S2	PFPeA	6.42	µg/kg	20	22	8.6
S2	PFHxA	9.03	µg/kg	20	22	11
S2	PFHpA	1.10	µg/kg	20	22	11
S2	PFOA	9.67	µg/kg	20	22	11
S2	PFNA	3.87	µg/kg	20	22	8
S2	PFDA	16.0	µg/kg	20	22	9.3
S2	PFDoA	12.5	µg/kg	20	22	11
S2	PFTeDA	12.9	µg/kg	20	22	9.4
S2	PFOSA	5.19	µg/kg	20	22	11
S2	MeFOSA	4.62	µg/kg	20	22	16
S2	EtFOSA	6.55	µg/kg	20	22	16
S2	MeFOSE	13.9	µg/kg	20	22	9.6
S2	EtFOSE	9.21	µg/kg	20	22	14
S2	6:2 FTS	4.45	µg/kg	20	22	9.5
S2	GenX	Not Set	µg/kg	Not Set	NA	18
S2	ADONA	21.9	µg/kg	20	22	23
S2	9Cl-PF3ONS	5.60	µg/kg	20	22	12
S2	11Cl-PF3OUdS	21.5	µg/kg	20	22	18
S3	PFBS	0.0219	µg/L	20	22	17
S3	PFPeS	0.0237	µg/L	20	22	15
S3	PFHxS	0.203	µg/L	20	22	14
S3	PFHxS_L	0.173	µg/L	20	22	14
S3	PFHpS	0.0113	µg/L	20	22	29
S3	PFOS	0.217	µg/L	20	22	19
S3	PFOS_L	0.119	µg/L	20	22	15
S3	PFBA	0.00873	µg/L	20	22	14
S3	PFPeA	0.0085	µg/L	20	22	23
S3	PFHxA	0.0257	µg/L	20	22	16
S3	PFHpA	0.00381	µg/L	20	22	23
S3	PFOA	0.0078	µg/L	20	22	22
S4	PFBS	0.0421	µg/L	20	22	15
S4	PFPeS	0.0330	µg/L	20	22	16
S4	PFHxS	0.0357	µg/L	20	22	14
S4	PFHxS_L	0.0358	µg/L	20	22	15
S4	PFHpS	0.0235	µg/L	20	22	16

Sample	Analyte	Assigned value	Unit	Target SD (as PCV, %)	Modified Horwitz CV (%)	Between laboratories' CV* (%)
S4	PFOS	0.0304	µg/L	20	22	19
S4	PFOS_L	0.0310	µg/L	20	22	15
S4	PFNS	0.0217	µg/L	20	22	19
S4	PFDS	0.0488	µg/L	20	22	27
S4	PFDoS	0.0521	µg/L	20	22	10
S4	PFBA	0.0518	µg/L	20	22	11
S4	PFPeA	0.0253	µg/L	20	22	15
S4	PFHxA	0.0393	µg/L	20	22	12
S4	PFHpA	0.0353	µg/L	20	22	16
S4	PFOA	0.0225	µg/L	20	22	17
S4	PFNA	0.373	µg/L	20	22	11
S4	PFDA	0.00960	µg/L	20	22	12
S4	PFUdA	0.0749	µg/L	20	22	15
S4	PFDoA	0.0423	µg/L	20	22	20
S4	PFTrDA	0.123	µg/L	20	22	18
S4	PFTeDA	0.0796	µg/L	20	22	19
S4	PFOSA	0.0655	µg/L	20	22	21
S4	6:2 FTS	0.0730	µg/L	20	22	12
S4	8:2 FTS	0.0739	µg/L	20	22	13
S4	GenX	0.0548	µg/L	20	22	17
S4	ADONA	0.0712	µg/L	20	22	14
S4	9Cl-PF3ONS	0.073	µg/L	20	22	24
S4	11Cl-PF3OUdS	Not Set	µg/L	Not Set	NA	52

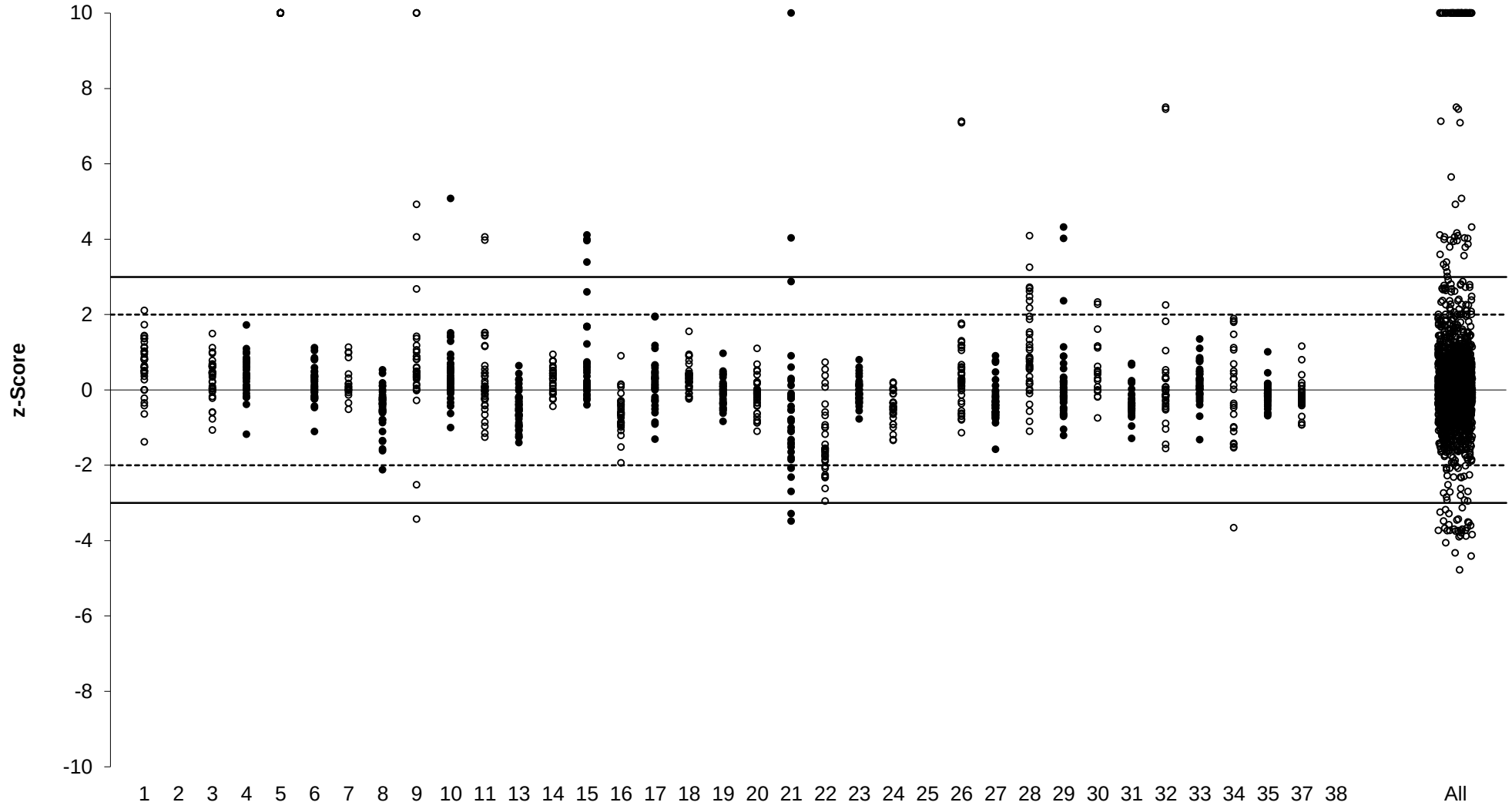
*Robust between-aboratories CV with outliers removed. Note: Shaded cells are between participant laboratories' CV which were higher than the target SD established by the study coordinator and the coefficient of variation from the predictive mathematical model (modified Horwitz equation). NA = Not Available

6.4 E_n-Score

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

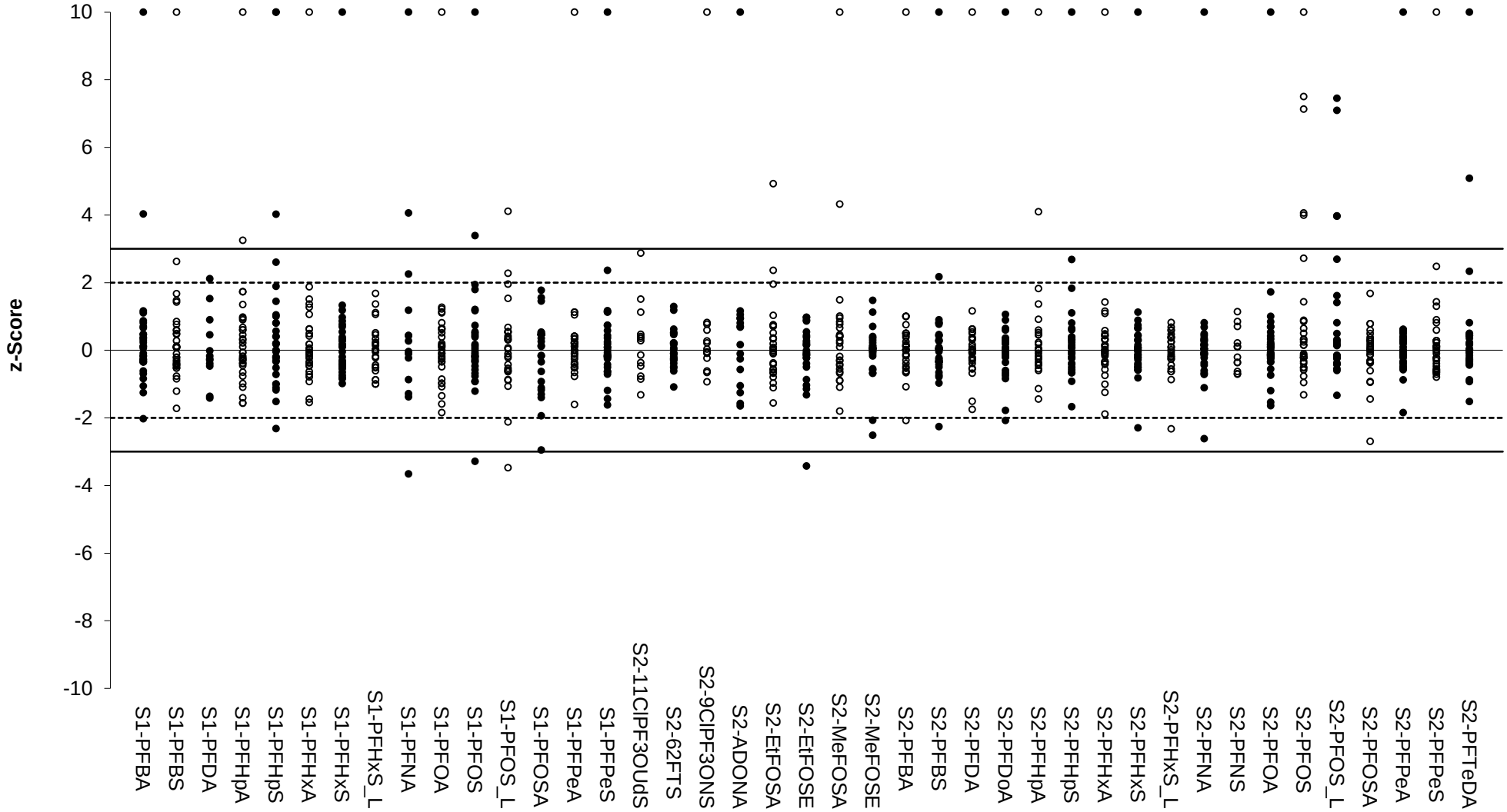
The dispersal of participants' E_n-scores is graphically presented in Figure 90. Where a laboratory did not report an expanded uncertainty with a result, an expanded uncertainty of zero (0) was used to calculate the E_n-score.

Of 2006 results for which E_n-scores were calculated, 1620 (81%) returned a satisfactory score of $|E_n| \leq 1.0$ indicating agreement of the participants' results with the assigned values within their respective expanded measurement uncertainties.



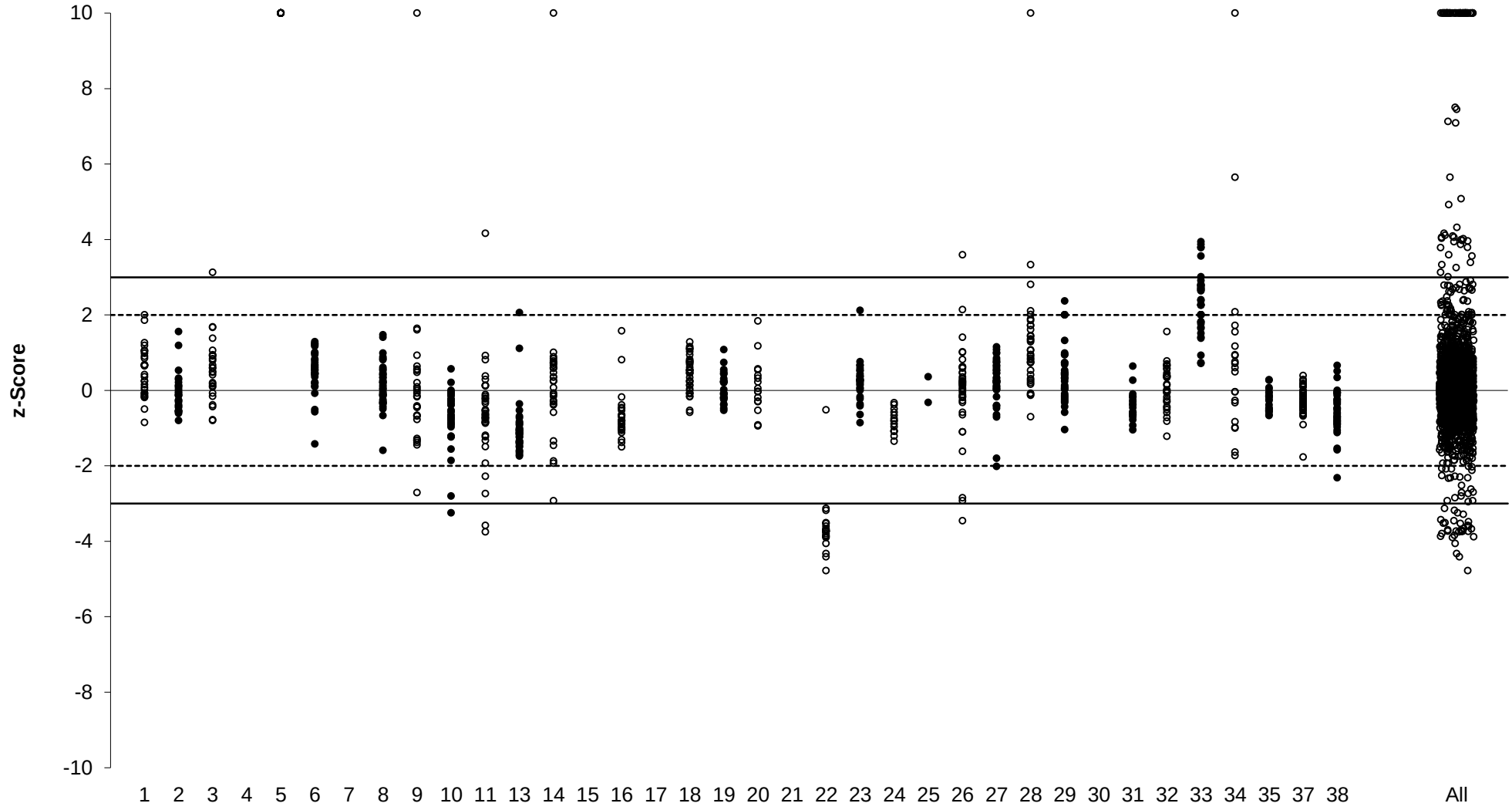
Scores greater than 10 have been plotted as 10.

Figure 86 z-Score Dispersal by Laboratory for Soil Samples S1 and S2



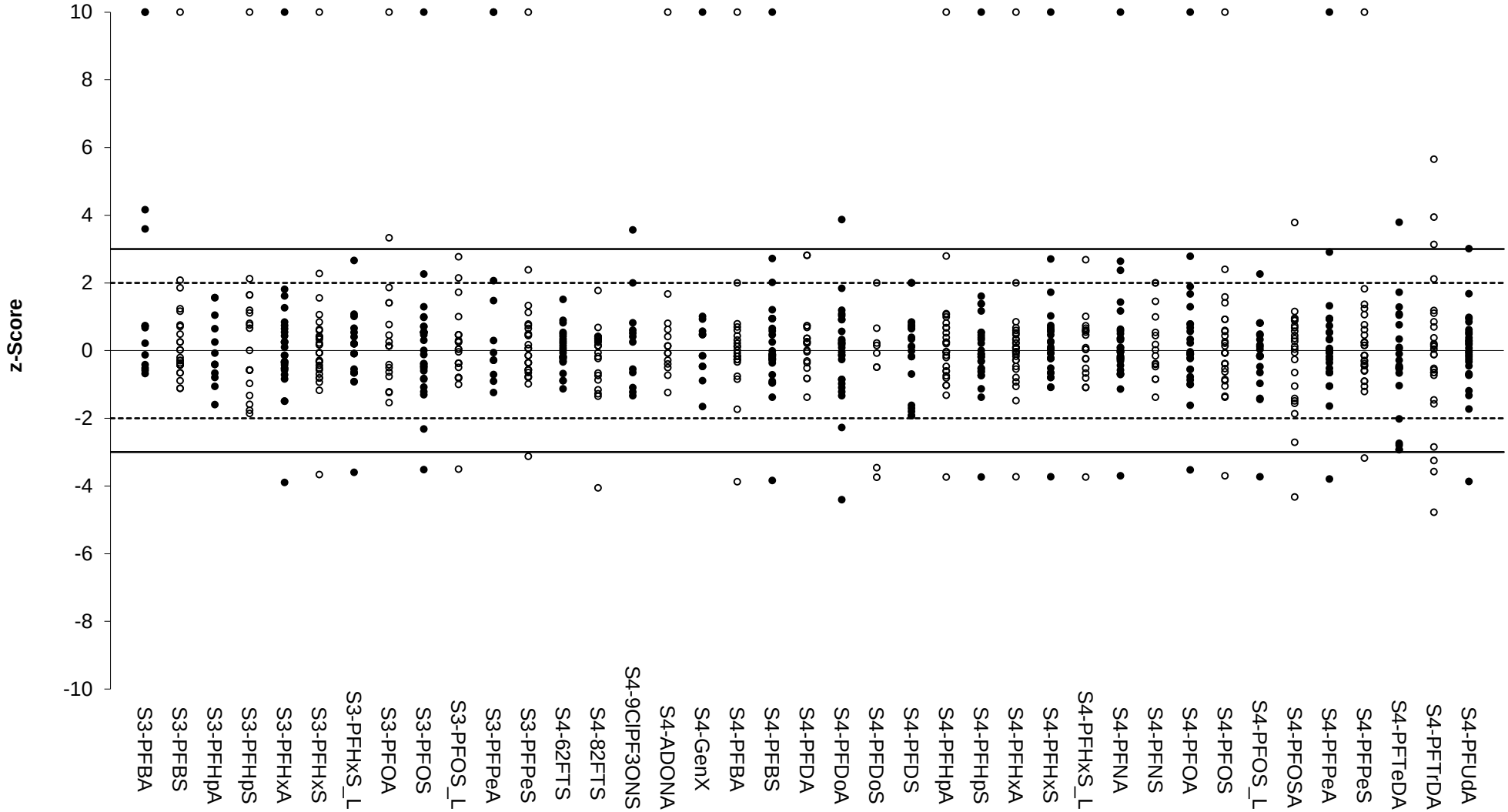
Scores greater than 10 have been plotted as 10.

Figure 87 z-Score Dispersal by Analyte for Soil Samples S1 and S2



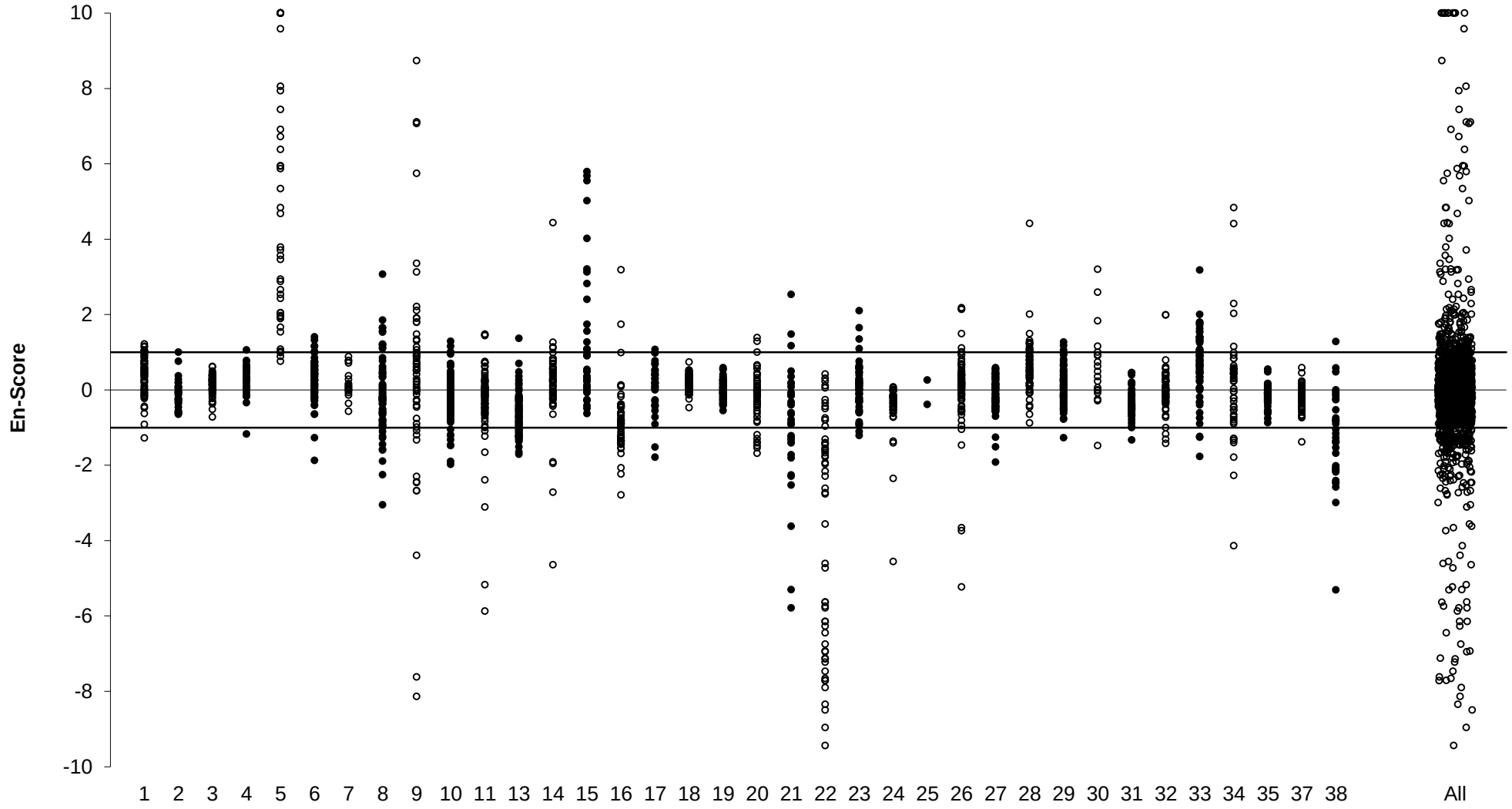
Scores greater than 10 have been plotted as 10.

Figure 88 z-Score Dispersal by Laboratory for Water Samples S3 and S4



Scores greater than 10 have been plotted as 10.

Figure 89 z-Score Dispersal by Analyte for Water Samples S3 and S4

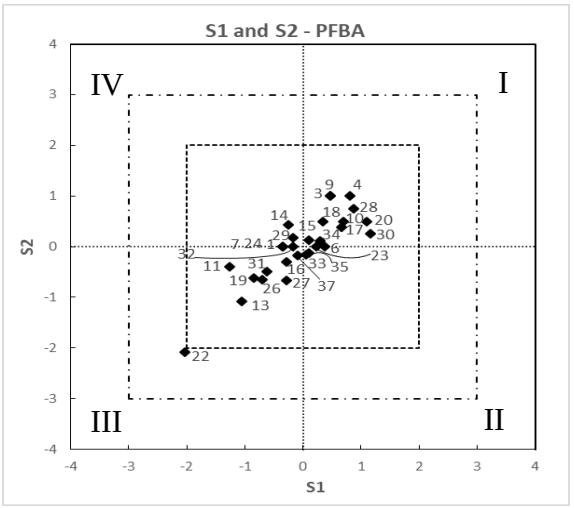


Scores greater than 10 have been plotted as 10.

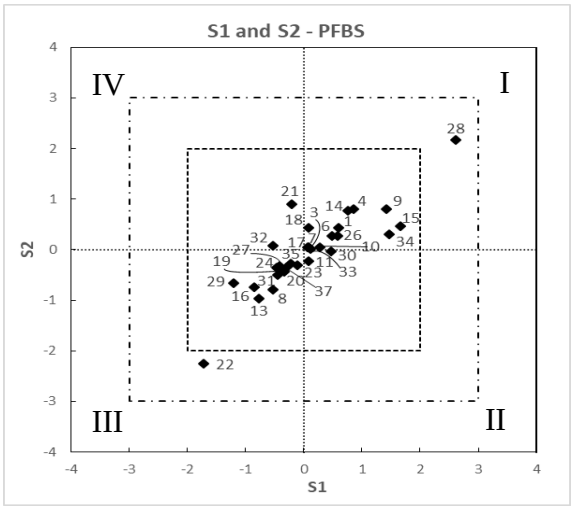
Figure 90 E_n-Score Dispersal by Laboratory

6.5 z-Score Scatter Plots

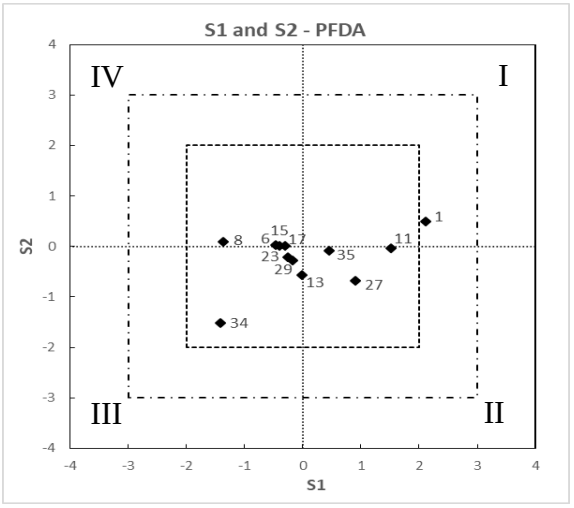
Scatter plots of z-scores for all analytes are presented in Figure 91. Scores are predominantly plotted in quadrants I and III, indicating that laboratory bias is the major contributor to the variability of results.

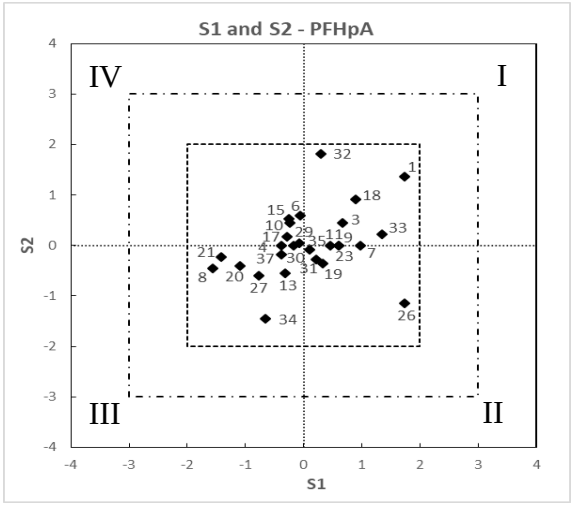


Laboratories 5 and 21 are off scale.

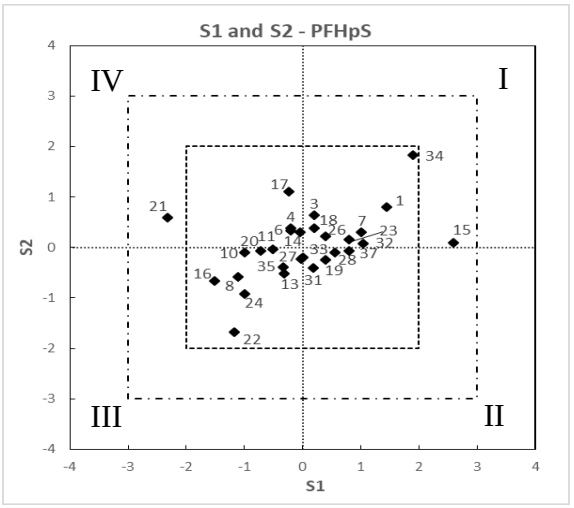


Laboratory 5 is off scale.

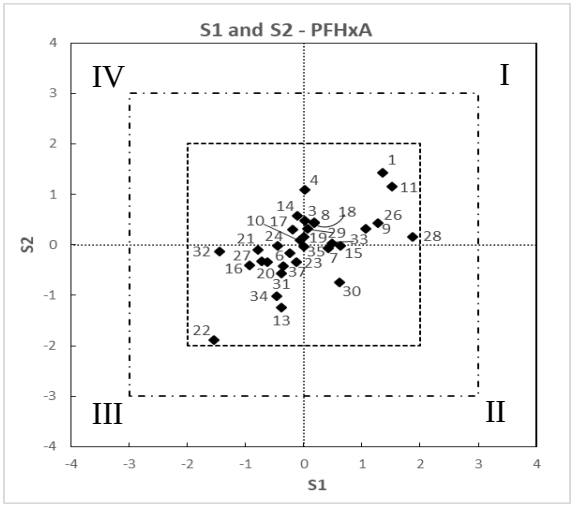




Laboratories 5 and 28 are off scale.

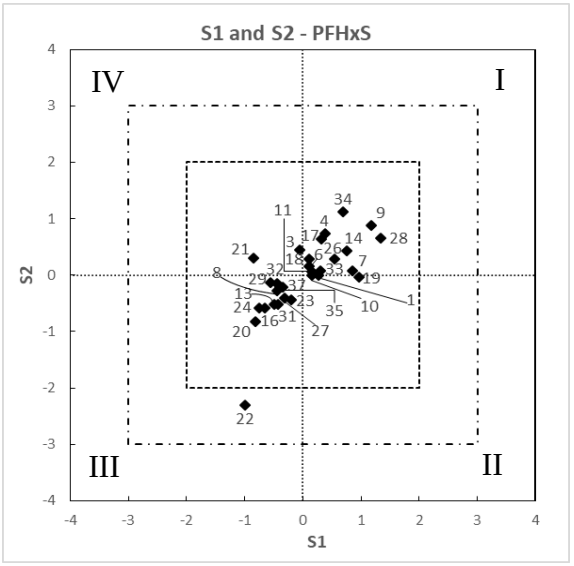


Laboratories 5, 9 and 29 are off scale.

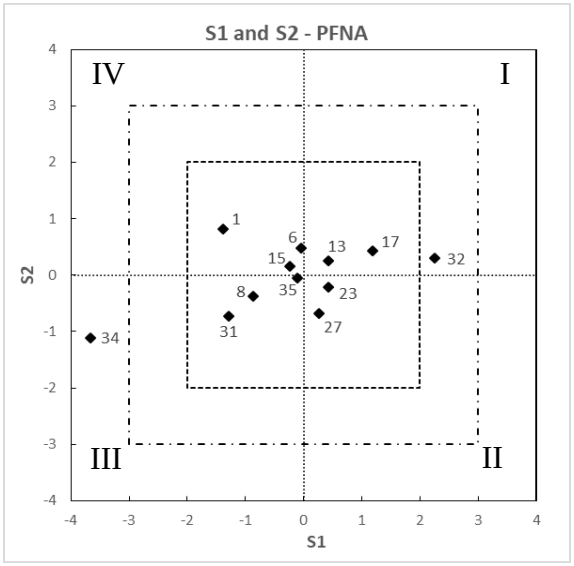


Laboratory 5 is off scale.

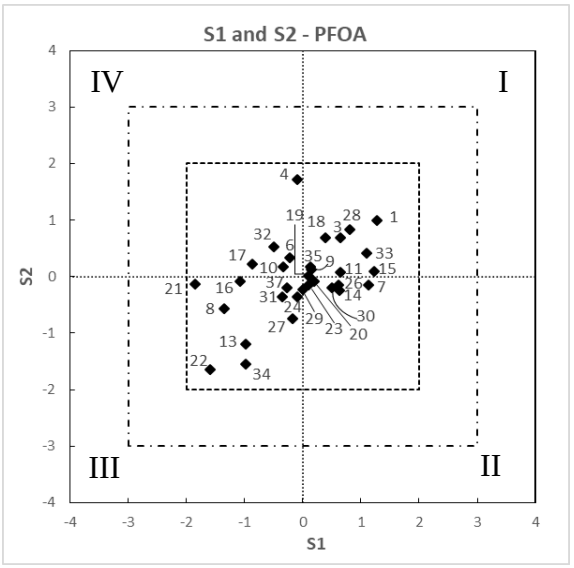
Figure 91 z-Score Scatter Plots



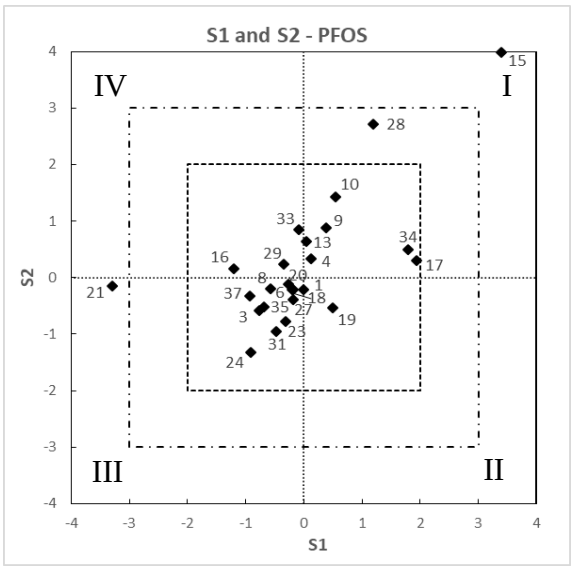
Laboratory 5 is off scale.



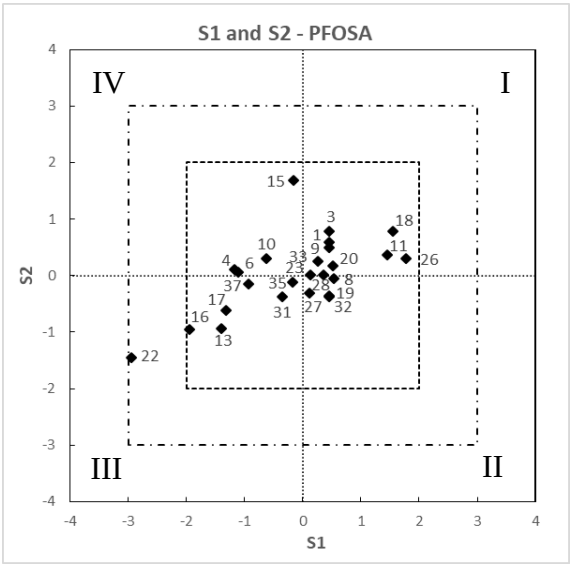
Laboratories 5 and 9 are off scale.

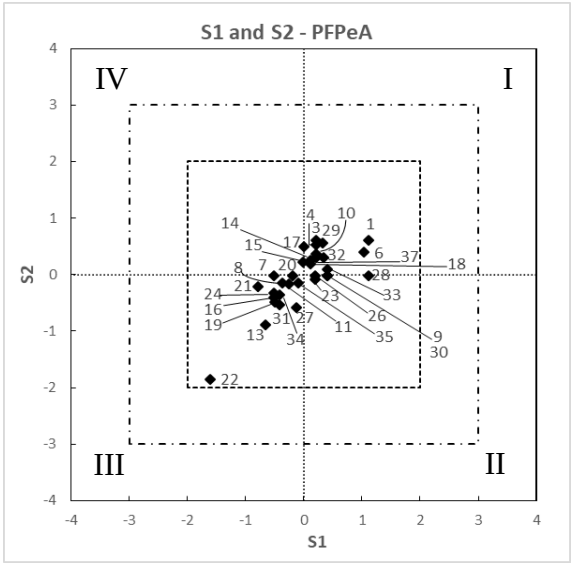


Laboratory 5 is off scale.



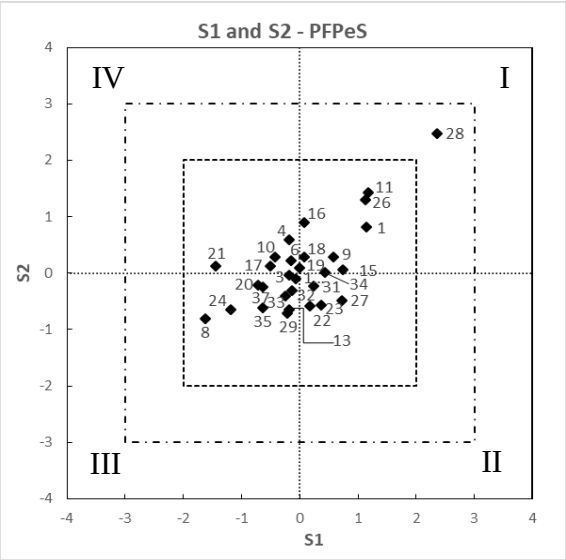
Laboratories 5, 11, 26 and 32 are off scale.



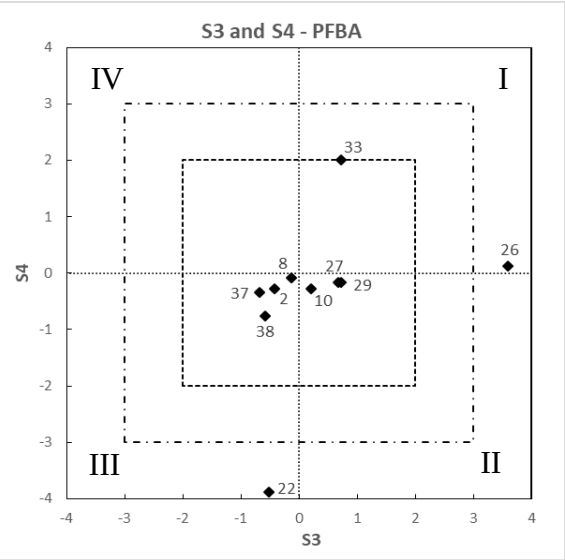


Laboratory 5 is off scale.

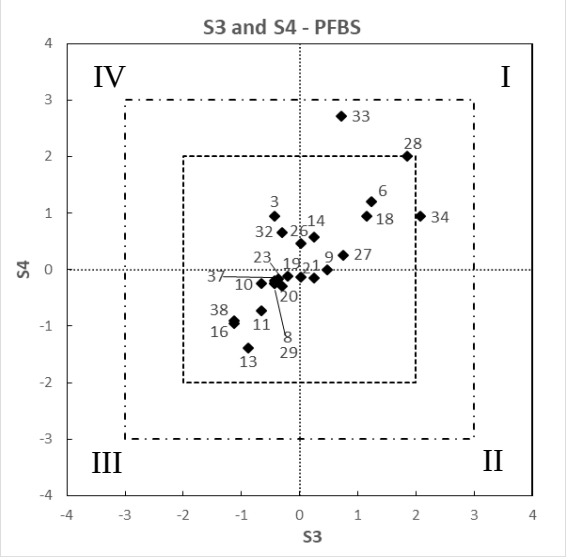
Figure 91 z-Score Scatter Plots (continued)



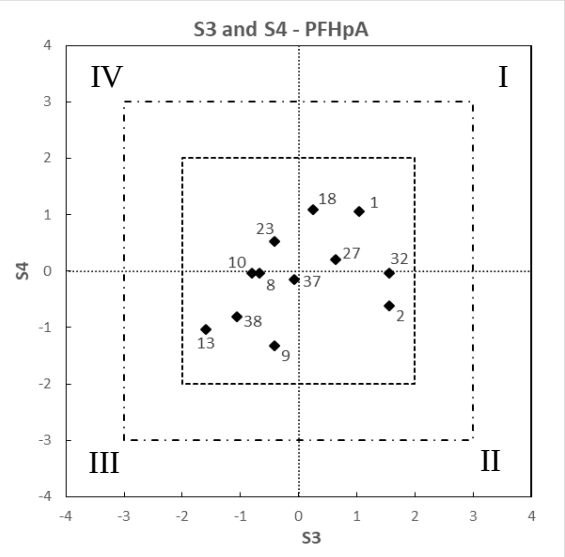
Laboratory 5 is off scale.

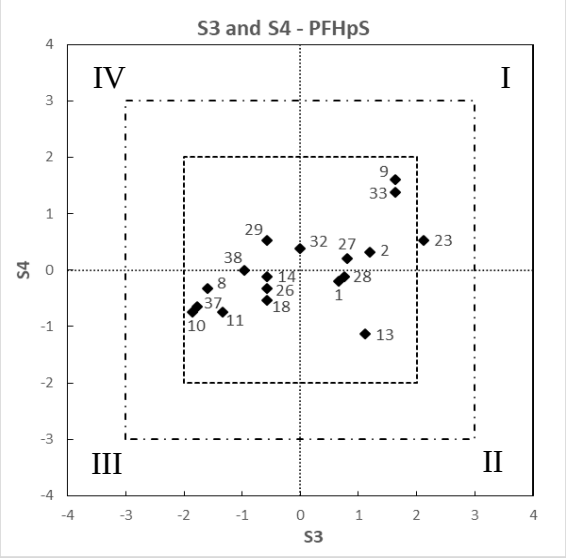


Laboratories 5, 11 and 34 are off scale.

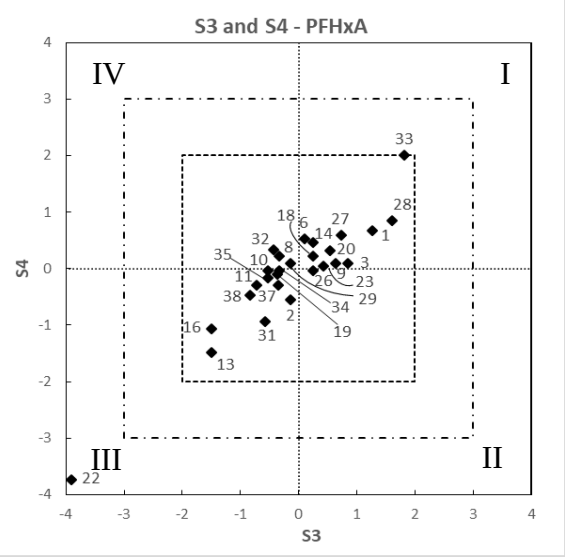


Laboratory 5 is off scale.



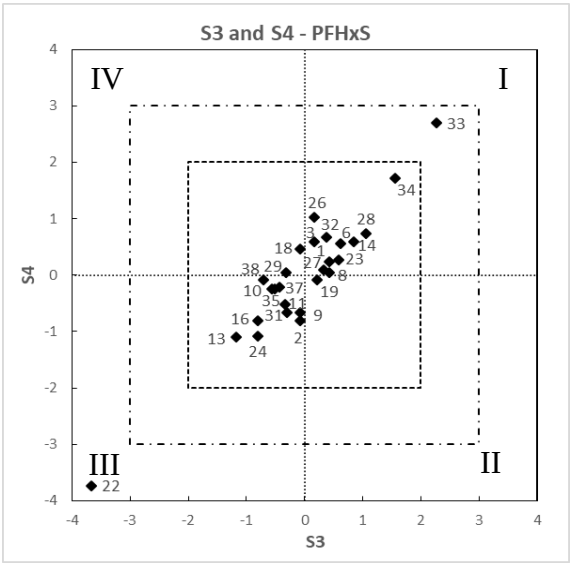


Laboratory 5 is off scale.

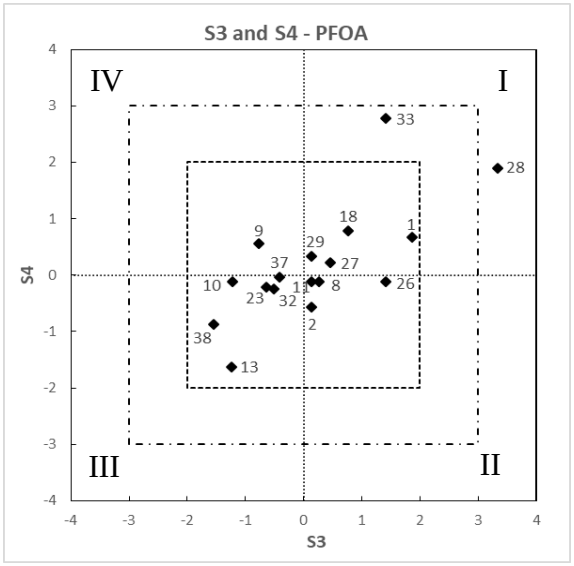


Laboratory 5 is off scale.

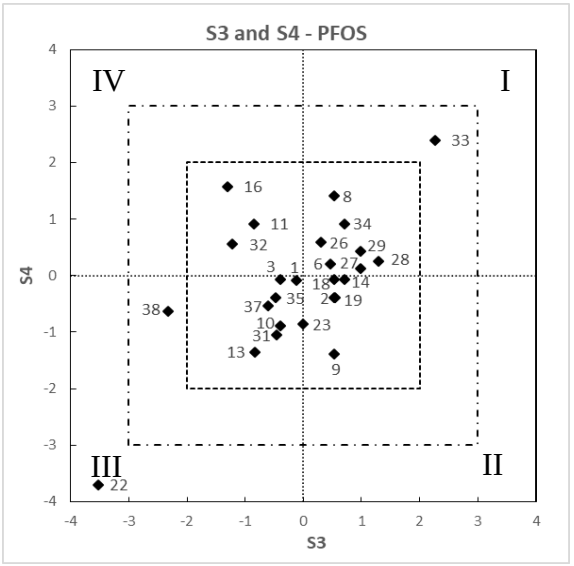
Figure 91 z-Score Scatter Plots (continued)



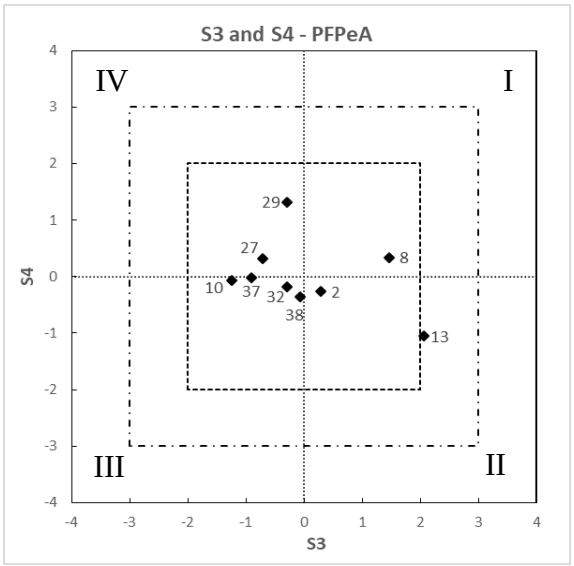
Laboratory 5 is off scale.



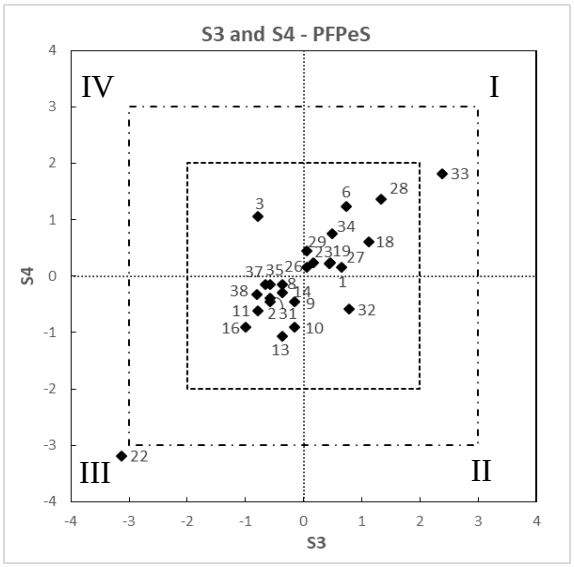
Laboratory 5 is off scale.



Laboratory 5 is off scale.



Laboratories 5 and 14 are off scale.



Laboratory 5 is off scale

Figure 91 z-Score Scatter Plots (continued)

Table 91 Summary of Participants' Results and Performance for Sample S1 (all values are in µg/kg)*

Lab. Code	PFBS	PFPeS	PFHxS	PFHxS_L	PFHpS	PFOS	PFOS_L	PFNS	PFDS	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFOSA
A.V.	26.5	19.7	93.0	82.6	12.5	3430	2800	Not Set	Not Set	8.60	13.4	62.7	6.61	20.4	0.276	0.211	4.58
1	29.7	24.2	98.0	NT	16.1	3420	2440	NT	16.1	8	16.4	79.7	8.9	25.6	0.2	0.3	5.0
2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
3	27	19	92	79	13	2900	2200	NT	14	9.4	14	63	7.5	23	<1	<0.5	5
4	31	19	100	88	12	3512	2972	5.8	2.2	10	14	63	6.1	20	< 1	< 1	3.5
5	2887.1898 7666667	4251.6581 6666667	3757.2692 5	NR	2946.0127 2666667	1072825.0 8730333	NR	NT	NT	1350.2983 5666667	1269.0269 7666667	4353.7500 6333333	475.89163 6666667	7641.4465 7	23.698343 3333333	NR	NT
6	29.1	19.1	94.8	82.5	12	3290	2560	5.32	2.37	9.23	16.2	59.7	6.53	19.5	0.274	0.191	3.56
7	27	NR	109	NR	15	NR	NR	NR	NR	8	12	68	7.9	25	NR	NR	NR
8	23.665	13.313	85.594	72.479	9.736	3033.953	1610.195	12.292	4.629	NT	12.418	64.919	4.54	14.872	0.228	0.153	5.061
9	34	22	115	105	42	3700	3000	16	7.0	9.4	14.5	76	7.4	21	0.50	<1	5
10	28	18	96	83	10	3800	3100	3.0	1.6	9.8	14	62	6.3	19	< 1.0	< 1.0	4.0
11	27.0	24.3	96.0	86.4	11.2	3730	3100	26.0	8.06	6.44	12.7	81.6	7.20	23.0	<0.5	0.275	5.91
13	22.4	18.97	83.8	75.4	11.7	3463.56	2678.04	24.36	3.86	6.78	11.64	57.92	6.2	16.4	0.3	0.21	3.3
14	30.541	19.44	107.201	90.97	12.4	3548.01	2817.11	6.69	<5	8.17	13.705	61.35	7.85	22.99	<5	<5	<5
15	35.3557	22.6316	NT	110.4313	18.9976	5758.53	5104.20	5.5298	3.2987	8.7942	13.349	70.604	6.2610	25.360	0.2632	0.1940	4.4340
16	22	20	81	68	8.7	2600	2300	7.9	3.2	8.1	12	51	5.3	16	NR	NR	2.8
17	26.89	17.71	98.92	84.90	11.90	4764	3892	NT	2.951	9.732	13.40	60.28	6.233	16.90	0.3412	0.1983	3.383
18	27	20	95	83	13	3300	2700	40	16	9.2	14	65	7.8	22	<1	<0.5	6
19	24.4	19.7	111	NT	13.5	3770	3029	NT	14.8	7.15	12.1	62.8	7.05	20.8	<0.5	<0.5	5
20	24.7	17.2	77.7	68.1	10.7	3246	2738	4.57	2.24	10.5	12.9	54.8	5.16	21.2	<1.93	<1.93	5.06
21	25.39	14.04	77.46	66.14	6.7	1172.85	849.64	<50	<50	15.53	11.3	52.78	4.75	12.85	<50	<50	<50
22	17.4	20.4	74.5	66	9.55	3930	3100	NT	<1.34	5.1	9.08	43.3	4.55	13.9	<1.34	<1.34	1.88
23	25.9	21.1	89.2	NT	14.5	3210	NT	NT	10.7	9	13.9	61.1	7.4	20.8	0.3	0.2	4.7
24	24	15	79	74	10	2800	2500	17	13	8	12	57	6	20	< 1	< 1	< 10
25	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
26	29.6	24.1	103	90	13.5	4230	3173	28.8	8.8	7.4	13.9	78.6	8.9	22.9	<0.5	<0.5	6.2
27	24.34	22.56	87.17	81.84	12.46	3305	2472	21.34	9.552	8.102	13.09	53.63	5.598	19.66	0.291	0.249	4.684
28	40.4	29	117.8	100.1	13.9	4250	3655	59.8	38.6	10.1	16.4	86.1	10.9	23.7	<2	<2	4.9
29	20.10	18.86	82.86	74.34	22.559	3196.3	2452.0	147.7	9.52	8.31	14.29	63.51	6.52	20.40	NR	0.204	NR
30	29	NT	NT	101	NT	NT	4070	NT	11.3	10.6	14.5	70.5	6.37	22.5	<1	<1	NT
31	24.17	20.64	85.01	NT	12.96	3110	NT	NT	13.11	7.54	12.27	57.94	6.89	18.99	0.205	<0.2	4.26
32	23.7	19.2	84.9	82.7	15.1	3340	2840	NT	<0.4	8.30	14.3	44.5	7.00	18.4	0.40	<0.4	5.00
33	27.11	18.72	98.6	85.78	12.49	3378.2	2970.8	67.18	3.38	8.79	14.5	68.81	8.39	24.88	< 0.2	< 0.2	4.82
34	34.27	21.393	105.8	NR	17.226	4660.105	NR	NR	NR	9.105	12.312	56.75	5.752	16.39	0.074	0.151	NR
35	25.32	17.18	84.8	NT	11.68	2955.3	NT	NT	19.93	8.7	13.15	62.88	6.74	20.97	0.27	0.23	4.42
37	24.9	16.9	86.6	79.5	14.5	2790	2312	6.13	2.35	8.44	13.7	58.3	6.10	19.3	<1.95	<1.95	3.73
38	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

* A.V. = Assigned Value, NS = Not Sent, NT = Not Tested, NR = Not Reported. Shaded cells are results which returned a questionable or unsatisfactory z-score.

Table 92 Summary of Participants' Results and Performance for Sample S2 (all values are in µg/kg)*

Lab. Code	PFBS	PFPeS	PFHxS	PFHxS_L	PFHpS	PFOS	PFOS_L	PFNS	PFBA	PFPeA	PFHxA	PFHpA	PFOA
A.V.	12.9	16.1	6.80	6.87	6.12	2.72	2.73	0.863	10.0	6.42	9.03	1.10	9.67
1	14.0	18.7	6.8	NT	7.1	2.6	2.5	NT	10	7.2	11.6	1.4	11.6
2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
3	13	16	7.4	7.4	6.9	2.4	2.4	NT	12	7.2	9.9	1.2	11
4	15	18	7.8	7.8	6.6	2.9	2.9	< 1	12	7.1	11	1.1	13
5	1318.880646666667	4294.504391666667	288.212673333333	NR	2164.833731666667	622.332183333333	NR	NT	1583.416095	624.368483333333	825.305926666667	125.548683333333	4372.366071666667
6	13.6	16.8	7	7	6.52	2.6	2.6	1.01	10	6.94	8.73	1.23	10.3
7	13	NR	6.9	NR	6.5	2.8	NR	NR	10	6.4	8.9	1.1	9.4
8	10.859	13.518	6.497	6.497	5.415	2.617	2.617	0.801	10.218	6.237	9.823	1.002	8.59
9	15	17	8.0	8.0	9.4	3.2	3.0	<1	12	6.4	9.6	1.1	9.9
10	13	17	6.8	6.8	6.0	3.5	3.5	< 1.0	11	6.9	9.2	1.2	10
11	12.3	20.7	6.88	6.70	6.07	4.93	4.90	0.878	9.20	6.20	11.1	1.10	9.82
13	10.4	14.02	6.1	6.1	5.49	3.07	2.82	0.74	7.83	5.29	6.78	0.98	7.34
14	14.88	15.79	7.386	7.386	6.49	<5	<5	<5	10.87	6.748	10.08	<5	9.177
15	14.0835	16.2992	NT	7.3674	6.2312	4.8923	4.8923	0.9837	10.2580	6.7190	8.9880	1.2140	9.8409
16	11	19	6.0	6.0	5.3	2.8	2.8	NR	9.4	5.9	8.3	NR	9.5
17	13.03	16.48	7.664	7.664	7.468	2.885	2.885	NT	10.75	7.044	9.579	1.140	10.11
18	14	17	7.2	7.2	6.6	2.6	2.6	0.9	11	6.8	9.8	1.3	11
19	12	16.4	6.75	NT	5.83	2.43	2.43	NT	8.75	5.8	9.3	1.02	9.71
20	11.8	15.3	5.68	5.68	6.05	2.66	2.65	0.827	11	6.39	8.4	1.01	9.52
21	15.23	16.5	7.21	7.21	6.85	2.64	2.64	<0.5	8.93	6.14	8.85	1.05	9.41
22	7.08	14.2	3.67	3.67	4.08	<3.44	<3.44	NT	5.84	4.04	5.61	<1.60	6.5
23	12.1	14.3	6.2	NT	6.3	2.3	NT	NT	10	6.3	8.4	1.1	9.4
24	12	14	6	6	5	2	2	< 1	10	6	9	< 1	9
25	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
26	13.6	20.3	7.2	7	6.4	6.6	6.6	0.8	8.7	6.4	9.8	0.85	9.4
27	12.040	14.550	6.262	6.262	5.844	2.508	2.508	0.755	8.665	5.672	8.431	0.967	8.235
28	18.5	24.1	7.7	7.7	6	4.2	4.2	<2	11.5	6.4	9.3	2	11.3
29	11.20	13.80	6.62	6.62	5.30	2.85	2.85	1.06	10.33	7.14	9.61	1.11	9.22
30	12.8	NT	NT	7.52	NT	NT	3.61	NT	10.5	6.39	7.67	1.1	9.3
31	11.6	15.37	6.1	NT	5.62	2.2	NT	NT	9.02	5.74	8	1.04	8.99
32	13.1	15.1	6.60	6.60	6.20	6.80	6.80	NT	10.0	6.80	8.80	1.50	10.7
33	12.93	14.81	6.91	6.89	5.88	3.18	3.17	0.743	9.77	6.54	9.06	1.15	10.49
34	13.672	16.137	8.327	NR	8.365	2.99	NR	NR	10.243	5.957	7.199	0.781	6.694
35	12.21	14.13	6.42	NT	5.64	2.44	NT	NT	9.7	6.23	8.97	1.08	10.00
37	12.0	15.4	6.52	6.52	6.03	2.54	2.52	0.882	9.67	6.67	8.27	1.06	9.30
38	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

* A.V. = Assigned Value, NS = Not Sent, NT = Not Tested, NR = Not Reported. Shaded cells are results which returned a questionable or unsatisfactory z-score.

Table 92 Summary of Participants' Results and Performance for Sample S2 (all values are in µg/kg)* (continued)

Lab. Code	PFNA	PFDA	PFDoA	PFTeDA	PFOSA	MeFOSA	EtFOSA	MeFOSE	EtFOSE	6:2 FTS	GenX	ADONA	9Cl-PF3ONS	11Cl-PF3OUdS
A.V.	3.87	16.0	12.5	12.9	5.19	4.62	6.55	13.9	9.21	4.45	Not Set	21.9	5.60	21.5
1	4.5	17.6	14.1	14.2	5.8	5.5	7.9	14.9	10.8	4.9	NT	NT	NT	NT
2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
3	3.9	18	14	14	6	6	7	17	11	5.0	NT	NT	NT	NT
4	3.9	18	12	14	5.3	5.0	7.5	14	11	< 5	6.2	NT	NT	NT
5	1250.789355	1025.75566833333	296.4389283 33333	1990.25909	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
6	4.24	16.1	13.4	13.8	5.25	4.88	7.02	14.5	9.09	4.28	6.31	25.4	6.52	26.3
7	NR	NR	NR	NR	NR	NR	NR	NR	NR	4.6	NR	NR	NR	NR
8	3.573	16.311	12.5	12.175	5.135	4.325	5.813	NT	NT	3.988	NT	20.778	5.333	19.893
9	3.9	17.1	<1	15	5.7	19	13	6.9	2.9	4.2	<1	131	NT	NT
10	4.4	16	14	26	5.5	5.4	6.8	14	9.7	5.6	5.9	26	5.9	28
11	4.14	15.9	12.4	12.3	5.57	4.23	5.28	14.0	7.09	4.24	4.76	21.4	4.86	17.8
13	4.07	14.2	12.01	11.89	4.22	4.44	5.66	12	8.47	4.23	4.06	16.38	4.55	22.7
14	<5	17.17	13.28	11.768	<5	5.04	7.22	14.7	8.795	<5	NT	NT	NT	NT
15	3.9860	16.0790	12.1910	12.9353	6.9368	4.8134	6.6029	NT	NT	4.6310	6.4773	24.9528	6.2584	NT
16	3.4	15	11	12	4.2	4.2	5.7	12	7.6	3.9	NR	NR	NR	NR
17	4.202	16.05	13.34	11.81	4.562	3.781	NT	NT	NT	4.860	NT	NT	NT	NT
18	3.8	17	13	14	6	5	7	15	10	4.5	6	26	5.5	23
19	3.78	15.8	12.1	13.4	4.82	4.34	6.66	13.6	9.48	4.37	NT	NT	NT	NT
20	3.79	15.7	12.54	12.9	5.38	4.99	6.47	13.8	9.51	4.64	6.9	24.9	5.54	20.9
21	3.53	14.27	7.31	8.99	2.39	2.96	5.09	8.15	6.77	3.48	5.69	14.67	23.33	33.84
22	1.84	10.4	8.06	10.5	3.69	3.99	6.05	14.1	9.91	NT	NT	NT	NT	NT
23	3.7	15.3	11.6	12.7	5.2	4.7	6.4	14.3	8.8	4.9	NT	NT	NT	NT
24	4	16	13	13	< 10	< 5	6	14	9	< 20	NT	NT	NT	NT
25	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
26	3.9	16.52	13.1	12.1	5.5	4.1	5.5	14.2	9.6	5.5	4.8	26.5	4.9	18.2
27	3.347	13.829	10.619	10.628	4.866	4.028	5.796	12.260	8.295	4.018	4.542	14.961	6.464	23.501
28	4	18	10.4	13.5	5.2	3.6	9.1	18	10.2	4.1	17	19.4	NT	NT
29	3.97	15.13	14.73	12.74	4.86	8.61	9.64	15.85	10.85	4.64	6.67	17.29	5.84	19.46
30	4.1	19.7	12.7	18.9	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
31	3.31	14.76	10.81	12.95	4.805	5.23	7.47	12.36	8.95	4.35	NT	NT	NT	NT
32	4.10	16.0	12.1	12.2	4.80	3.80	4.50	13.8	7.30	<0.4	NT	NT	NT	NT
33	3.79	17.74	13.19	14.13	5.45	5.33	7.53	14.09	8.96	4.18	5.44	22.62	5.63	15.84
34	3.009	11.155	15.145	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
35	3.83	15.74	12.03	13.32	5.07	5.55	6.54	13.44	9.19	4.36	NT	NT	NT	NT
37	3.76	15.3	12.3	12.5	5.04	NT	NT	NT	NT	4.46	5.55	27	5.53	23.2
38	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

* A.V. = Assigned Value, NS = Not Sent, NT = Not Tested, NR = Not Reported. Shaded cells are results which returned a questionable or unsatisfactory z-score.

Table 93 Summary of Participants' Results and Performance for Sample S3 (all values are in µg/L)*

Lab. Code	PFBS	PFPeS	PFHxS	PFHxS_L	PFHpS	PFOS	PFOS_L	PFBA	PFPeA	PFHxA	PFHpA	PFOA
A.V.	0.0219	0.0237	0.203	0.173	0.0113	0.217	0.119	0.00873	0.0085	0.0257	0.00381	0.0078
1	0.0230	0.0268	0.220	NT	0.0128	0.212	0.107	<0.006	<0.0011	0.0322	0.0046	0.0107
2	0.022	0.021	0.20	NT	0.014	0.24	NT	0.008	0.009	0.025	0.005	0.008
3	0.02	0.02	0.21	0.18	<0.01	0.2	0.1	<0.02	<0.02	0.03	<0.01	<0.01
4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5	14.118555	31.5450833333333	74.34251	NR	11.9041566666667	91.70008	NR	15.1540333333333	6.04729	10.9076066666667	NR	9.66497
6	0.0273	0.0272	0.228	0.196	< 0.01	0.237	0.13	<0.250	< 0.01	0.0262	< 0.01	< 0.01
7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
8	0.02	0.022	0.22	0.18	0.0077	0.24	0.13	0.0085	0.011	0.024	0.0033	0.0082
9	0.024	0.023	0.20	0.18	0.015	0.24	0.12	<0.1	<0.1	0.029	0.0035	0.0066
10	0.019	0.023	0.18	0.15	0.0071	0.20	0.11	0.0091	0.0064	0.023	0.0032	0.0059
11	0.019	0.020	0.189	0.154	0.0083	0.180	0.126	0.016	<0.01	0.022	<0.01	0.0080
13	0.018	0.022	0.155	0.141	0.0138	0.181	0.0952	<0.005	0.012	0.018	0.00259	0.00586
14	0.023	0.022	0.237	0.208	0.01	0.248	0.125	<0.05	0.026	0.027	<0.01	<0.01
15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
16	0.017	0.019	0.17	0.15	NR	0.16	0.10	NR	NR	0.018	NR	NR
17	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
18	0.027	0.029	0.20	0.17	0.010	0.24	0.12	<0.02	<0.02	0.027	0.004	0.009
19	0.021	0.0258	0.212	NT	<0.02	0.241	0.125	<0.5	<0.02	0.0238	<0.02	<0.01
20	0.0206	<0.0202	0.165	0.141	<0.0201	0.194	0.118	<0.0805	<0.0402	0.0285	<0.0201	<0.0201
21	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
22	<0.005	0.00888	0.0542	0.0485	<0.005	0.0642	0.0354	0.00783	<0.005	0.00563	<0.005	<0.005
23	0.0203	0.0245	0.227	NT	0.0161	0.217	NT	<0.01	<0.015	0.0279	0.0035	0.0068
24	< 0.02	< 0.02	0.17	0.15	< 0.02	0.17	0.11	< 0.05	< 0.03	< 0.02	< 0.02	< 0.03
25	NR	NR	0.19	NR	NR	NR	NR	NR	NR	NR	NR	NR
26	0.022	0.024	0.21	0.18	0.01	0.23	0.17	0.015	<0.01	0.027	<0.01	0.01
27	0.0252	0.0259	0.2162	0.1913	0.0131	0.2595	0.1428	0.0099	0.0073	0.0295	0.0043	0.0085
28	0.03	0.03	0.246	0.21	0.013	0.273	0.16	<0.002	<0.002	0.034	<0.002	0.013
29	0.020	0.024	0.190	0.170	0.010	0.260	0.130	0.010	0.008	0.025	NR	0.008
30	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
31	<0.02	0.021	0.191	NT	<0.02	0.197	NT	<0.1	<0.2	0.0227	<0.2	<0.01
32	0.0206	0.0274	0.218	0.187	0.0113	0.164	0.0994	<0.008	0.0080	0.0235	0.0050	0.0070
33	0.025	0.035	0.295	0.265	0.015	0.315	0.185	0.01	< 0.001	0.035	< 0.001	0.01
34	0.031	0.026	0.266	NR	NR	0.248	NR	0.159	NR	0.024	NR	NR
35	<0.02	0.021	0.182	NT	<0.02	0.196	NT	<0.1	<0.02	0.023	<0.02	<0.01
37	0.0200	0.0206	0.185	0.17	0.00731	0.191	0.11	0.00755	0.00696	0.0239	0.00375	0.00715
38	0.017	0.0199	0.1747	NR	0.0091	0.1161	NR	0.0077	0.0084	0.0214	0.003	0.0054

* A.V. = Assigned Value, NS = Not Sent, NT = Not Tested, NR = Not Reported. Shaded cells are results which returned a questionable or unsatisfactory z-score.

Table 94 Summary of Participants' Results and Performance for Sample S4 (all values are in µg/L)*

Lab. Code	PFBS	PFPeS	PFHxS	PFHxS_L	PFHpS	PFOS	PFOS_L	PFNS	PFDS	PFDoS	PFBA	PFPeA	PFHxA	PFHpA
A.V.	0.0421	0.0330	0.0357	0.0358	0.0235	0.0304	0.0310	0.0217	0.0488	0.0521	0.0518	0.0253	0.0393	0.0353
1	0.0408	0.0340	0.0374	NT	0.0226	0.0299	0.0299	NT	0.0702	NT	0.043	0.0254	0.0446	0.0428
2	0.041	0.030	0.03	NT	0.025	0.028	NT	NT	0.050	NT	0.049	0.024	0.035	0.031
3	0.05	0.04	0.04	0.04	0.03	0.03	0.03	NT	0.05	NT	0.06	0.03	0.04	0.04
4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5	28.3378116666667	42.846485	14.50722	NR	29.6249583333333	12.3720766666667	NR	NT	NT	NT	47.32131	12.18394	18.94214	28.7789166666667
6	0.0522	0.0412	0.0397	0.0397	0.0256	0.0317	0.0317	0.0236	0.0569	0.0513	0.0563	0.0301	0.0434	0.0423
7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
8	0.040	0.032	0.036	0.036	0.022	0.039	0.036	0.026	0.057	0.047	0.051	0.027	0.041	0.035
9	0.042	0.030	0.031	0.031	0.031	0.022	0.022	<0.05	<0.05	<0.05	0.05	0.03	0.04	0.026
10	0.040	0.027	0.034	0.034	0.020	0.025	0.025	0.018	NR	NT	0.049	0.025	0.039	0.035
11	0.036	0.029	0.032	0.032	0.020	0.036	0.036	0.018	0.030	0.013	0.053	0.022	0.037	0.038
13	0.0305	0.026	0.0279	0.0279	0.0182	0.0222	0.0222	0.0157	0.0321	NT	0.0338	0.02	0.0277	0.028
14	0.047	0.031	0.04	0.04	0.023	0.03	0.03	0.02	0.03	NT	0.049	0.029	0.043	0.04
15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
16	0.034	0.027	0.030	0.030	0.017	0.040	0.036	0.020	0.047	NR	NR	0.020	0.031	0.028
17	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
18	0.05	0.037	0.039	0.039	0.021	0.030	0.030	0.024	0.056	NT	0.059	0.028	0.041	0.043
19	0.0412	0.0345	0.0351	NT	0.0226	0.028	0.028	0.0218	0.056	NT	<0.5	0.0226	0.0385	0.0338
20	0.0397	<0.0367	<0.0365	<0.0365	<0.0365	<0.0365	<0.0365	<0.0365	0.0526	0.0544	<0.146	<0.0730	0.0418	<0.0365
21	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
22	0.00973	0.012	0.00904	0.00904	0.00592	0.00788	0.00788	NT	<0.005	NT	0.0116	0.00606	0.00997	0.0089
23	0.0407	0.0346	0.0376	NT	0.026	0.0252	NT	NT	0.0552	NT	0.054	0.0256	0.0397	0.039
24	0.034	0.025	0.028	0.028	< 0.02	< 0.02	< 0.02	< 0.02	< 0.09	0.047	< 0.05	< 0.03	0.033	0.03
25	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
26	0.046	0.034	0.043	0.043	0.022	0.034	0.034	0.021	0.033	0.016	0.053	0.022	0.039	0.037
27	0.0442	0.0346	0.0364	0.0364	0.0245	0.0312	0.0312	0.0199	0.0312	NT	0.05	0.0269	0.0439	0.0367
28	0.059	0.042	0.041	0.041	0.023	0.032	0.032	0.028	0.042	NT	0.055	0.028	0.046	0.041
29	0.040	0.036	0.036	0.036	0.026	0.033	0.033	0.031	0.073	NT	0.050	0.032	0.040	0.037
30	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
31	0.039	0.0304	0.031	NT	0.0207	0.024	NT	NT	0.055	NT	<0.1	0.022	0.032	0.031
32	0.0476	0.0291	0.0405	0.0405	0.0253	0.0338	0.0338	NT	0.0556	NT	0.0519	0.0244	0.0420	0.0350
33	0.065	0.045	0.055	0.055	0.03	0.045	0.045	0.035	0.075	0.09	0.075	0.04	0.055	0.055
34	0.05	0.038	0.048	NR	0.029	0.036	NR	NR	NR	NR	0.058	0.017	0.039	0.035
35	0.041	0.032	0.034	NT	0.021	0.028	NT	NT	0.047	NT	<0.1	0.025	0.038	0.032
37	0.0404	0.0321	0.0341	0.0341	0.0205	0.0271	0.027	0.0225	0.0487	0.0537	0.0483	0.0252	0.0370	0.0343
38	0.0344	0.0309	0.0351	NR	0.0235	0.0266	NR	0.0196	0.0521	0.059	0.0439	0.0235	0.0356	0.0296

Table 94 Summary of Participants' Results and Performance for Sample S4 (all values are in µg/L) (continued) *

Lab. Code	PFOA	PFNA	PFDA	PFUdA	PFDoA	PFTrDA	PFTeDA	PFOSA	6:2 FTS	8:2 FTS	GenX	ADONA	9Cl-PF3ONS	11Cl-PF3OUdS
A.V.	0.0225	0.373	0.00960	0.0749	0.0423	0.123	0.0796	0.0655	0.0730	0.0739	0.0548	0.0712	0.073	Not Set
1	0.0255	0.379	0.0103	0.0896	0.0524	0.144	0.0962	0.0773	0.072	0.084	NT	NT	NT	NT
2	0.020	0.37	0.009	0.078	0.043	0.12	0.071	NT	NT	NT	NT	NT	NT	NT
3	0.03	0.41	<0.02	0.1	0.05	0.2	<0.5	<0.1	0.08	0.08	NT	NT	NT	NT
4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5	27.104013333333333	355.847405	NR	NR	NR	NR	NR	NT	NT	NT	NT	NT	NT	NT
6	0.0283	0.46	0.0109	0.0776	0.0441	0.109	0.0715	0.0469	0.0791	0.0792	0.0659	0.0826	0.0817	0.0528
7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
8	0.022	0.38	0.010	0.084	0.047	0.12	0.085	0.077	0.068	0.076	NT	0.067	0.079	0.058
9	0.025	0.34	<0.05	0.055	<0.05	<0.05	<0.1	0.03	0.063	0.055	<0.05	0.34	NT	NT
10	0.022	0.35	0.0089	0.064	0.032	0.043	0.035	0.045	0.073	0.063	0.061	0.070	0.065	0.040
11	0.022	0.356	0.0080	0.057	0.023	0.035	0.036	0.046	0.070	0.061	0.053	0.073	0.055	0.017
13	0.0152	0.288	0.00695	0.0645	0.035	0.105	0.0712	0.0518	0.0565	0.0568	0.0366	0.0536	0.0534	0.0255
14	0.026	0.399	0.011	0.076	0.031	0.087	0.033	0.041	0.086	0.079	NT	NT	NT	NT
15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
16	0.018	0.32	NR	0.068	0.035	0.11	0.072	0.057	0.060	0.064	NR	NR	NR	NR
17	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
18	0.026	0.36	0.0096	0.083	0.051	0.15	0.1	0.075	0.078	0.076	0.06	0.073	0.085	0.056
19	0.0222	0.355	<0.02	0.0823	0.0442	0.128	0.0968	0.0712	0.0703	0.0785	NT	NT	NT	NT
20	<0.0365	0.359	<0.0365	0.0744	0.0579	0.152	0.0804	0.073	<0.132	<0.124	<0.146	<0.146	<0.147	<0.146
21	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
22	0.00661	0.0968	<0.005	0.017	0.00502	0.00552	<0.01	0.00875	NT	0.0139	NT	NT	NT	NT
23	0.0215	0.396	0.0101	0.0805	0.0447	0.132	0.0917	0.0743	0.077	0.076	NT	NT	NT	NT
24	< 0.03	0.33	< 0.05	0.07	< 0.09	< 0.23	< 0.09	< 0.18	0.06	0.054	NT	NT	NT	NT
25	NR	0.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
26	0.022	0.42	0.01	0.072	0.033	0.053	0.033	0.062	0.085	0.079	0.053	0.08	0.057	0.018
27	0.0235	0.3734	0.0101	0.0877	0.0514	0.1241	0.0475	0.0805	0.0808	0.0775	0.0496	0.0655	0.0635	0.0261
28	0.031	0.48	0.015	0.073	0.05	0.175	0.107	0.078	0.076	0.08	0.166	0.07	NT	NT
29	0.024	0.550	0.011	0.089	0.045	0.140	0.063	0.078	0.070	0.080	0.060	0.077	0.110	0.091
30	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
31	0.019	0.321	<0.02	0.071	0.041	0.107	0.078	0.069	0.0703	0.0713	NT	NT	NT	NT
32	0.0214	0.416	0.0103	0.0641	0.0419	0.127	0.0723	0.0701	0.0751	0.0730	NT	NT	NT	NT
33	0.035	0.57	0.015	0.12	0.075	0.22	0.14	0.115	0.095	0.1	0.065	0.095	0.125	0.07
34	0.018	0.353	0.008	0.049	0.034	0.262	NR	NR	NR	NR	NR	NR	NR	NR
35	0.02	0.369	<0.02	0.079	0.040	0.107	0.069	0.066	0.074	0.078	NT	NT	NT	NT
37	0.0223	0.371	0.00952	0.0793	0.0437	0.126	0.0811	0.0671	0.0684	0.0796	0.0497	0.0640	0.0766	0.0545
38	0.0186	0.3213	0.0086	0.074	0.0412	0.0841	0.075	0.0647	0.0693	0.0703	0.0451	0.0608	0.0805	0.0391

* A.V. = Assigned Value, NS = Not Sent, NT = Not Tested, NR = Not Reported. Shaded cells are results which returned a questionable or unsatisfactory z-score.

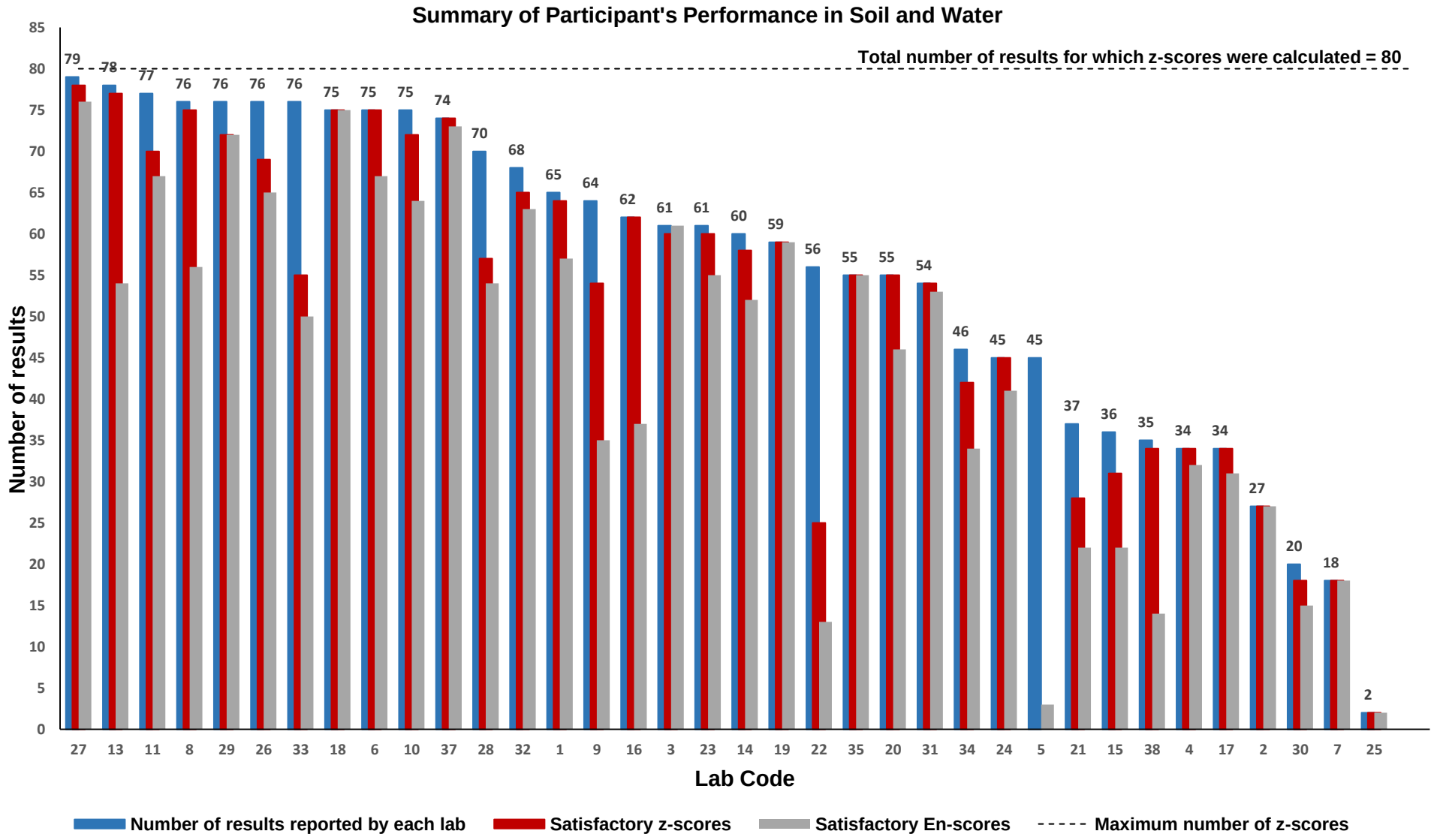


Figure 92 Summary of Participants' Performance in Soil and Water

6.6 Summary of Participants' Results and Performances

Summaries of participants' results and performances for scored analytes in this PT study are presented in Tables 91 to 94 and Figures 86 to 90.

Four laboratories reported at least one PFAS analyte that was not spiked into test samples S2 and S4 by the study coordinator. These results are presented in Appendix 3.

Twenty-nine laboratories analysed both matrices. No laboratories reported results for all of the analytes for which z-scores were calculated (80).

Laboratory **27** returned the highest number of satisfactory z-scores (78 out of 79). All results reported by laboratories **18** (75), **6** (75), **37** (74), **16** (62), **19** (59), **35** (55), **20** (55), **31** (54), **24** (45), **17** (34), **4** (34), **2** (27), **7** (18) and **25** (2) returned satisfactory z-scores (Figure 92).

Laboratory **27** had the highest number of satisfactory E_n-scores (76 out of 79). Laboratories **2**, **3**, **7**, **18**, **19**, **25** and **35** returned satisfactory E_n-scores for all analytes reported.

Two participants (Laboratories 2 and 38) analysed the water matrix only. Of the total number of results for which z-scores were calculated (39), Laboratory **38** reported 35. Thirty-four of these returned satisfactory z-scores and 14 returned satisfactory E_n scores.

All results reported by Laboratory 5 were higher than the assigned value by a factor of 20 to 1700. Systematic bias was also observed in the results of laboratories 22 and 33, most of the unsatisfactory results reported by Laboratory 22 in samples S3 and S4 were lower than the assigned value by a factor of approximately 0.25 while most of the unsatisfactory results reported by Laboratory 33 in the water samples were higher than the assigned value by a factor of approximately 1.5. These laboratories should check their dilution and/or standard preparation procedures. Using a matrix matched control sample which is to be taken through every single step of the analytical process together with the routine sample will also help to check the calculation/reporting procedure.

Their results were not included in the analyses of extraction methods and of instrumental techniques employed by participants.

6.7 Participants' Results and Analytical Methods for PFAS in Soil

Of 34 laboratories who analysed the soil samples, 33 reported results. Participants were requested to analyse the samples using their normal test method and to report a single result as they would normally report to a client. The method descriptions provided by participants for PFAS measurements in soil are presented in Appendix 5.

Laboratories **6**, **13** and **27** reported results for all of the analytes in the two soil samples and all returned satisfactory z-scores.

Overall the between-laboratory coeficient of variation for PFAS analytes in S1 were larger than in S2, an indication that PFAS measurements in soil sample S1 presented more difficulty to participants than in S2.

Extraction

Sample S1 was contaminated soil, whereas Sample S2 was soil fortified for 27 individual PFAS components. Analytes' mass fraction in the two soil samples were between 0.211 µg/kg and 93.0 µg/kg (with PFOS in S1 at 3430 µg/kg).

Of 33 participants who reported results for both soil samples, 26 used the same sample size for extraction. Laboratories used a wide variety of sample sizes. Plots of participants' performance in S1 and S2 versus the amount of sample taken for analysis are presented in Figure 93. Results from a sample size of 0.2 g were biased low. Caution should be exercised

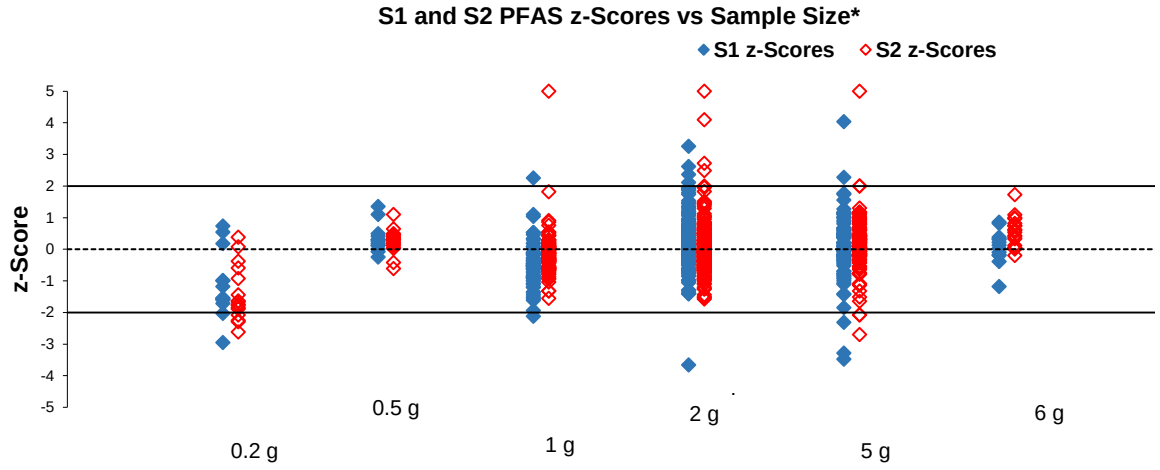
when a small sample size is taken for analysis as this might not be representative of the whole sample.

Most laboratories extracted their samples for 30 minutes. One laboratory conducted their sample extraction over four hours (Figure 94).

Methanol, base modified methanol and acetonitrile were the preferred extraction reagents. In general, PFAS results were compatible with each other regardless of the extraction reagent used (Figure 95).

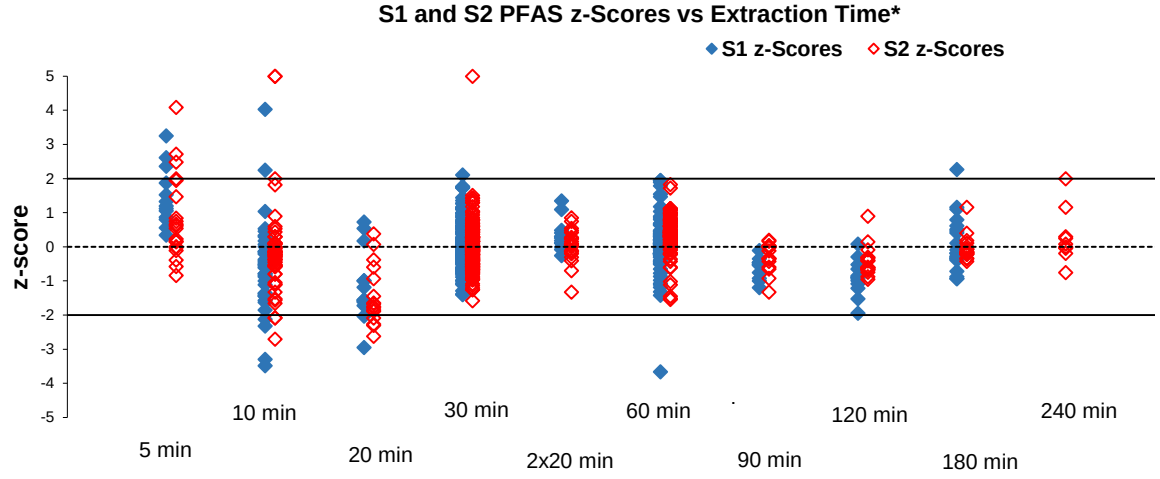
Participants used a wide variety of extraction procedures based on SLE, alkaline digestion, QuEChERS, Soxhlet or accelerated solvent extraction. The use of mass labelled standards played a significant role in correcting the difference between these in-house analytical methods. Most results produced were compatible with each other (Figure 96).

The most popular method was a SLE extraction based on the method developed by Powley et al. This method involved a sample size of 2 g, methanol or methanol base as extraction solvent, two to three rounds of 30 min shaking at room temperature and a clean-up step using active carbon. This method is known to give a recovery of 75% to 120% for all chain lengths. [9]



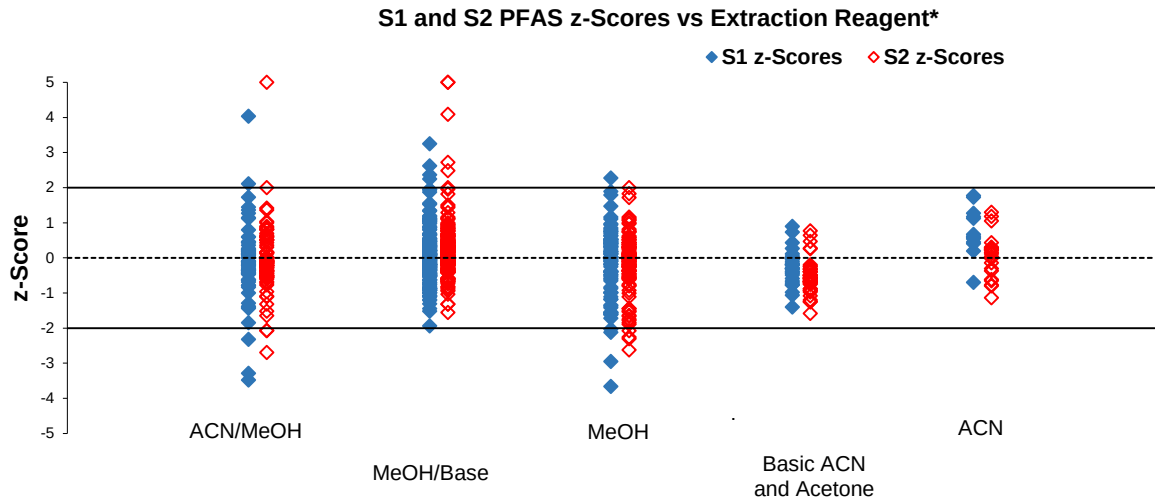
*Results from Laboratory 5 were excluded. Scores greater than 5 have been plotted as 5.

Figure 93 Participants' Performance in S1 and S2 vs Sample Size



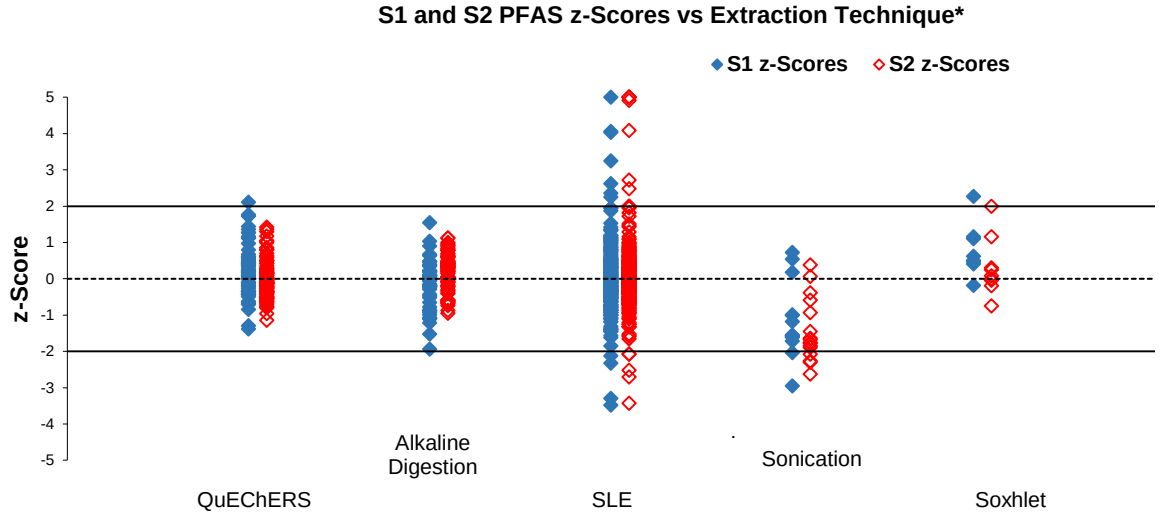
*Results from Laboratory 5 were excluded. Scores greater than 5 have been plotted as 5.

Figure 94 Participants' Performance in S1 and S2 vs Extraction Time



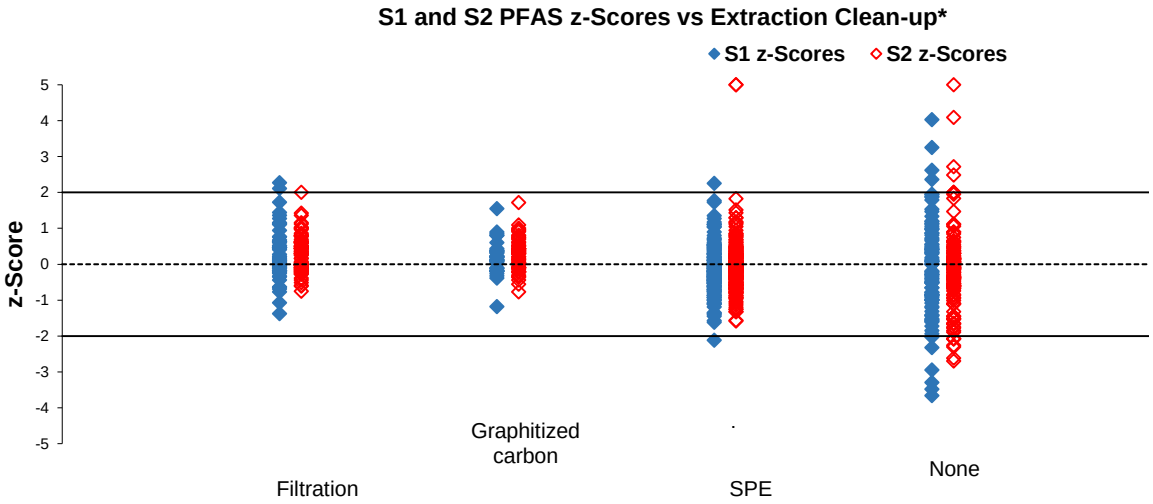
*Results from Laboratory 5 were excluded. Scores greater than 5 have been plotted as 5.

Figure 95 Participants' Performance in S1 and S2 vs. Extraction Reagent



*Results from Laboratory 5 were excluded. Scores greater than 5 have been plotted as 5.

Figure 96 Participants' Performance in S1 and S2 vs Extraction Technique



*Results from Laboratory 5 were excluded. Scores greater than 5 have been plotted as 5.

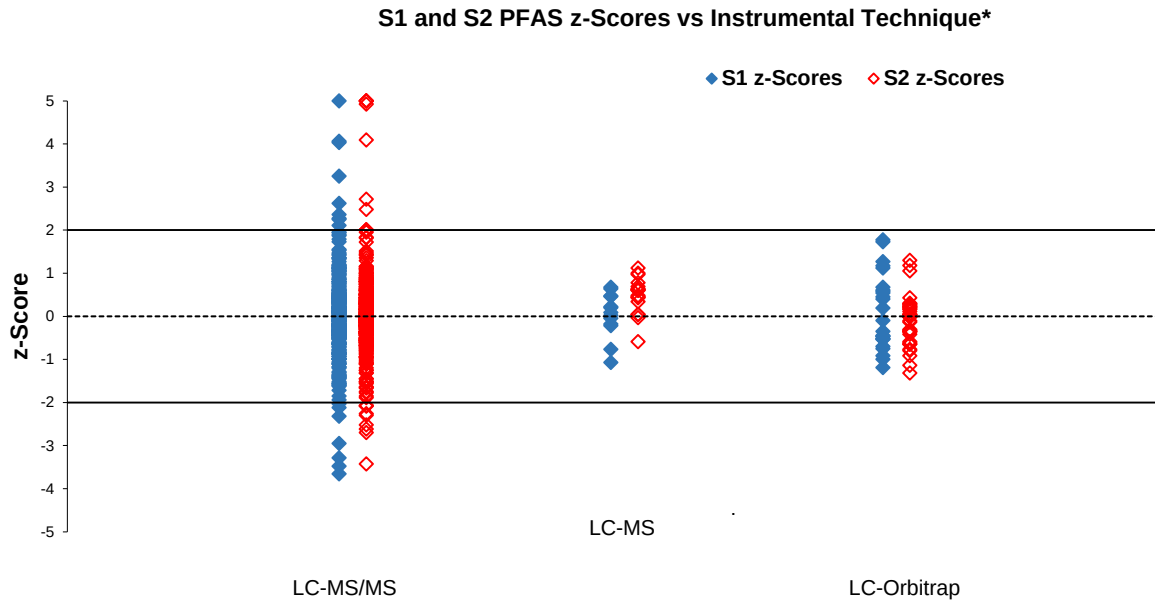
Figure 97 Participants' Performance in S1 and S2 vs Extraction Clean-up Procedure

Clean-up of the crude extracts is an important step in the removal of matrix constituents that may interfere in instrumental determination. Matrix effects have been known to be one of the main causes of variability in results. Most participants used SPE for clean-up of crude extracts. Five laboratories used filtration to remove solids from the extract, and 8 did not clean up after extraction. Large variation was noticed between the results reported by laboratories who chose not to clean up after extraction (Figure 97).

Instrumental Technique

The analytical detection method of choice was LC-MS (Figure 98). With the exception of three, all participants reported using LC-MS/MS (QQQ) for PFAS measurements. Laboratories 24 and 26 used Orbitrap and laboratory 3 used LC-MS. Most LC-MS/MS users used a C18 based column. All but four participants reported using a delay column.

Of 33 participants, 11 reported diluting both samples before analysis, two diluted only sample S1 while 3 diluted sample S1 for PFOS quantification alone.



*Results from Laboratory 5 were excluded. Scores greater than 5 have been plotted as 5.

Figure 98 Participants' Performance in S1 and S2 vs Instrumental Technique

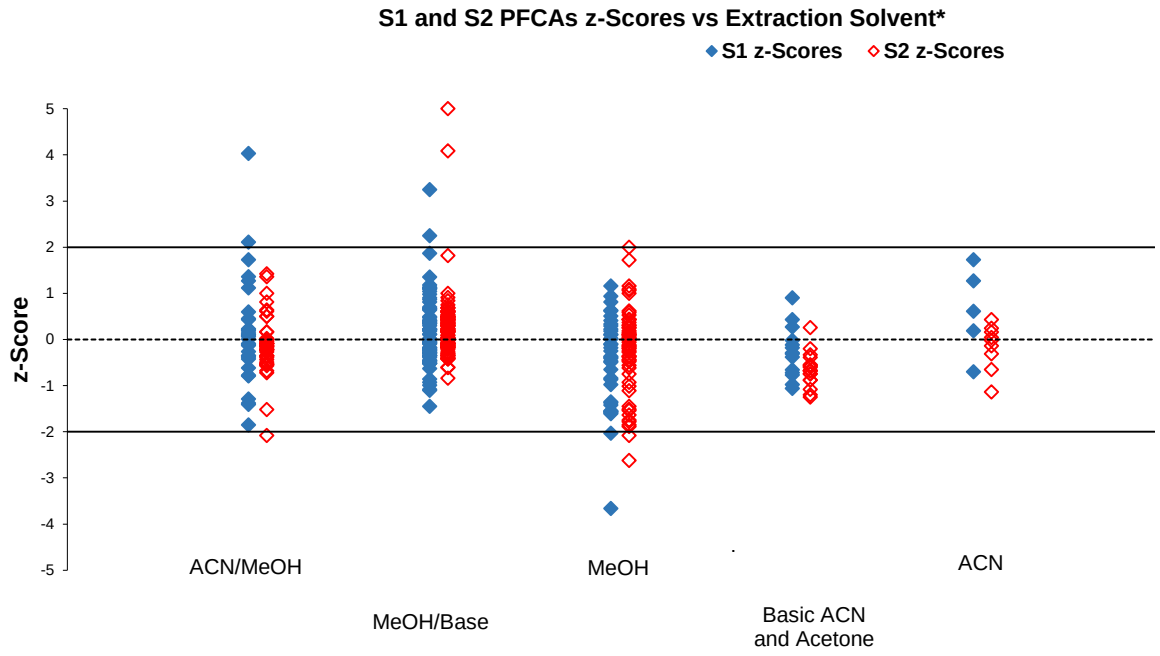
6.7.1 Individual PFCA Analytes in Soil

Sample S1 was contaminated soil, while sample S2 was soil fortified for 9 PFCAs analytes. PFCAs measurements in S1 presented more difficulty to participants than in S2. The between-laboratory coefficient of variation was between 10% and 22% for PFCAs results reported in S1, and between 8% and 11% for PFCAs results reported in the spiked soil sample S2.

PFDA in S1 followed by PFNA were the analytes with the largest coefficients of variation, of 22% and 21% respectively. PFDA was the analyte with the lowest number of reported results, (12) while of 14 results reported for PFNA only 10 returned satisfactory z-scores. The level of these two analytes in S1 was low, below 0.3 mg/kg, and this may have challenged participants' analytical methods.

Figure 99 presents plots of participants' z-scores for PFCAs in S1 and S2 versus the extraction reagent used. Although there may be a discrepancy between results produced by extraction solvents containing methanol and those produced by other extraction solvents, the

limited number of results from extraction with ACN or basic ACN and acetone has hampered our attempt to identify any relationship between them.



*Results from Laboratory 5 were excluded. Scores greater than 5 have been plotted as 5.

Figure 99 S1 and S2 PFCAs z-Scores vs Extraction Reagent

6.7.2 Individual PFECA and PFESA Analytes in Soil

GenX and ADONA and were introduced in a PT study for the first time in 2019 and 2020 respectively. As in the previous study, approximately only one third of participants reported results for ADONA and GenX in S2. The reported results were in a relatively good agreement with each other. The between-laboratory CV was 18% for GenX and 23% for ADONA.

The same standard solution was used to spike GenX in S2 as for S4. While the results reported for GenX in S2 were low only at 38% of the spiked value, the results reported for S4 were 91% of the spiked value. No assigned value was set for this analyte in S2. Low recovery in S2 may be explained by losses during PT sample preparation or low extraction efficiency due to the high organic content of the soil material used. The preparation procedure for this analyte will be changed in furture studies.

9Cl-PF3ONS and 11Cl-PF3OUdS Of 33 participants who reported results in the soil samples, 14 reported results for 9Cl-PF3ONS and 13 for 11Cl-PF3OUdS. All but one participant performed satisfactorily.

Plots of participants' performance for 11Cl-PF3OUdS in S2 versus method used are presented in Figure 100.

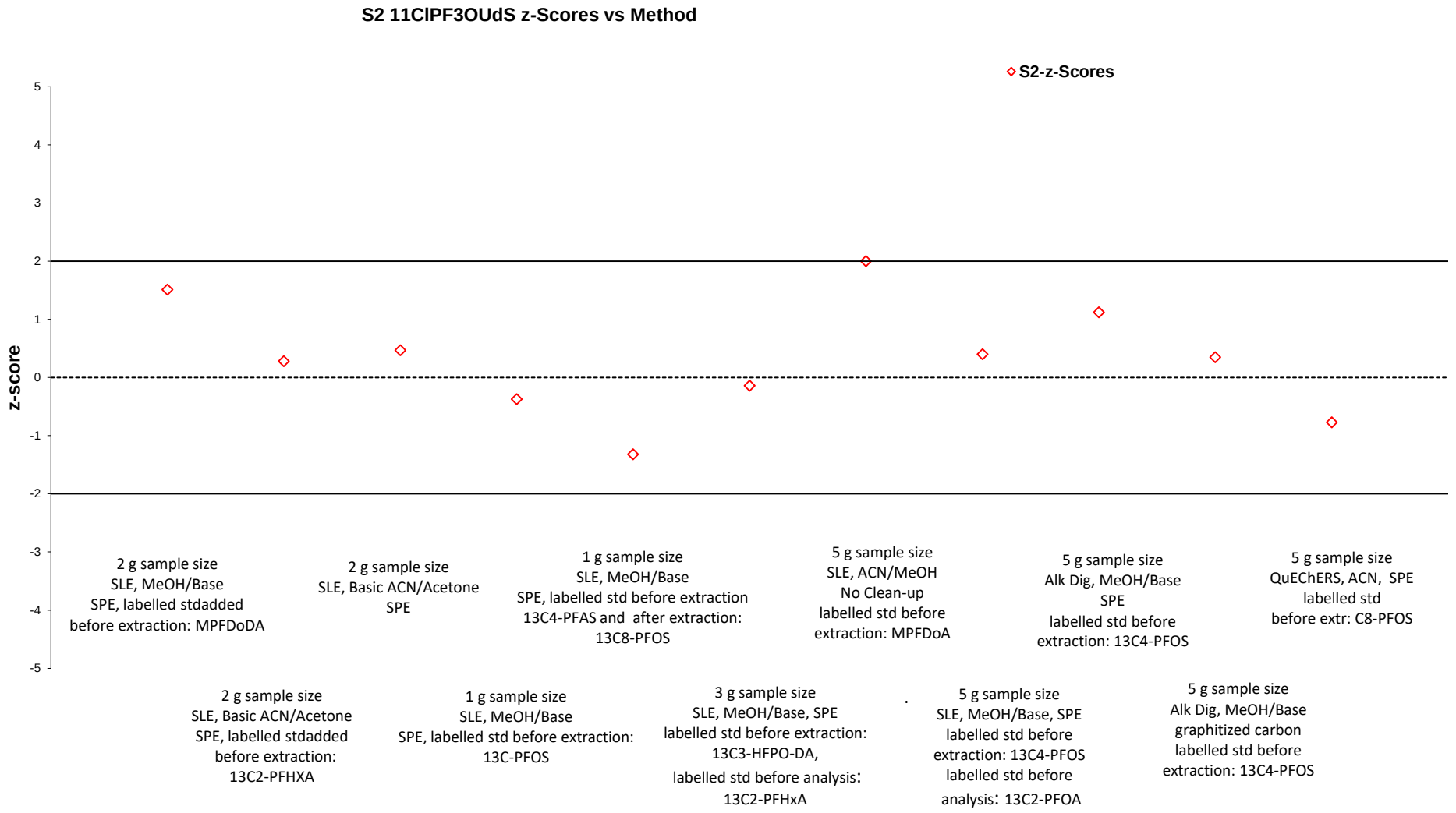
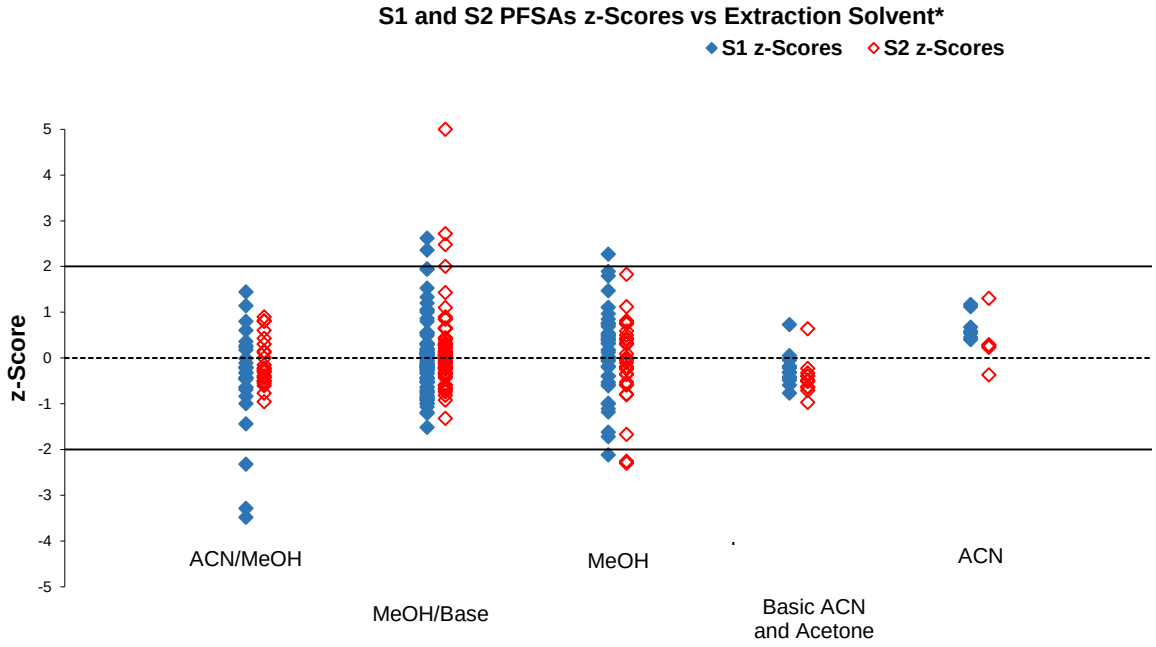


Figure 100 S2 11Cl-PF3OUdS z-Scores vs. Methods

6.7.3 Individual PFSA Analytes in Soil

Plots of participants' z-scores for PFSAs in S1 and S2 versus the extraction solvent used are presented in Figure 101. No relationship was evident between results produced using extraction solvents containing methanol and those produced by the other extraction solvents



*Results from Laboratory 5 were excluded. Scores greater than 5 have been plotted as 5.

Figure 101 Participants' Performance in S1 and S2 vs Extraction Reagent

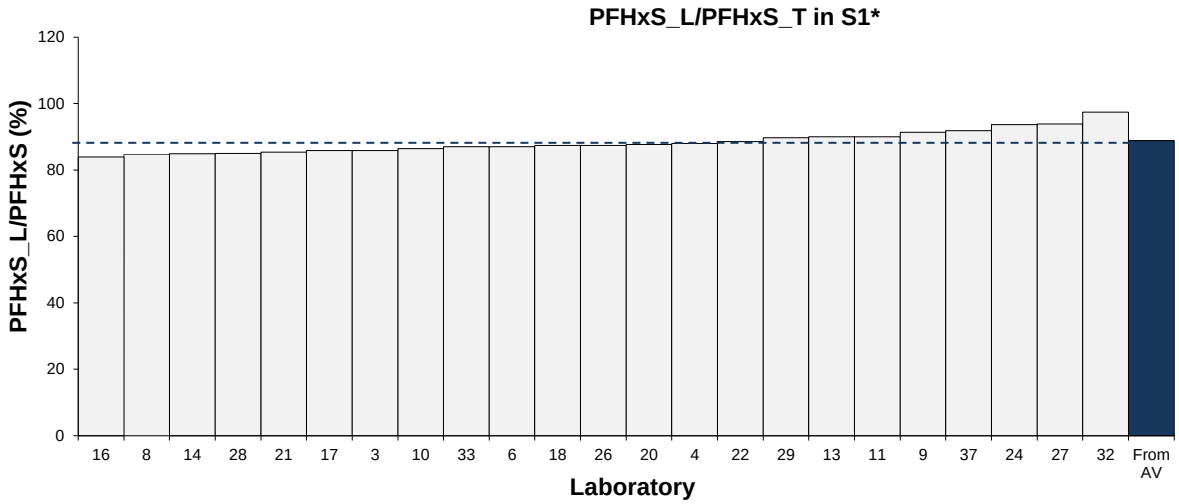
PFNS and PFDS No assigned value could be set for PFNS and PFDS in S1 because the results reported for these analytes were not compatible.

PFOS level in S1 was high, at 3430 µg/kg which may have resulted in suppression of the PFOS labelled internal standards used for these analytes. This might introduce a bias for analytes for which these labelled internal stdandards were used. The spread of results might be influenced by the amount of internal standards used and the instrumental technique involved.

Laboratories should consider using matrix matched control samples with high PFAS content to monitor the accuracy of their measurement results for analytes for which labelled PFOS internal standards were used and reassess their estimates of uncertainty for these tests.

PFHxS and PFHxS_L and PFOS and PFOS_L For PFAS that contain linear and branched isomers, participants were asked to report total results (the sum of linear and branched) whereas for PFOS and PFHxS they were asked to report both total (the sum of linear and branched isomers) and linear (the linear isomers only) results.

Twenty-three participants reported results for both total and linear PFHxS in S1. The ratios of PFHxS_L versus total PFHxS in S1 were between 84% and 97% while the assigned value ratio between the two isomers was 89% (Figure 102).

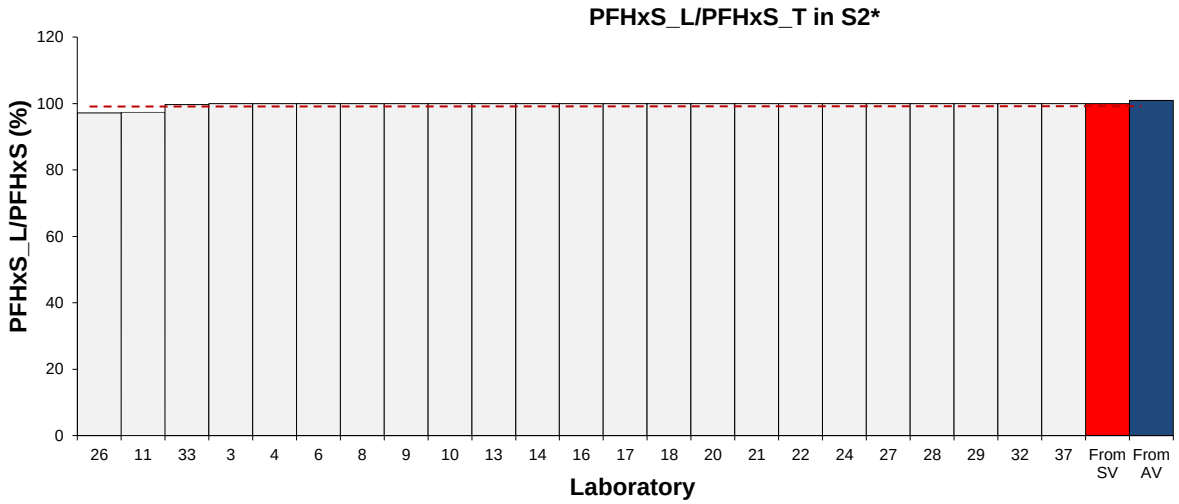


*The ratio from the AV is calculated based on the results reported by all participants including those who reported results for only one analyte

Figure 102 Bar Charts of PFHxS_L/PFHxS_T in S1

The soil sample S2 was spiked with linear PFHxS and linear PFOS standards. Twenty-three participants reported results for both PFHxS total and linear in S2. The linear to total ratio of the results reported for PFHxS isomers was between 97% to 100% (Figure 103).

Rounding of results and how laboratories used branched isomers for quantitation may explain some of the ratios lower than 100%. If they use a combined branched/linear standard and integrate branched/linear together for totals, the result could be different to a linear only result due to response factor differences between the isomers.

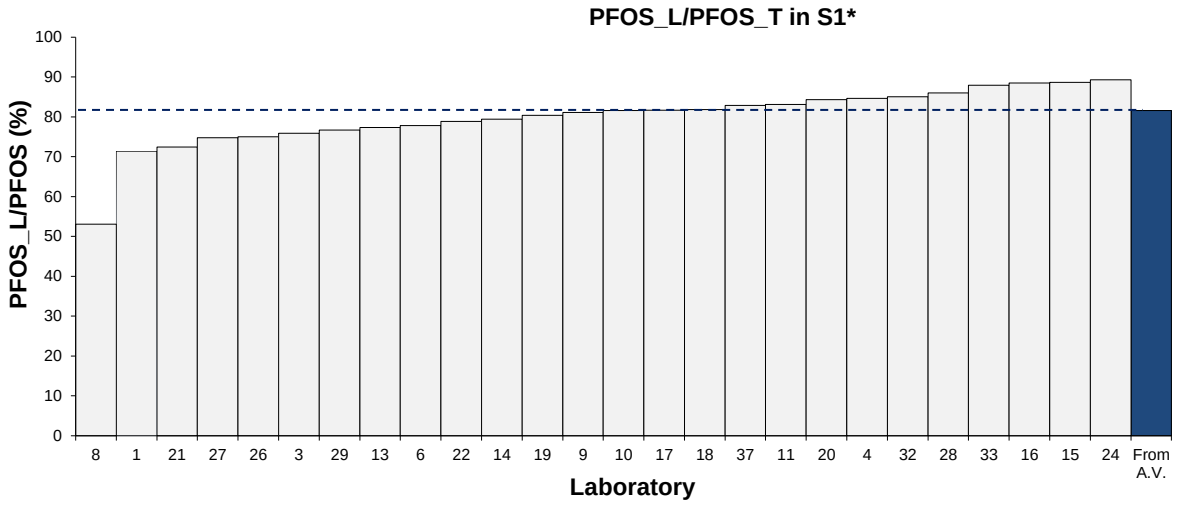


*The ratio from the AV is calculated based on the results reported by all participants including those who reported results for only one analyte

Figure 103 Bar Charts of PFHxS_L/PFHxS_T in S2

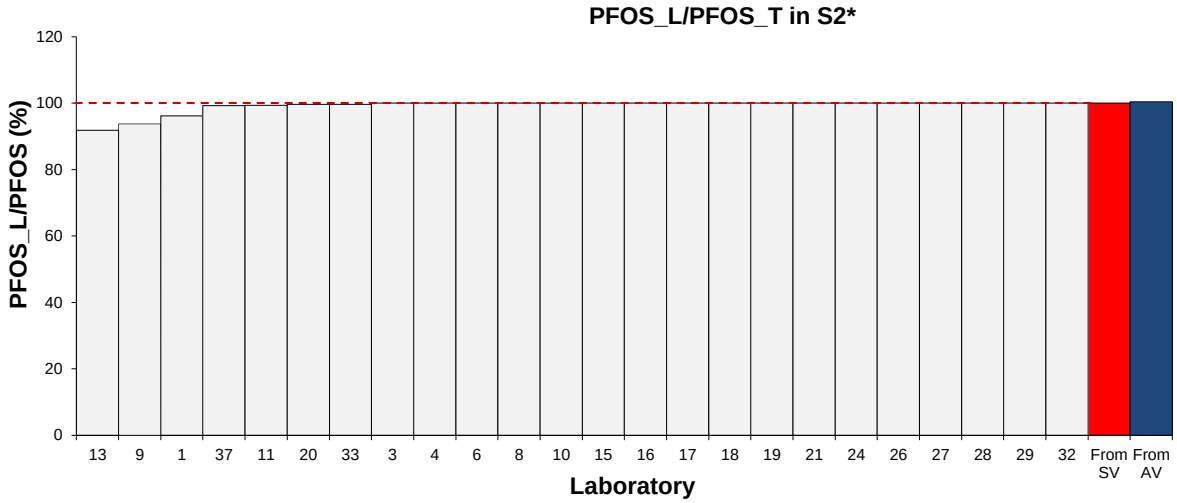
Figures 104 and 105 presents bar charts with ratios of PFOS_L results vs PFOS total results in in S1 and S2 respectively.

26 participants reported results for both PFOS isotopes (total and linear) in S1 The ratios were between 53% to 89%. 24 participants reported results for the two isomers in S2.



*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 104 Bar Charts o f PFOS_L/PFOS_T in S1



*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 105 Bar of Charts PFOS_L/PFOS_T in S2

6.7.4 Individual PFAA Precursors Analytes in Soil

PFOSA in S1 and S2 was at similar level, of 4.58 µg/kg in S1 and 5.19 in S2 µg/kg. Of 33 participants who reported results for the soil samples S1 and S2, 25 reported results for PFOSA in S1 and 27 in S2. All performed satisfactorily, with the exception of one laboratory in S1 and one in S2.

N-EtFOSA, N-MeFOSA, N-MeFOSE and 6:2 FTS in S2 did not present analytical difficulty to participating laboratories. The between-laboratory CVs for these analytes were between 9.5% and 16%.

6.8 Participants' Results and Analytical Methods for PFAS in Water

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

Extraction

Sample S3 was contaminated water, whereas sample S4 was milli-Q water fortified for 28 individual PFAS components. Analyte concentration in the two water samples were similar, between 0.00381 µg/L and 0.373 µg/L. Of 29 participants who reported results for both water samples, all but two participants used the same sample size for both samples.

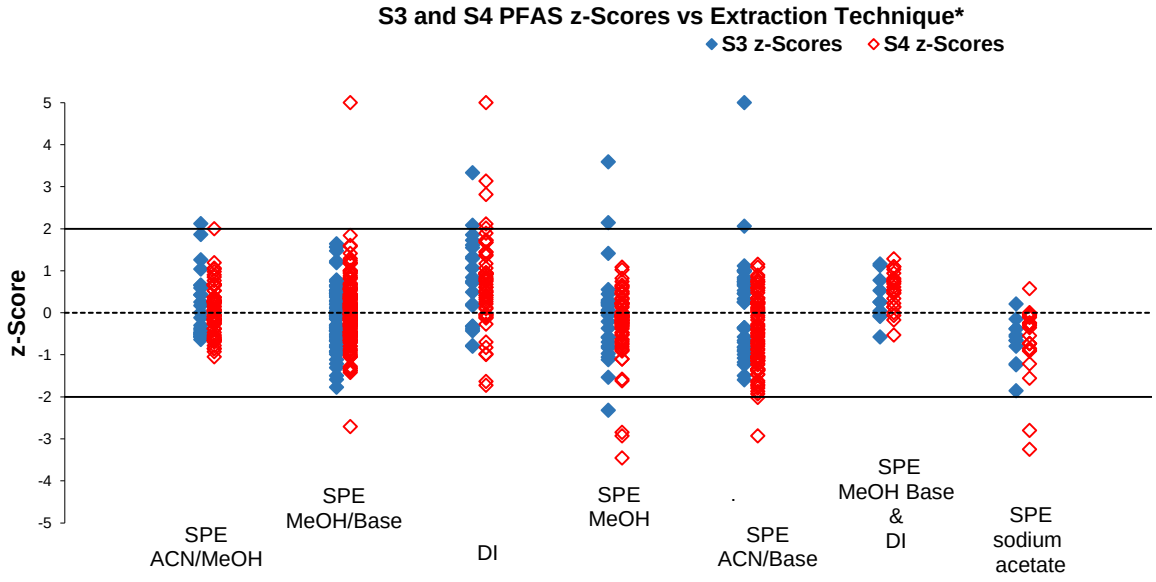
In order to account for analyte absorption into the wall of the container, participants were instructed to use the entire contents of the bottle for analysis. 18 reported using the entire container, wheres 3 used only 5 to 10 mL from each sample and 2 laboratories reported using the entire container of sample S4 and only 2.5 mL and 9.94 mL respectively of Sample S1.

Most laboratories chose to enrich the test samples using SPE (Figure 106).

Laboratories 3 and 28 reported using direct injection without sample enrichment however they also reported using the entire sample. Both laboratories performed unsatisfactorily or questionable for the measurement of the long chain carboxylic acid PFTrDA in S4.

Two similar water bottles were provided for analysis of each sample. Laboratory 18 may have measured some PFAS components by direct injection in water from one of the two bottles and the other PFAS components using SPE extractions using the entire water sample from the other bottle. The results they reported for the long chain carboxylic acids, PFUdA, PFTrDA and PFTeDA all returned satisfactory z-scores.

Laboratory 34 reported: 1 mL filtered water was extracted with 460 uL pH adjusted MeOH and then transfered into the LC vial for analysis after surrogate and internal standard addition. The direct injection procedure they followed might explain the unsatisfactory result they reported for PFTrDA in S4, as this PFAS component sticks to the walls of the bottle. The amount of methanol used may also have been insufficient to keep PFTrDA in the solution.



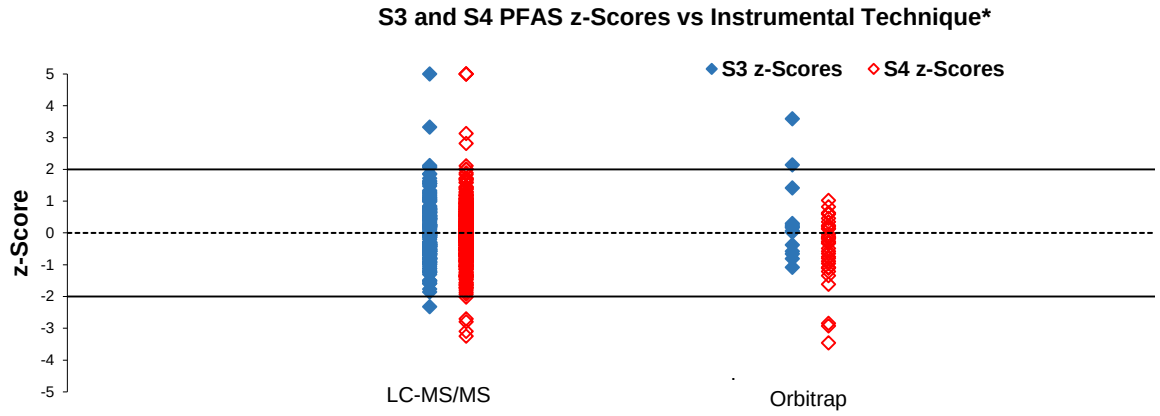
*Laboratories 5, 22 and 33 excluded. Scores greater than 5 have been plotted as 5.

Figure 106 S3 and S4 Performance vs Extraction Technique

The most popular method used for measurements of PFAS water samples S3 and S4 was a SPE extraction procedure which involved taking for analysis the entire sample, methanol or methanol base as elution solvent, and no clean-up step.

Instrumental Technique

With the exception of 2 participants, all laboratories reported using LC-MS/MS(QQQ) for PFAS measurements. Laboratories 24 and 26 used Orbitrap (Figure 107). Most LC-MS/MS users used a C18-based column and all but 3 reported using a delay column.



*Laboratories 5, 22 and 33 excluded. Scores greater than 5 have been plotted as 5.

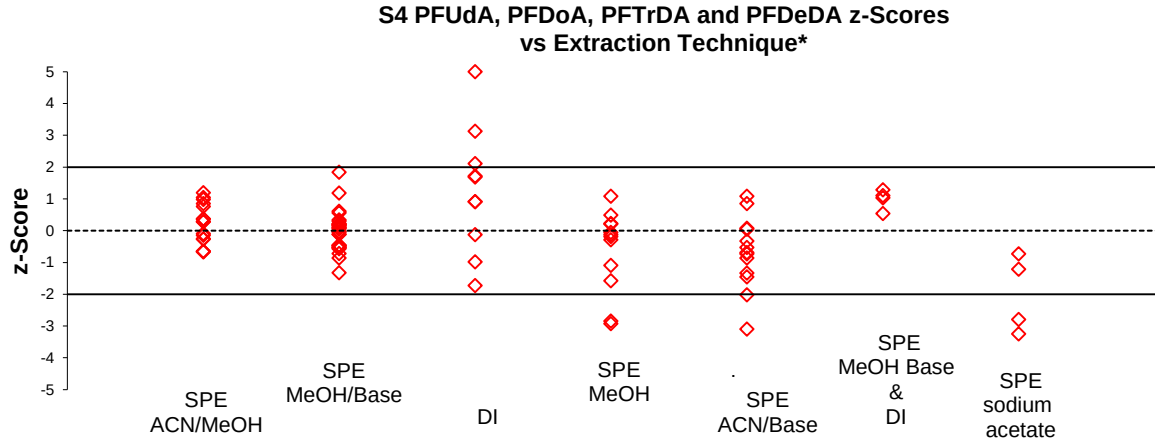
Figure 107 S3 and S4 Performance vs Instrumental Technique

6.8.1 Individual PFCAs Analytes in Water

Overall, PFCAs measuerements in S3 and S4 did not challenge participants' analytical techniques. The between-laboratory coeficient of variation was between 11% to 23% .

PFUdA, PFDoA, PFTrDA and PFTeDA 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. [10-14] These long chain PFCAs were spiked directly into each bottle with the aim of minimising loss during preparation. The assigned values for these analytes were between 80% and 94% of the spiked value.

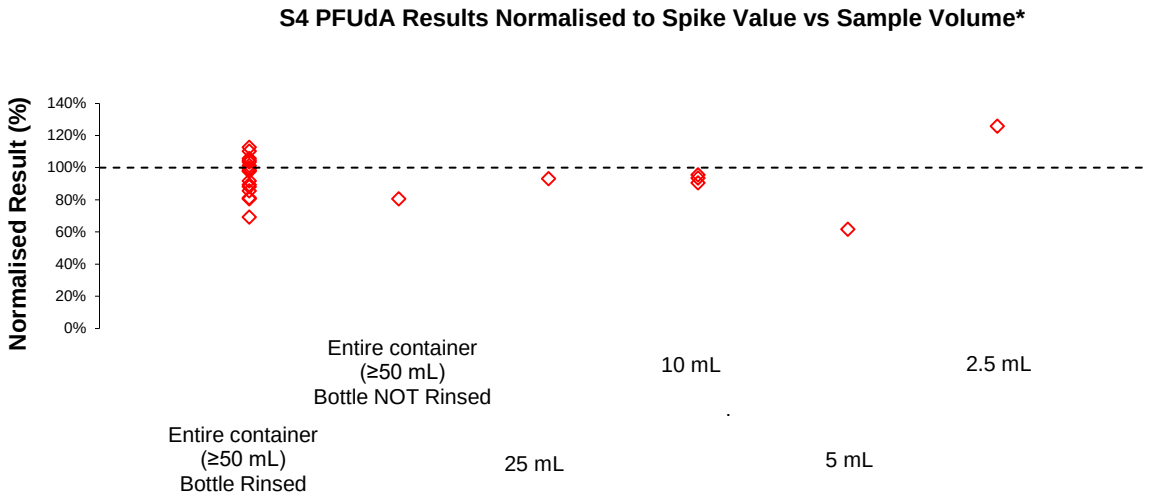
Figure 108 presents plots of participants'z-scores versus the extraction technique used. No relationship between the extraction technique used and laboratory-performance was evident.



*Laboratories 5, 22 and 33 excluded. Scores greater than 5 have been plotted as 5.

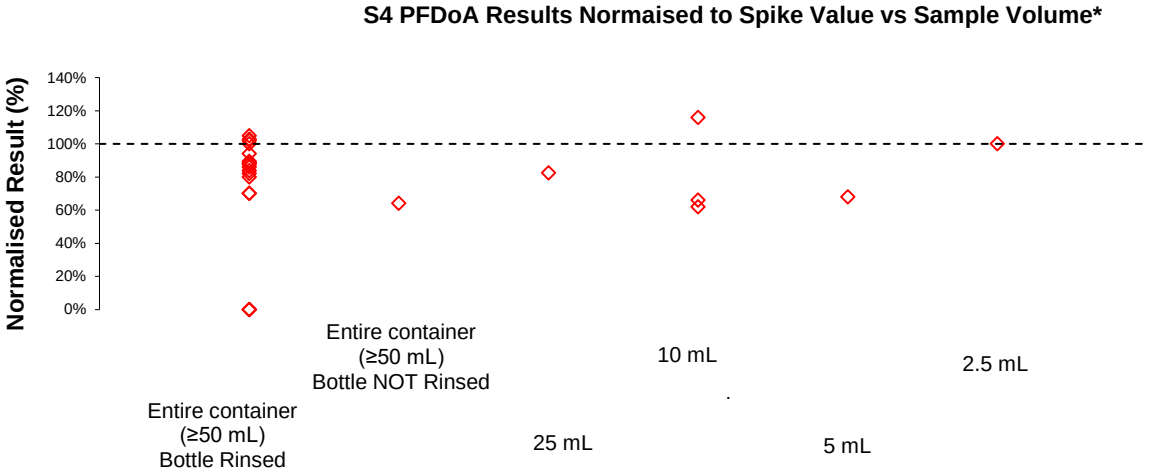
Figure 108 S3 and S4 Performance vs ExtractionTechnique

Plots of participants' results (normalised to spike value) versus testing method are presented in Figures 109 to 112.



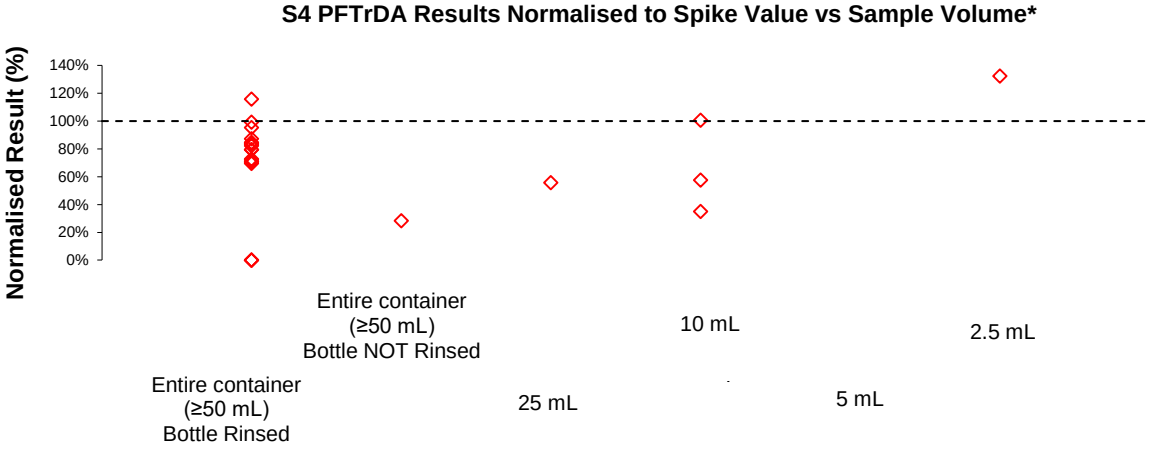
*Laboratories 22 and 33 excluded.

Figure 109 S4-PFUdA Results Normalised to Spiked Value versus Sample Volume



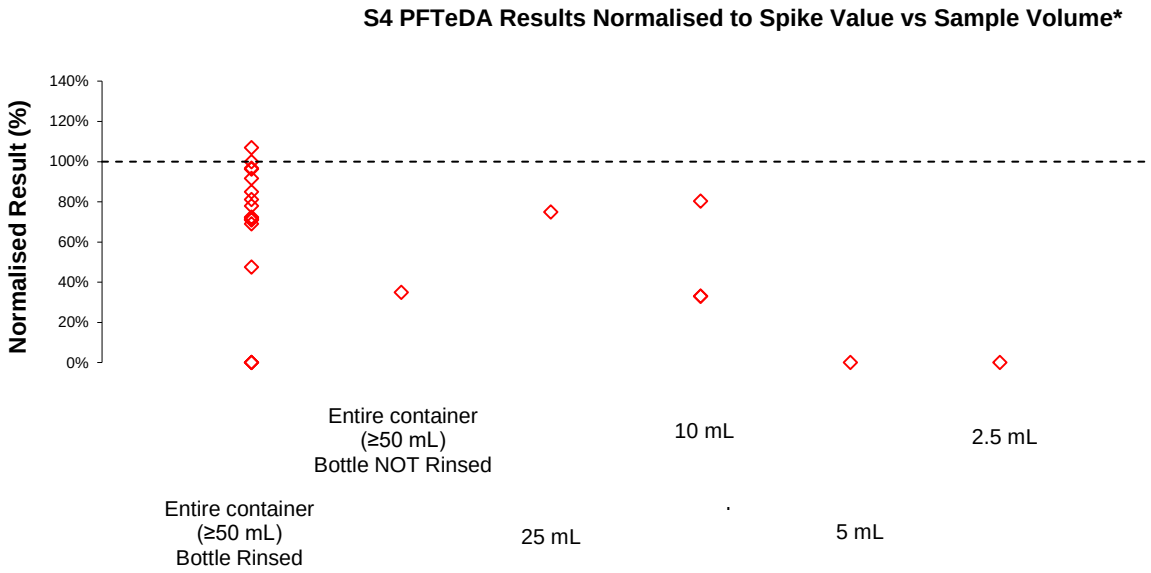
*Laboratories 22 and 33 excluded.

Figure 110 S4-PFDoA Results Normalised to Spiked Value versus Sample Volume



*Laboratories 22 and 33 excluded.

Figure 111 S4-PFTrDA Results Normalised to Spiked Value versus Sample Volume



*Laboratory 33 excluded.

Figure 112 S4-PFTeDA Results Normalised to Spiked Value versus Sample Volume

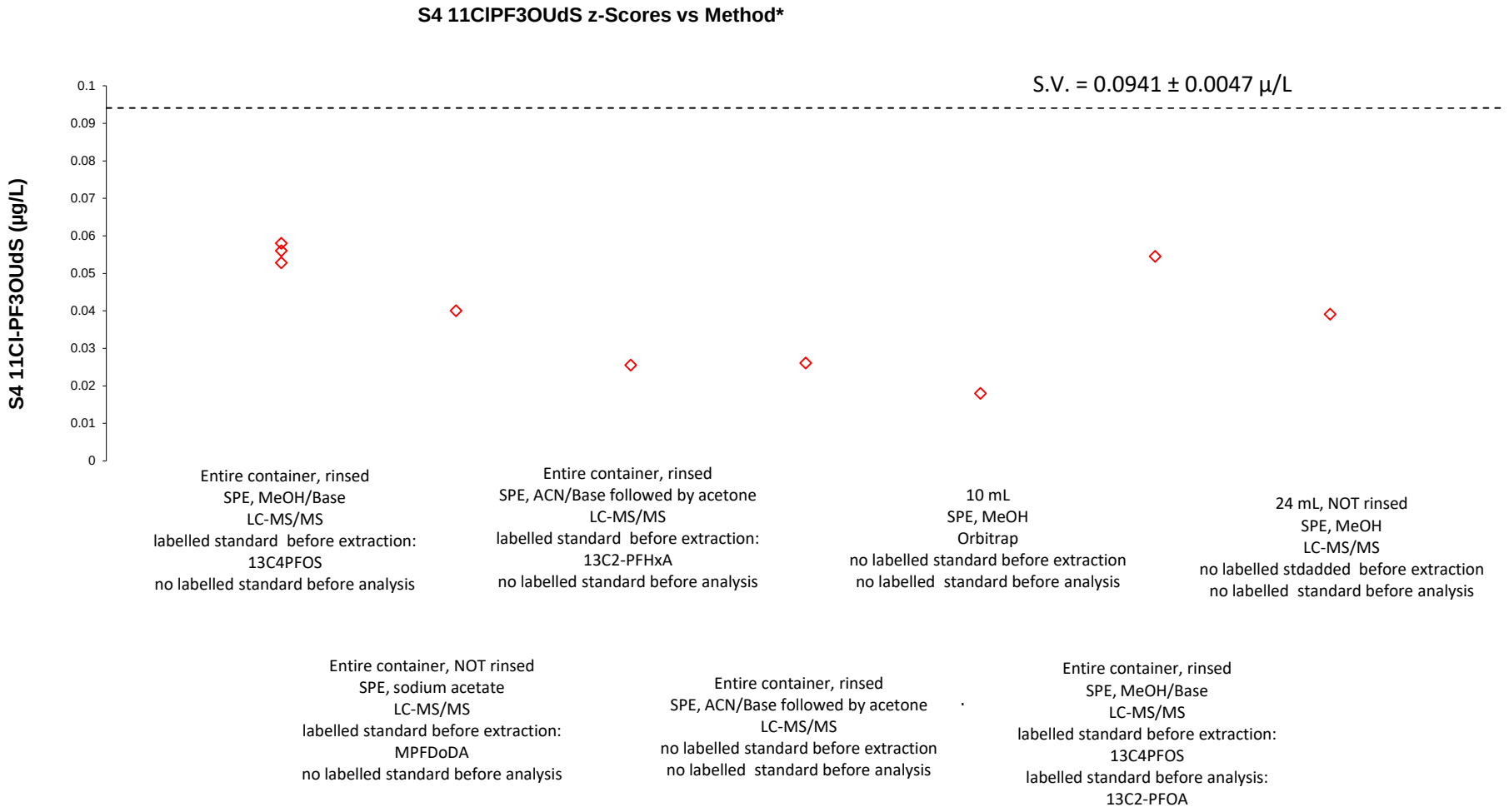
Most participants who recovered 100% of the spiked long chain carboxilic acids (PFUdA, PFDoA, PFTrDA and PFTeDA) used the entire container or almost the entire container (≥50 mL).

6.8.2 Individual PFECA and PFESA Analytes in Water

A limited number of participants (less than half) provided results for PFECA and PFESA analytes in water.

11Cl-PF3OUdS The results reported for 11Cl-PF3OUdS in S4 were variable (CV of 52%) and hence no assigned value could be set. This was the second time that 11Cl-PF3OUdS in water was included in a PT.

Plots of participants results for 11Cl-PF3OUdS in S4 versus method used are presented in Figure 113.



*Laboratories 22 and 33 excluded.

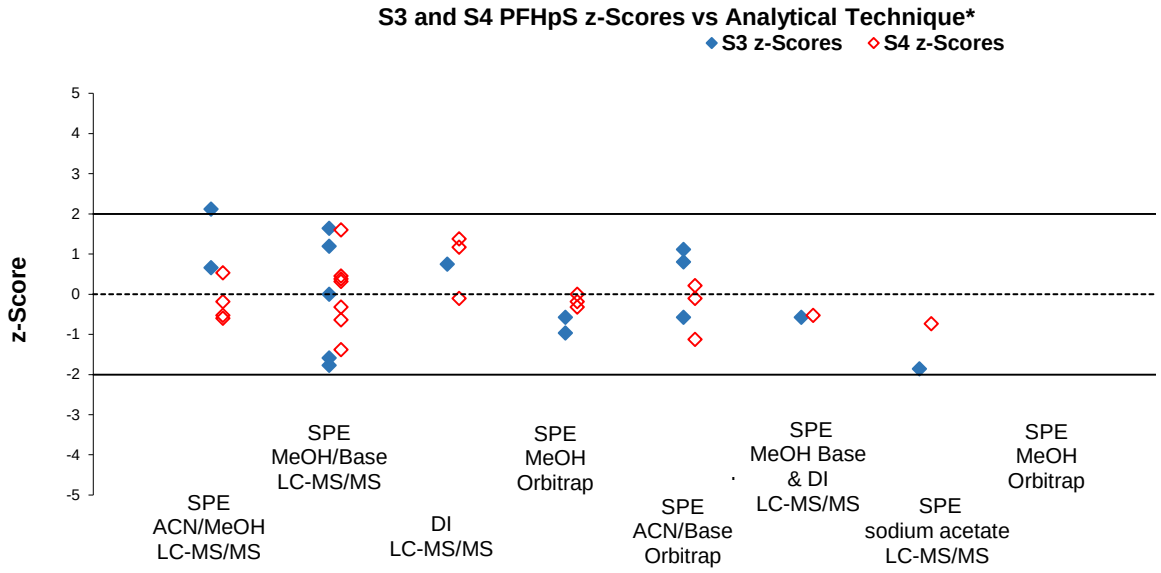
Figure 113 S4 11Cl-PF3OUdS Results vs. Methods

6.8.3 Individual PFSA Analyte in Water

PFHpS in S3 and **PFDS** in S4 were the PFSAs which presented the most analytical difficulty to participating laboratories, with between-laboratory CVs of 29% and 27% respectively.

While the between laboratory CV for PFHpS in S3 was 29%,in S4 it was much lower at only 16%. The PFHpS level in S3 may have challenged participants' analytical techniques at only 0.0113 µg/L, whereas in S4 it was almost double at 0.0235 µg/L.

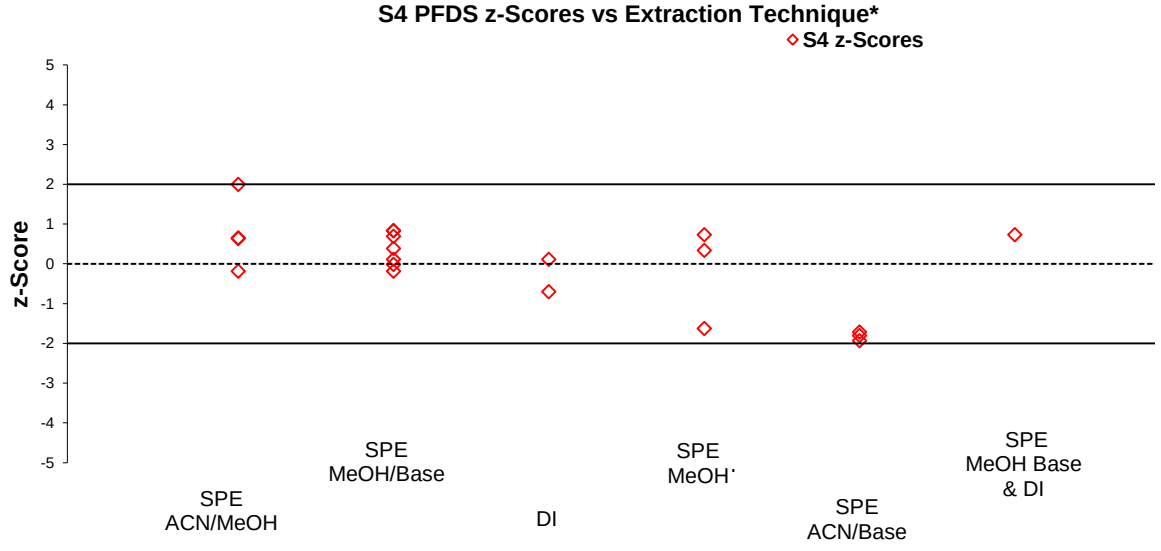
Plots of participants' performance versus analytical techniques used are presented in Figure 114.



*Laboratories 5, 22 and 33 excluded.

Figure 114 S3 and S4-PFHpS z-Scores versus Analytical Technique

Plots of participants' results versus analytical technique used for PFDS measurements are presented in Figure 115. Due to limited data and the variety of extraction techniques used, no significant trends in extraction and sample preparation procedures used were identified.

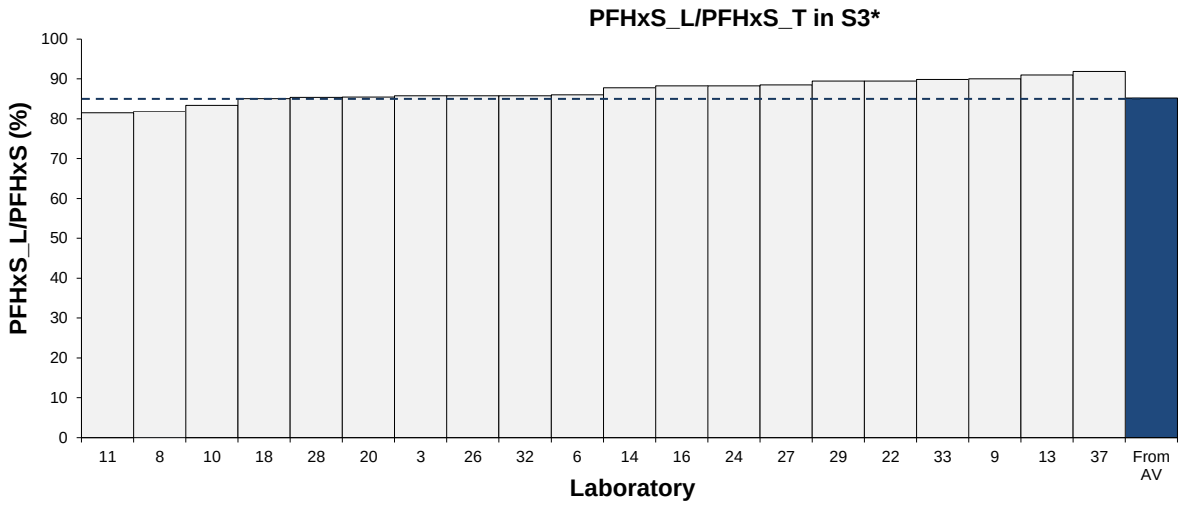


*Laboratories 5, 22 and 33 excluded.

Figure 115 S3 and S4-PFDS z-Scores versus Extraction Technique

PFHxS and PFHxS_L and PFOS and PFOS_L As for the soil samples, for PFOS and PFHxS participants were asked to report both total (the sum of linear and branched isomers) and linear (the linear isomer only) results.

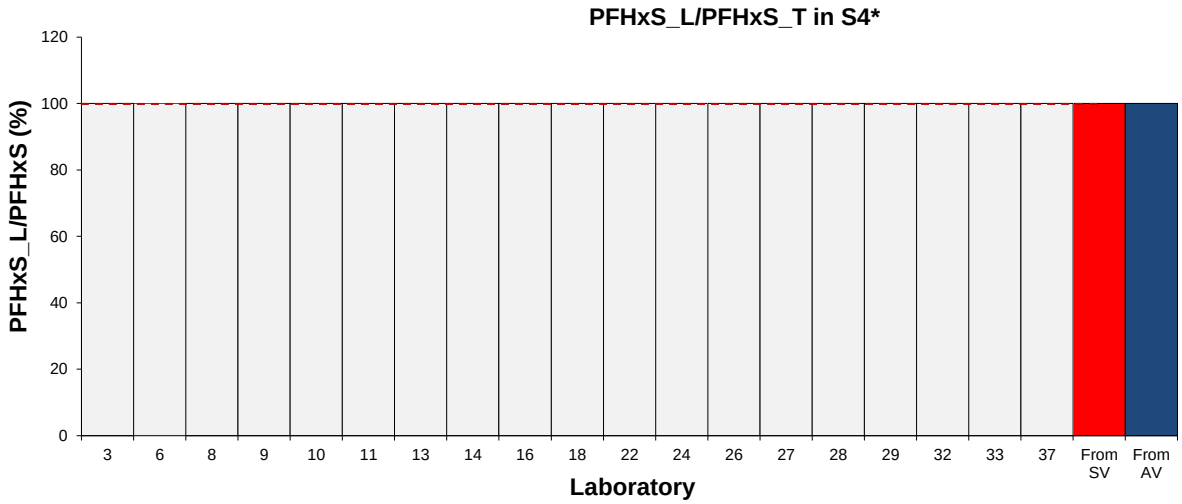
Twenty participants reported results for both total and linear PFHxS in S3. The ratios of PFHxS_L versus total PFHxS_T in S3 were between 81% and 92% while the assigned value ratio between the two isomers was 85% (Figure 116).



*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 Charts of PFHxS_L/PFHxS_T in S3

The water sample S4 was only spiked with the linear PFHxS standard, and therefore the linear to total ratio was expected to be 100%. Nineteen participants reported results for both PFHxS total and linear in S4. All reported results for both isomers were similar (Figure 117).

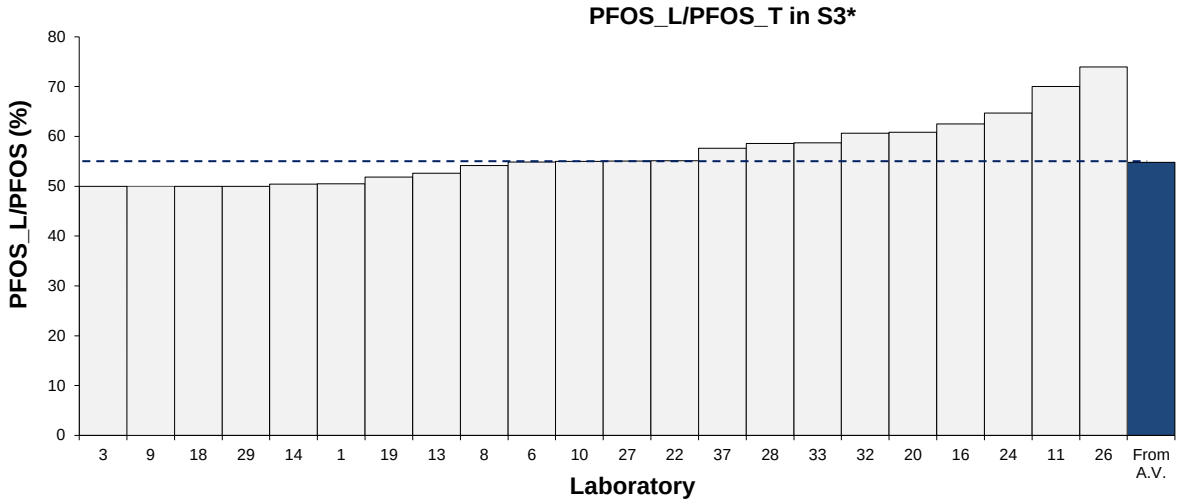


*The ratio from the AV is calculated based on the results reported by all participants including those who reported results for only one analyte

Figure 117 Bar Charts of PFHxS_L/PFHxS_T in S4

Twenty-two laboratories reported results for the two PFOS isomers in S3. The assigned values were 0.217 µg/L for total PFOS and 0.119 µg/L for linear PFOS, with the ratio of

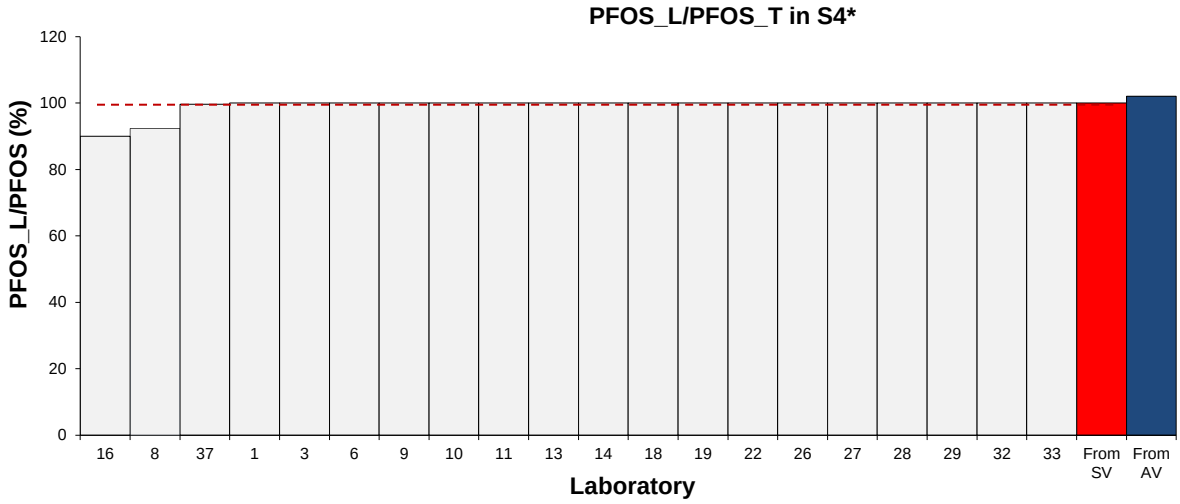
linear PFOS versus total PFOS being 55%. Figure 118 presents bar charts of linear PFOS results vs total PFOS results as reported by participants.



*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 118 Bar Charts of PFOS_L/PFOS_T in S3

As for PFHxS in S4 the expected ratio of linear PFOS versus total PFOS was also 100% as only linear PFOS was spiked into the water sample. Twenty participants reported results for both PFOS total and linear in S4. The linear to total ratio of the results reported for PFOS isomers was between 90% to 100% (Figure 119).



*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 119 Bar Charts of PFOS_L/PFOS_T in S4

PFDoS was spiked directly into each bottle with the aim of minimising the loss of these analytes during preparation. This was the second time that a long chain PFSA has been included in a PT study.

67% of the spiked value was recovered. Nine laboratories reported results for PFDoS in S4 and all were in excellent agreement with each other with the exception of two. The between-laboratory CV was 10% . Plots of participants z-scores versus method used are presented in Figure 120.

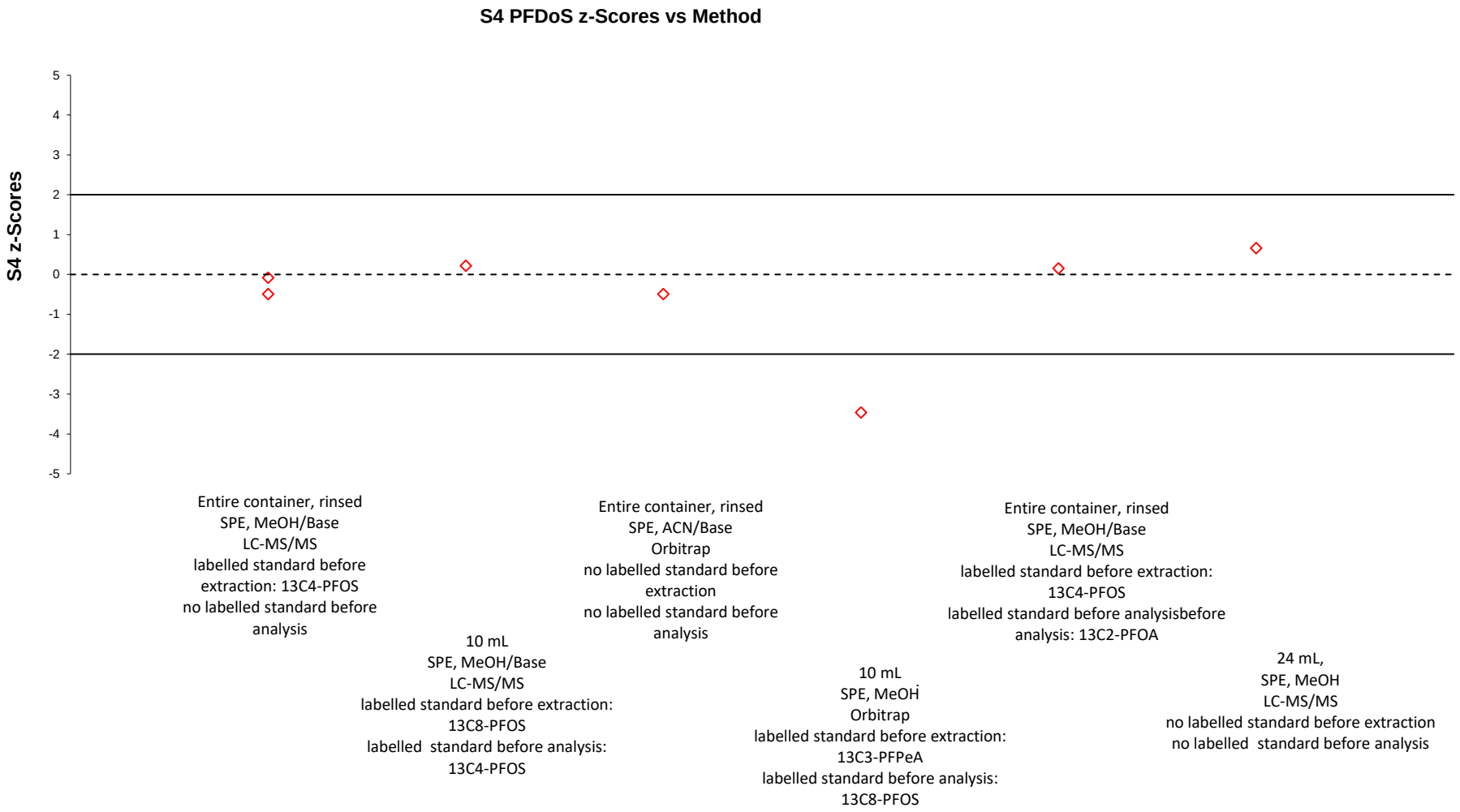


Figure 120 S4 PFDoS z-Scores vs Methods

6.8.4 Individual PFAA Precursors Analytes in Water

PFOSA As for long chain PFCAs and PFSAs, PFOSA was also identified as being an analyte which may potentially absorb into the container wall during sample preparation.[12,15] This analyte was added directly into the final bottles rather than during bulk sample preparation in order to mitigate loss during preparation. The assigned value for PFOSA in S4 was 81% of the spiked value and the reported results were in relatively good agreement with each other with a between-laboratory CV of 21%.

6.9 Effects of Sample Matrix

Samples S1 and S2 were soil samples and Samples S3 and S4 were water samples. Incurred water Sample S3 had the lowest percentage of numerical results for which z-scores were calculated, which may be due to low level of some analytes in this sample (below the LOR of some participants).

Sample S1 had a high percentage of satisfactory z-scores, meaning that laboratories were able to overcome matrix effects due to the high level of PFOS in the sample (Table 95).

Table 95 Satisfactory z-Scores for Each Matrix

Sample	Expected nr of z-Scores	Actual nr of z-Scores (% of expected nr. of z-Scores)	Nr. of Satisfactory z-Scores (% of satisfactory z-Scores)
S1 Soil (incurred)	510	425 (83%)	394 (93%)
S2 Soil (spiked)	884	704 (80%)	657 (93%)
S3 Water (incurred)	360	254 (71%)	224 (88%)
S4 Water (spiked)	810	623 (77%)	558 (90%)

6.10 False Negatives

Appendix 4 presents false negative results. These are analytes present in the samples which a participant tested for, but did not report a result; for example, when participants reported a 'less-than' result (< *x*) when the assigned value was higher than their limit of reporting (LOR), or did not report anything (NR). However sesults reported as NR may or may not be false negatives as this is depending on the participant's actual LOR.

For analytes where no assigned value was set, results were only considered to be false negatives where the robust average and spiked value were significantly higher than the participants' LOR, or if no value was reported.

6.11 Comparison with Previous PFAS in Soil and Water

In the first study conducted by NMI for PFAS analytes in soil and water AQA 15-03, participants were asked to report results for total and linear PFOS and PFOA only. 11 laboratories enrolled of which 10 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 follow-up 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. A summary of the rates of participation and reported results over the last 8 studies (2015 to 2022) is presented in Figure 121.

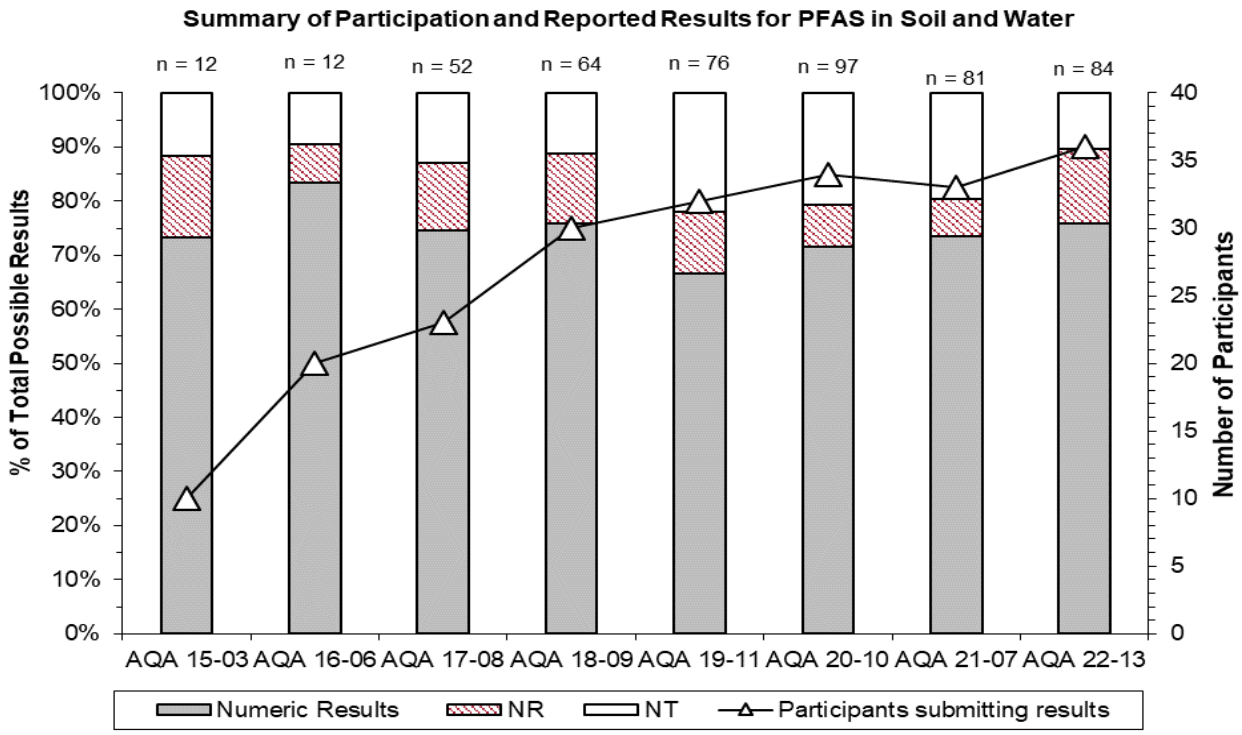


Figure 121 Summary of Participation and Reported Results for PFAS in Soil and Water PT Studies (n = number of analytes).

AQA 22-13 is the eighth NMI proficiency test of PFAS analytes in soil and water. For all analytes, the same fixed target standard deviation was used in the present study as in previous studies. This allows for a comparison of participants' performance over time and provides a benchmark for progressive improvement.

AQA 22-13 was the second study which included a long chain PFSA. While only 4 participants reported results for PFDoS in water in the previous PT study AQA 21-07, in the present study 9 laboratories reported results. The between-laboratory CV was 10% .

Participants still experience problems with the measurement of 11Cl-PF3OUdS in water. This analyte was introduced for the first time last year, in PT Study AQA 21-07. The results reported by participants in this study as in the present study were not compatible with each other and hence no assigned value could be set. The lack of available labelled standards for this test might explain the wide variability in participants results.

Participants still do not have capability to measure PFNS and PFDS in soil samples with high PFOS content. As in the previous study no assigned value was set for these analytes in the present study because the reported results were too variable.

A summary of participants' performance in the measurement of PFAS analytes in soil and water over time is presented in Figure 122.

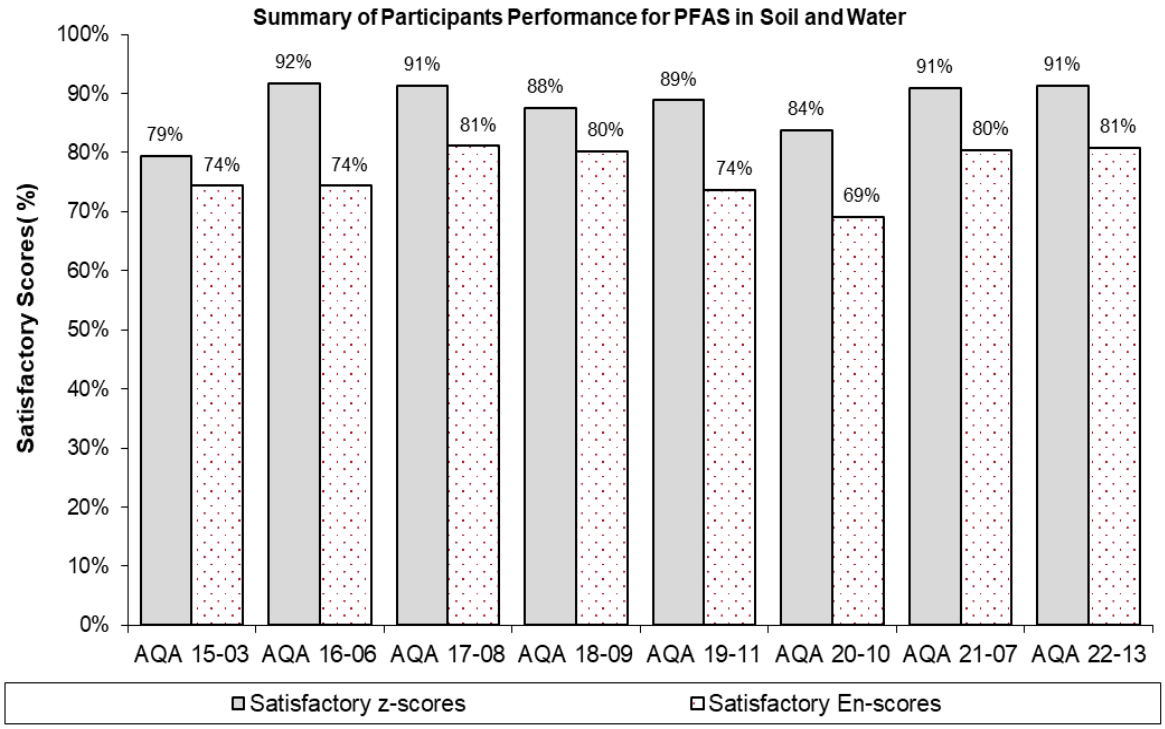


Figure 122 Summary of Participants' Performance for PFAS in Soil and Water PT Studies

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.

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APPENDIX 1 – SAMPLE PREPARATION

A1.1 Sample Preparation

Sample S1: One incurred soil was ground and sieved through an 850µm sieve and collected on a 355µm sieve. The ground, sieved soil was divided into fifty portions of approximately 26g using a Retsch Rotary divider, packed into labelled Greiner tubes, labelled and shrink-wrapped.

Sample S2: 1300 g of dried and sieved uncontaminated soil was placed in a 3 L round bottom flask. A slurry was produced by adding acetone. The slurry was spiked with a composite solution that had been prepared from stock solutions. Vials of Wellington Laboratories standards solutions were individually spiked. The slurry was placed on the Rotavap, and the acetone was evaporated off with a slight vacuum, with the heater being to no more than 40°C. The dry soil was divided into 20 – 25 g portions, packed into labelled Greiner tubes and shrink-wrapped.

Sample S3: An incurred water sample was placed in a 20L Schott bottle and autoclaved. The water was then dispensed through a sterile 0.2 µm pore size filter into 60mL HDPE containers using a peristaltic pump. The bottles were labelled, shrink-wrapped and stored in a refrigerator.

Sample S4: 6000 g of milli-Q water was spiked with a composite spike solution containing 20 analytes prepared in methanol. The spiked water was mixed for approximately 2 hours, and dispensed into labelled 65 mL HDPE bottles. Each bottle was then spiked with a composite solution containing PFUnA, PFDoA, PFTrA, PFTeDA, PFOSA and PFDoS to minimise the loss of these analytes during preparation. The bottles were tumbled, shrink-wrapped and refrigerated.

Soil and water samples were stored at 4°C prior to dispatch to participants.

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

A2.1 Robust Average and Associated Uncertainty

The robust average was calculated using the procedure described in ISO 13528:2015 Annex C.[5] The uncertainty was estimated as:

$$u_{rob\ average} = 1.25 \times S_{rob\ average} / \sqrt{p} \qquad \textit{Equation 4}$$

where:

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

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

p is the number of results

The expanded uncertainty ($U_{rob\ average}$) 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 96.

Table 96 Uncertainty Estimate for PFDA in Sample S2

No. results (p)*	31
Robust Average	16.0 µg/kg
$S_{rob\ av}$	1.49 µg/kg
$u_{rob\ av}$	0.33 µg/kg
k	2
$U_{rob\ av}$	0.7 µg/kg

*Outliers ecxluded

Therefore, the robust average for PFDA in Sample S2 is **16.0 ± 0.7 µg/kg**.

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 page 12).

A worked example is set out below in Table 97.

Table 97 z-Score and E_n-Score for Sample S2 PFDA Result Reported by Laboratory 3

Participant Result (µg/kg)	Assigned Value (µg/kg)	Target Standard Deviation	z-Score	E_n-Score
18 ± 5	16.0 ± 0.7	20% as PCV, or: 0.2 × 16.0 = 3.2 µg/kg	z-Score = $\frac{18 - 16.0}{3.20}$ = 0.62	E_n-Score = $\frac{18 - 16.0}{\sqrt{5^2 + 0.7^2}}$ = 0.40

APPENDIX 3 – ADDITIONAL ANALYTES

Table 98 Additional Analytes

Lab. Code	Sample	Analyte	Result S1 & S2 (µg/kg) S3 & S4 (µg/L)	Uncertainty S1 & S2 (µg/kg) S3 & S4 (µg/L)	Recovery (%)
2	S3	PFDoA	0.0005	0.0001	NR
6	S1	PFDoS	0.638	0.201	62
8	S1	PFUdS	1.933	NR	23
		PFDoS	1.733	0.64	23
		PFTrDS	1.00	NR	23
		PFDoA	0.048	0.01	64
		PFTrDA	0.008	0.001	74
		PFTeDA	0.013	0.003	74
		MeFOSA	0.105	NR	90
		6:2 FTS	0.122	0.06	75
	S2	PFTrDA	0.016	0.004	67
9	S1	PFDoS	2	0.2	NT
	S4	PFTrDS	0.012	0.002	NT
11	S1	6:2 FTS	0.282	0.085	77
15	S1	PFDoS	0.6467	0.080	71
		PFTrDS	0.3336	0.059	87
		PFUdA	0.0690	0.003	66
		6:2 FTS	0.0760	0.0049	96
		8:2 FTS	0.0460	0.0032	76
	S2	PFUdA	0.0150	0.0007	73
18	S3	PFNS	0.001	0.001	87
24	S1	PFDoS	2	1	NR
26	S1	6:2 FTS	0.30	0.3	67
28	S1	PFDoA	.2	NR	NR
	S3	PFNS	0.028	0.008	122
		PFDS	0.042	0.011	122
29	S1	PFUdA	0.039	0.008	81
		PFDoA	0.071	0.016	109
		MeFOSA	0.201	0.099	131.2
		MeFOSAA	0.033	0.012	99.75
		EtFOSAA	0.090	0.037	125.9
		8:2 FTS	0.042	0.017	81.75
	S2	8:2 FTS	0.015	0.006	143.4
34	S1	PFUdA	0.103	0.019	144
		PFDoA	0.196	0.131	144
37	S1	PFDoS	0.785	0.2355	55

Lab. Code	Sample	Analyte	Result S1 & S2 (µg/kg) S3 & S4 (µg/L)	Uncertainty S1 & S2 (µg/kg) S3 & S4 (µg/L)	Recovery (%)
38	S3	PFNA	0.0003	NR	NR
		PFDA	0.0002	NR	NR
		PFOSA	0.0002	NR	NR
		6:2 FTS	0.0001	NR	NR

APPENDIX 4 – FALSE NEGATIVES

Table 99 False Negatives

Lab. Code	Sample	Analyte	Assigned Value S1 & S2 (µg/kg) S3 & S4 (µg/L)	Spiked Value S1 & S2 (µg/kg) S3 & S4 (µg/L)	Reported Result** S1 & S2 (µg/kg) S3 & S4 (µg/L)
1	S3	PFBA	0.00873	Not Spiked	<0.006
1	S3	PFPeA	0.0085	Not Spiked	<0.0011
3	S3	PFHpS	0.0113	Not Spiked	<0.01
5	S1	PFHxS (linear)	82.6	Not Spiked	NR
5	S1	PFOS (linear)	2800	Not Spiked	NR
5	S1	PFDA	0.211	Not Spiked	NR
5	S2	PFHxS (linear)	6.87	7.27	NR
5	S2	PFOS (linear)	2.73	2.87	NR
5	S3	PFOS (linear)	0.119	Not Spiked	NR
5	S3	PFHpA	0.00381	Not Spiked	NR
5	S3	PFHxS (linear)	0.173	Not Spiked	NR
5	S4	PFHxS (linear)	0.0358	0.0378	NR
5	S4	PFOS (linear)	0.031	0.0334	NR
5	S4	PFDA	0.0096	0.00993	NR
5	S4	PFUdA	0.0749	0.0795	NR
5	S4	PFDoA	0.0423	0.05	NR
5	S4	PFTrDA	0.123	0.151	NR
5	S4	PFTeDA	0.0796	0.1	NR
6	S3	PFHpS	0.0113	Not Spiked	< 0.01
7	S1	PFPeS	19.7	Not Spiked	NR
7	S1	PFHxS (linear)	82.6	Not Spiked	NR
7	S1	PFOS (total)	3430	Not Spiked	NR
7	S1	PFOS (linear)	2800	Not Spiked	NR
7	S1	PFNA	0.276	Not Spiked	NR
7	S1	PFDA	0.211	Not Spiked	NR
7	S1	PFOSA	4.58	Not Spiked	NR
7	S2	PFPeS	16.1	16	NR
7	S2	PFHxS (linear)	6.87	7.27	NR
7	S2	PFOS (linear)	2.73	2.87	NR
7	S2	PFNS	0.863	0.96	NR
7	S2	PFNA	3.87	4.14	NR
7	S2	PFDA	16	15.1	NR
7	S2	PFDoA	12.5	15.1	NR
7	S2	PFTeDA	12.9	15	NR

Lab. Code	Sample	Analyte	Assigned Value S1 & S2 (µg/kg) S3 & S4 (µg/L)	Spiked Value S1 & S2 (µg/kg) S3 & S4 (µg/L)	Reported Result** S1 & S2 (µg/kg) S3 & S4 (µg/L)
7	S2	PFOSA	5.19	6.02	NR
7	S2	N-MeFOSA	4.62	5	NR
7	S2	N-EtFOSA	6.55	7	NR
7	S2	N-MeFOSE	13.9	15.1	NR
7	S2	N-EtFOSE	9.21	10	NR
7	S2	GenX	5.79*	15.1	NR
7	S2	ADONA	21.9	28.4	NR
7	S2	9Cl-PF3ONS	5.6	9.36	NR
7	S2	11Cl-PF3OUdS	21.5	24.9	NR
9	S2	PFDoA	12.5	15.1	<1
9	S2	GenX	5.79*	15.1	<1
9	S4	PFDoS	0.0521	0.0774	<0.05
9	S4	PFTrDA	0.123	0.151	<0.05
9	S4	GenX	0.0548	0.06	<0.05
10	S4	PFDS	0.0488	0.0817	NR
13	S3	PFBA	0.00873	Not Spiked	<0.005
14	S2	PFOSA	5.19	6.02	<5
16	S1	PFNA	0.276	Not Spiked	NR
16	S1	PFDA	0.211	Not Spiked	NR
16	S2	PFNS*	0.863	0.96	NR
16	S2	PFHpA	1.1	1	NR
16	S2	GenX	5.79*	15.1	NR
16	S2	ADONA	21.9	28.4	NR
16	S2	9Cl-PF3ONS	5.6	9.36	NR
16	S2	11Cl-PF3OUdS	21.5	24.9	NR
16	S3	PFHpS	0.0113	Not Spiked	NR
16	S3	PFBA	0.00873	Not Spiked	NR
16	S3	PFPeA	0.0085	Not Spiked	NR
16	S3	PFHpA	0.00381	Not Spiked	NR
16	S3	PFOA	0.0078	Not Spiked	NR
16	S4	PFDoS	0.0521	0.0774	NR
16	S4	PFBA	0.0518	0.0696	NR
16	S4	PFDA	0.0096	0.00993	NR
16	S4	GenX	0.0548	0.06	NR
16	S4	ADONA	0.0712	0.0754	NR
16	S4	9Cl-PF3ONS	0.073	0.0931	NR

Lab. Code	Sample	Analyte	Assigned Value S1 & S2 (µg/kg) S3 & S4 (µg/L)	Spiked Value S1 & S2 (µg/kg) S3 & S4 (µg/L)	Reported Result** S1 & S2 (µg/kg) S3 & S4 (µg/L)
16	S4	11Cl-PF3OUdS	0.046*	0.0941	NR
20	S3	PFPeS	0.0237	Not Spiked	<0.0202
21	S2	PFNS	0.863	0.96	<0.5
22	S3	PFBS	0.0219	Not Spiked	<0.005
22	S3	PFHpS	0.0113	Not Spiked	<0.005
22	S3	PFPeA	0.0085	Not Spiked	<0.005
22	S3	PFOA	0.0078	Not Spiked	<0.005
22	S4	PFDS	0.0488	0.0817	<0.005
22	S4	PFDA	0.0096	0.00993	<0.005
22	S4	PFTeDA	0.0796	0.1	<0.01
24	S2	PFHpA	1.1	1	< 1
24	S3	PFBS	0.0219	Not Spiked	< 0.02
24	S3	PFPeS	0.0237	Not Spiked	< 0.02
24	S3	PFHxA	0.0257	Not Spiked	< 0.02
24	S4	PFHpS	0.0235	0.0248	< 0.02
24	S4	PFOS (total)	0.0304	0.0334	< 0.02
24	S4	PFOS (linear)	0.031	0.0334	< 0.02
24	S4	PFNS	0.0217	0.0288	< 0.02
24	S4	PFBA	0.0518	0.0696	< 0.05
24	S2	PFHpA	1.1	1	< 1
24	S3	PFBS	0.0219	Not Spiked	< 0.02
24	S3	PFPeS	0.0237	Not Spiked	< 0.02
24	S3	PFHxA	0.0257	Not Spiked	< 0.02
24	S4	PFHpS	0.0235	0.0248	< 0.02
24	S4	PFOS (total)	0.0304	0.0334	< 0.02
24	S4	PFOS (linear)	0.031	0.0334	< 0.02
24	S4	PFNS	0.0217	0.0288	< 0.02
24	S4	PFBA	0.0518	0.0696	< 0.05
25	S1	PFBS	26.5	Not Spiked	NR
25	S1	PFPeS	19.7	Not Spiked	NR
25	S1	PFHxS (total)	93	Not Spiked	NR
25	S1	PFHxS (linear)	82.6	Not Spiked	NR
25	S1	PFHpS	12.5	Not Spiked	NR
25	S1	PFOS (total)	3430	Not Spiked	NR
25	S1	PFOS (linear)	2800	Not Spiked	NR
25	S1	PFBA	8.6	Not Spiked	NR

Lab. Code	Sample	Analyte	Assigned Value S1 & S2 (µg/kg) S3 & S4 (µg/L)	Spiked Value S1 & S2 (µg/kg) S3 & S4 (µg/L)	Reported Result** S1 & S2 (µg/kg) S3 & S4 (µg/L)
25	S1	PFPeA	13.4	Not Spiked	NR
25	S1	PFHxA	62.7	Not Spiked	NR
25	S1	PFHpA	6.61	Not Spiked	NR
25	S1	PFOA	20.4	Not Spiked	NR
25	S1	PFNA	0.276	Not Spiked	NR
25	S1	PFDA	0.211	Not Spiked	NR
25	S1	PFOS A	4.58	Not Spiked	NR
25	S2	PFBS	12.9	15	NR
25	S2	PFPeS	16.1	16	NR
25	S2	PFHxS (total)	6.8	7.27	NR
25	S2	PFHxS (linear)	6.87	7.27	NR
25	S2	PFHpS	6.12	6.94	NR
25	S2	PFOS (total)	2.72	2.87	NR
25	S2	PFOS (linear)	2.73	2.87	NR
25	S2	PFNS	0.863	0.96	NR
25	S2	PFBA	10	11.1	NR
25	S2	PFPeA	6.42	7.2	NR
25	S2	PFHxA	9.03	8.98	NR
25	S2	PFHpA	1.1	1	NR
25	S2	PFOA	9.67	10.1	NR
25	S2	PFNA	3.87	4.14	NR
25	S2	PFDA	16	15.1	NR
25	S2	PFDoA	12.5	15.1	NR
25	S2	PFTeDA	12.9	15	NR
25	S2	PFOS A	5.19	6.02	NR
25	S2	N-MeFOSA	4.62	5	NR
25	S2	N-EtFOSA	6.55	7	NR
25	S2	N-MeFOSE	13.9	15.1	NR
25	S2	N-EtFOSE	9.21	10	NR
25	S2	6:2 FTS	4.45	4.74	NR
25	S2	GenX	5.79*	15.1	NR
25	S2	ADONA	21.9	28.4	NR
25	S2	9Cl-PF3ONS	5.6	9.36	NR
25	S2	11Cl-PF3OUdS	21.5	24.9	NR
25	S3	PFBS	0.0219	Not Spiked	NR
25	S3	PFPeS	0.0237	Not Spiked	NR

Lab. Code	Sample	Analyte	Assigned Value S1 & S2 (µg/kg) S3 & S4 (µg/L)	Spiked Value S1 & S2 (µg/kg) S3 & S4 (µg/L)	Reported Result** S1 & S2 (µg/kg) S3 & S4 (µg/L)
25	S3	PFHxS (linear)	0.173	Not Spiked	NR
25	S3	PFHpS	0.0113	Not Spiked	NR
25	S3	PFOS (total)	0.217	Not Spiked	NR
25	S3	PFOS (linear)	0.119	Not Spiked	NR
25	S3	PFBA	0.00873	Not Spiked	NR
25	S3	PFPeA	0.0085	Not Spiked	NR
25	S3	PFHxA	0.0257	Not Spiked	NR
25	S3	PFHpA	0.00381	Not Spiked	NR
25	S3	PFOA	0.0078	Not Spiked	NR
25	S4	PFBS	0.0421	0.0504	NR
25	S4	PFPeS	0.033	0.0327	NR
25	S4	PFHxS (total)	0.0357	0.0378	NR
25	S4	PFHxS (linear)	0.0358	0.0378	NR
25	S4	PFHpS	0.0235	0.0248	NR
25	S4	PFOS (total)	0.0304	0.0334	NR
25	S4	PFOS (linear)	0.031	0.0334	NR
25	S4	PFNS	0.0217	0.0288	NR
25	S4	PFDS	0.0488	0.0817	NR
25	S4	PFDoS	0.0521	0.0774	NR
25	S4	PFBA	0.0518	0.0696	NR
25	S4	PFPeA	0.0253	0.0298	NR
25	S4	PFHxA	0.0393	0.0401	NR
25	S4	PFHpA	0.0353	0.0374	NR
25	S4	PFOA	0.0225	0.025	NR
25	S4	PFDA	0.0096	0.00993	NR
25	S4	PFUdA	0.0749	0.0795	NR
25	S4	PFDoA	0.0423	0.05	NR
25	S4	PFTrDA	0.123	0.151	NR
25	S4	PFTeDA	0.0796	0.1	NR
25	S4	PFOS A	0.0655	0.0813	NR
25	S4	6:2 FTS	0.073	0.0758	NR
25	S4	8:2 FTS	0.0739	0.0766	NR
25	S4	GenX	0.0548	0.06	NR
25	S4	ADONA	0.0712	0.0754	NR
25	S4	9Cl-PF3ONS	0.073	0.0931	NR
25	S4	11Cl-PF3OUdS	0.046*	0.0941	NR

Lab. Code	Sample	Analyte	Assigned Value S1 & S2 (µg/kg) S3 & S4 (µg/L)	Spiked Value S1 & S2 (µg/kg) S3 & S4 (µg/L)	Reported Result** S1 & S2 (µg/kg) S3 & S4 (µg/L)
28	S3	PFBA	0.00873	Not Spiked	<0.002
28	S3	PFPeA	0.0085	Not Spiked	<0.002
28	S3	PFHpA	0.00381	Not Spiked	<0.002
29	S1	PFNA	0.276	Not Spiked	NR
29	S1	PFOS A	4.58	Not Spiked	NR
29	S3	PFHpA	0.00381	Not Spiked	NR
31	S1	PFDA	0.211	Not Spiked	<0.2
31	S3	PFBS	0.0219	Not Spiked	<0.02
32	S2	6:2 FTS	4.45	4.74	<0.4
32	S3	PFBA	0.00873	Not Spiked	<0.008
33	S1	PFNA	0.276	Not Spiked	< 0.2
33	S1	PFDA	0.211	Not Spiked	< 0.2
33	S3	PFPeA	0.0085	Not Spiked	< 0.001
33	S3	PFHpA	0.00381	Not Spiked	< 0.001
34	S1	PFHxS (linear)	82.6	Not Spiked	NR
34	S1	PFOS (linear)	2800	Not Spiked	NR
34	S1	PFOSA	4.58	Not Spiked	NR
34	S2	PFHxS (linear)	6.87	7.27	NR
34	S2	PFOS (linear)	2.73	2.87	NR
34	S2	PFNS	0.863	0.96	NR
34	S2	PFTeDA	12.9	15	NR
34	S2	PFOSA	5.19	6.02	NR
34	S2	N-MeFOSA	4.62	5	NR
34	S2	N-EtFOSA	6.55	7	NR
34	S2	N-MeFOSE	13.9	15.1	NR
34	S2	N-EtFOSE	9.21	10	NR
34	S2	6:2 FTS	4.45	4.74	NR
34	S2	GenX	0.863*	15.1	NR
34	S2	ADONA	21.9	28.4	NR
34	S2	9Cl-PF3ONS	5.6	9.36	NR
34	S2	11Cl-PF3OUdS	21.5	24.9	NR
34	S3	PFHxS (linear)	0.173	Not Spiked	NR
34	S3	PFHpS	0.0113	Not Spiked	NR
34	S3	PFOS (linear)	0.119	Not Spiked	NR
34	S3	PFPeA	0.0085	Not Spiked	NR
34	S3	PFHpA	0.00381	Not Spiked	NR

Lab. Code	Sample	Analyte	Assigned Value S1 & S2 (µg/kg) S3 & S4 (µg/L)	Spiked Value S1 & S2 (µg/kg) S3 & S4 (µg/L)	Reported Result** S1 & S2 (µg/kg) S3 & S4 (µg/L)
34	S3	PFOA	0.0078	Not Spiked	NR
34	S4	PFHxS (linear)	0.0358	0.0378	NR
34	S4	PFOS (linear)	0.031	0.0334	NR
34	S4	PFNS	0.0217	0.0288	NR
34	S4	PFDS	0.0488	0.0817	NR
34	S4	PFDoS	0.0521	0.0774	NR
34	S4	PFTeDA	0.0796	0.1	NR
34	S4	PFOSA	0.0655	0.0813	NR
34	S4	6:2 FTS	0.073	0.0758	NR
34	S4	8:2 FTS	0.0739	0.0766	NR
34	S4	GenX	0.0548	0.06	NR
34	S4	ADONA	0.0712	0.0754	NR
34	S4	9Cl-PF3ONS	0.073	0.0931	NR
34	S4	11Cl-PF3OUdS	0.046*	0.0941	NR
35	S3	PFBS	0.0219	Not Spiked	<0.02
38	S3	PFHxS (linear)	0.173	Not Spiked	NR
38	S3	PFOS (linear)	0.119	Not Spiked	NR
38	S4	PFHxS (linear)	0.0358	0.0378	NR
38	S4	PFOS (linear)	0.031	0.0334	NR

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

APPENDIX 5 – PARTICIPANTS' TEST METHODS FOR SOIL SAMPLES

Participants' methods for soil samples are presented in Tables 100 to 143.

Table 100 Participant Methodology – Extraction

Lab. Code	S1 Sample Weight (g)	S2 Sample Weight (g)	Sample Pre-treatment	Extraction Technique	Extraction Solvent	Extraction Temperature	Extraction Time	Extraction Clean Up
1	2	2	Homogenisation	QuEChERS	Acetonitrile / Methanol	Ambient	30 minutes	Filtration
3	5	5	Homogenisation	Alkaline Digestion	Basified MeOH	Room	60 mins	Filtration
4	6	6	none	Solid-Liquid Extraction	Methanol	sonication	1 hour	Graphitized carbon
5	2	2	Homogenisation	Solid-Liquid Extraction	Methonal: UHP Water=1:1	25˚C	44831	Filtration
6	5.43	5.04	Homogenisation	Alkaline Digestion	KOH/Methanol	Room Temperature	1 hour	Solid-Phase Extraction
7	5	5		Solid-Liquid Extraction	NH4OH/MeOH	Room	30min	None
8*	1.0522	1.073	-	Solid-Liquid Extraction (SLE)	Methanol + 400 mM ammonium acetate	room temperature	10 minutes	Solid-Phase Extraction
9				Solid-Liquid Extraction				
10*	2.072 and 2.081 (duplicate)	2.066 and 2.017 (duplicate)	NA	Solid-Liquid Extraction	200mM NaOH, MeOH	Room temperature	30 min	dSPE (graphitised carbon)
13	2	2		Solid-Liquid Extraction	Basic acetonitrile/acetone	Room temperature	30mins	Solid-Phase Extraction
14	2	2	Homogenisation	Solid-Liquid Extraction	80% MeOH	Room Temp	30 Min	Filtration
16	1.01	1	Homogenisation	Alkaline Digestion	KOH in Methanol	Ambient	2 hr	None
17*	2	0.5	Homogenisation	Solid-Liquid Extraction	Methanol:Milli-Q (70:30) 0,05M NH4OH	room temperature	1h	None
18	5	5	Homogenisation	Alkaline Digestion	Basified MeOH	Room	60 mins	Envicarb if needed
19	2	2	pH Adjustment	QuEChERS	MeOH	Shaking	Room Temperature	None

Lab. Code	S1 Sample Weight (g)	S2 Sample Weight (g)	Sample Pre-treatment	Extraction Technique	Extraction Solvent	Extraction Temperature	Extraction Time	Extraction Clean Up
20*	1.02 (as received)	2.99 (as received)	Homogenisation	Solid-Liquid Extraction	Methanolic Ammonium Hydroxide	Ambient Room Temperature	30 minutes	Solid-Phase Extraction
21*	5.02	5.02	Homogenisation	Solid-Liquid Extraction	ACN/MeOH (1:1)	23 °C	10 min	None
22	0.2 g	0.2 g		Ultra sonic	Methanol	40 °C	20 min	none
23	2	2	Homogenisation	QuEChERS	Acetonitrile / Methanol	25C	30 minutes	Graphitized carbon
24*	1	1	pH Adjustment	Solid-Liquid Extraction	Extraction with MeOH/Ammonium hydroxide 99:1	Sonicate 30 min at 30-35 degrees	3x 5mL Extraction with MeOH/Ammonium hydroxide	Solid-Phase Extraction
26	5	5	Homogenisation	QuEChERS	ACN	Ambient	30 minutes	Solid-Phase Extraction
27	2	2	Homogenisation	Solid-Liquid Extraction	1:1 Basic ACN and Acetone	AMBIENT	30 MINS	Solid-Phase Extraction
28*	2	2	Homogenisation	Solid-Liquid Extraction	1% ammonia in methanol	room temp	5 min	None
30	5	5	Homogenisation	Soxhlet	Methanol	boiling point	4h	Filtration
31*	2	2	Homogenisation	QuEChERS	Acetonitrile/Methanol	Ambient	30 mins	
32	1	1	Homogenisation	Solid-Liquid Extraction	Methanol, 0.3% NH3	ambient	10 mins	Solid-Phase Extraction
33	0.5	1	Homogenisation	Solid-Liquid Extraction	99/1 methanol/ammonium hydroxide (v/v)	Room temperature	2 x 20 min	Bond-Elut Carbon SPE
34*	2	2	Homogenisation	If multiple or other, please type here.	Methanol and Water	Room temperature	1 hr Tumbling	None
35	2	2	Homogenisation	QuEChERS	5mm Ammonium Acetate in 60:40 ACN:MeOH	Ambient	30mins shaking	Filtration

Lab. Code	S1 Sample Weight (g)	S2 Sample Weight (g)	Sample Pre-treatment	Extraction Technique	Extraction Solvent	Extraction Temperature	Extraction Time	Extraction Clean Up
37	5.13	5	Homogenisation	Solid-Liquid Extraction	0.4% KOH in MeOH	Ambient	3 hour	Solid-Phase Extraction

*Additional Information in Table 98.

Table 101 Participant Methodology – Extraction Additional Information

Lab. Code	Extraction Additional Information
8	Extraction process: Vortex + Sonication
10	Vortex, shaking
17	After extraction with Methanaol: MQ 0,05M NH4) 30ul Acetic acid has been added and mixed with vortex. - Then 10 minute in centrifuge (1900 rpm) -Transfer extract in 2 ml tube and for 10 min centrifugation at 13500 rpm. - 5ul has been injected to LCMSM Sl.
20	Isotoptically labeled surrogate standards were spiked into sample prior to extraction
21	Dilution to 5mM Amonium Acetate before analysis
24	Strata X-AW 33um polymeric Weak Anion
28	Extraction done twice and combined
31	C18/GCB
34	2g soil + 5mL MeOH + 5mL H2O + 233 uL surrogate + 20 uL Ammonium Hydroxide then 1 hr Tumbling then centrifuged for 10 min @3000 rpm then filtered 0.7 mL then added 0.3 mL acedified water then added 13uL internal standard then vortex then transfer into the LC vial for analysis

Table 102 Participant Methodology – Instrumental Technique and Analysis

Lab. Code	Instrument	Guard Column	Instrument Column	Dilution Factor	Delay Column?	Blank Correction?	Standard Method?
1	LC-MSMS or LC-QQQ	C18 2.2um, 3 x 30mm	C18 1.6um, 2 x 50mm	Yes- Sample S1 was diluted x5 for PFDS, PFHxS and	Yes	No	In house

Lab. Code	Instrument	Guard Column	Instrument Column	Dilution Factor	Delay Column?	Blank Correction?	Standard Method?
				PFHxA and x200 for PFOS			
3	LC-MS	Pre-column Filter 0.2µm	C18 50mm x 2.1mm x 1.8µm	10 for both samples S1 and S2.	Yes	No	No. In-house
4	LC-MSMS or LC-QQQ	none	Waters T3 10cm	yes, 5.	Gemini C18 5cm	No	No
5	LC-MS	Shimadzu Shim-Pack XR-ODS 3.00mm*30mm	Shimadzu Shim-Pack XR-ODSIII (1.6um) 2.00mm*50mm	No	No	No	No
6	LC-MSMS or LC-QQQ		C18 10cm x 3.0 mm x 3 um	No	Yes	No	
7	LC-MSMS or LC-QQQ				Yes		
8	LC-MSMS or LC-QQQ	ACQUITY UPLC BEH C18 VanGuard Pre-column, 130Å, 1.7 µm, 2.1 mm X 5 mm	ACQUITY PREMIER BEH Shield RP18 1.7 µm 2.1 x 100 mm	No	No	No	
9	LC-MSMS or LC-QQQ	C18	2.1x100mn 1.9um		Yes	No	USEPA 537
10	LC-MSMS or LC-QQQ	NA	Zorbax XDB-C18, 100 mm x 2.1 mm, 1.8µm	NA	Yes	No	No
13	LC-MSMS or LC-QQQ	None	InfinityLab Poroshell HPH-C18 column, 2.1x50mm, 2.7micron	0.375	No	No	
14	LC-MSMS or LC-QQQ	C18, 2.1x5mm, 2.7um	C18, 2.1x50mm, 2.7um	PFOS 100x Dil	Yes	No	
16	LC-MSMS or LC-QQQ	NA	C18 1.7 um, 2.1 x 50mm	2	No	No	NR70
17*	LC-MSMS or LC-QQQ	Guard, Eclipse Plus C18 - 2.1 x 5mm; 1.8um	ZORBAX Eclipse Plus C18 2.1 x 100mm	applied dilution factors vary with component	Yes	No	No

Lab. Code	Instrument	Guard Column	Instrument Column	Dilution Factor	Delay Column?	Blank Correction?	Standard Method?
18	LC-MSMS or LC-QQQ	Pre-column Filter 0.2µm	C18 50mm x 2.1mm x 1.8µm	10 for both samples S1 and S2.	Yes	No	No. In-house
19	LC-MSMS or LC-QQQ	nil	C18 1.6µm, 2.0mm x 50mm	No	Yes	No	QuEChERS
20	LC-MSMS or LC-QQQ	Penomenex Evo C18 (2µm, 2 mm x 2.1 mm)	BEH C18 (1.7µm, 50 mm x 2.1 mm)	No	Yes	No	No
21	LC-MSMS or LC-QQQ	ACQUITY UPLC BEH C18 2.1x5mm	ACQUITY UPLC BEH C18 2.1x100mm	yes: S1 (high concentration of PFOS): 100 times	Yes	No	
22	UHPLC	UltraShield UHPLC 0.2 µm Restek	Raptor C18 1.8 µm 50 x 2.1 mm Restek		yes	no	
23	LC-MSMS or LC-QQQ	NA	C18 2.1 x 50 mm	S1 ran x1, x 5 and x 100	Yes	No	No
24*	Orbitrap	C18 3mm	Kinetex C18 100x3mm x 2.6um		Yes	Yes	In house
26	Orbitrap	C18	C18	DF5 & DF10	Yes	No	
27		LC MS/MS	UHPLC guard column; AU; InfinityLabPoroshell 120; EC-C18; 4.6 mm; 4 um	NO	YES	NO	Isotope dilution
28	LC-MSMS or LC-QQQ	Eclipse Plus 2.1 x 5x 2.7um	C18 Eclipse plus 3 x 100 x 1.8um	neat 10,100,500	yes	No	
30	API5500 HPLC-MS/MS	C18	Biphenyl 150x 2,5mm	yes, 1:10 and 1:100	No	No	no
31	LC-MSMS or LC-QQQ	C18 2.2um, 3 x 30mm	C18 1.6um, 2 x 50mm	No	Yes	No	In House
32	LC-MSMS or LC-QQQ	In line filter 0.2um	C18 50mm x 2.0 mm 1.6um	No	yes	No	
33	LC-MSMS or LC-QQQ	Phenomenex Evo C18 (2 mm x 2.1 mm)	Phenomenex Evo C18 (100 mm x 2.1 mm x 2.6 um)	S1 samples were diluted 100x and re-run for	Yes	No	Isotopic Dilution

Lab. Code	Instrument	Guard Column	Instrument Column	Dilution Factor	Delay Column?	Blank Correction?	Standard Method?
				PFOS quantification			
34*	LC-MSMS or LC-QQQ		Selectra® C18 (50 x 2.1 mm, 5 µm)		Yes	No	
35	LC-MSMS or LC-QQQ		C18 1.6um, 2.1 x 50mm	Neat, 10x, 100x, 1000x	Yes	No	N/A
37	LC-MSMS or LC-QQQ	C18 5u, 4x10mm	Gemini C18 3u, 3x10mm	5x, 10x, 200x	Yes	No	Modified EPA Method 537

*Additional Information in Table 100.

Table 103 Participant Methodology – Labelled Standards

Lab. Code	Extraction Additional Information
17	LC-parameters: Injection volume 5ul Column temperature 50°C MS-source parameters: Gas Temp: 250°C Gas Flow: 11 l/min Nebulizer: 25 psi Sheath Gas: 375°C Sheath Gas Flow: 11 l/min
24	In this method the linear standards are used to quantify both the linear as well as the branched isomers.
34	Shim-pack XR-ODS (3.0 mmi.d. x 30 mm) has been used as a delay column

Table 104 Participant Methodology – Labelled Standards

Lab. Code	Labelled Standard Source	Recovery Correction?	Labelled Standards Additional Information
1	Wellington Laboratories	Yes	
3	Wellington	Yes	
4	Wellington	Yes	
5	Wellington Standards	No	
6		Yes	
8	Wellington	Yes	
9	Wellington	no	
10	Wellington Laboratory	Yes	NA
13	Wellington	Yes	
14	Wellington		
16	Wellington	Yes	
17	Wellington	Yes	IS-correction using the above labelled standards
18	Wellington	Yes	
19	Wellington Laboratories	No	
20	Wellington	Yes	
21	Wellington	S1-No (high dilution), S2-Yes	
22		Yes	
23	Wellington	Yes	
24	Wellington	Yes	
26	Wellington	Yes	Results corrected by ISTD added before instrumentation
27	Wellington Laboratories	YES	
28	wellington	No	
30	Wellington	Yes	

Lab. Code	Labelled Standard Source	Recovery Correction?	Labelled Standards Additional Information
31	Wellington Laboratories	Yes	
32	Wellington	Yes	
33	Wellington	Yes	
35	Wellington	Yes	
37	Wellington Laboratories	Yes	

Table 105 Labelled Standards for PFBS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFBS	
2	Not Applicable	Not Applicable
3	13C3-PFBS	N/A
4		y
5	M3PFBS 100ppt.	N/A
6	13C3 PFBS	--
7		
8	13C-PFBS	NA
9		M3PFBS
10	M3PFBS	NA
11		
13	13C3-PFBS	
14	YES	
15		
16	M3PFBS	MPFDA
17	PFBS-13C3	
18	13C3-PFBS	N/A
19		13C3-PFBS
20	13C3-PFBS	18O2-PFHxS
21	MPFBS	
22	13C3-PFBS	13C4-PFOA
23	PFBS	
24	Sodium perfluoro-1-[2,3,4 13C3] butanesulfonate M3PFBS	
25		
26	PFOS-C8	PFBS-13C3
27	13C3-PFBS	
28	13C3-PFBS	
29		
30		
31	13C3-PFBS	
32	PFBS M3	
33	13C3-PFBS	13C3-PFHxS
34	M3PFBS	M8PFOS
35	13C3-PFBS	
37	13C3 PFBS	13C2 PFOA
38	Not Applicable	Not Applicable

Table 106 Labelled Standards for PFPeS

Lab. Code	Before Extraction	Before Instrument Analysis
1	16O2-PFHxS	
2	Not Applicable	Not Applicable
3	18O2-PFHxS	N/A
4		
5	M3PFBS 100ppt.	N/A
6	13C3 PFBS	--
7		
8	13C-PFHxS	NA
9		
10	M5PFHxA	NA
11		
13	13C3-PFBS	
14	YES	
15		
16	M3PFBS	MPFDA
17	PFHxS-13C3	
18	18O2-PFHxS	N/A
19		16O2-PFHxS
20	13C3-PFHxS	18O2-PFHxS
21	MPFBS	
22	13C3-PFBS	13C4-PFOA
23	PFHxS	
24		
25		
26	PFOS-C8	PFOS-C4
27		
28	13C3-PFBS	
29		
30		
31	16O2-PFHxS	
32	PFHxS M3	
33	18O2-PFHxS	13C3-PFHxS
34	M3PFBS	M8PFOS
35	16O2-PFHxS	
37	18O2 PFHxS	13C2 PFOA
38	Not Applicable	Not Applicable

Table 107 Labelled Standards for PFHxS

Lab. Code	Before Extraction	Before Instrument Analysis
1	16O2-PFHxS	
2	Not Applicable	Not Applicable
3	18O2-PFHxS	N/A
4		
5	M3PFBS 100ppt.	N/A
6	18O2 PFHxS	--
7		
8	13C-PFHxS	NA
9		
10	M3PFHxS	NA
11		
13	18O2-PFHXS	
14	NO	
15		
16	M3PFHxS	MPFDA
17	PFHxS-13C3	
18	18O2-PFHxS	N/A
19		16O2-PFHxS
20	13C3-PFHxS	18O2-PFHxS
21	MPFHxS	
22	18O2-PFHxS	13C4-PFOA
23	PFHxS	
24	Sodium perfluoro-1-[1,2,3 13C3] hexanesulfonate M3PFHxS	
25		
26	PFOS-C8	PFHxS-18O2
27	18O2-PFHxS	
28	13C3-PFHxS	
29		
30		
31	16O2-PFHxS	
32	PFHxS M3	
33	18O2-PFHxS	13C3-PFHxS
34	M3PFBS	M8PFOS
35	16O2-PFHxS	
37	18O2 PFHxS	13C2 PFOA
38	Not Applicable	Not Applicable

Table 108 Labelled Standards for PFHxS (linear)

Lab. Code	Before Extraction	Before Instrument Analysis
1	--	
2	Not Applicable	Not Applicable
3	18O2-PFHxS	N/A
4		y
5	N/A	N/A
6	18O2 PFHxS	--
7		
8	13C-PFHxS	NA
9		M3PFHxS
10	M3PFHxS	NA
11		
13	18O2-PFHXS	
14	YES	
15		
16	M3PFHxS	MPFDA
17	PFHxS-13C3	
18	18O2-PFHxS	N/A
19		NT
20	13C3-PFHxS	18O2-PFHxS
21	MPFHxS	
22	18O2-PFHxS	13C4-PFOA
23		
24		
25		
26	PFOS-C8	PFHxS-18O2
27	18O2-PFHxS	
28	13C3-PFHxS	
29		
30	yes	
31	16O2-PFHxS	
32	PFHxS M3	
33	18O2-PFHxS	13C3-PFHxS
34		
35	NT	
37	18O2 PFHxS	13C2 PFOA
38	Not Applicable	Not Applicable

Table 109 Labelled Standards for PFHpS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	Not Applicable	Not Applicable
3	13C4-PFOS	N/A
4		
5	M3PFBS 100ppt.	N/A
6	13C4 PFOS	--
7		
8	13C-PFHxS	NA
9		
10	M3PFHxS	NA
11		
13	18O2-PFHXS	
14	YES	
15		
16	M3PFHxS	MPFDA
17	PFOS-13C4	
18	13C4-PFOS	N/A
19		13C8-PFOS
20	13C8-PFOS	13C4-PFOS
21	MPFOS	
22	18O2-PFHxS	13C4-PFOA
23	PFHxS	
24		
25		
26	PFOS-C8	PFOS-C4
27		
28	13C3-PHxS	
29		
30		
31	13C8-PFOS	
32	PFHxS M3	
33	18O2-PFHxS	13C3-PFHxS
34	M3PFBS	M8PFOS
35	16O2-PFHxS	
37	13C4 PFOS	13C2 PFOA
38	Not Applicable	Not Applicable

Table 110 Labelled Standards for PFOS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	Not Applicable	Not Applicable
3	13C4-PFOS	N/A
4		
5	MPFOS 100ppt.	N/A
6	13C4 PFOS	--
7		
8	13C-PFOS	NA
9		
10	M8PFOS	NA
11		
13	13C8-PFOS	
14	NO	
15		
16	M8PFOS	MPFOS
17	PFOS-13C4	
18	13C4-PFOS	N/A
19	13C4-PFOS	13C8-PFOS
20	13C8-PFOS	13C4-PFOS
21	MPFOS	
22	13C4-PFOS	13C4-PFOA
23	PFOS	
24	Sodium perfluoro-1-[13C8] ocatanesulfonate M8PFOS	
25		
26	PFOS-C8	PFOS-C4
27	13C8-PFOS	
28	13C8-PFOS	
29		
30		
31	13C8-PFOS	
32	PFOS M8	
33	13C4-PFOS	13C8-PFOS
34	MPFOS	M8PFOS
35	13C8-PFOS	
37	13C4 PFOS	13C2 PFOA
38	Not Applicable	Not Applicable

Table 111 Labelled Standards for PFOS (linear)

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	Not Applicable	Not Applicable
3	13C4-PFOS	N/A
4	y	y
5	N/A	N/A
6	13C4 PFOS	--
7		
8	13C-PFOS	NA
9	MPFOS	M8PFOS
10	M8PFOS	NA
11		
13	13C8-PFOS	
14	YES	
15		
16	M8PFOS	MPFOS
17	PFOS-13C4	
18	13C4-PFOS	N/A
19		13C8-PFOS
20	13C8-PFOS	13C4-PFOS
21	MPFOS	
22	13C4-PFOS	13C4-PFOA
23		
24		
25		
26	PFOS-C8	PFOS-C4
27	13C8-PFOS	
28	13C8-PFOS	
29		
30	yes	
31	13C8-PFOS	
32	PFOS M8	
33	13C4-PFOS	13C8-PFOS
34		
35	NT	
37	13C4 PFOS	13C2 PFOA
38	Not Applicable	Not Applicable

Table 112 Labelled Standards for PFNS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	Not Applicable	Not Applicable
3	13C4-PFOS	N/A
4		
5	N/A	N/A
6	13C4 PFOS	--
7		
8	13C-PFOS	NA
9		
10	M8PFOS	NA
11		
13	13C8-PFOS	
14	YES	
15		
16	M8PFOS	MPFOS
17	NT	
18	13C4-PFOS	N/A
19		13C8-PFOS
20	13C8-PFOS	13C4-PFOS
21	MPFOS	
22		
23		
24		
25		
26	PFOS-C8	PFBS-13C3
27		
28	13C8-PFOS	
29		
30		
31	13C8-PFOS	
32		
33	13C4-PFOS	13C8-PFOS
34		
35	13C8-PFOS	
37	13C4 PFOS	13C2 PFOA
38	Not Applicable	Not Applicable

Table 113 Labelled Standards for PFDS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	Not Applicable	Not Applicable
3	13C4-PFOS	N/A
4		
5	N/A	N/A
6	13C4 PFOS	--
7		
8	13C-PFOS	NA
9		
10	M8PFOS	NA
11		
13	13C8-PFOS	
14	YES	
15		
16	M8PFOS	MPFOS
17	PFOS-13C4	
18	13C4-PFOS	N/A
19		13C8-PFOS
20	13C8-PFOS	13C4-PFOS
21	MPFOS	
22	13C2-PFUnA	13C4-PFOA
23	PFOS	
24		
25		
26	PFOS-C8	PFBA-13C4
27		
28	13C8-PFOS	
29		
30		
31	13C8-PFOS	
32	PFOS M8	
33	13C4-PFOS	13C8-PFOS
34		
35	13C8-PFOS	
37	13C4 PFOS	13C2 PFOA
38	Not Applicable	Not Applicable

Table 114 Labelled Standards for PFUdS

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

Table 115 Labelled Standards for PFDoS

Lab. Code	Before Extraction	Before Instrument Analysis
1	--	
2	Not Applicable	Not Applicable
3	NT	N/A
4		
5	N/A	N/A
6	13C4 PFOS	--
7		
8	13C-PFOS	NA
9		
10	NT	NA
11		
13	-	
14	NT	
15		
16	NT	NT
17	NT	
18	NT	N/A
19		13C8-PFOS
20	13C8-PFOS	13C4-PFOS
21	MPFTeDA	
22		
23		
24		
25		
26	PFOS-C8	PFPeA-13C3
27		
28	NA	
29		
30		
31	--	
32		
33	13C2-PFDoA	13C8-PFOA
34		
35	NT	
37	13C4 PFOS	13C2 PFOA
38	Not Applicable	Not Applicable

Table 116 Labelled Standards for PFTrDS

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

Table 117 Labelled Standards for PFBA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFBA	
2	Not Applicable	Not Applicable
3	13C4-PFBA	N/A
4		y
5	MPFBA 100 ppt.	N/A
6	13C4 PFBA	--
7		
8	13C-PFBA	NA
9	M3PFBA	MPFBA
10	M4PFBA	NA
11		
13	13C4-PFBA	
14	YES	
15		
16	MPFBA	M3PFBA
17	PFBA-13C4	
18	13C4-PFBA	N/A
19		13C4-PFBA
20	13C4-PFBA	13C3-PFBA
21	MPFBA	
22	13C4-PFBA	13C4-PFOA
23	PFBA	
24	Perfluoro-n-[13C4]butanoic acid MPFBA	
25		
26	PFOS-C8	PFBA-13C4
27	13C4-PFBA	
28	13C4-PFBA	
29		
30	yes	
31	13C4-PFBA	
32	PFBA M4	
33	13C4-PFBA	13C3-PFBA
34	MPFBA	MPFDA
35	13C4-PFBA	
37	13C4 PFBA	13C2 PFOA
38	Not Applicable	Not Applicable

Table 118 Labelled Standards for PFPeA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C5-PFPeA	
2	Not Applicable	Not Applicable
3	13C3-PFPeA	N/A
4		y
5	MPFBA 100 ppt.	N/A
6	13C5 PFPeA	--
7		
8	13C-PFPeA	NA
9		M5PFPeA
10	M5PFPeA	NA
11		
13	13C5-PFPEA	
14	YES	
15		
16	M5PFPeA	M3PFBA
17	PFHxA-13C2	
18	13C3-PFPeA	N/A
19		13C5-PFPeA
20	13C5-PFPeA	13C2-PFHxA
21	MPFPeA	
22	13C5-PFPeA	13C4-PFOA
23	PFPeA	
24	Perfluoro-n-[13C5]pentanoic acid M5PFPeA	
25		
26	PFOS-C8	PFPeA-13C3
27	13C5-PFPeA	
28	13C5-PFPeA	
29		
30		
31	13C5-PFPeA	
32	PFPeA M5	
33	13C4-PFPeA	13C5 -PFPeA
34	MPFBA	MPFDA
35	13C5-PFPeA	
37	13C5 PFPeA	13C2 PFOA
38	Not Applicable	Not Applicable

Table 119 Labelled Standards for PFHxA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C5-PFHxA	
2	Not Applicable	Not Applicable
3	13C2-PFHxA	N/A
4		y
5	MPFHxA 10 ppt.	N/A
6	13C2 PFHxA	--
7		
8	13C-PFHxA	NA
9		M5PFHxA
10	M5PFHxA	NA
11		
13	13C2-PFHXA	
14	YES	
15		
16	M5PFHxA	M3PFBA
17	PFHxA-13C2	
18	13C2-PFHxA	N/A
19		13C5-PFHxA
20	13C5-PFHxA	13C2-PFHxA
21	MPFHxA	
22	13C2-PFHxA	13C4-PFOA
23	PFHxA	
24	Perfluoro-n-[1,2,3,4,6-13C5]hexanoic acid M5PFHxA	
25		
26	PFOS-C8	PFHxA-13C2
27	13C2-PFHXA	
28	13C5-PFHxA	
29		
30	yes	
31	13C5-PFHxA	
32	PFHxA M6	
33	13C2-PFHxA	13C5 -PFPeA
34	MPFHxA	MPFDA
35	13C5-PFHxA	
37	13C2 PFHxA	13C2 PFOA
38	Not Applicable	Not Applicable

Table 120 Labelled Standards for PFHpA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFHpA	
2	Not Applicable	Not Applicable
3	13C4-PFHpA	N/A
4		y
5	MPFHxA 10 ppt.	N/A
6	13C4 PFHpA	--
7		
8	13C-PFHpA	NA
9		M4PFHpA
10	MPFHpA	NA
11		
13	13C4-PFHPA	
14	YES	
15		
16	M4PFHpA	M3PFBA
17	PFHpA-13C4	
18	13C4-PFHpA	N/A
19		13C4-PFHpA
20	13C4-PFHpA	13C4-PFOA
21	MPFHpA	
22	13C4-PFHpA	13C4-PFOA
23	PFHpA	
24	Perfluoro-n-[1,2,3,4-13C4]heptanoic acid M4PFHpA	
25		
26	PFOS-C8	PFHpA-13C4
27	13C4-PFHpA	
28	13C4-PFHpA	
29		
30		
31	13C4-PFHpA	
32	PFHpA M4	
33	13C3-PFHpA	13C8-PFOA
34	MPFHxA	MPFDA
35	13C4-PFHpA	
37	13C4 PFHpA	13C2 PFOA
38	Not Applicable	Not Applicable

Table 121 Labelled Standards for PFOA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFOA	
2	Not Applicable	Not Applicable
3	13C4-PFOA	N/A
4	y	y
5	MPFOA 10 ppt.	N/A
6	13C4 PFOA	--
7		
8	13C-PFOA	NA
9	M2PFOA	M8PFOA
10	M8PFOA	NA
11		
13	13C8-PFOA	
14	YES	
15		
16	M8PFOA	M2PFOA
17	PFOA-13C8	
18	13C4-PFOA	N/A
19	13C8-PFOA	13C4-PFOA
20	13C8-PFOA	13C4-PFOA
21	MPFOA	
22	13C8-PFOA	13C4-PFOA
23	PFOA	
24	Perfluoro-n-[13C8]octanoic acid M8PFOA	
25		
26	PFOS-C8	PFOA-13C4
27	13C8-PFOA	
28	13C8-PFOA	
29		
30	yes	
31	13C4-PFOA	
32	PFOA M8	
33	13C4-PFOA	13C8-PFOA
34	MPFOA	MPFDA
35	13C4-PFOA	
37	13C4 PFOA	13C2 PFOA
38	Not Applicable	Not Applicable

Table 122 Labelled Standards for PFNA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C5-PFNA	
2	Not Applicable	Not Applicable
3	13C5-PFNA	N/A
4		y
5	MPFOA 10 ppt.	N/A
6	13C5 PFNA	--
7		
8	13C-PFNA	NA
9		M9PFNA
10	M9PFNA	NA
11		
13	13C5-PFNA	
14	YES	
15		
16	M9PFNA	M2PFOA
17	PFDA-13C2	
18	13C5-PFNA	N/A
19		13C5-PFNA
20	13C9-PFNA	13C5-PFNA
21	MPFNA	
22	13C5-PFNA	13C4-PFOA
23	PFNA	
24	Perfluoro-n-[13C9]nonanoic acid M9PFNA	
25		
26	PFOS-C8	PFNA-13C5
27	13C5-PFNA	
28	13C9-PFNA	
29		
30	yes	
31	13C5-PFNA	
32	PFNA M9	
33	13C5-PFNA	13C8-PFOA
34	MPFOA	MPFDA
35	13C5-PFNA	
37	13C5 PFNA	13C2 PFOA
38	Not Applicable	Not Applicable

Table 123 Labelled Standards for PFDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C6-PFDA	
2	Not Applicable	Not Applicable
3	13C2-PFDA	N/A
4		y
5	MPFUdA 10ppt.	N/A
6	13C2 PFDA	--
7		
8	13C-PFDA	NA
9	MPFDA	M6PFDA
10	M6PFDA	NA
11		
13	13C6-PFDA	
14	YES	
15		
16	M6PFDA	MPFDA
17	PFDA-13C2	
18	13C2-PFDA	N/A
19		13C6-PFDA
20	13C6-PFDA	13C2-PFDA
21	MPFDA	
22	13C2-PFDA	13C4-PFOA
23	PFDA	
24	Perfluoro-n-[1,2,3,4,6-13C6]decanoic acid M6PFDA	
25		
26	PFOS-C8	PFDA-13C2
27	13C6-PFDA	
28	13C6-PFDA	
29		
30	yes	
31	13C6-PFDA	
32	PFDA M6	
33	13C2-PFDA	13C8-PFOA
34	MPFUdA	MPFDA
35	13C6-PFDA	
37	13C2 PFDA	13C2 PFOA
38	Not Applicable	Not Applicable

Table 124 Labelled Standards for PFUdA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFUnDA	
2	Not Applicable	Not Applicable
3	13C2-PFUdA	N/A
4		y
5	MPFUdA 10ppt.	N/A
6	13C2 PFUdA	--
7		
8	13C-PFUdA	NA
9		M7PFUdA
10	M7PFUnDA	NA
11		
13	13C2-PFUDA	
14	YES	
15		
16	M7PFUdA	MPFDA
17	PFDA-13C2	
18	13C2-PFUdA	N/A
19		13C2-PFUnDA
20	13C7-PFUnA	13C2-PFDA
21	MPFUdA	
22	13C2-PFUnA	13C4-PFOA
23	PFUdA	
24	Perfluoro-n-[1,2,3,4,6,7-13C7]undecanoic acid M7PFUdA	
25		
26	PFOS-C8	PFUNDA-13C2
27	13C2-PFUnA	
28	13C9-PFUdA	
29		
30	yes	
31	13C2-PFUnDA	
32	PFUdA M7	
33	13C2-PFUdA	13C8-PFOA
34	MPFUdA	MPFDA
35	13C2-PFUnDA	
37	13C2 PFUdA	13C2 PFOA
38	Not Applicable	Not Applicable

Table 125 Labelled Standards for PFDoA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFDoDA	
2	Not Applicable	Not Applicable
3	13C2-PFDoDA	N/A
4		y
5	MPFUdA 10ppt.	N/A
6	13C2 PFDoA	--
7		
8	13C-PFDoA	NA
9		MPFDoA
10	MPFDoDA	NA
11		
13	13C2-PFDOA	
14	YES	
15		
16	MPFDoA	MPFDA
17	PFDoA-13C2	
18	13C2-PFDoDA	N/A
19		13C2-PFDoDA
20	13C2-PFDoA	13C2-PFDA
21	MPFDoA	
22	13C2-PFDoA	13C4-PFOA
23	PFDoA	
24	Perfluoro-n-[1,2 13C2]dodecanoic acid MPFDoA	
25		
26	PFOS-C8	PFDoDA-13C2
27	13C2-PFDoA	
28	13C2-PFDoA	
29		
30	yes	
31	13C2-PFDoDA	
32	PFDoA M2	
33	13C2-PFDoA	13C8-PFOA
34	MPFUdA	MPFDA
35	13C2-PFDoDA	
37	13C2 PFDoA	13C2 PFOA
38	Not Applicable	Not Applicable

Table 126 Labelled Standards for PFTrDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFDoDA	
2	Not Applicable	Not Applicable
3	13C2-PFTeDA	N/A
4		
5	M2PFTeDA 20ppt.	N/A
6	13C2 PFDoA	--
7		
8	13C-PFDoA	NA
9		
10	MPFDoDA	NA
11		
13	13C2-PFTEDA	
14	YES	
15		
16	MPFDoA	MPFDA
17	PFTeDA-13C2	
18	13C2-PFTeDA	N/A
19		13C2-PFTeDA
20	13C2-PFDoA; 13C2-PFTeDA	13C2-PFDA
21	MPFDoA	
22	13C2-PFTeDA	13C4-PFOA
23	PFDoA	
24		
25		
26	PFOS-C8	PFTeDA-13C2
27		
28	13C2-PFTeDA	
29		
30		
31	13C2-PFDoDA	
32	PFDoA M2	
33	13C2-PFTeDA	13C8-PFOA
34	M2PFTeDA	MPFDA
35	13C2-PFDoDA	
37	13C2 PFDoA	13C2 PFOA
38	Not Applicable	Not Applicable

Table 127 Labelled Standards for PFTeDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFTeDA	
2	Not Applicable	Not Applicable
3	13C2-PFTeDA	N/A
4		y
5	M2PFTeDA 20ppt.	N/A
6	13C2 PFTeDA	--
7		
8	13C-PFTeA	NA
9		M2PFTeDA
10	MPFTeDA	NA
11		
13	13C2-PFTEDA	
14	YES	
15		
16	M2PFTeDA	MPFDA
17	PFTeDA-13C2	
18	13C2-PFTeDA	N/A
19		13C2-PFTeDA
20	13C2-PFTeDA	13C2-PFDA
21	MPFTeDA	
22	13C2-PFTeDA	13C4-PFOA
23	PFTeDA	
24	Perfluoro-n-[1,2 13C2]tetradecanoic acid M2PFTeDA	
25		
26	PFOS-C8	PFTeDA-13C2
27	13C2-PFTeDA	
28	13C2-PFTeDA	
29		
30		
31	13C2-PFTeDA	
32	PFTeDA M2	
33	13C2-PFTeDA	13C8-PFOA
34	M2PFTeDA	MPFDA
35	13C2-PFTeDA	
37	13C2 PFTeDA	13C2 PFOA
38	Not Applicable	Not Applicable

Table 128 Labelled Standards for PFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-FOSA	
2	Not Applicable	Not Applicable
3	13C8-FOSA	N/A
4		y
5	N/A	N/A
6	13C8 PFOSA	--
7		
8	13C-PFOSA	NA
9		M8-FOSA
10	MPFOSA	NA
11		
13	13C8-FOSA	
14	YES	
15		
16	M8FOSA-I	MPFOS
17	PFOSA-13C8	
18	13C8-FOSA	N/A
19		13C8-FOSA
20	13C8-PFOSA	13C4-PFOS
21	MPFOS	
22	13C8-PFOSA	13C4-PFOA
23	PFOSA	
24	Perfluoro-1-[13C8]otanesulfonamide	
25		
26	PFOS-C8	FOSA-13C8
27	13C8-FOSA	
28	D3-N-MeFOSA	
29		
30		
31	13C8-FOSA	
32	PFOSA M8	
33	13C8-FOSA	
34		
35	13C8-FOSA	
37	13C8 FOSA	13C2 PFOA
38	Not Applicable	Not Applicable

Table 129 Labelled Standards for N-MeFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1	d3-MeFOSA	
2	Not Applicable	Not Applicable
3	D3-M PFOSA	N/A
4		y
5	N/A	N/A
6	d3-NMeFOSA	--
7		
8	13C-MePFOSA	NA
9		d-N-MeFOSA
10	d-NMeFOSA-M	NA
11		
13	d3-N-MEFOSA	
14	YES	
15		
16	d-N-MeFOSA-M	MPFOS
17	N-MeFOSA-D3	
18	D3-M PFOSA	N/A
19		d3-MeFOSA
20	D3-N-MeFOSA	13C4-PFOS
21	MEtFOSA	
22	d3-N-MeFOSA	13C4-PFOA
23	N-MeFOSA	
24	N-methyl-d3-perfluoro-1-octancesulfonamide	
25		
26	PFOS-C8	MeFOSA-D3
27	d3-MeFOSA	
28	D3-N-MeFOSA	
29		
30		
31	d3-MeFOSA	
32	d3-N-MeFOSAA	
33	D3-N-Me FOSA	
34		
35	d3-MeFOSA	
37	NT	
38	Not Applicable	Not Applicable

Table 130 Labelled Standards for N-EtFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1	d5-EtFOSA	
2	Not Applicable	Not Applicable
3	D5-E PFOSA	N/A
4		y
5	N/A	N/A
6	d5-NEtFOSA	--
7		
8	13C-EtPFOSA	NA
9		d-N-EtFOSA
10	d-NEtFOSA-M	NA
11		
13	d5-N-ETFOSA	
14	YES	
15		
16	d-N-EtFOSA-M	MPFOS
17	NT	
18	D5-E PFOSA	N/A
19		d5-EtFOSA
20	D5-N-EtFOSA	13C4-PFOS
21	MEtFOSA	
22	d5-N-EtFOSA	13C4-PFOA
23	N-EtFOSA	
24	N-ethyl-d5-perfluoro-1-octanesulfonamide	
25		
26	PFOS-C8	EtFOSA-D5
27	d5-EtFOSA	
28	D3-N-MeFOSA	
29		
30		
31	d5-EtFOSA	
32	d3-N-MeFOSAA	
33	D5-N-Et FOSA	
34		
35	d5-EtFOSA	
37	NT	
38	Not Applicable	Not Applicable

Table 131 Labelled Standards for N-MeFOSAA

Lab. Code	Before Extraction	Before Instrument Analysis
1	d3-MeFOSAA	
2	Not Applicable	Not Applicable
3	D3-Me-FOSAA	N/A
4		y
5	N/A	N/A
6	d3-NMeFOSAA	--
7		
8	13C-MePFOSAA	NA
9		d3-N-MeFOSAA
10	d3-NMeFOSAA	NA
11		
13	d3-N-MEFOSAA	
14	YES	
15		
16	d3-N-MeFOSAA	MPFOS
17	N-MeFOSAA-D3	
18	D3-Me-FOSAA	N/A
19		d3-MeFOSAA
20	D3-MeFOSAA	13C2-D4-6:2 FTS
21	d3-MeFOSAA	
22	d3-N-MeFOSAA	13C4-PFOA
23	N-MeFOSAA	
24		
25		
26	PFOS-C8	MeFOSAA-D3
27	d3-N-MeFOSAA	
28	D3-N-MeFOSAA	
29		
30		
31	d3-MeFOSAA	
32	d3-N-MeFOSAA	
33	D3-N-Me FOSAA	
34		
35	d3-MeFOSAA	
37	d3-NMeFOSAA	13C2 PFOA
38	Not Applicable	Not Applicable

Table 132 Labelled Standards for N-EtFOSAA

Lab. Code	Before Extraction	Before Instrument Analysis
1	d5-EtFOSAA	
2	Not Applicable	Not Applicable
3	D5-Et-FOSAA	N/A
4		y
5	N/A	N/A
6	d5-NEtFOSAA	--
7		
8	13C-EtPFOSAA	NA
9		d5-N-EtFOSAA
10	d5-NEtFOSAA	NA
11		
13	d5-N-ETFOSAA	
14	YES	
15		
16	d5-N-EtFOSAA	MPFOS
17	N-EtFOSAA-D5	
18	D5-Et-FOSAA	N/A
19		d5-EtFOSAA
20	D5-EtFOSAA	13C2-D4-6:2 FTS
21	d5-EtFOSAA	
22	d5-N-EtFOSAA	13C4-PFOA
23	N-EtFOSAA	
24	N-ethyl-d5-perfluoro-1-octanesulfonamide	
25		
26	PFOS-C8	EtFOSAA-D5
27	d5-N-EtFOSAA	
28	D5-N-EtFOSAA	
29		
30		
31	d5-EtFOSAA	
32	d3-N-EtFOSAA	
33	D5-N-Et FOSAA	
34		
35	d5-EtFOSAA	
37	d5-NEtFOSAA	13C2 PFOA
38	Not Applicable	Not Applicable

Table 133 Labelled Standards for N-MeFOSE

Lab. Code	Before Extraction	Before Instrument Analysis
1	d7-MeFOSE	
2	Not Applicable	Not Applicable
3	D7-Me-FOSE	N/A
4		y
5	N/A	N/A
6	d7-NMeFOSE	--
7		
8	NT	NA
9		d7-N-MeFOSE
10	d7-NMeFOSE-M	NA
11		
13	d7-N-MEFOSE	
14	YES	
15		
16	d7-N-MeFOSE-M	MPFOS
17	NT	
18	D7-Me-FOSE	N/A
19		d7-MeFOSE
20	D7-N-MeFOSE	13C4-PFOS
21	MEtFOSA	
22	d7-MeFOSE	13C4-PFOA
23	N-MeFOSE	
24	d7-N-MeFOSE-M 2-(N-methyl-d3-perfluoro-1-octanesulfonamido) ethand4-ol	
25		
26	PFOS-C8	MeFOSE-D3
27	d7-MeFOSE	
28	D9-N-EtFOSE	
29		
30		
31	d7-MeFOSE	
32	d3-N-MeFOSAA	
33	D7-N-Me FOSE	
34		
35	d7-MeFOSE	
37	NT	
38	Not Applicable	Not Applicable

Table 134 Labelled Standards for N-EtFOSE

Lab. Code	Before Extraction	Before Instrument Analysis
1	d3EtFOSE	
2	Not Applicable	Not Applicable
3	D9-Et-FOSE	N/A
4		y
5	N/A	N/A
6	d9-NEtFOSE	--
7		
8	NT	NA
9		d9-N-EtFOSE
10	d9-NEtFOSE-M	NA
11		
13	d9-N-ETFOSE	
14	YES	
15		
16	d9-N-EtFOSE-M	MPFOS
17	NT	
18	D9-Et-FOSE	N/A
19		d3-EtFOSE
20	D9-N-EtFOSE	13C4-PFOS
21	MEtFOSA	
22	d9-N-EtFOSE	13C4-PFOA
23	N-EtFOSE	
24	d9-N-EtFOSE-M 2-(N-ethyl-d5-perfluoro-1-octanesulfonamido) ethan-d4-ol	
25		
26	PFOS-C8	EtFOSE-D9
27	d9-EtFOSE	
28	D9-N-EtFOSE	
29		
30		
31	d3EtFOSE	
32	d3-N-MeFOSAA	
33	D9-N-Et FOSE	
34		
35	d3-EtFOSE	
37	NT	
38	Not Applicable	Not Applicable

Table 135 Labelled Standards for 4:2 FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-4:2 FTS	
2	Not Applicable	Not Applicable
3	13C2 4:2-FTS	N/A
4		y
5	N/A	N/A
6	13C2-4:2 FTS	--
7		
8	13C-4:2 FTS	NA
9		M2-4:2FTS
10	M4:2 FTS	NA
11		
13	13C2-4:2FTS	
14	YES	
15		
16	M2-4:2 FTS	MPFOS
17	4:2 FTS-13C2	
18	13C2 4:2-FTS	N/A
19		13C2-4:2 FTS
20	13C2-4:2 FTS	13C2-D4-6:2 FTS
21	M4:2FTS	
22	13C2-4:2 FTS	13C4-PFOA
23	4:2 FTS	
24	M2-4:2FTS -1H,1H,2H,2H-perfluoro1-[1,2-13C2]-hexane sulfonate (4:2)	
25		
26	PFOS-C8	4:2 FTS-13C2
27	13C2-42FTS	
28	13C2-6:2 FTS	
29		
30		
31	13C2-4:2 FTS	
32	M2-4:2 FTS	
33	13C2-4:2 FTS	
34		
35	13C2-4:2 FTS	
37	M2-4:2 FTS	13C2 PFOA
38	Not Applicable	Not Applicable

Table 136 Labelled Standards for 6:2 FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-6:2 FTS	
2	Not Applicable	Not Applicable
3	13C2,12C6 6:2-FTS	N/A
4		y
5	N/A	N/A
6	13C2-6:2 FTS	--
7		
8	13C-6:2 FTS	NA
9		M2-6:2FTS
10	M6:2 FTS	NA
11		
13	13C2-6:2FTS	
14	YES	
15		
16	M2-6:2 FTS	MPFOS
17	6:2 FTS-13C2	
18	13C2,12C6 6:2-FTS	N/A
19		13C2-6:2 FTS
20	13C2-6:2 FTS	13C2-D4-6:2 FTS
21	M6:2FTS	
22	13C2-6:2FTS	13C4-PFOA
23	6:2 FTS	
24	M2-6:2FTS -1H,1H,2H,2H-perfluoro1-[1,2-13C2]-octane sulfonate (6:2)	
25		
26	PFOS-C8	6:2 FTS-13C2
27	13C2-62FTS	
28	13C2-6:2 FTS	
29		
30		
31	13C2-6:2 FTS	
32	M2-6:2 FTS	
33	13C2-6:2 FTS	
34		
35	13C2-6:2 FTS	
37	M2-6:2 FTS	13C2 PFOA
38	Not Applicable	Not Applicable

Table 137 Labelled Standards for 8:2 FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-8:2 FTS	
2	Not Applicable	Not Applicable
3	13C2 8:2-FTS	N/A
4		y
5	N/A	N/A
6	13C2-8:2 FTS	--
7		
8	13C-8:2 FTS	NA
9		M2-8:2FTS
10	M8:2 FTS	NA
11		
13	13C2-8:2FTS	
14	YES	
15		
16	M2-8:2 FTS	MPFOS
17	8:2 FTS-13C2	
18	13C2 8:2-FTS	N/A
19		13C2-8:2 FTS
20	13C2-8:2 FTS	13C2-D4-6:2 FTS
21	M8:2FTS	
22	13C2-8:2 FTS	13C4-PFOA
23	8:2 FTS	
24	M2-8:2FTS -1H,1H,2H,2H-perfluoro1-[1,2-13C2]-decane sulfonate (8:2)	
25		
26	PFOS-C8	8:2 FTS-13C2
27	13C2-82FTS	
28	13C2-8:2FTS	
29		
30		
31	13C2-8:2 FTS	
32	M2-8:2 FTS	
33	13C2-8:2 FTS	
34		
35	13C2-8:2 FTS	
37	M2-8:2 FTS	13C2 PFOA
38	Not Applicable	Not Applicable

Table 138 Labelled Standards for 10:2 FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-8:2 FTS	
2	Not Applicable	Not Applicable
3	13C2 8:2-FTS	N/A
4		
5	N/A	N/A
6	13C2-10:2 FTS	--
7		
8	13C-6:2 FTS	NA
9		
10	MPFDoDA	NA
11		
13	13C2-10:2FTS	
14	YES	
15		
16	M2-8:2 FTS	MPFOS
17	10:2 FTS-13C2-D4	
18	13C2 8:2-FTS	N/A
19		13C2-8:2 FTS
20	NT	NT
21	M8:2FTS	
22	13C2-8:2 FTS	13C4-PFOA
23	8:2 FTS	
24		
25		
26	PFOS-C8	10:2 FTS-13C2
27	13C2d4 10:2 FTS	
28	13C2-8:2FTS	
29		
30		
31	13C2-8:2 FTS	
32	M2-8:2 FTS	
33	13C2-PFDoA	
34		
35	13C2-8:2 FTS	
37	M2-8:2 FTS	13C2 PFOA
38	Not Applicable	Not Applicable

Table 139 Labelled Standards for GenX

Lab. Code	Before Extraction	Before Instrument Analysis
1	--	
2	Not Applicable	Not Applicable
3	13C312C3HF11O3	N/A
4		y
5	N/A	N/A
6	13C3 HFPO-DA	--
7		
8	NT	NA
9		
10	M3HFPO-DA	NA
11		
13	13C3-HFPO-DA	
14	NT	
15		
16	NT	NT
17	NT	
18	13C312C3HF11O3	N/A
19		NT
20	13C3-HFPO-DA	13C2-PFHxA
21	MHFPO-DA	
22		
23		
24		
25		
26	PFOS-C8	PFPeA-13C3
27	13C3-GenX (MHFPA)	
28	13C3-GenX	
29		
30		
31	--	
32		
33	13C4-PFOA	
34		
35	NT	
37	13C3 HFPO-DA	13C2 PFOA
38	Not Applicable	Not Applicable

Table 140 Labelled Standards for ADONA

Lab. Code	Before Extraction	Before Instrument Analysis
1	--	
2	Not Applicable	Not Applicable
3	13C4-PFHpA	N/A
4		
5	N/A	N/A
6	13C4 PFOS	--
7		
8	13C-PFOA	NA
9		
10	MPFHpA	NA
11		
13	13C8-PFOS	
14	NT	
15		
16	NT	NT
17	NT	
18	13C4-PFHpA	N/A
19		NT
20	13C3-HFPO-DA	13C2-PFHxA
21	MPFPeA	
22		
23		
24		
25		
26	PFOS-C8	FOSA-13C8
27		
28	13C4-PFHpA	
29		
30		
31	--	
32		
33	13C4-PFOA	
34		
35	NT	
37	13C4 PFOS	13C2 PFOA
38	Not Applicable	Not Applicable

Table 141 Labelled Standards for 9Cl-PF3ONS

Lab. Code	Before Extraction	Before Instrument Analysis
1	--	
2	Not Applicable	Not Applicable
3	13C4-PFOS	N/A
4		
5	N/A	N/A
6	13C4 PFOS	--
7		
8	13C-PFOS	NA
9		
10	M8PFOS	NA
11		
13	13C8-PFOS	
14	NT	
15		
16	NT	NT
17	NT	
18	13C4-PFOS	N/A
19		NT
20	13C3-HFPO-DA	13C2-PFHxA
21	MPFUdA	
22		
23		
24		
25		
26	PFOS-C8	
27		
28	NA	
29		
30		
31	--	
32		
33	13C4-PFOS	13C8-PFOS
34		
35	NT	
37	13C4 PFOS	13C2 PFOA
38	Not Applicable	Not Applicable

Table 142 Labelled Standards for 11Cl-PF3OUdS

Lab. Code	Before Extraction	Before Instrument Analysis
1	--	
2	Not Applicable	Not Applicable
3	13C4-PFOS	N/A
4		
5	N/A	N/A
6	13C4 PFOS	--
7		
8	13C-PFOS	NA
9		
10	MPFDoDA	NA
11		
13	13C2-PFHXA	
14	NT	
15		
16	NT	NT
17	NT	
18	13C4-PFOS	N/A
19		NT
20	13C3-HFPO-DA	13C2-PFHxA
21	MPFDoA	
22		
23		
24		
25		
26	PFOS-C8	
27		
28	NA	
29		
30		
31	--	
32		
33	13C4-PFOS	13C8-PFOS
34		
35	NT	
37	13C4 PFOS	13C2 PFOA
38	Not Applicable	Not Applicable

Table 143 Participant Methodology for Soil Samples– Additional Information

Lab. Code	Sample	Additional Information
3	S1	All linear and branched present have been reported although some branched peaks are not confirmed by traceable standards.
8	S1	PFBA was not determined due to low recovery of internal standard
18	S1 and S2	All linear and branched present have been reported although some branched peaks are not confirmed by traceable standards.
20	S1 and S2	The sample was received at a temperature of 20.4ºC; which was above the laboratory method recommended sample storage temperature (less than or equal to 6ºC).
21	S1	Results are not recalculated to the recoveries of internal standards due to high dilution.
24	S1	Extra Compounds Detected < LOR: PFOSA
	S2	Extra Compounds Detected < LOR: PFNS, PFOSA, N-MeFOSA
33	S1	PFDS showed clusters of interfering peaks in chromatogram, so only quantified linear isomer
34	S1	For PFOS (total) analysis the sample was diluted 100 times

APPENDIX 6 – PARTICIPANTS' TEST METHODS FOR WATER SAMPLES

Participants' methods for water samples are presented in Tables 144 to 186.

Table 144 Participant Methodology for Water Samples – Extraction

Lab. Code	S3 Entire Container/ Volume (mL)	S4 Entire Container/ Volume (mL)	Bottle Rinsed	Rinsing Solvent (if applicable)	Sample Pretreatment	Extraction Technique (Clean-Up)	Extraction Solvent	Elution Solvent (if applicable)	Extraction Temperature	Extraction Time
1	Entire container (~60mL)	Entire container (~60mL)	Yes	Acetonitrile / Methanol	pH Adjustment	Solid Phase Extraction (SPE)	Acetonitrile / Methanol	Acetonitrile / Methanol	Ambient	Approximately 1 hour
2*	60mL	60mL	Yes	water then MeOH		Solid-Phase Extraction: Oasis WAX	water then washed with acetate buffer	MeOH then 0.1% Ammonia in MeOH	room	
3	2.5ml	Yes	Yes	Methanol	pH Adjustment	Direct injection	MeOH	Basified MeOH and MeOH	Room	60 mins
4	entire container	entire container	Yes	Methanol	pH Adjustment	Solid-Phase Extraction: Strata -X-AW		Methanol		
5	1mL	1mL	No	N/A	Homogenisation	Liquid-Liquid Extraction	Methonal	N/A	25˚C	
6	Y (50 mL)	Y (50 mL)	Yes	Reagent water, followed with elution solvent.	None	Solid-Phase Extraction: Oasis WAX	NA	0.3% NH4OH: Methanol	Room	NA
8	Yes	Yes	Yes	MeOH and MeOH with NH4OH (0,1%)	NA	Solid-Phase Extraction: Oasis WAX	NA	MeOH and MeOH with NH4OH (0,1%)	room temperature	NA
9	55	54	Yes	Methanol	pH Adjustment	Solid-Phase Extraction: Oasis WAX		Basic Methanol		

Lab. Code	S3 Entire Container/ Volume (mL)	S4 Entire Container/ Volume (mL)	Bottle Rinsed	Rinsing Solvent (if applicable)	Sample Pretreatment	Extraction Technique (Clean-Up)	Extraction Solvent	Elution Solvent (if applicable)	Extraction Temperature	Extraction Time
10	100	100	No	NA	NA	Solid-Phase Extraction: Oasis WAX	No	25 mM sodium acetate solution (pH4)	NA	NA
13	yes	yes	Yes	Methanol		Solid Phase extraction: Cleanert PWAX		Basic acetonitrile/ Acetone	Room temperature	30 mins
14	10	10				Solid-Phase Extraction: Oasis WAX		1% Basic_ACN	Room Temp	20 min
16	Yes	Yes	Yes	acidified MeOH/H2O	pH Adjustment	Solid-Phase Extraction: Strata -X-AW	Ammonia in Methanol	Ammonia in Methanol	Ambient	
18	Yes	Yes	Yes	Methanol	pH Adjustment	SPE and Direct Injection	MeOH	Basified MeOH and MeOH	Room	60 mins
19	60	60	Yes	pH Adjustment	Solid Phase Extraction (SPE)	MeOH	Vortex	Room Temperature	180 minutes	None
20*	9.94	Yes	Yes	Canadian Springs Water	pH Adjustment	Solid-Phase Extraction: Oasis WAX	Methanolic Ammonium Hydroxide		Ambient Room Temperature	20 minutes
22	10 ml	10 ml			pH Adjustment	Solid-Phase Extraction: HR-XAW	Water	Methanol-Ammoniak	room temperature	-
23	Yes	Yes	Yes	Methanol	pH Adjustment	Solid-Phase Extraction: Strata -X-AW	Acetonitrile / Methanol	Acetonitrile / Methanol	25C	NA

Lab. Code	S3 Entire Container/ Volume (mL)	S4 Entire Container/ Volume (mL)	Bottle Rinsed	Rinsing Solvent (if applicable)	Sample Pretreatment	Extraction Technique (Clean-Up)	Extraction Solvent	Elution Solvent (if applicable)	Extraction Temperature	Extraction Time
24			Yes	Eluting solvent	pH Adjustment	Solid-Phase Extraction: Strata -X-AW		10:89:1 IPA/ACN/Ammonium hydroxide	Room	
26	10	10	Yes	MeOH	Homogenisation	Solid-Phase Extraction: Oasis HLB	MeOH	MeOH	Ambient	1hr
27	50	50	YES	MEOH	Homogenisation	Solid-Phase Extraction: Strata -X-AW		3mL Basic ACN followed by 2mL Acetone	AMBIENT	
28	yes	yes	yes	methanol	None	Direct Injection				
31*	Entire container (~60mL)	Entire container (~60mL)	Yes	Acetonitrile/Methanol	pH Adjustment	Solid-Phase Extraction	Acetonitrile/ Methanol	Acetonitrile/ Methanol	Ambient	Approximately 1 hour
32	entire container	entire container	Yes	Methanol, 0.3% NH3	Homogenisation	Solid-Phase Extraction: Oasis WAX		Methanol, 0.3% NH3		
33	Yes	Yes	Yes	MQ water	Homogenisation	Solid-Phase Extraction: Strata -X-AW	Ammonium hydroxide in methanol (0.2%)	Ammonium hydroxide in methanol (0.2%)	Room temperature	2 hr
34*	5 mL	5 mL			Homogenisation	Liquid-Liquid Extraction	pH adjusted MeOH		Room temparature	1 min
35	Entire sample	Entire sample	Yes	60:40 ACN:MeOH in 0.1% NH4OH	pH Adjustment	Solid-Phase Extraction: Strata -X-AW	60:40 ACN:MeOH in 0.1% NH4OH	60:40 ACN:MeOH in 0.1% NH4OH	Ambient	30 mins

Lab. Code	S3 Entire Container/ Volume (mL)	S4 Entire Container/ Volume (mL)	Bottle Rinsed	Rinsing Solvent (if applicable)	Sample Pretreatment	Extraction Technique (Clean-Up)	Extraction Solvent	Elution Solvent (if applicable)	Extraction Temperature	Extraction Time
37	55.5	54.2	Yes	Basic Methanol	Homogenisation	Solid-Phase Extraction: Oasis WAX	Basic Methanol	Basic Methanol	Ambient	20-30 minute load time
38	25mL	24mL	No		pH Adjustment	Solid-Phase Extraction: C18	Methanol	Methanol	ambient	1 day

*Additional Information in Table 140.

Table 145 Participant Methodology for Water Samples – Extraction Additional Information

Lab. Code	Extraction Additional Information
2	SPE cartridges dried before elution. Extracts concentrated using N2 at 60oC
20	Isotoptically labeled surrogate standards were spiked into sample prior to extraction
25	Direct Injection LCMSMS
31	Solid-Phase Extraction: Strata –X
34	1 mL filtered water + 460uL pH adjusted MeOH + 20uL surrogate + 20 uL internal standard + 1 min vortex then transfer into the LC vial for analysis

Table 146 Participant Methodology for Water Samples – Instrumental Technique and Analysis

Lab. Code	Instrument	Guard Column	Instrument Column	Dilution Factor	Delay Column?	Blank Correction?	Standard Method?
1	LC-MSMS or LC-QQQ	C18 2.2um, 3 x 30mm	C18 1.6um, 2 x 50mm	No	Yes	No	In house
2*	LC-MSMS or LC-QQQ	Poroshell EC-C18, 5mm x 2.1mm x 2.7um	Poroshell EC-C18, 100mm x 2.1mm x 2.7um		Yes		Nata accredited method based on US EPA Methods 533 and 537.1
3	LC-MSMS or LC-QQQ	Pre-column Filter 0.2µm	C18 50mm x 2.1mm x 1.8µm	No	Yes	No	No. In-house
4	LC-MSMS or LC-QQQ	none	Waters T3 10cm	yes, 5.	Gemini C18 5cm	No	No
5	LC-MS	Shimadzu Shim-Pack XR-ODS 3.00mm*30mm	Shimadzu Shim-Pack XR-ODSIII (1.6um) 2.00mm*50mm	No	No	No	No
6	LC-MSMS or LC-QQQ	None	C18 10cm x 3.0 mm x 3 um	None	Yes	No	
8	LC-MSMS or LC-QQQ	ACQUITY UPLC BEH C18 VanGuard Pre-column, 130Å, 1.7 µm, 2.1 mm X 5 mm	ACQUITY PREMIER BEH Shield RP18 1.7 µm 2.1 x 100 mm	No	No	No	
9	LC-MSMS or LC-QQQ	C18	2.1x100mn 1.9um		Yes	No	USEPA 537
10	LC-MSMS or LC-QQQ	NA	Zorbax XDB-C18, 100 mm x 2.1 mm, 1.8µm	NA	Yes	No	No
13	LC-MSMS or LC-QQQ	None	InfinityLab Poroshell HPH-C18 column, 2.1x50mm, 2.7micron		No	No	
14	LC-MSMS or LC-QQQ	C18, 2.1x5mm, 2.7um	C18, 2.1x50mm, 2.7um	NO	Yes	No	
16	LC-MSMS or LC-QQQ	NA	C18 1.7 um, 2.1 x 50mm	No	No	No	USEPA 537
18	LC-MSMS or LC-QQQ	Pre-column Filter 0.2µm	C18 50mm x 2.1mm x 1.8µm	No	Yes	No	No. In-house
19	LC-MSMS or LC-QQQ	nil	C18 1.6µm, 2.0mm x 50mm	No	Yes	No	No

Lab. Code	Instrument	Guard Column	Instrument Column	Dilution Factor	Delay Column?	Blank Correction?	Standard Method?
20	LC-MSMS or LC-QQQ	Penomenex Evo C18 (2µm, 2 mm x 2.1 mm)	BEH C18 (1.7µm, 50 mm x 2.1 mm)	No	Yes	No	No
22	UHPLC	UltraShield UHPLC 0.2 µm Restek	Raptor C18 1.8 µm 50 x 2.1 mm Restek		yes	no	
23	LC-MSMS or LC-QQQ	NA	C18 2.1 x 50 mm	No	Yes	No	No
24*	Orbitrap	C18 3mm	Kinetex C18 100x3mm 2.6 um		Yes	Yes	Method 537 modified
25*	LC-MSMS or LC-QQQ				Yes	No	In-House
26	Orbitrap	C18	C18		Yes	No	
27	LC-MSMS or LC-QQQ	UHPLC guard column; AU; InfinityLabPoroshell 120; EC-C18; 4.6 mm; 4 um	LC column; AU; Poroshell 120 HPH C18; 2.1x50 mm; 2.7 um; narrow bore	NO	YES	NO	Isotope Dilution
28	LC-MSMS or LC-QQQ	Eclipse Plus 2.1 x 5x 2.7um	C18 Eclipse plus 3 x 100 x 1.8um	neat,10,100	yes	No	Direct Injection
31	LC-MSMS or LC-QQQ	C18 2.2um, 3 x 30mm	C18 1.6um, 2 x 50mm	No	Yes	No	In House
32	LC-MSMS or LC-QQQ	In line filter 0.2um	C18 50mm x 2.0 mm 1.6um	No	yes	No	
33	LC-MSMS or LC-QQQ	Phenomenex Evo C18 (2 mm x 2.1 mm)	Phenomenex Evo C18 (100 mm x 2.1 mm x 2.6 um)	No	Yes	No	Isotopic Dilution
34*	LC-MSMS or LC-QQQ		Selectra® C18 (50 x 2.1 mm, 5 µm)	NA	Yes	No	
35	LC-MSMS or LC-QQQ		C18 1.6um, 2.1 x 50mm	Neat, 10x	Yes	No	N/A
37	LC-MSMS or LC-QQQ	C18 5u, 4x10mm	Gemini C18 3u, 3x10mm	No	Yes	No	Modified EPA Method 537
38*	LC-MSMS or LC-QQQ	N/A	C18 10cm	4.86E-02	Yes	No	Yes. Spe

*Additonal informationin Table 142.

Table 147 Participant Methodology for Water Samples – Instrumental Technique and Analysis Additional Information

Lab. Code	Instrumental Technique and Analysis Additional Information
2	delay column used between pump and autosampler Zorbax Eclipse Plus C18, 4.6mm x 50mm x 3.5um
24	In this method the linear standards are used to quantify both the linear as well as the branched isomers
25	Direct Injection LCMSMS
34	Shim-pack XR-ODS (3.0 mmi.d. x 30 mm) has been used as a delay column
38	Dynamic MRM

Table 148 Participant Methodology for Water Samples – Labelled Standards

Lab. Code	Labelled Standard Source	Recovery Correction?	Labelled Standards Additional Information
1	Wellington Laboratories	Yes	
2	Wellington	Yes	
3	Wellington	Yes	
4	Wellington	Yes	
5	Wellington Standards	No	
6	Wellington	Yes	
8	Wellington	Yes	
9	Wellington	no	
10	Welington Laboratory	Yes	
13	Wellington	Yes	
14	Wellington		
16	Wellington	Yes	
18	Wellington	Yes	
19	Wellington Laboratories	No	

Lab. Code	Labelled Standard Source	Recovery Correction?	Labelled Standards Additional Information
20	Wellington	Yes	
22		Yes	
23	Wellington	Yes	
24	Wellington	Yes	
25	Wellington Laboratories	No	Wellington Laboratories
26	Wellington	Yes	Results corrected by ISTD added before extraction
27	Wellington Laboratories	Yes	
28	Wellington	No	
31	Wellington Laboratories	Yes	
32	Wellington	Yes	
33	Wellington	Yes	
35	Wellington	Yes	
37	Wellington Laboratories	Yes	
38	Wellington	No	

Table 149 Labelled Standards for PFBS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFBS	
2		
3	13C3-PFBS	N/A
4		y
5	M3PFBS 100ppt.	N/A
6	13C3 PFBS	--
7	Not Applicable	Not Applicable
8	13C-PFBS	NA
9		M3PFBS
10	M3PFBS	NA
11		
13	13C3-PFBS	
14	YES	
15	Not Applicable	Not Applicable
16	M3PFBS	MPFDA
17	Not Applicable	Not Applicable
18	13C3-PFBS	N/A
19		13C3-PFBS
20	13C3-PFBS	18O2-PFHxS
21	Not Applicable	Not Applicable
22	13C3-PFBS	13C4-PFOA
23	PFBS	
24	Sodium perfluoro-1-[2,3,4 13C3] butanesulfonate M3PFBS	
25		
26	PFBS-13C3	PFOS-13C8
27	13C3-PFBS	
28	13C3-PFBS	
29		
30	Not Applicable	Not Applicable
31	13C3-PFBS	
32	PFBS M3	
33	13C3-PFBS	13C3-PFHxS
34	M3PFBS	M8PFOS
35	13C3-PFBS	
37	13C3 PFBS	13C2 PFOA
38		

Table 150 Labelled Standards for PFPeS

Lab. Code	Before Extraction	Before Instrument Analysis
1	16O2-PFHxS	
2		
3	18O2-PFHxS	N/A
4		
5	M3PFBS 100ppt.	N/A
6	13C3 PFBS	--
7	Not Applicable	Not Applicable
8	13C-PFHxS	NA
9		
10	M5PFHxA	NA
11		
13	13C3-PFBS	
14	YES	
15	Not Applicable	Not Applicable
16	M3PFBS	MPFDA
17	Not Applicable	Not Applicable
18	18O2-PFHxS	N/A
19		16O2-PFHxS
20	13C3-PFHxS	18O2-PFHxS
21	Not Applicable	Not Applicable
22	13C3-PFBS	13C4-PFOA
23	PFHxS	
24		
25		
26	PFOS-C4	PFOS-13C8
27		
28	13C3-PFBS	
29		
30	Not Applicable	Not Applicable
31	16O2-PFHxS	
32	PFHxS M3	
33	18O2-PFHxS	13C3-PFHxS
34	M3PFBS	M8PFOS
35	16O2-PFHxS	
37	18O2 PFHxS	13C2 PFOA
38		

Table 151 Labelled Standards for PFHxS

Lab. Code	Before Extraction	Before Instrument Analysis
1	16O2-PFHxS	
2	Yes	
3	18O2-PFHxS	N/A
4		
5	M3PFBS 100ppt.	N/A
6	18O2 PFHxS	--
7	Not Applicable	Not Applicable
8	13C-PFHxS	NA
9		
10	M3PFHxS	NA
11		
13	18O2-PFHXS	
14	NO	
15	Not Applicable	Not Applicable
16	M3PFHxS	MPFDA
17	Not Applicable	Not Applicable
18	18O2-PFHxS	N/A
19		16O2-PFHxS
20	13C3-PFHxS	18O2-PFHxS
21	Not Applicable	Not Applicable
22	18O2-PFHxS	13C4-PFOA
23	PFHxS	
24	Sodium perfluoro-1-[1,2,3 13C3] hexanesulfonate M3PFHxS	
25		Yes
26	PFHxS-18O2	PFOS-13C8
27	18O2-PFHxS	
28	13C3-PFHxS	
29		
30	Not Applicable	Not Applicable
31	16O2-PFHxS	
32	PFHxS M3	
33	18O2-PFHxS	13C3-PFHxS
34	M3PFBS	M8PFOS
35	16O2-PFHxS	
37	18O2 PFHxS	13C2 PFOA
38		

Table 152 Labelled Standards for PFHxS (linear)

Lab. Code	Before Extraction	Before Instrument Analysis
1	--	
2		
3	18O2-PFHxS	N/A
4		y
5	N/A	N/A
6	18O2 PFHxS	--
7	Not Applicable	Not Applicable
8	13C-PFHxS	NA
9		M3PFHxS
10	M3PFHxS	NA
11		
13	18O2-PFHXS	
14	YES	
15	Not Applicable	Not Applicable
16	M3PFHxS	MPFDA
17	Not Applicable	Not Applicable
18	18O2-PFHxS	N/A
19		NT
20	13C3-PFHxS	18O2-PFHxS
21	Not Applicable	Not Applicable
22	18O2-PFHxS	13C4-PFOA
23		
24		
25		
26	PFHxS-18O2	PFOS-13C8
27	18O2-PFHxS	
28	13C3-PFHxS	
29		
30	Not Applicable	Not Applicable
31	16O2-PFHxS	
32	PFHxS M3	
33	18O2-PFHxS	13C3-PFHxS
34		
35	NT	
37	18O2 PFHxS	13C2 PFOA
38	N/A	N/A

Table 153 Labelled Standards for PFHpS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2		
3	13C4-PFOS	N/A
4		
5	M3PFBS 100ppt.	N/A
6	13C4 PFOS	--
7	Not Applicable	Not Applicable
8	13C-PFHxS	NA
9		
10	M3PFHxS	NA
11		
13	18O2-PFHXS	
14	YES	
15	Not Applicable	Not Applicable
16	M3PFHxS	MPFDA
17	Not Applicable	Not Applicable
18	13C4-PFOS	N/A
19		13C8-PFOS
20	13C8-PFOS	13C4-PFOS
21	Not Applicable	Not Applicable
22	18O2-PFHxS	13C4-PFOA
23	PFHxS	
24		
25		
26	PFOS-C4	PFOS-13C8
27		
28	13C3-PHxS	
29		
30	Not Applicable	Not Applicable
31	13C8-PFOS	
32	PFHxS M3	
33	18O2-PFHxS	13C3-PFHxS
34	M3PFBS	M8PFOS
35	16O2-PFHxS	
37	13C4 PFOS	13C2 PFOA
38		

Table 154 Labelled Standards for PFOS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	Yes	
3	13C4-PFOS	N/A
4		
5	MPFOS 100ppt.	N/A
6	13C4 PFOS	--
7	Not Applicable	Not Applicable
8	13C-PFOS	NA
9		
10	M8PFOS	NA
11		
13	13C8-PFOS	
14	NO	
15	Not Applicable	Not Applicable
16	M8PFOS	MPFOS
17	Not Applicable	Not Applicable
18	13C4-PFOS	N/A
19	13C4-PFOS	13C8-PFOS
20	13C8-PFOS	13C4-PFOS
21	Not Applicable	Not Applicable
22	13C4-PFOS	13C4-PFOA
23	PFOS	
24	Sodium perfluoro-1-[13C8] ocatanesulfonate M8PFOS	
25		
26	PFOS-C4	PFOS-13C8
27	13C8-PFOS	
28	13C8-PFOS	
29		
30	Not Applicable	Not Applicable
31	13C8-PFOS	
32	PFOS M8	
33	13C4-PFOS	13C8-PFOS
34	MPFOS	M8PFOS
35	13C8-PFOS	
37	13C4 PFOS	13C2 PFOA
38		

Table 155 Labelled Standards for PFOS (linear)

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2		
3	13C4-PFOS	N/A
4	y	y
5	N/A	N/A
6	13C4 PFOS	--
7	Not Applicable	Not Applicable
8	13C-PFOS	NA
9	MPFOS	M8PFOS
10	M8PFOS	NA
11		
13	13C8-PFOS	
14	YES	
15	Not Applicable	Not Applicable
16	M8PFOS	MPFOS
17	Not Applicable	Not Applicable
18	13C4-PFOS	N/A
19		13C8-PFOS
20	13C8-PFOS	13C4-PFOS
21	Not Applicable	Not Applicable
22	13C4-PFOS	13C4-PFOA
23		
24		
25		
26	PFOS-C4	PFOS-13C8
27	13C8-PFOS	
28	13C8-PFOS	
29		
30	Not Applicable	Not Applicable
31	13C8-PFOS	
32	PFOS M8	
33	13C4-PFOS	13C8-PFOS
34		
35	NT	
37	13C4 PFOS	13C2 PFOA
38	N/A	N/A

Table 156 Labelled Standards for PFNS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2		
3	13C4-PFOS	N/A
4		
5	N/A	N/A
6	13C4 PFOS	--
7	Not Applicable	Not Applicable
8	13C-PFOS	NA
9		
10	M8PFOS	NA
11		
13	13C8-PFOS	
14	YES	
15	Not Applicable	Not Applicable
16	M8PFOS	MPFOS
17	Not Applicable	Not Applicable
18	13C4-PFOS	N/A
19		13C8-PFOS
20	13C8-PFOS	13C4-PFOS
21	Not Applicable	Not Applicable
22		
23		
24		
25		
26	PFBS-13C3	PFOS-13C8
27		
28	13C8-PFOS	
29		
30	Not Applicable	Not Applicable
31	13C8-PFOS	
32		
33	13C4-PFOS	13C8-PFOS
34		
35	13C8-PFOS	
37	13C4 PFOS	13C2 PFOA
38		

Table 157 Labelled Standards for PFDS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2		
3	13C4-PFOS	N/A
4		
5	N/A	N/A
6	13C4 PFOS	--
7	Not Applicable	Not Applicable
8	13C-PFOS	NA
9		
10	M8PFOS	NA
11		
13	13C8-PFOS	
14	YES	
15	Not Applicable	Not Applicable
16	M8PFOS	MPFOS
17	Not Applicable	Not Applicable
18	13C4-PFOS	N/A
19		13C8-PFOS
20	13C8-PFOS	13C4-PFOS
21	Not Applicable	Not Applicable
22	13C2-PFUnA	13C4-PFOA
23	PFOS	
24		
25		
26	PFBA-13C4	PFOS-13C8
27		
28	13C8-PFOS	
29		
30	Not Applicable	Not Applicable
31	13C8-PFOS	
32	PFOS M8	
33	13C4-PFOS	13C8-PFOS
34		
35	13C8-PFOS	
37	13C4 PFOS	13C2 PFOA
38		

Table 158 Labelled Standards for PFUdS

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

Table 159 Labelled Standards for PFDoS

Lab. Code	Before Extraction	Before Instrument Analysis
1	--	
2		
3	NT	N/A
4		
5	N/A	N/A
6	13C4 PFOS	--
7	Not Applicable	Not Applicable
8	13C-PFOS	NA
9		
10	NT	NA
11		
13	-	
14	NT	
15	Not Applicable	Not Applicable
16	NT	NT
17	Not Applicable	Not Applicable
18	NT	N/A
19		13C8-PFOS
20	13C8-PFOS	13C4-PFOS
21	Not Applicable	Not Applicable
22		
23		
24		
25		
26	PFPeA-13C3	PFOS-13C8
27		
28	NA	
29		
30	Not Applicable	Not Applicable
31	--	
32		
33	13C2-PFDoA	13C8-PFOA
34		
35	NT	
37	13C4 PFOS	13C2 PFOA
38		

Table 160 Labelled Standards for PFTrDS

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

Table 161 Labelled Standards for PFBA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFBA	
2	Yes	
3	13C4-PFBA	N/A
4		y
5	MPFBA 100 ppt.	N/A
6	13C4 PFBA	--
7	Not Applicable	Not Applicable
8	13C-PFBA	NA
9	M3PFBA	MPFBA
10	M4PFBA	NA
11		
13	13C4-PFBA	
14	YES	
15	Not Applicable	Not Applicable
16	MPFBA	M3PFBA
17	Not Applicable	Not Applicable
18	13C4-PFBA	N/A
19		13C4-PFBA
20	13C4-PFBA	13C3-PFBA
21	Not Applicable	Not Applicable
22	13C4-PFBA	13C4-PFOA
23	PFBA	
24	Perfluoro-n-[13C4]butanoic acid MPFBA	
25		
26	PFBA-13C4	PFOS-13C8
27	13C4-PFBA	
28	13C4-PFBA	
29		
30	Not Applicable	Not Applicable
31	13C4-PFBA	
32	PFBA M4	
33	13C4-PFBA	13C3-PFBA
34	MPFBA	MPFDA
35	13C4-PFBA	
37	13C4 PFBA	13C2 PFOA
38		

Table 162 Labelled Standards for PFPeA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C5-PFPeA	
2		
3	13C3-PFPeA	N/A
4		y
5	MPFBA 100 ppt.	N/A
6	13C5 PFPeA	--
7	Not Applicable	Not Applicable
8	13C-PFPeA	NA
9		M5PFPeA
10	M5PFPeA	NA
11		
13	13C5-PFPEA	
14	YES	
15	Not Applicable	Not Applicable
16	M5PFPeA	M3PFBA
17	Not Applicable	Not Applicable
18	13C3-PFPeA	N/A
19		13C5-PFPeA
20	13C5-PFPeA	13C2-PFHxA
21	Not Applicable	Not Applicable
22	13C5-PFPeA	13C4-PFOA
23	PFPeA	
24	Perfluoro-n-[13C5]pentanoic acid M5PFPeA	
25		
26	PFPeA-13C3	PFOS-13C8
27	13C5-PFPeA	
28	13C5-PFPeA	
29		
30	Not Applicable	Not Applicable
31	13C5-PFPeA	
32	PFPeA M5	
33	13C4-PFPeA	13C5 -PFPeA
34	MPFBA	MPFDA
35	13C5-PFPeA	
37	13C5 PFPeA	13C2 PFOA
38		

Table 163 Labelled Standards for PFHxA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C5-PFHxA	
2	Yes	
3	13C2-PFHxA	N/A
4		y
5	MPFHxA 10 ppt.	N/A
6	13C2 PFHxA	--
7	Not Applicable	Not Applicable
8	13C-PFHxA	NA
9		M5PFHxA
10	M5PFHxA	NA
11		
13	13C2-PFHXA	
14	YES	
15	Not Applicable	Not Applicable
16	M5PFHxA	M3PFBA
17	Not Applicable	Not Applicable
18	13C2-PFHxA	N/A
19		13C5-PFHxA
20	13C5-PFHxA	13C2-PFHxA
21	Not Applicable	Not Applicable
22	13C2-PFHxA	13C4-PFOA
23	PFHxA	
24	Perfluoro-n-[1,2,3,4,6-13C5]hexanoic acid M5PFHxA	
25		
26	PFHxA-13C2	PFOS-13C8
27	13C2-PFHXA	
28	13C5-PFHxA	
29		
30	Not Applicable	Not Applicable
31	13C5-PFHxA	
32	PFHxA M6	
33	13C2-PFHxA	13C5 -PFPeA
34	MPFHxA	MPFDA
35	13C5-PFHxA	
37	13C2 PFHxA	13C2 PFOA
38		

Table 164 Labelled Standards for PFHpA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFHpA	
2		
3	13C4-PFHpA	N/A
4		y
5	MPFHxA 10 ppt.	N/A
6	13C4 PFHpA	--
7	Not Applicable	Not Applicable
8	13C-PFHpA	NA
9		M4PFHpA
10	MPFHpA	NA
11		
13	13C4-PFHPA	
14	YES	
15	Not Applicable	Not Applicable
16	M4PFHpA	M3PFBA
17	Not Applicable	Not Applicable
18	13C4-PFHpA	N/A
19		13C4-PFHpA
20	13C4-PFHpA	13C4-PFOA
21	Not Applicable	Not Applicable
22	13C4-PFHpA	13C4-PFOA
23	PFHpA	
24	Perfluoro-n-[1,2,3,4-13C4]heptanoic acid M4PFHpA	
25		
26	PFHpA-13C4	PFOS-13C8
27	13C4-PFHpA	
28	13C4-PFHpA	
29		
30	Not Applicable	Not Applicable
31	13C4-PFHpA	
32	PFHpA M4	
33	13C3-PFHpA	13C8-PFOA
34	MPFHxA	MPFDA
35	13C4-PFHpA	
37	13C4 PFHpA	13C2 PFOA
38		

Table 165 Labelled Standards for PFOA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFOA	
2	Yes	
3	13C4-PFOA	N/A
4	y	y
5	MPFOA 10 ppt.	N/A
6	13C4 PFOA	--
7	Not Applicable	Not Applicable
8	13C-PFOA	NA
9	M2PFOA	M8PFOA
10	M8PFOA	NA
11		
13	13C8-PFOA	
14	YES	
15	Not Applicable	Not Applicable
16	M8PFOA	M2PFOA
17	Not Applicable	Not Applicable
18	13C4-PFOA	N/A
19	13C8-PFOA	13C4-PFOA
20	13C8-PFOA	13C4-PFOA
21	Not Applicable	Not Applicable
22	13C8-PFOA	13C4-PFOA
23	PFOA	
24	Perfluoro-n-[13C8]octanoic acid M8PFOA	
25		
26	PFOA-13C4	PFOS-13C8
27	13C8-PFOA	
28	13C8-PFOA	
29		
30	Not Applicable	Not Applicable
31	13C4-PFOA	
32	PFOA M8	
33	13C4-PFOA	13C8-PFOA
34	MPFOA	MPFDA
35	13C4-PFOA	
37	13C4 PFOA	13C2 PFOA
38		

Table 166 Labelled Standards for PFNA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C5-PFNA	
2	Yes	
3	13C5-PFNA	N/A
4		y
5	MPFOA 10 ppt.	N/A
6	13C5 PFNA	--
7	Not Applicable	Not Applicable
8	13C-PFNA	NA
9		M9PFNA
10	M9PFNA	NA
11		
13	13C5-PFNA	
14	YES	
15	Not Applicable	Not Applicable
16	M9PFNA	M2PFOA
17	Not Applicable	Not Applicable
18	13C5-PFNA	N/A
19		13C5-PFNA
20	13C9-PFNA	13C5-PFNA
21	Not Applicable	Not Applicable
22	13C5-PFNA	13C4-PFOA
23	PFNA	
24	Perfluoro-n-[13C9]nonanoic acid M9PFNA	
25		Yes
26	PFNA-13C5	PFOS-13C8
27	13C5-PFNA	
28	13C9-PFNA	
29		
30	Not Applicable	Not Applicable
31	13C5-PFNA	
32	PFNA M9	
33	13C5-PFNA	13C8-PFOA
34	MPFOA	MPFDA
35	13C5-PFNA	
37	13C5 PFNA	13C2 PFOA
38		

Table 167 Labelled Standards for PFDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C6-PFDA	
2	Yes	
3	13C2-PFDA	N/A
4		y
5	MPFUdA 10ppt.	N/A
6	13C2 PFDA	--
7	Not Applicable	Not Applicable
8	13C-PFDA	NA
9	MPFDA	M6PFDA
10	M6PFDA	NA
11		
13	13C6-PFDA	
14	YES	
15	Not Applicable	Not Applicable
16	M6PFDA	MPFDA
17	Not Applicable	Not Applicable
18	13C2-PFDA	N/A
19		13C6-PFDA
20	13C6-PFDA	13C2-PFDA
21	Not Applicable	Not Applicable
22	13C2-PFDA	13C4-PFOA
23	PFDA	
24	Perfluoro-n-[1,2,3,4,6-13C6]decanoic acid M6PFDA	
25		
26	PFDA-13C2	PFOS-13C8
27	13C6-PFDA	
28	13C6-PFDA	
29		
30	Not Applicable	Not Applicable
31	13C6-PFDA	
32	PFDA M6	
33	13C2-PFDA	13C8-PFOA
34	MPFUdA	MPFDA
35	13C6-PFDA	
37	13C2 PFDA	13C2 PFOA
38		

Table 168 Labelled Standards for PFUdA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFUnDA	
2	Yes	
3	13C2-PFUdA	N/A
4		y
5	MPFUdA 10ppt.	N/A
6	13C2 PFUdA	--
7	Not Applicable	Not Applicable
8	13C-PFUdA	NA
9		M7PFUdA
10	M7PFUnDA	NA
11		
13	13C2-PFUDA	
14	YES	
15	Not Applicable	Not Applicable
16	M7PFUdA	MPFDA
17	Not Applicable	Not Applicable
18	13C2-PFUdA	N/A
19		13C2-PFUnDA
20	13C7-PFUnA	13C2-PFDA
21	Not Applicable	Not Applicable
22	13C2-PFUnA	13C4-PFOA
23	PFUdA	
24	Perfluoro-n-[1,2,3,4,6,7-13C7]undecanoic acid M7PFUdA	
25		
26	PFUNDA-13C2	PFOS-13C8
27	13C2-PFUnA	
28	13C9-PFUdA	
29		
30	Not Applicable	Not Applicable
31	13C2-PFUnDA	
32	PFUdA M7	
33	13C2-PFUdA	13C8-PFOA
34	MPFUdA	MPFDA
35	13C2-PFUnDA	
37	13C2 PFUdA	13C2 PFOA
38		

Table 169 Labelled Standards for PFDoA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFDoDA	
2	Yes	
3	13C2-PFDoDA	N/A
4		y
5	MPFUdA 10ppt.	N/A
6	13C2 PFDoA	--
7	Not Applicable	Not Applicable
8	13C-PFDoA	NA
9		MPFDoA
10	MPFDoDA	NA
11		
13	13C2-PFDOA	
14	YES	
15	Not Applicable	Not Applicable
16	MPFDoA	MPFDA
17	Not Applicable	Not Applicable
18	13C2-PFDoDA	N/A
19		13C2-PFDoDA
20	13C2-PFDoA	13C2-PFDA
21	Not Applicable	Not Applicable
22	13C2-PFDoA	13C4-PFOA
23	PFDoA	
24	Perfluoro-n-[1,2 13C2]dodecanoic acid MPFDoA	
25		
26	PFDoDA-13C2	PFOS-13C8
27	13C2-PFDoA	
28	13C2-PFDoA	
29		
30	Not Applicable	Not Applicable
31	13C2-PFDoDA	
32	PFDoA M2	
33	13C2-PFDoA	13C8-PFOA
34	MPFUdA	MPFDA
35	13C2-PFDoDA	
37	13C2 PFDoA	13C2 PFOA
38		

Table 170 Labelled Standards for PFTrDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFDoDA	
2		
3	13C2-PFTeDA	N/A
4		
5	M2PFTeDA 20ppt.	N/A
6	13C2 PFDoA	--
7	Not Applicable	Not Applicable
8	13C-PFDoA	NA
9		
10	MPFDoDA	NA
11		
13	13C2-PFTEDA	
14	YES	
15	Not Applicable	Not Applicable
16	MPFDoA	MPFDA
17	Not Applicable	Not Applicable
18	13C2-PFTeDA	N/A
19		13C2-PFTeDA
20	13C2-PFDoA; 13C2-PFTeDA	13C2-PFDA
21	Not Applicable	Not Applicable
22	13C2-PFTeDA	13C4-PFOA
23	PFDoA	
24		
25		
26	PFTeDA-13C2	PFOS-13C8
27		
28	13C2-PFTeDA	
29		
30	Not Applicable	Not Applicable
31	13C2-PFDoDA	
32	PFDoA M2	
33	13C2-PFTeDA	13C8-PFOA
34	M2PFTeDA	MPFDA
35	13C2-PFDoDA	
37	13C2 PFDoA	13C2 PFOA
38		

Table 171 Labelled Standards for PFTeDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFTeDA	
2		
3	13C2-PFTeDA	N/A
4		y
5	M2PFTeDA 20ppt.	N/A
6	13C2 PFTeDA	--
7	Not Applicable	Not Applicable
8	13C-PFTeA	NA
9		M2PFTeDA
10	MPFTeDA	NA
11		
13	13C2-PFTEDA	
14	YES	
15	Not Applicable	Not Applicable
16	M2PFTeDA	MPFDA
17	Not Applicable	Not Applicable
18	13C2-PFTeDA	N/A
19		13C2-PFTeDA
20	13C2-PFTeDA	13C2-PFDA
21	Not Applicable	Not Applicable
22	13C2-PFTeDA	13C4-PFOA
23	PFTeDA	
24	Perfluoro-n-[1,2 13C2]tetradecanoic acid M2PFTeDA	
25		
26	PFTeDA-13C2	PFOS-13C8
27	13C2-PFTeDA	
28	13C2-PFTeDA	
29		
30	Not Applicable	Not Applicable
31	13C2-PFTeDA	
32	PFTeDA M2	
33	13C2-PFTeDA	13C8-PFOA
34	M2PFTeDA	MPFDA
35	13C2-PFTeDA	
37	13C2 PFTeDA	13C2 PFOA
38		

Table 172 Labelled Standards for PFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-FOSA	
2		
3	13C8-FOSA	N/A
4		y
5	N/A	N/A
6	13C8 PFOSA	--
7	Not Applicable	Not Applicable
8	13C-PFOSA	NA
9		M8-FOSA
10	MPFOSA	NA
11		
13	13C8-FOSA	
14	YES	
15	Not Applicable	Not Applicable
16	M8FOSA-I	MPFOS
17	Not Applicable	Not Applicable
18	13C8-FOSA	N/A
19		13C8-FOSA
20	13C8-PFOSA	13C4-PFOS
21	Not Applicable	Not Applicable
22	13C8-PFOSA	13C4-PFOA
23	PFOSA	
24	Perfluoro-1-[13C8]otanesulfonamide	
25		
26	FOSA-13C8	PFOS-13C8
27	13C8-FOSA	
28	D3-N-MeFOSA	
29		
30	Not Applicable	Not Applicable
31	13C8-FOSA	
32	PFOSA M8	
33	13C8-FOSA	
34		
35	13C8-FOSA	
37	13C8 FOSA	13C2 PFOA
38		

Table 173 Labelled Standards for N-MeFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1	d3-MeFOSA	
2		
3	D3-M PFOSA	N/A
4		y
5	N/A	N/A
6	d3-NMeFOSA	--
7	Not Applicable	Not Applicable
8	13C-MePFOSA	NA
9		d-N-MeFOSA
10	d-NMeFOSA-M	NA
11		
13	d3-N-MEFOSA	
14	YES	
15	Not Applicable	Not Applicable
16	d-N-MeFOSA-M	MPFOS
17	Not Applicable	Not Applicable
18	D3-M PFOSA	N/A
19		d3-MeFOSA
20	D3-N-MeFOSA	13C4-PFOS
21	Not Applicable	Not Applicable
22	d3-N-MeFOSA	13C4-PFOA
23	N-MeFOSA	
24	N-methyl-d3-perfluoro-1-octancesulfonamide	
25		
26	MeFOSA-D3	PFOS-13C8
27	d3-MeFOSA	
28	D3-N-MeFOSA	
29		
30	Not Applicable	Not Applicable
31	d3-MeFOSA	
32	d3-N-MeFOSAA	
33	D3-N-Me FOSA	
34		
35	d3-MeFOSA	
37	NT	
38		

Table 174 Labelled Standards for N-EtFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1	d5-EtFOSA	
2		
3	D5-E PFOSA	N/A
4		y
5	N/A	N/A
6	d5-NEtFOSA	--
7	Not Applicable	Not Applicable
8	13C-EtPFOSA	NA
9		d-N-EtFOSA
10	d-NEtFOSA-M	NA
11		
13	d5-N-ETFOSA	
14	YES	
15	Not Applicable	Not Applicable
16	d-N-EtFOSA-M	MPFOS
17	Not Applicable	Not Applicable
18	D5-E PFOSA	N/A
19		d5-EtFOSA
20	D5-N-EtFOSA	13C4-PFOS
21	Not Applicable	Not Applicable
22	d5-N-EtFOSA	13C4-PFOA
23	N-EtFOSA	
24	N-ethyl-d5-perfluoro-1-octanesulfonamide	
25		
26	EtFOSA-D5	PFOS-13C8
27	d5-EtFOSA	
28	D3-N-MeFOSA	
29		
30	Not Applicable	Not Applicable
31	d5-EtFOSA	
32	d3-N-MeFOSAA	
33	D5-N-Et FOSA	
34		
35	d5-EtFOSA	
37	NT	
38		

Table 175 Labelled Standards for N-MeFOSAA

Lab. Code	Before Extraction	Before Instrument Analysis
1	d3-MeFOSAA	
2		
3	D3-Me-FOSAA	N/A
4		y
5	N/A	N/A
6	d3-NMeFOSAA	--
7	Not Applicable	Not Applicable
8	13C-MePFOSAA	NA
9		d3-N-MeFOSAA
10	d3-NMeFOSAA	NA
11		
13	d3-N-MEFOSAA	
14	YES	
15	Not Applicable	Not Applicable
16	d3-N-MeFOSAA	MPFOS
17	Not Applicable	Not Applicable
18	D3-Me-FOSAA	N/A
19		d3-MeFOSAA
20	D3-MeFOSAA	13C2-D4-6:2 FTS
21	Not Applicable	Not Applicable
22	d3-N-MeFOSAA	13C4-PFOA
23	N-MeFOSAA	
24		
25		
26	MeFOSAA-D3	PFOS-13C8
27	d3-N-MeFOSAA	
28	D3-N-MeFOSAA	
29		
30	Not Applicable	Not Applicable
31	d3-MeFOSAA	
32	d3-N-MeFOSAA	
33	D3-N-Me FOSAA	
34		
35	d3-MeFOSAA	
37	d3-NMeFOSAA	13C2 PFOA
38		

Table 176 Labelled Standards for N-EtFOSAA

Lab. Code	Before Extraction	Before Instrument Analysis
1	d5-EtFOSAA	
2		
3	D5-Et-FOSAA	N/A
4		y
5	N/A	N/A
6	d5-NEtFOSAA	--
7	Not Applicable	Not Applicable
8	13C-EtPFOSAA	NA
9		d5-N-EtFOSAA
10	d5-NEtFOSAA	NA
11		
13	d5-N-ETFOSAA	
14	YES	
15	Not Applicable	Not Applicable
16	d5-N-EtFOSAA	MPFOS
17	Not Applicable	Not Applicable
18	D5-Et-FOSAA	N/A
19		d5-EtFOSAA
20	D5-EtFOSAA	13C2-D4-6:2 FTS
21	Not Applicable	Not Applicable
22	d5-N-EtFOSAA	13C4-PFOA
23	N-EtFOSAA	
24	N-ethyl-d5-perfluoro-1-octanesulfonamide	
25		
26	EtFOSAA-D5	PFOS-13C8
27	d5-N-EtFOSAA	
28	D5-N-EtFOSAA	
29		
30	Not Applicable	Not Applicable
31	d5-EtFOSAA	
32	d3-N-EtFOSAA	
33	D5-N-Et FOSAA	
34		
35	d5-EtFOSAA	
37	d5-NEtFOSAA	13C2 PFOA
38		

Table 177 Labelled Standards for N-MeFOSE

Lab. Code	Before Extraction	Before Instrument Analysis
1	d7-MeFOSE	
2		
3	D7-Me-FOSE	N/A
4		y
5	N/A	N/A
6	d7-NMeFOSE	--
7	Not Applicable	Not Applicable
8	NT	NA
9		d7-N-MeFOSE
10	d7-NMeFOSE-M	NA
11		
13	d7-N-MEFOSE	
14	YES	
15	Not Applicable	Not Applicable
16	d7-N-MeFOSE-M	MPFOS
17	Not Applicable	Not Applicable
18	D7-Me-FOSE	N/A
19		d7-MeFOSE
20	D7-N-MeFOSE	13C4-PFOS
21	Not Applicable	Not Applicable
22	d7-MeFOSE	13C4-PFOA
23	N-MeFOSE	
24	d7-N-MeFOSE-M 2-(N-methyl-d3-perfluoro-1-octanesulfonamido) ethand4-ol	
25		
26	MeFOSE-D3	PFOS-13C8
27	d7-MeFOSE	
28	D9-N-EtFOSE	
29		
30	Not Applicable	Not Applicable
31	d7-MeFOSE	
32	d3-N-MeFOSAA	
33	D7-N-Me FOSE	
34		
35	d7-MeFOSE	
37	NT	
38		

Table 178 Labelled Standards for N-EtFOSE

Lab. Code	Before Extraction	Before Instrument Analysis
1	d3EtFOSE	
2		
3	D9-Et-FOSE	N/A
4		y
5	N/A	N/A
6	d9-NEtFOSE	--
7	Not Applicable	Not Applicable
8	NT	NA
9		d9-N-EtFOSE
10	d9-NEtFOSE-M	NA
11		
13	d9-N-ETFOSE	
14	YES	
15	Not Applicable	Not Applicable
16	d9-N-EtFOSE-M	MPFOS
17	Not Applicable	Not Applicable
18	D9-Et-FOSE	N/A
19		d3-EtFOSE
20	D9-N-EtFOSE	13C4-PFOS
21	Not Applicable	Not Applicable
22	d9-N-EtFOSE	13C4-PFOA
23	N-EtFOSE	
24	d9-N-EtFOSE-M 2-(N-ethyl-d5-perfluoro-1-octanesulfonamido) ethan-d4-ol	
25		
26	EtFOSE-D9	PFOS-13C8
27	d9-EtFOSE	
28	D9-N-EtFOSE	
29		
30	Not Applicable	Not Applicable
31	d3EtFOSE	
32	d3-N-MeFOSAA	
33	D9-N-Et FOSE	
34		
35	d3-EtFOSE	
37	NT	
38		

Table 179 Labelled Standards for 4:2 FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-4:2 FTS	
2		
3	13C2 4:2-FTS	N/A
4		y
5	N/A	N/A
6	13C2-4:2 FTS	--
7	Not Applicable	Not Applicable
8	13C-4:2 FTS	NA
9		M2-4:2FTS
10	M4:2 FTS	NA
11		
13	13C2-4:2FTS	
14	YES	
15	Not Applicable	Not Applicable
16	M2-4:2 FTS	MPFOS
17	Not Applicable	Not Applicable
18	13C2 4:2-FTS	N/A
19		13C2-4:2 FTS
20	13C2-4:2 FTS	13C2-D4-6:2 FTS
21	Not Applicable	Not Applicable
22	13C2-4:2 FTS	13C4-PFOA
23	4:2 FTS	
24	M2-4:2FTS -1H,1H,2H,2H-perfluoro1-[1,2-13C2]-hexane sulfonate (4:2)	
25		
26	4:2 FTS-13C2	PFOS-13C8
27	13C2-42FTS	
28	13C2-6:2 FTS	
29		
30	Not Applicable	Not Applicable
31	13C2-4:2 FTS	
32	M2-4:2 FTS	
33	13C2-4:2 FTS	
34		
35	13C2-4:2 FTS	
37	M2-4:2 FTS	13C2 PFOA
38		

Table 180 Labelled Standards for 6:2 FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-6:2 FTS	
2		
3	13C2,12C6 6:2-FTS	N/A
4		y
5	N/A	N/A
6	13C2-6:2 FTS	--
7	Not Applicable	Not Applicable
8	13C-6:2 FTS	NA
9		M2-6:2FTS
10	M6:2 FTS	NA
11		
13	13C2-6:2FTS	
14	YES	
15	Not Applicable	Not Applicable
16	M2-6:2 FTS	MPFOS
17	Not Applicable	Not Applicable
18	13C2,12C6 6:2-FTS	N/A
19		13C2-6:2 FTS
20	13C2-6:2 FTS	13C2-D4-6:2 FTS
21	Not Applicable	Not Applicable
22	13C2-6:2FTS	13C4-PFOA
23	6:2 FTS	
24	M2-6:2FTS -1H,1H,2H,2H-perfluoro1-[1,2-13C2]-octane sulfonate (6:2)	
25		
26	6:2 FTS-13C2	PFOS-13C8
27	13C2-62FTS	
28	13C2-6:2 FTS	
29		
30	Not Applicable	Not Applicable
31	13C2-6:2 FTS	
32	M2-6:2 FTS	
33	13C2-6:2 FTS	
34		
35	13C2-6:2 FTS	
37	M2-6:2 FTS	13C2 PFOA
38		

Table 181 Labelled Standards for 8:2 FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-8:2 FTS	
2		
3	13C2 8:2-FTS	N/A
4		y
5	N/A	N/A
6	13C2-8:2 FTS	--
7	Not Applicable	Not Applicable
8	13C-8:2 FTS	NA
9		M2-8:2FTS
10	M8:2 FTS	NA
11		
13	13C2-8:2FTS	
14	YES	
15	Not Applicable	Not Applicable
16	M2-8:2 FTS	MPFOS
17	Not Applicable	Not Applicable
18	13C2 8:2-FTS	N/A
19		13C2-8:2 FTS
20	13C2-8:2 FTS	13C2-D4-6:2 FTS
21	Not Applicable	Not Applicable
22	13C2-8:2 FTS	13C4-PFOA
23	8:2 FTS	
24	M2-8:2FTS -1H,1H,2H,2H-perfluoro1-[1,2-13C2]-decane sulfonate (8:2)	
25		
26	8:2 FTS-13C2	PFOS-13C8
27	13C2-82FTS	
28	13C2-8:2FTS	
29		
30	Not Applicable	Not Applicable
31	13C2-8:2 FTS	
32	M2-8:2 FTS	
33	13C2-8:2 FTS	
34		
35	13C2-8:2 FTS	
37	M2-8:2 FTS	13C2 PFOA
38		

Table 182 Labelled Standards for 10:2 FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-8:2 FTS	
2		
3	13C2 8:2-FTS	N/A
4		
5	N/A	N/A
6	13C2-10:2 FTS	--
7	Not Applicable	Not Applicable
8	13C-6:2 FTS	NA
9		
10	MPFDoDA	NA
11		
13	13C2-10:2FTS	
14	YES	
15	Not Applicable	Not Applicable
16	M2-8:2 FTS	MPFOS
17	Not Applicable	Not Applicable
18	13C2 8:2-FTS	N/A
19		13C2-8:2 FTS
20	NT	NT
21	Not Applicable	Not Applicable
22	13C2-8:2 FTS	13C4-PFOA
23	8:2 FTS	
24		
25		
26	10:2 FTS-13C2	PFOS-13C8
27	13C2d4 10:2 FTS	
28	13C2-8:2FTS	
29		
30	Not Applicable	Not Applicable
31	13C2-8:2 FTS	
32	M2-8:2 FTS	
33	13C2-PFDoA	
34		
35	13C2-8:2 FTS	
37	M2-8:2 FTS	13C2 PFOA
38		

Table 183 Labelled Standards for GenX

Lab. Code	Before Extraction	Before Instrument Analysis
1	--	
2		
3	13C312C3HF11O3	N/A
4		y
5	N/A	N/A
6	13C3 HFPO-DA	--
7	Not Applicable	Not Applicable
8	NT	NA
9		
10	M3HFPO-DA	NA
11		
13	13C3-HFPO-DA	
14	NT	
15	Not Applicable	Not Applicable
16	NT	NT
17	Not Applicable	Not Applicable
18	13C312C3HF11O3	N/A
19		NT
20	13C3-HFPO-DA	13C2-PFHxA
21	Not Applicable	Not Applicable
22		
23		
24		
25		
26	PFPeA-13C3	PFOS-13C8
27	13C3-GenX (MHFPA)	
28	13C3-GenX	
29		
30	Not Applicable	Not Applicable
31	--	
32		
33	13C4-PFOA	
34		
35	NT	
37	13C3 HFPO-DA	13C2 PFOA
38		

Table 184 Labelled Standards for ADONA

Lab. Code	Before Extraction	Before Instrument Analysis
1	--	
2		
3	13C4-PFHpA	N/A
4		
5	N/A	N/A
6	13C4 PFOS	--
7	Not Applicable	Not Applicable
8	13C-PFOA	NA
9		
10	MPFHpA	NA
11		
13	13C8-PFOS	
14	NT	
15	Not Applicable	Not Applicable
16	NT	NT
17	Not Applicable	Not Applicable
18	13C4-PFHpA	N/A
19		NT
20	13C3-HFPO-DA	13C2-PFHxA
21	Not Applicable	Not Applicable
22		
23		
24		
25		
26	FOSA-13C8	PFOS-13C8
27		
28	13C4-PFHpA	
29		
30	Not Applicable	Not Applicable
31	--	
32		
33	13C4-PFOA	
34		
35	NT	
37	13C4 PFOS	13C2 PFOA
38		

Table 185 Labelled Standards for 9Cl-PF3ONS

Lab. Code	Before Extraction	Before Instrument Analysis
1	--	
2		
3	13C4-PFOS	N/A
4		
5	N/A	N/A
6	13C4 PFOS	--
7	Not Applicable	Not Applicable
8	13C-PFOS	NA
9		
10	M8PFOS	NA
11		
13	13C8-PFOS	
14	NT	
15	Not Applicable	Not Applicable
16	NT	NT
17	Not Applicable	Not Applicable
18	13C4-PFOS	N/A
19		NT
20	13C3-HFPO-DA	13C2-PFHxA
21	Not Applicable	Not Applicable
22		
23		
24		
25		
26		
27		
28	NA	
29		
30	Not Applicable	Not Applicable
31	--	
32		
33	13C4-PFOS	13C8-PFOS
34		
35	NT	
37	13C4 PFOS	13C2 PFOA
38		

Table 186 Labelled Standards for 11Cl-PF3OUdS

Lab. Code	Before Extraction	Before Instrument Analysis
1	--	
2		
3	13C4-PFOS	N/A
4		
5	N/A	N/A
6	13C4 PFOS	--
7	Not Applicable	Not Applicable
8	13C-PFOS	NA
9		
10	MPFDoDA	NA
11		
13	13C2-PFHXA	
14	NT	
15	Not Applicable	Not Applicable
16	NT	NT
17	Not Applicable	Not Applicable
18	13C4-PFOS	N/A
19		NT
20	13C3-HFPO-DA	13C2-PFHxA
21	Not Applicable	Not Applicable
22		
23		
24		
25		
26		
27		
28	NA	
29		
30	Not Applicable	Not Applicable
31	--	
32		
33	13C4-PFOS	13C8-PFOS
34		
35	NT	
37	13C4 PFOS	13C2 PFOA
38		

Table 187 Participant Methodology for Water Samples – Additional Information

Lab. Code	Sample	Additional Information
8	S3	N-MeFOSA and N-EtFOSA were not determined due to low recovery of internal standard
10	S3	4:2 FTS is not reported (NR) because of a high internal standard recovery PFDS is not reported (NR) because of poor recovery of our QC sample NT = not tested
	S4	PFDS is not reported (NR) because of poor recovery of our QC sample NT = not tested
18	S3 and S4	All linear and branched present have been reported although some branched peaks are not confirmed by traceable standards.
20	S3 and S4	The sample was received at a temperature of 20.4ºC; which was above the laboratory method recommended sample storage temperature (less than or equal to 6ºC).
24	S3	Extra Compounds Detected < LOR: PFHxA
	S4	Extra Compounds Detected < LOR: PFBA, PFPeA, PFOA, PFTrDA, PFOSA

APPENDIX 7 – ACRONYMS AND ABBREVIATIONS

10:2 FTS	1H, 1H, 2H, 2H-perfluorododecane sulfonate
11Cl-PF3OUdS	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
4:2 FTS	1H, 1H, 2H, 2H-perfluorohexane sulfonate
6:2 FTS	1H, 1H, 2H, 2H-perfluorooctane sulfonate
8:2 FTS	1H, 1H, 2H, 2H-perfluorodecane sulfonate
9Cl-PF3ONS	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid
ACN	Acetonitrile
ADONA	Ammonium 4,8-dioxa-3H-perfluorononanoate
Alk Dig	Alkaline Digestion
ASE	Accelerated Solvent Extraction
ASLP	Australian Standard Leaching Protocol
AQA	Analytical and Quality Assurance
AV	Assigned Value
CRM	Certified Reference Material
CV	Coefficient of Variation
EPA	Environment Protection Authority
EtFOSA	N-Ethyl perfluorooctane sulfonamide
EtFOSAA	N-Ethyl perfluorooctane sulfonamido acetic acid
EtFOSE	N-Ethyl perfluorooctane sulfonamidoethanol
FOSA	Perfluoro-1-octanesulfonamide
GenX	Ammonium 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy) propanoate
GUM	Guide for Uncertainty Measurement
HV	Homogeneity Value
IPE	Ion Pair Extraction
ISO	International Standards Organisation
ISTD	Internal Standard
LC	Liquid Chromatography
LC-MSMS	Liquid Chromatography with Tandem Mass Spectrometry
LCS	Laboratory Control Sample
LLE	Liquid-Liquid Extraction
LOR	Limit of Reporting
LSE	Liquid-Solid Extraction
Max	Maximum value in a set of results
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 value in a set of results
MS	Mass Spectrometry
MTBE	Methyl tert-butyl ether
MU	Measurement Uncertainty
NATA	National Association of Testing Authorities, Australia
NMI	National Measurement Institute (of Australia)
NR	Not Reported
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
PFESA	Polyfluorinated ether sulfonic acid
PFHpA	Perfluoro-n-heptanoic acid
PFHpS	Perfluoroheptane sulfonate
PFHxA	Perfluoro-n-hexanoic acid
PFHxS	Potassium perfluorohexanesulfonate
PFHxS_L	Potassium perfluorohexanesulfonate linear
PFNA	Perfluoro-n-nonanoic acid
PFNS	Perfluorononane sulfonate
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PFOS_L	Perfluorooctane sulfonate linear
PFOSA	Perfluoro-1-octanesulfonamide
PFPeA	Perfluoro-n-pentanoic acid
PFPeS	Perfluoropentane sulfonate
PFSA	Perfluorosulfonic acid
PFTeDA	Perfluorotetradecanoic acid
PFTrDA	Perfluorotridecanoic acid
PFTrDS	Perfluorotridecane sulfonate
PFUdA	Perfluoroundecanoic acid
PFUdS	Perfluoroundecane sulfonate

PLE	Pressurised Liquid Extraction
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)
Target SD	Target standard deviation
TBA	Tert-butanol
TCLP	Toxicity characteristic leaching procedure
UHPLC	Ultra-High-Performance Liquid Chromatography
US EPA	United States Environmental Protection Agency
WAX	Weak Anion Exchange

END OF REPORT