Australian Government
Department of Industry, Science and Resources

National Measurement Institute

Proficiency Test Final Report AQA 25-11 PFAS in Food and Biota

January 2026

Our purpose is to help the government build a better future for all Australians through enabling a productive, resilient and sustainable economy, enriched by science and technology.

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.

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SUMMARY

This report presents the results of the proficiency test AQA 25-11 PFAS in Food and Biota. This study was designed based on USEPA Method 1633 requirements and participant demands, and is focused on the measurement of 34 per- and polyfluoroalkyl substances (PFAS) analytes, total: PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFNA, PFDA, PFUdA, PFDoA, PFTrDA, PFTeDA, PFODA, PFBS, PFPeS, PFHxS, PFHpS, PFOS, PFNS, PFDS, PFOSA, N-MeFOSA, N-MeFOSAA, N-EtFOSAA, EtFOSE, 6:2FTS, 8:2FTS, 10:2FTS, 3:3FTCA, GenX, ADONA, 9Cl-PF3ONS and 11Cl-PF3OUdS. Participants were also asked to report linear: PFHxS and PFOS.

Eighteen laboratories registered to participate, and 17 participants submitted results by the due date.

The sample set consisted of a spiked fish paste sample (Sample S1), a spiked fruit puree (50% banana, 50% apple) sample (Sample S2) and a spiked infant formula sample (Sample S3).

The assigned values were the robust averages of participants' results. The associated uncertainties were evaluated from the robust standard deviations of the participants' results. The consensus of participants' results is not traceable to any external reference, so although assigned values have been expressed in SI units, metrological traceability has not been established.

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

i. *assess laboratory capability in correctly identifying PFAS in food and biota matrices*;

Laboratory 14 reported numeric results for all 78 spiked analytes across the three samples.

Nine participants did not report numeric results for analytes that they tested for and were spiked into the samples.

Seven participants reported analytes that were not spiked into the samples.

ii. compare the performances of participants and assess their accuracy in the measurement of PFAS in food and biota matrices;

Of 932 z-scores, 895 (96%) returned $|z| \leq 2.0$, indicating an acceptable performance.

Of 927 E_n-scores, 743 (80%) returned $|E_n| < 1.0$, indicating agreement of the participant's result with the assigned value within their respective expanded uncertainties.

Laboratory **14** returned the highest number of acceptable z-scores 75.

Laboratory **4** had the highest proportion of acceptable results, with all 74 reported values returning acceptable z-scores.

Laboratory **9** returned acceptable z-scores and E_n-scores for all 72 analytes for which they reported numeric results.

iii. evaluate laboratories' methods used in the determination of PFAS in food and biota analysis;

Higher between laboratories coefficient of variation indicated that PFAS measurements in the infant formula sample posed greater challenges for participants compared to the fish paste and fruit puree samples. Additionally, the ratios of assigned values to spiked values for analytes in infant formula were generally lower than those for fish and fruit.

Overall, the analyte levels in the infant formula samples were much lower than those in the fish paste and fruit puree samples. Increasing the sample size could effectively lower the

method detection limit by increasing the amount of analyte extracted and its concentration in the final extract, thereby improving quantification in complex food matrices.

The laboratory that achieved the highest recovery of spiked analytes in the infant formula sample (S3) used a method involving weighing 5 g of sample, adding the internal standard prior to extraction, and allowing it to equilibrate for 30–60 minutes. The sample was then reconstituted with 15 mL of reagent water acidified with 150 µL of formic acid before extraction. A QuEChERS extraction was performed over 15 minutes, followed by carbon clean-up. The extract was further concentrated at 60 °C for 40–60 minutes and then subjected to clean-up before instrumental determination using SPE with NH_4OH/MeOH as the elution solvent.

iv. develop the practical application of measurement uncertainty and provide participants with information that will be useful in evaluating their uncertainties;

Of 944 numeric results reported for analytes of interest in this study, 842 (89%) were reported with an associated expanded measurement uncertainty.

Although it is a requirement of ISO/IEC 17025 that laboratories have procedures to evaluate measurement uncertainty, several laboratories that did not report measurement uncertainty with their results. In addition, some laboratories are still reporting unrealistically small or excessively large relative uncertainties for routine PFAS analysis. The magnitude of the reported measurement uncertainties for spiked analytes in this study was within the range 0% to 78% of the reported value.

v. compare the performance of participants with their past performance;

NMIA has been conducting PFAS in food and biota proficiency testing (PT) studies since 2016.

AQA 16-06 included 6 tests across two samples, and 92% of scored results returned an acceptable *z*-score. The present study AQA 25-11 included 78 tests across three samples, and 96% of scored results returned an acceptable *z*-score.

vi. *produce materials that can be used in method validation and as control samples.*

The test samples of this PT study are homogeneous and well characterised. Surplus samples are available for purchase from NMIA and can be used for quality control and method validation purposes.

1 INTRODUCTION

1.1 NMIA Proficiency Testing Program

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

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

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

1.2 Study Aims

The aims of the study were to:

- assess laboratory capability in correctly identifying PFAS in food and biota matrices;
- compare the performances of participants and assess their accuracy in the measurement of PFAS in food and biota matrices;
- evaluate laboratories' methods used in the determination of PFAS in food and biota analysis;
- develop the practical application of measurement uncertainty and provide participants with information that will be useful in evaluating their uncertainties;
- compare the performance of participants with their past performance; and
- produce materials that can be used in method validation and as control samples.

The choice of test method was left to the participating laboratories.

1.3 Study Conduct

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

NMIA is accredited by the National Association of Testing Authorities, Australia (NATA) to ISO/IEC 17043:2023 as a provider of proficiency testing schemes. This study falls within the scope of NMIA's accreditation.

2 STUDY INFORMATION

2.1 Study Timetable

The timetable of the study was:

Invitations sent	10/06/2025
Samples sent	18/08/2025
Results due	03/10/2025
Interim Report	08/10/2025
Preliminary Report	15/10/2025

2.2 Participation and Laboratory Code

Eighteen laboratories registered to participate in this study and seventeen reported results. All participants were assigned a confidential laboratory code number for this study.

2.3 Selection of PFAS Analytes and Test Material Preparation

Participants were provided with a list of potential PFAS analytes that were spiked into the study's samples, as presented in Table 1.

Table 1 Potential Spiked PFAS Analytes

PFBA	PFHxDA	PFDS	4:2FTS	7:3FTCA
PFPeA	PFODA	PFUdS	6:2FTS	GenX
PFHxA	FOUEA	PFDoS	8:2FTS	ADONA
PFHpA	PFBS	PFTrDS	10:2FTS	PFMPA
PFOA	PFPeS	PFOSA	6:2diPAP	PFMBA
PFNA	PFHxS (total)	N-MeFOSA	8:2diPAP	NFDHA
PFDA	PFHxS (linear)	N-N-EtFOSA	6:2FTOH	9Cl-PF3ONS
PFUdA	PFHpS	N-MeFOSAA	8:2FTOH	11Cl-PF3OUdS
PFDoA	PFOS (total)	N-N-EtFOSAA	10:2FTOH	PFEESA
PFTrDA	PFOS (linear)	N-MeFOSE	3:3FTCA	PFECHS
PFTeDA	PFNS	N-EtFOSE	5:3FTCA	

Consideration was given to USEPA Method 1633 (applicable to aqueous, solid, biosolids and tissue samples) when selecting PFAS analytes and their spiked values for this study.[5]

All samples were prepared in May of 2025. Care was taken to avoid any PFAS contamination during sample preparation. The prepared samples were:

- Sample S1: Fish paste (5 g portions) spiked with 28 different PFAS analytes.
- Sample S2: Fruit puree (50% banana, 50% apple) (30 g portions) spiked with 23 different PFAS analytes.
- Sample S3: Infant formula (20 g portions) spiked with 27 different PFAS analytes.

Details of spiked analytes and values are presented in Table 2. Further sample preparation details can be found in Appendix 1.

Table 2 Spiked Values of Test Samples

PFAS	Sample S1 Fish paste (Spiked) µg/kg	Sample S2 Fruit puree (Spiked) µg/kg	Sample S3 Infant formula (Spiked) µg/kg
PFBA	3.58	2.86	2.94
PFPeA	0.901	0.933	1.22
PFHxA	2.69	5.73	0.784
PFHpA	5.34	1.91	1.17
PFOA	0.938	3.33	1.77
PFNA	1.33	2.38	0.491
PFDA	4.92	7.62	7.85
PFUdA	7.16	Not Spiked	7.84
PFDoA	7.16	7.62	Not Spiked
PFTrDA	7.16	Not Spiked	7.84
PFTeDA	7.16	7.62	7.84
PFODA	17.9	Not Spiked	Not Spiked
PFBS*	1.35	0.944	1.07
PFPeS*	3.14	4.67	0.675
PFHxS*	2.24	0.764	0.587
PFHxS_L*	2.24	0.764	0.587
PFHpS*	1.36	1.43	0.684
PFOS*	2.24	1.90	1.97
PFOS_L*	1.77	1.50	1.55
PFNS*	1.33	2.11	0.972
PFDS*	6.30	4.12	1.48
PFOSA	4.48	3.64	Not Spiked
N-MeFOSA	7.16	Not Spiked	11.8
N-MeFOSAA	5.37	Not Spiked	9.80
N-EtFOSAA	Not Spiked	Not Spiked	7.84
EtFOSE	Not Spiked	Not Spiked	11.8
6:2FTS*	8.06	Not Spiked	Not Spiked
8:2FTS*	Not Spiked	6.63	9.77
10:2FTS*	Not Spiked	6.68	3.91
3:3FTCA	31.3	Not Spiked	Not Spiked
GenX	Not Spiked	Not Spiked	1.08
ADONA*	19.6	10.9	Not Spiked
9Cl-PF3ONS*	22.3	Not Spiked	Not Spiked
11Cl-PF3OUdS*	Not Spiked	23.7	10.8

*Values for these analytes are the anion concentration.

2.4 Homogeneity and Stability of Test Materials

The process used to prepare, store and dispatch Samples S1 and S3 has been demonstrated in previous NMIA PFAS in food and biota PT studies to produce sufficiently homogeneous and stable samples.[6]

Since Sample S2 was a new matrix type introduced in this study, homogeneity and stability testing were performed. The results confirmed that the sample was sufficiently homogeneous and stable to allow the evaluation of participants' performance.

The stability of all three samples was also assessed by comparing the results returned by participants with the spiked values. Assigned values for scored analytes were within 87% to 113%, 89% to 115% and 57% to 107% of the spiked values for Samples S1, S2 and S3 respectively. These values are similar to those observed in previous NMIA PFAS food and biota PT studies and provides support for the stability of these analytes.

Further details on the homogeneity and stability assessment are given in Appendix 2.

2.5 Test Material Storage and Dispatch

After preparation, the test materials were dispensed into sample tubes, labelled and shrink-wrapped. Prior to sample dispatch, the samples were stored at -20 °C.

Samples were packed into insulated polystyrene foam boxes with cooler bricks and sent by courier on 18 August 2025.

The following items were packaged with the samples:

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

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

2.6 Instructions to Participants

Participants were instructed as follows:

- Quantitatively analyse the samples for PFAS, using your routine test method and report results in units of µg/kg on as received basis for all samples.
- Thaw out the Samples S1 and S2 and mix it thoroughly before subsampling.
- Keep the Sample S3 COVERED to avoid moisture absorption.
- If analyses cannot be commenced on the day of receipt, please STORE THE SAMPLES FROZEN.
- The PFAS analytes that may be present in the samples were given in a list. Participants could elect not to test for all listed analytes.
- Report results using the electronic results sheet emailed to you.
- For each analyte report a single result expressed as if reporting to a client (i.e. corrected for recovery or not, according to your standard procedure, but state if results are corrected on the result sheet). This figure will be used in all statistical analysis in the study report.
- For each analyte report the associated expanded measurement uncertainty as µg/kg (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 evaluations as required by the results sheet.
- If determined, report your internal standard percentage recovery. This will be presented in the report for information only.
- Return the completed results sheet by email (proficiency@measurement.gov.au) by 19 September 2025.

The results due date was later changed to 3 October 2025 for all participants.

2.7 Interim Report and Preliminary Report

An Interim Report was emailed to all participants on 8 October 2025.

A Preliminary Report was emailed to all participants on 15 October 2025. This report included a summary of the results reported by participants, assigned values, performance coefficients of variation (PCVs), *z*-scores and E_n-scores for each analyte in this study.

No data from the Preliminary Report has been changed in this Final Report.

3 PARTICIPANT LABORATORY INFORMATION

3.1 Participants' Test Methods

Participants were requested to provide information about their methodology. Responses are presented in Appendix 6.

3.2 Basis of Participants' Measurement Uncertainty Evaluations

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

Table 3 Basis of Participants' Uncertainty Evaluation

Lab. Code	Approach to Evaluating MU	Information Sources for MU Evaluation*		Guide Document for Evaluating MU
		Precision	Method Bias	
1	Bottom Up (ISO/GUM, fish bone/cause and effect diagram) k = 2	Duplicate analysis Instrument calibration	Instrument calibration	ISO/GUM
2	Coverage factor not reported			
3	Coverage factor not reported			
4	Standard deviation of replicate analyses multiplied by 2 or 3 Measurement Uncertainty (U) evaluated from the standard deviation (u) of replicate recovery samples using the expression U = 2 x u. k = 2	Control samples - SS		Statistics and Chemometrics for Analytical Chemistry, Miller and Miller, 5th
5	Top Down - precision and evaluations of the method and laboratory bias Coverage factor not reported	Control samples - SS Duplicate analysis Instrument calibration	Instrument calibration Laboratory bias from PT studies Recoveries of SS Standard purity	
6	Standard deviation of replicate analyses multiplied by 2 or 3 Coverage factor not reported	Control samples - SS Duplicate analysis Instrument calibration	Recoveries of SS	Eurachem/CITAC Guide
8	Bottom Up (ISO/GUM, fish bone/cause and effect diagram) k = 2	Duplicate analysis Instrument calibration	Instrument calibration Standard purity	ISO/GUM
9	Top Down - precision and evaluations of the method and laboratory bias k = 2	Control samples - CRM Duplicate analysis Instrument calibration	CRM Laboratory bias from PT studies Recoveries of SS	NMIA Uncertainty Course
10	Top Down - precision and evaluations of the method and laboratory bias k = 2	Control samples - RM / Ex PT Sample Duplicate analysis	CRM Laboratory bias from PT studies Recoveries of SS	Nordtest Report TR537
11	Top Down - reproducibility (standard deviation) from PT studies used directly k = 2	Standard deviation from PT studies only		ISO/GUM
			CRM	

Lab. Code	Approach to Evaluating MU	Information Sources for MU Evaluation*		Guide Document for Evaluating MU
		Precision	Method Bias	
12	Standard deviation of replicate analyses multiplied by 2 or 3 Coverage factor not reported	Control samples - SS Duplicate analysis Instrument calibration	CRM Instrument calibration Standard purity	
13	Standard deviation of triplicate analysis Coverage factor not reported	Standard deviation from PT studies only		
14	Top Down - precision and evaluations of the method and laboratory bias k = 2	Control samples - SS	Recoveries of SS	Nordtest Report TR537
15	Coverage factor not reported			
16	Top Down - precision and evaluations of the method and laboratory bias Coverage factor not reported	Control samples - CRM Duplicate analysis Instrument calibration		Technical Report No1/2007
18	Standard deviation of replicate analyses multiplied by 2 or 3 k = 2	Control samples - SS		ISO/GUM
19	Standard deviation of triplicate analysis Coverage factor not reported	Standard deviation from PT studies only		

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

3.3 Participants' Comments

Participants were invited to make comments on the samples, this PT study in general, and suggestions for future PT studies. Such feedback is useful in improving future studies.

In this study, no participants made any comments.

4 PRESENTATION OF RESULTS AND STATISTICAL ANALYSIS

4.1 Results Summary

Participant results are presented in Tables 4 to 81, with resultant summary statistics: robust average, median, mean, number of numeric results, maximum, minimum, robust standard deviation (SD_{rob}) and robust coefficient of variation (CV_{rob}). Bar charts of results and performance scores are presented in Figures 2 to 79. An example chart with interpretation guide is shown in Figure 1.

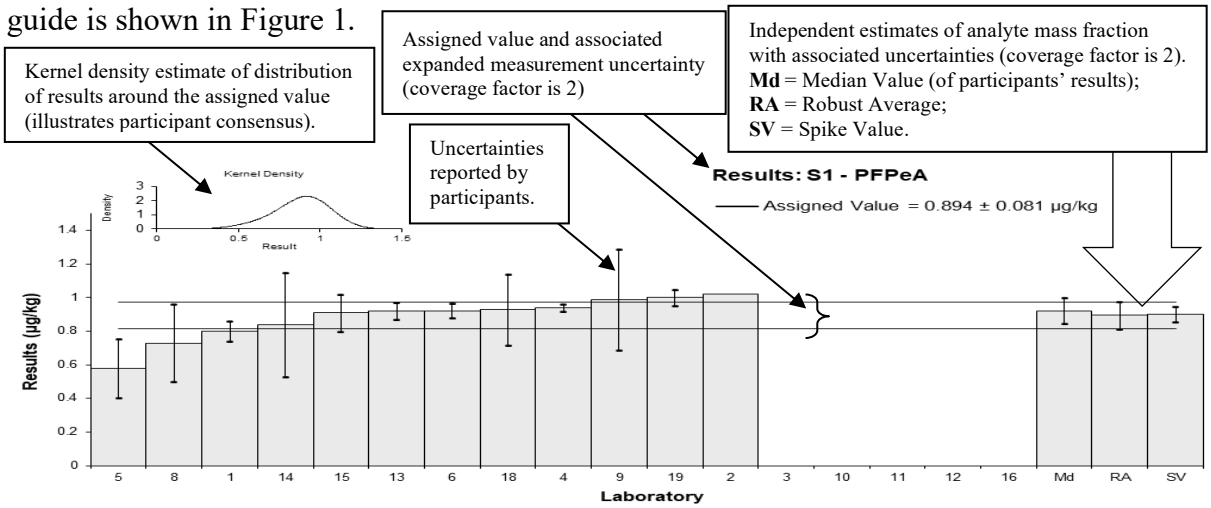


Figure 1 Guide to Presentation of Results

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 (gross errors) were obvious blunders, such as those with incorrect units, decimal errors, or results from a different proficiency test item 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 3. 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 fraction of analyte. Assigned values were the robust average of participants' results, outliers removed; the expanded uncertainties were evaluated from the associated robust standard deviations.[4,7]

4.4 Robust Average and Robust Between-Laboratory Coefficient of Variation

The robust averages and associated expanded measurement uncertainties were calculated using the procedure described in 'Statistical methods for use in proficiency testing by interlaboratory comparisons', ISO13528.[7] The robust between-laboratory coefficient of variation (robust CV) is a measure of the variability of participants' results and was calculated using the procedure described in ISO13528. [7]

4.5 Standard Deviation for Proficiency Assessment

The standard deviation for proficiency assessment (SDPA,σ) is the product of the assigned value (X) and the performance coefficient of variation (PCV). This value is used for calculation of participant z-score and provides scaling for laboratory deviation from the assigned value.

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

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 on experience from previous studies. It is backed up by mathematical models such as the Thompson Horwitz equation.[8]

4.6 z-Score

An example of *z*-score calculation using data from the present study is given in Appendix 3. 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 standard deviation for proficiency assessment.

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

- $|z| \leq 2.0$ is acceptable;
- $2.0 < |z| < 3.0$ is questionable; and
- $|z| \geq 3.0$ is unacceptable.

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

4.7 E_n-Score

An example of E_n-score calculation using data from the present study is given in Appendix 3. 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 ($|E_n|$):

- $|E_n| < 1.0$ is acceptable;
- $|E_n| \geq 1.0$ is unacceptable.

4.8 Traceability and Measurement Uncertainty

Laboratories accredited to ISO/IEC 17025[9] must establish and demonstrate the traceability and measurement uncertainty associated with their test results. Guidelines for quantifying uncertainty in analytical measurement are described in the Eurachem/CITAC Guide.[10]

5 TABLES AND FIGURES

Table 4

Sample Details

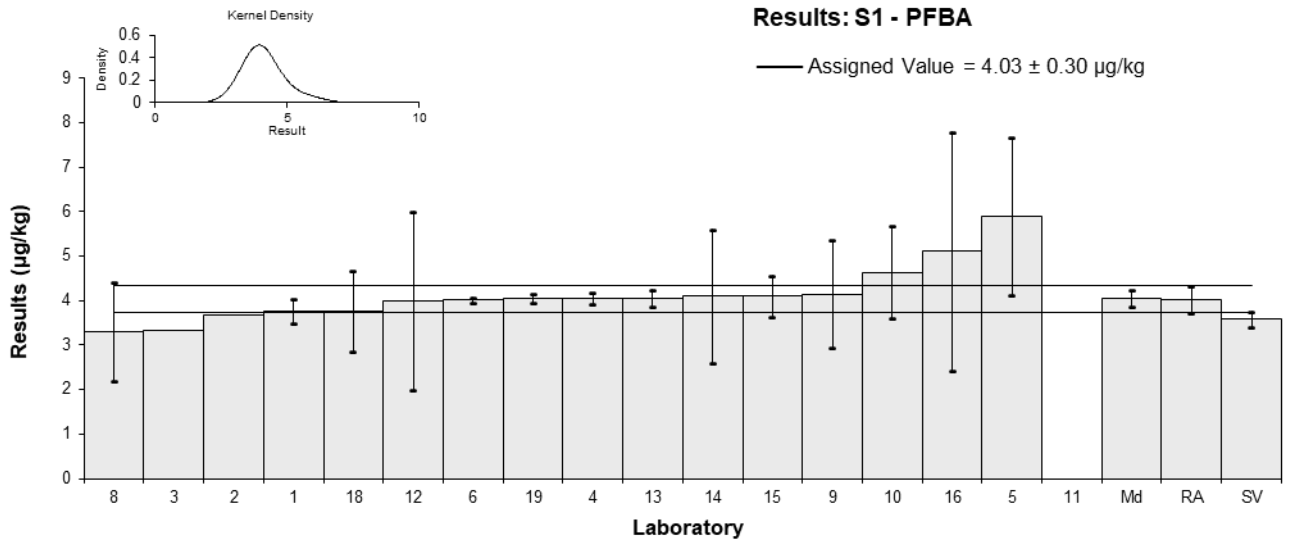
Sample No.	S1
Matrix	Fish paste
Analyte	PFBA
Unit	µg/kg

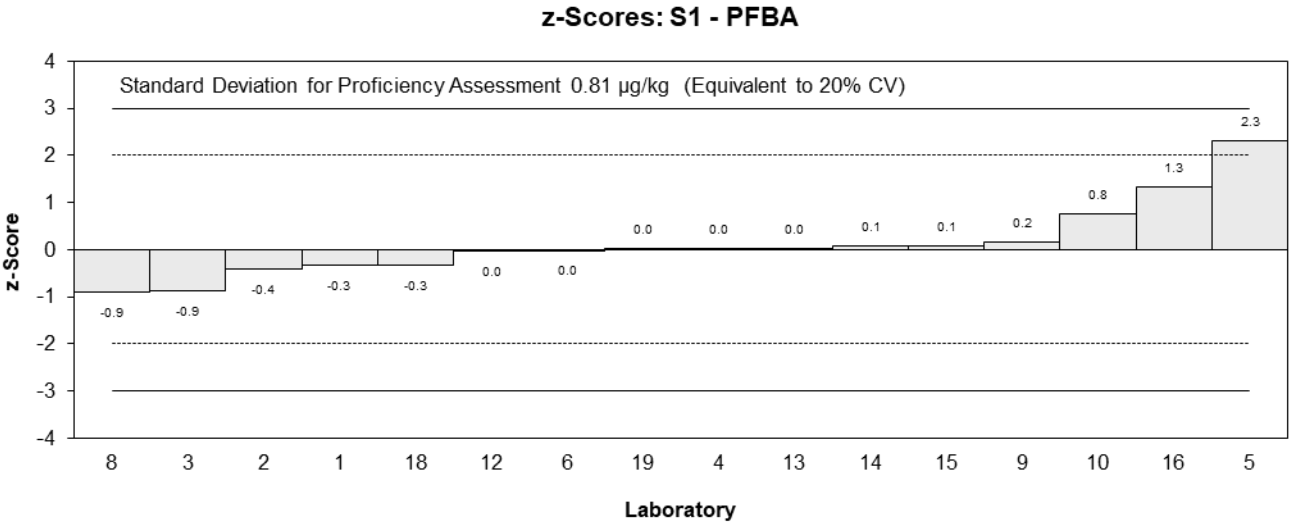
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	3.76	0.27	NR	-0.33	-0.67
2	3.69	NR	114	-0.42	-1.13
3	3.32	NR	NR	-0.88	-2.37
4	4.05	0.12	106	0.02	0.06
5	5.9	1.77	91	2.32	1.04
6	4.01	0.0672	75	-0.02	-0.07
8	3.3	1.1	65	-0.91	-0.64
9	4.15	1.2	84	0.15	0.10
10	4.64	1.04	74.9	0.76	0.56
11	NT	NT	NT		
12	4	2	101	-0.04	-0.01
13	4.057	0.184	87	0.03	0.08
14	4.1	1.5	NT	0.09	0.05
15	4.1	0.46	NR	0.09	0.13
16	5.108	2.68	67	1.34	0.40
18	3.76	0.901	95.5	-0.33	-0.28
19	4.048	0.096	129	0.02	0.06

Statistics

Assigned Value	4.03	0.30
Spike Value	3.58	0.18
Robust Average	4.03	0.30
Median	4.05	0.18
Mean	4.12	
N	16	
Max	5.9	
Min	3.3	
Robust SD	0.49	
Robust CV	12%	


Kernel Density
Density
Result
Results: S1 - PFBA
Assigned Value = 4.03 ± 0.30 µg/kg
Results (µg/kg)
8 3 2 1 18 12 6 19 4 13 14 15 9 10 16 5 11 Md RA SV
Laboratory


z-Scores: S1 - PFBA
Standard Deviation for Proficiency Assessment 0.81 µg/kg (Equivalent to 20% CV)
z-Score
-0.9 -0.9 -0.4 -0.3 -0.3 0.0 0.0 0.0 0.0 0.1 0.1 0.2 0.8 1.3 2.3
8 3 2 1 18 12 6 19 4 13 14 15 9 10 16 5
Laboratory

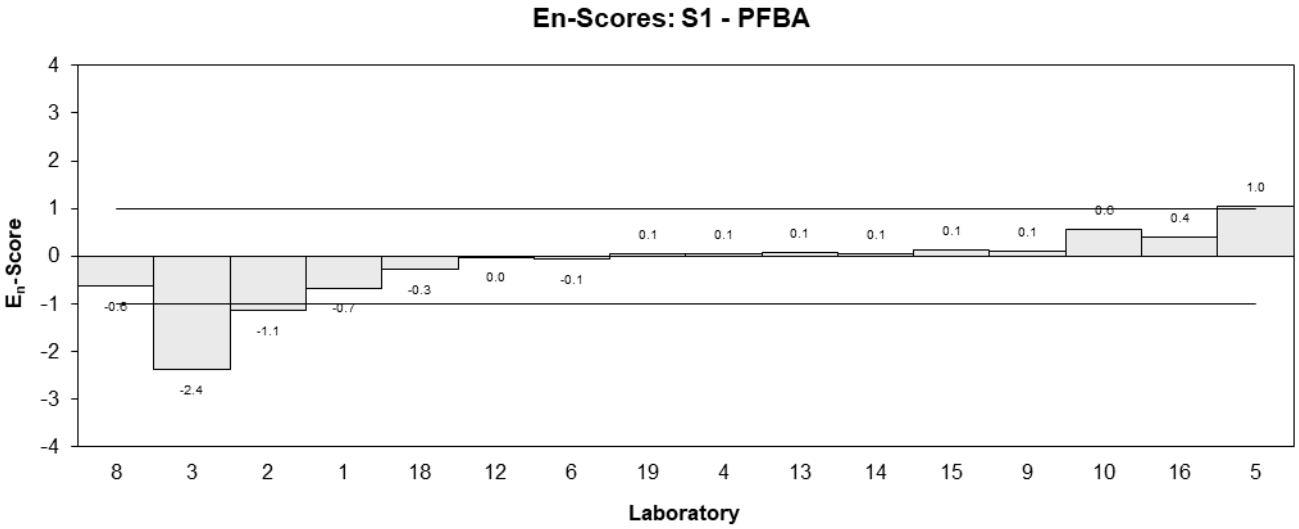

En-Scores: S1 - PFBA
En-Score
-0.6 -2.4 -1.1 -0.7 -0.3 0.0 -0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.6 0.4 1.0
8 3 2 1 18 12 6 19 4 13 14 15 9 10 16 5
Laboratory

Figure 2

Table 5

Sample Details

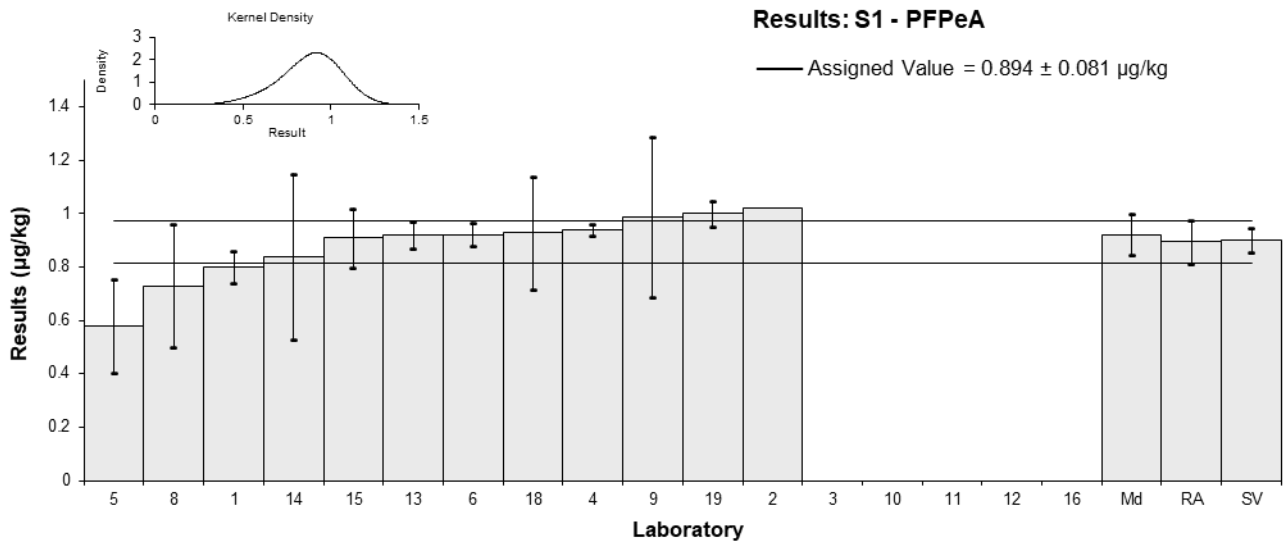
Sample No.	S1
Matrix	Fish paste
Analyte	PFPeA
Unit	µg/kg

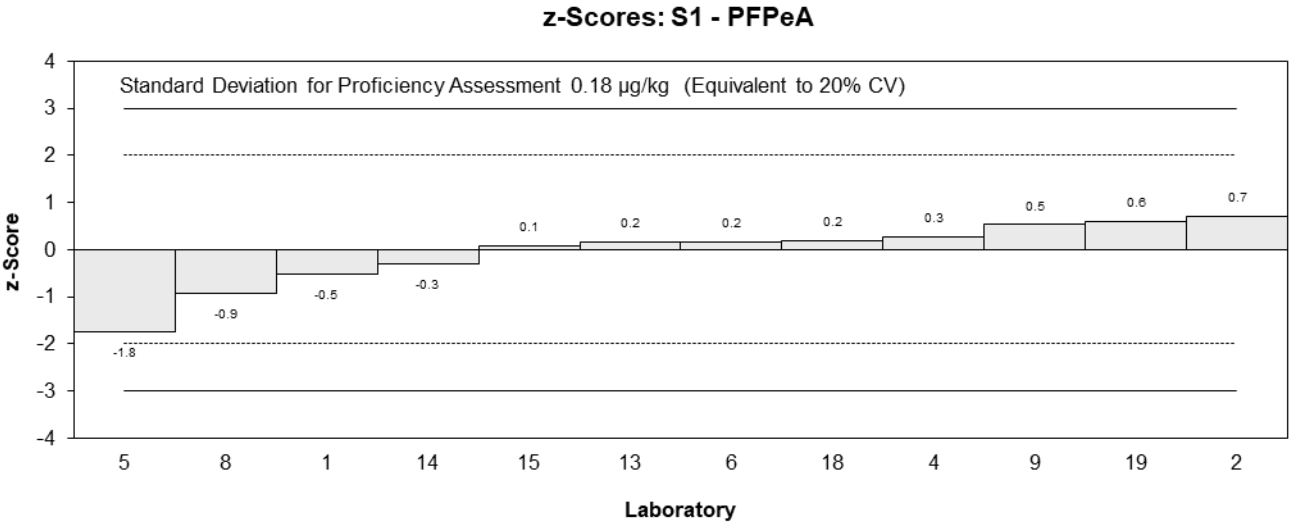
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.8	0.06	NR	-0.53	-0.93
2	1.02	NR	105	0.70	1.56
3	<1	NR	NR		
4	0.94	0.02	99	0.26	0.55
5	0.58	0.174	98	-1.76	-1.64
6	0.922	0.0443	77	0.16	0.30
8	0.73	0.23	102	-0.92	-0.67
9	0.989	0.3	85	0.53	0.31
10	<1.70	NR	55.8		
11	NT	NT	NT		
12	< 2	1	79		
13	0.921	0.049	67	0.15	0.29
14	0.84	0.31	NT	-0.30	-0.17
15	0.91	0.11	NR	0.09	0.12
16	<2	NR	79		
18	0.928	0.213	82.6	0.19	0.15
19	1	0.05	131	0.59	1.11

Statistics

Assigned Value	0.894	0.081
Spike Value	0.901	0.045
Robust Average	0.894	0.081
Median	0.922	0.078
Mean	0.882	
N	12	
Max	1.02	
Min	0.58	
Robust SD	0.11	
Robust CV	13%	


Kernel Density
Density
Result
Results: S1 - PFPeA
Assigned Value = 0.894 ± 0.081 µg/kg
Results (µg/kg)
Laboratory
5 8 1 14 15 13 6 18 4 9 19 2 3 10 11 12 16 Md RA SV


z-Scores: S1 - PFPeA
Standard Deviation for Proficiency Assessment 0.18 µg/kg (Equivalent to 20% CV)
z-Score
-1.8 -0.9 -0.5 -0.3 0.1 0.2 0.2 0.2 0.3 0.5 0.6 0.7
Laboratory
5 8 1 14 15 13 6 18 4 9 19 2

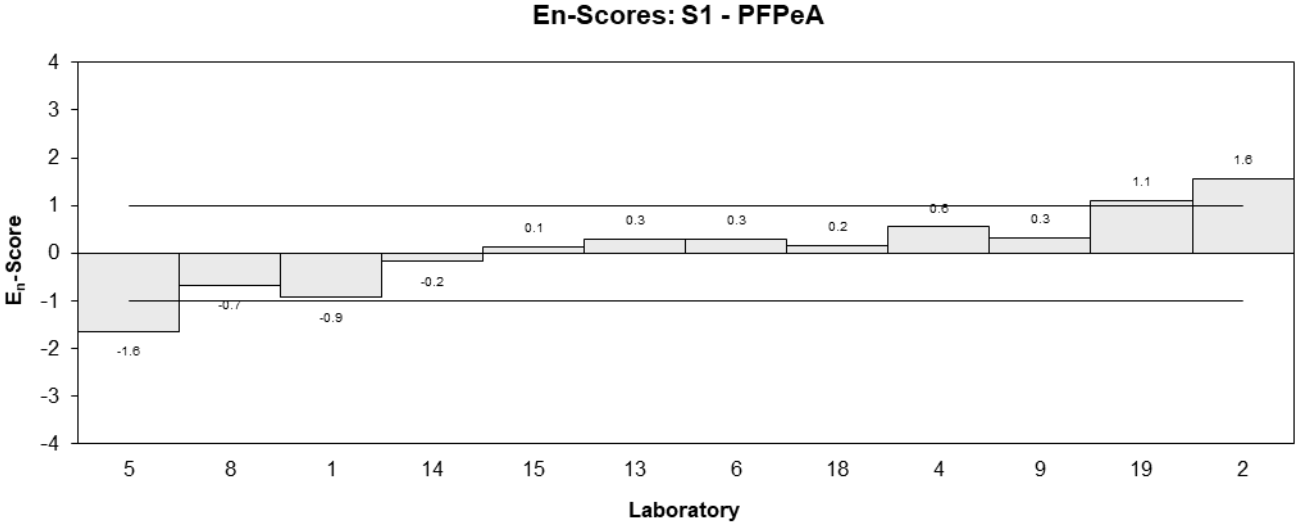

En-Scores: S1 - PFPeA
En-Score
-1.6 -0.7 -0.9 -0.2 0.1 0.3 0.3 0.2 0.6 0.3 1.1 1.6
Laboratory
5 8 1 14 15 13 6 18 4 9 19 2

Figure 3

Table 6

Sample Details

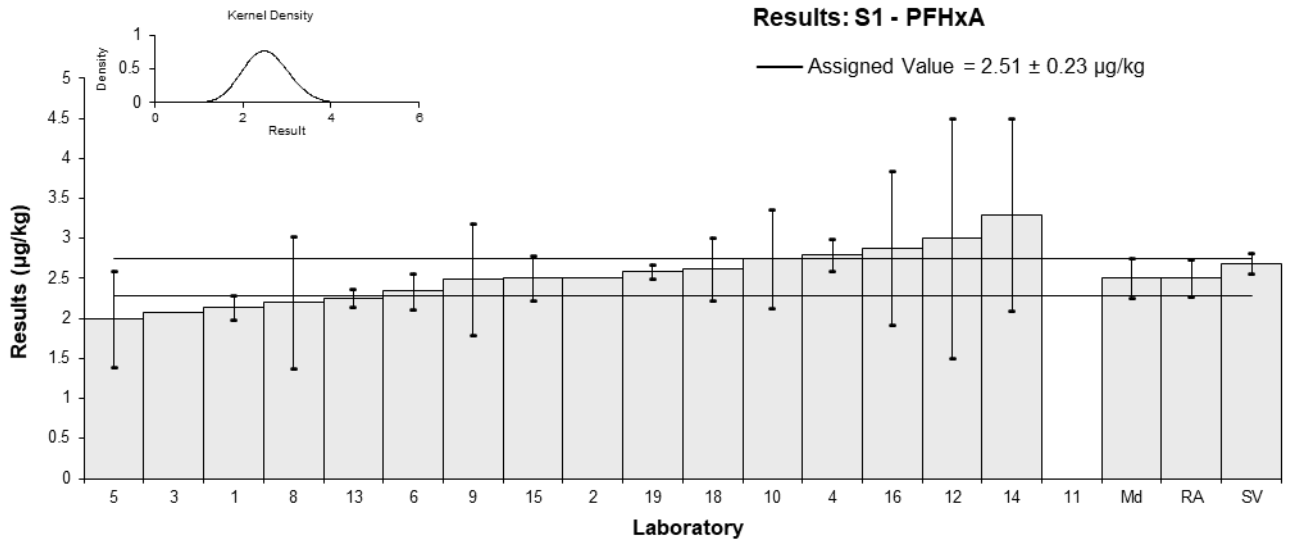
Sample No.	S1
Matrix	Fish paste
Analyte	PFHxA
Unit	µg/kg

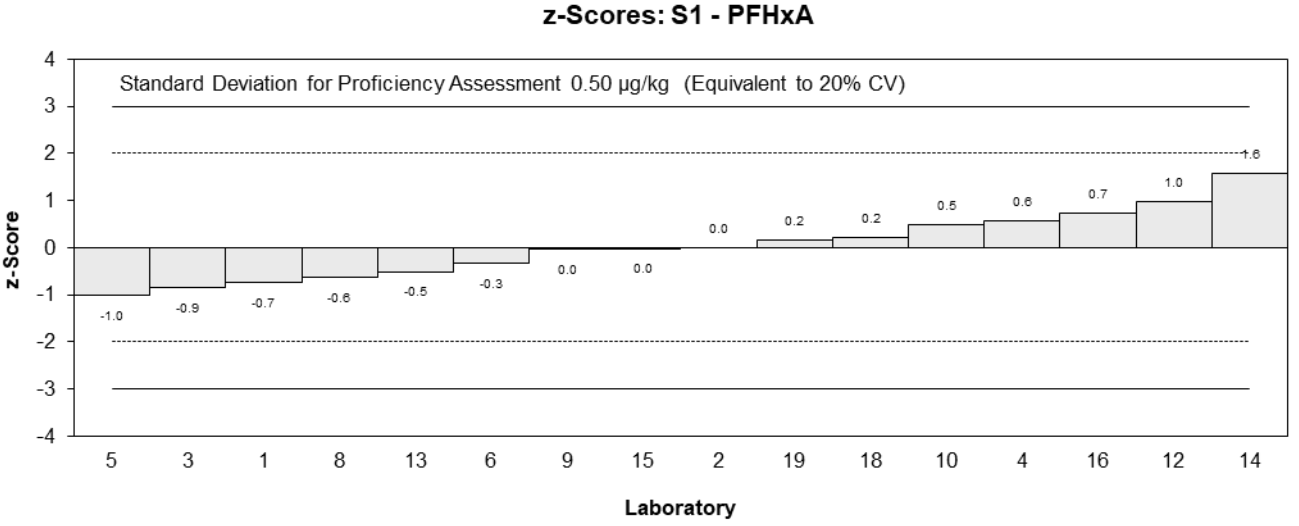
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	2.14	0.15	NR	-0.74	-1.35
2	2.51	NR	125	0.00	0.00
3	2.08	NR	NR	-0.86	-1.87
4	2.79	0.2	99	0.56	0.92
5	2.0	0.6	89	-1.02	-0.79
6	2.34	0.224	77	-0.34	-0.53
8	2.2	0.82	108	-0.62	-0.36
9	2.49	0.7	87	-0.04	-0.03
10	2.75	0.613	62.1	0.48	0.37
11	NT	NT	NT		
12	3	1.5	95	0.98	0.32
13	2.255	0.112	72	-0.51	-1.00
14	3.3	1.2	NT	1.57	0.65
15	2.5	0.28	NR	-0.02	-0.03
16	2.88	0.96	90	0.74	0.37
18	2.62	0.393	96.3	0.22	0.24
19	2.59	0.09	103	0.16	0.32

Statistics

Assigned Value	2.51	0.23
Spike Value	2.69	0.13
Robust Average	2.51	0.23
Median	2.51	0.25
Mean	2.53	
N	16	
Max	3.3	
Min	2	
Robust SD	0.37	
Robust CV	15%	


Kernel Density
Density
Result
Results: S1 - PFHxA
Assigned Value = 2.51 ± 0.23 µg/kg
Results (µg/kg)
Laboratory
5 3 1 8 13 6 9 15 2 19 18 10 4 16 12 14 11 Md RA SV


z-Scores: S1 - PFHxA
Standard Deviation for Proficiency Assessment 0.50 µg/kg (Equivalent to 20% CV)
z-Score
-1.0 -0.9 -0.7 -0.6 -0.5 -0.3 0.0 0.0 0.0 0.2 0.2 0.5 0.6 0.7 1.0 1.6
Laboratory
5 3 1 8 13 6 9 15 2 19 18 10 4 16 12 14

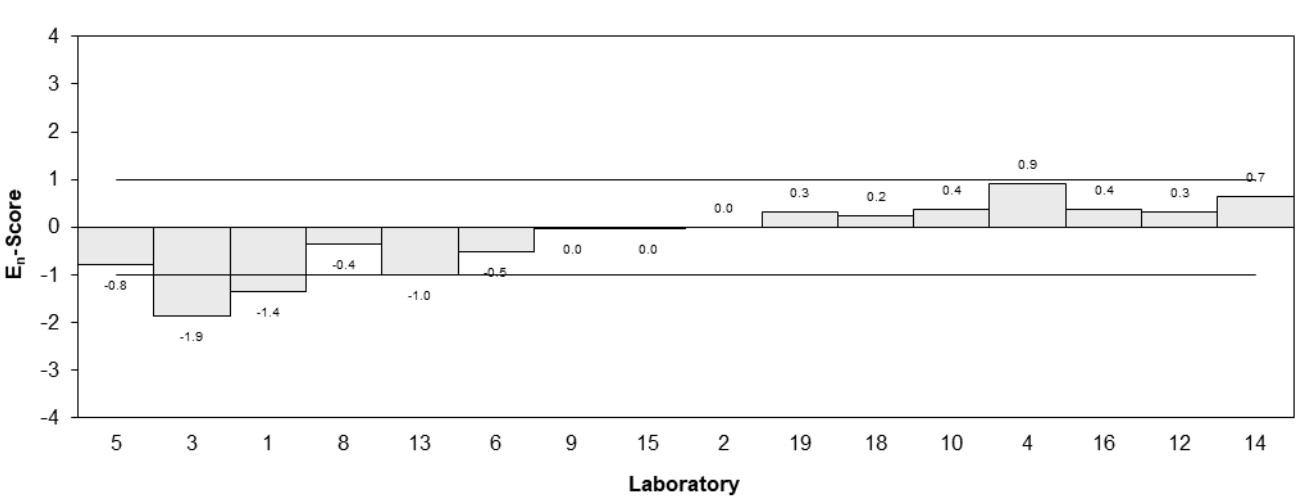

En-Scores: S1 - PFHxA
En-Score
-0.8 -1.9 -1.4 -0.4 -1.0 -0.5 0.0 0.0 0.0 0.3 0.2 0.4 0.9 0.4 0.3 0.7
Laboratory
5 3 1 8 13 6 9 15 2 19 18 10 4 16 12 14

Figure 4

Table 7

Sample Details

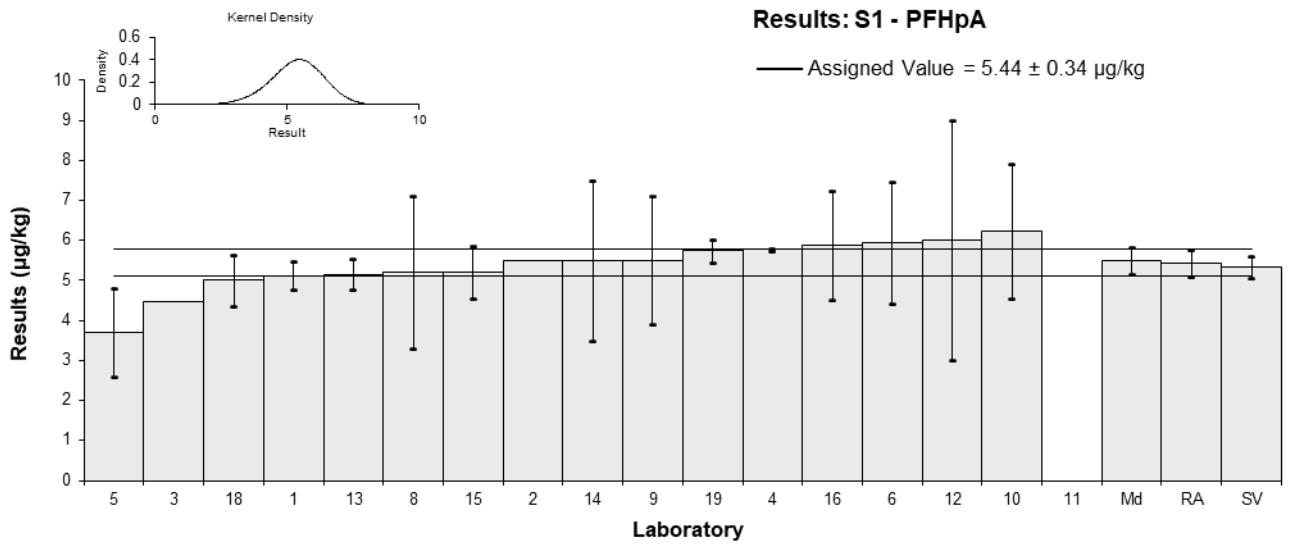
Sample No.	S1
Matrix	Fish paste
Analyte	PFHpA
Unit	µg/kg

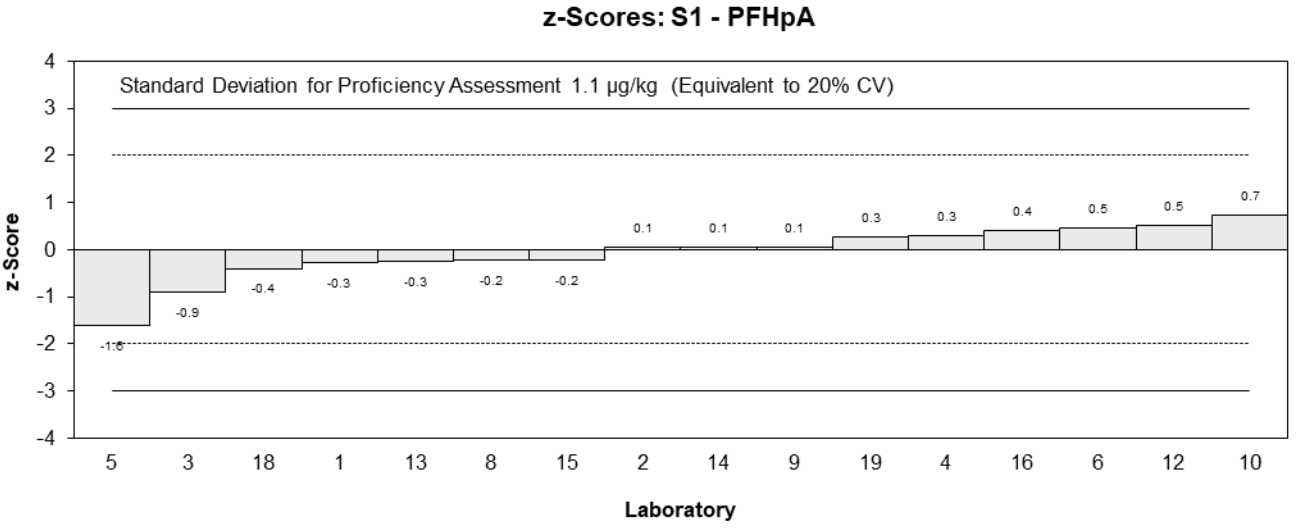
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	5.12	0.36	NR	-0.29	-0.65
2	5.5	NR	113	0.06	0.18
3	4.46	NR	NR	-0.90	-2.88
4	5.77	0.03	94	0.30	0.97
5	3.7	1.11	92	-1.60	-1.50
6	5.94	1.52	82	0.46	0.32
8	5.2	1.9	97	-0.22	-0.12
9	5.51	1.6	84	0.06	0.04
10	6.24	1.68	77.3	0.74	0.47
11	NT	NT	NT		
12	6	3	88	0.51	0.19
13	5.156	0.38	72	-0.26	-0.56
14	5.5	2.0	NT	0.06	0.03
15	5.2	0.66	NR	-0.22	-0.32
16	5.876	1.36	90	0.40	0.31
18	5.00	0.650	93.3	-0.40	-0.60
19	5.74	0.29	89	0.28	0.67

Statistics

Assigned Value	5.44	0.34
Spike Value	5.34	0.27
Robust Average	5.44	0.34
Median	5.50	0.33
Mean	5.37	
N	16	
Max	6.24	
Min	3.7	
Robust SD	0.54	
Robust CV	10%	


Kernel Density
Density
Result
Results: S1 - PFHpA
Assigned Value = 5.44 ± 0.34 µg/kg
Results (µg/kg)
Laboratory
5 3 18 1 13 8 15 2 14 9 19 4 16 6 12 10 11 Md RA SV


z-Scores: S1 - PFHpA
Standard Deviation for Proficiency Assessment 1.1 µg/kg (Equivalent to 20% CV)
z-Score
-1.6 -0.9 -0.4 -0.3 -0.3 -0.2 -0.2 0.1 0.1 0.1 0.3 0.3 0.4 0.5 0.5 0.7
Laboratory
5 3 18 1 13 8 15 2 14 9 19 4 16 6 12 10

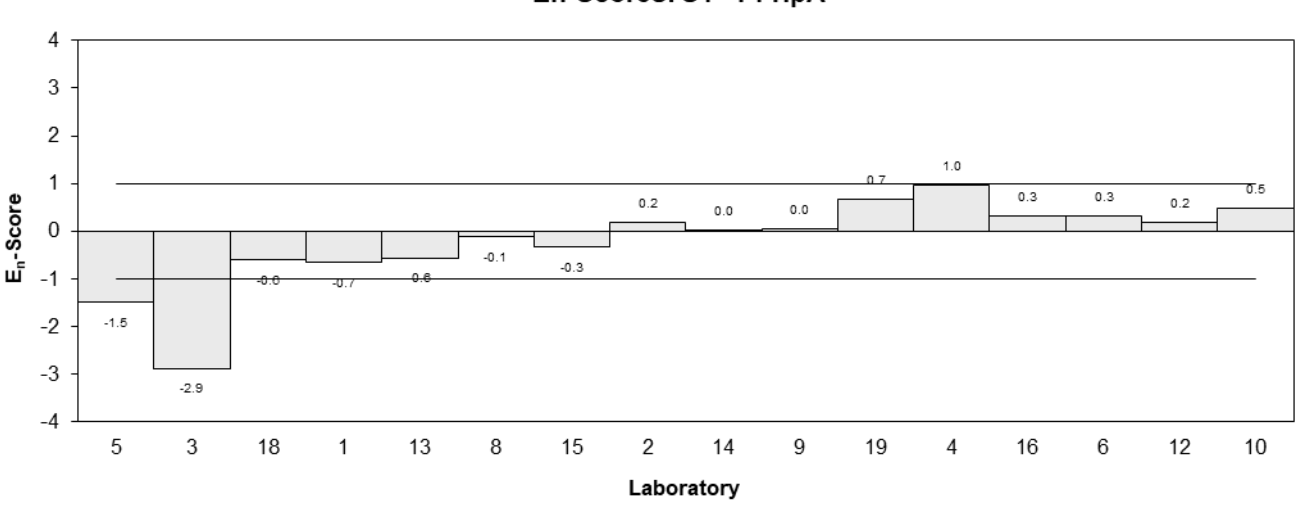

En-Scores: S1 - PFHpA
En-Score
-1.5 -2.9 -0.6 -0.7 -0.6 -0.1 -0.3 0.2 0.0 0.0 0.7 1.0 0.3 0.3 0.2 0.5
Laboratory
5 3 18 1 13 8 15 2 14 9 19 4 16 6 12 10

Figure 5

Table 8

Sample Details

Sample No.	S1
Matrix	Fish paste
Analyte	PFOA
Unit	µg/kg

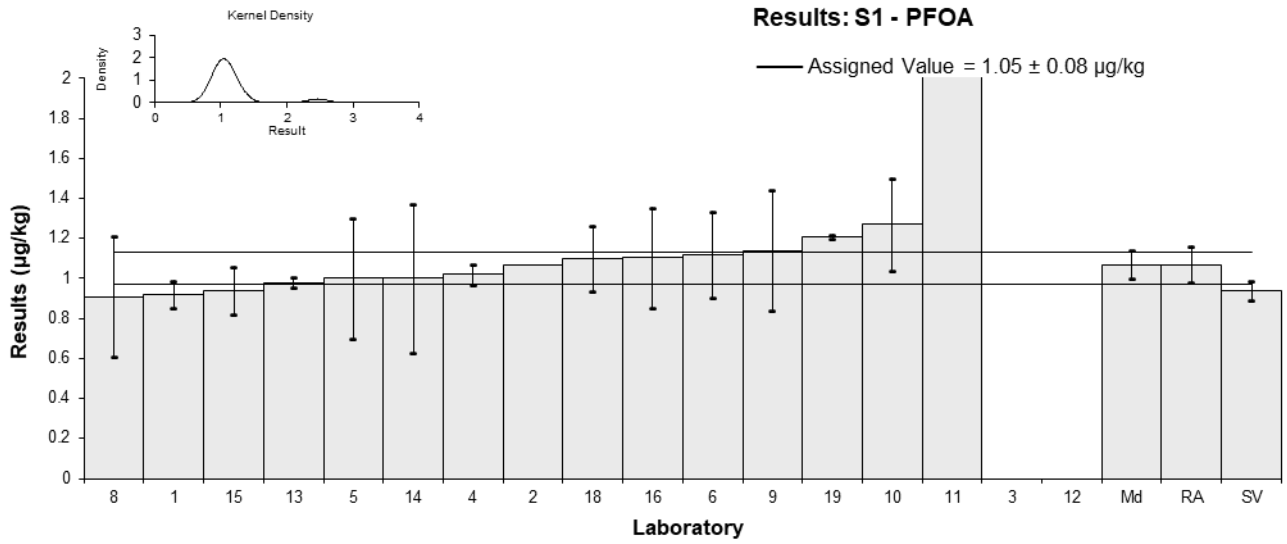
Participant Results

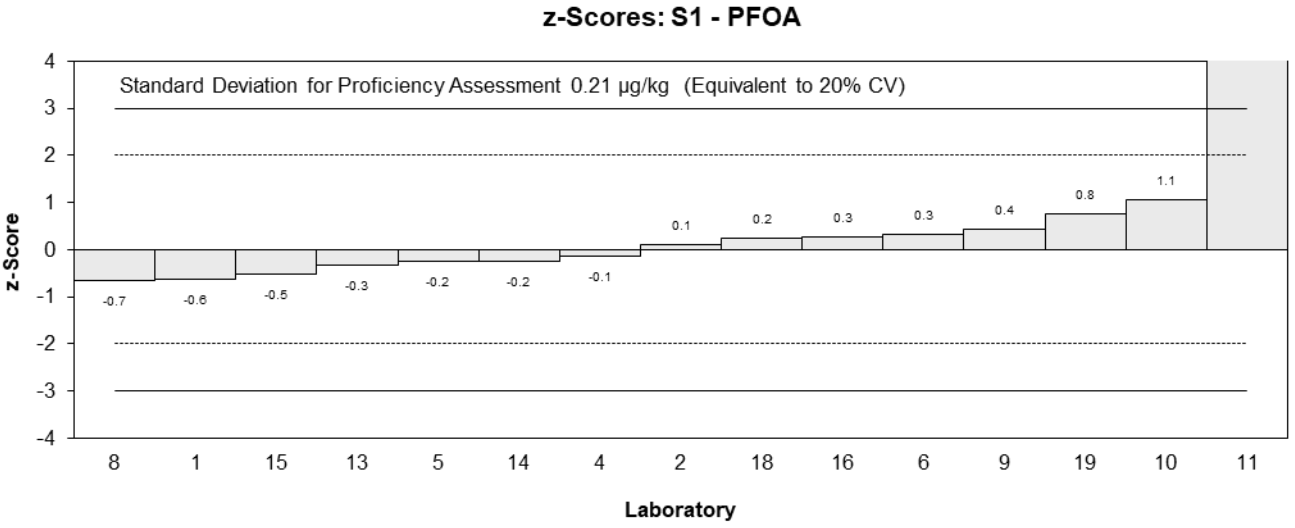
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.92	0.07	NR	-0.62	-1.22
2	1.07	NR	112	0.10	0.25
3	<1	NR	NR		
4	1.02	0.05	96	-0.14	-0.32
5	1.0	0.3	92	-0.24	-0.16
6	1.12	0.2143	80	0.33	0.31
8	0.91	0.30	94	-0.67	-0.45
9	1.14	0.3	81	0.43	0.29
10	1.27	0.231	82.9	1.05	0.90
11*	2.468	0.128	122	6.75	9.39
12	< 5	2.5	79		
13	0.98	0.025	79	-0.33	-0.84
14	1.0	0.37	NT	-0.24	-0.13
15	0.94	0.12	NR	-0.52	-0.76
16	1.104	0.25	92	0.26	0.21
18	1.10	0.165	93.3	0.24	0.27
19	1.21	0.01	79	0.76	1.98

* Outlier, see Section 4.2

Statistics

Assigned Value	1.05	0.08
Spike Value	0.938	0.047
Robust Average	1.07	0.09
Median	1.07	0.07
Mean	1.15	
N	15	
Max	2.468	
Min	0.91	
Robust SD	0.13	
Robust CV	12%	


Kernel Density
Density
Result
Results: S1 - PFOA
Assigned Value = 1.05 ± 0.08 µg/kg
Results (µg/kg)
Laboratory
8 1 15 13 5 14 4 2 18 16 6 9 19 10 11 3 12 Md RA SV


z-Scores: S1 - PFOA
Standard Deviation for Proficiency Assessment 0.21 µg/kg (Equivalent to 20% CV)
z-Score
-0.7 -0.6 -0.5 -0.3 -0.2 -0.2 -0.1 0.1 0.2 0.3 0.3 0.4 0.8 1.1
Laboratory
8 1 15 13 5 14 4 2 18 16 6 9 19 10 11

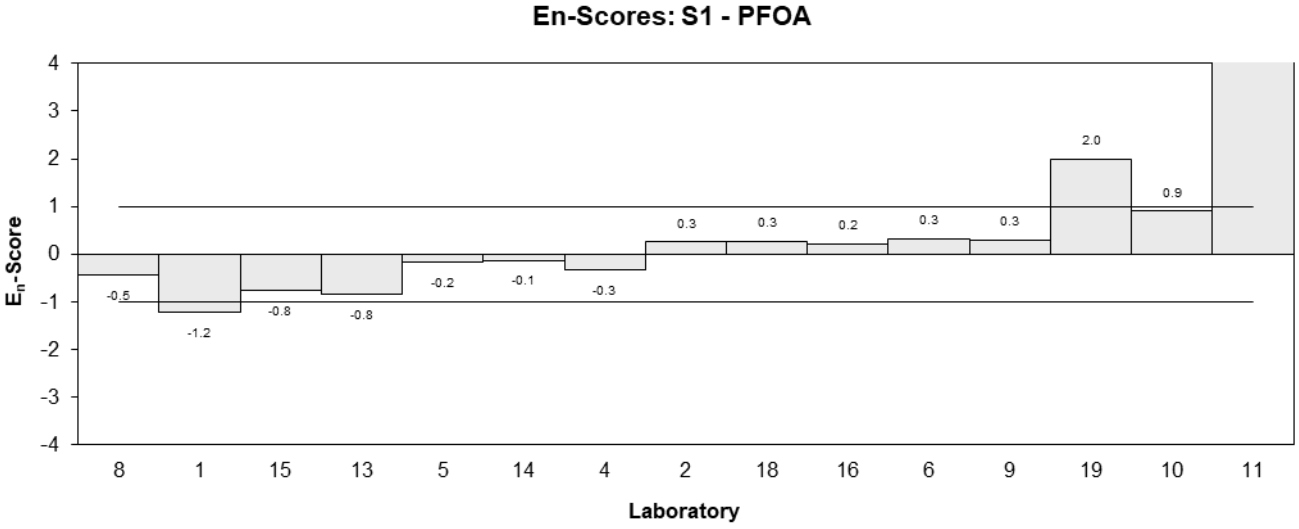

En-Scores: S1 - PFOA
En-Score
-0.5 -1.2 -0.8 -0.8 -0.2 -0.1 -0.3 0.3 0.3 0.2 0.3 0.3 2.0 0.9
Laboratory
8 1 15 13 5 14 4 2 18 16 6 9 19 10 11

Figure 6

Table 9

Sample Details

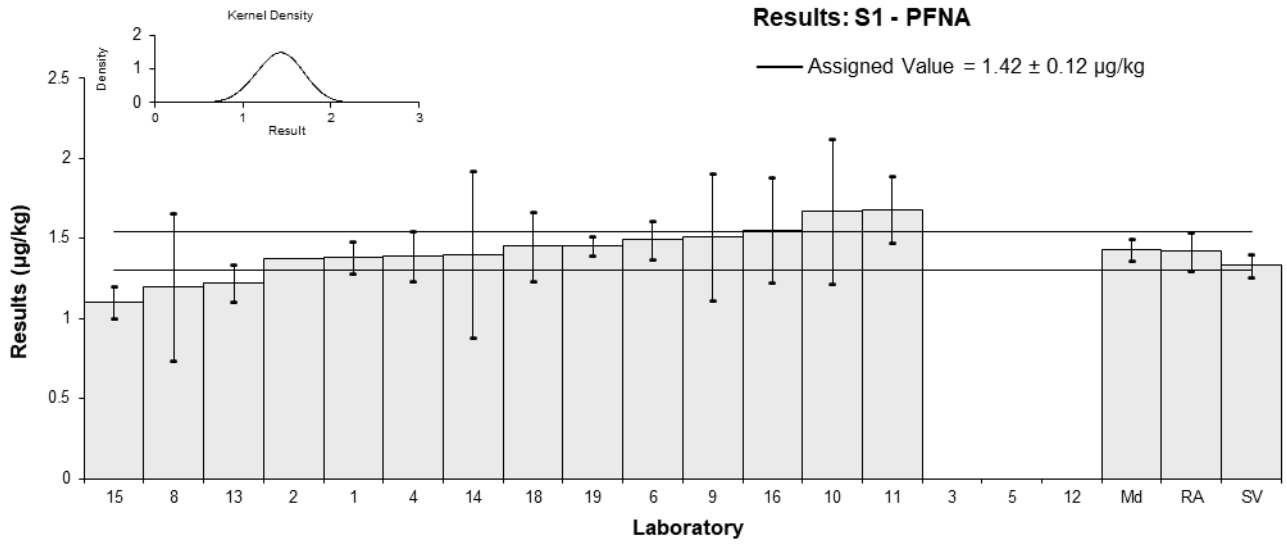
Sample No.	S1
Matrix	Fish paste
Analyte	PFNA
Unit	µg/kg

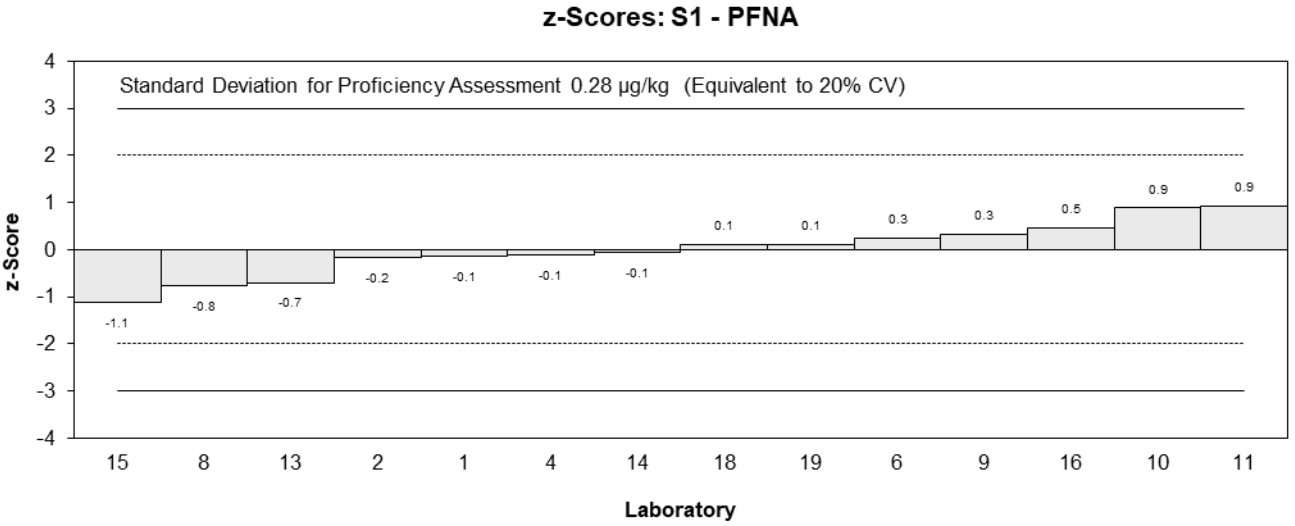
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	1.38	0.1	NR	-0.14	-0.26
2	1.37	NR	117	-0.18	-0.42
3	<1	NR	NR		
4	1.39	0.16	90	-0.11	-0.15
5	<0.001	NR	NR		
6	1.49	0.1178	73	0.25	0.42
8	1.2	0.46	96	-0.77	-0.46
9	1.51	0.4	86	0.32	0.22
10	1.67	0.452	82.9	0.88	0.53
11	1.68	0.209	118	0.92	1.08
12	< 2	1	111		
13	1.22	0.115	79	-0.70	-1.20
14	1.4	0.52	NT	-0.07	-0.04
15	1.1	0.10	NR	-1.13	-2.05
16	1.554	0.33	96	0.47	0.38
18	1.45	0.217	93.3	0.11	0.12
19	1.45	0.06	79	0.11	0.22

Statistics

Assigned Value	1.42	0.12
Spike Value	1.33	0.07
Robust Average	1.42	0.12
Median	1.43	0.07
Mean	1.42	
N	14	
Max	1.68	
Min	1.1	
Robust SD	0.18	
Robust CV	13%	


Kernel Density
Density
Result
Results: S1 - PFNA
Assigned Value = 1.42 ± 0.12 µg/kg
Results (µg/kg)
15 8 13 2 1 4 14 18 19 6 9 16 10 11 3 5 12 Md RA SV
Laboratory


z-Scores: S1 - PFNA
Standard Deviation for Proficiency Assessment 0.28 µg/kg (Equivalent to 20% CV)
z-Score
-1.1 -0.8 -0.7 -0.2 -0.1 -0.1 -0.1 0.1 0.1 0.3 0.3 0.5 0.9 0.9
15 8 13 2 1 4 14 18 19 6 9 16 10 11
Laboratory

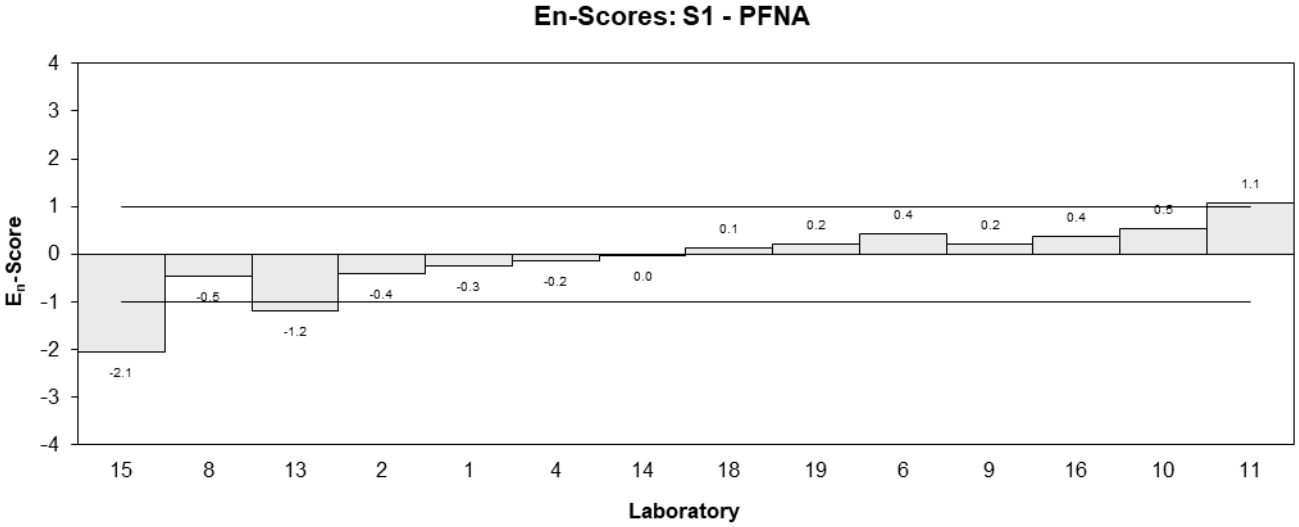

En-Scores: S1 - PFNA
En-Score
-2.1 -0.5 -1.2 -0.4 -0.3 -0.2 0.0 0.1 0.2 0.4 0.2 0.4 0.5 1.1
15 8 13 2 1 4 14 18 19 6 9 16 10 11
Laboratory

Figure 7

Table 10

Sample Details

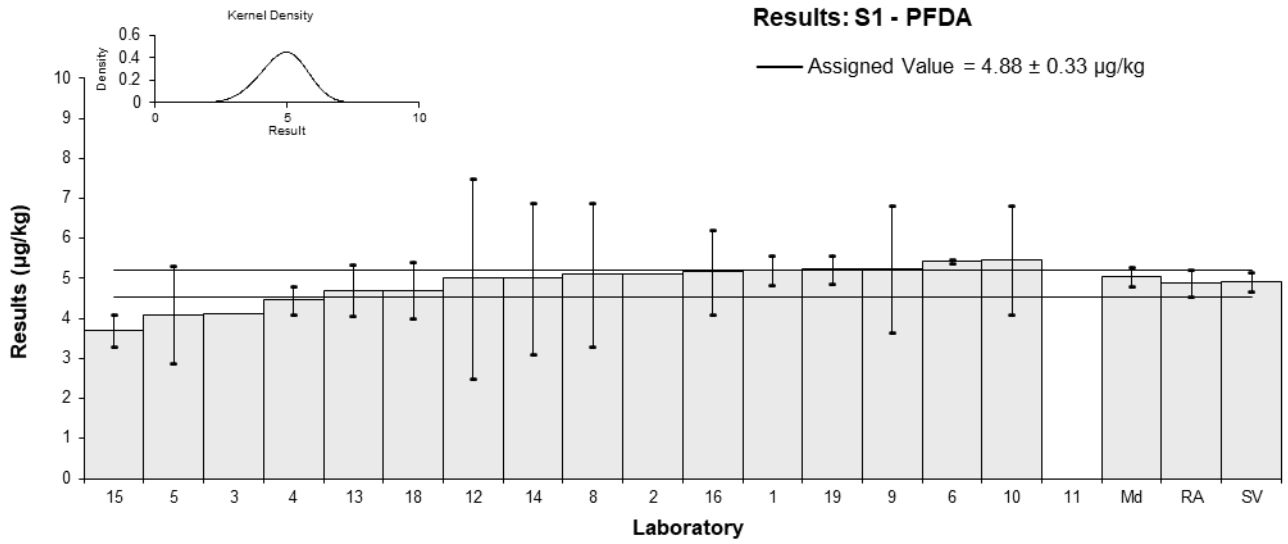
Sample No.	S1
Matrix	Fish paste
Analyte	PFDA
Unit	µg/kg

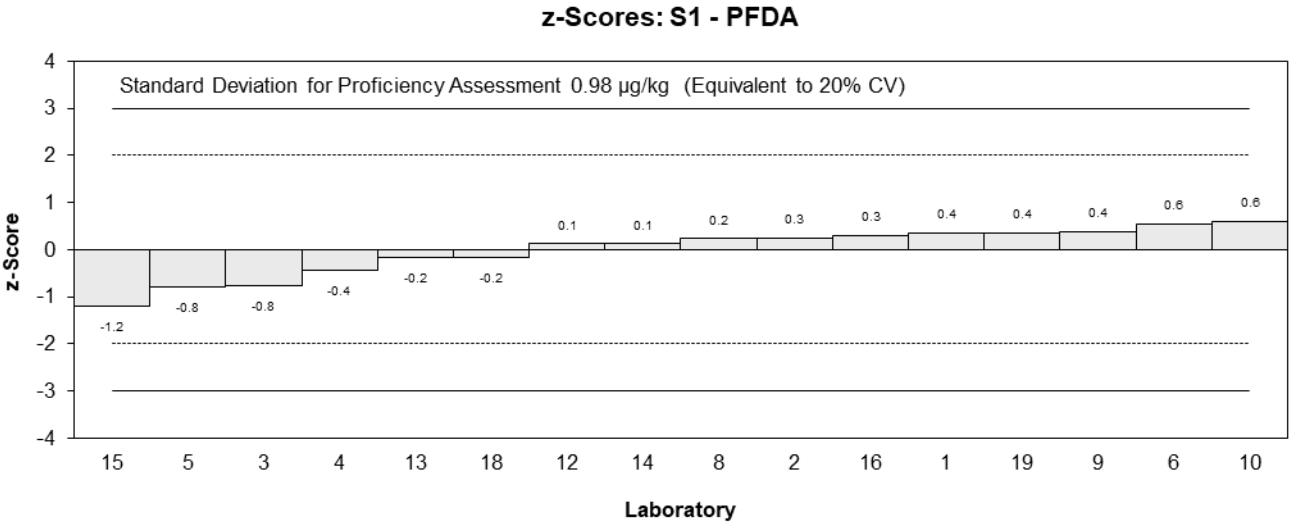
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	5.22	0.37	NR	0.35	0.69
2	5.12	NR	109	0.25	0.73
3	4.12	NR	NR	-0.78	-2.30
4	4.46	0.36	98	-0.43	-0.86
5	4.1	1.23	95	-0.80	-0.61
6	5.42	0.0529	41	0.55	1.62
8	5.1	1.8	92	0.23	0.12
9	5.24	1.6	90	0.37	0.22
10	5.47	1.36	62.9	0.60	0.42
11	NT	NT	NT		
12	5	2.5	58	0.12	0.05
13	4.704	0.65	79	-0.18	-0.24
14	5.0	1.9	NT	0.12	0.06
15	3.7	0.41	NR	-1.21	-2.24
16	5.164	1.05	102	0.29	0.26
18	4.71	0.707	88.6	-0.17	-0.22
19	5.23	0.35	59	0.36	0.73

Statistics

Assigned Value	4.88	0.33
Spike Value	4.92	0.25
Robust Average	4.88	0.33
Median	5.05	0.25
Mean	4.86	
N	16	
Max	5.47	
Min	3.7	
Robust SD	0.53	
Robust CV	11%	


Kernel Density
Density
Result
Results: S1 - PFDA
Assigned Value = 4.88 ± 0.33 µg/kg
Results (µg/kg)
15 5 3 4 13 18 12 14 8 2 16 1 19 9 6 10 11 Md RA SV
Laboratory


z-Scores: S1 - PFDA
Standard Deviation for Proficiency Assessment 0.98 µg/kg (Equivalent to 20% CV)
z-Score
-1.2 -0.8 -0.8 -0.4 -0.2 -0.2 0.1 0.1 0.2 0.3 0.3 0.4 0.4 0.4 0.6 0.6
15 5 3 4 13 18 12 14 8 2 16 1 19 9 6 10
Laboratory

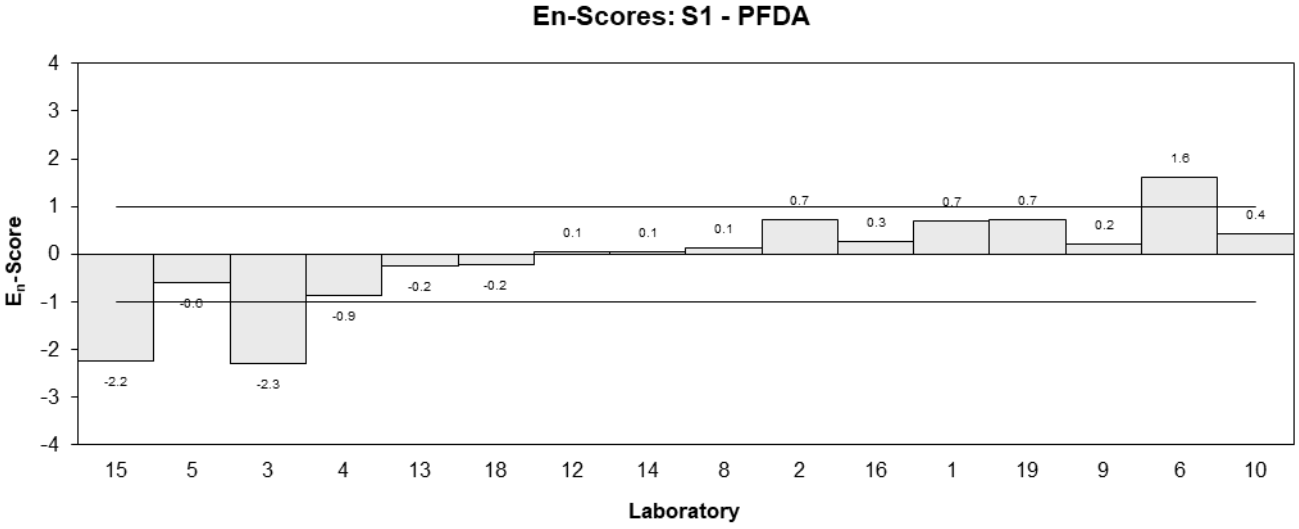

En-Scores: S1 - PFDA
En-Score
-2.2 -0.6 -2.3 -0.9 -0.2 -0.2 0.1 0.1 0.1 0.7 0.3 0.7 0.7 0.2 1.6 0.4
15 5 3 4 13 18 12 14 8 2 16 1 19 9 6 10
Laboratory

Figure 8

Table 11

Sample Details

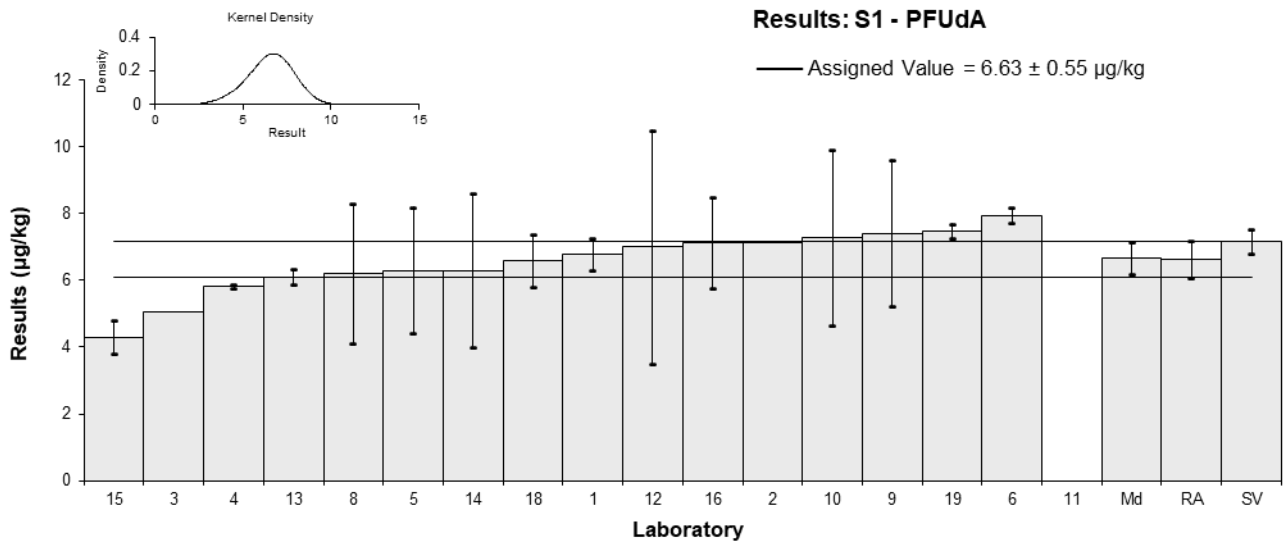
Sample No.	S1
Matrix	Fish paste
Analyte	PFUdA
Unit	µg/kg

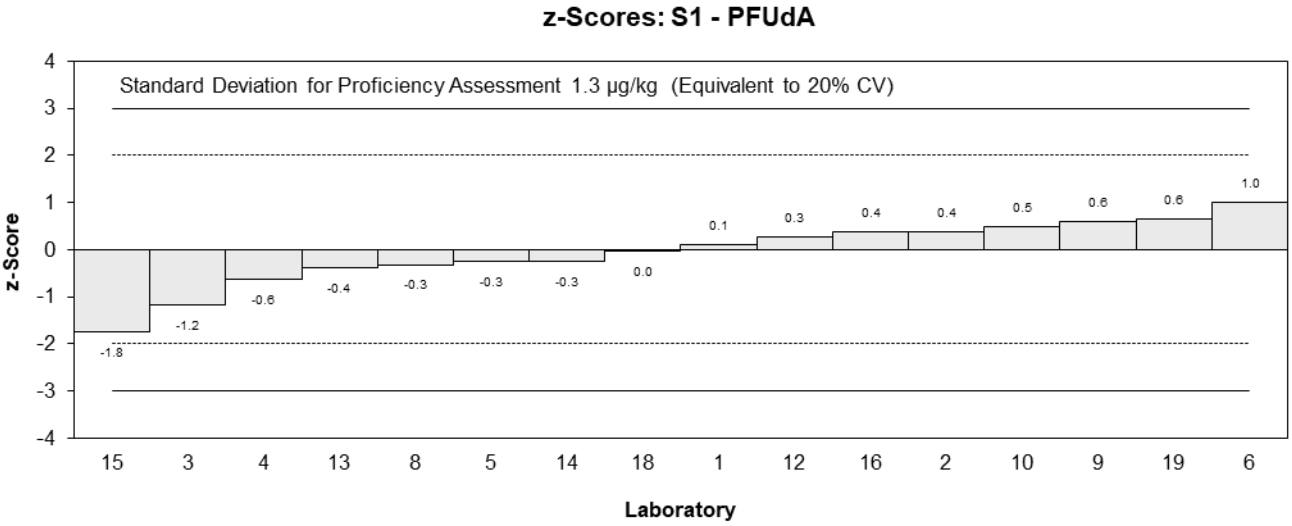
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	6.78	0.48	NR	0.11	0.21
2	7.13	NR	92	0.38	0.91
3	5.07	NR	NR	-1.18	-2.84
4	5.81	0.06	92	-0.62	-1.48
5	6.3	1.89	100	-0.25	-0.17
6	7.95	0.238	17	1.00	2.20
8	6.2	2.1	102	-0.32	-0.20
9	7.42	2.2	80	0.60	0.35
10	7.28	2.63	68.4	0.49	0.24
11	NT	NT	NT		
12	7	3.5	60	0.28	0.10
13	6.107	0.233	79	-0.39	-0.88
14	6.3	2.3	NT	-0.25	-0.14
15	4.3	0.49	NR	-1.76	-3.16
16	7.124	1.36	96	0.37	0.34
18	6.58	0.790	88.6	-0.04	-0.05
19	7.48	0.22	55	0.64	1.43

Statistics

Assigned Value	6.63	0.55
Spike Value	7.16	0.36
Robust Average	6.63	0.55
Median	6.68	0.49
Mean	6.55	
N	16	
Max	7.95	
Min	4.3	
Robust SD	0.88	
Robust CV	13%	


Kernel Density
Density
Result
Results: S1 - PFUdA
Assigned Value = 6.63 ± 0.55 µg/kg
Results (µg/kg)
Laboratory
15 3 4 13 8 5 14 18 1 12 16 2 10 9 19 6 11 Md RA SV


z-Scores: S1 - PFUdA
Standard Deviation for Proficiency Assessment 1.3 µg/kg (Equivalent to 20% CV)
z-Score
-1.8 -1.2 -0.6 -0.4 -0.3 -0.3 -0.3 0.0 0.1 0.3 0.4 0.4 0.5 0.6 0.6 1.0
Laboratory
15 3 4 13 8 5 14 18 1 12 16 2 10 9 19 6

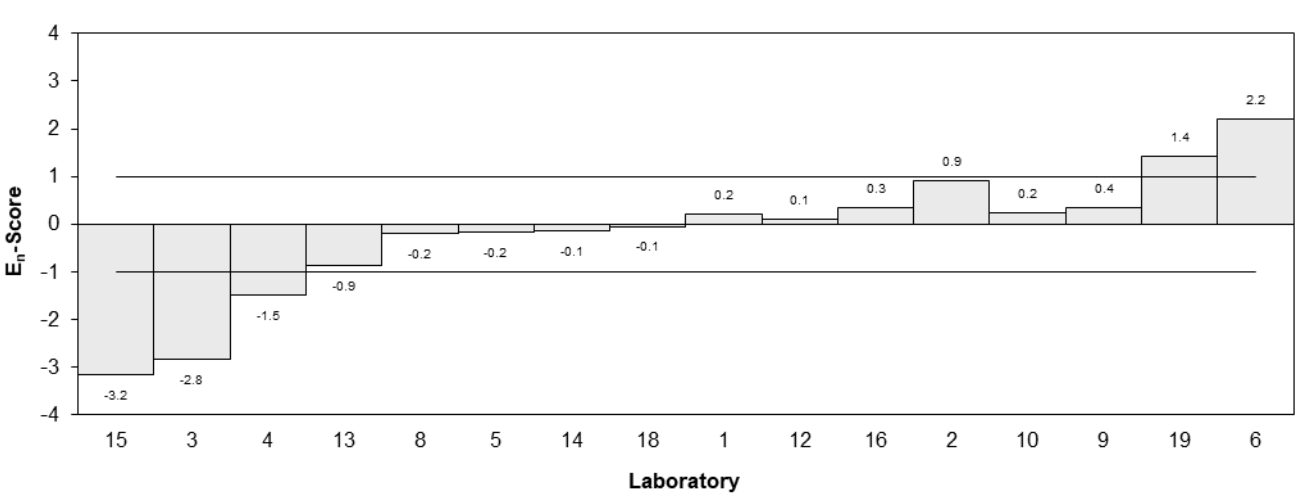

En-Scores: S1 - PFUdA
En-Score
-3.2 -2.8 -1.5 -0.9 -0.2 -0.2 -0.1 -0.1 0.2 0.1 0.3 0.9 0.2 0.4 1.4 2.2
Laboratory
15 3 4 13 8 5 14 18 1 12 16 2 10 9 19 6

Figure 9

Table 12

Sample Details

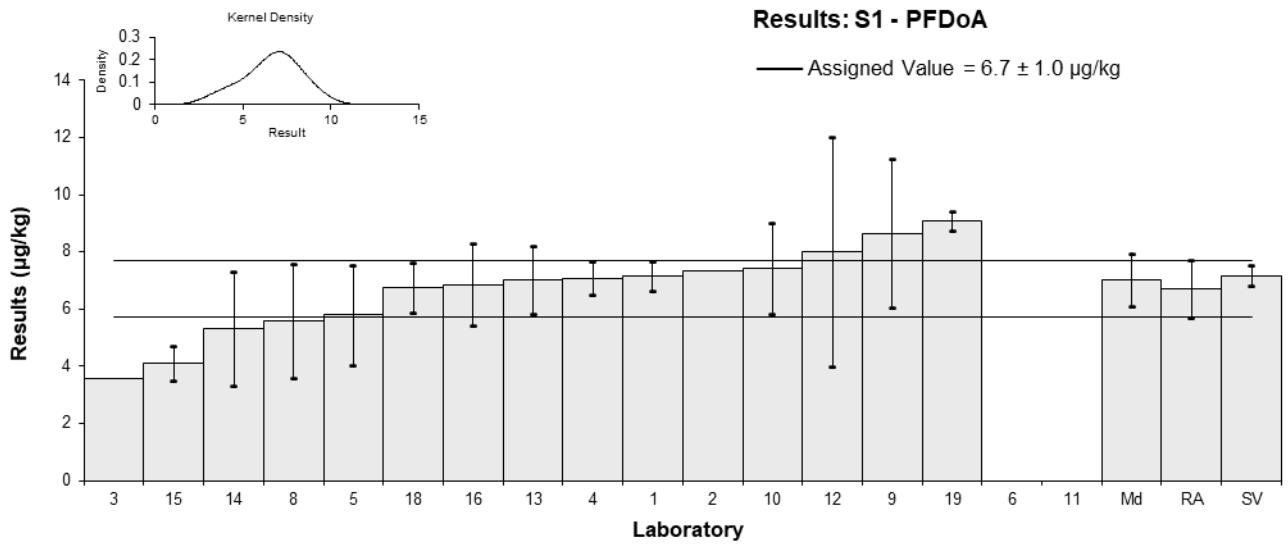
Sample No.	S1
Matrix	Fish paste
Analyte	PFDoA
Unit	µg/kg

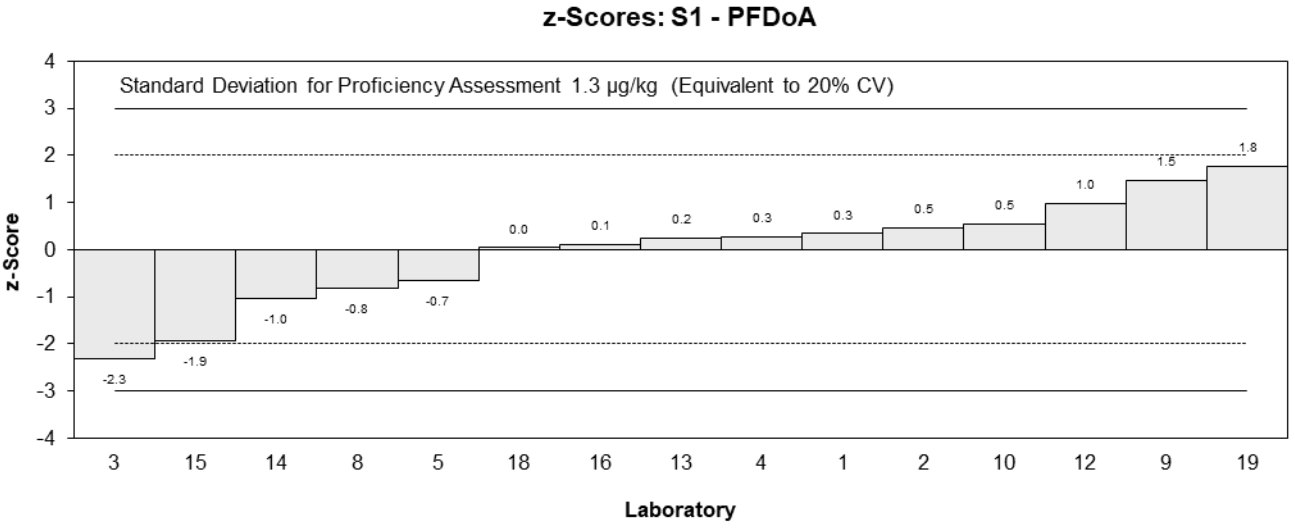
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	7.16	0.51	NR	0.34	0.41
2	7.33	NR	66	0.47	0.63
3	3.58	NR	NR	-2.33	-3.12
4	7.08	0.59	95	0.28	0.33
5	5.8	1.74	98	-0.67	-0.45
6	NR	NR	NR		
8	5.6	2.0	87	-0.82	-0.49
9	8.65	2.6	65	1.46	0.70
10	7.42	1.6	83.8	0.54	0.38
11	NT	NT	NT		
12	8	4	98	0.97	0.32
13	7.022	1.171	64	0.24	0.21
14	5.3	2.0	NT	-1.04	-0.63
15	4.1	0.59	NR	-1.94	-2.24
16	6.848	1.44	97	0.11	0.08
18	6.75	0.877	88.8	0.04	0.04
19	9.07	0.33	56	1.77	2.25

Statistics

Assigned Value	6.7	1.0
Spike Value	7.16	0.36
Robust Average	6.7	1.0
Median	7.02	0.94
Mean	6.65	
N	15	
Max	9.07	
Min	3.58	
Robust SD	1.6	
Robust CV	24%	


Kernel Density
Density
Result
Results: S1 - PFDoA
Assigned Value = 6.7 ± 1.0 µg/kg
Results (µg/kg)
Laboratory
3 15 14 8 5 18 16 13 4 1 2 10 12 9 19 6 11 Md RA SV


z-Scores: S1 - PFDoA
Standard Deviation for Proficiency Assessment 1.3 µg/kg (Equivalent to 20% CV)
z-Score
-2.3 -1.9 -1.0 -0.8 -0.7 0.0 0.1 0.2 0.3 0.3 0.5 0.5 1.0 1.5 1.8
Laboratory
3 15 14 8 5 18 16 13 4 1 2 10 12 9 19

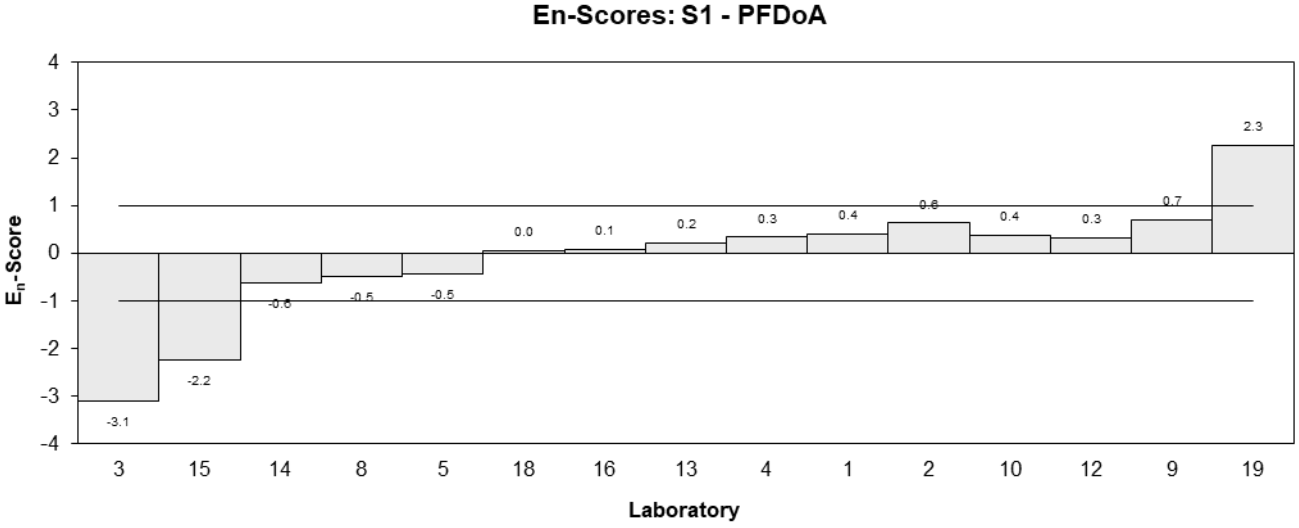

En-Scores: S1 - PFDoA
En-Score
-3.1 -2.2 -0.6 -0.5 -0.5 0.0 0.1 0.2 0.3 0.4 0.6 0.4 0.3 0.7 2.3
Laboratory
3 15 14 8 5 18 16 13 4 1 2 10 12 9 19

Figure 10

Table 13

Sample Details

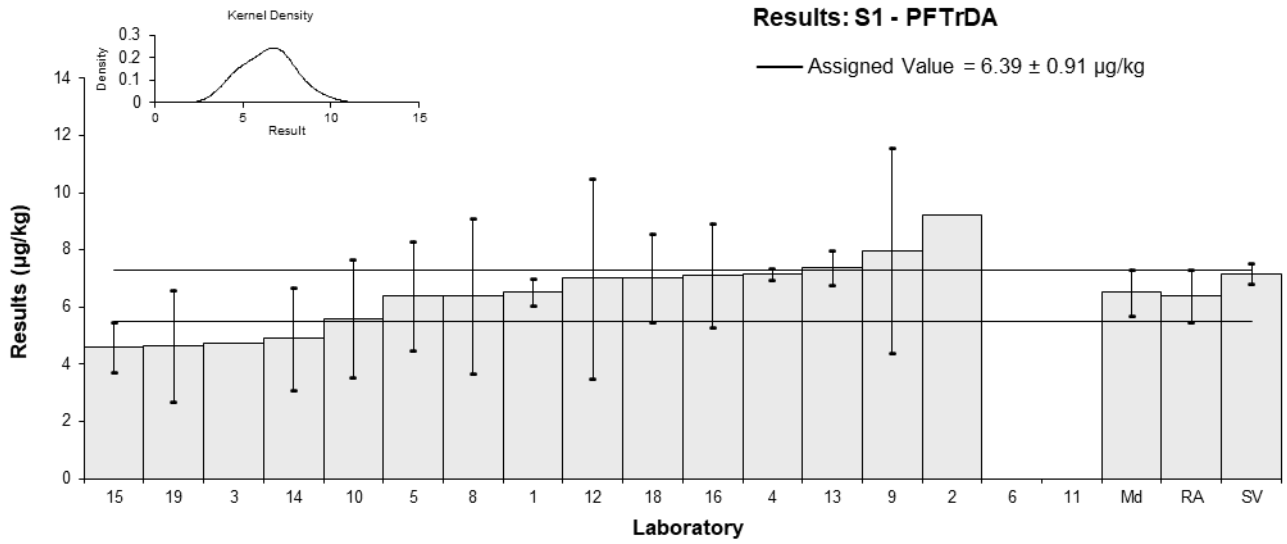
Sample No.	S1
Matrix	Fish paste
Analyte	PFTrDA
Unit	µg/kg

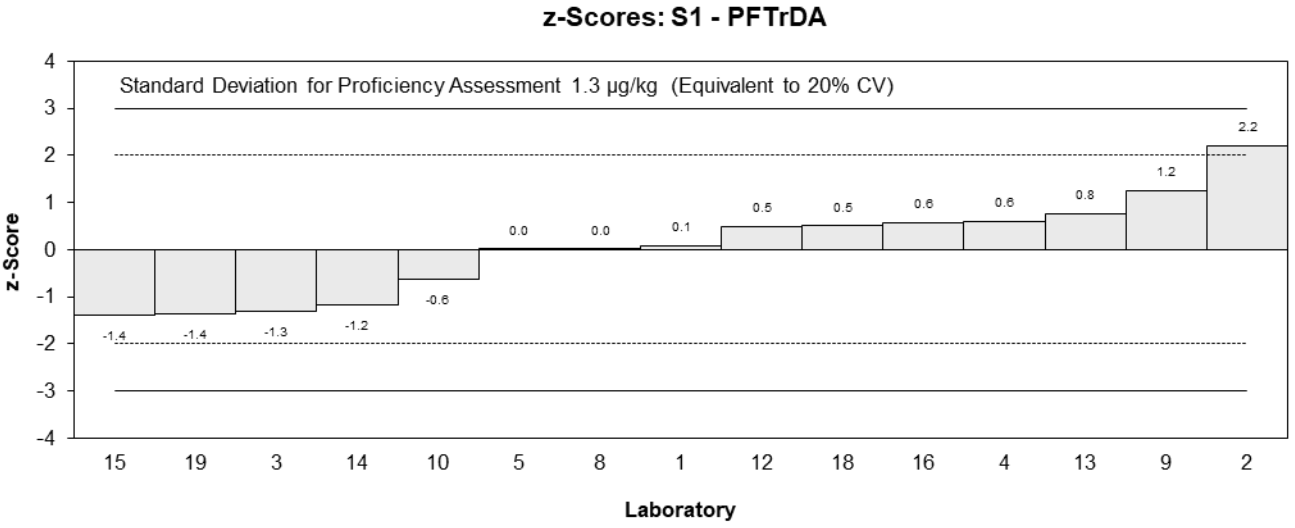
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	6.51	0.47	NR	0.09	0.12
2	9.21	NR	43	2.21	3.10
3	4.72	NR	NR	-1.31	-1.84
4	7.14	0.2	95	0.59	0.80
5	6.4	1.92	96	0.01	0.00
6	NR	NR	NR		
8	6.4	2.7	75	0.01	0.00
9	7.98	3.6	NR	1.24	0.43
10	5.6	2.06	121.3	-0.62	-0.35
11	NT	NT	NT		
12	7	3.5	NR	0.48	0.17
13	7.364	0.602	64	0.76	0.89
14	4.9	1.8	NT	-1.17	-0.74
15	4.6	0.86	NR	-1.40	-1.43
16	7.112	1.83	97	0.56	0.35
18	7.03	1.55	92.1	0.50	0.36
19	4.64	1.97	56	-1.37	-0.81

Statistics

Assigned Value	6.39	0.91
Spike Value	7.16	0.36
Robust Average	6.39	0.91
Median	6.51	0.82
Mean	6.44	
N	15	
Max	9.21	
Min	4.6	
Robust SD	1.4	
Robust CV	22%	


Kernel Density
Density
Result
Results: S1 - PFTrDA
Assigned Value = 6.39 ± 0.91 µg/kg
Results (µg/kg)
Laboratory
15 19 3 14 10 5 8 1 12 18 16 4 13 9 2 6 11 Md RA SV


z-Scores: S1 - PFTrDA
Standard Deviation for Proficiency Assessment 1.3 µg/kg (Equivalent to 20% CV)
z-Score
-1.4 -1.4 -1.3 -1.2 -0.6 0.0 0.0 0.1 0.5 0.5 0.6 0.6 0.8 1.2 2.2
Laboratory
15 19 3 14 10 5 8 1 12 18 16 4 13 9 2

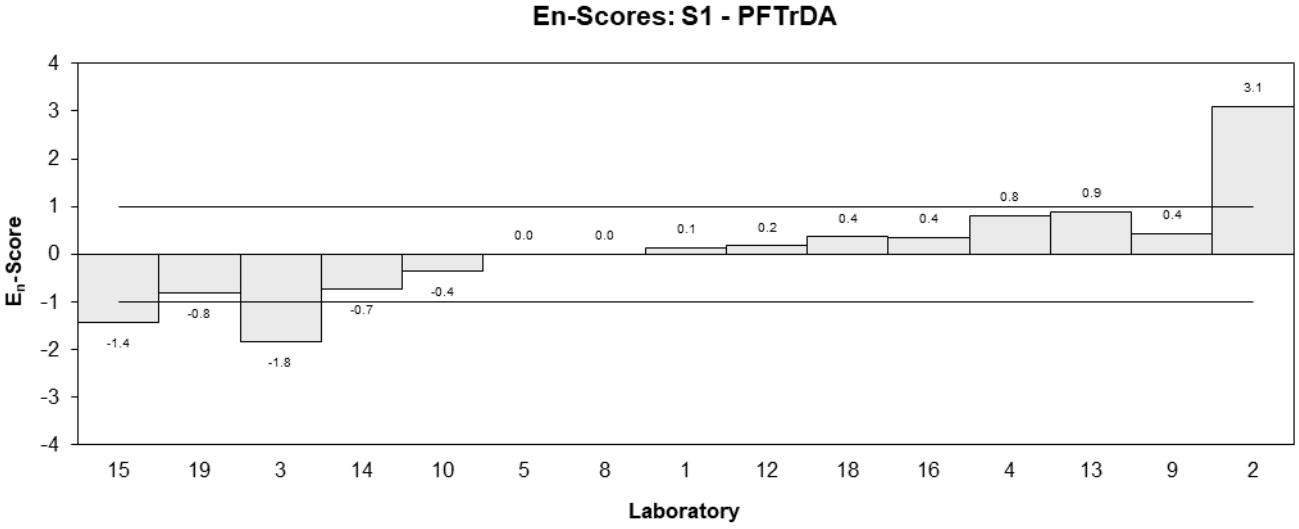

En-Scores: S1 - PFTrDA
En-Score
-1.4 -0.8 -1.8 -0.7 -0.4 0.0 0.0 0.1 0.2 0.4 0.4 0.8 0.9 0.4 3.1
Laboratory
15 19 3 14 10 5 8 1 12 18 16 4 13 9 2

Figure 11

Table 14

Sample Details

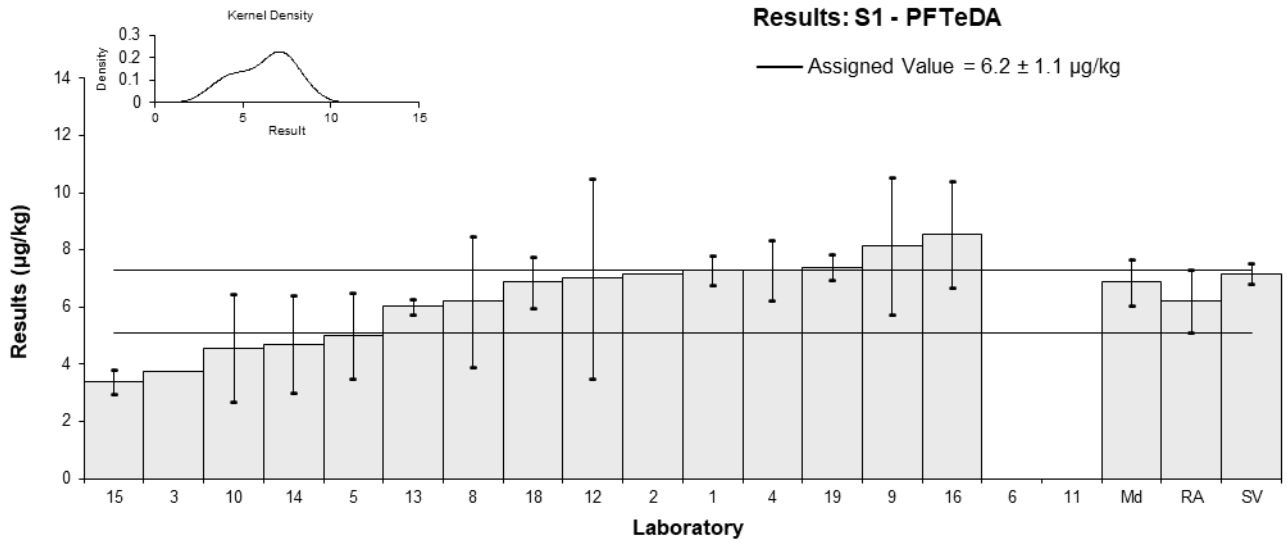
Sample No.	S1
Matrix	Fish paste
Analyte	PFTeDA
Unit	µg/kg

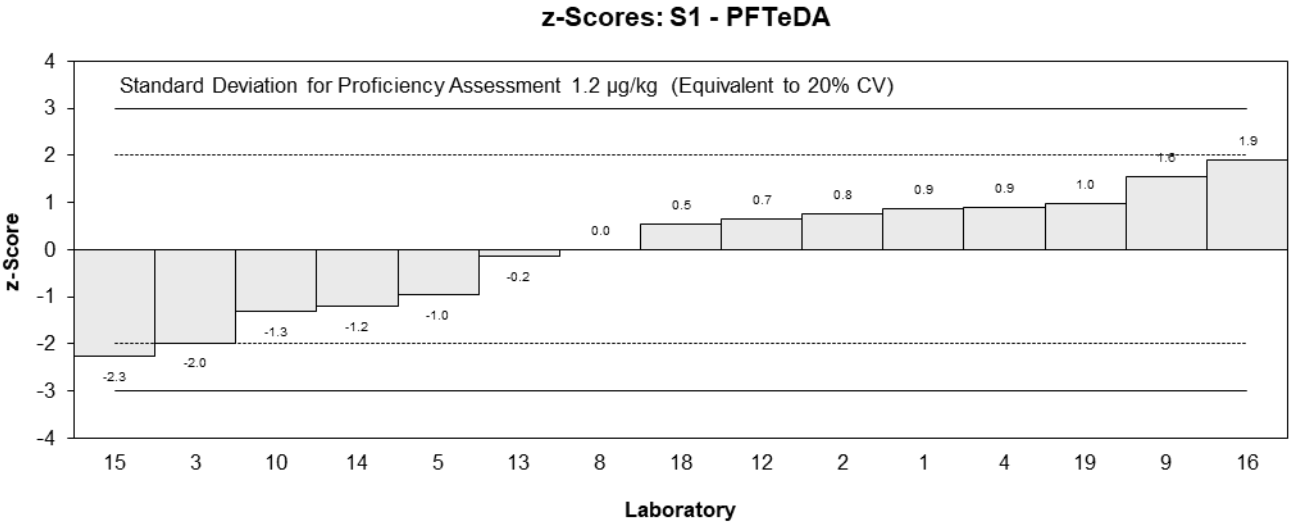
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	7.28	0.52	NR	0.87	0.89
2	7.14	NR	43	0.76	0.85
3	3.75	NR	NR	-1.98	-2.23
4	7.3	1.06	100	0.89	0.72
5	5.0	1.5	81	-0.97	-0.65
6	NR	NR	NR		
8	6.2	2.3	75	0.00	0.00
9	8.13	2.4	54	1.56	0.73
10	4.56	1.89	121.3	-1.32	-0.75
11	NT	NT	NT		
12	7	3.5	99	0.65	0.22
13	6.017	0.269	54	-0.15	-0.16
14	4.7	1.7	NT	-1.21	-0.74
15	3.4	0.43	NR	-2.26	-2.37
16	8.558	1.86	97	1.90	1.09
18	6.87	0.893	92.1	0.54	0.47
19	7.4	0.46	56	0.97	1.01

Statistics

Assigned Value	6.2	1.1
Spike Value	7.16	0.36
Robust Average	6.2	1.1
Median	6.87	0.82
Mean	6.22	
N	15	
Max	8.558	
Min	3.4	
Robust SD	1.8	
Robust CV	29%	


Kernel Density
Density
Result
Results: S1 - PFTeDA
Assigned Value = 6.2 ± 1.1 µg/kg
Results (µg/kg)
Laboratory
15 3 10 14 5 13 8 18 12 2 1 4 19 9 16 6 11 Md RA SV


z-Scores: S1 - PFTeDA
Standard Deviation for Proficiency Assessment 1.2 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
15 3 10 14 5 13 8 18 12 2 1 4 19 9 16
-2.3 -2.0 -1.3 -1.2 -1.0 -0.2 0.0 0.5 0.7 0.8 0.9 0.9 1.0 1.6 1.9

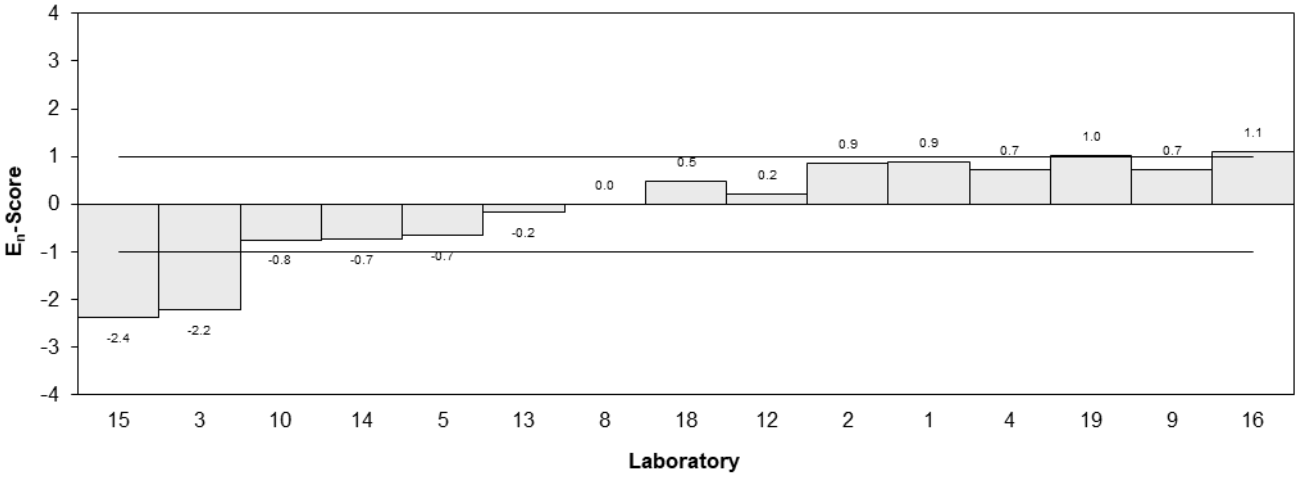

En-Scores: S1 - PFTeDA
En-Score
Laboratory
15 3 10 14 5 13 8 18 12 2 1 4 19 9 16
-2.4 -2.2 -0.8 -0.7 -0.7 -0.2 0.0 0.5 0.2 0.9 0.9 0.7 1.0 0.7 1.1

Figure 12

Table 15

Sample Details

Sample No.	S1
Matrix	Fish paste
Analyte	PFODA
Unit	µg/kg

Participant Results

Lab. Code	Result	Uncertainty	Rec
1	NT	NT	NT
2	NT	NT	NT
3	10.9	NR	NR
4	NT	NT	NT
5	21	6.3	97
6	NT	NT	NT
8	NT	NT	NT
9	NT	NT	NT
10	20	10.6	121.3
11	NT	NT	NT
12	NT	NT	NT
13	NT	NT	NT
14	12	4.4	NT
15	NT	NT	NT
16	NT	NT	NT
18	NT	NT	NT
19	< 0.039	NR	NR

Statistics

Assigned Value	Not Set	
Spike Value	17.9	0.9
Robust Average	NA (N<6)	
Median	16.0	8.3
Mean	16.0	
N	4	
Max	21	
Min	10.9	
Robust SD	NA (N<6)	
Robust CV	NA (N<6)	

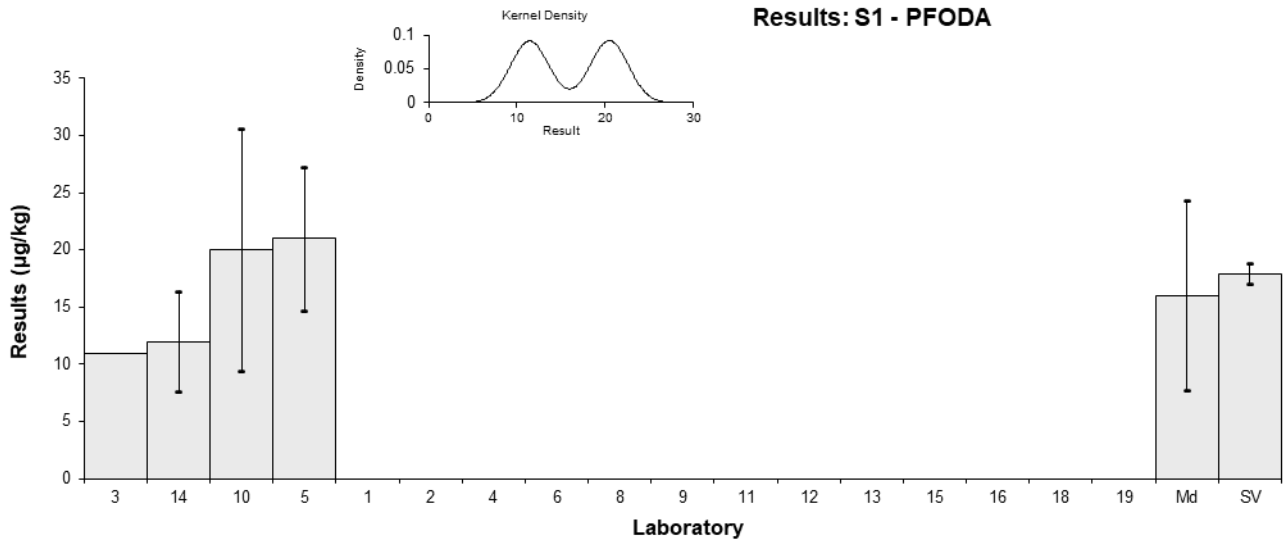

Results: S1 - PFODA
Kernel Density
Density
0.1
0.05
0
0
10
20
30
Result
Results (µg/kg)
35
30
25
20
15
10
5
0
3
14
10
5
1
2
4
6
8
9
11
12
13
15
16
18
19
Md
SV
Laboratory

Figure 13

Table 16

Sample Details

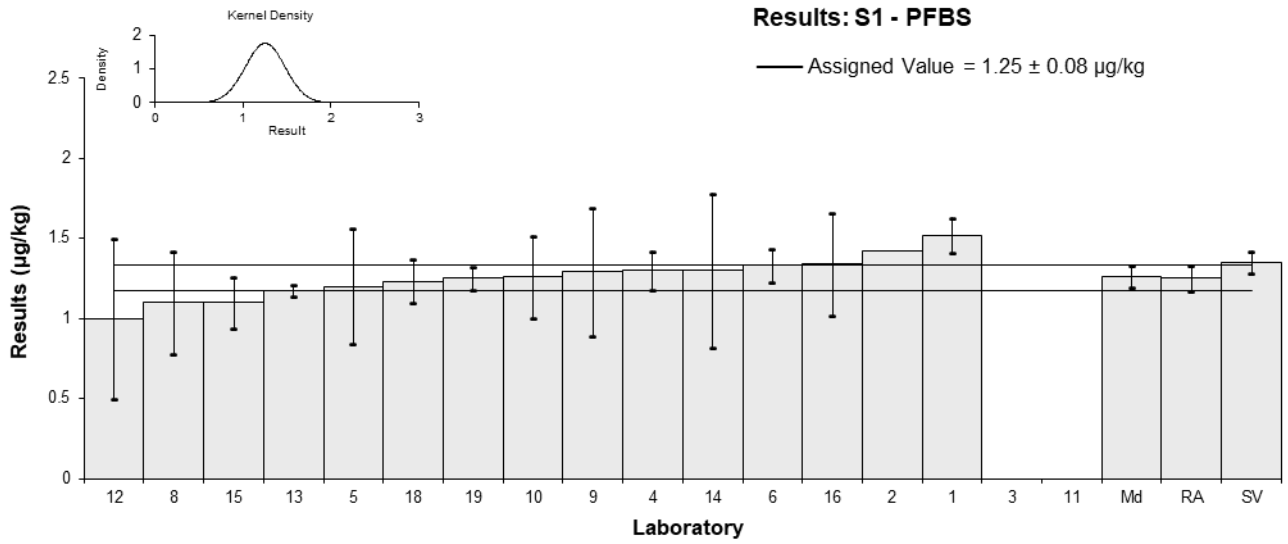
Sample No.	S1
Matrix	Fish paste
Analyte	PFBS
Unit	µg/kg

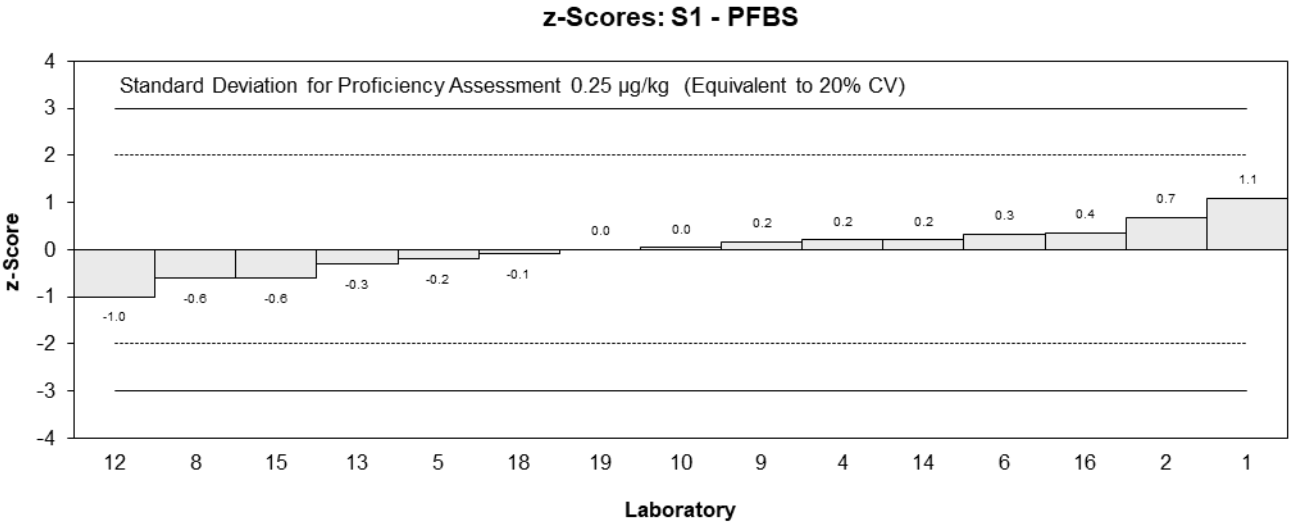
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	1.52	0.11	NR	1.08	1.99
2	1.42	NR	125	0.68	2.12
3	<1	NR	NR		
4	1.3	0.12	102	0.20	0.35
5	1.2	0.36	109	-0.20	-0.14
6	1.33	0.102	85	0.32	0.62
8	1.1	0.32	103	-0.60	-0.45
9	1.29	0.4	88	0.16	0.10
10	1.26	0.256	94.3	0.04	0.04
11	NT	NT	NT		
12	1	0.5	92	-1.00	-0.49
13	1.174	0.033	88	-0.30	-0.88
14	1.3	0.48	NT	0.20	0.10
15	1.1	0.16	NR	-0.60	-0.84
16	1.338	0.32	87	0.35	0.27
18	1.23	0.136	112.7	-0.08	-0.13
19	1.25	0.07	109	0.00	0.00

Statistics

Assigned Value	1.25	0.08
Spike Value	1.35	0.07
Robust Average	1.25	0.08
Median	1.26	0.07
Mean	1.25	
N	15	
Max	1.52	
Min	1	
Robust SD	0.13	
Robust CV	10%	


Kernel Density
Density
Result
Results: S1 - PFBS
Assigned Value = 1.25 ± 0.08 µg/kg
Results (µg/kg)
12 8 15 13 5 18 19 10 9 4 14 6 16 2 1 3 11 Md RA SV
Laboratory


z-Scores: S1 - PFBS
Standard Deviation for Proficiency Assessment 0.25 µg/kg (Equivalent to 20% CV)
z-Score
-1.0 -0.6 -0.6 -0.3 -0.2 -0.1 0.0 0.0 0.2 0.2 0.2 0.3 0.4 0.7 1.1
12 8 15 13 5 18 19 10 9 4 14 6 16 2 1
Laboratory

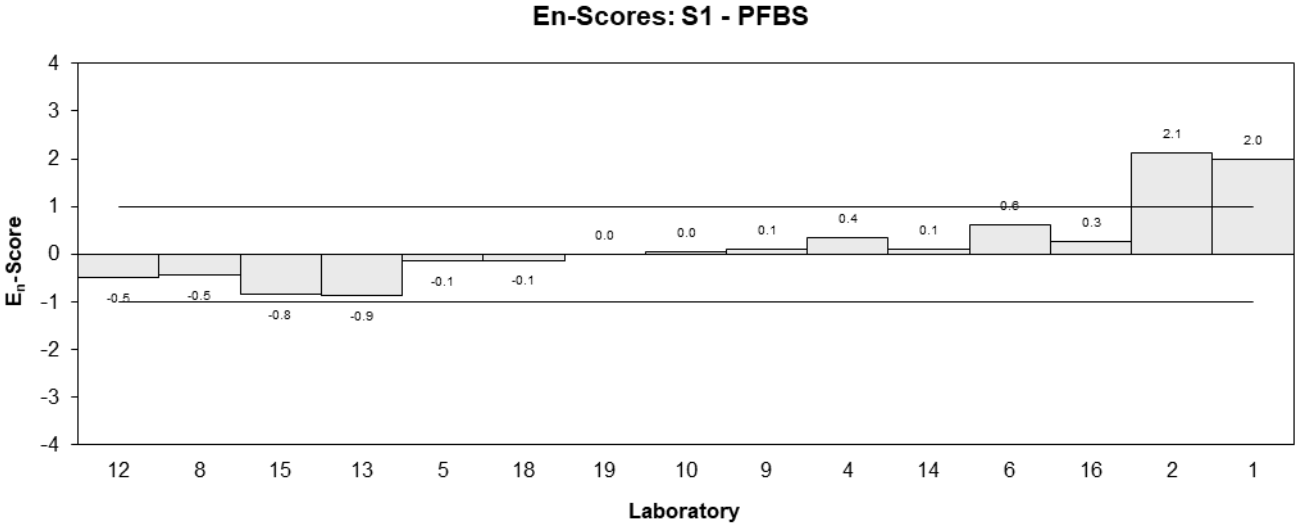

En-Scores: S1 - PFBS
En-Score
-0.5 -0.5 -0.8 -0.9 -0.1 -0.1 0.0 0.0 0.1 0.4 0.1 0.6 0.3 2.1 2.0
12 8 15 13 5 18 19 10 9 4 14 6 16 2 1
Laboratory

Figure 14

Table 17

Sample Details

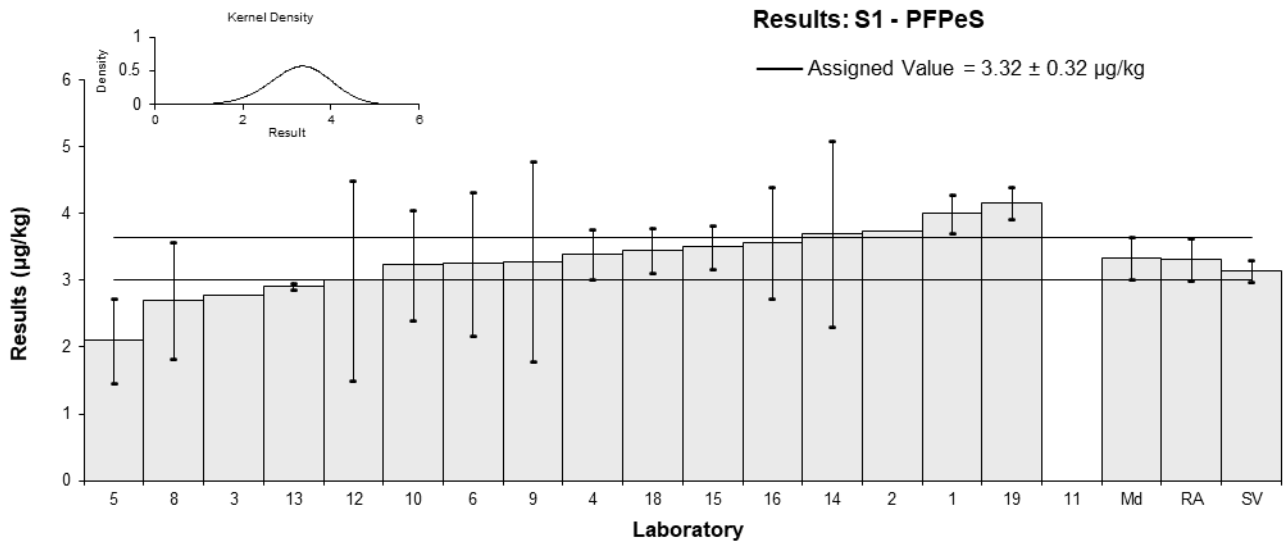
Sample No.	S1
Matrix	Fish paste
Analyte	PFPeS
Unit	µg/kg

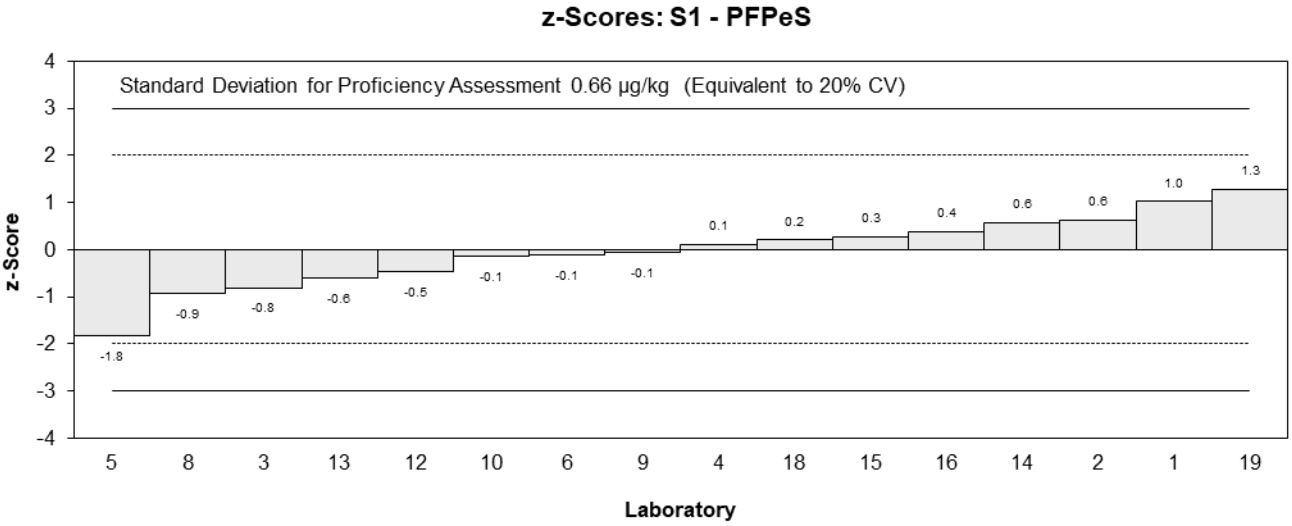
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	4	0.29	NR	1.02	1.57
2	3.73	NR	125	0.62	1.28
3	2.78	NR	NR	-0.81	-1.69
4	3.39	0.37	99	0.11	0.14
5	2.1	0.63	98	-1.84	-1.73
6	3.25	1.07	86	-0.11	-0.06
8	2.7	0.88	103	-0.93	-0.66
9	3.28	1.5	NR	-0.06	-0.03
10	3.23	0.83	94.3	-0.14	-0.10
11	NT	NT	NT		
12	3	1.5	NR	-0.48	-0.21
13	2.917	0.045	92	-0.61	-1.25
14	3.7	1.4	NT	0.57	0.26
15	3.5	0.32	NR	0.27	0.40
16	3.568	0.836	83	0.37	0.28
18	3.45	0.345	112.7	0.20	0.28
19	4.17	0.24	83	1.28	2.12

Statistics

Assigned Value	3.32	0.32
Spike Value	3.14	0.16
Robust Average	3.32	0.32
Median	3.34	0.32
Mean	3.30	
N	16	
Max	4.17	
Min	2.1	
Robust SD	0.51	
Robust CV	15%	


Kernel Density
Density
Result
Results: S1 - PFPeS
Assigned Value = 3.32 ± 0.32 µg/kg
Results (µg/kg)
Laboratory
5 8 3 13 12 10 6 9 4 18 15 16 14 2 1 19 11 Md RA SV


z-Scores: S1 - PFPeS
Standard Deviation for Proficiency Assessment 0.66 µg/kg (Equivalent to 20% CV)
z-Score
-1.8 -0.9 -0.8 -0.6 -0.5 -0.1 -0.1 -0.1 0.1 0.2 0.3 0.4 0.6 0.6 1.0 1.3
Laboratory
5 8 3 13 12 10 6 9 4 18 15 16 14 2 1 19

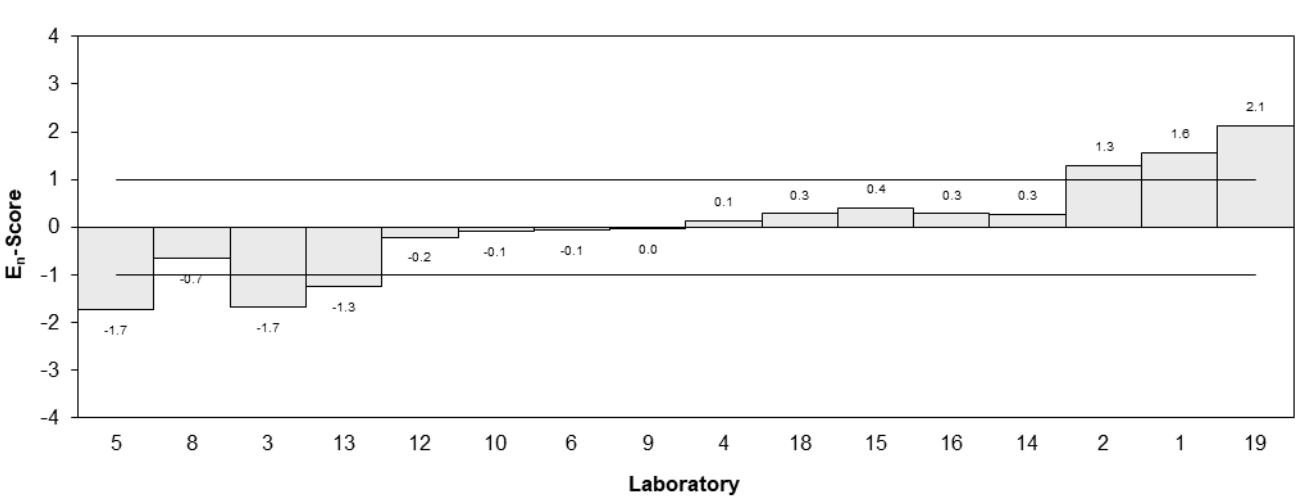

En-Scores: S1 - PFPeS
En-Score
-1.7 -0.7 -1.7 -1.3 -0.2 -0.1 -0.1 0.0 0.1 0.3 0.4 0.3 0.3 1.3 1.6 2.1
Laboratory
5 8 3 13 12 10 6 9 4 18 15 16 14 2 1 19

Figure 15

Table 18

Sample Details

Sample No.	S1
Matrix	Fish paste
Analyte	PFHxS (total)
Unit	µg/kg

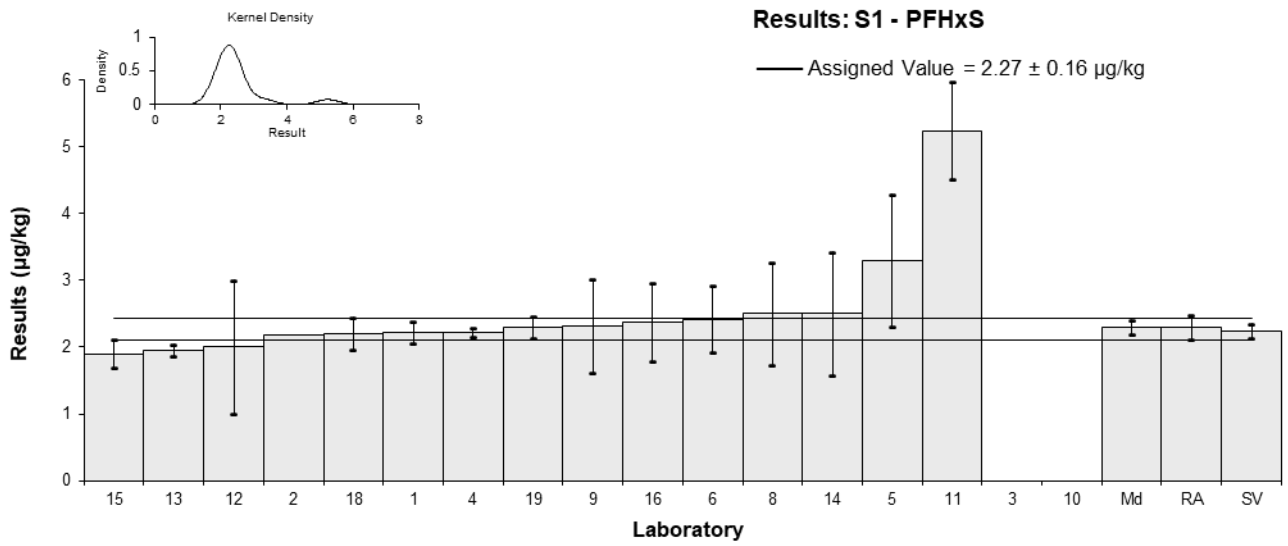
Participant Results

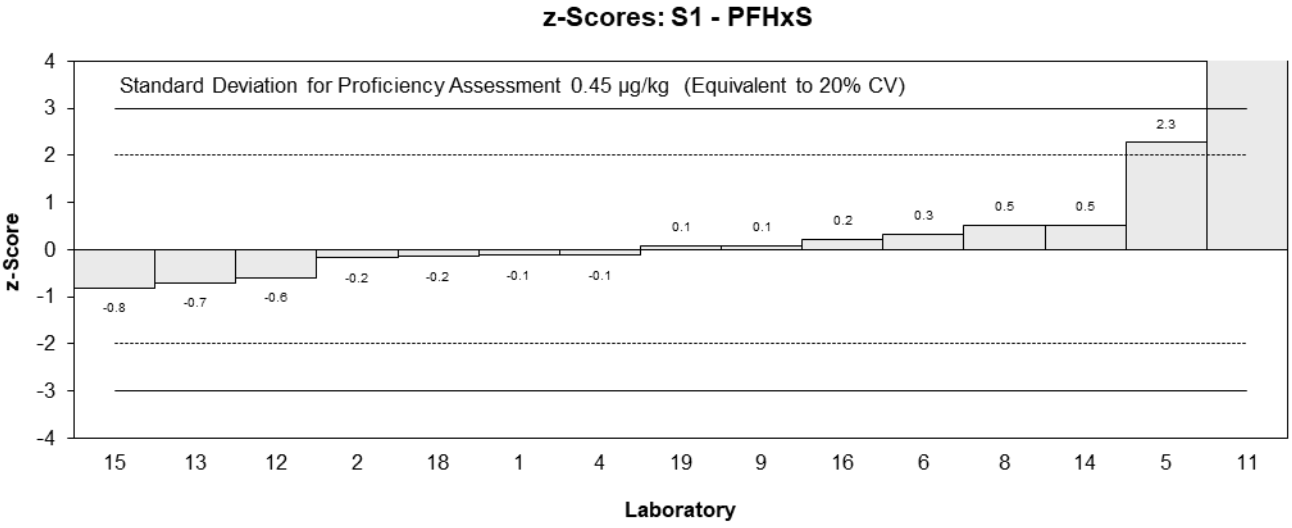
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	2.22	0.16	NR	-0.11	-0.22
2	2.19	NR	132	-0.18	-0.50
3	NR	NR	NR		
4	2.22	0.06	101	-0.11	-0.29
5	3.3	0.99	90	2.27	1.03
6	2.42	0.501	86	0.33	0.29
8	2.5	0.76	88	0.51	0.30
9	2.31	0.7	83	0.09	0.06
10	NT	NT	NT		
11*	5.242	0.729	114	6.55	3.98
12	2	1	101	-0.59	-0.27
13	1.953	0.094	92	-0.70	-1.71
14	2.5	0.93	NT	0.51	0.24
15	1.9	0.21	NR	-0.81	-1.40
16	2.372	0.58	83	0.22	0.17
18	2.20	0.242	117.5	-0.15	-0.24
19	2.3	0.16	83	0.07	0.13

* Outlier, see Section 4.2

Statistics

Assigned Value	2.27	0.16
Spike Value	2.24	0.11
Robust Average	2.30	0.18
Median	2.30	0.11
Mean	2.51	
N	15	
Max	5.242	
Min	1.9	
Robust SD	0.28	
Robust CV	12%	


Kernel Density
Density
Result
Results: S1 - PFHxS
Assigned Value = 2.27 ± 0.16 µg/kg
Results (µg/kg)
15 13 12 2 18 1 4 19 9 16 6 8 14 5 11 3 10 Md RA SV
Laboratory


z-Scores: S1 - PFHxS
Standard Deviation for Proficiency Assessment 0.45 µg/kg (Equivalent to 20% CV)
z-Score
-0.8 -0.7 -0.6 -0.2 -0.2 -0.1 -0.1 0.1 0.1 0.2 0.3 0.5 0.5 2.3
15 13 12 2 18 1 4 19 9 16 6 8 14 5 11
Laboratory

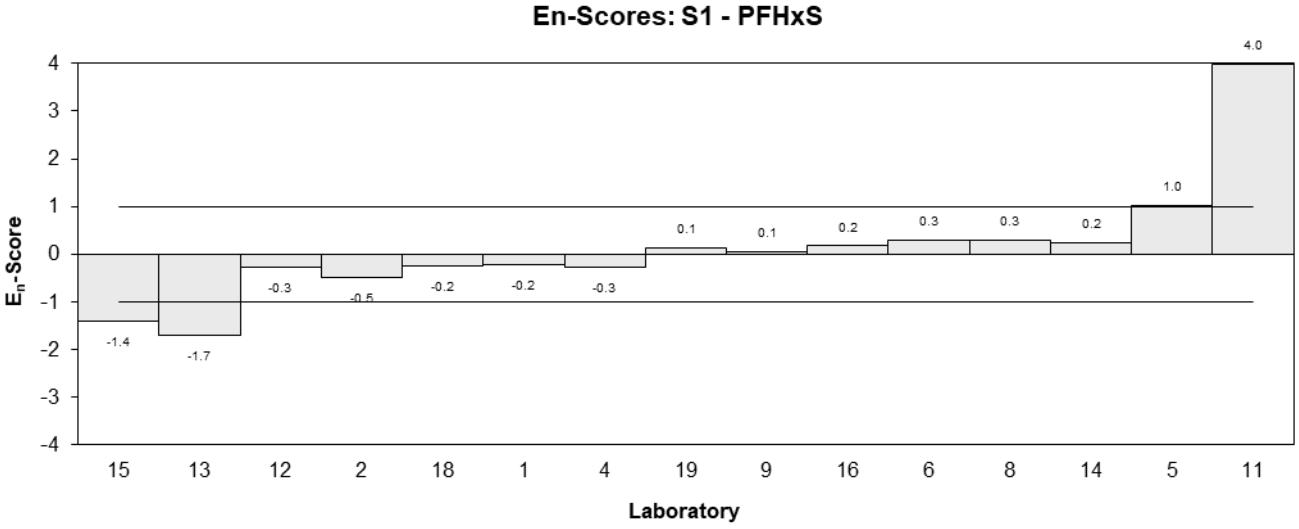

En-Scores: S1 - PFHxS
En-Score
-1.4 -1.7 -0.3 -0.5 -0.2 -0.2 -0.3 0.1 0.1 0.2 0.3 0.3 0.2 1.0 4.0
15 13 12 2 18 1 4 19 9 16 6 8 14 5 11
Laboratory

Figure 16

Table 19

Sample Details

Sample No.	S1
Matrix	Fish paste
Analyte	PFHxS_L
Unit	µg/kg

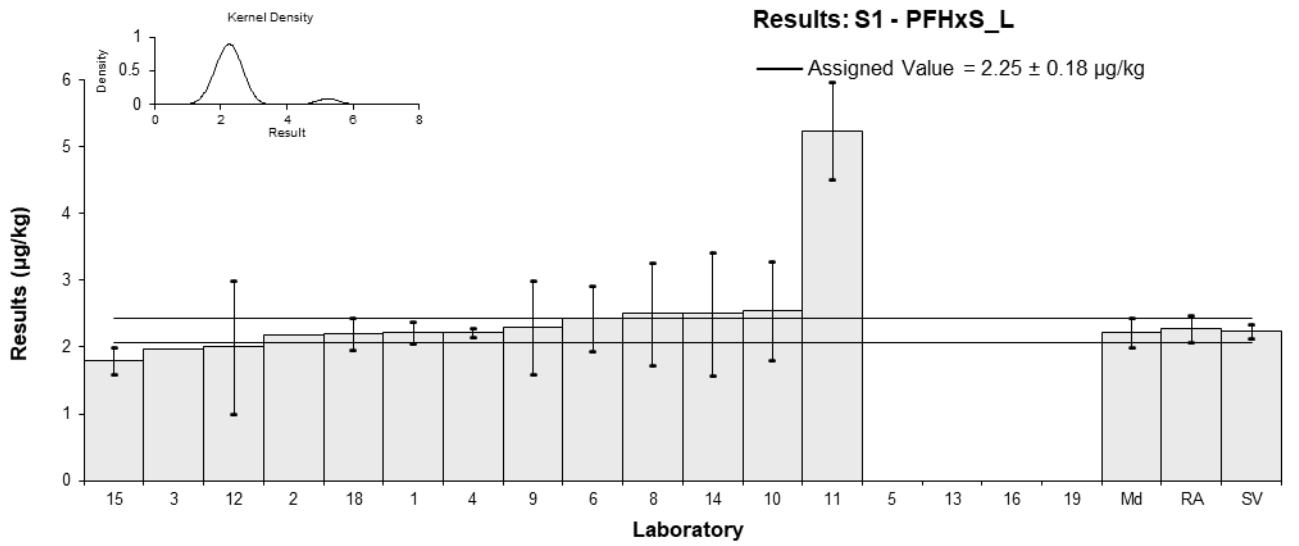
Participant Results

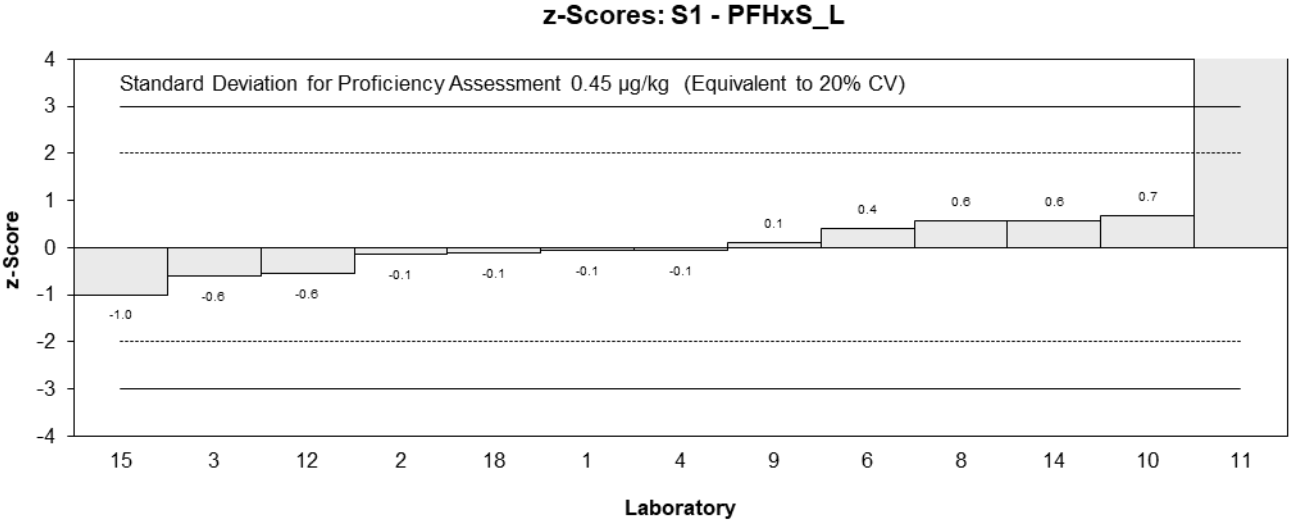
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	2.22	0.16	NR	-0.07	-0.12
2	2.19	NR	132	-0.13	-0.33
3	1.98	NR	NR	-0.60	-1.50
4	2.22	0.06	101	-0.07	-0.16
5	NT	NT	NT		
6	2.43	0.485	86	0.40	0.35
8	2.5	0.76	88	0.56	0.32
9	2.3	0.7	NR	0.11	0.07
10	2.55	0.744	73.8	0.67	0.39
11*	5.242	0.729	114	6.65	3.98
12	2	1	NR	-0.56	-0.25
13	NT	NT	NT		
14	2.5	0.93	NT	0.56	0.26
15	1.8	0.20	NR	-1.00	-1.67
16	NT	NT	NT		
18	2.20	0.242	117.5	-0.11	-0.17
19	NT	NT	NT		

* Outlier, see Section 4.2

Statistics

Assigned Value	2.25	0.18
Spike Value	2.24	0.11
Robust Average	2.28	0.20
Median	2.22	0.23
Mean	2.47	
N	13	
Max	5.242	
Min	1.8	
Robust SD	0.28	
Robust CV	12%	


Kernel Density
Density
Result
Results: S1 - PFHxS_L
Assigned Value = 2.25 ± 0.18 µg/kg
Results (µg/kg)
15 3 12 2 18 1 4 9 6 8 14 10 11 5 13 16 19 Md RA SV
Laboratory


z-Scores: S1 - PFHxS_L
Standard Deviation for Proficiency Assessment 0.45 µg/kg (Equivalent to 20% CV)
z-Score
-1.0 -0.6 -0.6 -0.1 -0.1 -0.1 -0.1 0.1 0.4 0.6 0.6 0.7
15 3 12 2 18 1 4 9 6 8 14 10 11
Laboratory

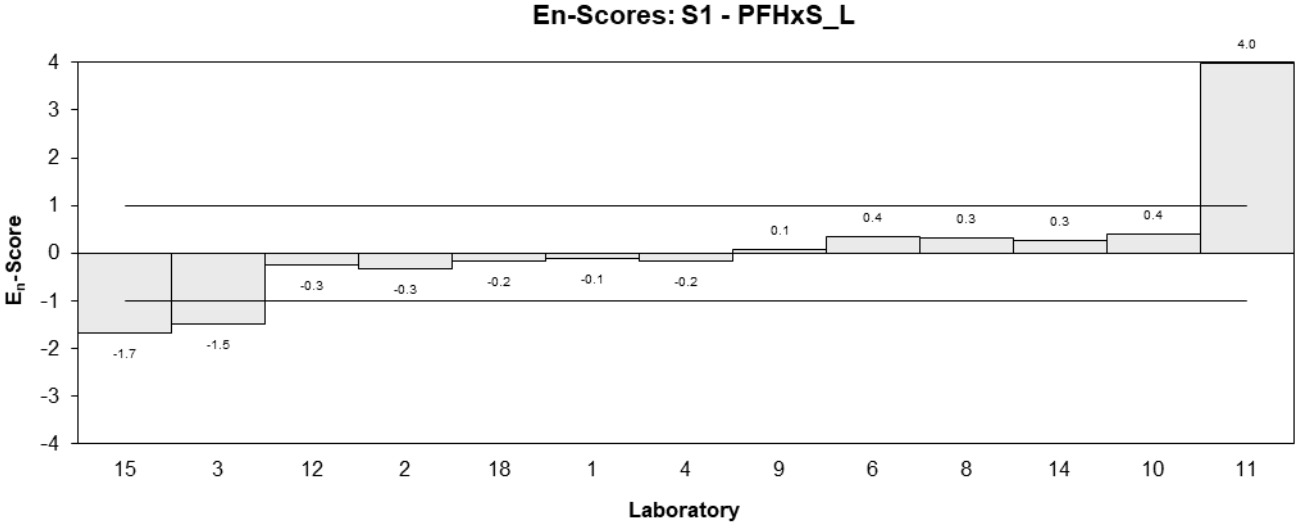

En-Scores: S1 - PFHxS_L
En-Score
-1.7 -1.5 -0.3 -0.3 -0.2 -0.1 -0.2 0.1 0.4 0.3 0.3 0.4 4.0
15 3 12 2 18 1 4 9 6 8 14 10 11
Laboratory

Figure 17

Table 20

Sample Details

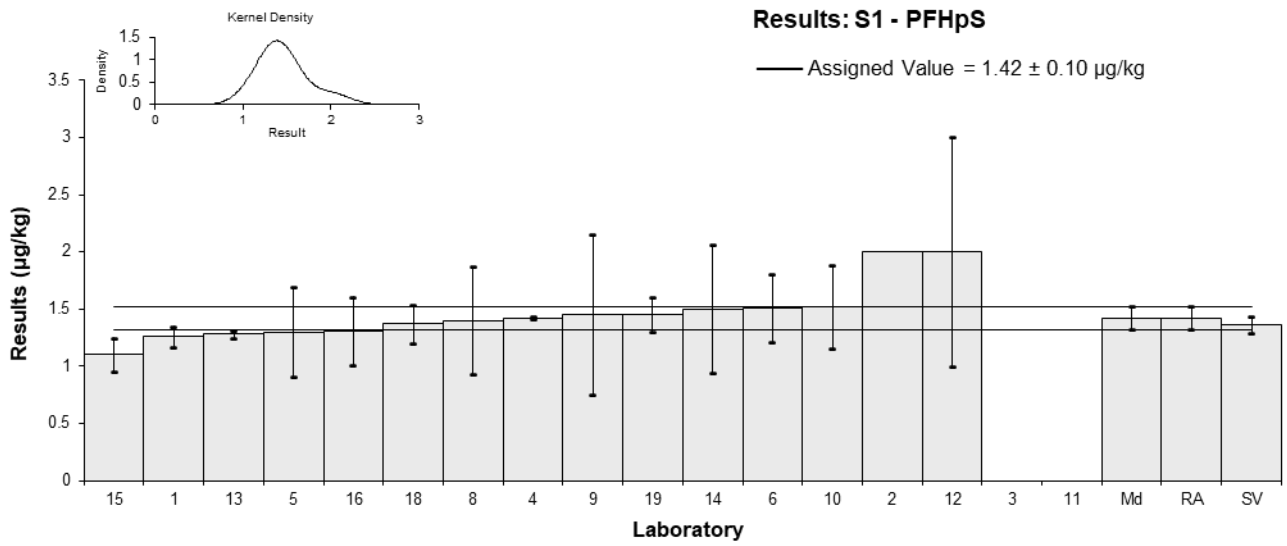
Sample No.	S1
Matrix	Fish paste
Analyte	PFHpS
Unit	µg/kg

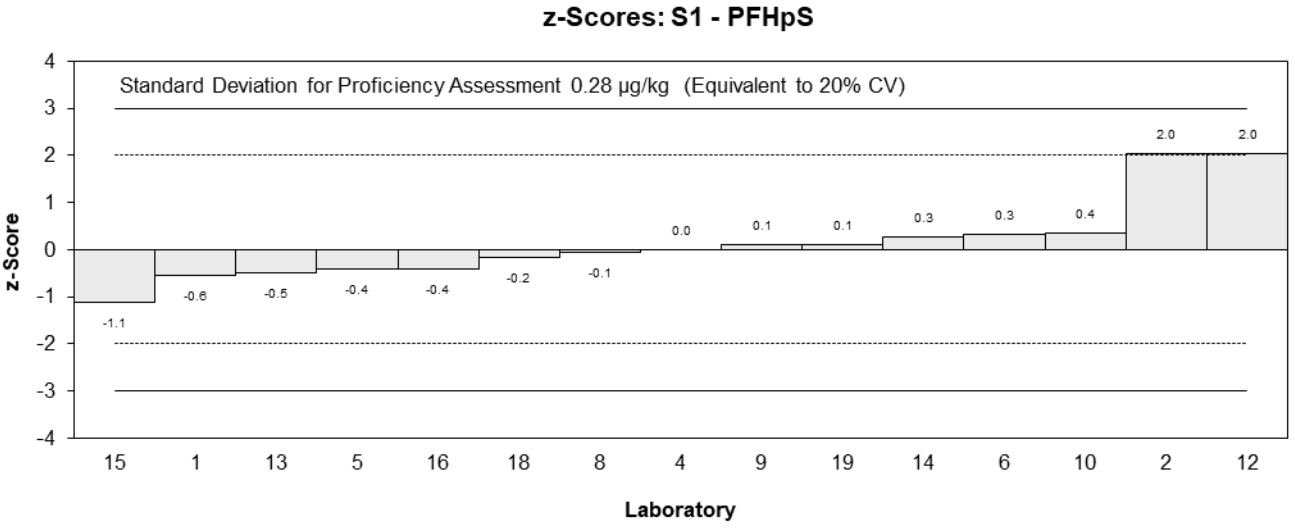
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	1.26	0.09	NR	-0.56	-1.19
2	2	NR	96	2.04	5.80
3	<1	NR	NR		
4	1.42	0.01	101	0.00	0.00
5	1.3	0.39	104	-0.42	-0.30
6	1.51	0.294	86	0.32	0.29
8	1.4	0.47	88	-0.07	-0.04
9	1.45	0.7	NR	0.11	0.04
10	1.52	0.363	94.3	0.35	0.27
11	NT	NT	NT		
12	2	1	NR	2.04	0.58
13	1.28	0.035	92	-0.49	-1.32
14	1.5	0.56	NT	0.28	0.14
15	1.1	0.15	NR	-1.13	-1.78
16	1.304	0.3	98	-0.41	-0.37
18	1.37	0.165	117.5	-0.18	-0.26
19	1.45	0.15	83	0.11	0.17

Statistics

Assigned Value	1.42	0.10
Spike Value	1.36	0.07
Robust Average	1.42	0.10
Median	1.42	0.10
Mean	1.46	
N	15	
Max	2	
Min	1.1	
Robust SD	0.16	
Robust CV	11%	


Kernel Density
Density
Result
Results: S1 - PFHpS
Assigned Value = 1.42 ± 0.10 µg/kg
Results (µg/kg)
15 1 13 5 16 18 8 4 9 19 14 6 10 2 12 3 11 Md RA SV
Laboratory


z-Scores: S1 - PFHpS
Standard Deviation for Proficiency Assessment 0.28 µg/kg (Equivalent to 20% CV)
z-Score
-1.1 -0.6 -0.5 -0.4 -0.4 -0.2 -0.1 0.0 0.1 0.1 0.3 0.3 0.4 2.0 2.0
15 1 13 5 16 18 8 4 9 19 14 6 10 2 12
Laboratory

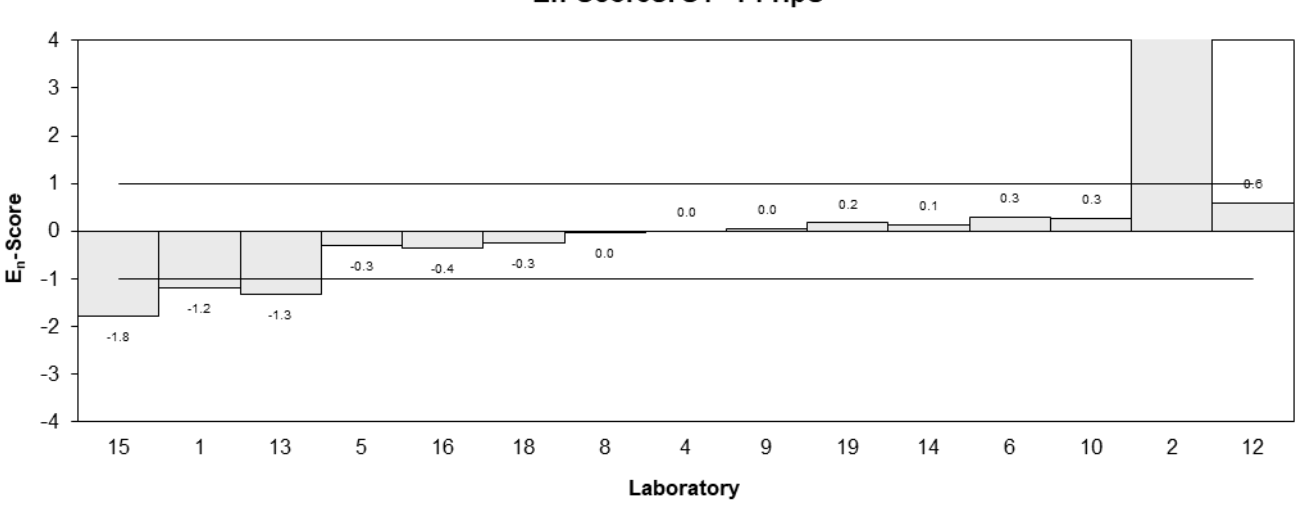

En-Scores: S1 - PFHpS
En-Score
-1.8 -1.2 -1.3 -0.3 -0.4 -0.3 0.0 0.0 0.0 0.2 0.1 0.3 0.3 0.6
15 1 13 5 16 18 8 4 9 19 14 6 10 2 12
Laboratory

Figure 18

Table 21

Sample Details

Sample No.	S1
Matrix	Fish paste
Analyte	PFOS (total)
Unit	µg/kg

Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	2.1	0.15	NR	-0.27	-0.48
2	2.99	NR	96	1.73	3.85
3	<2.00	NR	NR		
4	2.44	0.48	94	0.50	0.42
5	1.7	0.51	94	-1.17	-0.95
6	2.36	0.234	83	0.32	0.45
8	2.3	0.68	94	0.18	0.11
9	2.24	0.7	91	0.05	0.03
10	2.49	0.608	84.5	0.61	0.42
11*	4.289	0.387	106	4.66	4.75
12	2	1	79	-0.50	-0.22
13	2.179	0.112	91	-0.09	-0.18
14	2.1	0.78	NT	-0.27	-0.15
15	1.4	0.15	NR	-1.85	-3.28
16	2.174	0.51	98	-0.10	-0.08
18	2.08	0.374	114.7	-0.32	-0.33
19	2.62	0.13	80	0.90	1.68

* Outlier, see Section 4.2

Statistics

Assigned Value	2.22	0.20
Spike Value	2.24	0.11
Robust Average	2.26	0.24
Median	2.21	0.17
Mean	2.34	
N	16	
Max	4.289	
Min	1.4	
Robust SD	0.38	
Robust CV	17%	

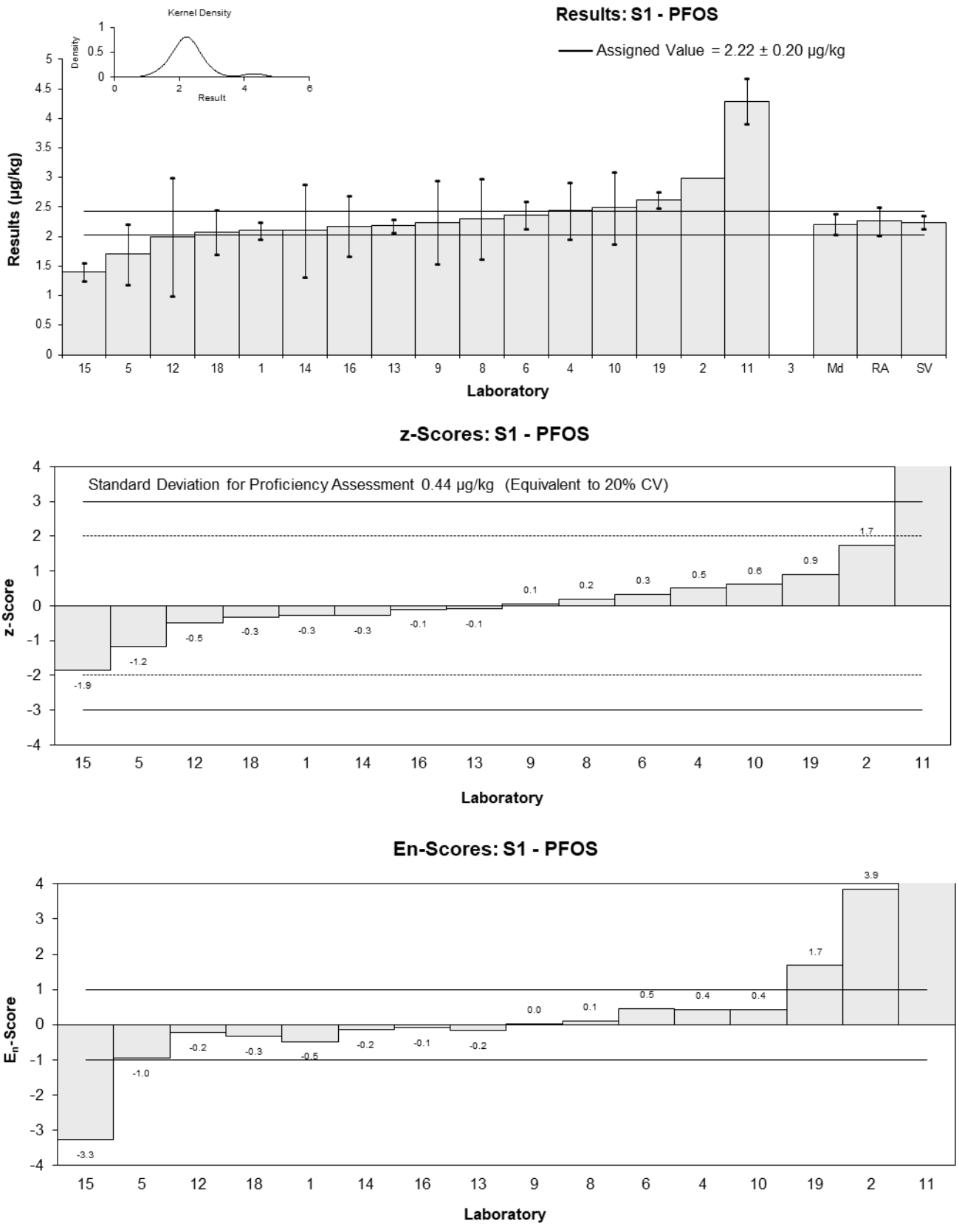

Results: S1 - PFOS
Kernel Density
Density
Result
Assigned Value = 2.22 ± 0.20 µg/kg
Results (µg/kg)
15 5 12 18 1 14 16 13 9 8 6 4 10 19 2 11 3 Md RA SV
Laboratory
z-Scores: S1 - PFOS
Standard Deviation for Proficiency Assessment 0.44 µg/kg (Equivalent to 20% CV)
z-Score
-1.9 -1.2 -0.5 -0.3 -0.3 -0.3 -0.1 -0.1 0.1 0.2 0.3 0.5 0.6 0.9 1.7
15 5 12 18 1 14 16 13 9 8 6 4 10 19 2 11
Laboratory
En-Scores: S1 - PFOS
En-Score
-3.3 -1.0 -0.2 -0.3 -0.5 -0.2 -0.1 -0.2 0.0 0.1 0.5 0.4 0.4 1.7 3.9
15 5 12 18 1 14 16 13 9 8 6 4 10 19 2 11
Laboratory

Figure 19

Table 22

Sample Details

Sample No.	S1
Matrix	Fish paste
Analyte	PFOS_L
Unit	µg/kg

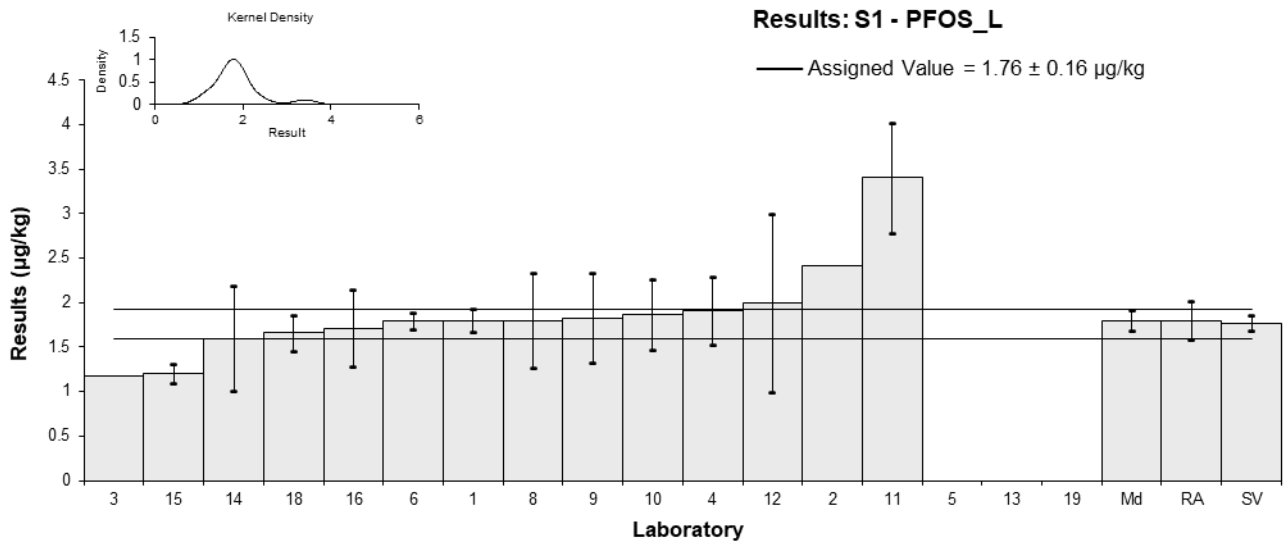
Participant Results

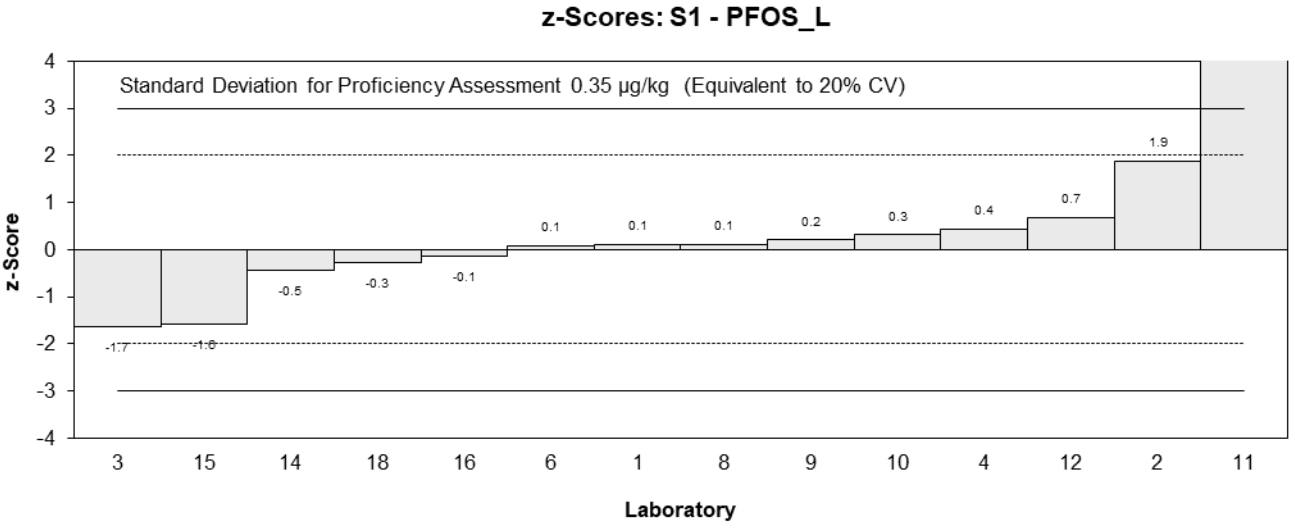
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	1.8	0.13	NR	0.11	0.19
2	2.42	NR	96	1.87	4.12
3	1.18	NR	NR	-1.65	-3.63
4	1.91	0.38	94	0.43	0.36
5	NT	NT	NT		
6	1.79	0.095	83	0.09	0.16
8	1.8	0.53	94	0.11	0.07
9	1.83	0.5	NR	0.20	0.13
10	1.87	0.395	84.5	0.31	0.26
11*	3.408	0.619	106	4.68	2.58
12	2	1	NR	0.68	0.24
13	NT	NT	NT		
14	1.6	0.59	NT	-0.45	-0.26
15	1.2	0.11	NR	-1.59	-2.88
16	1.712	0.43	98	-0.14	-0.10
18	1.66	0.200	114.7	-0.28	-0.39
19	NT	NT	NT		

* Outlier, see Section 4.2

Statistics

Assigned Value	1.76	0.16
Spike Value	1.77	0.09
Robust Average	1.80	0.22
Median	1.80	0.12
Mean	1.87	
N	14	
Max	3.408	
Min	1.18	
Robust SD	0.33	
Robust CV	18%	


Kernel Density
Density
Result
Results: S1 - PFOS_L
Assigned Value = 1.76 ± 0.16 µg/kg
Results (µg/kg)
Laboratory
3 15 14 18 16 6 1 8 9 10 4 12 2 11 5 13 19 Md RA SV


z-Scores: S1 - PFOS_L
Standard Deviation for Proficiency Assessment 0.35 µg/kg (Equivalent to 20% CV)
z-Score
-1.7 -1.6 -0.5 -0.3 -0.1 0.1 0.1 0.1 0.2 0.3 0.4 0.7 1.9
Laboratory
3 15 14 18 16 6 1 8 9 10 4 12 2 11

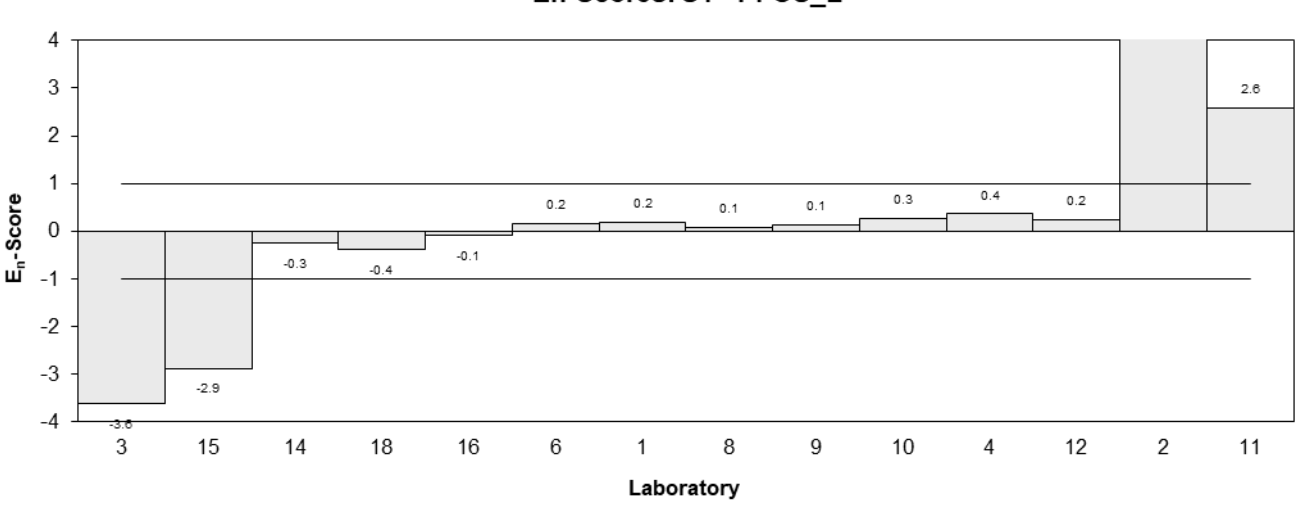

En-Scores: S1 - PFOS_L
En-Score
-3.6 -2.9 -0.3 -0.4 -0.1 0.2 0.2 0.1 0.1 0.3 0.4 0.2 2.6
Laboratory
3 15 14 18 16 6 1 8 9 10 4 12 2 11

Figure 20

Table 23

Sample Details

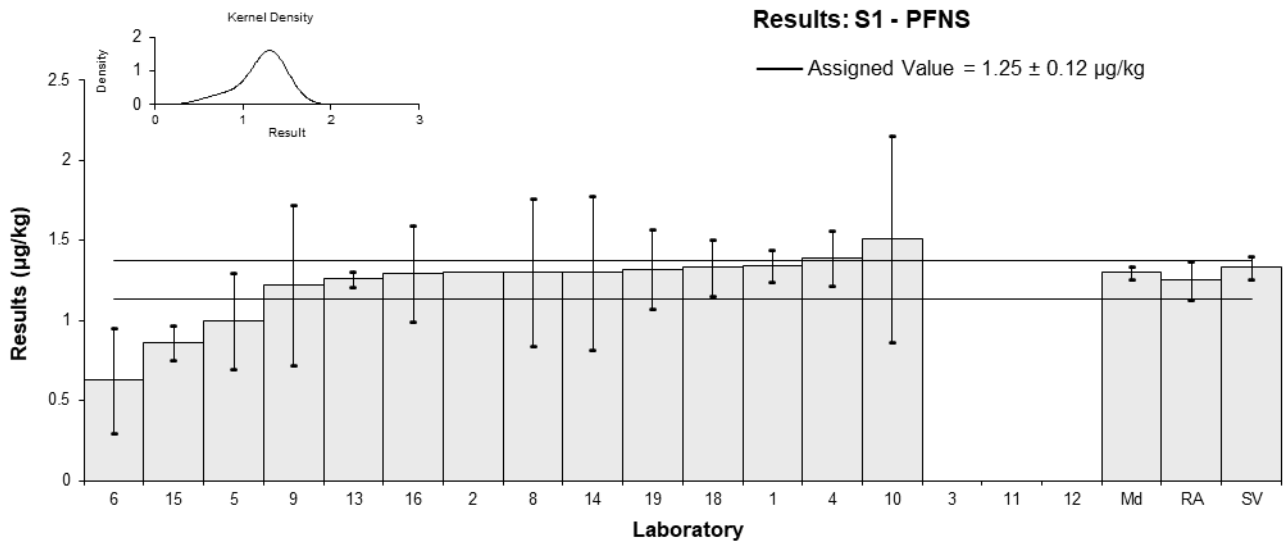
Sample No.	S1
Matrix	Fish paste
Analyte	PFNS
Unit	µg/kg

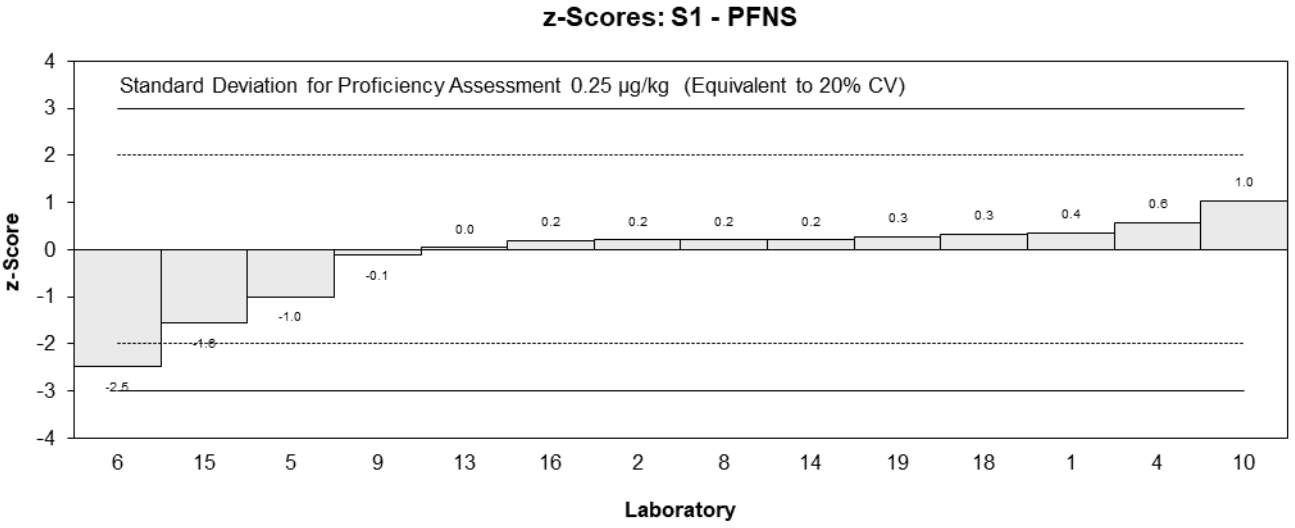
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	1.34	0.1	NR	0.36	0.58
2	1.3	NR	92	0.20	0.42
3	<1	NR	NR		
4	1.39	0.17	94	0.56	0.67
5	1.0	0.3	84	-1.00	-0.77
6	0.627	0.328	83	-2.49	-1.78
8	1.3	0.46	94	0.20	0.11
9	1.22	0.5	NR	-0.12	-0.06
10	1.51	0.648	84.5	1.04	0.39
11	NT	NT	NT		
12	< 2	1	NR		
13	1.259	0.048	91	0.04	0.07
14	1.3	0.48	NT	0.20	0.10
15	0.86	0.11	NR	-1.56	-2.40
16	1.296	0.3	98	0.18	0.14
18	1.33	0.173	114.7	0.32	0.38
19	1.32	0.25	80	0.28	0.25

Statistics

Assigned Value	1.25	0.12
Spike Value	1.33	0.07
Robust Average	1.25	0.12
Median	1.30	0.04
Mean	1.22	
N	14	
Max	1.51	
Min	0.627	
Robust SD	0.18	
Robust CV	14%	


Kernel Density
Density
Result
Results: S1 - PFNS
Assigned Value = 1.25 ± 0.12 µg/kg
Results (µg/kg)
Laboratory
6 15 5 9 13 16 2 8 14 19 18 1 4 10 3 11 12 Md RA SV


z-Scores: S1 - PFNS
Standard Deviation for Proficiency Assessment 0.25 µg/kg (Equivalent to 20% CV)
z-Score
-2.5
-1.6
-1.0
-0.1
0.0
0.2
0.2
0.2
0.2
0.3
0.3
0.4
0.6
1.0
Laboratory
6 15 5 9 13 16 2 8 14 19 18 1 4 10

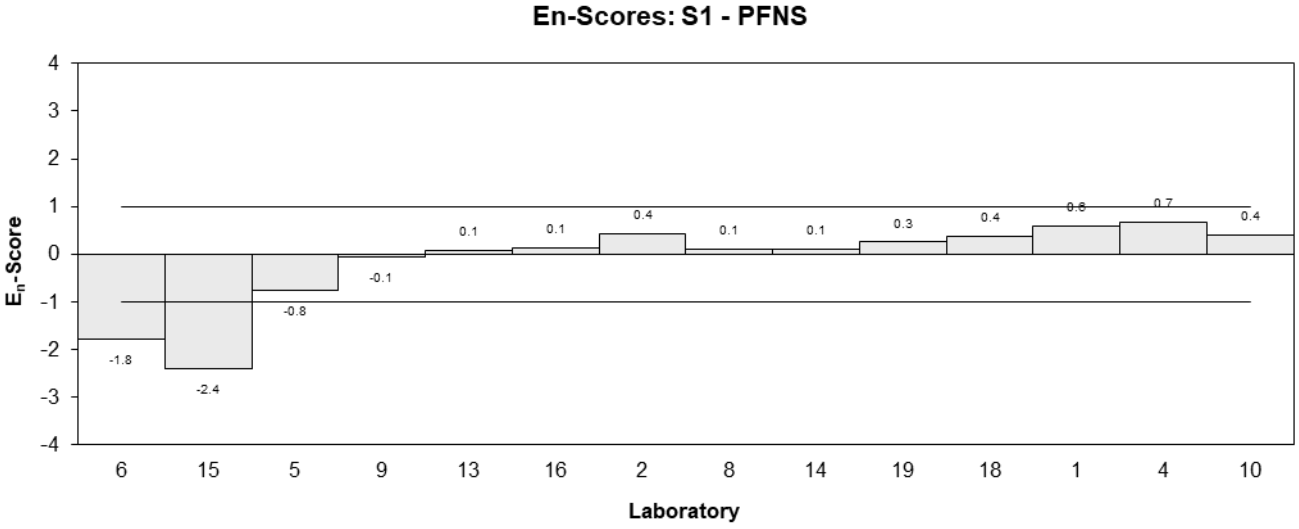

En-Scores: S1 - PFNS
En-Score
-1.8
-2.4
-0.8
-0.1
0.1
0.1
0.4
0.1
0.1
0.3
0.4
0.6
0.7
0.4
Laboratory
6 15 5 9 13 16 2 8 14 19 18 1 4 10

Figure 21

Table 24

Sample Details

Sample No.	S1
Matrix	Fish paste
Analyte	PFDS
Unit	µg/kg

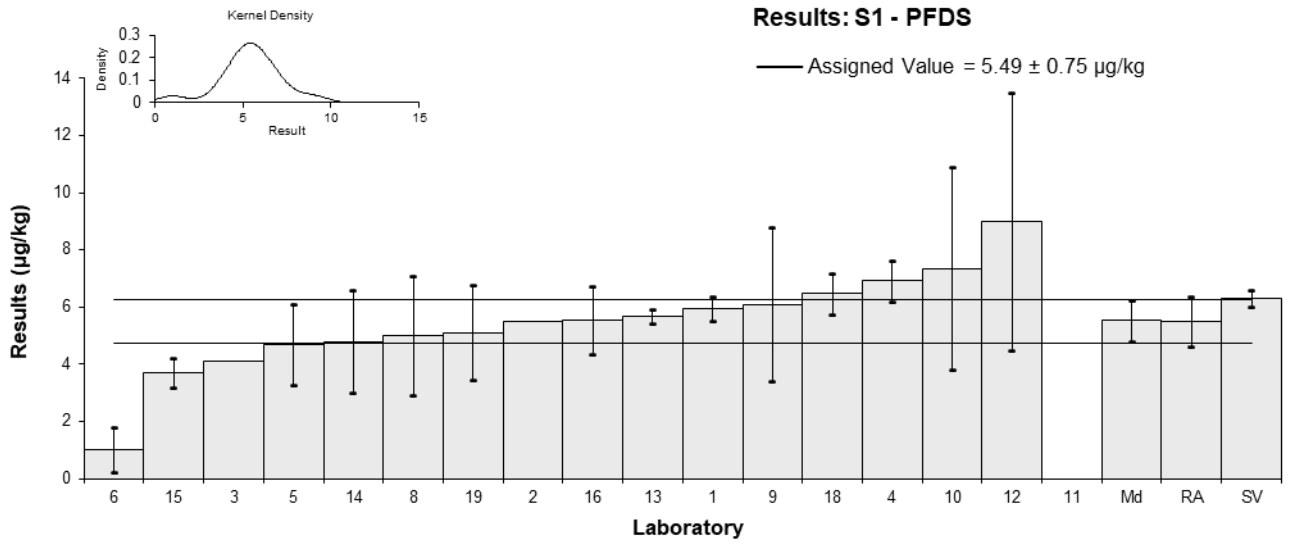
Participant Results

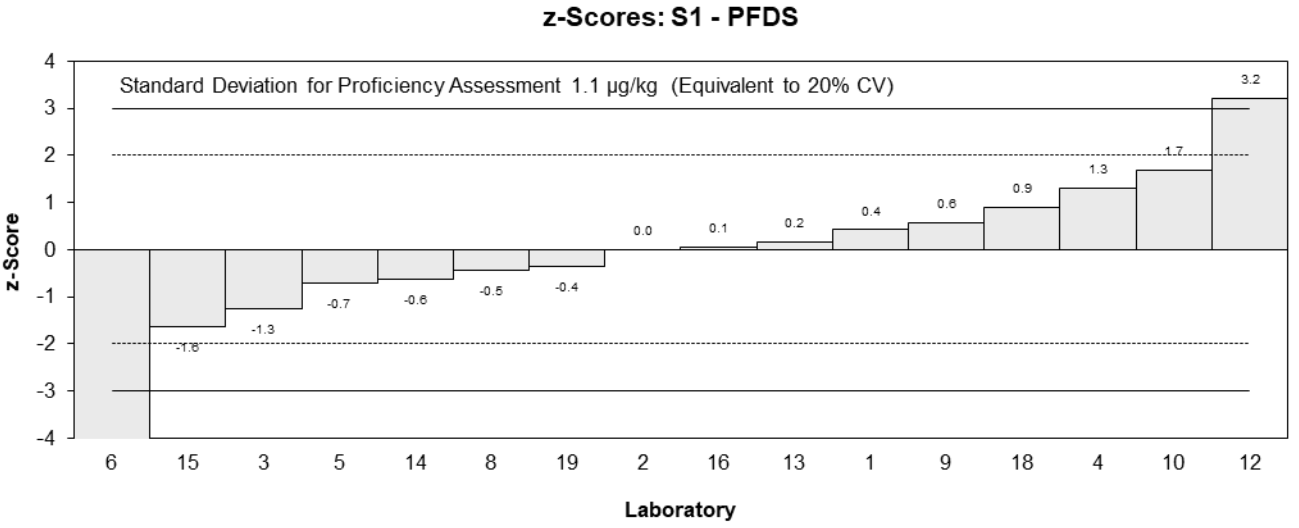
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	5.95	0.42	NR	0.42	0.54
2	5.49	NR	66	0.00	0.00
3	4.1	NR	NR	-1.27	-1.85
4	6.92	0.71	94	1.30	1.38
5	4.7	1.41	69	-0.72	-0.49
6*	1.01	0.791	83	-4.08	-4.11
8	5.0	2.1	94	-0.45	-0.22
9	6.1	2.7	NR	0.56	0.22
10	7.35	3.53	83.7	1.69	0.52
11	NT	NT	NT		
12*	9	4.5	NR	3.20	0.77
13	5.675	0.23	91	0.17	0.24
14	4.8	1.8	NT	-0.63	-0.35
15	3.7	0.51	NR	-1.63	-1.97
16	5.542	1.18	98	0.05	0.04
18	6.47	0.712	114.7	0.89	0.95
19	5.11	1.65	80	-0.35	-0.21

* Outlier, see Section 4.2

Statistics

Assigned Value	5.49	0.75
Spike Value	6.30	0.31
Robust Average	5.49	0.86
Median	5.52	0.71
Mean	5.43	
N	16	
Max	9	
Min	1.01	
Robust SD	1.4	
Robust CV	25%	


Kernel Density
Density
Result
Results: S1 - PFDS
Assigned Value = 5.49 ± 0.75 µg/kg
Results (µg/kg)
Laboratory
6 15 3 5 14 8 19 2 16 13 1 9 18 4 10 12 11 Md RA SV


z-Scores: S1 - PFDS
Standard Deviation for Proficiency Assessment 1.1 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
6 15 3 5 14 8 19 2 16 13 1 9 18 4 10 12
-1.6 -1.3 -0.7 -0.6 -0.5 -0.4 0.0 0.1 0.2 0.4 0.6 0.9 1.3 1.7 3.2

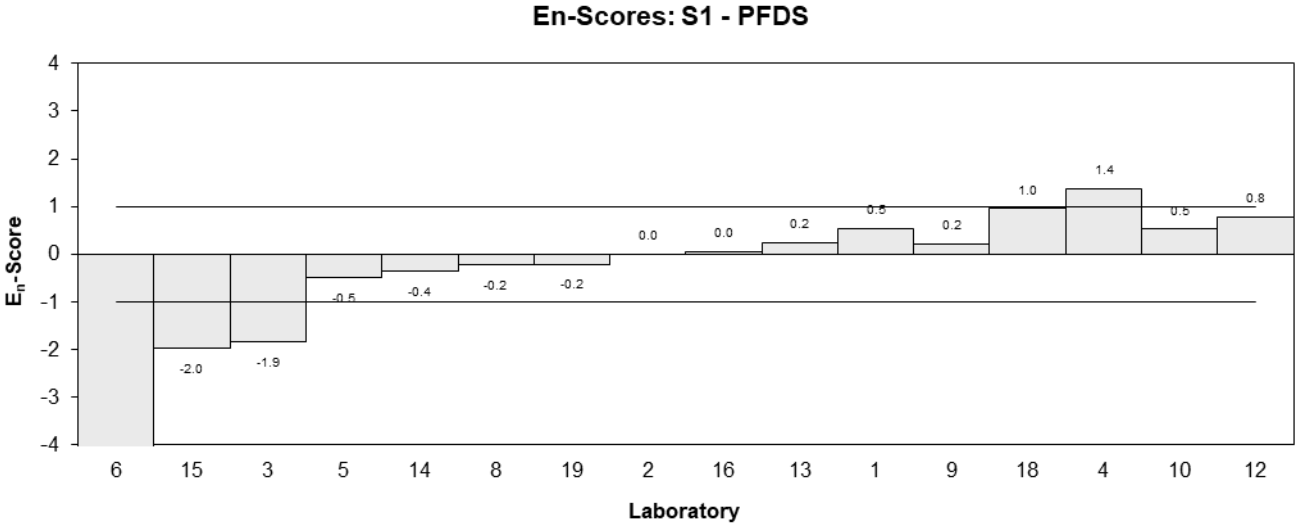

En-Scores: S1 - PFDS
En-Score
Laboratory
6 15 3 5 14 8 19 2 16 13 1 9 18 4 10 12
-2.0 -1.9 -0.5 -0.4 -0.2 -0.2 0.0 0.0 0.2 0.5 0.2 1.0 1.4 0.5 0.8

Figure 22

Table 25

Sample Details

Sample No.	S1
Matrix	Fish paste
Analyte	PFOSA
Unit	µg/kg

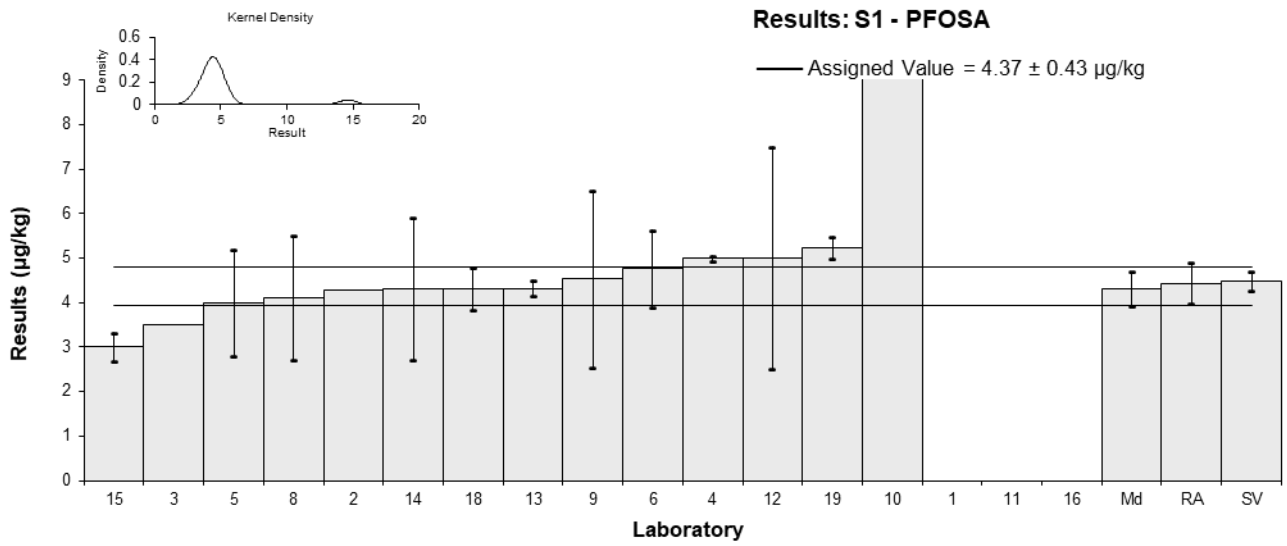
Participant Results

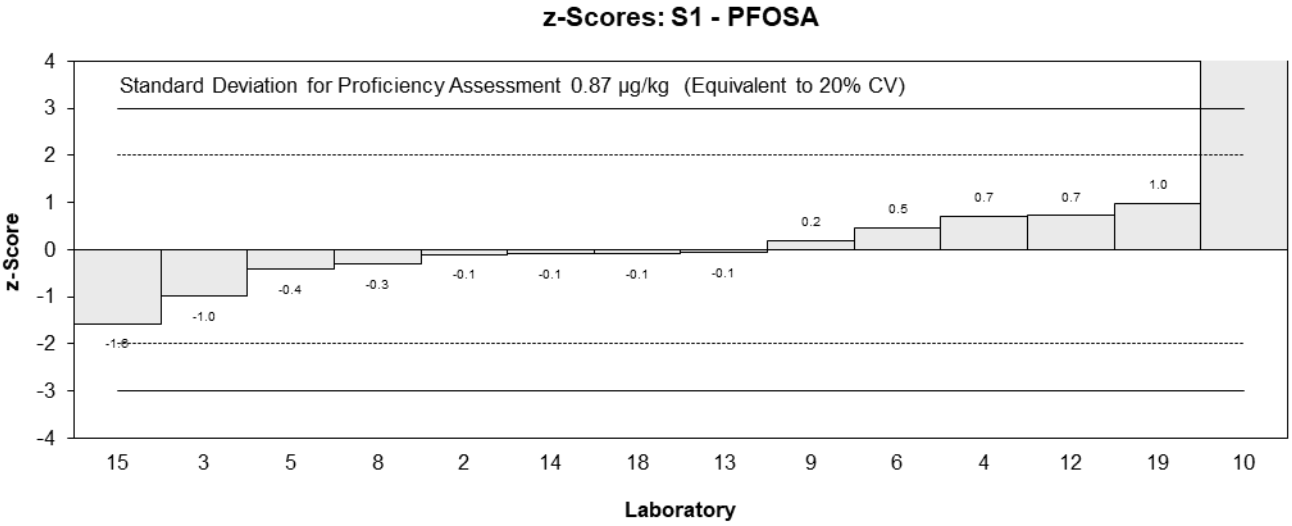
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	4.28	NR	114	-0.10	-0.21
3	3.51	NR	NR	-0.98	-2.00
4	4.99	0.06	101	0.71	1.43
5	4.00	1.2	82	-0.42	-0.29
6	4.77	0.863	14	0.46	0.41
8	4.1	1.4	93	-0.31	-0.18
9	4.53	2.0	89	0.18	0.08
10*	14.6	3.82	80	11.70	2.66
11	NT	NT	NT		
12	5	2.5	56	0.72	0.25
13	4.324	0.182	51	-0.05	-0.10
14	4.3	1.6	NT	-0.08	-0.04
15	3.0	0.32	NR	-1.57	-2.56
16	<5	NR	81		
18	4.30	0.473	105.8	-0.08	-0.11
19	5.23	0.25	38	0.98	1.73

* Outlier, see Section 4.2

Statistics

Assigned Value	4.37	0.43
Spike Value	4.48	0.22
Robust Average	4.44	0.46
Median	4.31	0.38
Mean	5.1	
N	14	
Max	14.6	
Min	3	
Robust SD	0.68	
Robust CV	15%	


Results: S1 - PFOSA
Kernel Density
Density
Result
Assigned Value = 4.37 ± 0.43 µg/kg
Results (µg/kg)
15 3 5 8 2 14 18 13 9 6 4 12 19 10 1 11 16 Md RA SV
Laboratory


z-Scores: S1 - PFOSA
Standard Deviation for Proficiency Assessment 0.87 µg/kg (Equivalent to 20% CV)
z-Score
-1.6 -1.0 -0.4 -0.3 -0.1 -0.1 -0.1 -0.1 0.2 0.5 0.7 0.7 1.0
15 3 5 8 2 14 18 13 9 6 4 12 19 10
Laboratory

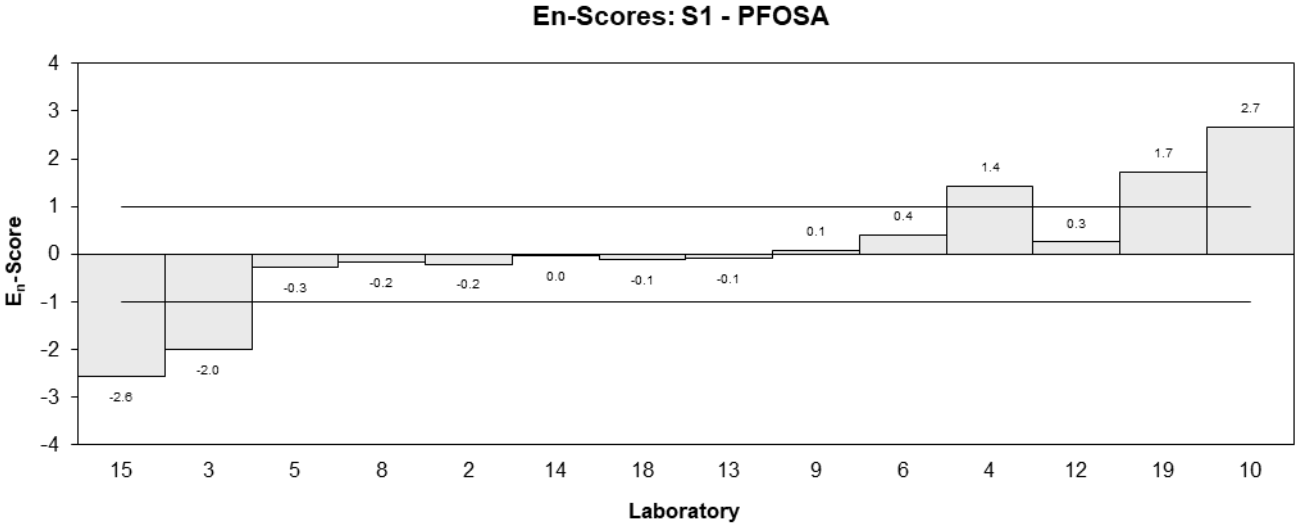

En-Scores: S1 - PFOSA
En-Score
-2.6 -2.0 -0.3 -0.2 -0.2 0.0 -0.1 -0.1 0.1 0.4 1.4 0.3 1.7 2.7
15 3 5 8 2 14 18 13 9 6 4 12 19 10
Laboratory

Figure 23

Table 26

Sample Details

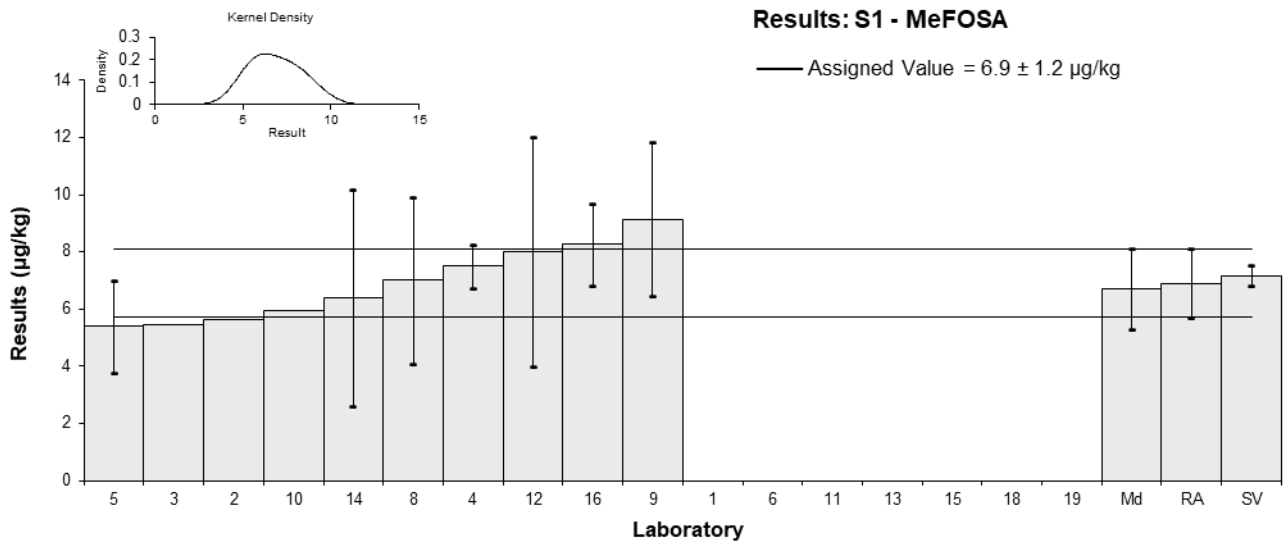
Sample No.	S1
Matrix	Fish paste
Analyte	N-MeFOSA
Unit	µg/kg

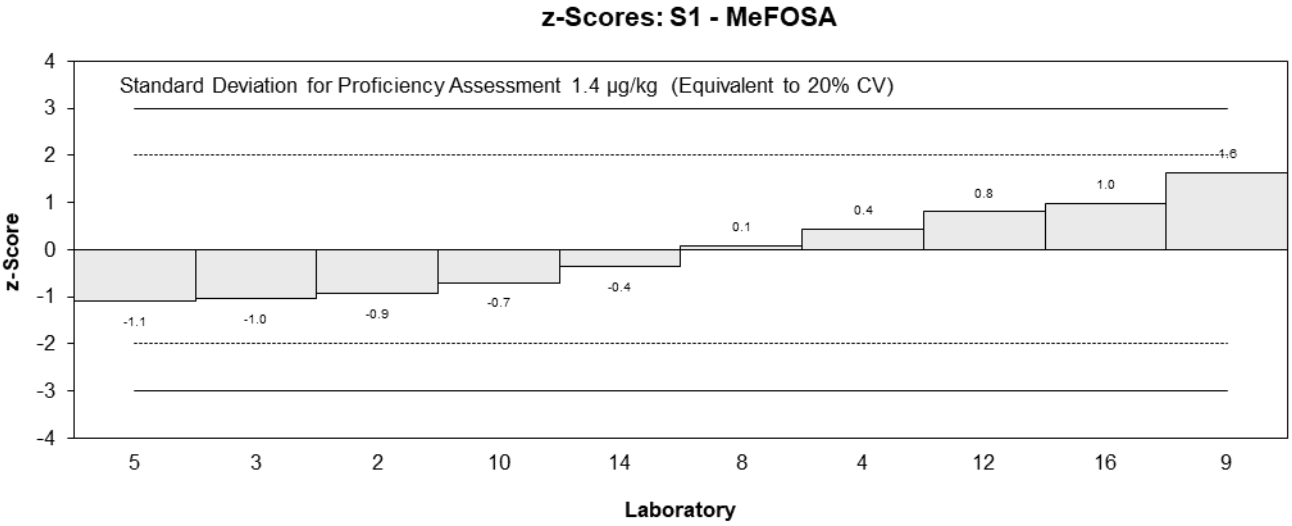
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	5.61	NR	39	-0.93	-1.08
3	5.46	NR	NR	-1.04	-1.20
4	7.5	0.77	102	0.43	0.42
5	5.4	1.62	100	-1.09	-0.74
6	NR	NR	NR		
8	7.0	2.9	64	0.07	0.03
9	9.14	2.7	52	1.62	0.76
10	5.93	NR	70.9	-0.70	-0.81
11	NT	NT	NT		
12	8	4	55	0.80	0.26
13	NT	NT	NT		
14	6.4	3.8	NT	-0.36	-0.13
15	<0.5	NR	NR		
16	8.258	1.43	79	0.98	0.73
18	NT	NT	NT		
19	NT	NT	NT		

Statistics

Assigned Value	6.9	1.2
Spike Value	7.16	0.36
Robust Average	6.9	1.2
Median	6.7	1.4
Mean	6.87	
N	10	
Max	9.14	
Min	5.4	
Robust SD	1.5	
Robust CV	22%	


Results: S1 - MeFOSA
Kernel Density
Density
Result
Assigned Value = 6.9 ± 1.2 µg/kg
Results (µg/kg)
Laboratory
5 3 2 10 14 8 4 12 16 9 1 6 11 13 15 18 19 Md RA SV


z-Scores: S1 - MeFOSA
Standard Deviation for Proficiency Assessment 1.4 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
-1.1 -1.0 -0.9 -0.7 -0.4 0.1 0.4 0.8 1.0 1.6
5 3 2 10 14 8 4 12 16 9

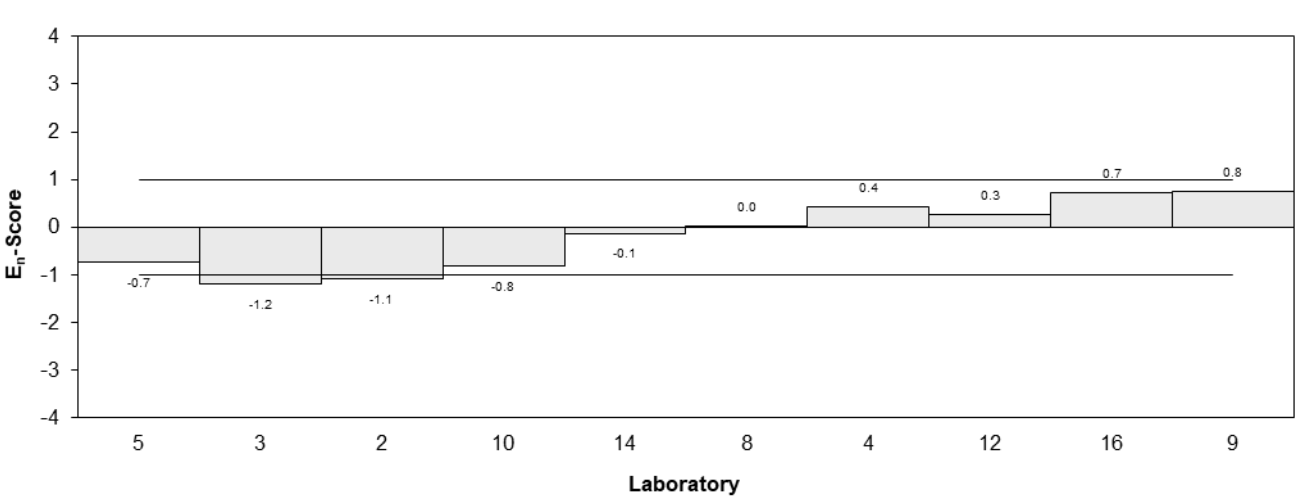

En-Scores: S1 - MeFOSA
En-Score
Laboratory
-0.7 -1.2 -1.1 -0.8 -0.1 0.0 0.4 0.3 0.7 0.8
5 3 2 10 14 8 4 12 16 9

Figure 24

Table 27

Sample Details

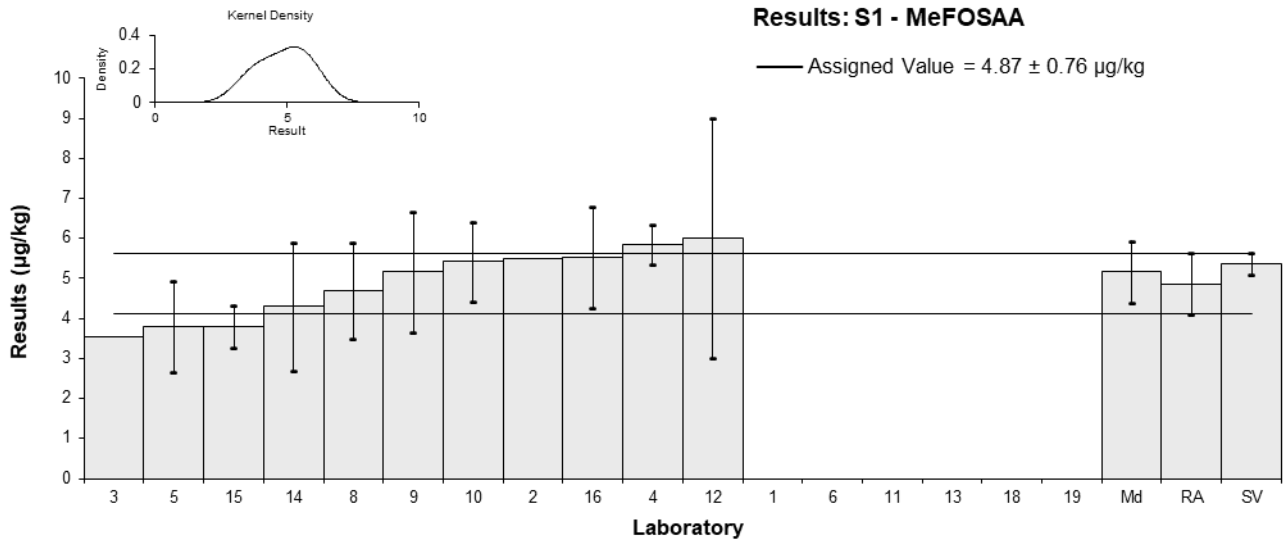
Sample No.	S1
Matrix	Fish paste
Analyte	N-MeFOSAA
Unit	µg/kg

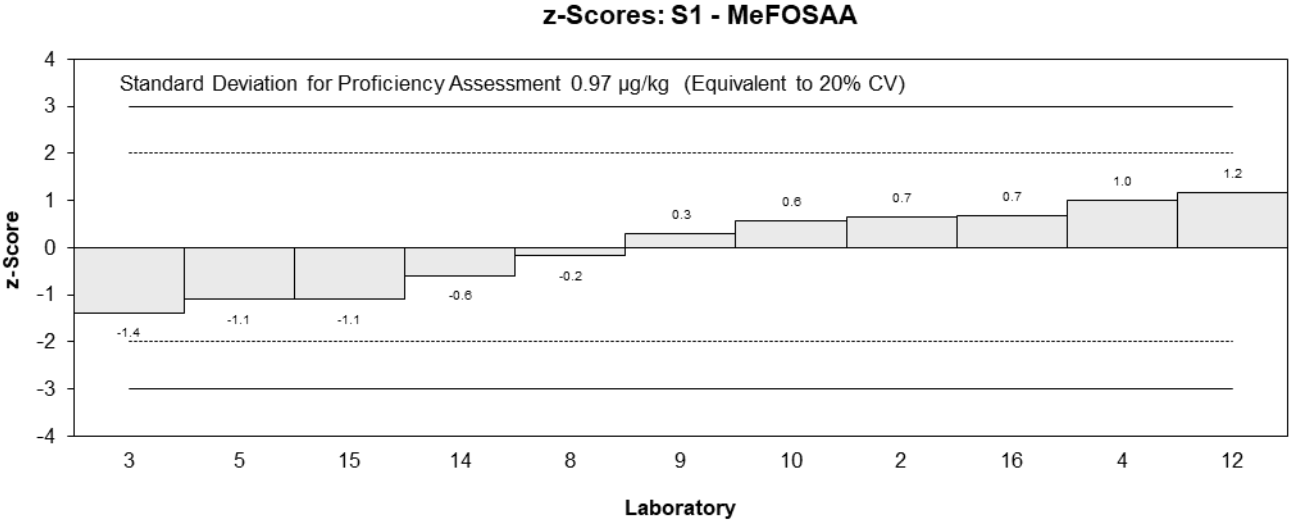
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	5.5	NR	121	0.65	0.83
3	3.53	NR	NR	-1.38	-1.76
4	5.85	0.49	96	1.01	1.08
5	3.8	1.14	85	-1.10	-0.78
6	NR	NR	NR		
8	4.7	1.2	86	-0.17	-0.12
9	5.16	1.5	80	0.30	0.17
10	5.42	1	85.9	0.56	0.44
11	NT	NT	NT		
12	6	3	NR	1.16	0.37
13	NT	NT	NT		
14	4.3	1.6	NT	-0.59	-0.32
15	3.8	0.54	NR	-1.10	-1.15
16	5.518	1.26	109	0.67	0.44
18	NT	NT	NT		
19	NT	NT	NT		

Statistics

Assigned Value	4.87	0.76
Spike Value	5.37	0.27
Robust Average	4.87	0.76
Median	5.16	0.77
Mean	4.87	
N	11	
Max	6	
Min	3.53	
Robust SD	1.0	
Robust CV	21%	


Kernel Density
Density
Result
Results: S1 - MeFOSAA
Assigned Value = 4.87 ± 0.76 µg/kg
Results (µg/kg)
Laboratory
3 5 15 14 8 9 10 2 16 4 12 1 6 11 13 18 19 Md RA SV


z-Scores: S1 - MeFOSAA
Standard Deviation for Proficiency Assessment 0.97 µg/kg (Equivalent to 20% CV)
z-Score
-1.4 -1.1 -1.1 -0.6 -0.2 0.3 0.6 0.7 0.7 1.0 1.2
Laboratory
3 5 15 14 8 9 10 2 16 4 12

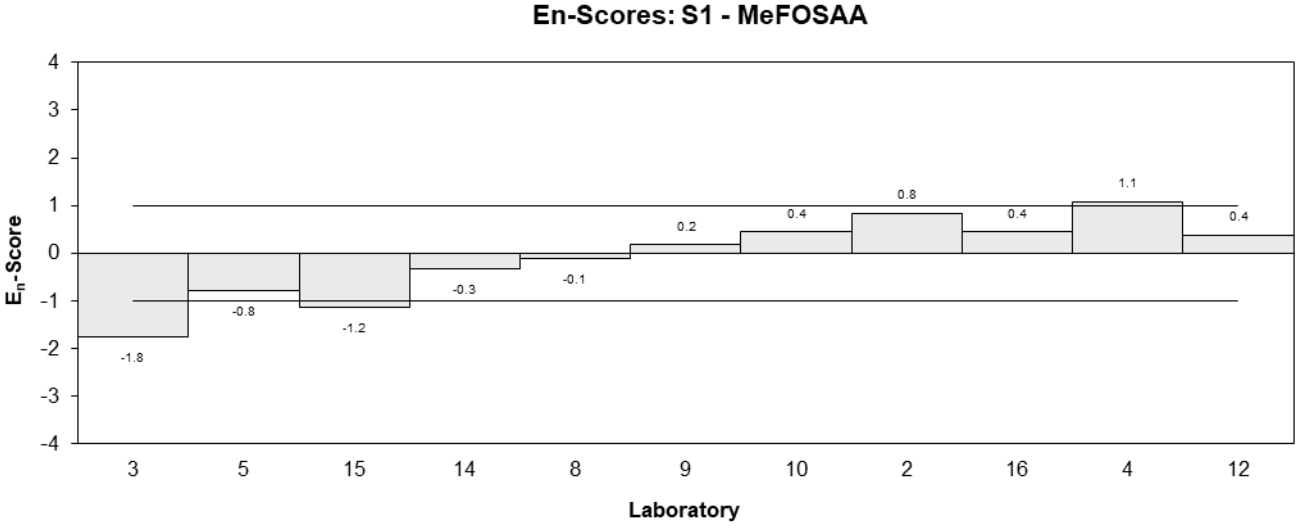

En-Scores: S1 - MeFOSAA
En-Score
-1.8 -0.8 -1.2 -0.3 -0.1 0.2 0.4 0.8 0.4 1.1 0.4
Laboratory
3 5 15 14 8 9 10 2 16 4 12

Figure 25

Table 28

Sample Details

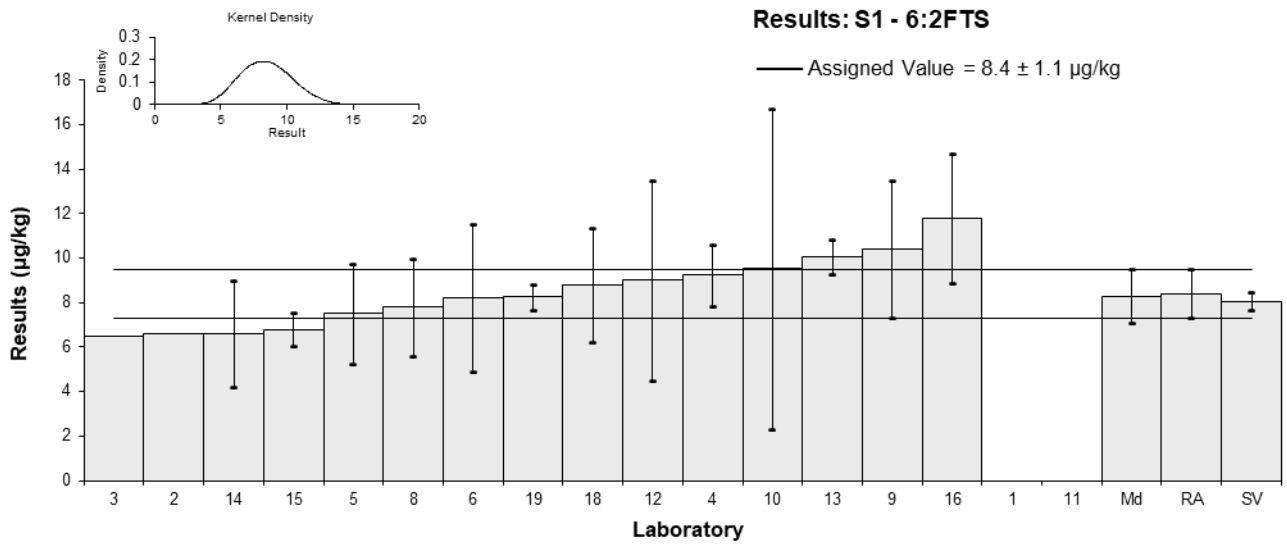
Sample No.	S1
Matrix	Fish paste
Analyte	6:2FTS
Unit	µg/kg

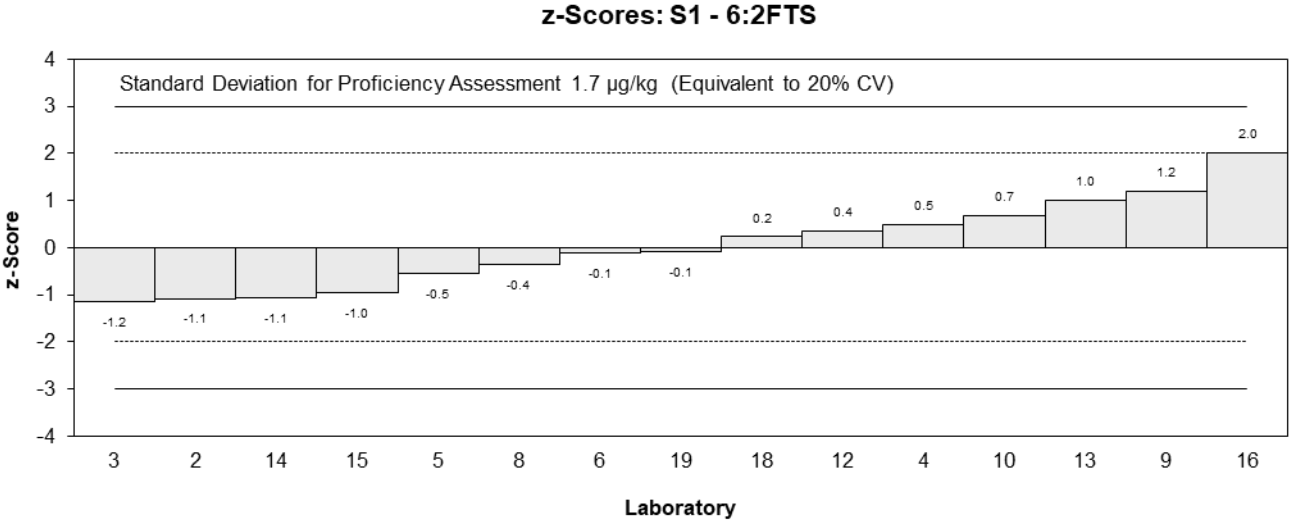
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	6.58	NR	173	-1.08	-1.65
3	6.47	NR	NR	-1.15	-1.75
4	9.23	1.4	86	0.49	0.47
5	7.5	2.25	94	-0.54	-0.36
6	8.21	3.3	69	-0.11	-0.05
8	7.8	2.2	86	-0.36	-0.24
9	10.4	3.1	78	1.19	0.61
10	9.52	7.19	83.2	0.67	0.15
11	NT	NT	NT		
12	9	4.5	102	0.36	0.13
13	10.077	0.792	56	1.00	1.24
14	6.6	2.4	NT	-1.07	-0.68
15	6.8	0.74	NR	-0.95	-1.21
16	11.78	2.91	147	2.01	1.09
18	8.79	2.55	87.0	0.23	0.14
19	8.25	0.57	103	-0.09	-0.12

Statistics

Assigned Value	8.4	1.1
Spike Value	8.06	0.40
Robust Average	8.4	1.1
Median	8.3	1.2
Mean	8.47	
N	15	
Max	11.78	
Min	6.47	
Robust SD	1.6	
Robust CV	20%	


Kernel Density
Density
Result
Results: S1 - 6:2FTS
Assigned Value = 8.4 ± 1.1 µg/kg
Results (µg/kg)
Laboratory
3 2 14 15 5 8 6 19 18 12 4 10 13 9 16 1 11 Md RA SV


z-Scores: S1 - 6:2FTS
Standard Deviation for Proficiency Assessment 1.7 µg/kg (Equivalent to 20% CV)
z-Score
-1.2 -1.1 -1.1 -1.0 -0.5 -0.4 -0.1 -0.1 0.2 0.4 0.5 0.7 1.0 1.2 2.0
Laboratory
3 2 14 15 5 8 6 19 18 12 4 10 13 9 16

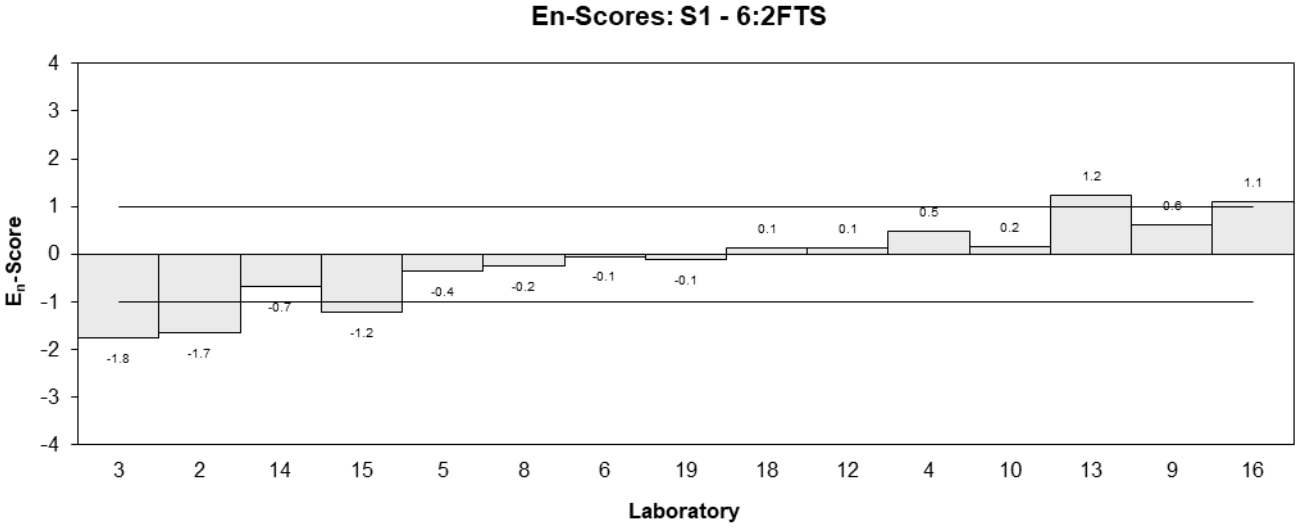

En-Scores: S1 - 6:2FTS
En-Score
-1.8 -1.7 -0.7 -1.2 -0.4 -0.2 -0.1 -0.1 0.1 0.1 0.5 0.2 1.2 0.6 1.1
Laboratory
3 2 14 15 5 8 6 19 18 12 4 10 13 9 16

Figure 26

Table 29

Sample Details

Sample No.	S1
Matrix	Fish paste
Analyte	3:3FTCA
Unit	µg/kg

Participant Results

Lab. Code	Result	Uncertainty	Rec
1	NT	NT	NT
2	25	NR	105
3	22	NR	NR
4	33.25	1.68	99
5	NT	NT	NT
6	11.83	0.474	77
8	NT	NT	NT
9	28.2	13	NR
10	NT	NT	NT
11	NT	NT	NT
12	19	10	NR
13	NT	NT	NT
14	3.3	1.2	NT
15	<0.5	NR	NR
16	12.78	NR	92
18	NT	NT	NT
19	NT	NT	NT

Statistics

Assigned Value	Not Set	
Spike Value	31.3	1.6
Robust Average	19.4	9.8
Median	21	10
Mean	19.4	
N	8	
Max	33.25	
Min	3.3	
Robust SD	11	
Robust CV	57%	

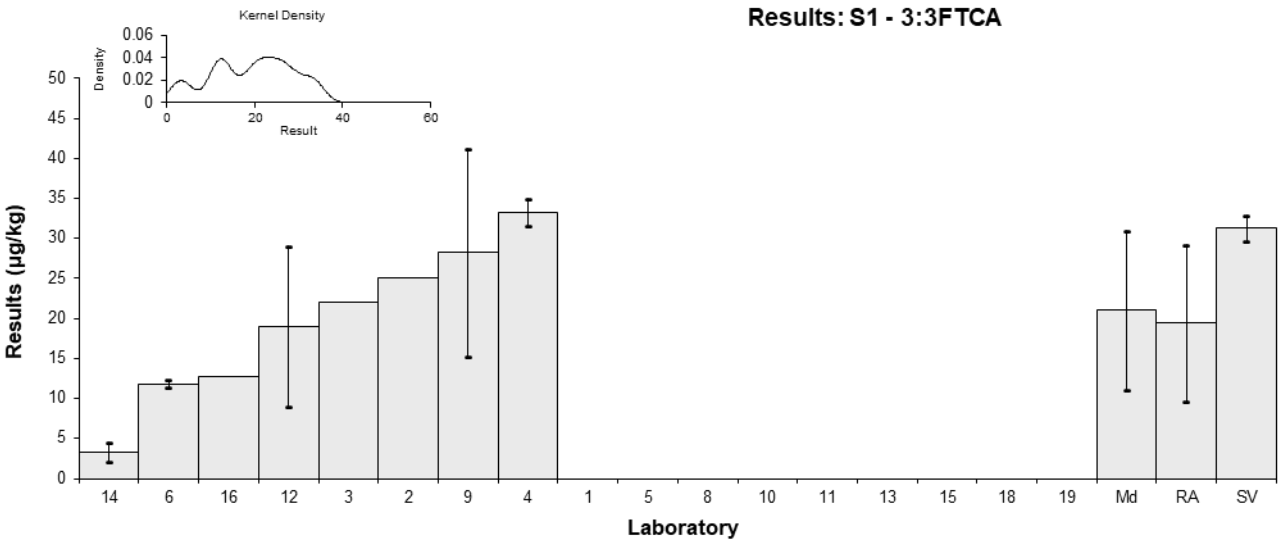

Results: S1 - 3:3FTCA
Kernel Density
Density
0.06
0.04
0.02
0
0
20
40
60
Result
Results (µg/kg)
50
45
40
35
30
25
20
15
10
5
0
14
6
16
12
3
2
9
4
1
5
8
10
11
13
15
18
19
Md
RA
SV
Laboratory

Figure 27

Table 30

Sample Details

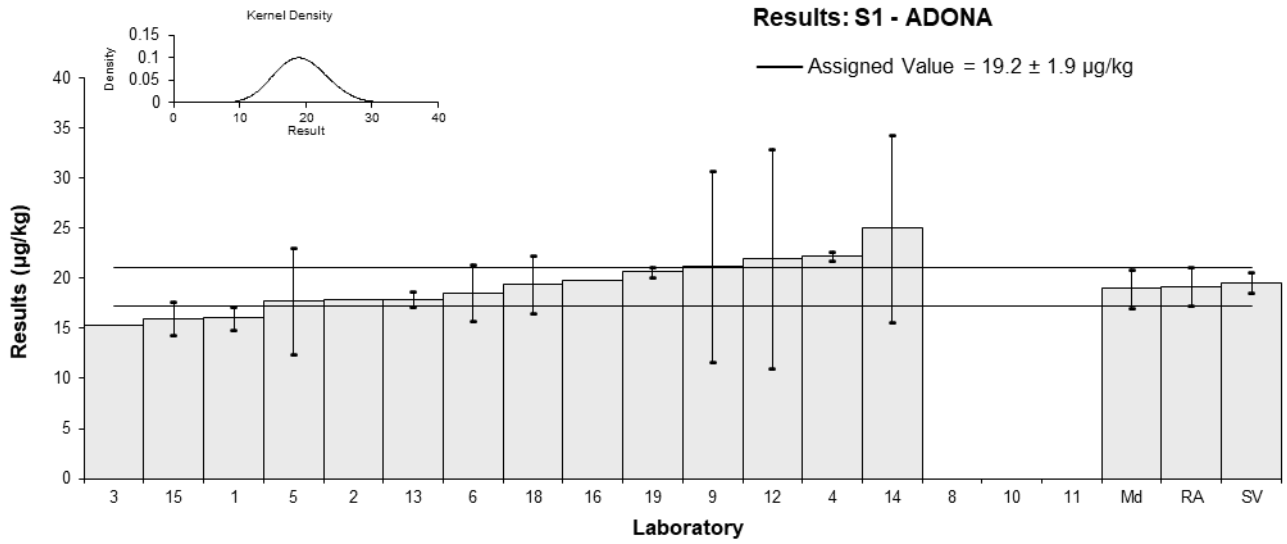
Sample No.	S1
Matrix	Fish paste
Analyte	ADONA
Unit	µg/kg

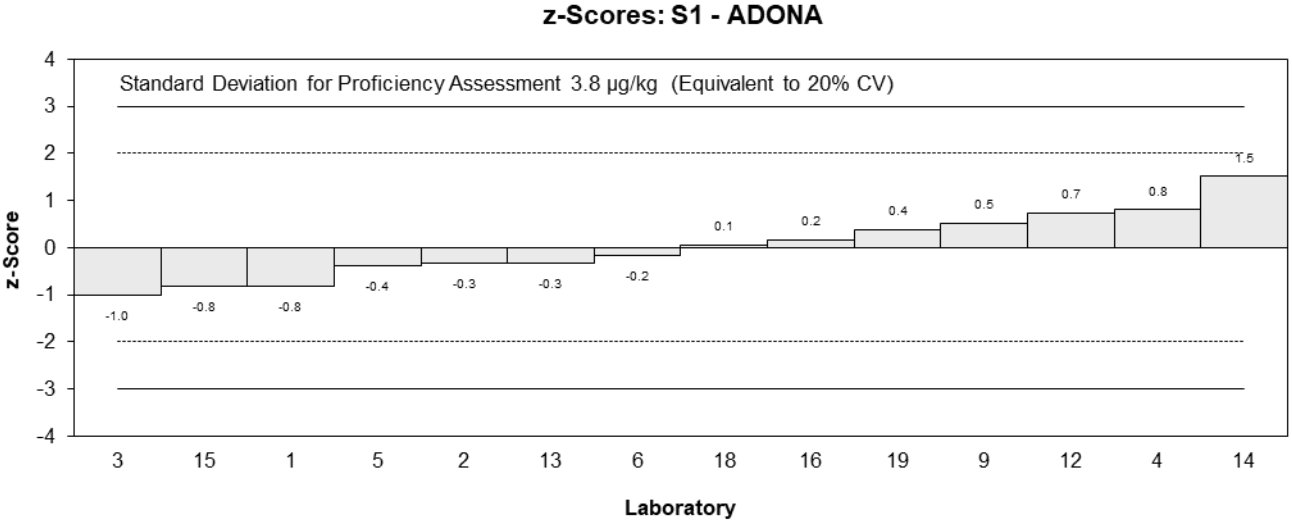
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	16.03	1.14	NR	-0.83	-1.43
2	17.9	NR	120	-0.34	-0.68
3	15.3	NR	NR	-1.02	-2.05
4	22.26	0.47	94	0.80	1.56
5	17.7	5.31	95	-0.39	-0.27
6	18.57	2.86	82	-0.16	-0.18
8	NT	NT	NT		
9	21.2	9.5	NR	0.52	0.21
10	NT	NT	NT		
11	NT	NT	NT		
12	22	11	NR	0.73	0.25
13	17.92	0.739	79	-0.33	-0.63
14	25	9.3	NT	1.51	0.61
15	16.0	1.7	NR	-0.83	-1.26
16	19.8	NR	86	0.16	0.32
18	19.4	2.90	97.6	0.05	0.06
19	20.64	0.54	79	0.38	0.73

Statistics

Assigned Value	19.2	1.9
Spike Value	19.6	1.0
Robust Average	19.2	1.9
Median	19.0	1.9
Mean	19.3	
N	14	
Max	25	
Min	15.3	
Robust SD	2.9	
Robust CV	15%	


Kernel Density
Density
Result
Results: S1 - ADONA
Assigned Value = 19.2 ± 1.9 µg/kg
Results (µg/kg)
Laboratory
3 15 1 5 2 13 6 18 16 19 9 12 4 14 8 10 11 Md RA SV


z-Scores: S1 - ADONA
Standard Deviation for Proficiency Assessment 3.8 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
3 15 1 5 2 13 6 18 16 19 9 12 4 14
-1.0 -0.8 -0.8 -0.4 -0.3 -0.3 -0.2 0.1 0.2 0.4 0.5 0.7 0.8 1.5

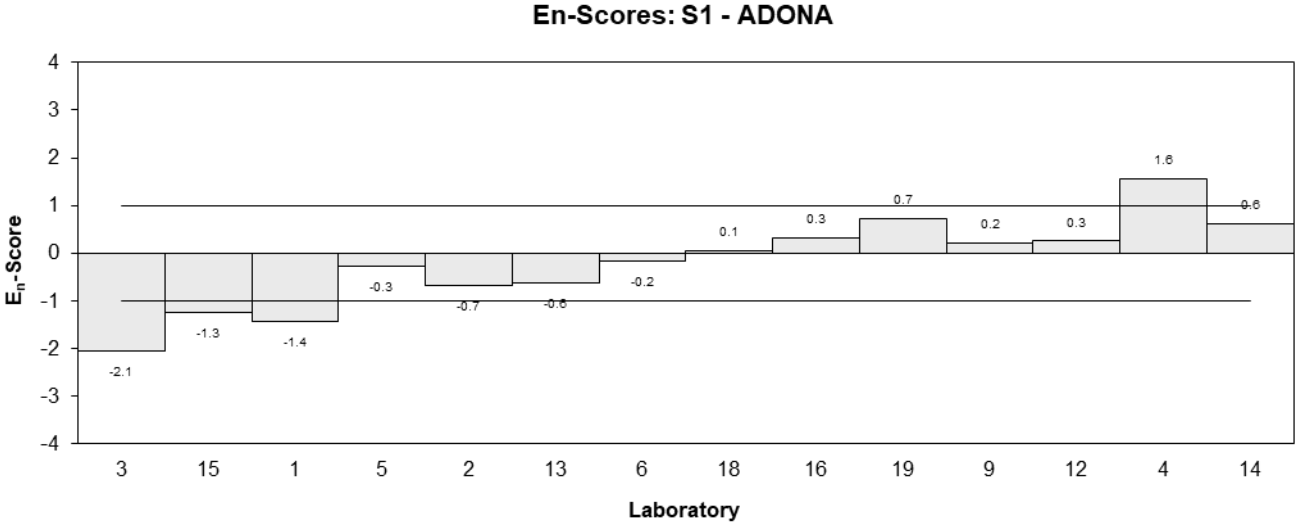

En-Scores: S1 - ADONA
En-Score
Laboratory
3 15 1 5 2 13 6 18 16 19 9 12 4 14
-2.1 -1.3 -1.4 -0.3 -0.7 -0.6 -0.2 0.1 0.3 0.7 0.2 0.3 1.6 0.6

Figure 28

Table 31

Sample Details

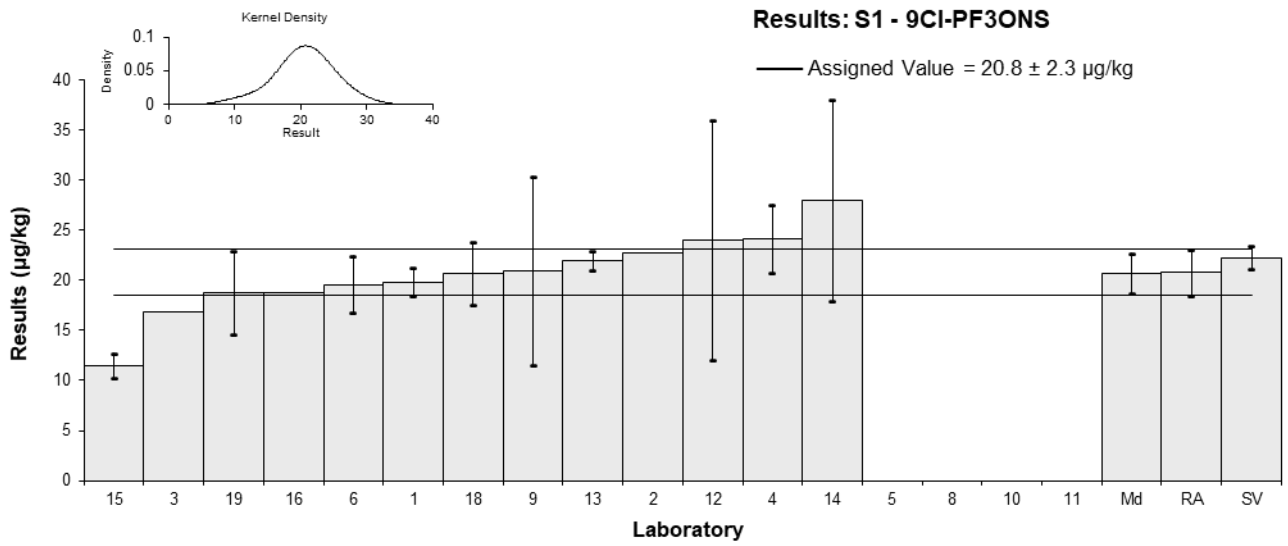
Sample No.	S1
Matrix	Fish paste
Analyte	9Cl-PF3ONS
Unit	µg/kg

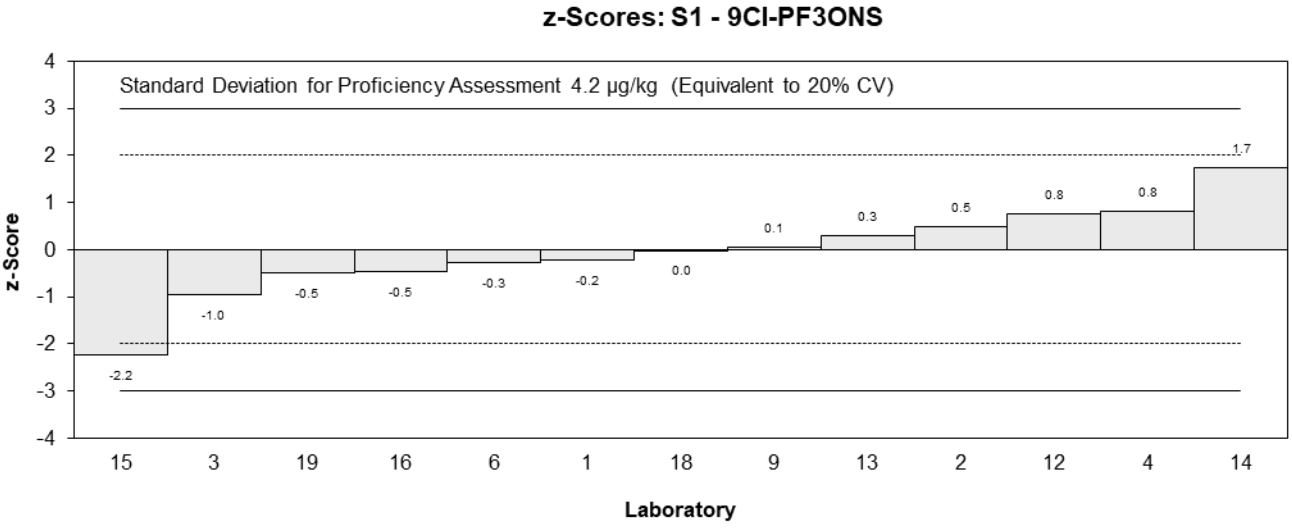
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	19.85	1.41	NR	-0.23	-0.35
2	22.8	NR	96	0.48	0.87
3	16.8	NR	NR	-0.96	-1.74
4	24.19	3.41	94	0.81	0.82
5	NT	NT	NT		
6	19.6	2.86	83	-0.29	-0.33
8	NT	NT	NT		
9	21	9.4	NR	0.05	0.02
10	NT	NT	NT		
11	NT	NT	NT		
12	24	12	NR	0.77	0.26
13	21.988	0.949	91	0.29	0.48
14	28	10	NT	1.73	0.70
15	11.5	1.2	NR	-2.24	-3.58
16	18.79	NR	91	-0.48	-0.87
18	20.7	3.10	114.7	-0.02	-0.03
19	18.77	4.13	80	-0.49	-0.43

Statistics

Assigned Value	20.8	2.3
Spike Value	22.3	1.1
Robust Average	20.8	2.3
Median	20.7	2.0
Mean	20.6	
N	13	
Max	28	
Min	11.5	
Robust SD	3.3	
Robust CV	16%	


Results: S1 - 9Cl-PF3ONS
Assigned Value = 20.8 ± 2.3 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
15 3 19 16 6 1 18 9 13 2 12 4 14 5 8 10 11 Md RA SV


z-Scores: S1 - 9Cl-PF3ONS
Standard Deviation for Proficiency Assessment 4.2 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
15 3 19 16 6 1 18 9 13 2 12 4 14
-2.2 -1.0 -0.5 -0.5 -0.3 -0.2 0.0 0.1 0.3 0.5 0.8 0.8 1.7

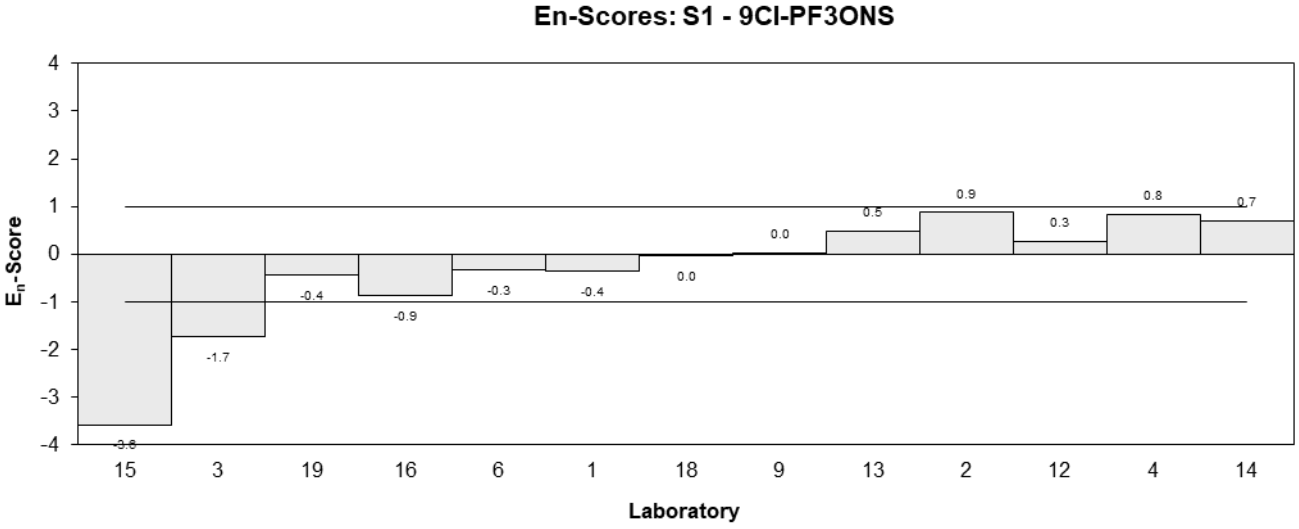

En-Scores: S1 - 9Cl-PF3ONS
En-Score
Laboratory
15 3 19 16 6 1 18 9 13 2 12 4 14
-3.6 -1.7 -0.4 -0.9 -0.3 -0.4 0.0 0.0 0.5 0.9 0.3 0.8 0.7

Figure 29

Table 32

Sample Details

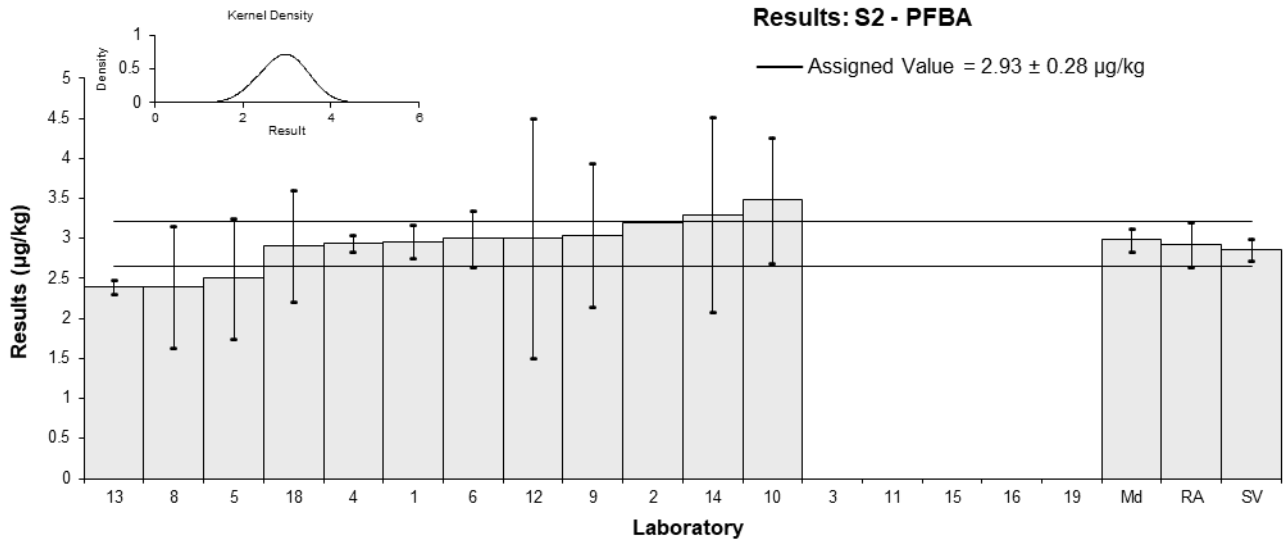
Sample No.	S2
Matrix	Fruit puree
Analyte	PFBA
Unit	µg/kg

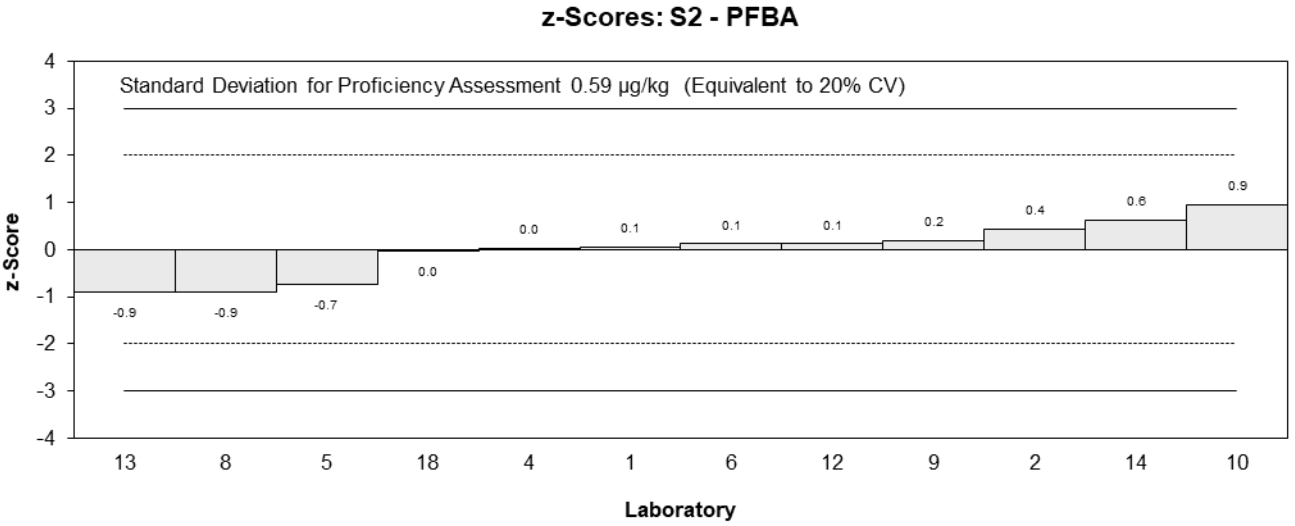
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	2.96	0.21	NR	0.05	0.09
2	3.19	NR	98	0.44	0.93
3	NS	NS	NS		
4	2.94	0.11	105	0.02	0.03
5	2.5	0.75	91	-0.73	-0.54
6	3	0.353	85	0.12	0.16
8	2.4	0.76	85	-0.90	-0.65
9	3.04	0.9	80	0.19	0.12
10	3.48	0.782	11.7	0.94	0.66
11	NS	NS	NS		
12	3	1.5	84	0.12	0.05
13	2.395	0.084	100	-0.91	-1.83
14	3.3	1.22	NT	0.63	0.30
15	NS	NS	NS		
16	<5	NR	88		
18	2.91	0.698	93.7	-0.03	-0.03
19	NS	NS	NS		

Statistics

Assigned Value	2.93	0.28
Spike Value	2.86	0.14
Robust Average	2.93	0.28
Median	2.98	0.15
Mean	2.93	
N	12	
Max	3.48	
Min	2.395	
Robust SD	0.39	
Robust CV	13%	


Results: S2 - PFBA
Kernel Density
Density
Result
Assigned Value = 2.93 ± 0.28 µg/kg
Results (µg/kg)
13 8 5 18 4 1 6 12 9 2 14 10 3 11 15 16 19 Md RA SV
Laboratory


z-Scores: S2 - PFBA
Standard Deviation for Proficiency Assessment 0.59 µg/kg (Equivalent to 20% CV)
z-Score
-0.9 -0.9 -0.7 0.0 0.0 0.1 0.1 0.1 0.2 0.4 0.6 0.9
13 8 5 18 4 1 6 12 9 2 14 10
Laboratory

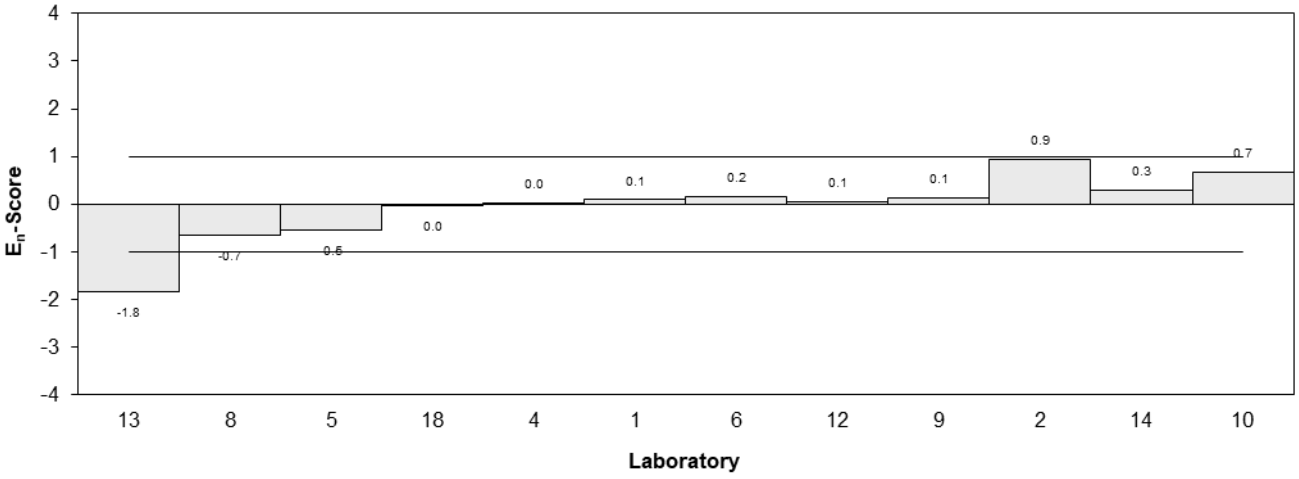

En-Scores: S2 - PFBA
En-Score
-1.8 -0.7 -0.6 0.0 0.0 0.1 0.2 0.1 0.1 0.9 0.3 0.7
13 8 5 18 4 1 6 12 9 2 14 10
Laboratory

Figure 30

Table 33

Sample Details

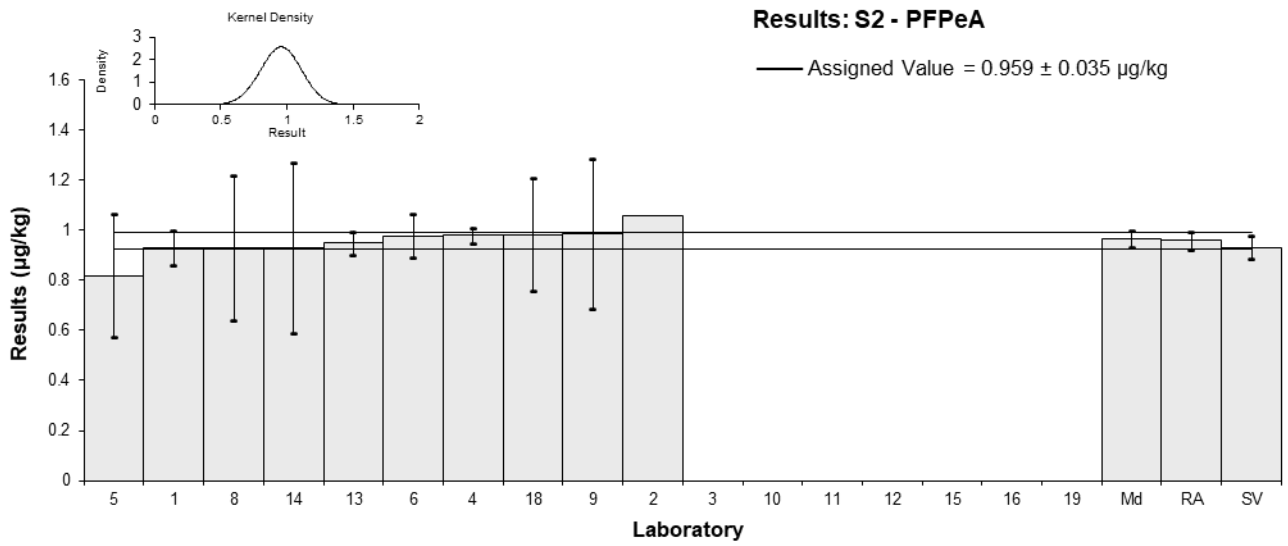
Sample No.	S2
Matrix	Fruit puree
Analyte	PFPeA
Unit	µg/kg

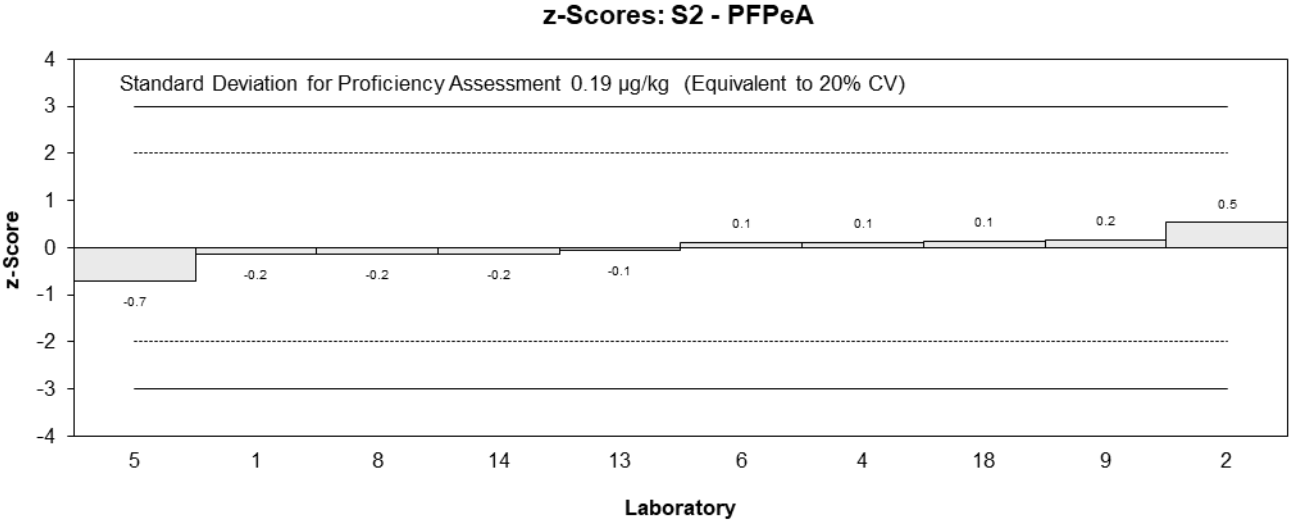
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.93	0.07	NR	-0.15	-0.37
2	1.06	NR	94	0.53	2.89
3	NS	NS	NS		
4	0.98	0.03	98	0.11	0.46
5	0.82	0.246	98	-0.72	-0.56
6	0.979	0.0859	87	0.10	0.22
8	0.93	0.29	118	-0.15	-0.10
9	0.987	0.3	79	0.15	0.09
10	<1.70	NR	14.3		
11	NS	NS	NS		
12	< 2	1	70		
13	0.95	0.046	79	-0.05	-0.16
14	0.93	0.34	NT	-0.15	-0.08
15	NS	NS	NS		
16	<2	NR	103		
18	0.983	0.226	79.3	0.13	0.10
19	NS	NS	NS		

Statistics

Assigned Value	0.959	0.035
Spike Value	0.933	0.047
Robust Average	0.959	0.035
Median	0.965	0.033
Mean	0.955	
N	10	
Max	1.06	
Min	0.82	
Robust SD	0.044	
Robust CV	4.6%	


Kernel Density
Density
Result
Results: S2 - PFPeA
Assigned Value = 0.959 ± 0.035 µg/kg
Results (µg/kg)
Laboratory
5 1 8 14 13 6 4 18 9 2 3 10 11 12 15 16 19 Md RA SV


z-Scores: S2 - PFPeA
Standard Deviation for Proficiency Assessment 0.19 µg/kg (Equivalent to 20% CV)
z-Score
-0.7 -0.2 -0.2 -0.2 -0.1 0.1 0.1 0.1 0.2 0.5
Laboratory
5 1 8 14 13 6 4 18 9 2

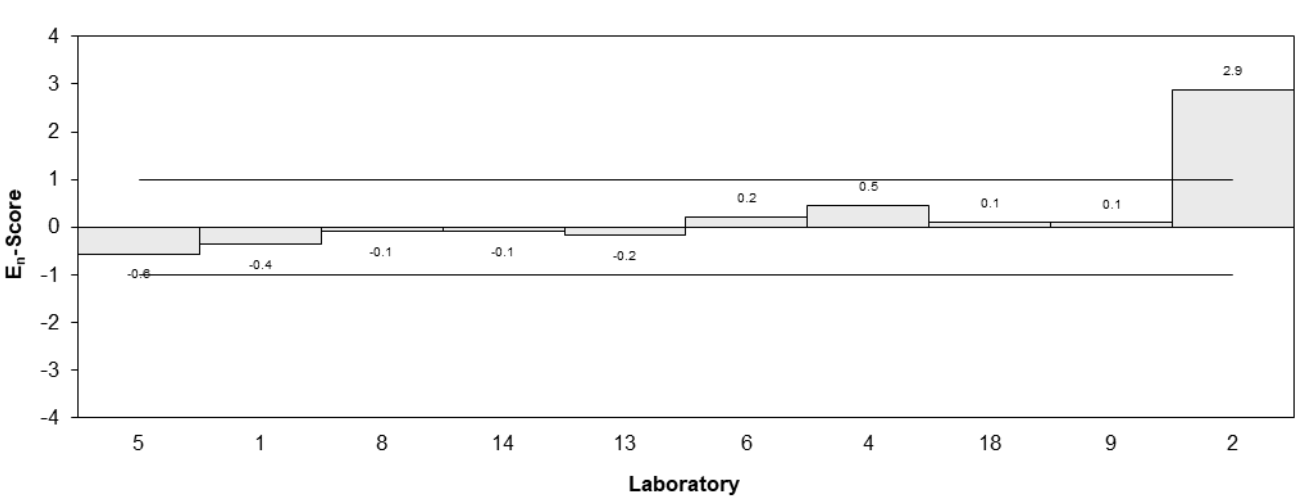

En-Scores: S2 - PFPeA
En-Score
-0.6 -0.4 -0.1 -0.1 -0.2 0.2 0.5 0.1 0.1 2.9
Laboratory
5 1 8 14 13 6 4 18 9 2

Figure 31

Table 34

Sample Details

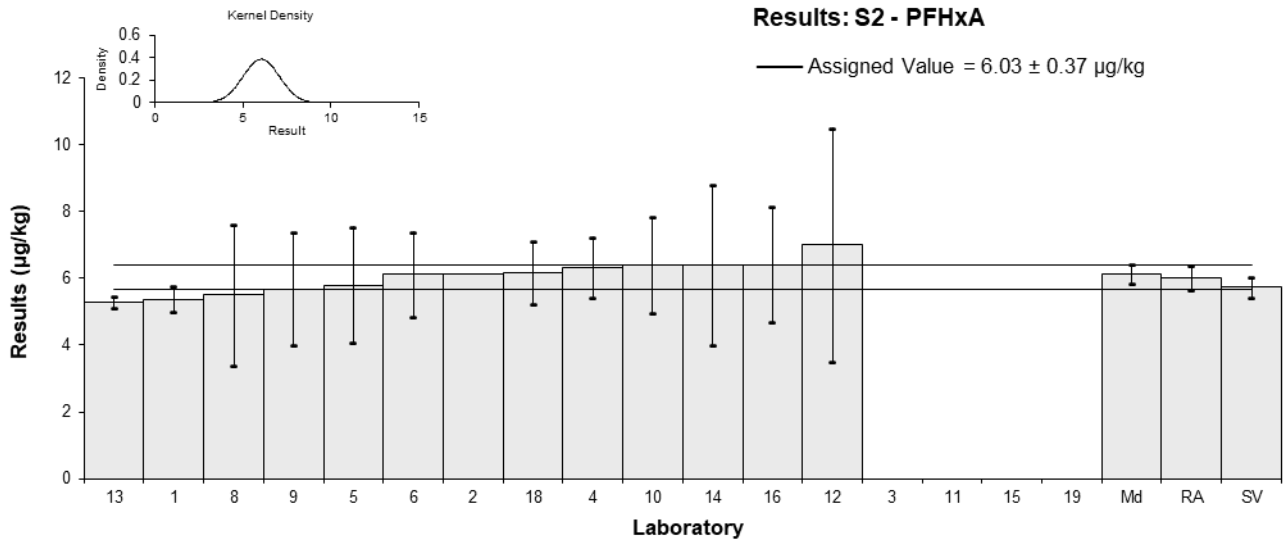
Sample No.	S2
Matrix	Fruit puree
Analyte	PFHxA
Unit	µg/kg

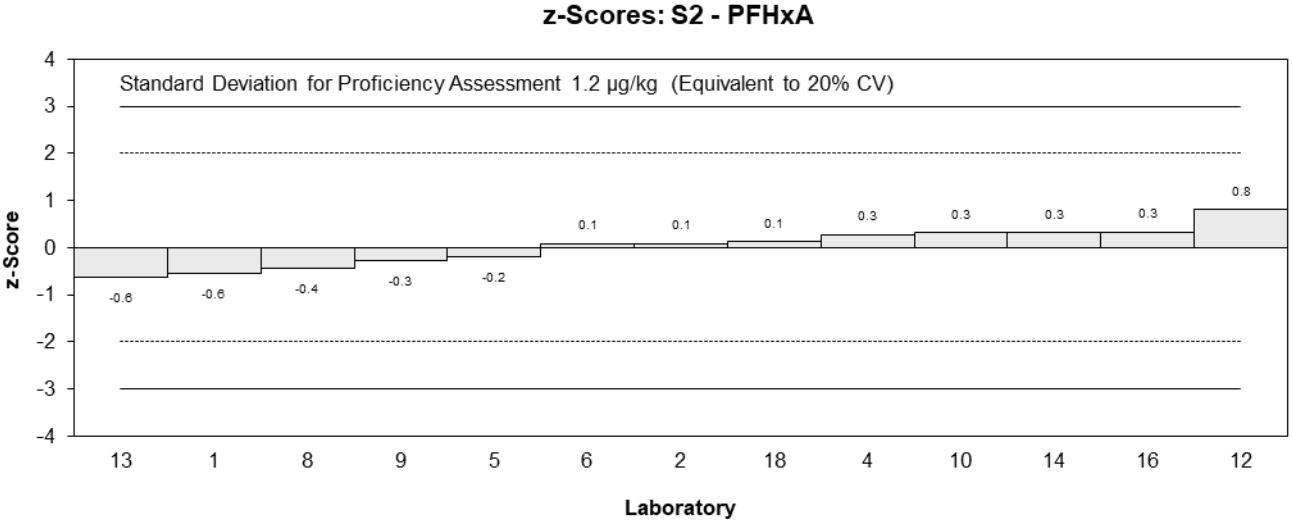
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	5.37	0.38	NR	-0.55	-1.24
2	6.14	NR	108	0.09	0.30
3	NS	NS	NS		
4	6.34	0.9	100	0.26	0.32
5	5.8	1.74	89	-0.19	-0.13
6	6.12	1.28	84	0.07	0.07
8	5.5	2.1	105	-0.44	-0.25
9	5.68	1.7	84	-0.29	-0.20
10	6.4	1.43	21.9	0.31	0.25
11	NS	NS	NS		
12	7	3.5	85	0.80	0.28
13	5.282	0.167	81	-0.62	-1.84
14	6.4	2.4	NT	0.31	0.15
15	NS	NS	NS		
16	6.41	1.73	113	0.32	0.21
18	6.17	0.926	87.5	0.12	0.14
19	NS	NS	NS		

Statistics

Assigned Value	6.03	0.37
Spike Value	5.73	0.29
Robust Average	6.03	0.37
Median	6.14	0.28
Mean	6.05	
N	13	
Max	7	
Min	5.282	
Robust SD	0.53	
Robust CV	8.8%	


Results: S2 - PFHxA
Kernel Density
Density
Result
Assigned Value = 6.03 ± 0.37 µg/kg
Results (µg/kg)
Laboratory
13 1 8 9 5 6 2 18 4 10 14 16 12 3 11 15 19 Md RA SV


z-Scores: S2 - PFHxA
Standard Deviation for Proficiency Assessment 1.2 µg/kg (Equivalent to 20% CV)
z-Score
-0.6 -0.6 -0.4 -0.3 -0.2 0.1 0.1 0.1 0.3 0.3 0.3 0.3 0.8
Laboratory
13 1 8 9 5 6 2 18 4 10 14 16 12

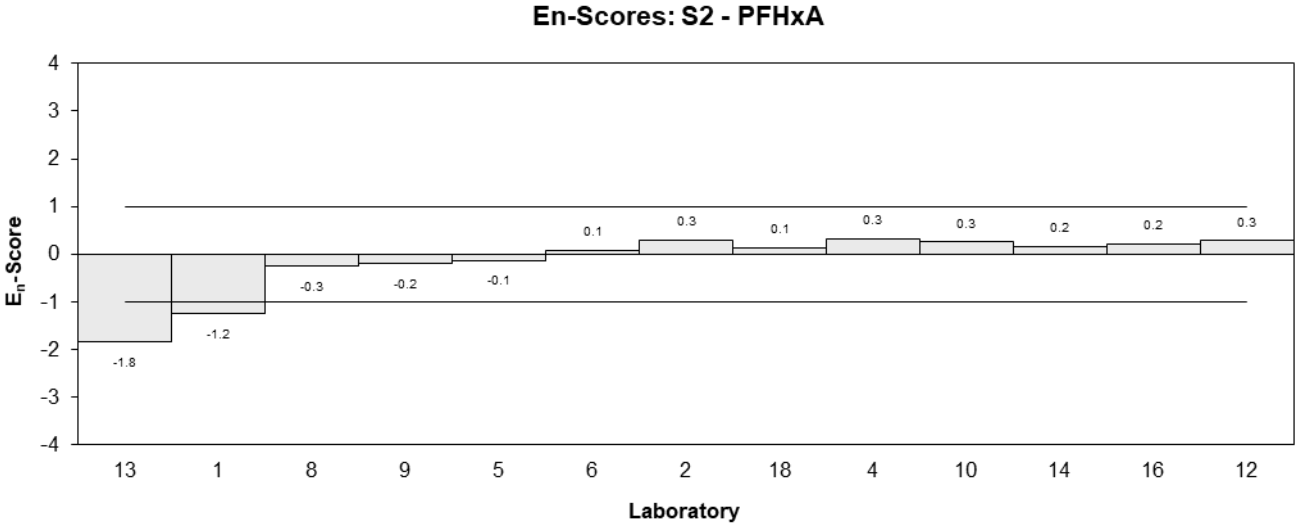

En-Scores: S2 - PFHxA
En-Score
-1.8 -1.2 -0.3 -0.2 -0.1 0.1 0.3 0.1 0.3 0.3 0.2 0.2 0.3
Laboratory
13 1 8 9 5 6 2 18 4 10 14 16 12

Figure 32

Table 35

Sample Details

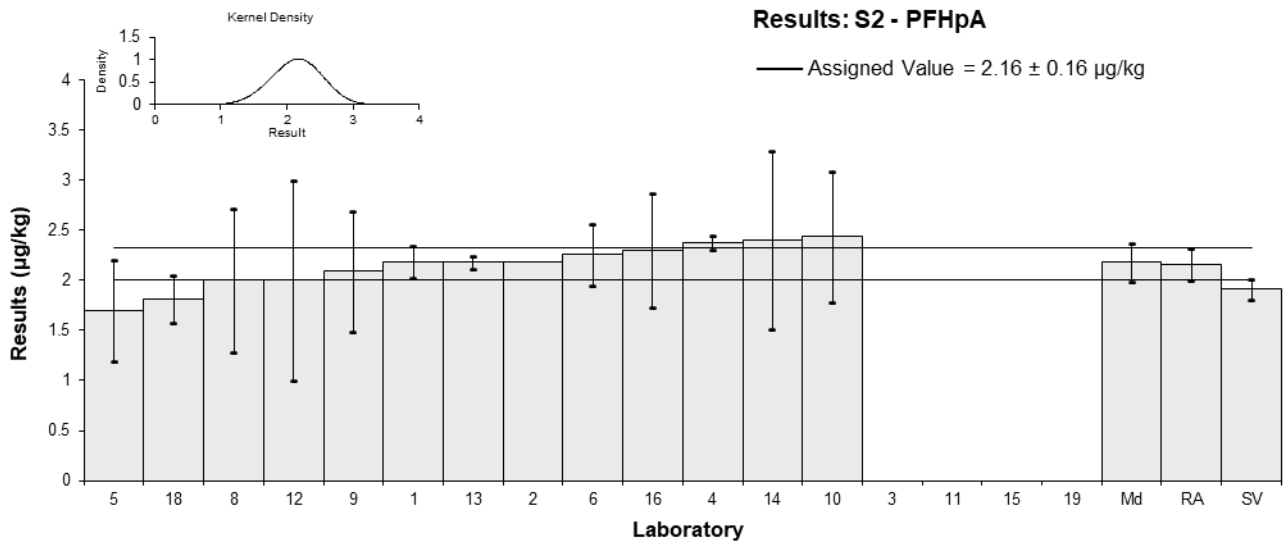
Sample No.	S2
Matrix	Fruit puree
Analyte	PFHpA
Unit	µg/kg

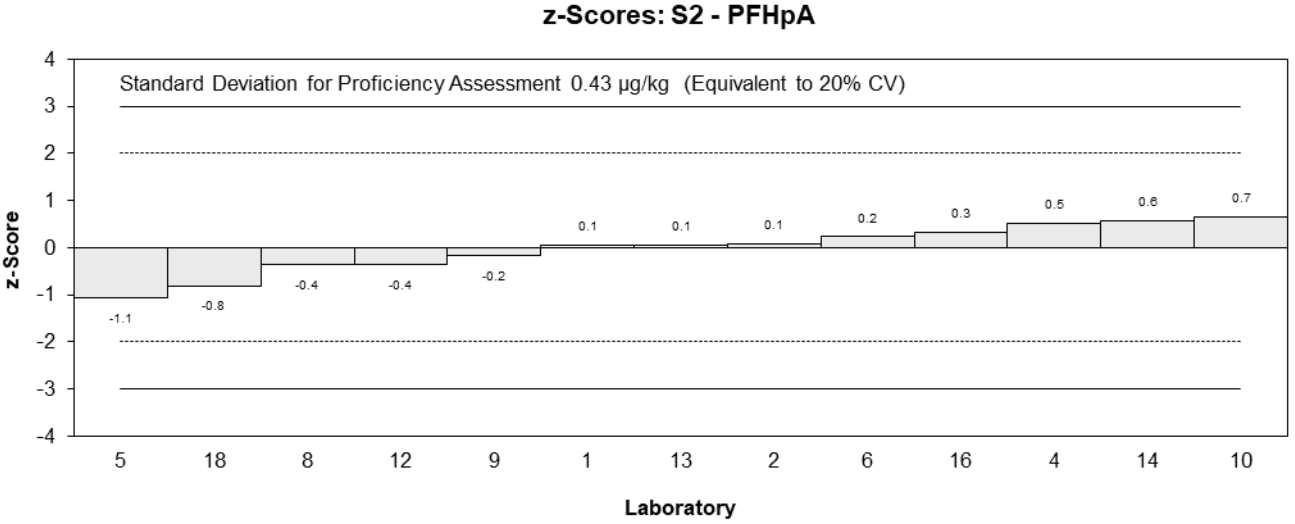
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	2.18	0.16	NR	0.05	0.09
2	2.19	NR	106	0.07	0.19
3	NS	NS	NS		
4	2.38	0.07	90	0.51	1.26
5	1.7	0.51	92	-1.06	-0.86
6	2.26	0.309	74	0.23	0.29
8	2.0	0.72	81	-0.37	-0.22
9	2.09	0.6	78	-0.16	-0.11
10	2.44	0.655	46.4	0.65	0.42
11	NS	NS	NS		
12	2	1	85	-0.37	-0.16
13	2.181	0.06	81	0.05	0.12
14	2.4	0.89	NT	0.56	0.27
15	NS	NS	NS		
16	2.298	0.57	111	0.32	0.23
18	1.81	0.235	90.5	-0.81	-1.23
19	NS	NS	NS		

Statistics

Assigned Value	2.16	0.16
Spike Value	1.91	0.10
Robust Average	2.16	0.16
Median	2.18	0.19
Mean	2.15	
N	13	
Max	2.44	
Min	1.7	
Robust SD	0.24	
Robust CV	11%	


Results: S2 - PFHpA
Assigned Value = 2.16 ± 0.16 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
5 18 8 12 9 1 13 2 6 16 4 14 10 3 11 15 19 Md RA SV
Laboratory


z-Scores: S2 - PFHpA
Standard Deviation for Proficiency Assessment 0.43 µg/kg (Equivalent to 20% CV)
z-Score
-1.1 -0.8 -0.4 -0.4 -0.2 0.1 0.1 0.1 0.2 0.3 0.5 0.6 0.7
5 18 8 12 9 1 13 2 6 16 4 14 10
Laboratory

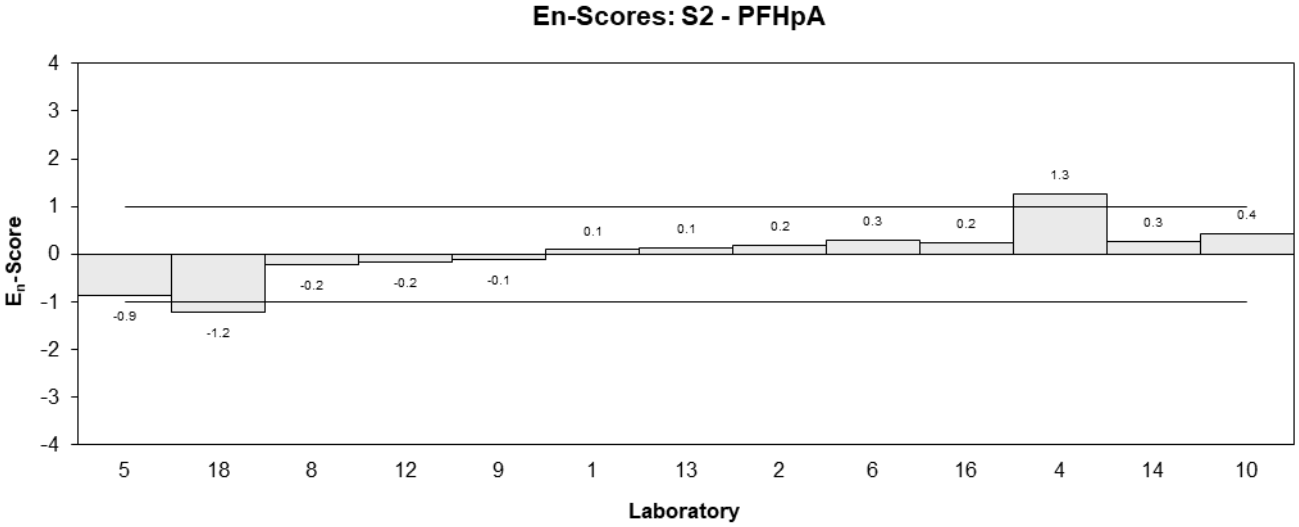

En-Scores: S2 - PFHpA
En-Score
-0.9 -1.2 -0.2 -0.2 -0.1 0.1 0.1 0.2 0.3 0.2 1.3 0.3 0.4
5 18 8 12 9 1 13 2 6 16 4 14 10
Laboratory

Figure 33

Table 36

Sample Details

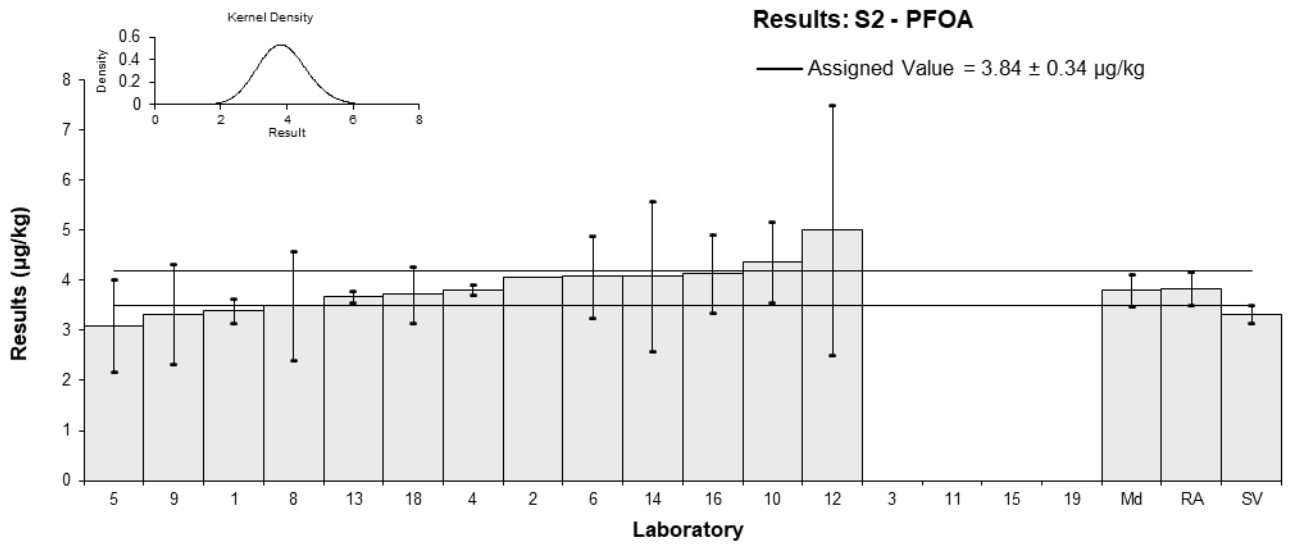
Sample No.	S2
Matrix	Fruit puree
Analyte	PFOA
Unit	µg/kg

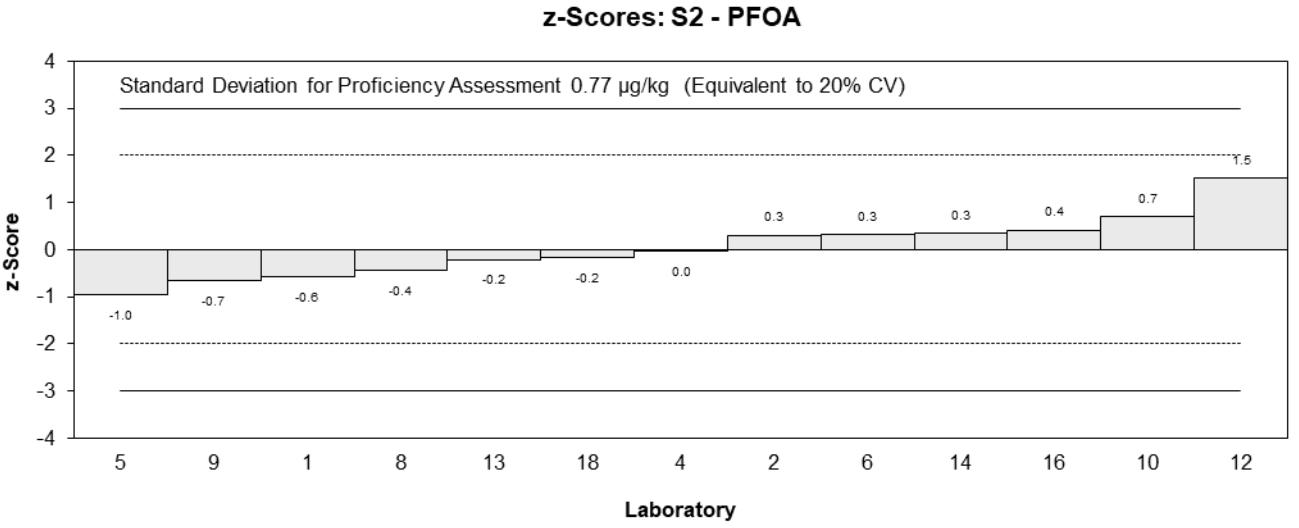
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	3.40	0.24	NR	-0.57	-1.06
2	4.06	NR	114	0.29	0.65
3	NS	NS	NS		
4	3.81	0.1	90	-0.04	-0.08
5	3.1	0.93	92	-0.96	-0.75
6	4.08	0.812	66	0.31	0.27
8	3.5	1.1	106	-0.44	-0.30
9	3.33	1.0	77	-0.66	-0.48
10	4.37	0.796	64.1	0.69	0.61
11	NS	NS	NS		
12	5	2.5	75	1.51	0.46
13	3.677	0.125	80	-0.21	-0.45
14	4.1	1.5	NT	0.34	0.17
15	NS	NS	NS		
16	4.144	0.78	122	0.40	0.36
18	3.72	0.557	90.5	-0.16	-0.18
19	NS	NS	NS		

Statistics

Assigned Value	3.84	0.34
Spike Value	3.33	0.17
Robust Average	3.84	0.34
Median	3.81	0.32
Mean	3.87	
N	13	
Max	5	
Min	3.1	
Robust SD	0.49	
Robust CV	13%	


Kernel Density
Density
Result
Results: S2 - PFOA
Assigned Value = 3.84 ± 0.34 µg/kg
Results (µg/kg)
Laboratory
5 9 1 8 13 18 4 2 6 14 16 10 12 3 11 15 19 Md RA SV


z-Scores: S2 - PFOA
Standard Deviation for Proficiency Assessment 0.77 µg/kg (Equivalent to 20% CV)
z-Score
-1.0 -0.7 -0.6 -0.4 -0.2 -0.2 0.0 0.3 0.3 0.3 0.4 0.7 1.5
Laboratory
5 9 1 8 13 18 4 2 6 14 16 10 12

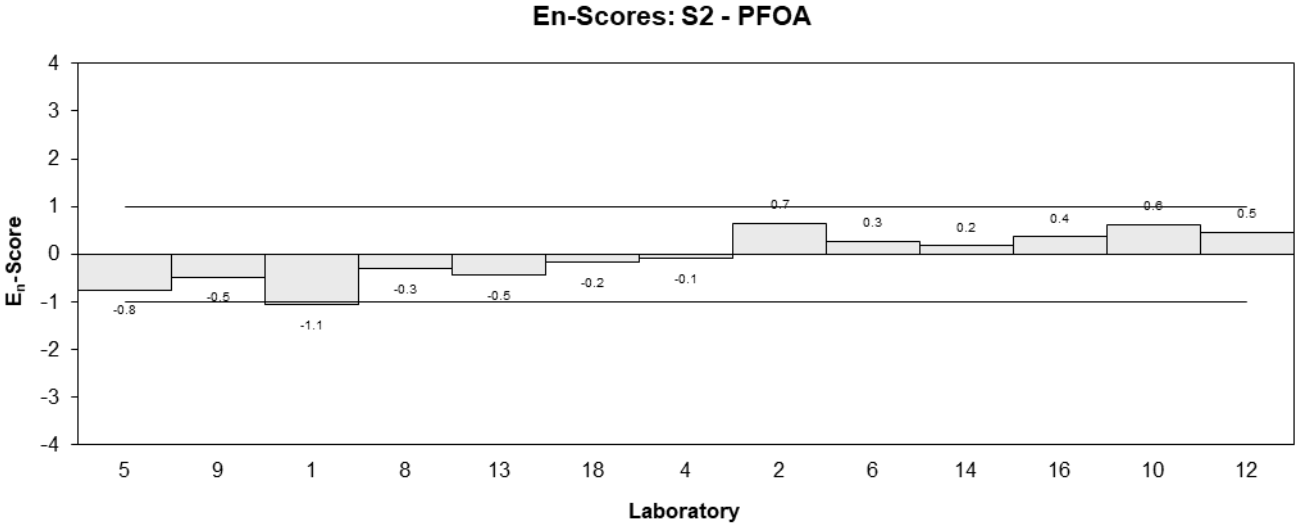

En-Scores: S2 - PFOA
En-Score
-0.8 -0.5 -1.1 -0.3 -0.5 -0.2 -0.1 0.7 0.3 0.2 0.4 0.6 0.5
Laboratory
5 9 1 8 13 18 4 2 6 14 16 10 12

Figure 34

Table 37

Sample Details

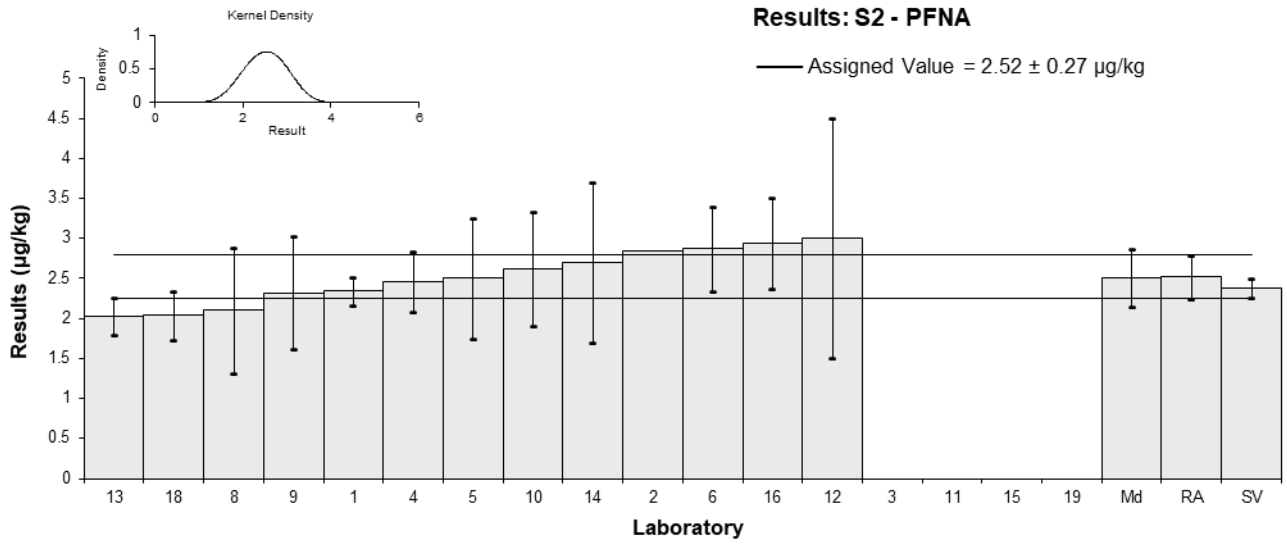
Sample No.	S2
Matrix	Fruit puree
Analyte	PFNA
Unit	µg/kg

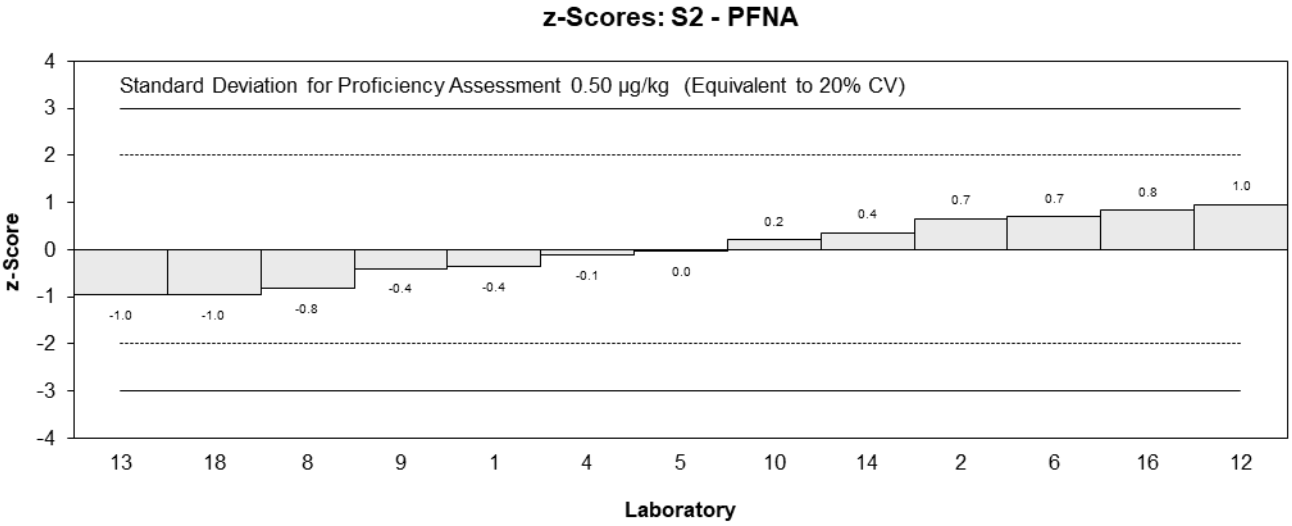
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	2.34	0.17	NR	-0.36	-0.56
2	2.85	NR	114	0.65	1.22
3	NS	NS	NS		
4	2.46	0.38	82	-0.12	-0.13
5	2.5	0.75	136	-0.04	-0.03
6	2.87	0.527	51	0.69	0.59
8	2.1	0.79	90	-0.83	-0.50
9	2.32	0.7	74	-0.40	-0.27
10	2.62	0.711	65.5	0.20	0.13
11	NS	NS	NS		
12	3	1.5	115	0.95	0.31
13	2.031	0.235	80	-0.97	-1.37
14	2.7	1.0	NT	0.36	0.17
15	NS	NS	NS		
16	2.938	0.57	121	0.83	0.66
18	2.04	0.307	90.5	-0.95	-1.17
19	NS	NS	NS		

Statistics

Assigned Value	2.52	0.27
Spike Value	2.38	0.12
Robust Average	2.52	0.27
Median	2.50	0.36
Mean	2.52	
N	13	
Max	3	
Min	2.031	
Robust SD	0.39	
Robust CV	15%	


Kernel Density
Density
Result
Results: S2 - PFNA
Assigned Value = 2.52 ± 0.27 µg/kg
Results (µg/kg)
Laboratory
13 18 8 9 1 4 5 10 14 2 6 16 12 3 11 15 19 Md RA SV


z-Scores: S2 - PFNA
Standard Deviation for Proficiency Assessment 0.50 µg/kg (Equivalent to 20% CV)
z-Score
-1.0 -1.0 -0.8 -0.4 -0.4 -0.1 0.0 0.2 0.4 0.7 0.7 0.8 1.0
Laboratory
13 18 8 9 1 4 5 10 14 2 6 16 12

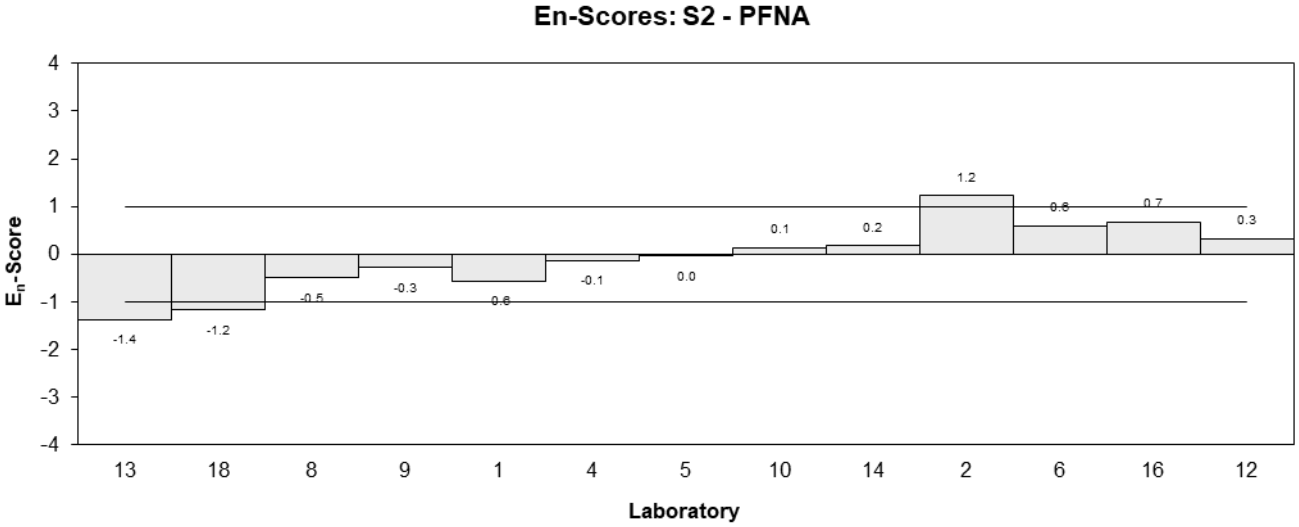

En-Scores: S2 - PFNA
En-Score
-1.4 -1.2 -0.5 -0.3 -0.6 -0.1 0.0 0.1 0.2 1.2 0.6 0.7 0.3
Laboratory
13 18 8 9 1 4 5 10 14 2 6 16 12

Figure 35

Table 38

Sample Details

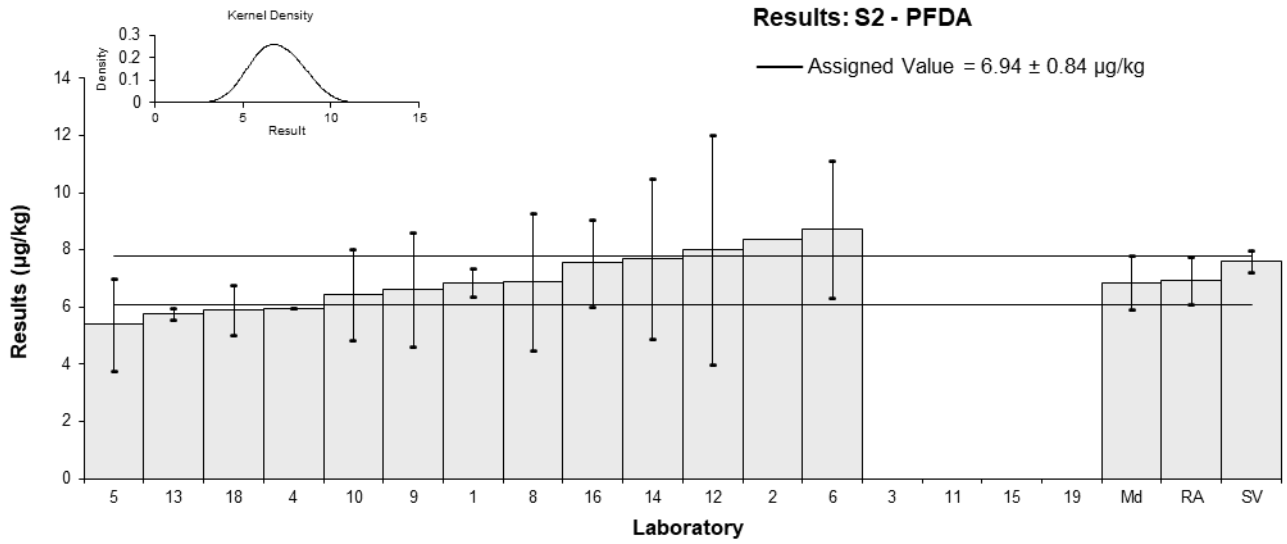
Sample No.	S2
Matrix	Fruit puree
Analyte	PFDA
Unit	µg/kg

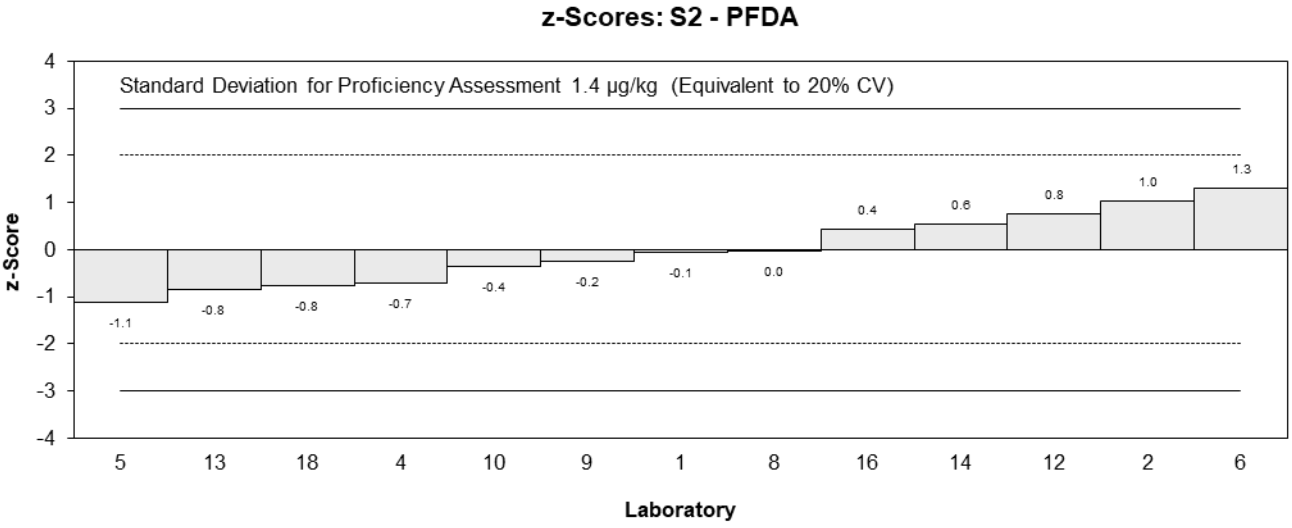
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	6.86	0.49	NR	-0.06	-0.08
2	8.38	NR	101	1.04	1.71
3	NS	NS	NS		
4	5.96	0	91	-0.71	-1.17
5	5.4	1.62	95	-1.11	-0.84
6	8.74	2.4	26	1.30	0.71
8	6.9	2.4	87	-0.03	-0.02
9	6.6	2.0	69	-0.24	-0.16
10	6.45	1.6	73.5	-0.35	-0.27
11	NS	NS	NS		
12	8	4	61	0.76	0.26
13	5.777	0.202	80	-0.84	-1.35
14	7.7	2.8	NT	0.55	0.26
15	NS	NS	NS		
16	7.548	1.52	121	0.44	0.35
18	5.89	0.883	87.7	-0.76	-0.86
19	NS	NS	NS		

Statistics

Assigned Value	6.94	0.84
Spike Value	7.62	0.38
Robust Average	6.94	0.84
Median	6.86	0.93
Mean	6.94	
N	13	
Max	8.74	
Min	5.4	
Robust SD	1.2	
Robust CV	17%	


Results: S2 - PFDA
Kernel Density
Density
Result
Assigned Value = 6.94 ± 0.84 µg/kg
Results (µg/kg)
Laboratory
5 13 18 4 10 9 1 8 16 14 12 2 6 3 11 15 19 Md RA SV


z-Scores: S2 - PFDA
Standard Deviation for Proficiency Assessment 1.4 µg/kg (Equivalent to 20% CV)
z-Score
-1.1 -0.8 -0.8 -0.7 -0.4 -0.2 -0.1 0.0 0.4 0.6 0.8 1.0 1.3
Laboratory
5 13 18 4 10 9 1 8 16 14 12 2 6

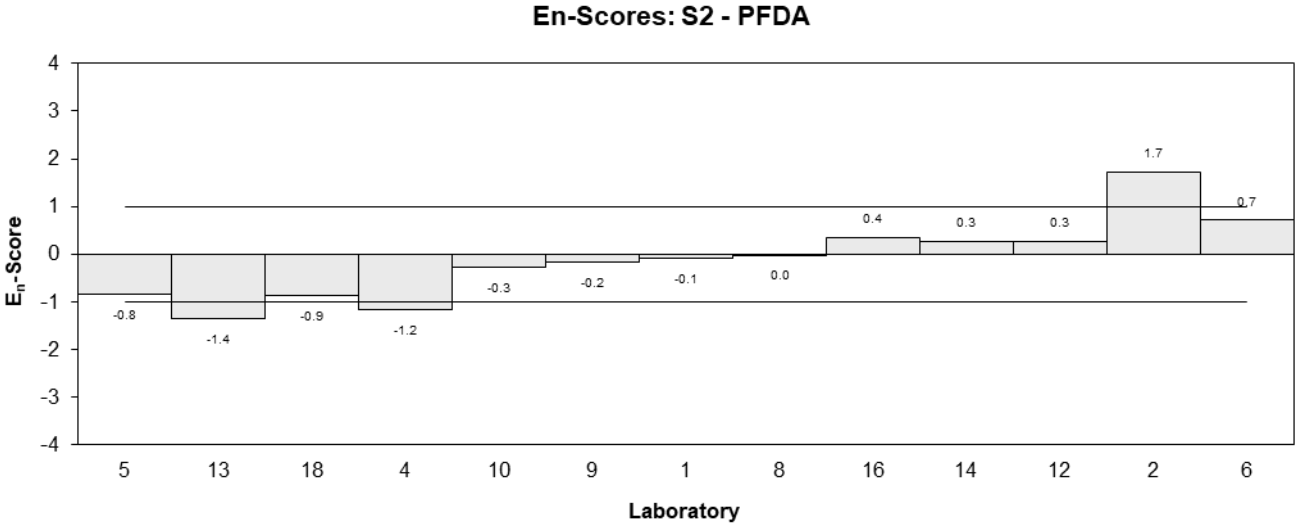

En-Scores: S2 - PFDA
En-Score
-0.8 -1.4 -0.9 -1.2 -0.3 -0.2 -0.1 0.0 0.4 0.3 0.3 1.7 0.7
Laboratory
5 13 18 4 10 9 1 8 16 14 12 2 6

Figure 36

Table 39

Sample Details

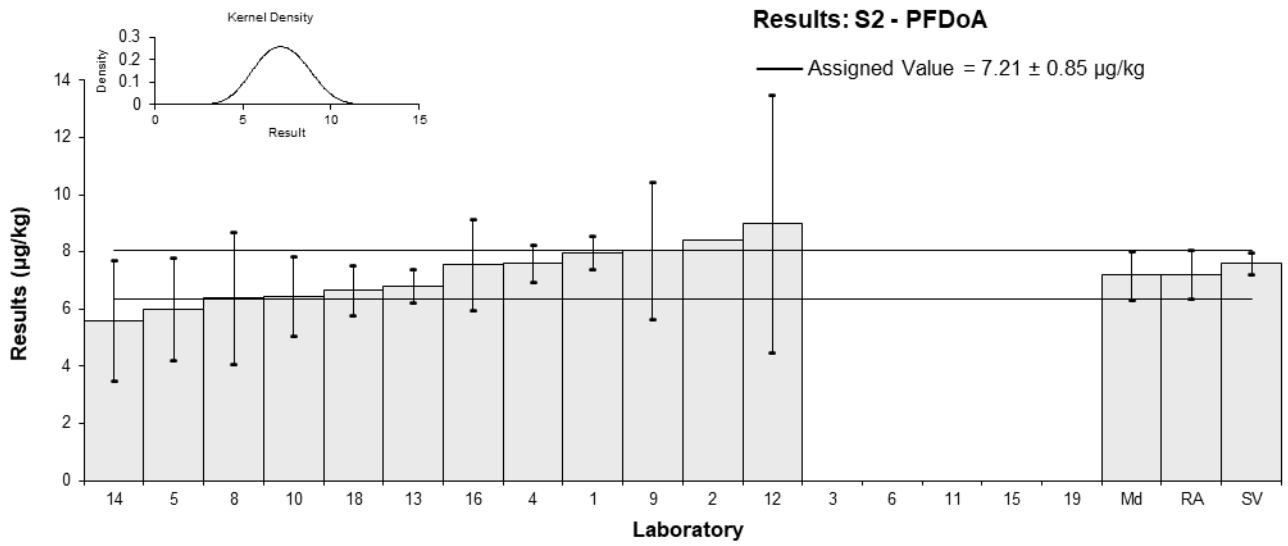
Sample No.	S2
Matrix	Fruit puree
Analyte	PFDoA
Unit	µg/kg

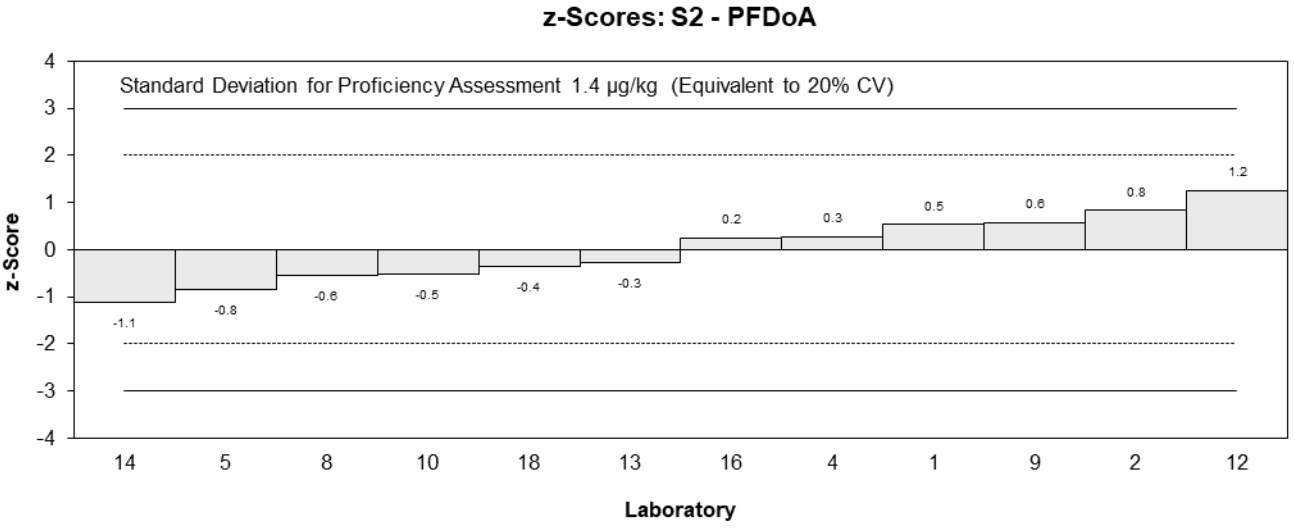
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	7.98	0.57	NR	0.53	0.75
2	8.41	NR	78	0.83	1.41
3	NS	NS	NS		
4	7.61	0.65	93	0.28	0.37
5	6.0	1.8	98	-0.84	-0.61
6	NR	NR	NR		
8	6.4	2.3	97	-0.56	-0.33
9	8.04	2.4	50	0.58	0.33
10	6.44	1.39	75	-0.53	-0.47
11	NS	NS	NS		
12	9	4.5	102	1.24	0.39
13	6.817	0.597	70	-0.27	-0.38
14	5.6	2.1	NT	-1.12	-0.71
15	NS	NS	NS		
16	7.554	1.59	90	0.24	0.19
18	6.67	0.867	80.7	-0.37	-0.44
19	NS	NS	NS		

Statistics

Assigned Value	7.21	0.85
Spike Value	7.62	0.38
Robust Average	7.21	0.85
Median	7.19	0.85
Mean	7.21	
N	12	
Max	9	
Min	5.6	
Robust SD	1.2	
Robust CV	16%	


Results: S2 - PFDoA
Kernel Density
Density
Result
Assigned Value = 7.21 ± 0.85 µg/kg
Results (µg/kg)
Laboratory
14 5 8 10 18 13 16 4 1 9 2 12 3 6 11 15 19 Md RA SV


z-Scores: S2 - PFDoA
Standard Deviation for Proficiency Assessment 1.4 µg/kg (Equivalent to 20% CV)
z-Score
-1.1 -0.8 -0.6 -0.5 -0.4 -0.3 0.2 0.3 0.5 0.6 0.8 1.2
Laboratory
14 5 8 10 18 13 16 4 1 9 2 12

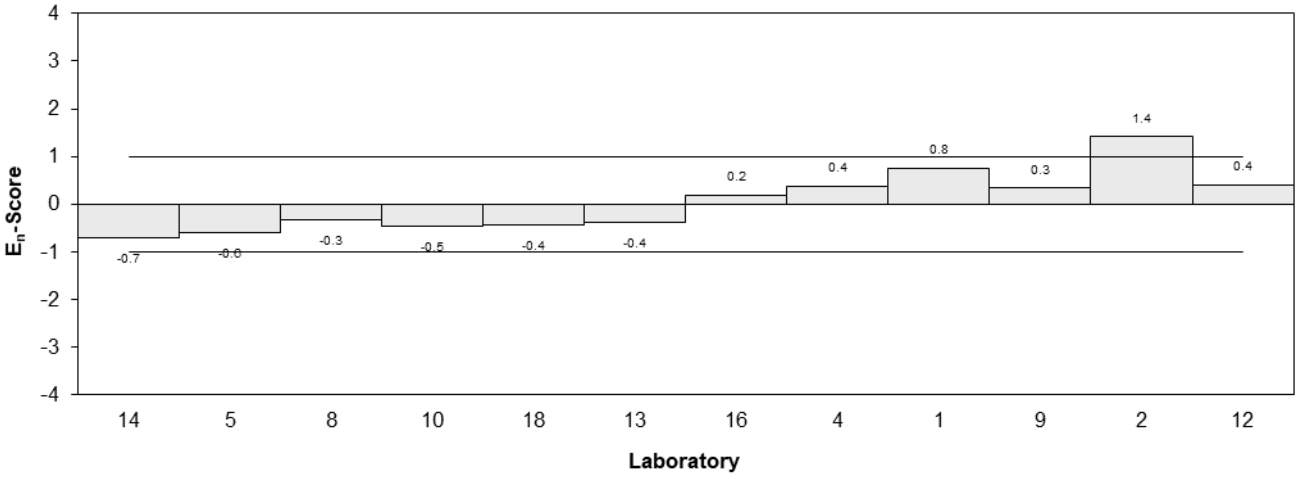

En-Scores: S2 - PFDoA
En-Score
-0.7 -0.6 -0.3 -0.5 -0.4 -0.4 0.2 0.4 0.8 0.3 1.4 0.4
Laboratory
14 5 8 10 18 13 16 4 1 9 2 12

Figure 37

Table 40

Sample Details

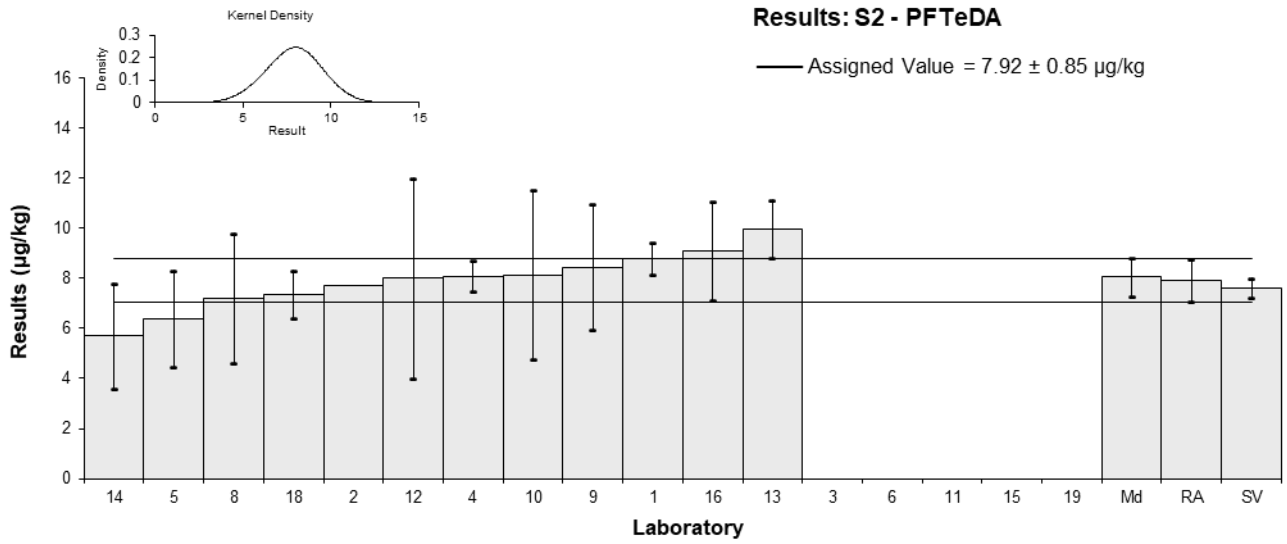
Sample No.	S2
Matrix	Fruit puree
Analyte	PFTeDA
Unit	µg/kg

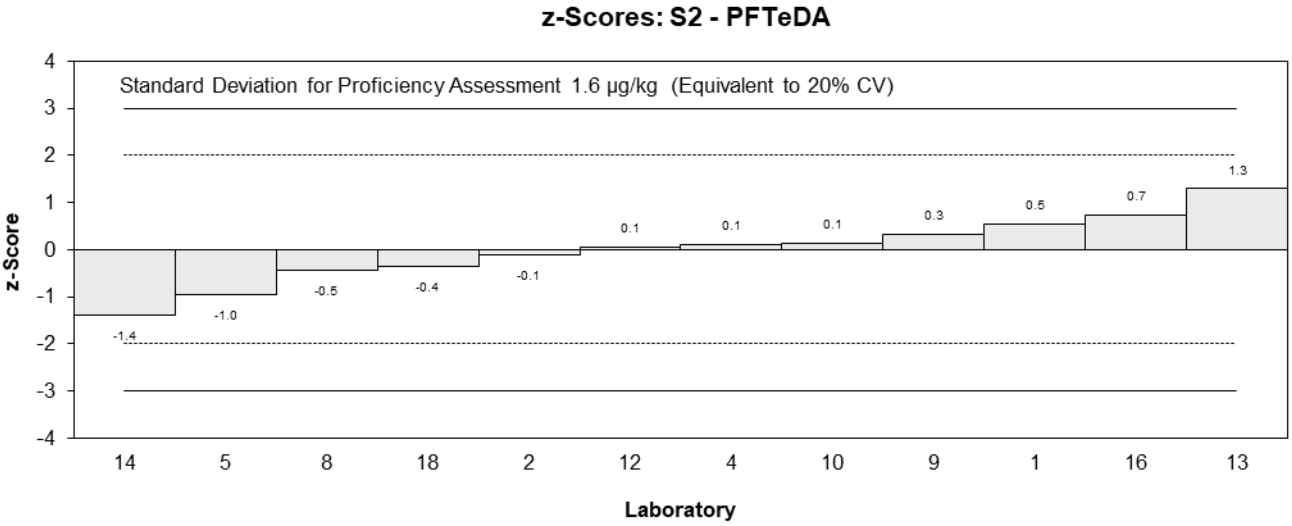
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	8.78	0.63	NR	0.54	0.81
2	7.73	NR	34	-0.12	-0.22
3	NS	NS	NS		
4	8.09	0.6	103	0.11	0.16
5	6.4	1.92	81	-0.96	-0.72
6	NR	NR	NR		
8	7.2	2.6	87	-0.45	-0.26
9	8.45	2.5	35	0.33	0.20
10	8.14	3.37	65.1	0.14	0.06
11	NS	NS	NS		
12	8	4	109	0.05	0.02
13	9.965	1.163	45	1.29	1.42
14	5.7	2.1	NT	-1.40	-0.98
15	NS	NS	NS		
16	9.082	1.97	33	0.73	0.54
18	7.37	0.957	82.7	-0.35	-0.43
19	NS	NS	NS		

Statistics

Assigned Value	7.92	0.85
Spike Value	7.62	0.38
Robust Average	7.92	0.85
Median	8.05	0.75
Mean	7.91	
N	12	
Max	9.965	
Min	5.7	
Robust SD	1.2	
Robust CV	15%	


Kernel Density
Density
Result
Results: S2 - PFTeDA
Assigned Value = 7.92 ± 0.85 µg/kg
Results (µg/kg)
Laboratory
14 5 8 18 2 12 4 10 9 1 16 13 3 6 11 15 19 Md RA SV


z-Scores: S2 - PFTeDA
Standard Deviation for Proficiency Assessment 1.6 µg/kg (Equivalent to 20% CV)
z-Score
-1.4 -1.0 -0.5 -0.4 -0.1 0.1 0.1 0.1 0.3 0.5 0.7 1.3
Laboratory
14 5 8 18 2 12 4 10 9 1 16 13

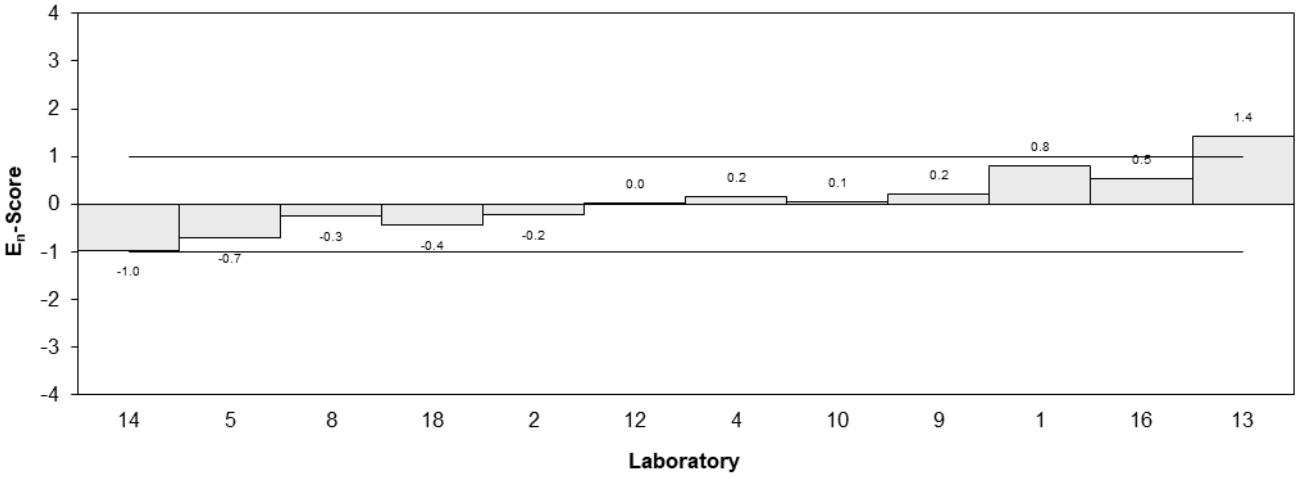

En-Scores: S2 - PFTeDA
En-Score
-1.0 -0.7 -0.3 -0.4 -0.2 0.0 0.2 0.1 0.2 0.8 0.5 1.4
Laboratory
14 5 8 18 2 12 4 10 9 1 16 13

Figure 38

Table 41

Sample Details

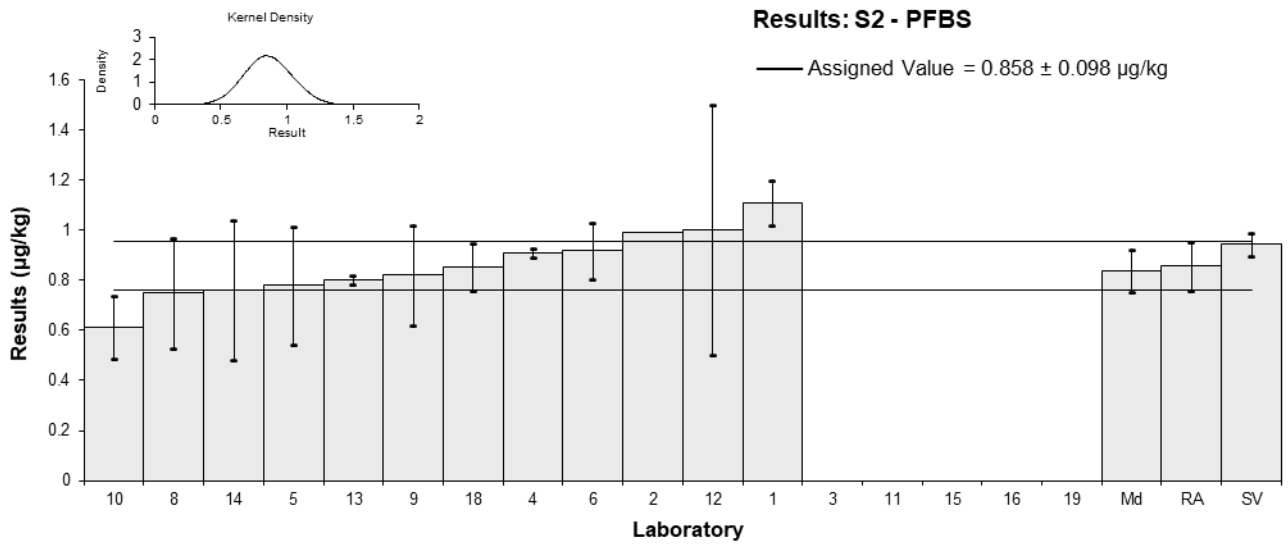
Sample No.	S2
Matrix	Fruit puree
Analyte	PFBS
Unit	µg/kg

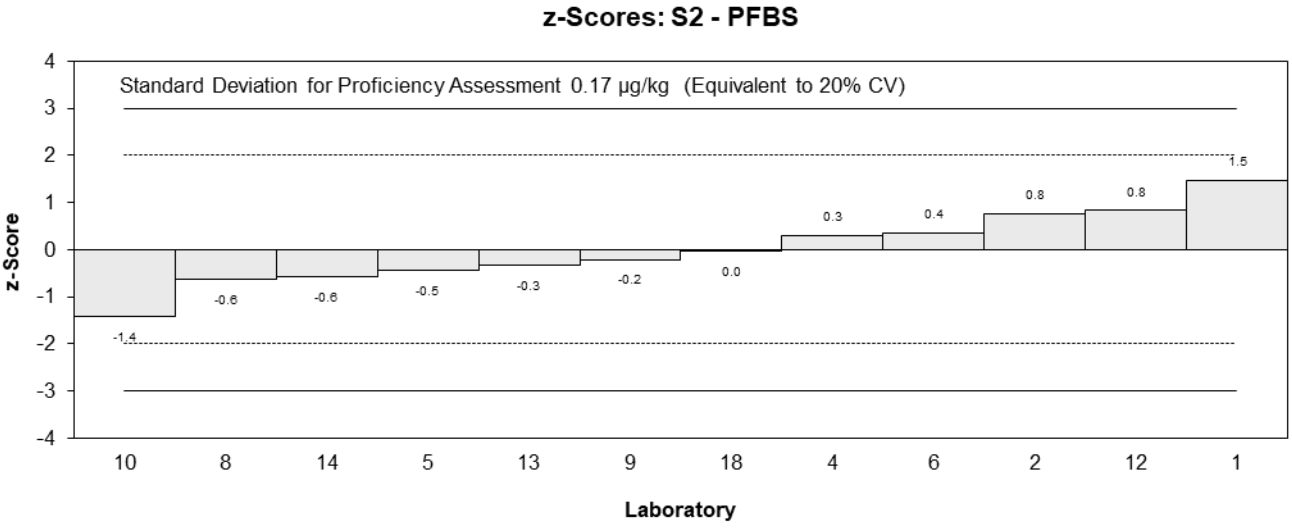
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	1.11	0.09	NR	1.47	1.89
2	0.99	NR	122	0.77	1.35
3	NS	NS	NS		
4	0.91	0.02	102	0.30	0.52
5	0.78	0.234	109	-0.45	-0.31
6	0.918	0.113	100	0.35	0.40
8	0.75	0.22	104	-0.63	-0.45
9	0.822	0.2	83	-0.21	-0.16
10	0.613	0.125	72	-1.43	-1.54
11	NS	NS	NS		
12	1	0.5	98	0.83	0.28
13	0.802	0.017	89	-0.33	-0.56
14	0.76	0.28	NT	-0.57	-0.33
15	NS	NS	NS		
16	<1	NR	101		
18	0.853	0.094	112.3	-0.03	-0.04
19	NS	NS	NS		

Statistics

Assigned Value	0.858	0.098
Spike Value	0.944	0.047
Robust Average	0.858	0.098
Median	0.838	0.085
Mean	0.859	
N	12	
Max	1.11	
Min	0.613	
Robust SD	0.14	
Robust CV	16%	


Results: S2 - PFBS
Kernel Density
Density
Result
Assigned Value = 0.858 ± 0.098 µg/kg
Results (µg/kg)
Laboratory
10 8 14 5 13 9 18 4 6 2 12 1 3 11 15 16 19 Md RA SV


z-Scores: S2 - PFBS
Standard Deviation for Proficiency Assessment 0.17 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 8 14 5 13 9 18 4 6 2 12 1
-1.4 -0.6 -0.6 -0.5 -0.3 -0.2 0.0 0.3 0.4 0.8 0.8 1.5

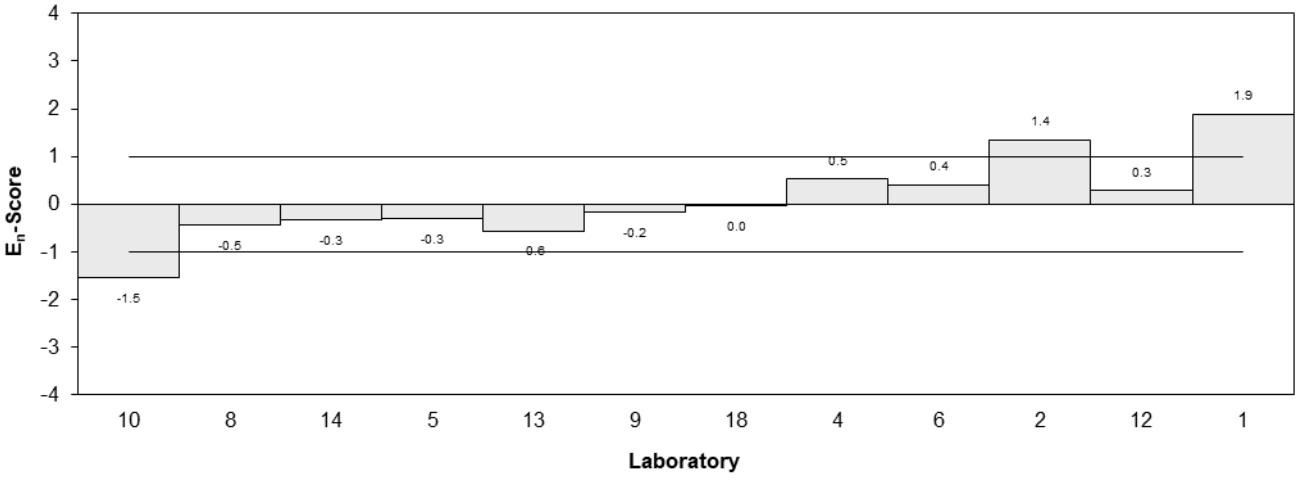

En-Scores: S2 - PFBS
En-Score
Laboratory
10 8 14 5 13 9 18 4 6 2 12 1
-1.5 -0.5 -0.3 -0.3 -0.6 -0.2 0.0 0.5 0.4 1.4 0.3 1.9

Figure 39

Table 42

Sample Details

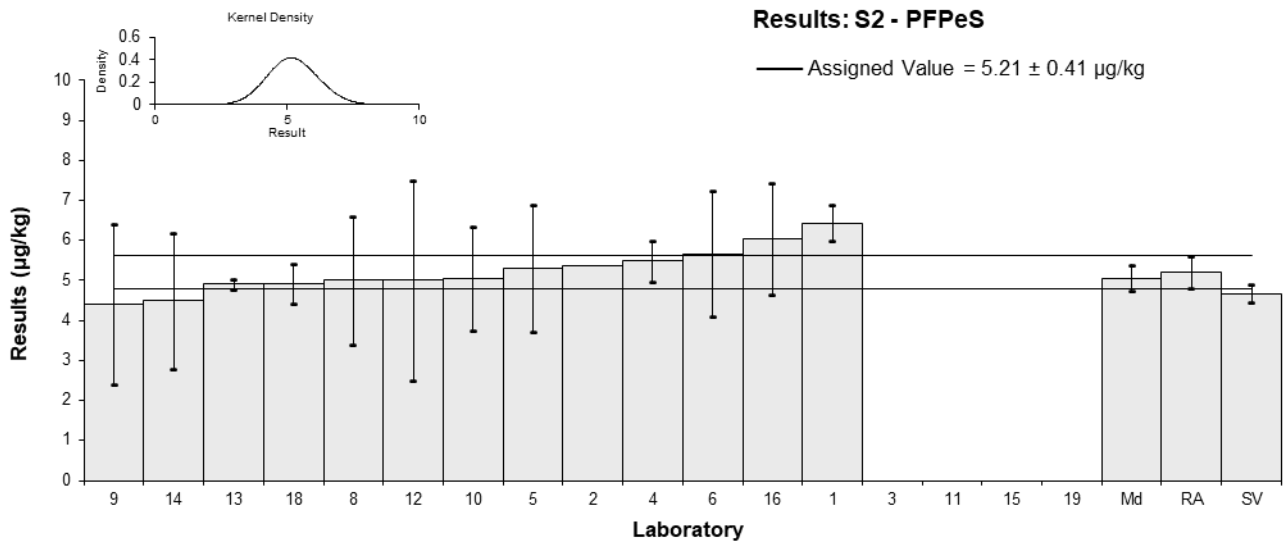
Sample No.	S2
Matrix	Fruit puree
Analyte	PFPeS
Unit	µg/kg

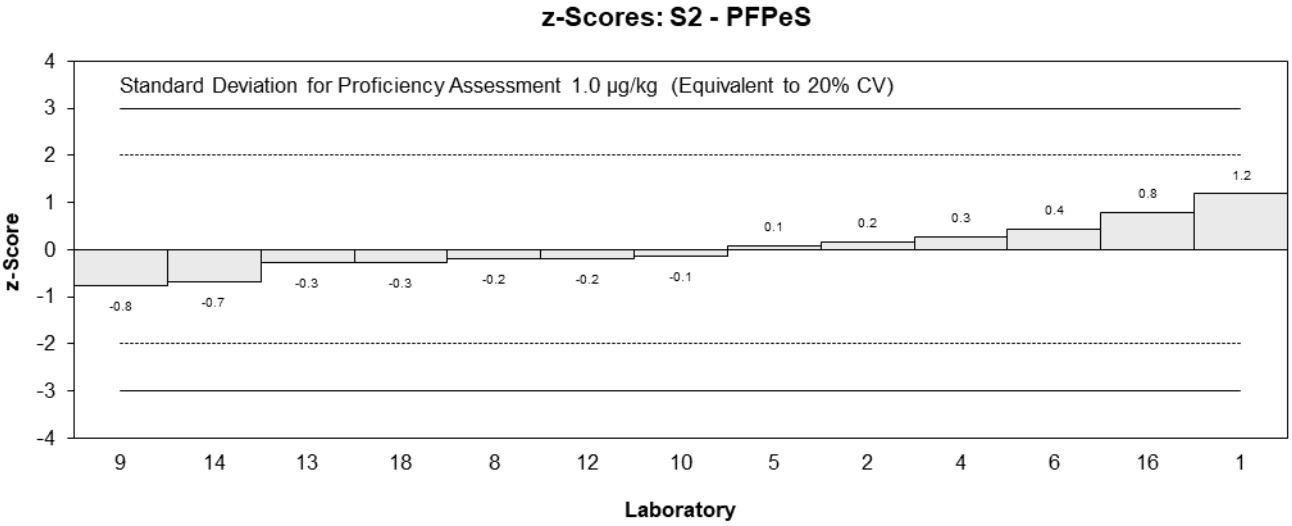
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	6.44	0.46	NR	1.18	2.00
2	5.38	NR	122	0.16	0.41
3	NS	NS	NS		
4	5.48	0.51	100	0.26	0.41
5	5.3	1.59	98	0.09	0.05
6	5.66	1.57	90	0.43	0.28
8	5.0	1.6	104	-0.20	-0.13
9	4.41	2.0	NR	-0.77	-0.39
10	5.06	1.3	72	-0.14	-0.11
11	NS	NS	NS		
12	5	2.5	NR	-0.20	-0.08
13	4.909	0.132	89	-0.29	-0.70
14	4.5	1.7	NT	-0.68	-0.41
15	NS	NS	NS		
16	6.036	1.39	97	0.79	0.57
18	4.92	0.492	112.3	-0.28	-0.45
19	NS	NS	NS		

Statistics

Assigned Value	5.21	0.41
Spike Value	4.67	0.23
Robust Average	5.21	0.41
Median	5.06	0.33
Mean	5.24	
N	13	
Max	6.44	
Min	4.41	
Robust SD	0.59	
Robust CV	11%	


Kernel Density
Density
Result
Results: S2 - PFPeS
Assigned Value = 5.21 ± 0.41 µg/kg
Results (µg/kg)
Laboratory
9 14 13 18 8 12 10 5 2 4 6 16 1 3 11 15 19 Md RA SV


z-Scores: S2 - PFPeS
Standard Deviation for Proficiency Assessment 1.0 µg/kg (Equivalent to 20% CV)
z-Score
-0.8 -0.7 -0.3 -0.3 -0.2 -0.2 -0.1 0.1 0.2 0.3 0.4 0.8 1.2
Laboratory
9 14 13 18 8 12 10 5 2 4 6 16 1

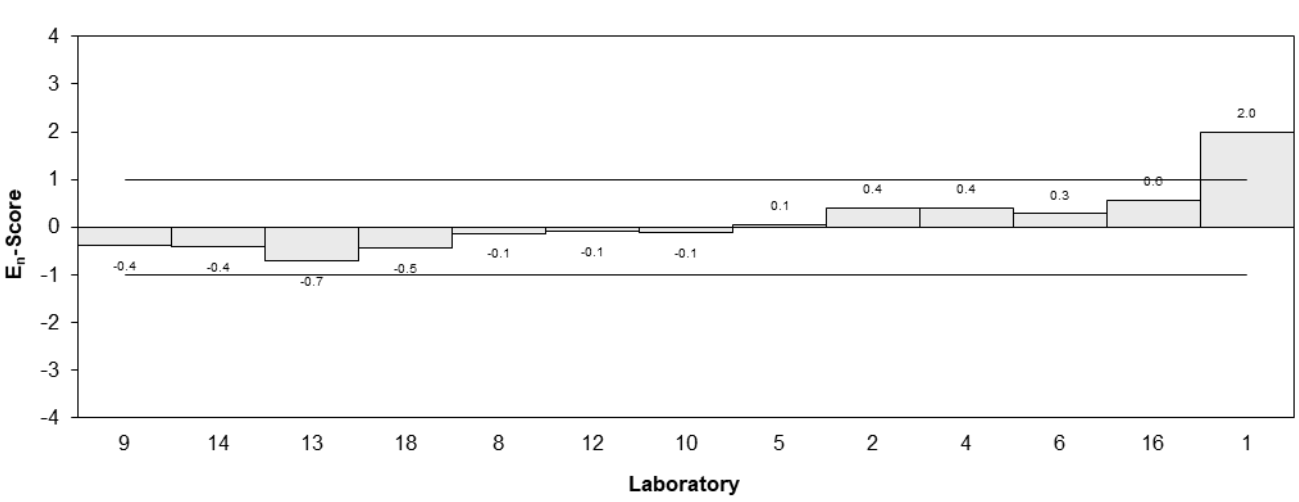

En-Scores: S2 - PFPeS
En-Score
-0.4 -0.4 -0.7 -0.5 -0.1 -0.1 -0.1 0.1 0.4 0.4 0.3 0.6 2.0
Laboratory
9 14 13 18 8 12 10 5 2 4 6 16 1

Figure 40

Table 43

Sample Details

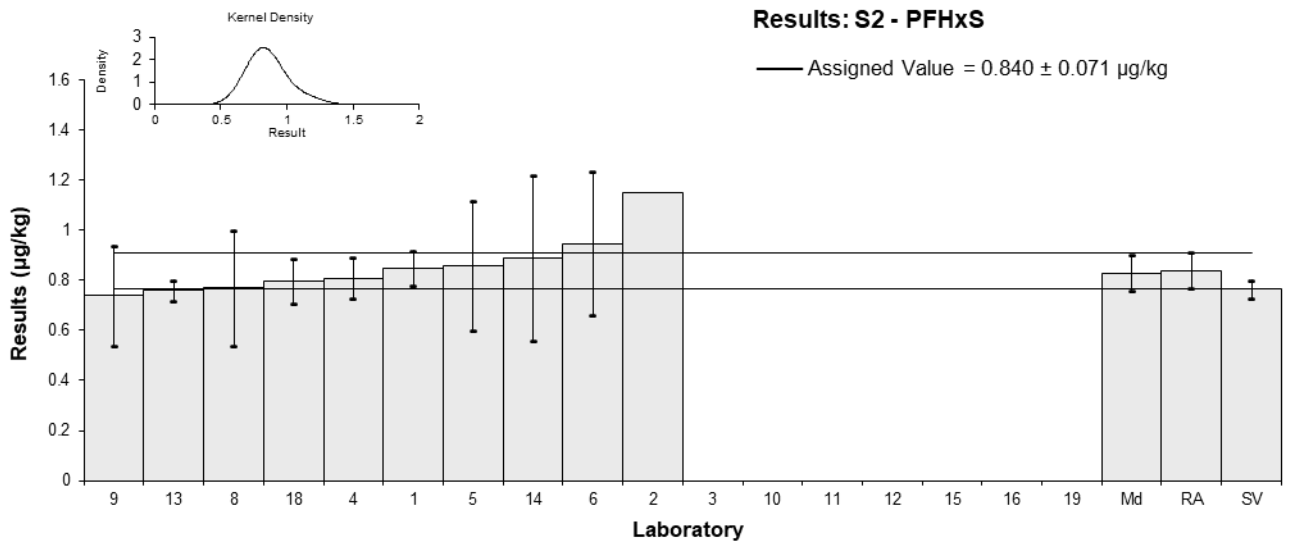
Sample No.	S2
Matrix	Fruit puree
Analyte	PFHxS (total)
Unit	µg/kg

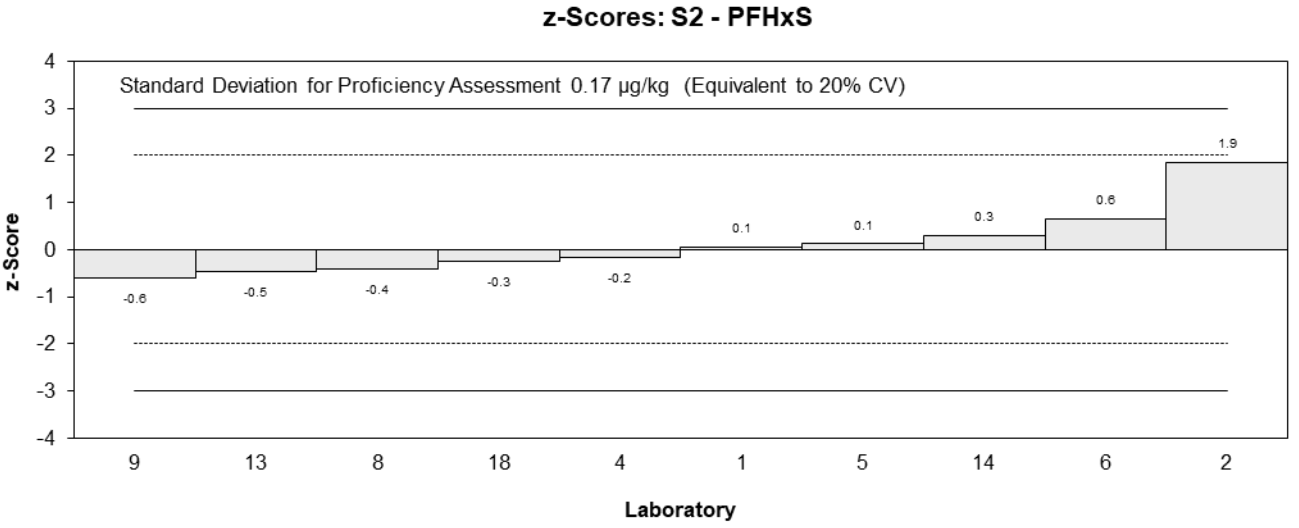
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.85	0.07	NR	0.06	0.10
2	1.15	NR	110	1.85	4.37
3	NS	NS	NS		
4	0.81	0.08	96	-0.18	-0.28
5	0.86	0.258	90	0.12	0.07
6	0.947	0.288	90	0.64	0.36
8	0.77	0.23	120	-0.42	-0.29
9	0.74	0.2	73	-0.60	-0.47
10	NT	NT	NT		
11	NS	NS	NS		
12	< 2	1	107		
13	0.761	0.041	89	-0.47	-0.96
14	0.89	0.33	NT	0.30	0.15
15	NS	NS	NS		
16	<1	NR	97		
18	0.797	0.088	105.4	-0.26	-0.38
19	NS	NS	NS		

Statistics

Assigned Value	0.840	0.071
Spike Value	0.764	0.038
Robust Average	0.840	0.071
Median	0.830	0.070
Mean	0.858	
N	10	
Max	1.15	
Min	0.74	
Robust SD	0.09	
Robust CV	11%	


Kernel Density
Density
Result
Results: S2 - PFHxS
Assigned Value = 0.840 ± 0.071 µg/kg
Results (µg/kg)
Laboratory
9 13 8 18 4 1 5 14 6 2 3 10 11 12 15 16 19 Md RA SV


z-Scores: S2 - PFHxS
Standard Deviation for Proficiency Assessment 0.17 µg/kg (Equivalent to 20% CV)
z-Score
-0.6 -0.5 -0.4 -0.3 -0.2 0.1 0.1 0.3 0.6 1.9
Laboratory
9 13 8 18 4 1 5 14 6 2

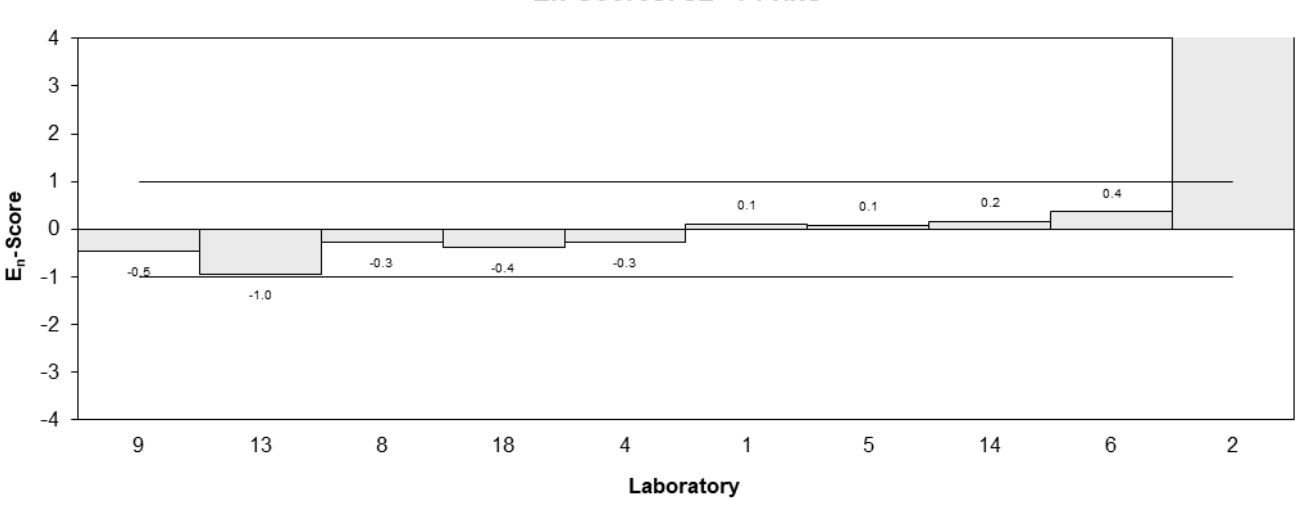

En-Scores: S2 - PFHxS
En-Score
-0.5 -1.0 -0.3 -0.4 -0.3 0.1 0.1 0.2 0.4
Laboratory
9 13 8 18 4 1 5 14 6 2

Figure 41

Table 44

Sample Details

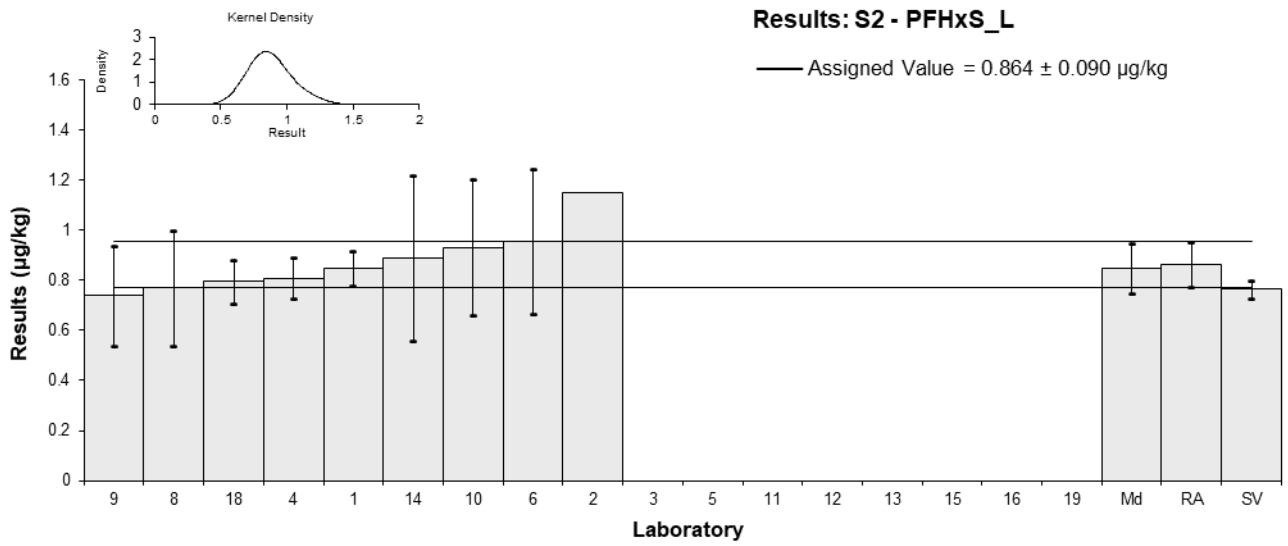
Sample No.	S2
Matrix	Fruit puree
Analyte	PFHxS_L
Unit	µg/kg

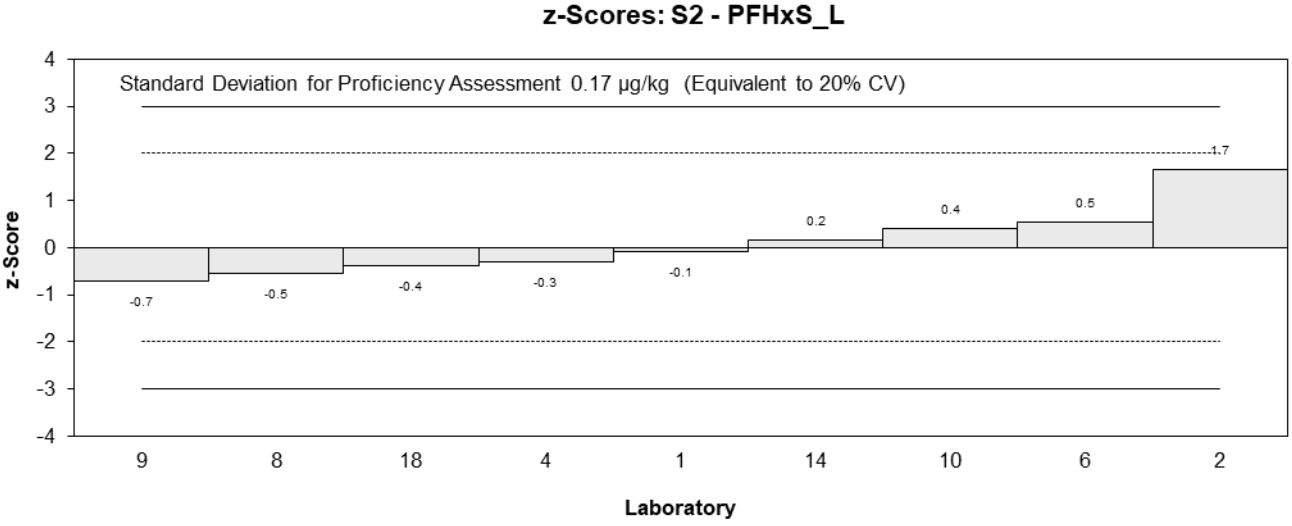
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.85	0.07	NR	-0.08	-0.12
2	1.15	NR	110	1.66	3.18
3	NS	NS	NS		
4	0.81	0.08	96	-0.31	-0.45
5	NT	NT	NT		
6	0.957	0.29	90	0.54	0.31
8	0.77	0.23	120	-0.54	-0.38
9	0.74	0.2	NR	-0.72	-0.57
10	0.933	0.272	45.3	0.40	0.24
11	NS	NS	NS		
12	< 2	1	NR		
13	NT	NT	NT		
14	0.89	0.33	NT	0.15	0.08
15	NS	NS	NS		
16	NT	NT	NT		
18	0.796	0.088	105.4	-0.39	-0.54
19	NS	NS	NS		

Statistics

Assigned Value	0.864	0.090
Spike Value	0.764	0.038
Robust Average	0.864	0.090
Median	0.850	0.099
Mean	0.877	
N	9	
Max	1.15	
Min	0.74	
Robust SD	0.11	
Robust CV	12%	


Kernel Density
Density
Result
Results: S2 - PFHxS_L
Assigned Value = 0.864 ± 0.090 µg/kg
Results (µg/kg)
Laboratory
9 8 18 4 1 14 10 6 2 3 5 11 12 13 15 16 19 Md RA SV


z-Scores: S2 - PFHxS_L
Standard Deviation for Proficiency Assessment 0.17 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
9 8 18 4 1 14 10 6 2
-0.7 -0.5 -0.4 -0.3 -0.1 0.2 0.4 0.5 1.7

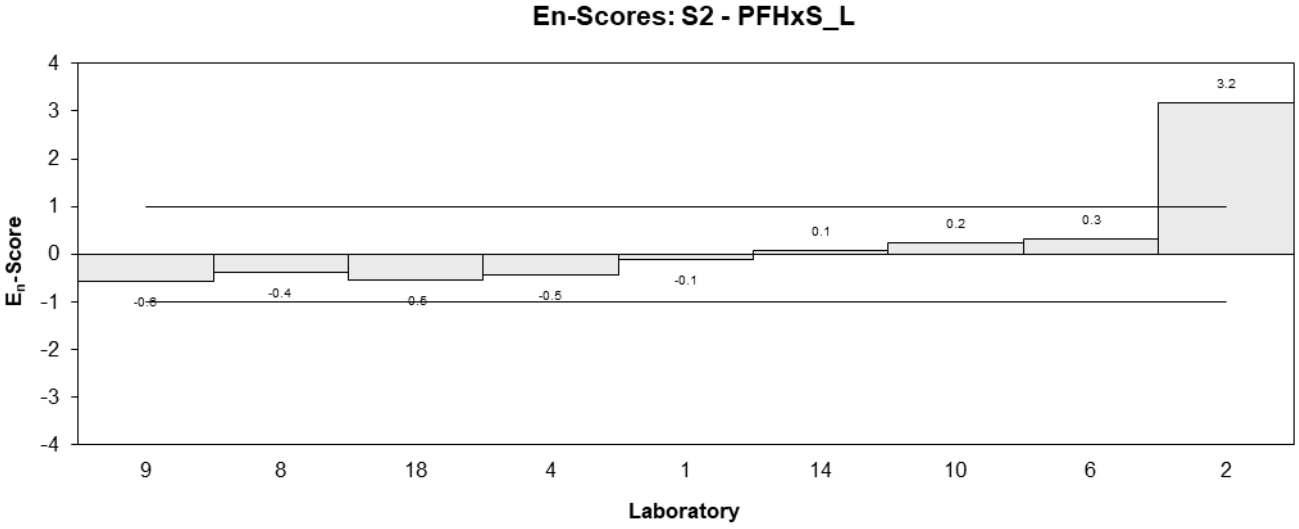

En-Scores: S2 - PFHxS_L
En-Score
Laboratory
9 8 18 4 1 14 10 6 2
-0.6 -0.4 -0.5 -0.5 -0.1 0.1 0.2 0.3 3.2

Figure 42

Table 45

Sample Details

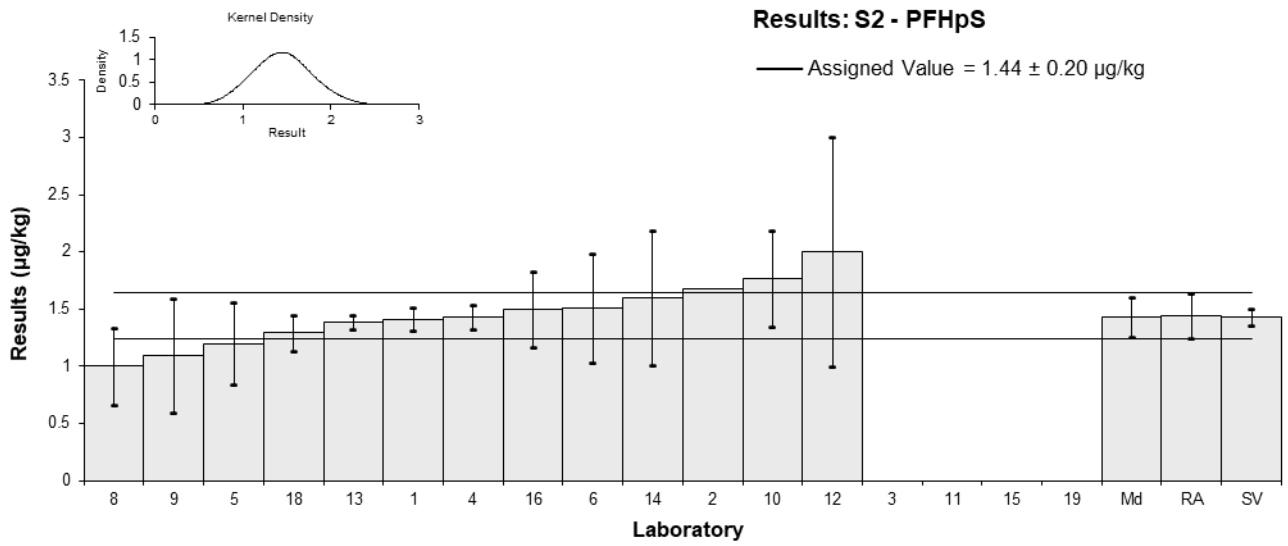
Sample No.	S2
Matrix	Fruit puree
Analyte	PFHpS
Unit	µg/kg

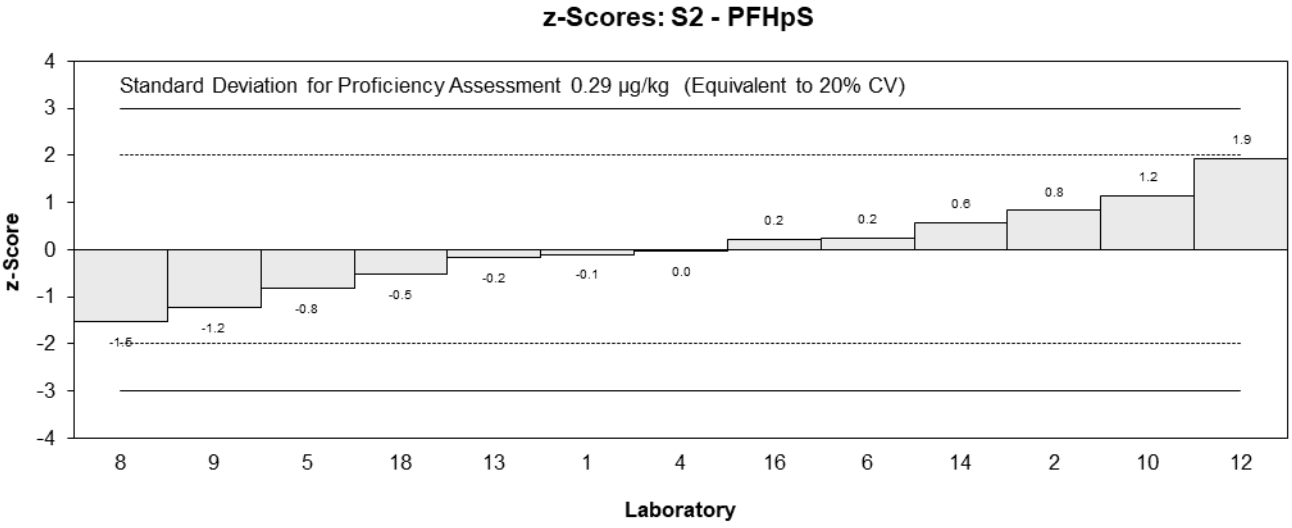
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	1.41	0.10	NR	-0.10	-0.13
2	1.68	NR	120	0.83	1.20
3	NS	NS	NS		
4	1.43	0.11	96	-0.03	-0.04
5	1.2	0.36	104	-0.83	-0.58
6	1.51	0.474	90	0.24	0.14
8	1.0	0.34	120	-1.53	-1.12
9	1.09	0.5	NR	-1.22	-0.65
10	1.77	0.422	72	1.15	0.71
11	NS	NS	NS		
12	2	1	NR	1.94	0.55
13	1.387	0.065	89	-0.18	-0.25
14	1.6	0.59	NT	0.56	0.26
15	NS	NS	NS		
16	1.5	0.33	116	0.21	0.16
18	1.29	0.155	105.4	-0.52	-0.59
19	NS	NS	NS		

Statistics

Assigned Value	1.44	0.20
Spike Value	1.43	0.07
Robust Average	1.44	0.20
Median	1.43	0.17
Mean	1.45	
N	13	
Max	2	
Min	1	
Robust SD	0.29	
Robust CV	20%	


Kernel Density
Density
Result
Results: S2 - PFHpS
Assigned Value = 1.44 ± 0.20 µg/kg
Results (µg/kg)
Laboratory
8 9 5 18 13 1 4 16 6 14 2 10 12 3 11 15 19 Md RA SV


z-Scores: S2 - PFHpS
Standard Deviation for Proficiency Assessment 0.29 µg/kg (Equivalent to 20% CV)
z-Score
-1.6 -1.2 -0.8 -0.5 -0.2 -0.1 0.0 0.2 0.2 0.6 0.8 1.2 1.9
Laboratory
8 9 5 18 13 1 4 16 6 14 2 10 12

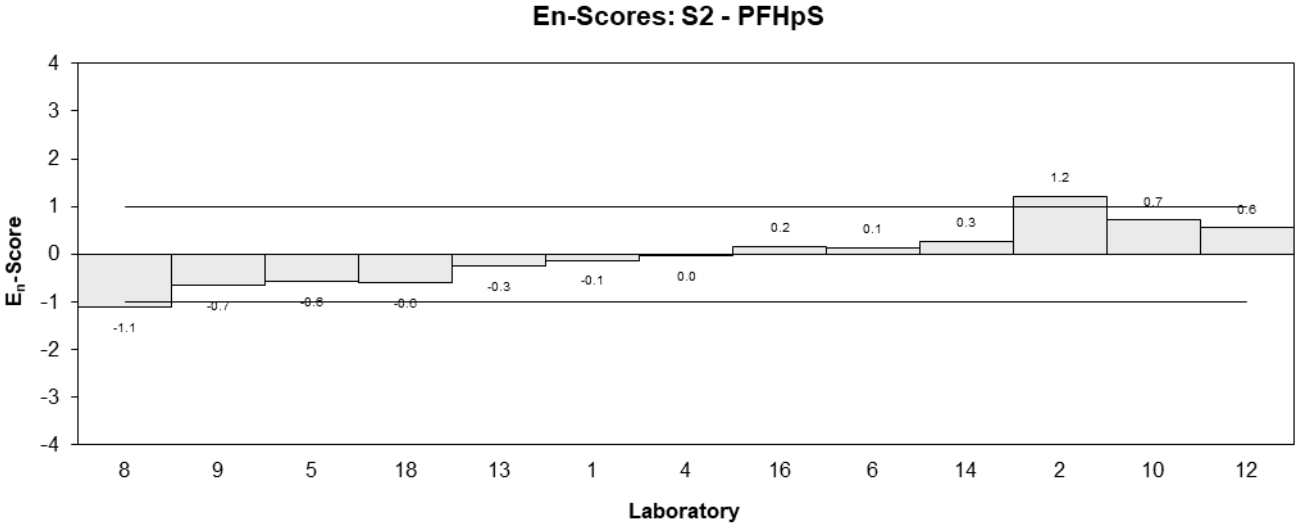

En-Scores: S2 - PFHpS
En-Score
-1.1 -0.7 -0.6 -0.6 -0.3 -0.1 0.0 0.2 0.1 0.3 1.2 0.7 0.6
Laboratory
8 9 5 18 13 1 4 16 6 14 2 10 12

Figure 43

Table 46

Sample Details

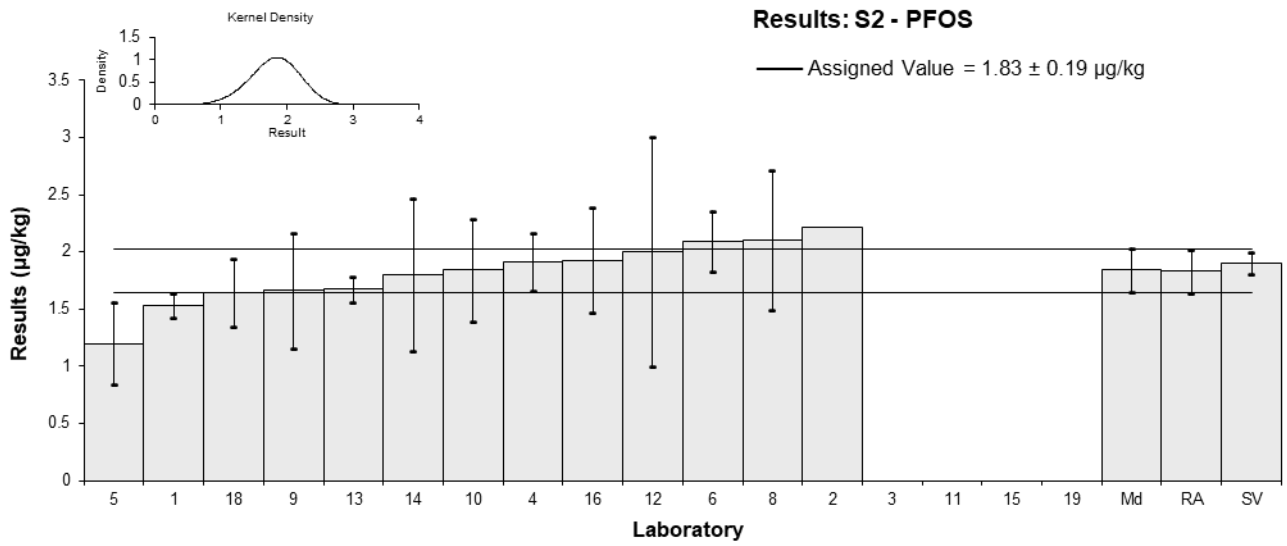
Sample No.	S2
Matrix	Fruit puree
Analyte	PFOS (total)
Unit	µg/kg

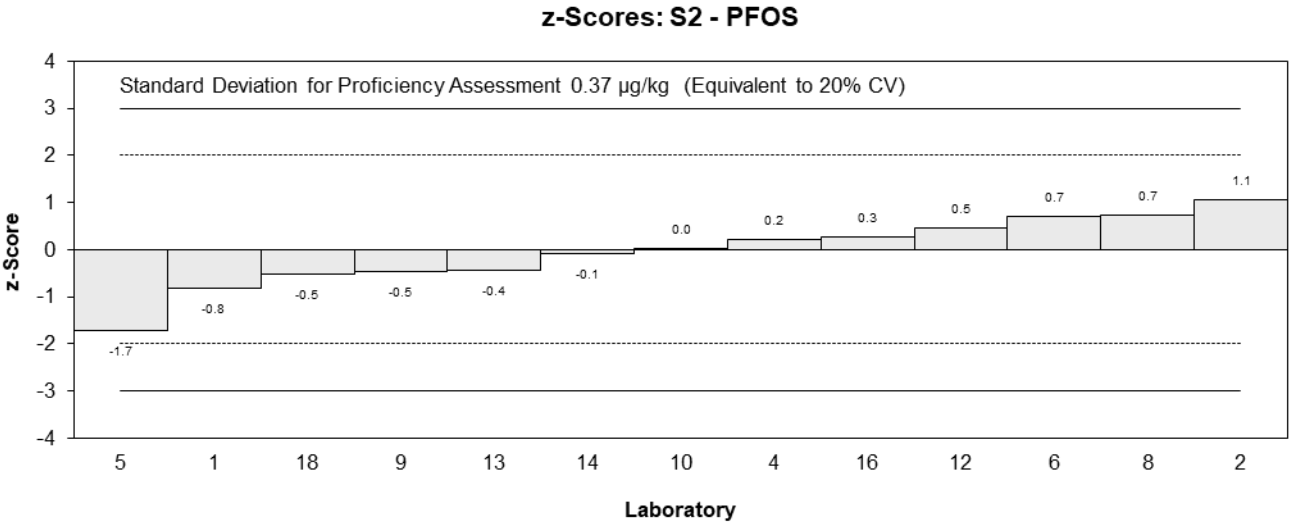
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	1.53	0.11	NR	-0.82	-1.37
2	2.22	NR	120	1.07	2.05
3	NS	NS	NS		
4	1.91	0.25	90	0.22	0.25
5	1.2	0.36	94	-1.72	-1.55
6	2.09	0.266	85	0.71	0.80
8	2.1	0.61	73	0.74	0.42
9	1.66	0.5	70	-0.46	-0.32
10	1.84	0.444	66.6	0.03	0.02
11	NS	NS	NS		
12	2	1	87	0.46	0.17
13	1.672	0.109	87	-0.43	-0.72
14	1.8	0.67	NT	-0.08	-0.04
15	NS	NS	NS		
16	1.924	0.46	116	0.26	0.19
18	1.64	0.296	97.4	-0.52	-0.54
19	NS	NS	NS		

Statistics

Assigned Value	1.83	0.19
Spike Value	1.90	0.10
Robust Average	1.83	0.19
Median	1.84	0.19
Mean	1.81	
N	13	
Max	2.22	
Min	1.2	
Robust SD	0.27	
Robust CV	15%	


Kernel Density
Density
Result
Results: S2 - PFOS
Assigned Value = 1.83 ± 0.19 µg/kg
Results (µg/kg)
Laboratory
5 1 18 9 13 14 10 4 16 12 6 8 2 3 11 15 19 Md RA SV


z-Scores: S2 - PFOS
Standard Deviation for Proficiency Assessment 0.37 µg/kg (Equivalent to 20% CV)
z-Score
-1.7 -0.8 -0.6 -0.5 -0.4 -0.1 0.0 0.2 0.3 0.5 0.7 0.7 1.1
Laboratory
5 1 18 9 13 14 10 4 16 12 6 8 2

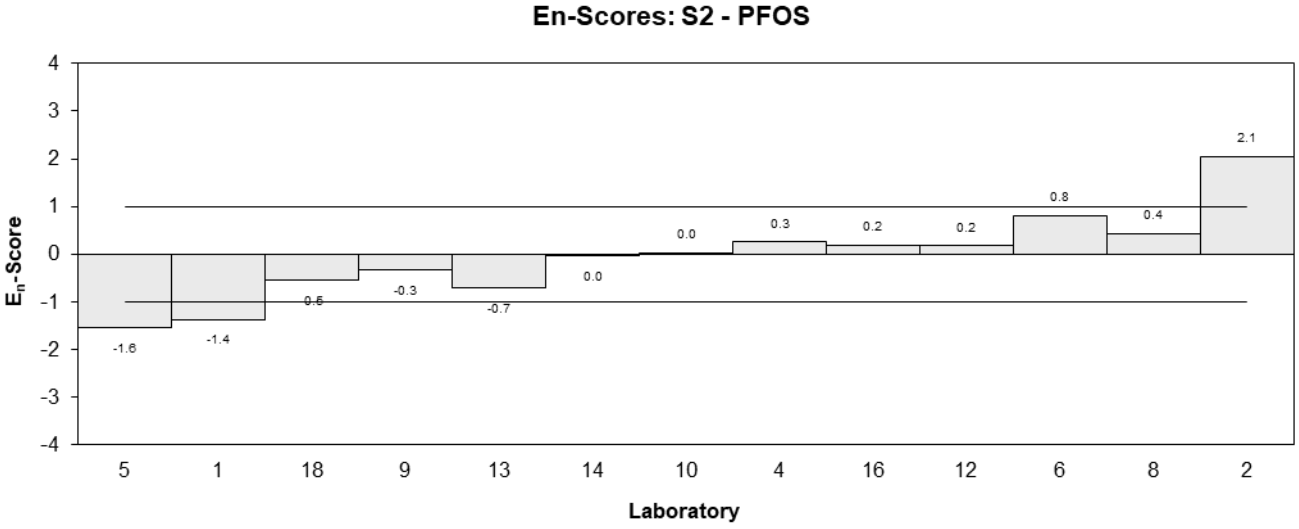

En-Scores: S2 - PFOS
En-Score
-1.6 -1.4 -0.6 -0.3 -0.7 0.0 0.0 0.3 0.2 0.2 0.8 0.4 2.1
Laboratory
5 1 18 9 13 14 10 4 16 12 6 8 2

Figure 44

Table 47

Sample Details

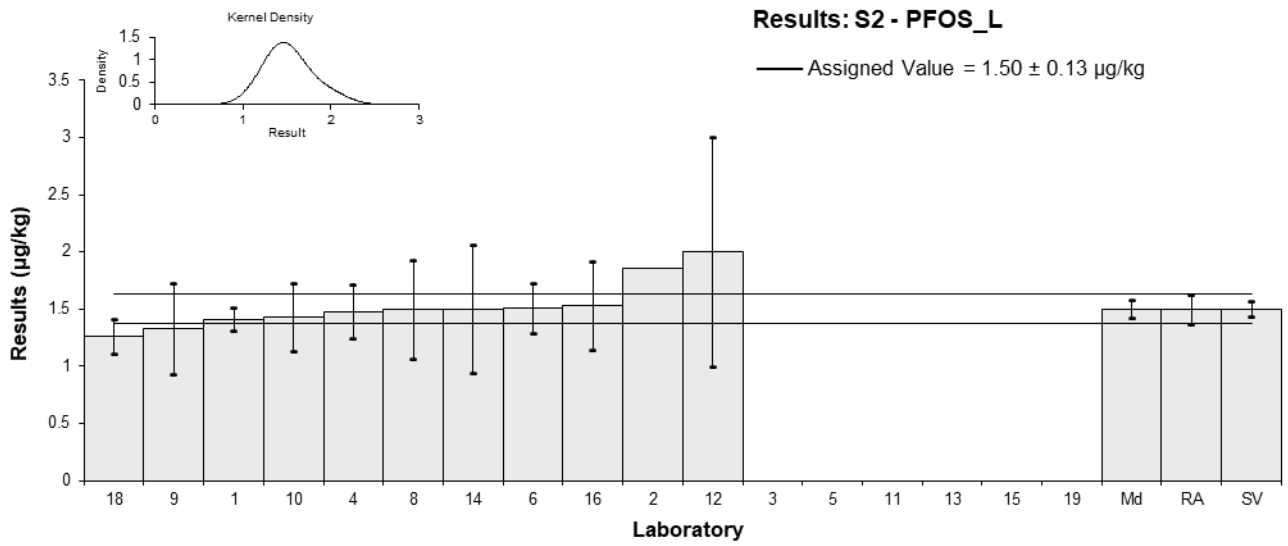
Sample No.	S2
Matrix	Fruit puree
Analyte	PFOS_L
Unit	µg/kg

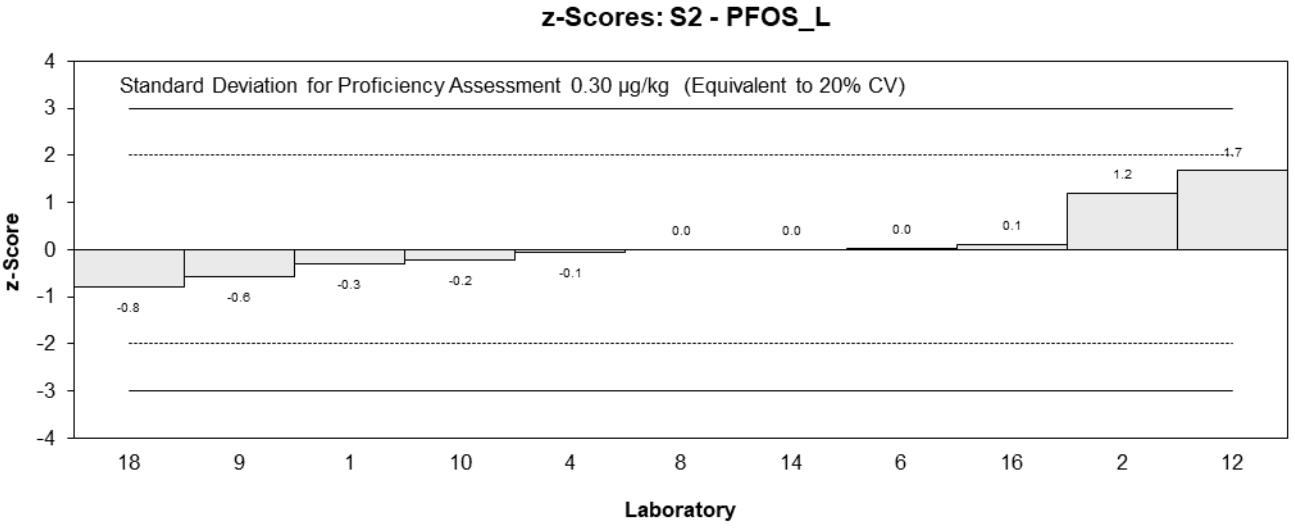
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	1.41	0.10	NR	-0.30	-0.55
2	1.86	NR	120	1.20	2.77
3	NS	NS	NS		
4	1.48	0.24	90	-0.07	-0.07
5	NT	NT	NT		
6	1.51	0.216	85	0.03	0.04
8	1.5	0.43	73	0.00	0.00
9	1.33	0.4	NR	-0.57	-0.40
10	1.43	0.302	66.6	-0.23	-0.21
11	NS	NS	NS		
12	2	1	NR	1.67	0.50
13	NT	NT	NT		
14	1.5	0.56	NT	0.00	0.00
15	NS	NS	NS		
16	1.532	0.39	116	0.11	0.08
18	1.26	0.151	97.4	-0.80	-1.20
19	NS	NS	NS		

Statistics

Assigned Value	1.50	0.13
Spike Value	1.50	0.07
Robust Average	1.50	0.13
Median	1.50	0.08
Mean	1.53	
N	11	
Max	2	
Min	1.26	
Robust SD	0.17	
Robust CV	11%	


Kernel Density
Density
Result
Results: S2 - PFOS_L
Assigned Value = 1.50 ± 0.13 µg/kg
Results (µg/kg)
Laboratory
18 9 1 10 4 8 14 6 16 2 12 3 5 11 13 15 19 Md RA SV


z-Scores: S2 - PFOS_L
Standard Deviation for Proficiency Assessment 0.30 µg/kg (Equivalent to 20% CV)
z-Score
-0.8 -0.6 -0.3 -0.2 -0.1 0.0 0.0 0.0 0.1 1.2 1.7
Laboratory
18 9 1 10 4 8 14 6 16 2 12

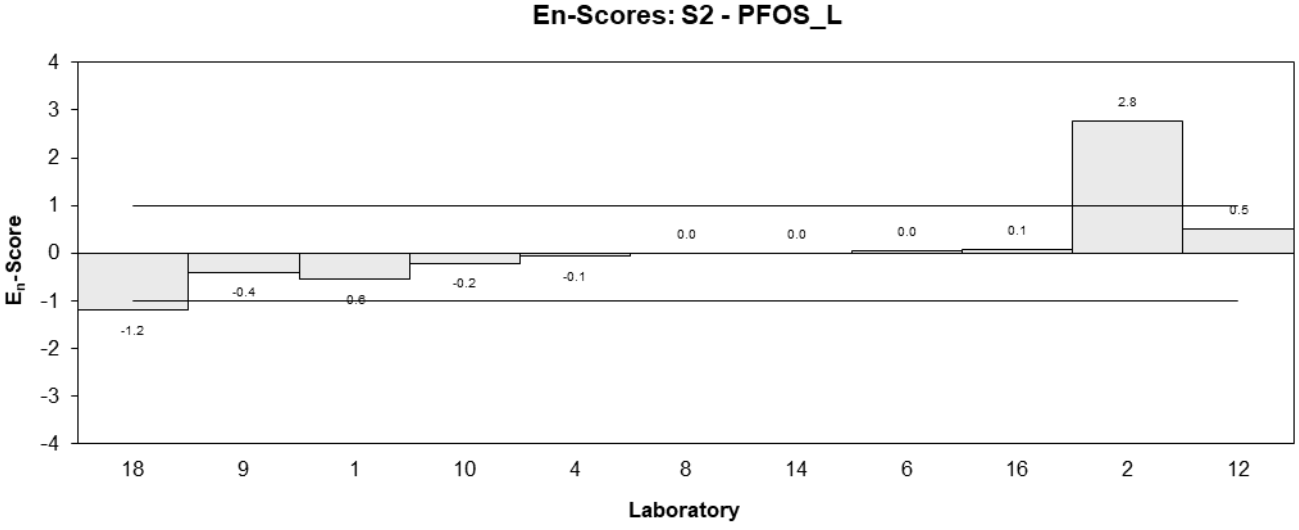

En-Scores: S2 - PFOS_L
En-Score
-1.2 -0.4 -0.6 -0.2 -0.1 0.0 0.0 0.0 0.1 2.8 0.5
Laboratory
18 9 1 10 4 8 14 6 16 2 12

Figure 45

Table 48

Sample Details

Sample No.	S2
Matrix	Fruit puree
Analyte	PFNS
Unit	µg/kg

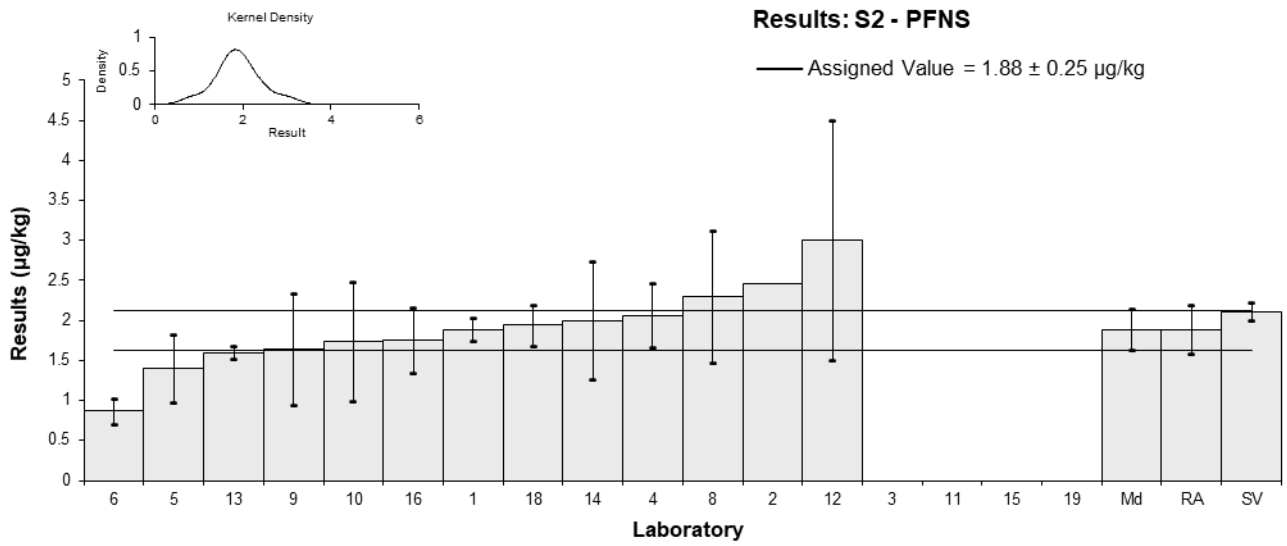
Participant Results

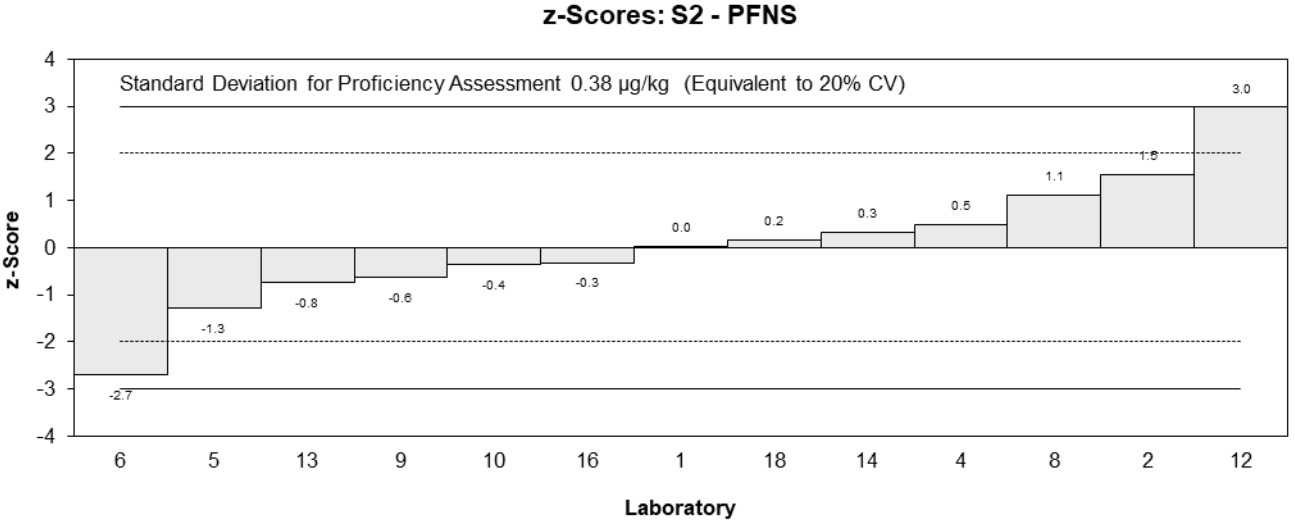
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	1.89	0.14	NR	0.03	0.03
2	2.46	NR	67	1.54	2.32
3	NS	NS	NS		
4	2.06	0.4	90	0.48	0.38
5	1.4	0.42	84	-1.28	-0.98
6*	0.867	0.162	85	-2.69	-3.40
8	2.3	0.82	73	1.12	0.49
9	1.64	0.7	NR	-0.64	-0.32
10	1.74	0.746	66.6	-0.37	-0.18
11	NS	NS	NS		
12*	3	1.5	NR	2.98	0.74
13	1.599	0.084	87	-0.75	-1.07
14	2	0.74	NT	0.32	0.15
15	NS	NS	NS		
16	1.76	0.41	116	-0.32	-0.25
18	1.94	0.252	97.4	0.16	0.17
19	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	1.88	0.25
Spike Value	2.11	0.11
Robust Average	1.89	0.31
Median	1.89	0.26
Mean	1.90	
N	13	
Max	3	
Min	0.867	
Robust SD	0.45	
Robust CV	24%	


Results: S2 - PFNS
Assigned Value = 1.88 ± 0.25 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
6 5 13 9 10 16 1 18 14 4 8 2 12 3 11 15 19 Md RA SV
Laboratory


z-Scores: S2 - PFNS
Standard Deviation for Proficiency Assessment 0.38 µg/kg (Equivalent to 20% CV)
z-Score
-2.7 -1.3 -0.8 -0.6 -0.4 -0.3 0.0 0.2 0.3 0.5 1.1 1.6 3.0
6 5 13 9 10 16 1 18 14 4 8 2 12
Laboratory

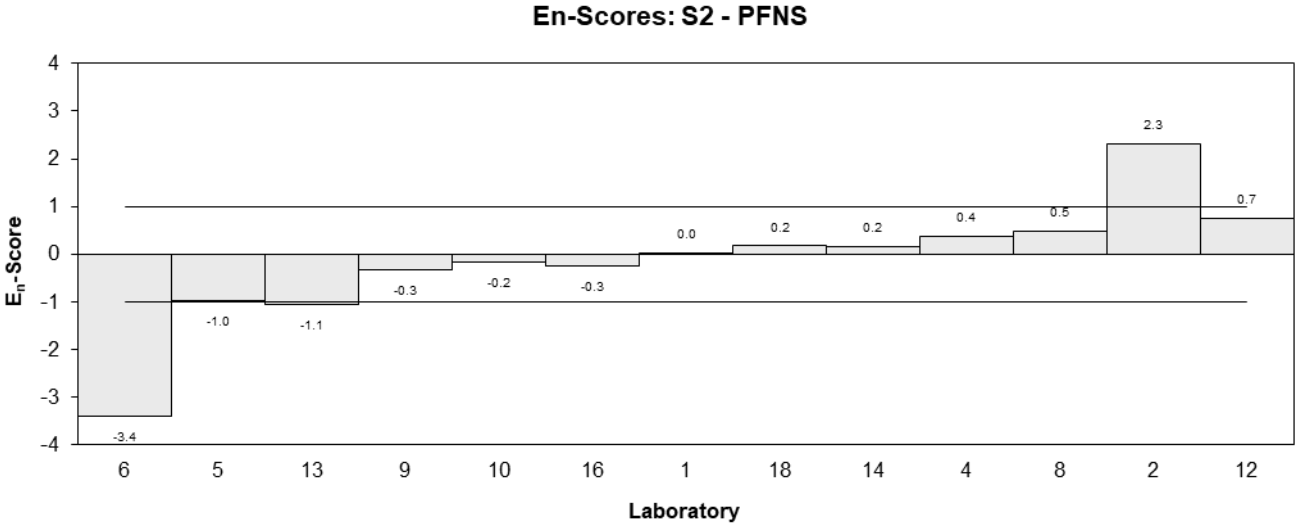

En-Scores: S2 - PFNS
En-Score
-3.4 -1.0 -1.1 -0.3 -0.2 -0.3 0.0 0.2 0.2 0.4 0.5 2.3 0.7
6 5 13 9 10 16 1 18 14 4 8 2 12
Laboratory

Figure 46

Table 49

Sample Details

Sample No.	S2
Matrix	Fruit puree
Analyte	PFDS
Unit	µg/kg

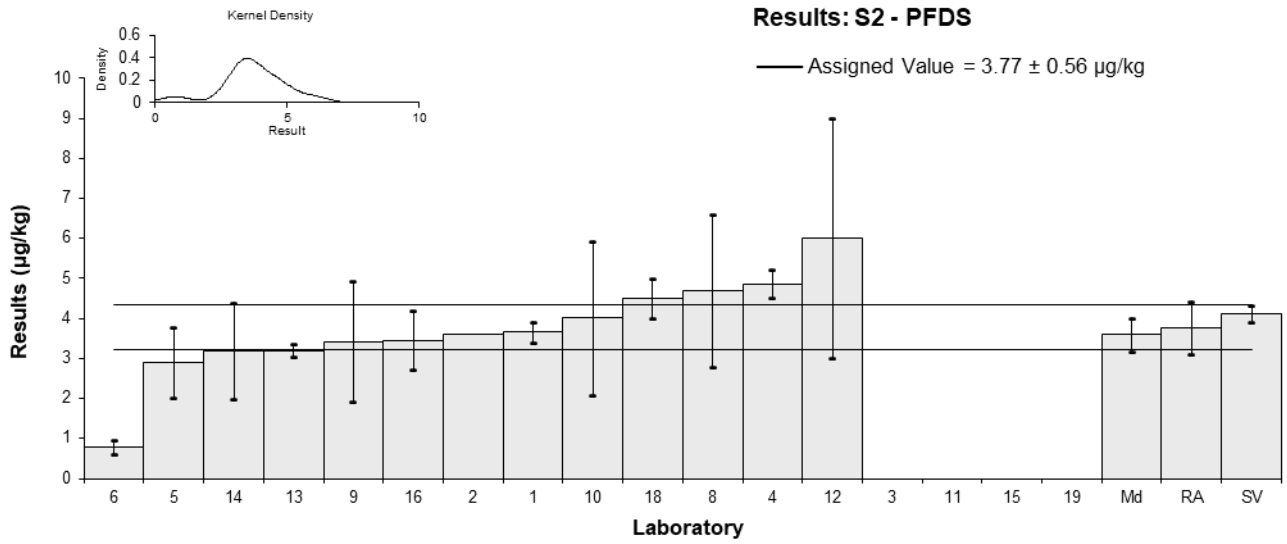
Participant Results

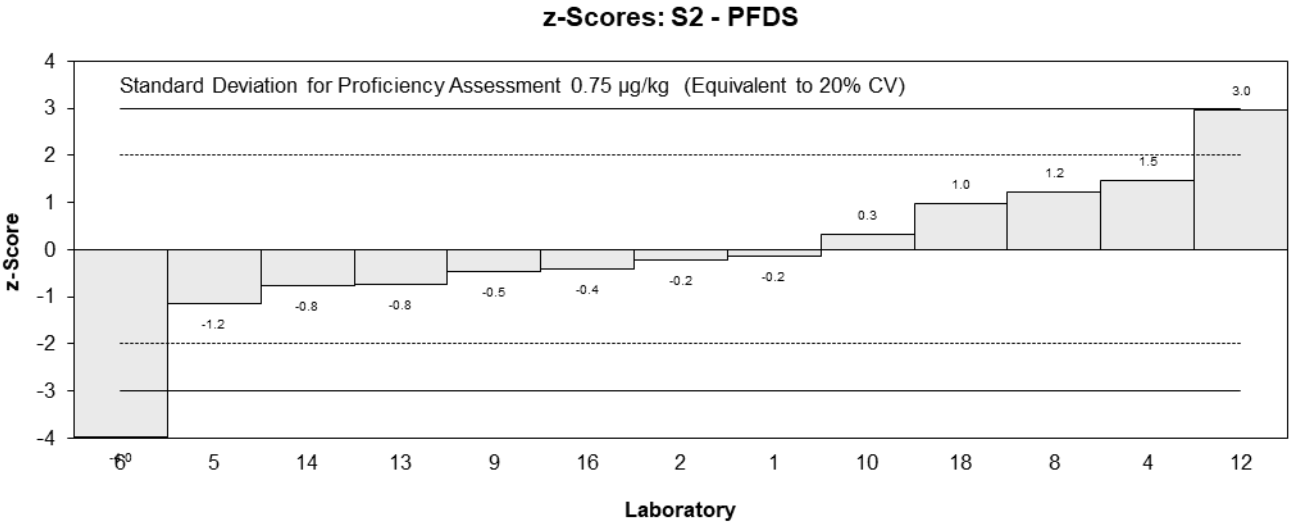
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	3.66	0.26	NR	-0.15	-0.18
2	3.6	NR	78	-0.23	-0.30
3	NS	NS	NS		
4	4.87	0.35	90	1.46	1.67
5	2.9	0.87	69	-1.15	-0.84
6*	0.772	0.175	85	-3.98	-5.11
8	4.7	1.9	73	1.23	0.47
9	3.42	1.5	NR	-0.46	-0.22
10	4.01	1.93	66.7	0.32	0.12
11	NS	NS	NS		
12*	6	3	NR	2.96	0.73
13	3.201	0.148	87	-0.75	-0.98
14	3.2	1.2	NT	-0.76	-0.43
15	NS	NS	NS		
16	3.452	0.73	116	-0.42	-0.35
18	4.50	0.495	97.4	0.97	0.98
19	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	3.77	0.56
Spike Value	4.12	0.21
Robust Average	3.77	0.66
Median	3.60	0.42
Mean	3.71	
N	13	
Max	6	
Min	0.772	
Robust SD	0.95	
Robust CV	25%	


Kernel Density
Density
Result
Results: S2 - PFDS
Assigned Value = 3.77 ± 0.56 µg/kg
Results (µg/kg)
Laboratory
6 5 14 13 9 16 2 1 10 18 8 4 12 3 11 15 19 Md RA SV


z-Scores: S2 - PFDS
Standard Deviation for Proficiency Assessment 0.75 µg/kg (Equivalent to 20% CV)
z-Score
-1.2 -0.8 -0.8 -0.5 -0.4 -0.2 -0.2 0.3 1.0 1.2 1.5 3.0
Laboratory
6 5 14 13 9 16 2 1 10 18 8 4 12

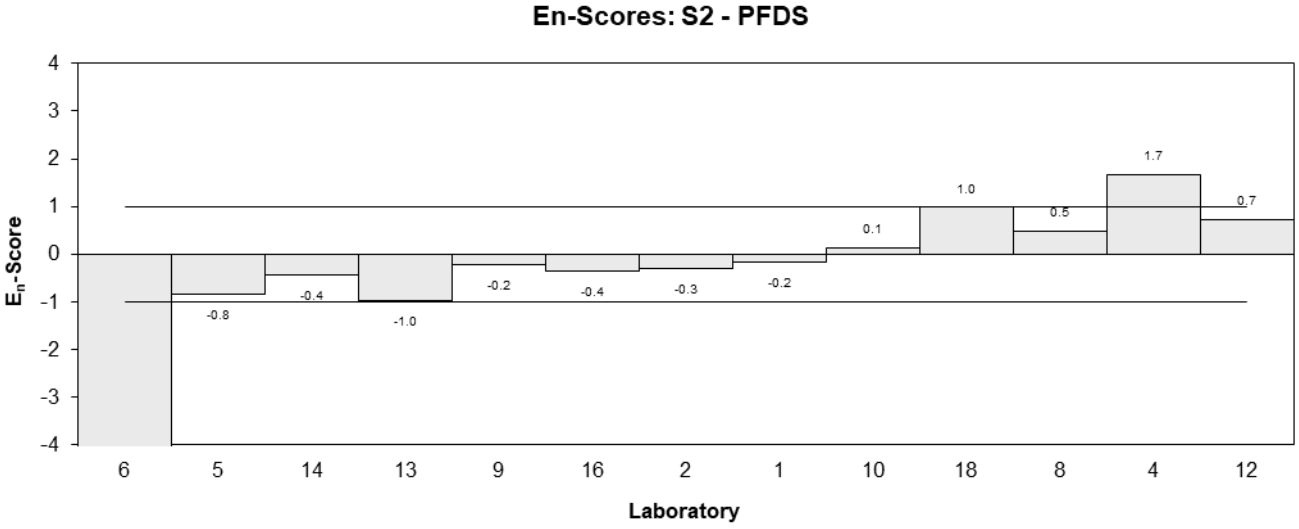

En-Scores: S2 - PFDS
En-Score
-0.8 -0.4 -1.0 -0.2 -0.4 -0.3 -0.2 0.1 1.0 0.5 1.7 0.7
Laboratory
6 5 14 13 9 16 2 1 10 18 8 4 12

Figure 47

Table 50

Sample Details

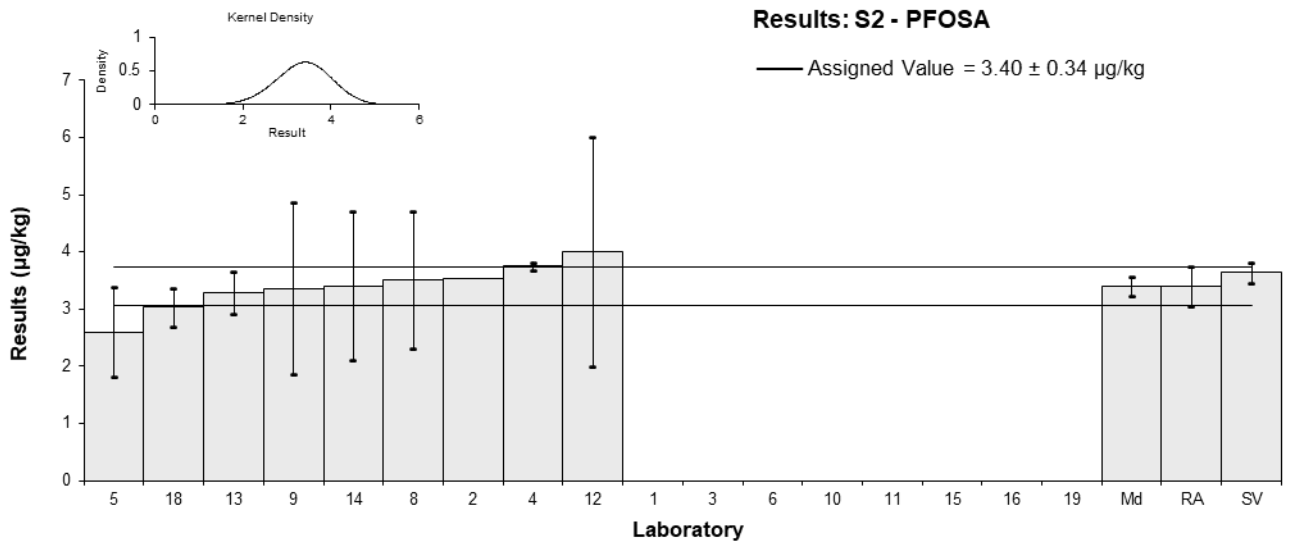
Sample No.	S2
Matrix	Fruit puree
Analyte	PFOSA
Unit	µg/kg

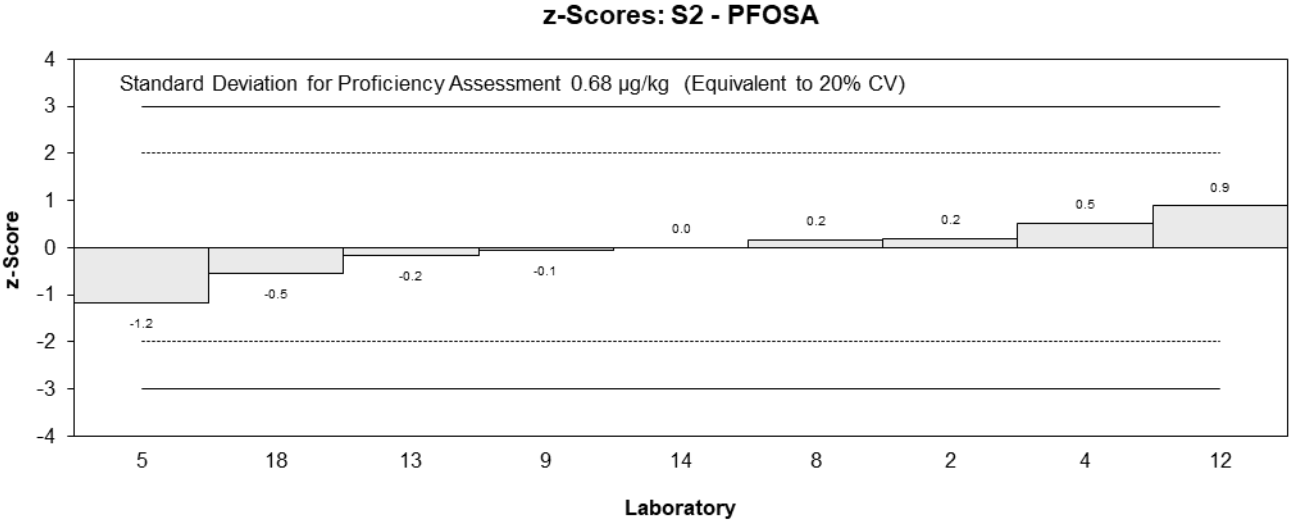
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	3.53	NR	88	0.19	0.38
3	NS	NS	NS		
4	3.75	0.07	97	0.51	1.01
5	2.6	0.78	82	-1.18	-0.94
6	NR	NR	NR		
8	3.5	1.2	116	0.15	0.08
9	3.36	1.5	77	-0.06	-0.03
10	<0.122	NR	86.9		
11	NS	NS	NS		
12	4	2	54	0.88	0.30
13	3.278	0.367	40	-0.18	-0.24
14	3.4	1.3	NT	0.00	0.00
15	NS	NS	NS		
16	<5	NR	97		
18	3.03	0.333	87.8	-0.54	-0.78
19	NS	NS	NS		

Statistics

Assigned Value	3.40	0.34
Spike Value	3.64	0.18
Robust Average	3.40	0.34
Median	3.40	0.16
Mean	3.38	
N	9	
Max	4	
Min	2.6	
Robust SD	0.41	
Robust CV	12%	


Kernel Density
Density
Result
Results: S2 - PFOSA
Assigned Value = 3.40 ± 0.34 µg/kg
Results (µg/kg)
Laboratory
5 18 13 9 14 8 2 4 12 1 3 6 10 11 15 16 19 Md RA SV


z-Scores: S2 - PFOSA
Standard Deviation for Proficiency Assessment 0.68 µg/kg (Equivalent to 20% CV)
z-Score
-1.2 -0.5 -0.2 -0.1 0.0 0.2 0.2 0.5 0.9
Laboratory
5 18 13 9 14 8 2 4 12

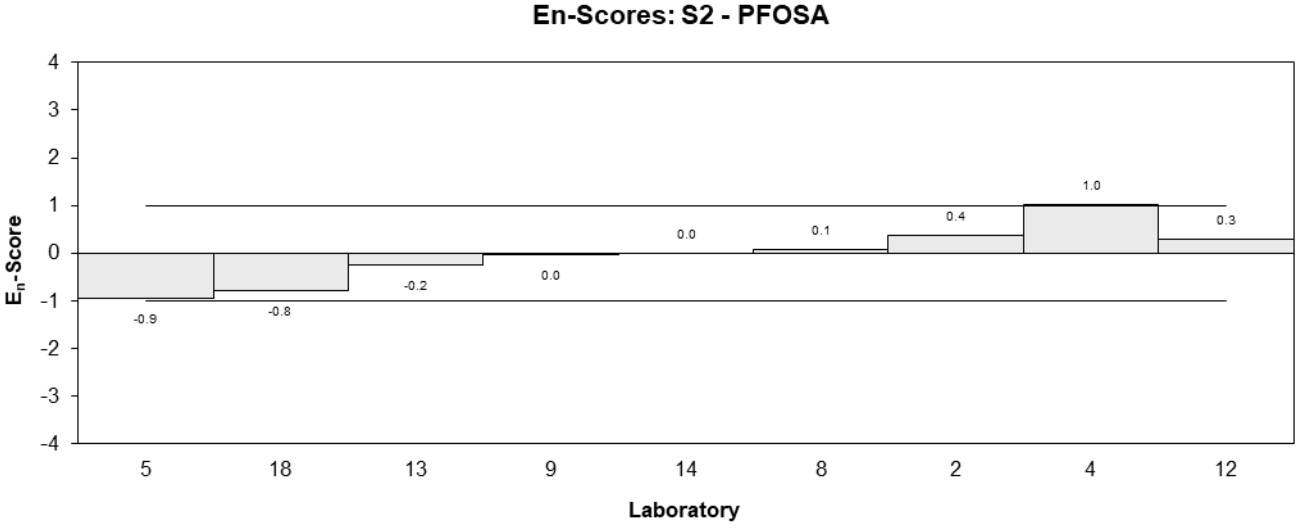

En-Scores: S2 - PFOSA
En-Score
-0.9 -0.8 -0.2 0.0 0.0 0.1 0.4 1.0 0.3
Laboratory
5 18 13 9 14 8 2 4 12

Figure 48

Table 51

Sample Details

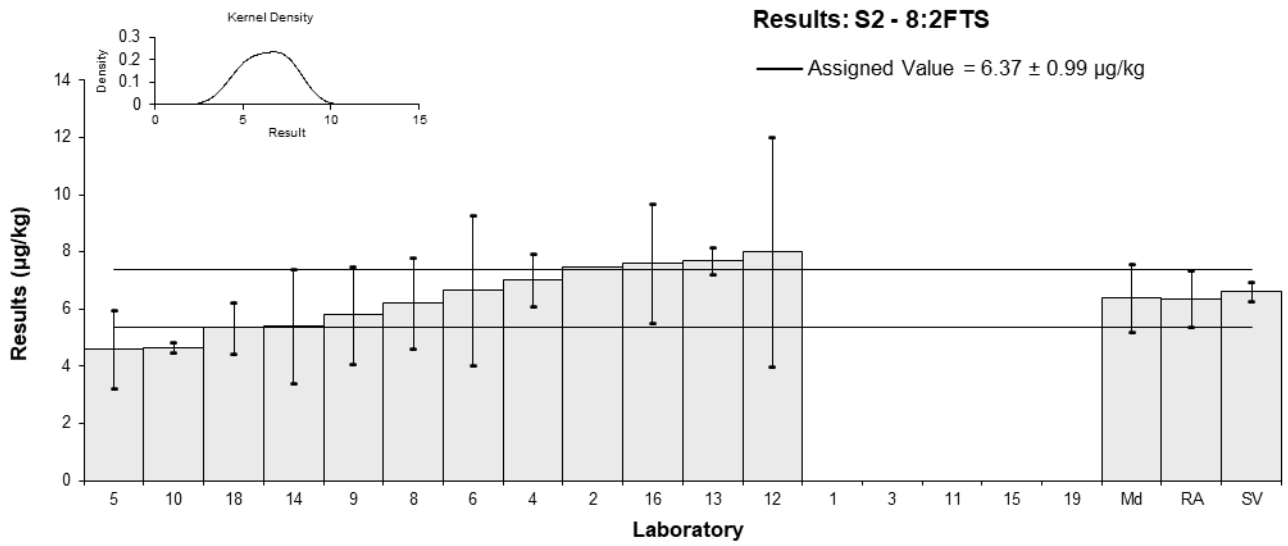
Sample No.	S2
Matrix	Fruit puree
Analyte	8:2FTS
Unit	µg/kg

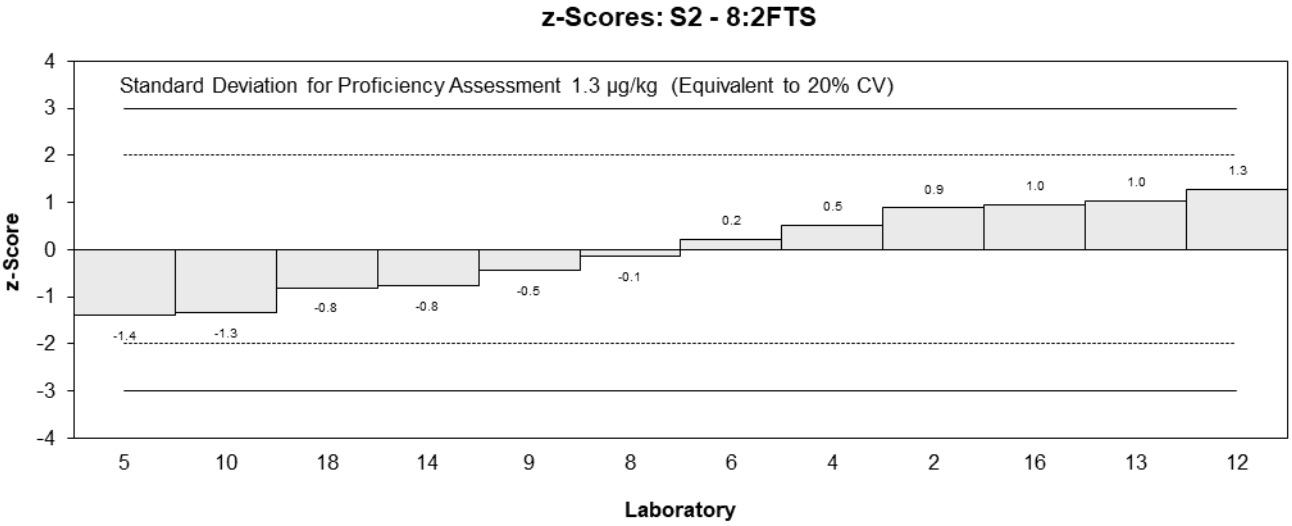
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	7.49	NR	352	0.88	1.13
3	NS	NS	NS		
4	7.02	0.94	83	0.51	0.48
5	4.6	1.38	82	-1.39	-1.04
6	6.65	2.62	45	0.22	0.10
8	6.2	1.6	81	-0.13	-0.09
9	5.80	1.7	37	-0.45	-0.29
10	4.66	0.165	90.8	-1.34	-1.70
11	NS	NS	NS		
12	8	4	59	1.28	0.40
13	7.692	0.456	61	1.04	1.21
14	5.4	2.0	NT	-0.76	-0.43
15	NS	NS	NS		
16	7.586	2.09	239	0.95	0.53
18	5.34	0.907	72.2	-0.81	-0.77
19	NS	NS	NS		

Statistics

Assigned Value	6.37	0.99
Spike Value	6.63	0.33
Robust Average	6.37	0.99
Median	6.4	1.2
Mean	6.37	
N	12	
Max	8	
Min	4.6	
Robust SD	1.4	
Robust CV	22%	


Results: S2 - 8:2FTS
Kernel Density
Density
Result
Assigned Value = 6.37 ± 0.99 µg/kg
Results (µg/kg)
Laboratory
5 10 18 14 9 8 6 4 2 16 13 12 1 3 11 15 19 Md RA SV


z-Scores: S2 - 8:2FTS
Standard Deviation for Proficiency Assessment 1.3 µg/kg (Equivalent to 20% CV)
z-Score
-1.4 -1.3 -0.8 -0.8 -0.5 -0.1 0.2 0.5 0.9 1.0 1.0 1.3
Laboratory
5 10 18 14 9 8 6 4 2 16 13 12

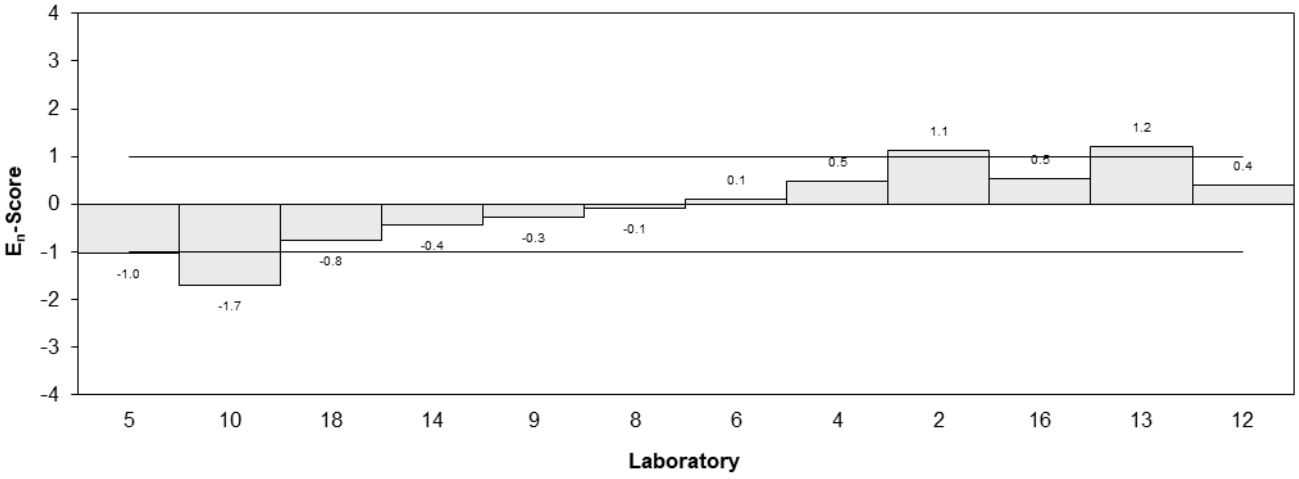

En-Scores: S2 - 8:2FTS
En-Score
-1.0 -1.7 -0.8 -0.4 -0.3 -0.1 0.1 0.5 1.1 0.5 1.2 0.4
Laboratory
5 10 18 14 9 8 6 4 2 16 13 12

Figure 49

Table 52

Sample Details

Sample No.	S2
Matrix	Fruit puree
Analyte	10:2FTS
Unit	µg/kg

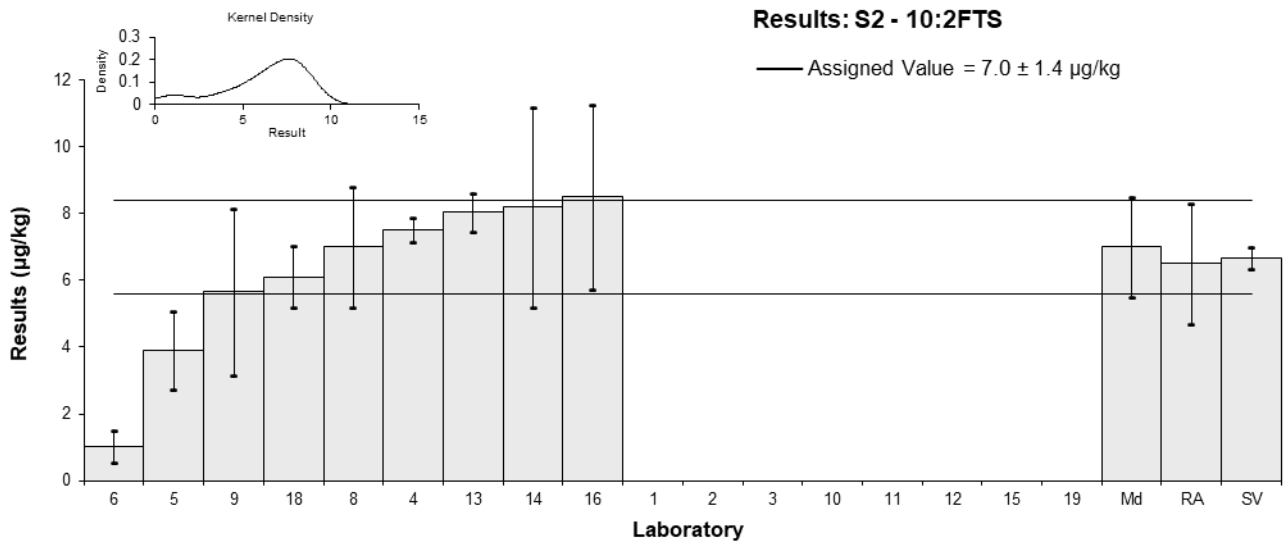
Participant Results

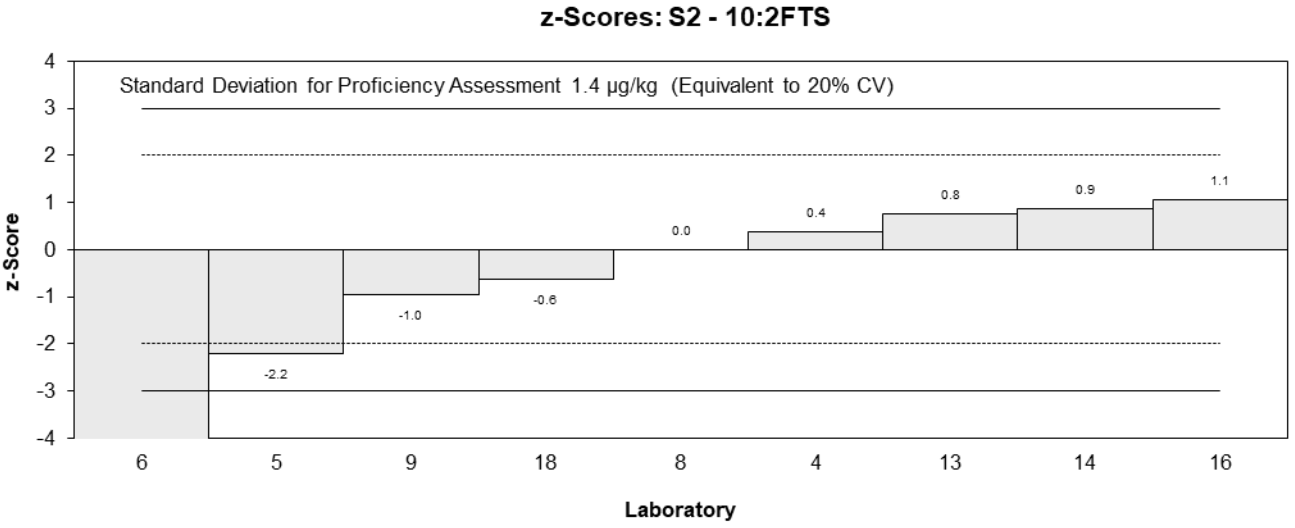
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NT	NT	NT		
3	NS	NS	NS		
4	7.52	0.36	93	0.37	0.36
5	3.9	1.17	75	-2.21	-1.70
6*	1.03	0.485	39	-4.26	-4.03
8	7.0	1.8	134	0.00	0.00
9	5.66	2.5	NR	-0.96	-0.47
10	NT	NT	NT		
11	NS	NS	NS		
12	< 9	4.5	NR		
13	8.05	0.579	59	0.75	0.69
14	8.2	3.0	NT	0.86	0.36
15	NS	NS	NS		
16	8.498	2.78	164	1.07	0.48
18	6.11	0.916	78.5	-0.64	-0.53
19	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	7.0	1.4
Spike Value	6.68	0.33
Robust Average	6.5	1.8
Median	7.0	1.5
Mean	6.2	
N	9	
Max	8.498	
Min	1.03	
Robust SD	2.2	
Robust CV	33%	


Results: S2 - 10:2FTS
Assigned Value = 7.0 ± 1.4 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
6 5 9 18 8 4 13 14 16 1 2 3 10 11 12 15 19 Md RA SV


z-Scores: S2 - 10:2FTS
Standard Deviation for Proficiency Assessment 1.4 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
6 5 9 18 8 4 13 14 16
-2.2
-1.0
-0.6
0.0
0.4
0.8
0.9
1.1

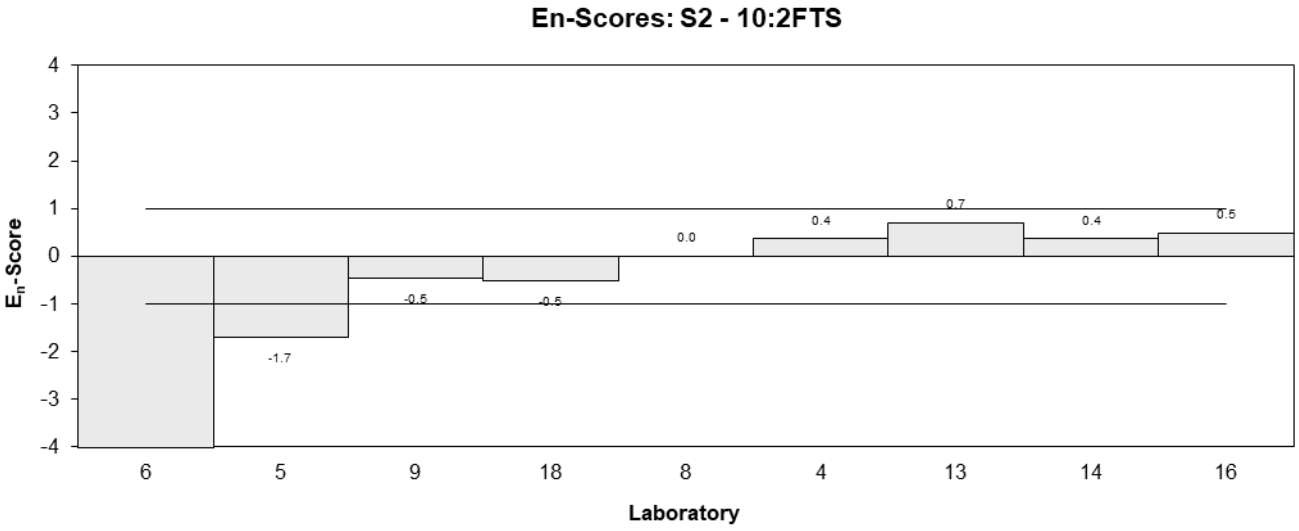

En-Scores: S2 - 10:2FTS
En-Score
Laboratory
6 5 9 18 8 4 13 14 16
-1.7
-0.5
-0.5
0.0
0.4
0.7
0.4
0.5

Figure 50

Table 53

Sample Details

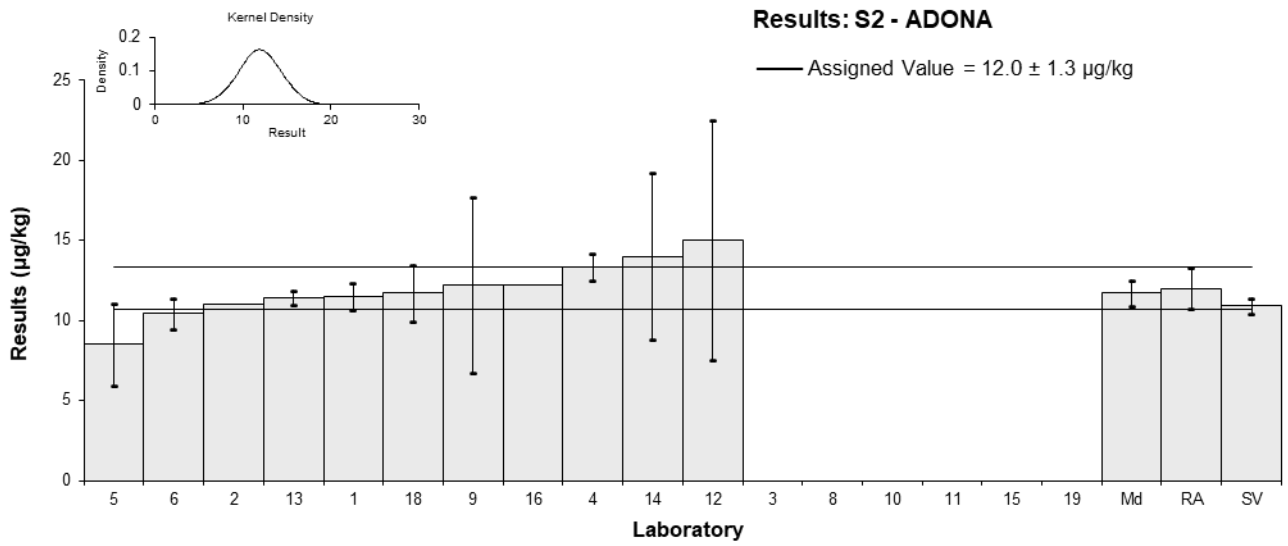
Sample No.	S2
Matrix	Fruit puree
Analyte	ADONA
Unit	µg/kg

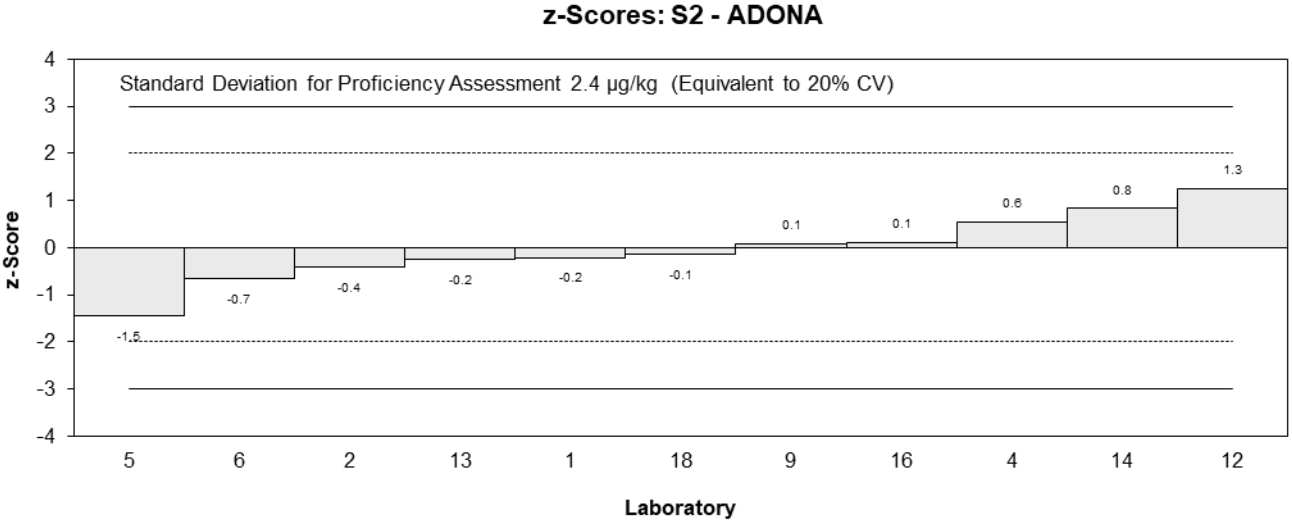
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	11.49	0.82	NR	-0.21	-0.33
2	11	NR	118	-0.42	-0.77
3	NS	NS	NS		
4	13.32	0.85	90	0.55	0.85
5	8.5	2.55	95	-1.46	-1.22
6	10.44	0.969	74	-0.65	-0.96
8	NT	NT	NT		
9	12.2	5.5	NR	0.08	0.04
10	NT	NT	NT		
11	NS	NS	NS		
12	15	7.5	NR	1.25	0.39
13	11.431	0.435	80	-0.24	-0.42
14	14	5.2	NT	0.83	0.37
15	NS	NS	NS		
16	12.24	NR	97	0.10	0.18
18	11.7	1.76	86.3	-0.13	-0.14
19	NS	NS	NS		

Statistics

Assigned Value	12.0	1.3
Spike Value	10.9	0.5
Robust Average	12.0	1.3
Median	11.7	0.8
Mean	11.9	
N	11	
Max	15	
Min	8.5	
Robust SD	1.7	
Robust CV	14%	


Kernel Density
Density
Result
Results: S2 - ADONA
Assigned Value = 12.0 ± 1.3 µg/kg
Results (µg/kg)
Laboratory
5 6 2 13 1 18 9 16 4 14 12 3 8 10 11 15 19 Md RA SV


z-Scores: S2 - ADONA
Standard Deviation for Proficiency Assessment 2.4 µg/kg (Equivalent to 20% CV)
z-Score
-1.5 -0.7 -0.4 -0.2 -0.2 -0.1 0.1 0.1 0.6 0.8 1.3
Laboratory
5 6 2 13 1 18 9 16 4 14 12

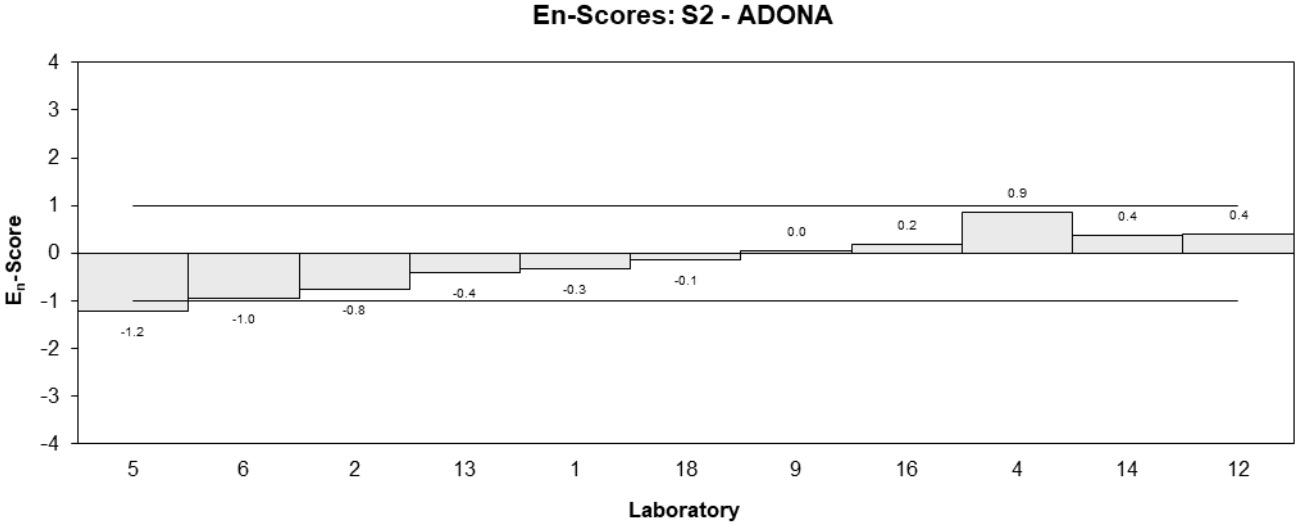

En-Scores: S2 - ADONA
En-Score
-1.2 -1.0 -0.8 -0.4 -0.3 -0.1 0.0 0.2 0.9 0.4 0.4
Laboratory
5 6 2 13 1 18 9 16 4 14 12

Figure 51

Table 54

Sample Details

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

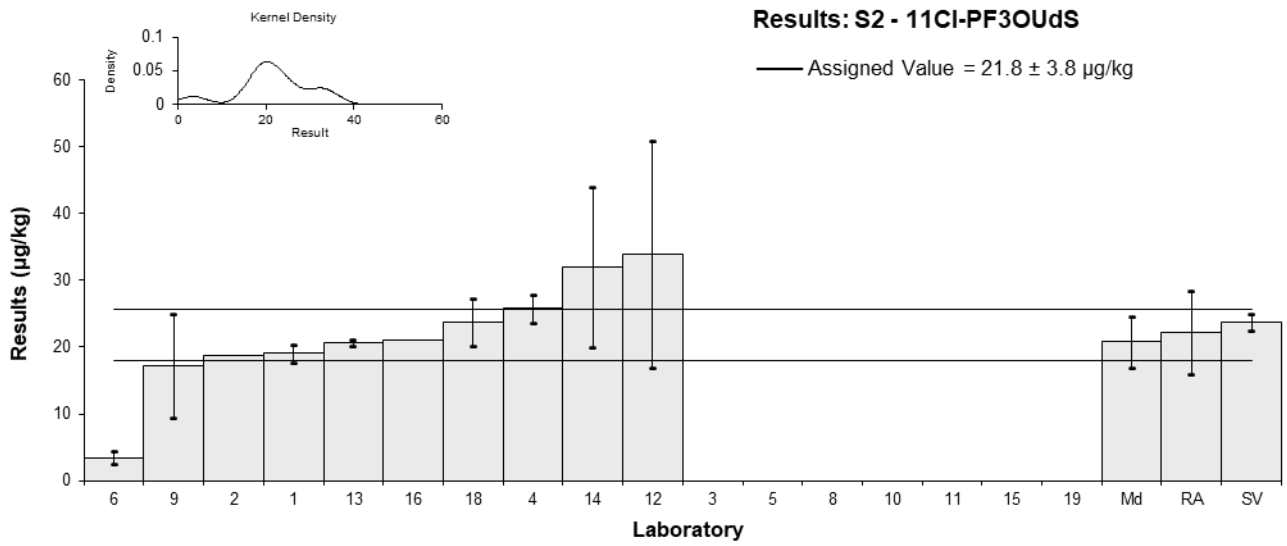
Participant Results

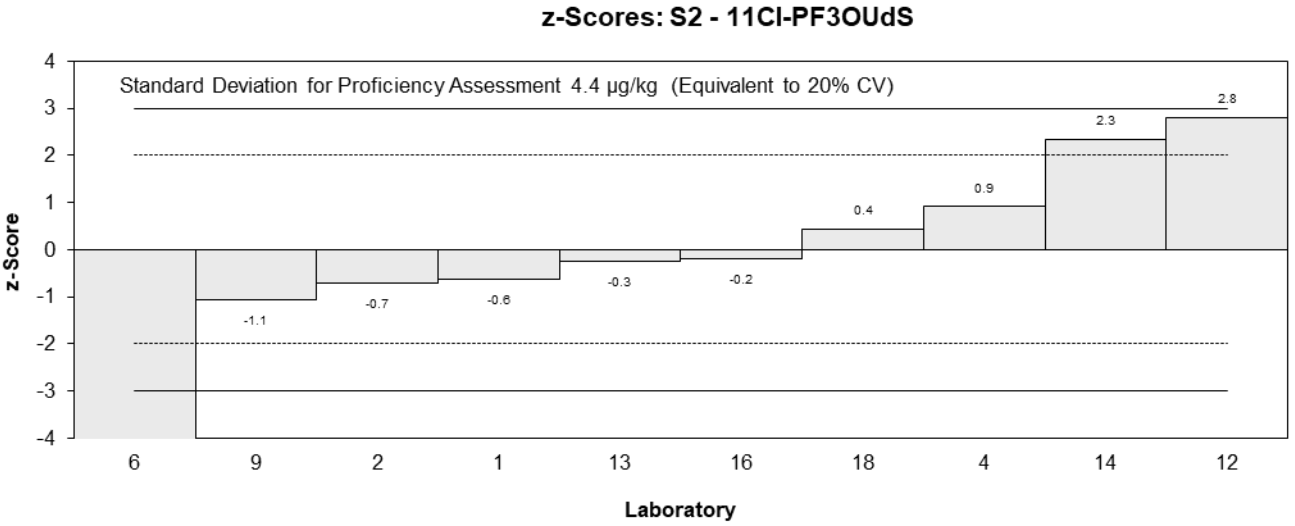
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	19.07	1.36	NR	-0.63	-0.68
2	18.7	NR	78	-0.71	-0.82
3	NS	NS	NS		
4	25.77	2.06	93	0.91	0.92
5	NT	NT	NT		
6*	3.46	1	85	-4.21	-4.67
8	NT	NT	NT		
9	17.2	7.7	NR	-1.06	-0.54
10	NT	NT	NT		
11	NS	NS	NS		
12*	34	17	NR	2.80	0.70
13	20.668	0.532	87	-0.26	-0.30
14	32	12	NT	2.34	0.81
15	NS	NS	NS		
16	20.97	NR	123	-0.19	-0.22
18	23.7	3.56	97.4	0.44	0.36
19	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	21.8	3.8
Spike Value	23.7	1.2
Robust Average	22.2	6.3
Median	20.8	3.8
Mean	21.6	
N	10	
Max	34	
Min	3.46	
Robust SD	7.9	
Robust CV	36%	


Results: S2 - 11Cl-PF3OUdS
Assigned Value = 21.8 ± 3.8 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
6 9 2 1 13 16 18 4 14 12 3 5 8 10 11 15 19 Md RA SV


z-Scores: S2 - 11Cl-PF3OUdS
Standard Deviation for Proficiency Assessment 4.4 µg/kg (Equivalent to 20% CV)
z-Score
-1.1
-0.7
-0.6
-0.3
-0.2
0.4
0.9
2.3
2.8
Laboratory
6 9 2 1 13 16 18 4 14 12

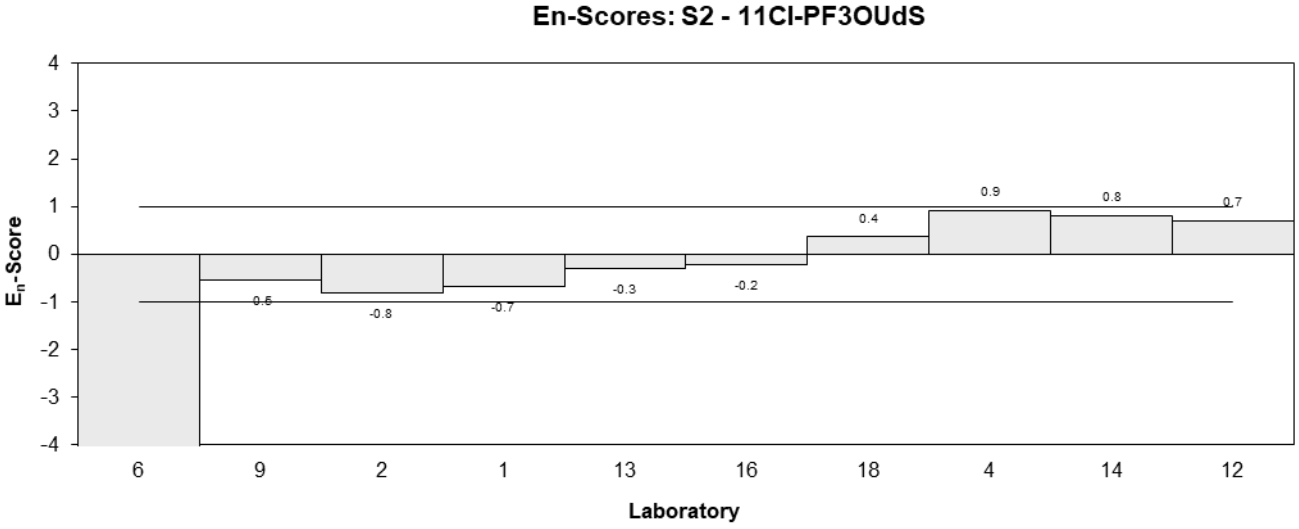

En-Scores: S2 - 11Cl-PF3OUdS
En-Score
-0.6
-0.8
-0.7
-0.3
-0.2
0.4
0.9
0.8
0.7
Laboratory
6 9 2 1 13 16 18 4 14 12

Figure 52

Table 55

Sample Details

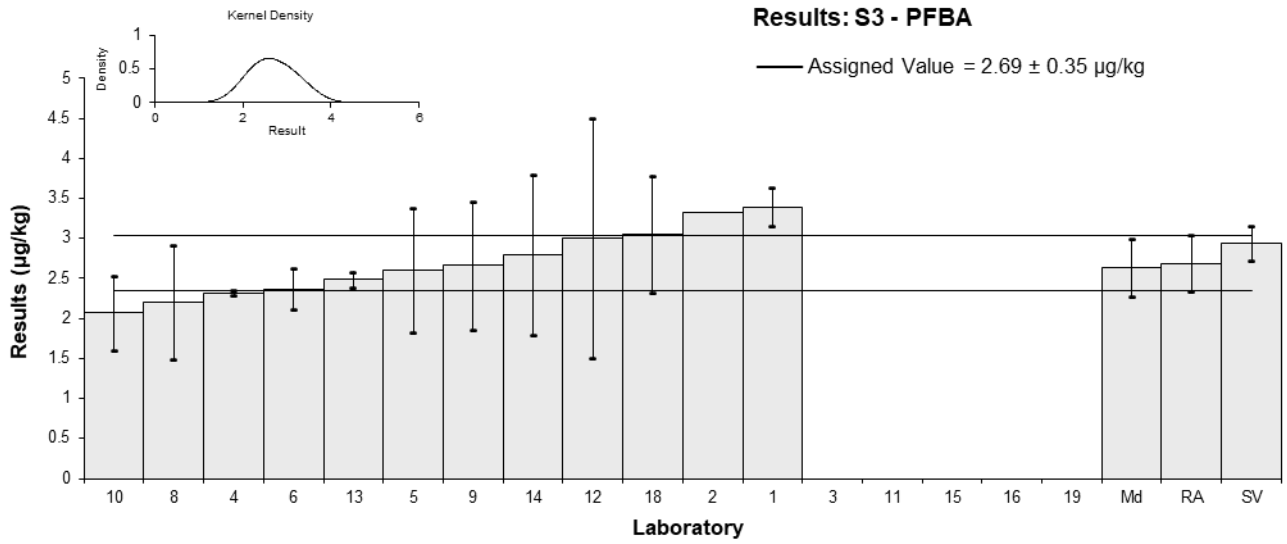
Sample No.	S3
Matrix	Infant formula
Analyte	PFBA
Unit	µg/kg

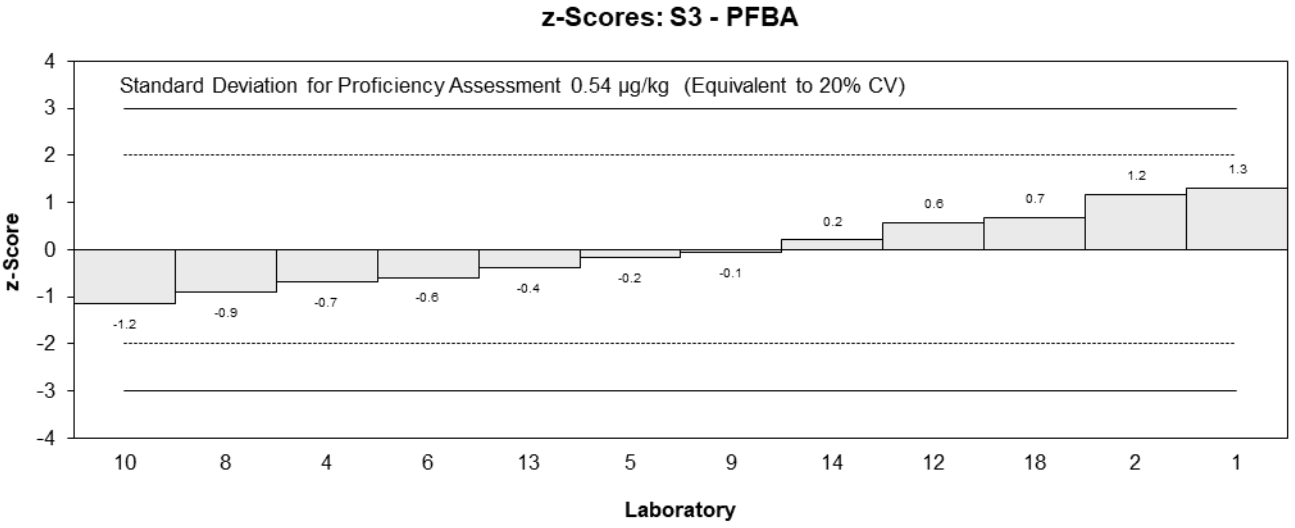
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	3.39	0.24	NR	1.30	1.65
2	3.32	NR	83	1.17	1.80
3	NS	NS	NS		
4	2.32	0.03	119	-0.69	-1.05
5	2.6	0.78	91	-0.17	-0.11
6	2.37	0.255	33	-0.59	-0.74
8	2.2	0.71	74	-0.91	-0.62
9	2.66	0.8	66	-0.06	-0.03
10	2.07	0.467	11.4	-1.15	-1.06
11	NS	NS	NS		
12	3	1.5	83	0.58	0.20
13	2.486	0.101	97	-0.38	-0.56
14	2.8	1.0	NT	0.20	0.10
15	NS	NS	NS		
16	<5	NR	85		
18	3.05	0.732	87.0	0.67	0.44
19	NS	NS	NS		

Statistics

Assigned Value	2.69	0.35
Spike Value	2.94	0.21
Robust Average	2.69	0.35
Median	2.63	0.36
Mean	2.69	
N	12	
Max	3.39	
Min	2.07	
Robust SD	0.49	
Robust CV	18%	


Results: S3 - PFBA
Kernel Density
Density
Result
Assigned Value = 2.69 ± 0.35 µg/kg
Results (µg/kg)
10 8 4 6 13 5 9 14 12 18 2 1 3 11 15 16 19 Md RA SV
Laboratory


z-Scores: S3 - PFBA
Standard Deviation for Proficiency Assessment 0.54 µg/kg (Equivalent to 20% CV)
z-Score
-1.2 -0.9 -0.7 -0.6 -0.4 -0.2 -0.1 0.2 0.6 0.7 1.2 1.3
10 8 4 6 13 5 9 14 12 18 2 1
Laboratory

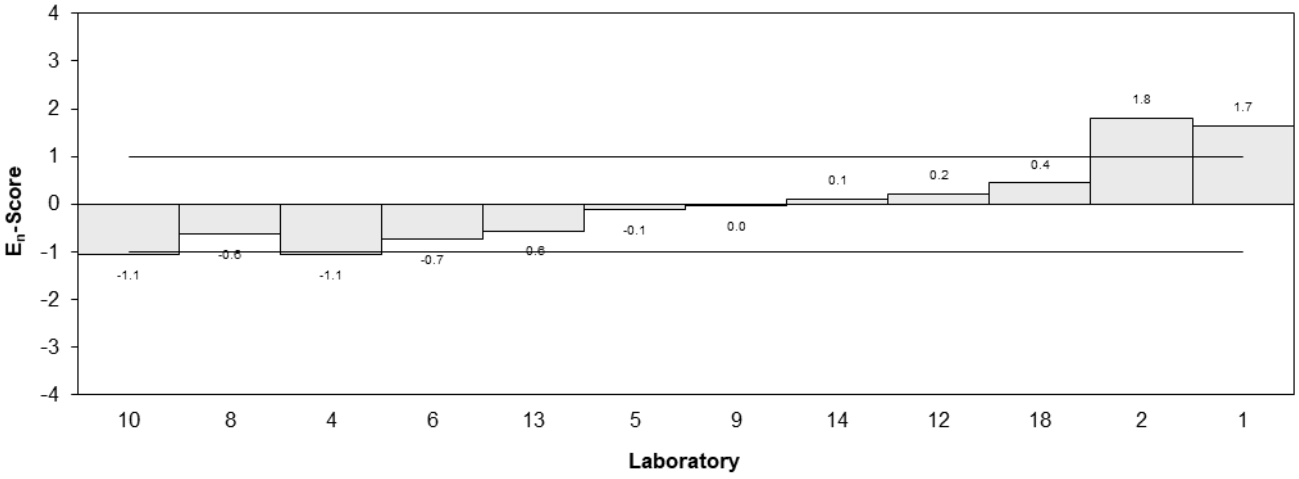

En-Scores: S3 - PFBA
En-Score
-1.1 -0.6 -1.1 -0.7 -0.6 -0.1 0.0 0.1 0.2 0.4 1.8 1.7
10 8 4 6 13 5 9 14 12 18 2 1
Laboratory

Figure 53

Table 56

Sample Details

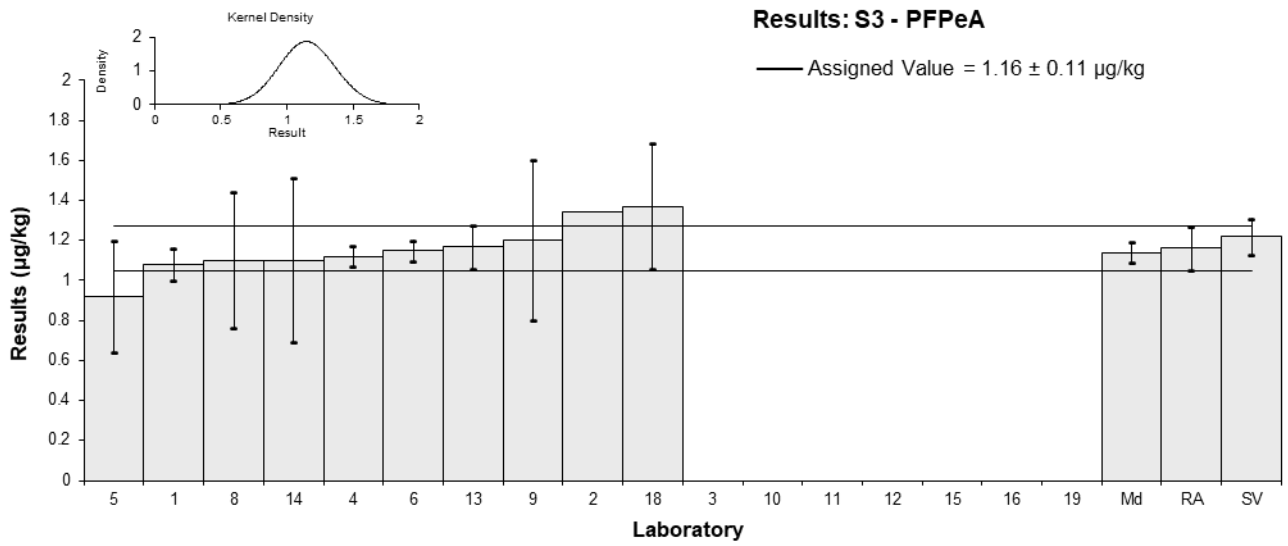
Sample No.	S3
Matrix	Infant formula
Analyte	PFPeA
Unit	µg/kg

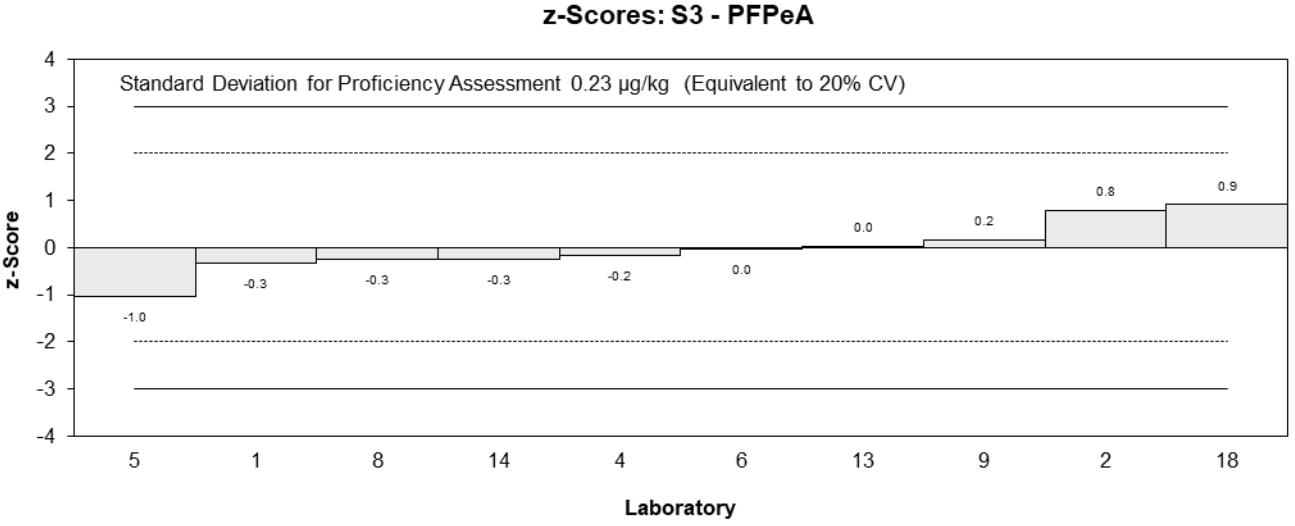
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	1.08	0.08	NR	-0.34	-0.59
2	1.34	NR	95	0.78	1.64
3	NS	NS	NS		
4	1.12	0.05	115	-0.17	-0.33
5	0.92	0.276	98	-1.03	-0.81
6	1.15	0.051	36	-0.04	-0.08
8	1.1	0.34	75	-0.26	-0.17
9	1.2	0.4	69	0.17	0.10
10	<1.69	NR	24.8		
11	NS	NS	NS		
12	< 2	1	62		
13	1.167	0.108	77	0.03	0.05
14	1.1	0.41	NT	-0.26	-0.14
15	NS	NS	NS		
16	<2	NR	92		
18	1.37	0.315	74.6	0.91	0.63
19	NS	NS	NS		

Statistics

Assigned Value	1.16	0.11
Spike Value	1.22	0.09
Robust Average	1.16	0.11
Median	1.14	0.05
Mean	1.15	
N	10	
Max	1.37	
Min	0.92	
Robust SD	0.14	
Robust CV	12%	


Kernel Density
Density
Result
Results: S3 - PFPeA
Assigned Value = 1.16 ± 0.11 µg/kg
Results (µg/kg)
Laboratory
5 1 8 14 4 6 13 9 2 18 3 10 11 12 15 16 19 Md RA SV


z-Scores: S3 - PFPeA
Standard Deviation for Proficiency Assessment 0.23 µg/kg (Equivalent to 20% CV)
z-Score
-1.0 -0.3 -0.3 -0.3 -0.2 0.0 0.0 0.2 0.8 0.9
Laboratory
5 1 8 14 4 6 13 9 2 18

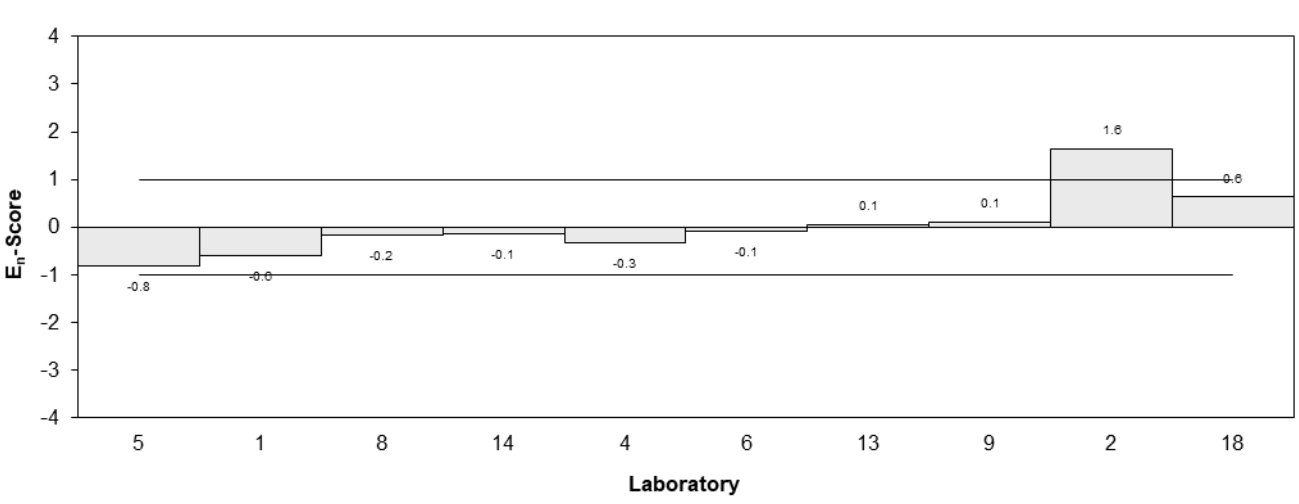

En-Scores: S3 - PFPeA
En-Score
-0.8 -0.6 -0.2 -0.1 -0.3 -0.1 0.1 0.1 1.6 0.6
Laboratory
5 1 8 14 4 6 13 9 2 18

Figure 54

Table 57

Sample Details

Sample No.	S3
Matrix	Infant formula
Analyte	PFHxA
Unit	µg/kg

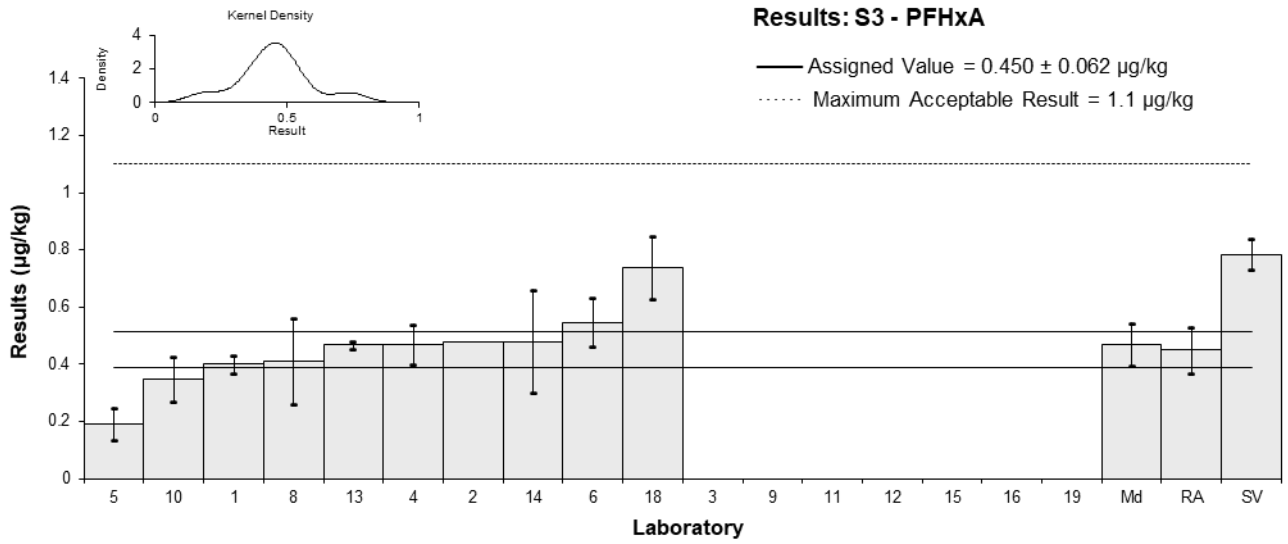
Participant Results

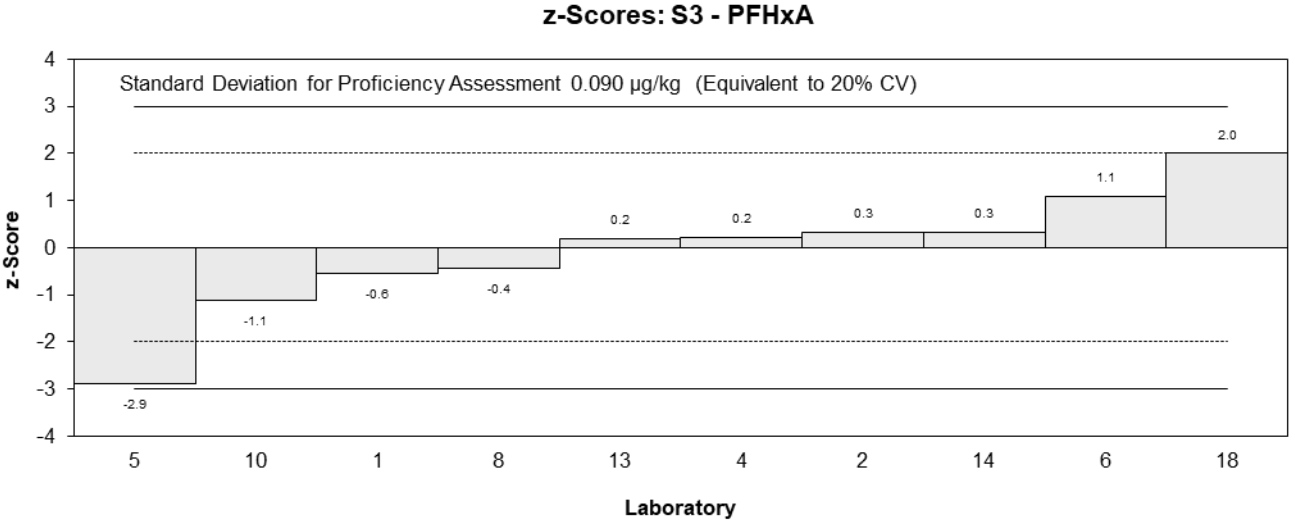
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.4	0.03	NR	-0.56	-0.73
2	0.48	NR	111	0.33	0.48
3	NS	NS	NS		
4	0.47	0.07	109	0.22	0.21
5*	0.19	0.057	89	-2.89	-3.09
6	0.547	0.085	31	1.08	0.92
8	0.41	0.15	95	-0.44	-0.25
9	<0.5	NR	75		
10	0.348	0.078	23	-1.13	-1.02
11	NS	NS	NS		
12	< 1	0.5	74		
13	0.467	0.012	84	0.19	0.27
14	0.48	0.18	NT	0.33	0.16
15	NS	NS	NS		
16	<1	NR	112		
18*	0.736	0.110	81.9	2.00▼	
19	NS	NS	NS		

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

Statistics

Assigned Value	0.450	0.062
Spike Value	0.784	0.055
Robust Average	0.450	0.081
Max Acceptable Result	1.10	
Median	0.469	0.074
Mean	0.453	
N	10	
Max	0.736	
Min	0.19	
Robust SD	0.1	
Robust CV	23%	


Kernel Density
Density
Result
Results: S3 - PFHxA
Assigned Value = 0.450 ± 0.062 µg/kg
Maximum Acceptable Result = 1.1 µg/kg
Results (µg/kg)
Laboratory
5 10 1 8 13 4 2 14 6 18 3 9 11 12 15 16 19 Md RA SV


z-Scores: S3 - PFHxA
Standard Deviation for Proficiency Assessment 0.090 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
5 10 1 8 13 4 2 14 6 18
-2.9
-1.1
-0.6
-0.4
0.2
0.2
0.3
0.3
1.1
2.0

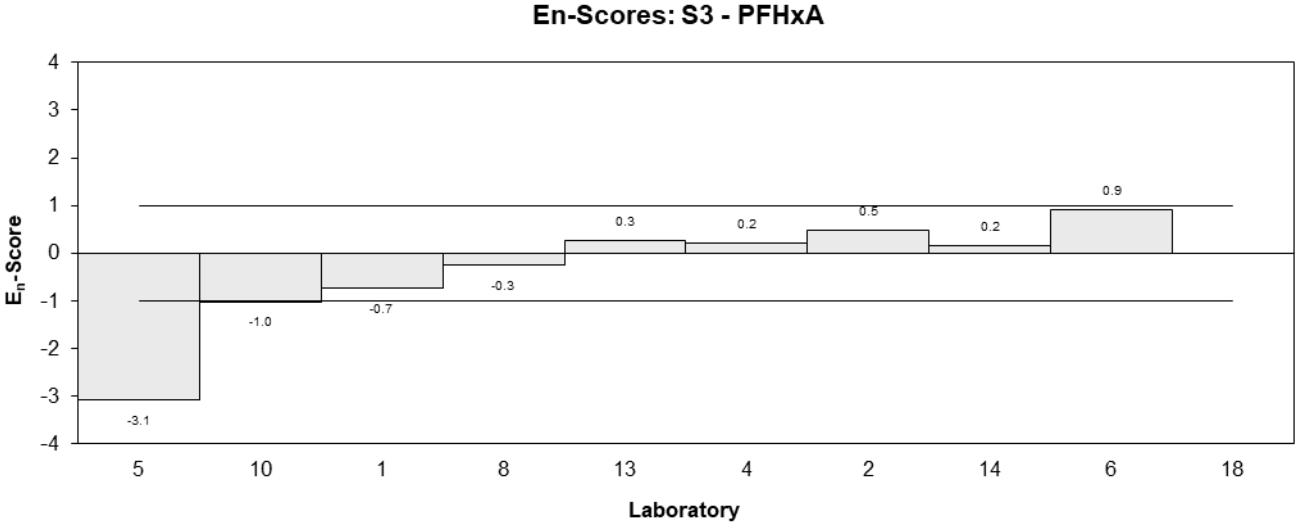

En-Scores: S3 - PFHxA
En-Score
Laboratory
5 10 1 8 13 4 2 14 6 18
-3.1
-1.0
-0.7
-0.3
0.3
0.2
0.5
0.2
0.9

Figure 55

Table 58

Sample Details

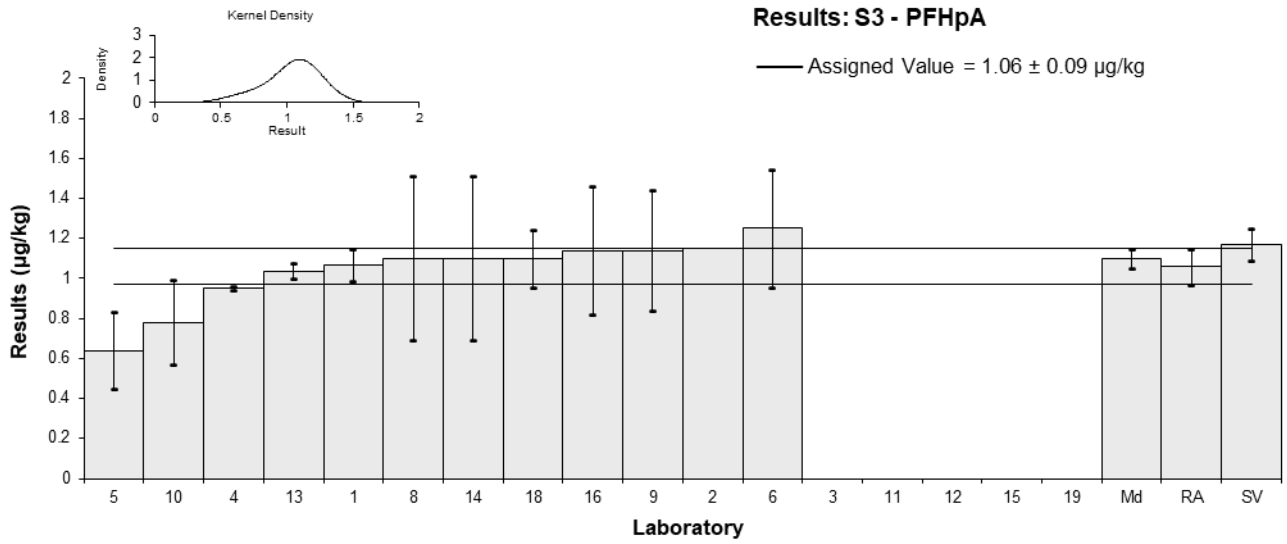
Sample No.	S3
Matrix	Infant formula
Analyte	PFHpA
Unit	µg/kg

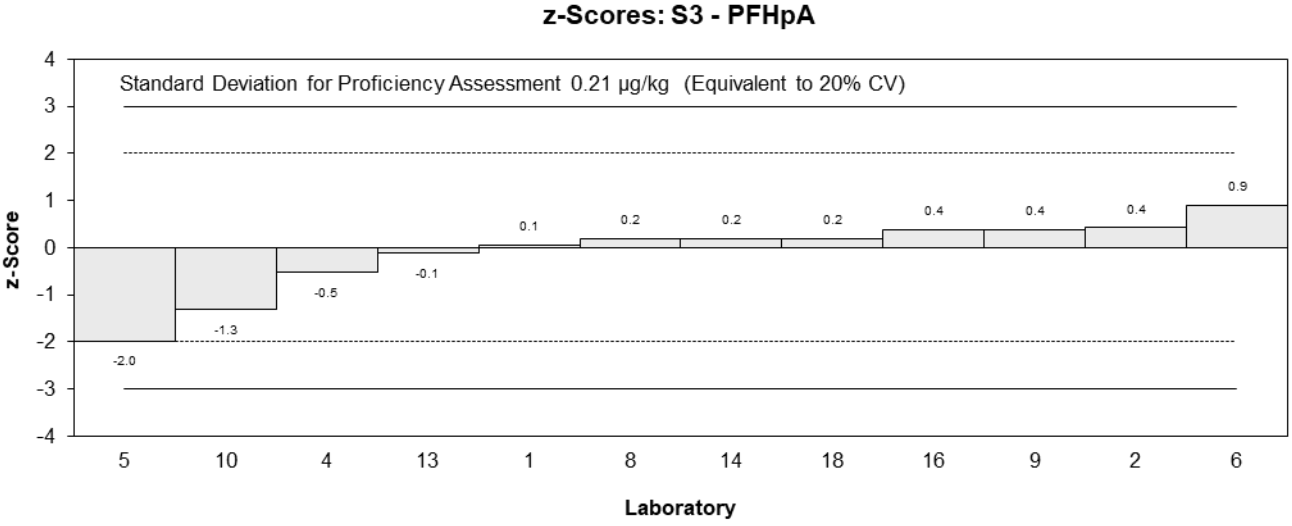
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	1.07	0.08	NR	0.05	0.08
2	1.15	NR	103	0.42	1.00
3	NS	NS	NS		
4	0.95	0.01	112	-0.52	-1.21
5	0.64	0.192	92	-1.98	-1.98
6	1.25	0.293	48	0.90	0.62
8	1.1	0.41	108	0.19	0.10
9	1.14	0.3	76	0.38	0.26
10	0.781	0.21	42.5	-1.32	-1.22
11	NS	NS	NS		
12	< 2	1	68		
13	1.037	0.04	84	-0.11	-0.23
14	1.1	0.41	NT	0.19	0.10
15	NS	NS	NS		
16	1.138	0.32	108	0.37	0.23
18	1.10	0.143	86.1	0.19	0.24
19	NS	NS	NS		

Statistics

Assigned Value	1.06	0.09
Spike Value	1.17	0.08
Robust Average	1.06	0.09
Median	1.10	0.05
Mean	1.04	
N	12	
Max	1.25	
Min	0.64	
Robust SD	0.13	
Robust CV	12%	


Kernel Density
Density
Result
Results: S3 - PFHpA
Assigned Value = 1.06 ± 0.09 µg/kg
Results (µg/kg)
Laboratory
5 10 4 13 1 8 14 18 16 9 2 6 3 11 12 15 19 Md RA SV


z-Scores: S3 - PFHpA
Standard Deviation for Proficiency Assessment 0.21 µg/kg (Equivalent to 20% CV)
z-Score
-2.0 -1.3 -0.5 -0.1 0.1 0.2 0.2 0.2 0.4 0.4 0.4 0.9
Laboratory
5 10 4 13 1 8 14 18 16 9 2 6

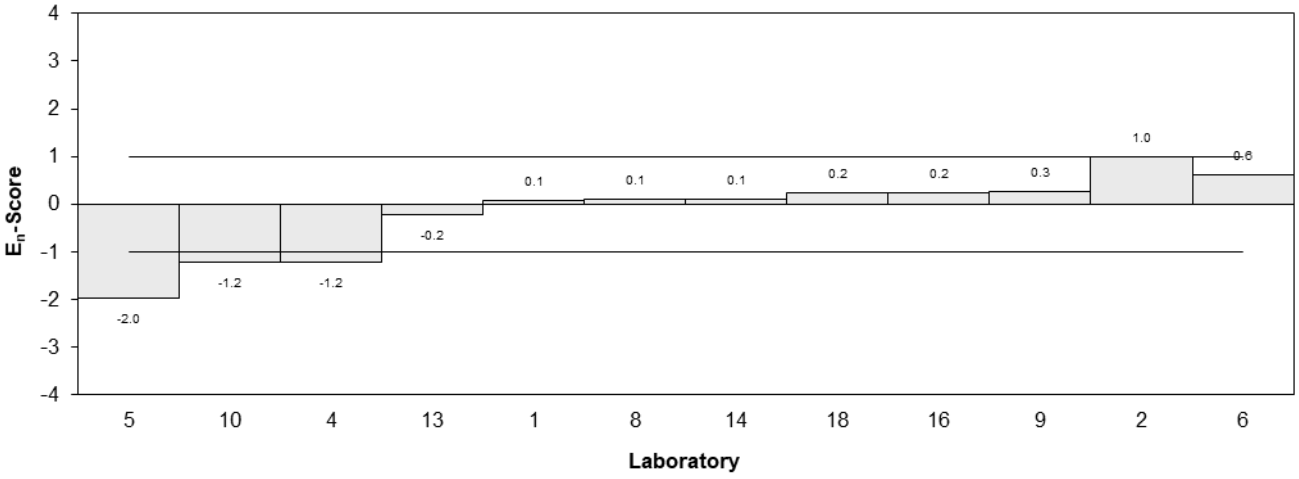

En-Scores: S3 - PFHpA
En-Score
-2.0 -1.2 -1.2 -0.2 0.1 0.1 0.1 0.2 0.2 0.3 1.0 0.6
Laboratory
5 10 4 13 1 8 14 18 16 9 2 6

Figure 56

Table 59

Sample Details

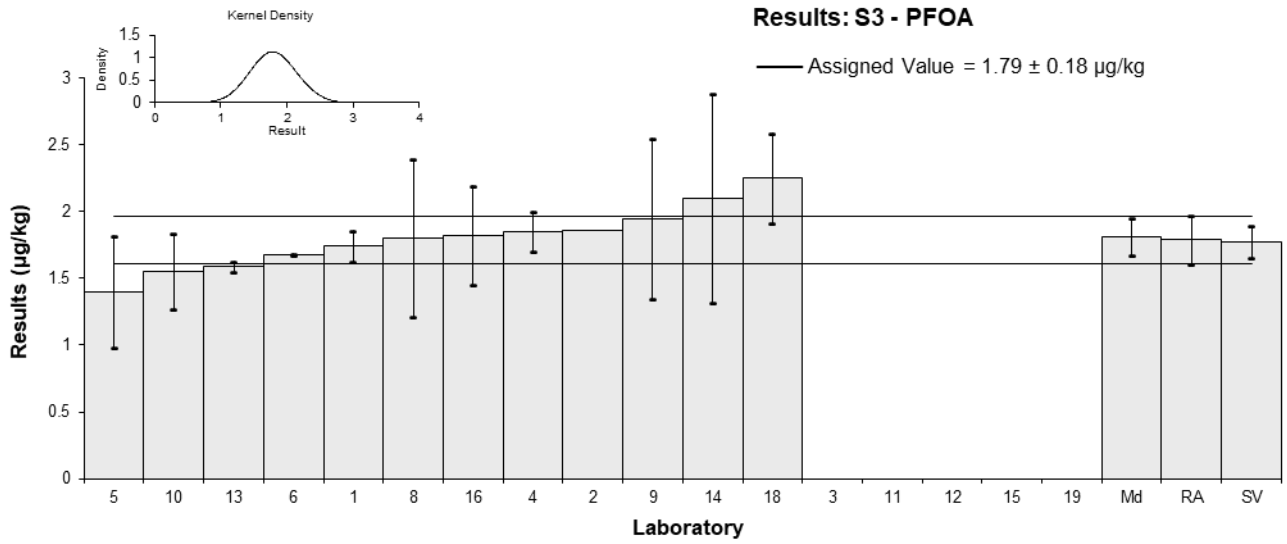
Sample No.	S3
Matrix	Infant formula
Analyte	PFOA
Unit	µg/kg

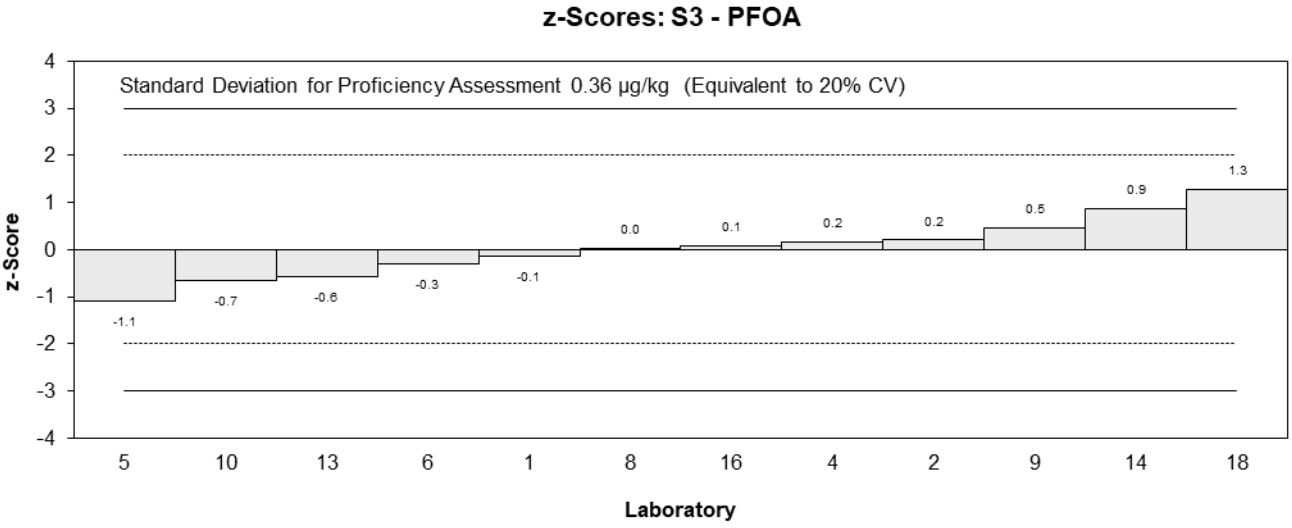
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	1.74	0.12	NR	-0.14	-0.23
2	1.86	NR	110	0.20	0.39
3	NS	NS	NS		
4	1.85	0.15	133	0.17	0.26
5	1.4	0.42	92	-1.09	-0.85
6	1.68	0.00662	41	-0.31	-0.61
8	1.8	0.59	114	0.03	0.02
9	1.95	0.6	73	0.45	0.26
10	1.55	0.283	53	-0.67	-0.72
11	NS	NS	NS		
12	< 5	2.5	60		
13	1.587	0.039	88	-0.57	-1.10
14	2.1	0.78	NT	0.87	0.39
15	NS	NS	NS		
16	1.822	0.37	117	0.09	0.08
18	2.25	0.338	86.1	1.28	1.20
19	NS	NS	NS		

Statistics

Assigned Value	1.79	0.18
Spike Value	1.77	0.12
Robust Average	1.79	0.18
Median	1.81	0.14
Mean	1.80	
N	12	
Max	2.25	
Min	1.4	
Robust SD	0.25	
Robust CV	14%	


Kernel Density
Density
Result
Results: S3 - PFOA
Assigned Value = 1.79 ± 0.18 µg/kg
Results (µg/kg)
5 10 13 6 1 8 16 4 2 9 14 18 3 11 12 15 19 Md RA SV
Laboratory


z-Scores: S3 - PFOA
Standard Deviation for Proficiency Assessment 0.36 µg/kg (Equivalent to 20% CV)
z-Score
-1.1 -0.7 -0.6 -0.3 -0.1 0.0 0.1 0.2 0.2 0.5 0.9 1.3
5 10 13 6 1 8 16 4 2 9 14 18
Laboratory

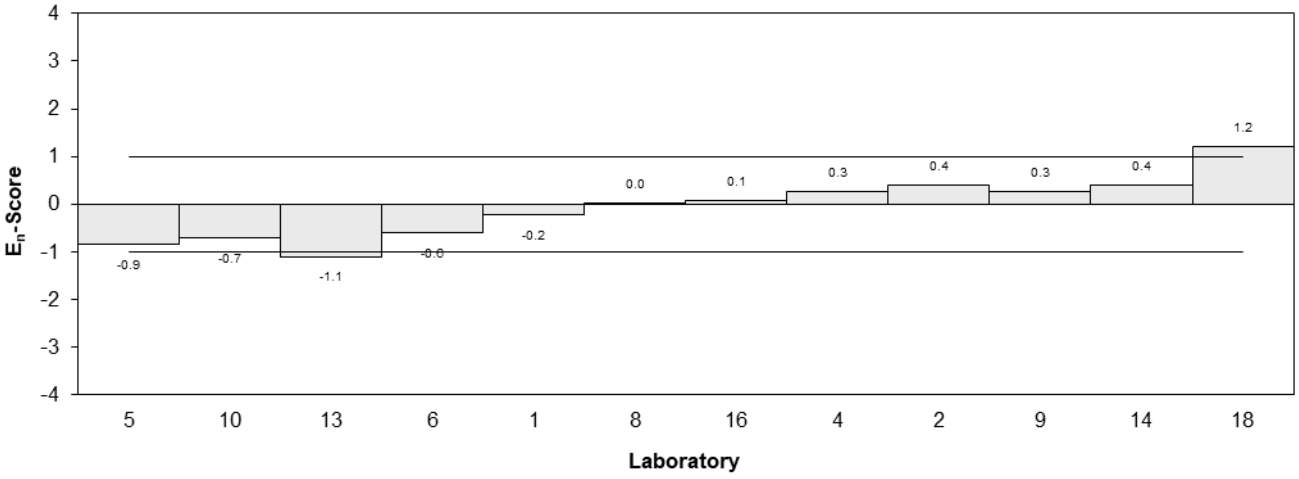

En-Scores: S3 - PFOA
En-Score
-0.9 -0.7 -1.1 -0.6 -0.2 0.0 0.1 0.3 0.4 0.3 0.4 1.2
5 10 13 6 1 8 16 4 2 9 14 18
Laboratory

Figure 57

Table 60

Sample Details

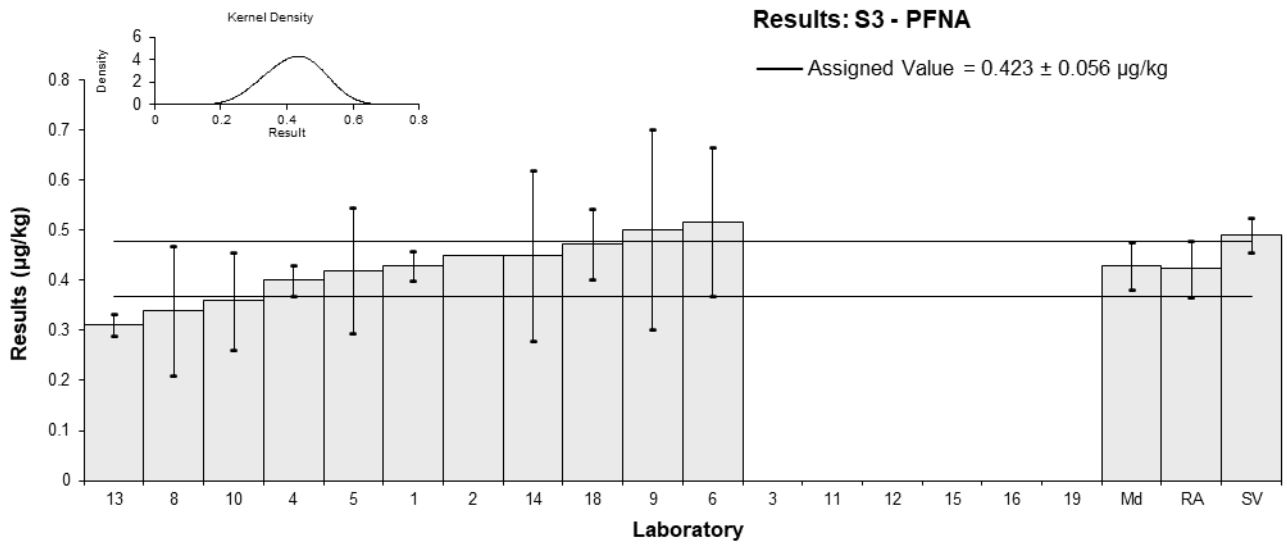
Sample No.	S3
Matrix	Infant formula
Analyte	PFNA
Unit	µg/kg

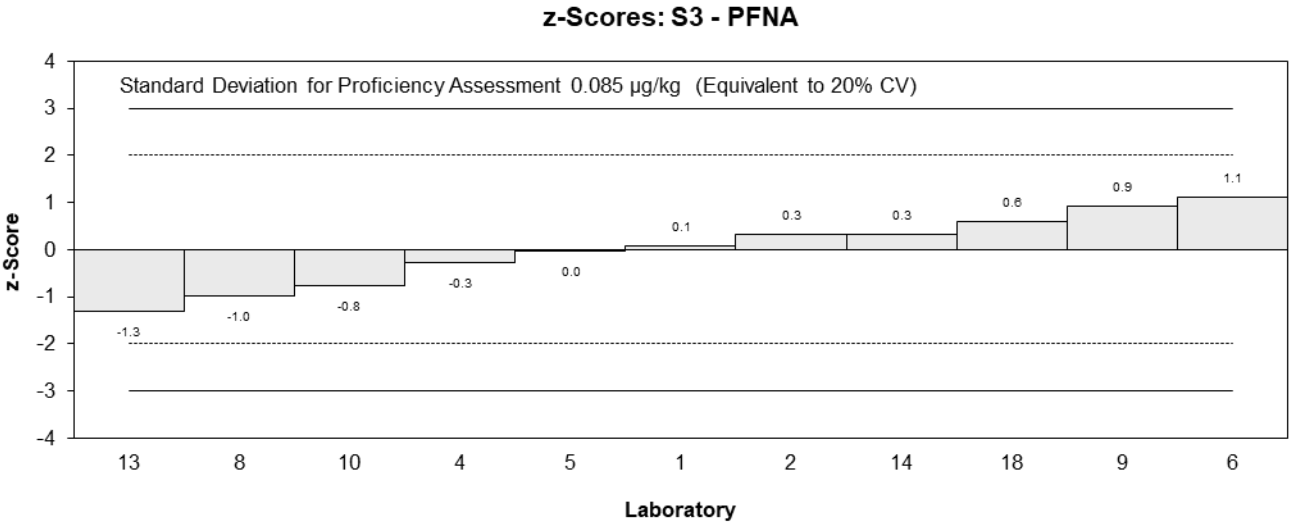
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.43	0.03	NR	0.08	0.11
2	0.45	NR	96	0.32	0.48
3	NS	NS	NS		
4	0.4	0.03	101	-0.27	-0.36
5	0.42	0.126	136	-0.04	-0.02
6	0.517	0.149	23	1.11	0.59
8	0.34	0.13	111	-0.98	-0.59
9	0.502	0.2	71	0.93	0.38
10	0.359	0.097	51.6	-0.76	-0.57
11	NS	NS	NS		
12	< 2	1	93		
13	0.311	0.021	88	-1.32	-1.87
14	0.45	0.17	NT	0.32	0.15
15	NS	NS	NS		
16	<1	NR	125		
18	0.473	0.071	86.1	0.59	0.55
19	NS	NS	NS		

Statistics

Assigned Value	0.423	0.056
Spike Value	0.491	0.034
Robust Average	0.423	0.056
Median	0.430	0.048
Mean	0.423	
N	11	
Max	0.517	
Min	0.311	
Robust SD	0.074	
Robust CV	18%	


Results: S3 - PFNA
Kernel Density
Density
Result
Assigned Value = 0.423 ± 0.056 µg/kg
Results (µg/kg)
Laboratory
13 8 10 4 5 1 2 14 18 9 6 3 11 12 15 16 19 Md RA SV


z-Scores: S3 - PFNA
Standard Deviation for Proficiency Assessment 0.085 µg/kg (Equivalent to 20% CV)
z-Score
-1.3 -1.0 -0.8 -0.3 0.0 0.1 0.3 0.3 0.6 0.9 1.1
Laboratory
13 8 10 4 5 1 2 14 18 9 6

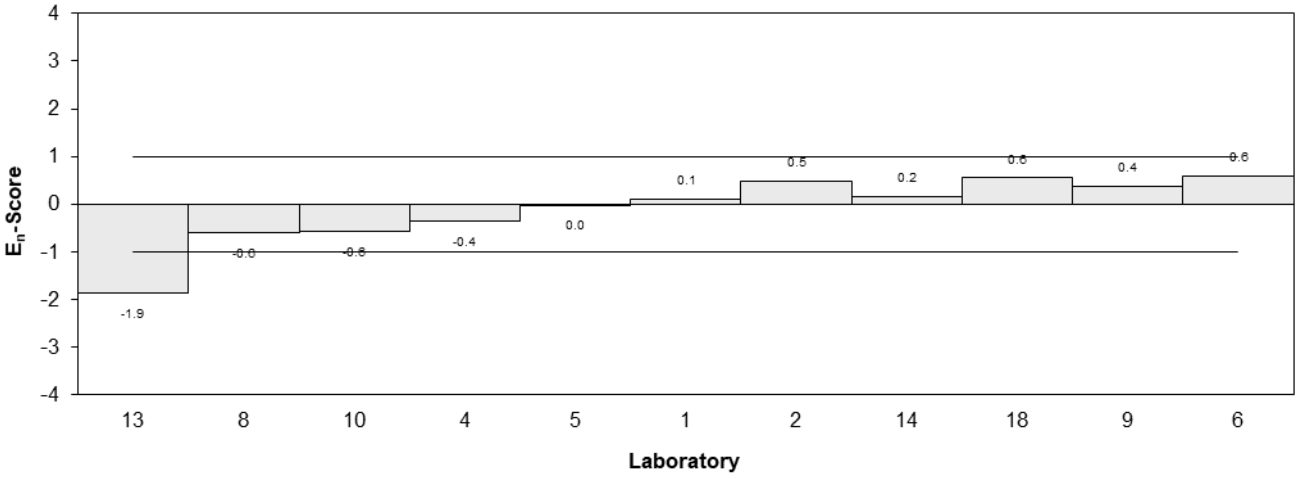

En-Scores: S3 - PFNA
En-Score
-1.9 -0.6 -0.6 -0.4 0.0 0.1 0.5 0.2 0.6 0.4 0.6
Laboratory
13 8 10 4 5 1 2 14 18 9 6

Figure 58

Table 61

Sample Details

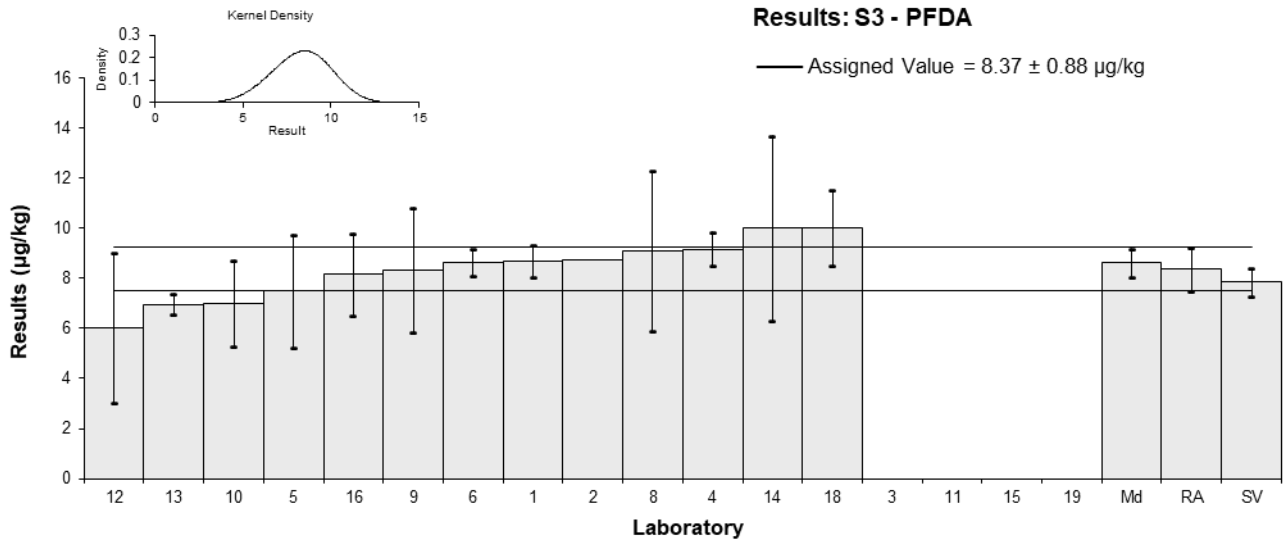
Sample No.	S3
Matrix	Infant formula
Analyte	PFDA
Unit	µg/kg

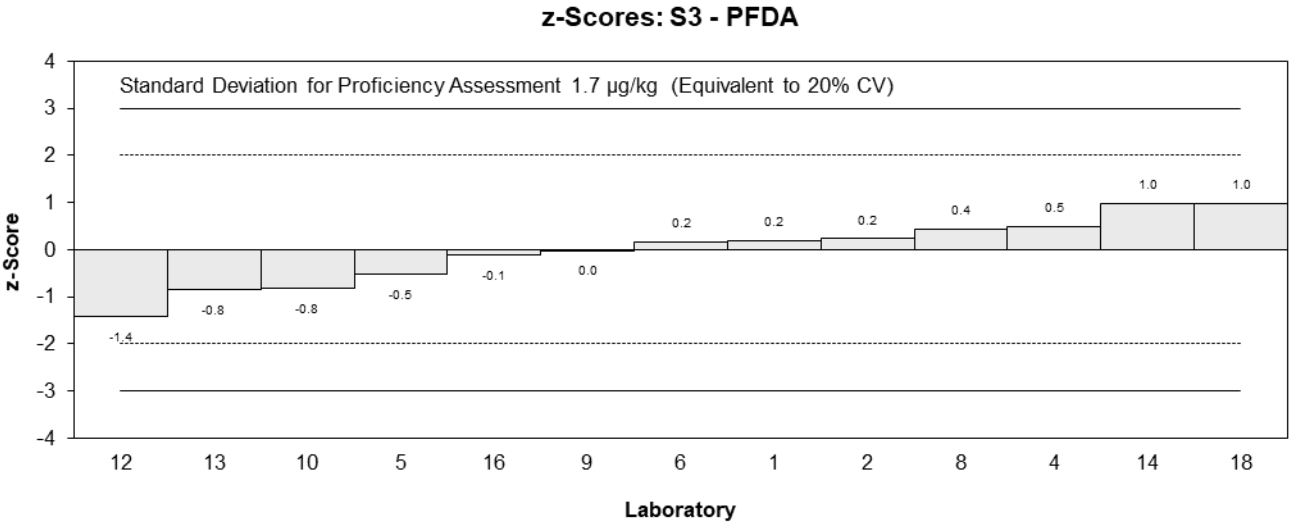
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	8.69	0.62	NR	0.19	0.30
2	8.75	NR	88	0.23	0.43
3	NS	NS	NS		
4	9.17	0.68	110	0.48	0.72
5	7.5	2.25	95	-0.52	-0.36
6	8.63	0.537	22	0.16	0.25
8	9.1	3.2	118	0.44	0.22
9	8.34	2.5	69	-0.02	-0.01
10	7	1.73	61.8	-0.82	-0.71
11	NS	NS	NS		
12	6	3	56	-1.42	-0.76
13	6.969	0.431	88	-0.84	-1.43
14	10	3.7	NT	0.97	0.43
15	NS	NS	NS		
16	8.176	1.64	121	-0.12	-0.10
18	10.0	1.51	80.2	0.97	0.93
19	NS	NS	NS		

Statistics

Assigned Value	8.37	0.88
Spike Value	7.85	0.55
Robust Average	8.37	0.88
Median	8.63	0.56
Mean	8.33	
N	13	
Max	10	
Min	6	
Robust SD	1.3	
Robust CV	15%	


Kernel Density
Density
Result
Results: S3 - PFDA
Assigned Value = 8.37 ± 0.88 µg/kg
Results (µg/kg)
Laboratory
12 13 10 5 16 9 6 1 2 8 4 14 18 3 11 15 19 Md RA SV


z-Scores: S3 - PFDA
Standard Deviation for Proficiency Assessment 1.7 µg/kg (Equivalent to 20% CV)
z-Score
-1.4 -0.8 -0.8 -0.5 -0.1 0.0 0.2 0.2 0.2 0.4 0.5 1.0 1.0
Laboratory
12 13 10 5 16 9 6 1 2 8 4 14 18

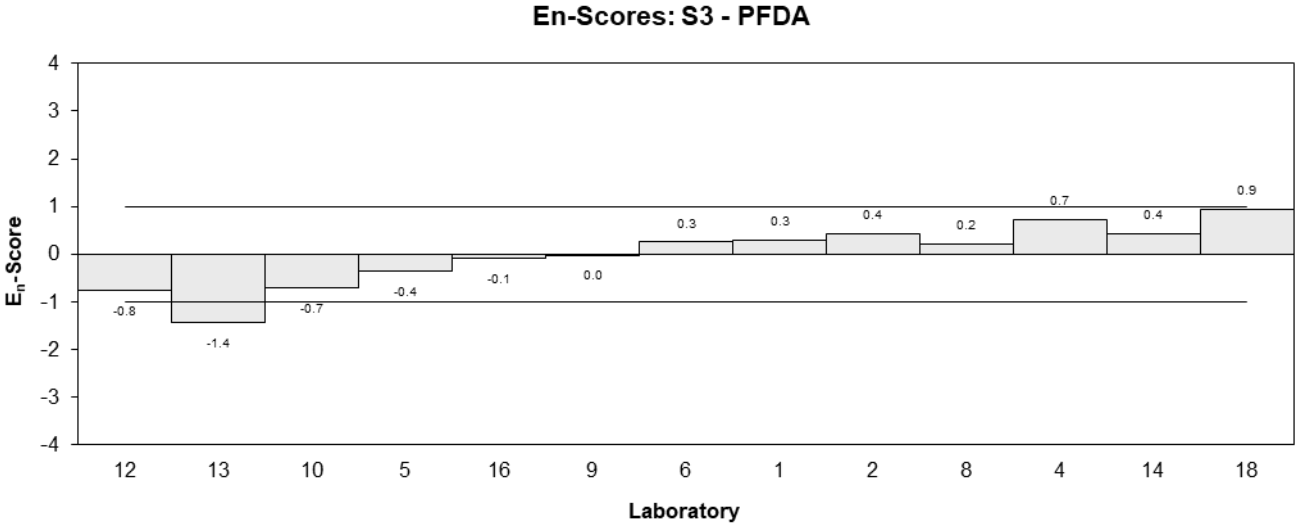

En-Scores: S3 - PFDA
En-Score
-0.8 -1.4 -0.7 -0.4 -0.1 0.0 0.3 0.3 0.4 0.2 0.7 0.4 0.9
Laboratory
12 13 10 5 16 9 6 1 2 8 4 14 18

Figure 59

Table 62

Sample Details

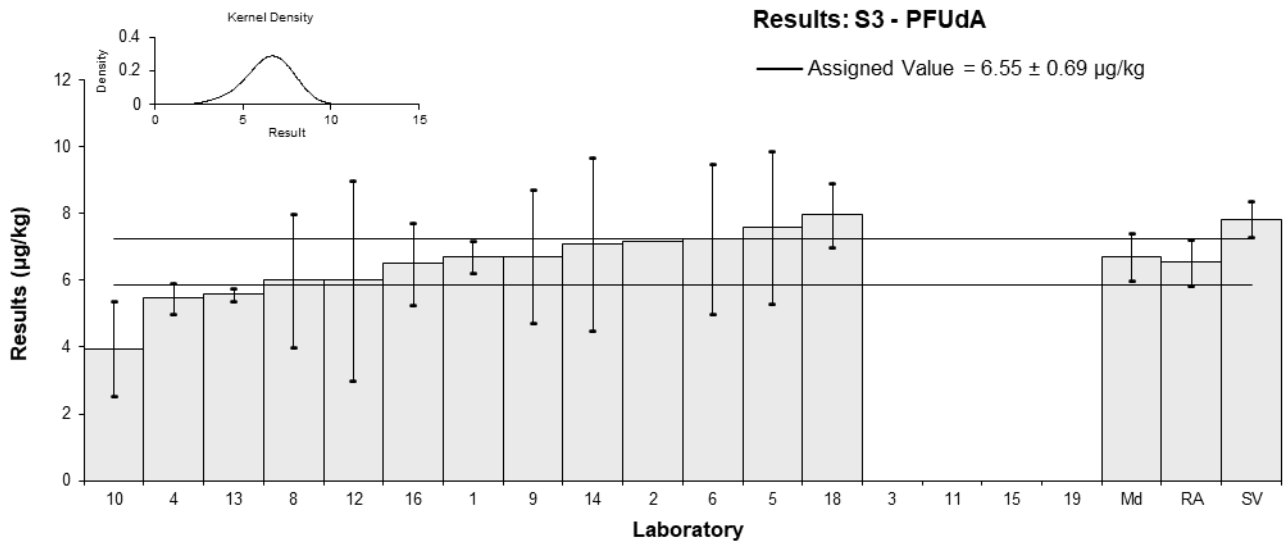
Sample No.	S3
Matrix	Infant formula
Analyte	PFUdA
Unit	µg/kg

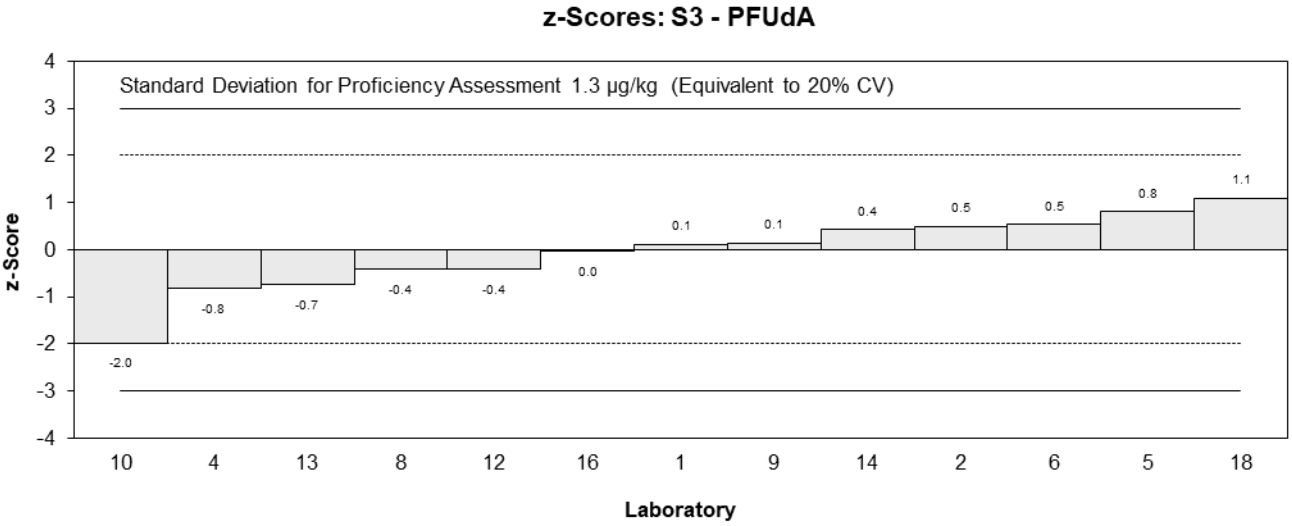
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	6.70	0.48	NR	0.11	0.18
2	7.18	NR	68	0.48	0.91
3	NS	NS	NS		
4	5.47	0.47	102	-0.82	-1.29
5	7.6	2.28	100	0.80	0.44
6	7.24	2.26	14	0.53	0.29
8	6.0	2.0	107	-0.42	-0.26
9	6.72	2.0	99	0.13	0.08
10	3.95	1.43	62.4	-1.98	-1.64
11	NS	NS	NS		
12	6	3	45	-0.42	-0.18
13	5.576	0.186	90	-0.74	-1.36
14	7.1	2.6	NT	0.42	0.20
15	NS	NS	NS		
16	6.504	1.24	120	-0.04	-0.03
18	7.97	0.957	80.2	1.08	1.20
19	NS	NS	NS		

Statistics

Assigned Value	6.55	0.69
Spike Value	7.84	0.55
Robust Average	6.55	0.69
Median	6.70	0.72
Mean	6.46	
N	13	
Max	7.97	
Min	3.95	
Robust SD	1.0	
Robust CV	15%	


Kernel Density
Density
Result
Results: S3 - PFUdA
Assigned Value = 6.55 ± 0.69 µg/kg
Results (µg/kg)
Laboratory
10 4 13 8 12 16 1 9 14 2 6 5 18 3 11 15 19 Md RA SV


z-Scores: S3 - PFUdA
Standard Deviation for Proficiency Assessment 1.3 µg/kg (Equivalent to 20% CV)
z-Score
-2.0 -0.8 -0.7 -0.4 -0.4 0.0 0.1 0.1 0.4 0.5 0.5 0.8 1.1
Laboratory
10 4 13 8 12 16 1 9 14 2 6 5 18

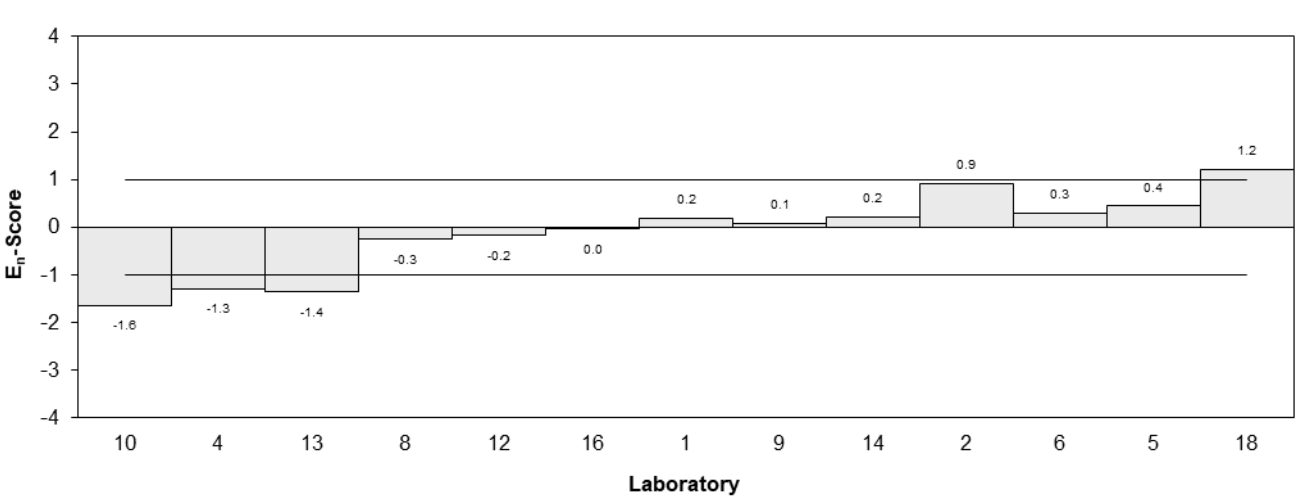

En-Scores: S3 - PFUdA
En-Score
-1.6 -1.3 -1.4 -0.3 -0.2 0.0 0.2 0.1 0.2 0.9 0.3 0.4 1.2
Laboratory
10 4 13 8 12 16 1 9 14 2 6 5 18

Figure 60

Table 63

Sample Details

Sample No.	S3
Matrix	Infant formula
Analyte	PFTrDA
Unit	µg/kg

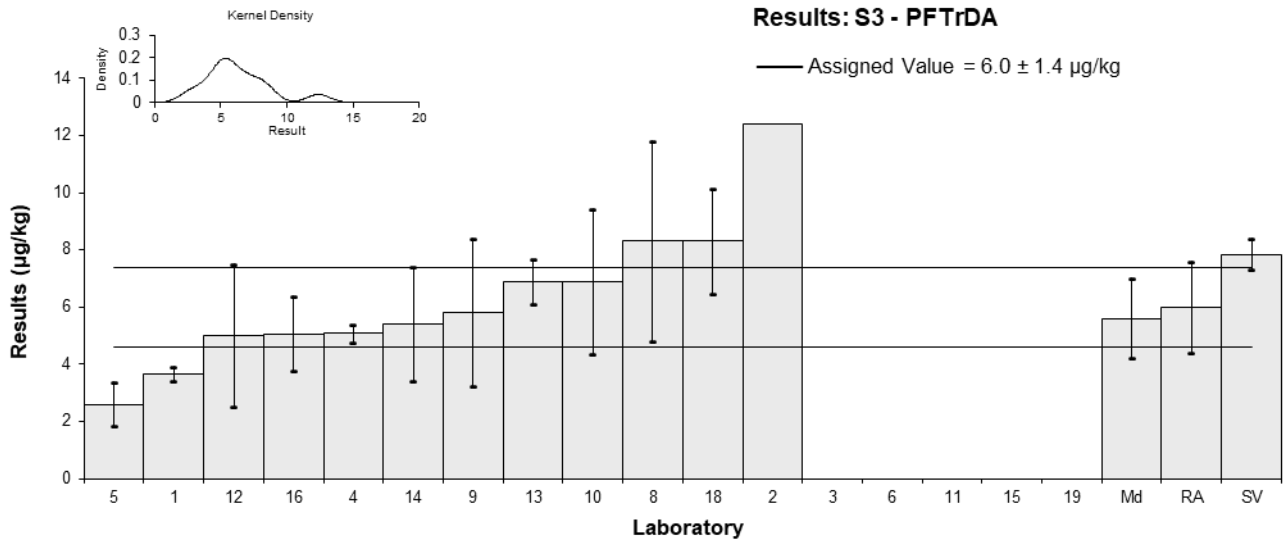
Participant Results

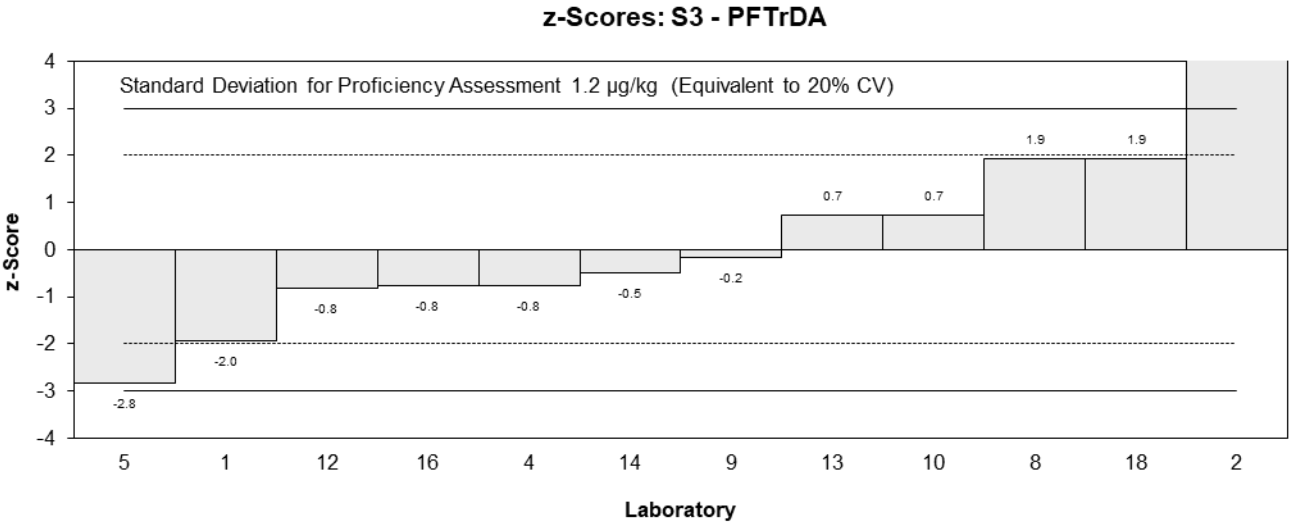
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	3.66	0.26	NR	-1.95	-1.64
2*	12.4	NR	24	5.33	4.57
3	NS	NS	NS		
4	5.07	0.31	115	-0.77	-0.65
5*	2.6	0.78	96	-2.83	-2.12
6	NR	NR	NR		
8	8.3	3.5	72	1.92	0.61
9	5.81	2.6	NR	-0.16	-0.06
10	6.89	2.54	27.8	0.74	0.31
11	NS	NS	NS		
12	5	2.5	NR	-0.83	-0.35
13	6.874	0.794	72	0.73	0.54
14	5.4	2.0	NT	-0.50	-0.25
15	NS	NS	NS		
16	5.068	1.31	118	-0.78	-0.49
18	8.30	1.83	82.2	1.92	1.00
19	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	6.0	1.4
Spike Value	7.84	0.55
Robust Average	6.0	1.6
Median	5.6	1.4
Mean	6.3	
N	12	
Max	12.4	
Min	2.6	
Robust SD	2.3	
Robust CV	37%	


Results: S3 - PFTrDA
Kernel Density
Density
Result
Assigned Value = 6.0 ± 1.4 µg/kg
Results (µg/kg)
Laboratory
5 1 12 16 4 14 9 13 10 8 18 2 3 6 11 15 19 Md RA SV


z-Scores: S3 - PFTrDA
Standard Deviation for Proficiency Assessment 1.2 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
5 1 12 16 4 14 9 13 10 8 18 2

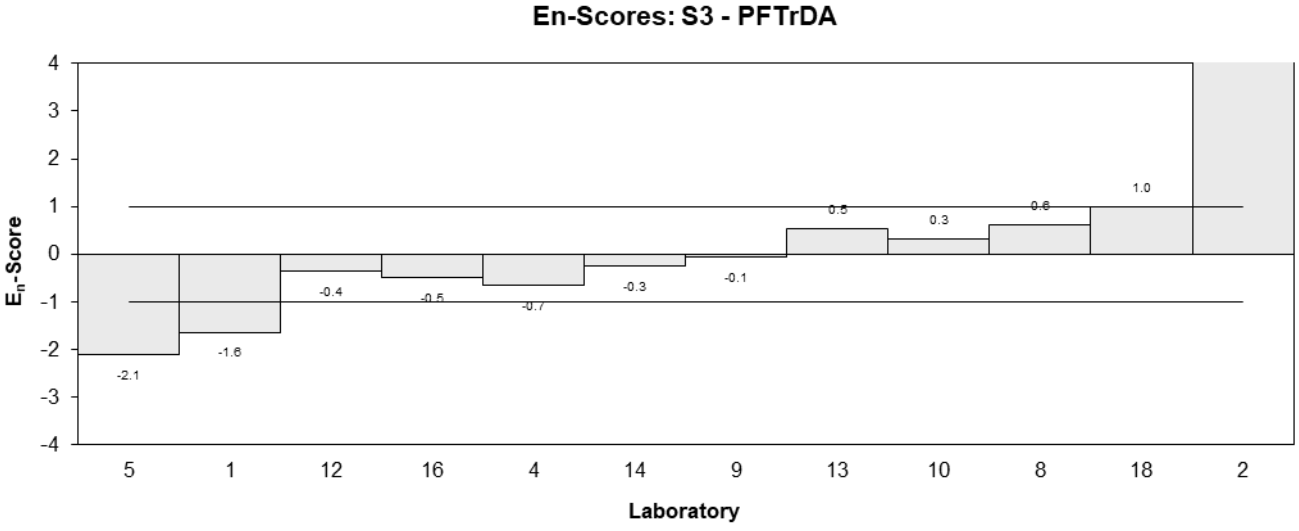

En-Scores: S3 - PFTrDA
En-Score
Laboratory
5 1 12 16 4 14 9 13 10 8 18 2

Figure 61

Table 64

Sample Details

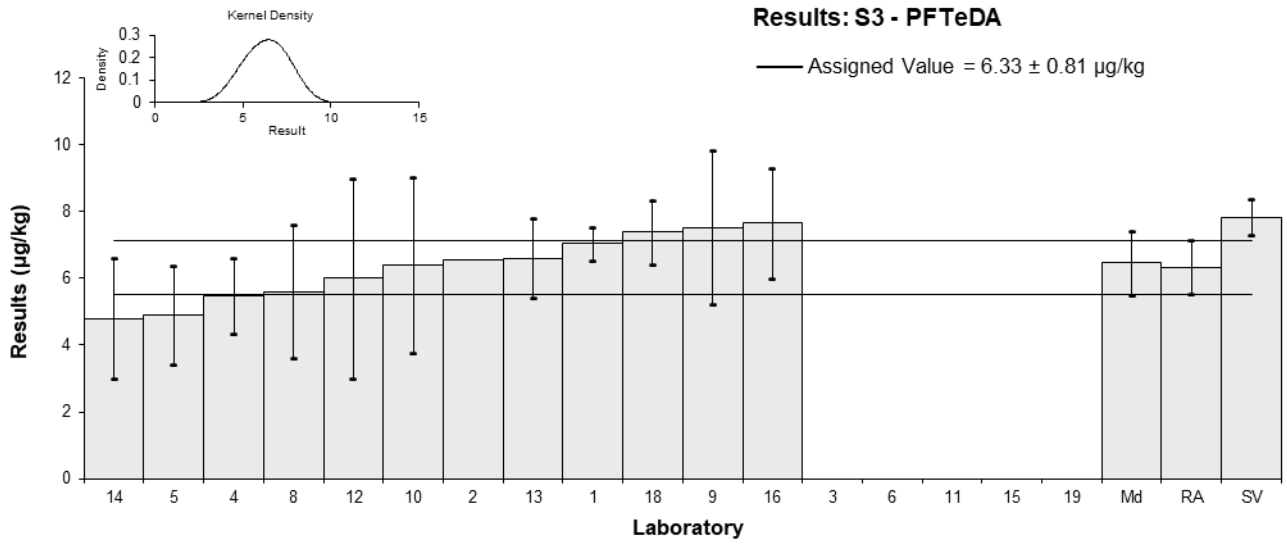
Sample No.	S3
Matrix	Infant formula
Analyte	PFTeDA
Unit	µg/kg

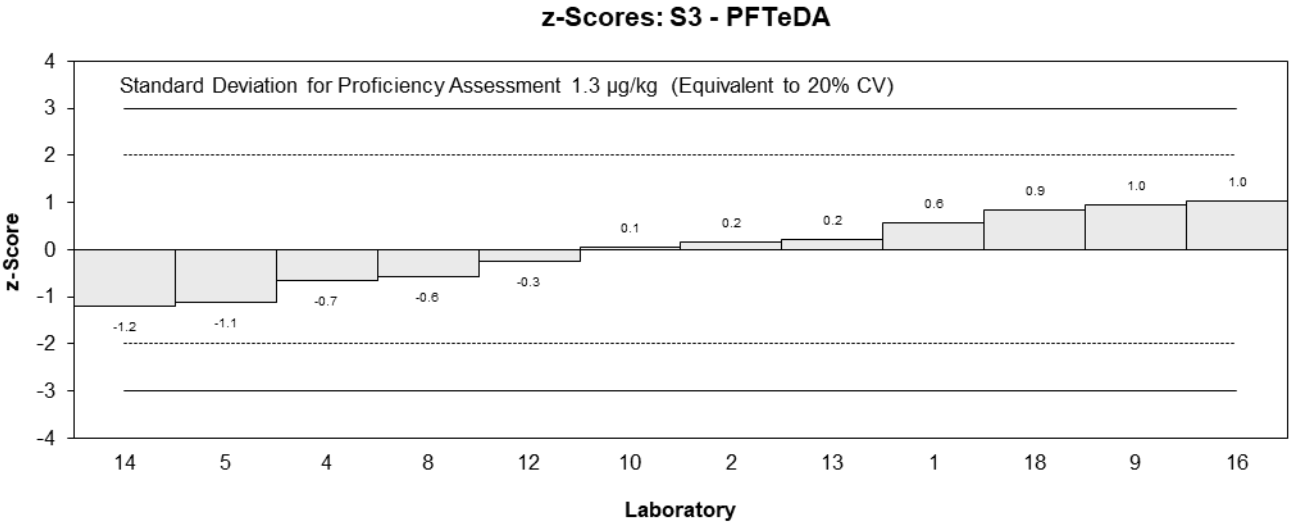
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	7.05	0.50	NR	0.57	0.76
2	6.54	NR	24	0.17	0.26
3	NS	NS	NS		
4	5.48	1.13	87	-0.67	-0.61
5	4.9	1.47	81	-1.13	-0.85
6	NR	NR	NR		
8	5.6	2.0	72	-0.58	-0.34
9	7.53	2.3	112	0.95	0.49
10	6.4	2.65	27.8	0.06	0.03
11	NS	NS	NS		
12	6	3	62	-0.26	-0.11
13	6.609	1.198	45	0.22	0.19
14	4.8	1.8	NT	-1.21	-0.78
15	NS	NS	NS		
16	7.652	1.66	110	1.04	0.72
18	7.40	0.962	82.2	0.85	0.85
19	NS	NS	NS		

Statistics

Assigned Value	6.33	0.81
Spike Value	7.84	0.55
Robust Average	6.33	0.81
Median	6.47	0.96
Mean	6.33	
N	12	
Max	7.652	
Min	4.8	
Robust SD	1.1	
Robust CV	18%	


Results: S3 - PFTeDA
Assigned Value = 6.33 ± 0.81 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
14 5 4 8 12 10 2 13 1 18 9 16 3 6 11 15 19 Md RA SV


z-Scores: S3 - PFTeDA
Standard Deviation for Proficiency Assessment 1.3 µg/kg (Equivalent to 20% CV)
z-Score
-1.2 -1.1 -0.7 -0.6 -0.3 0.1 0.2 0.2 0.6 0.9 1.0 1.0
Laboratory
14 5 4 8 12 10 2 13 1 18 9 16

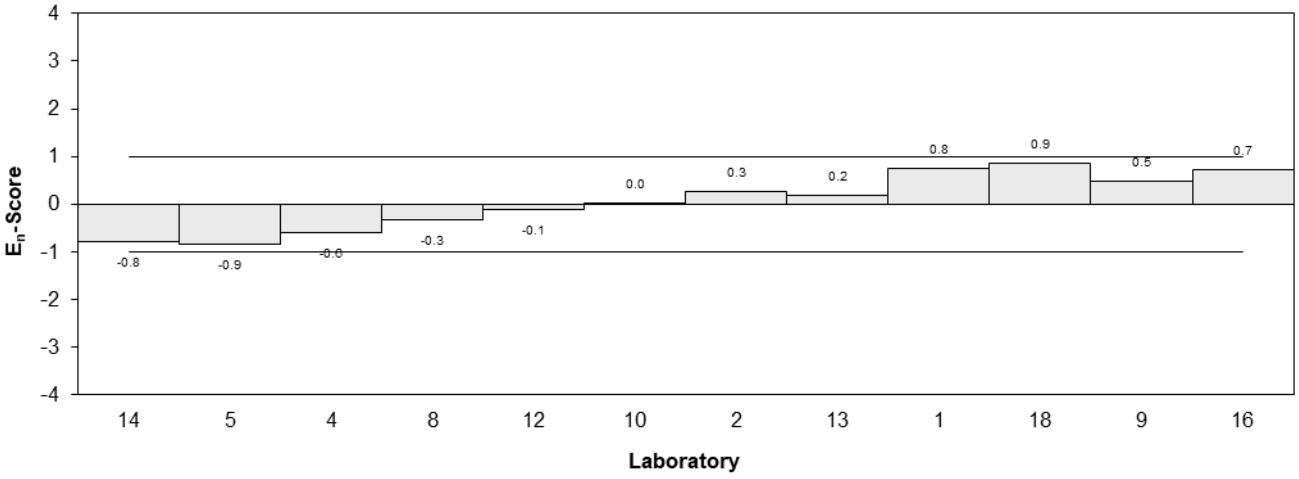

En-Scores: S3 - PFTeDA
En-Score
-0.8 -0.9 -0.6 -0.3 -0.1 0.0 0.3 0.2 0.8 0.9 0.5 0.7
Laboratory
14 5 4 8 12 10 2 13 1 18 9 16

Figure 62

Table 65

Sample Details

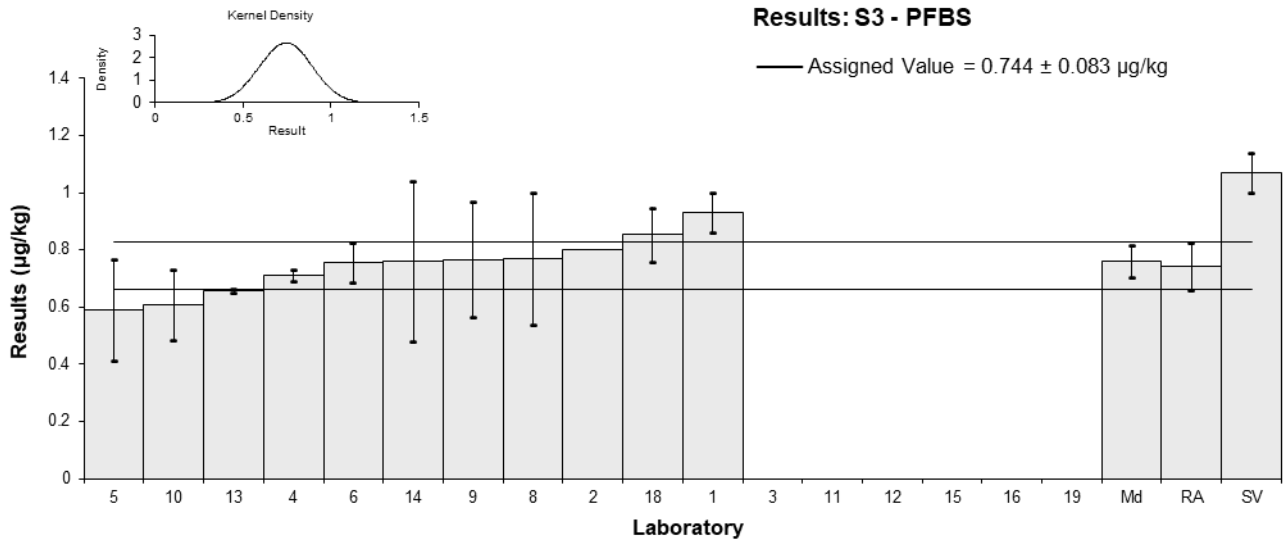
Sample No.	S3
Matrix	Infant formula
Analyte	PFBS
Unit	µg/kg

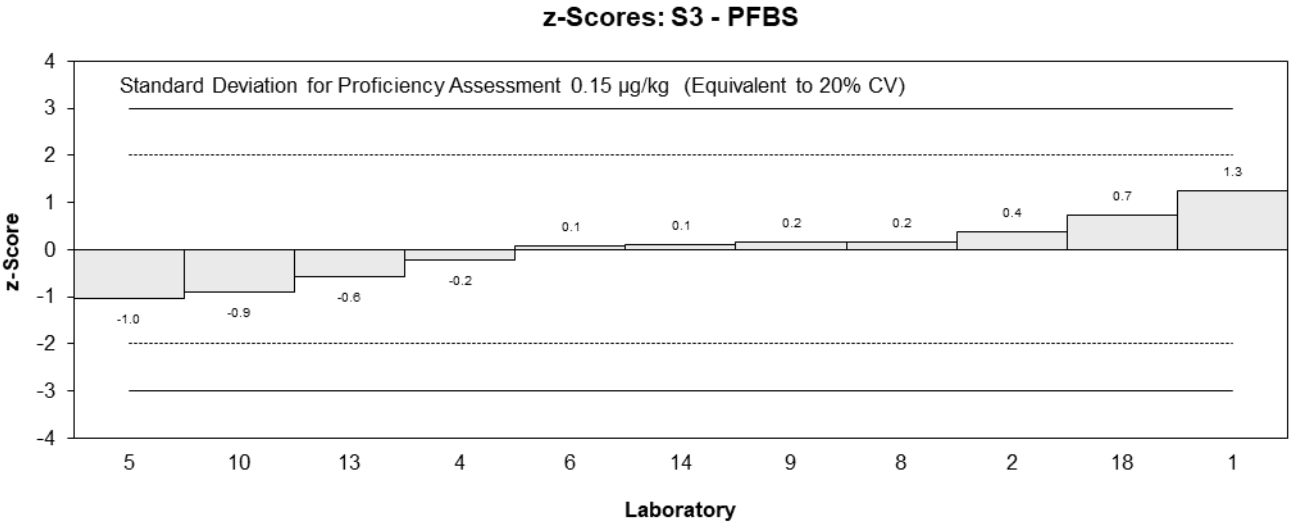
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.93	0.07	NR	1.25	1.71
2	0.8	NR	125	0.38	0.67
3	NS	NS	NS		
4	0.71	0.02	115	-0.23	-0.40
5	0.59	0.177	109	-1.03	-0.79
6	0.756	0.071	94	0.08	0.11
8	0.77	0.23	97	0.17	0.11
9	0.767	0.2	73	0.15	0.11
10	0.608	0.123	74.9	-0.91	-0.92
11	NS	NS	NS		
12	< 1	0.5	80		
13	0.657	0.006	94	-0.58	-1.05
14	0.76	0.28	NT	0.11	0.05
15	NS	NS	NS		
16	<1	NR	101		
18	0.854	0.094	102.5	0.74	0.88
19	NS	NS	NS		

Statistics

Assigned Value	0.744	0.083
Spike Value	1.07	0.07
Robust Average	0.744	0.083
Median	0.760	0.056
Mean	0.746	
N	11	
Max	0.93	
Min	0.59	
Robust SD	0.11	
Robust CV	15%	


Kernel Density
Density
Result
Results: S3 - PFBS
Assigned Value = 0.744 ± 0.083 µg/kg
Results (µg/kg)
Laboratory
5 10 13 4 6 14 9 8 2 18 1 3 11 12 15 16 19 Md RA SV


z-Scores: S3 - PFBS
Standard Deviation for Proficiency Assessment 0.15 µg/kg (Equivalent to 20% CV)
z-Score
-1.0 -0.9 -0.6 -0.2 0.1 0.1 0.2 0.2 0.4 0.7 1.3
Laboratory
5 10 13 4 6 14 9 8 2 18 1

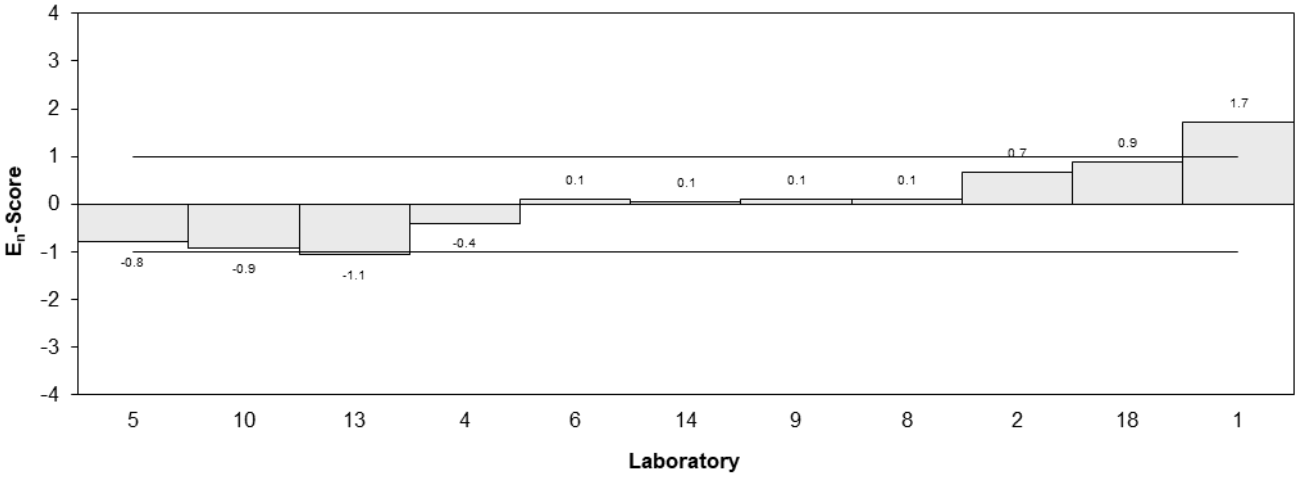

En-Scores: S3 - PFBS
En-Score
-0.8 -0.9 -1.1 -0.4 0.1 0.1 0.1 0.1 0.7 0.9 1.7
Laboratory
5 10 13 4 6 14 9 8 2 18 1

Figure 63

Table 66

Sample Details

Sample No.	S3
Matrix	Infant formula
Analyte	PFPeS
Unit	µg/kg

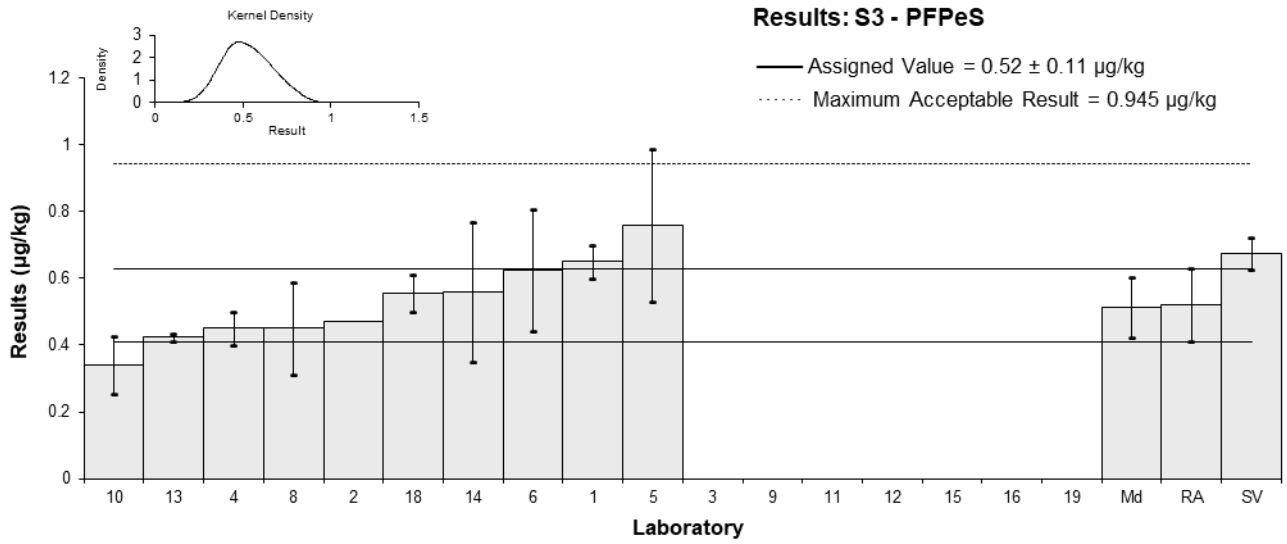
Participant Results

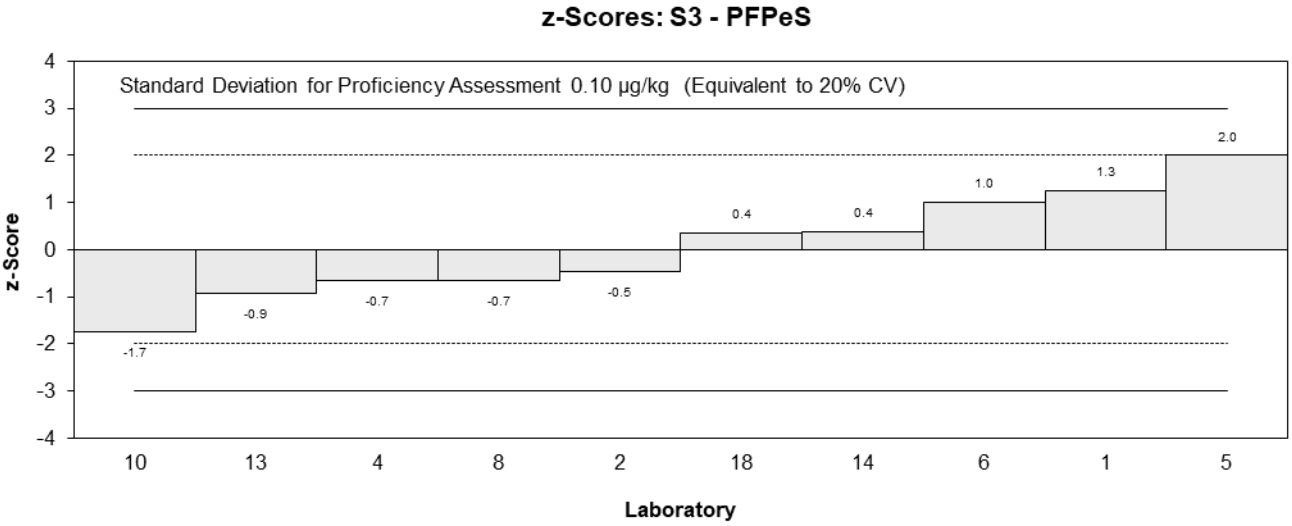
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.65	0.05	NR	1.25	1.08
2	0.47	NR	125	-0.48	-0.45
3	NS	NS	NS		
4	0.45	0.05	109	-0.67	-0.58
5	0.76	0.228	98	2.00▼	
6	0.624	0.182	72	1.00	0.49
8	0.45	0.14	97	-0.67	-0.39
9	<0.5	NR	NR		
10	0.339	0.086	74.9	-1.74	-1.30
11	NS	NS	NS		
12	< 1	0.5	NR		
13	0.424	0.012	97	-0.92	-0.87
14	0.56	0.21	NT	0.38	0.17
15	NS	NS	NS		
16	<1	NR	102		
18	0.556	0.056	102.5	0.35	0.29
19	NS	NS	NS		

▼ Adjusted Score, see Section 6.3

Statistics

Assigned Value	0.52	0.11
Spike Value	0.675	0.047
Robust Average	0.52	0.11
Max Acceptable Result	0.945	
Median	0.513	0.089
Mean	0.528	
N	10	
Max	0.76	
Min	0.339	
Robust SD	0.13	
Robust CV	26%	


Kernel Density
Density
Result
Results: S3 - PFPeS
Assigned Value = 0.52 ± 0.11 µg/kg
Maximum Acceptable Result = 0.945 µg/kg
Results (µg/kg)
10 13 4 8 2 18 14 6 1 5 3 9 11 12 15 16 19 Md RA SV
Laboratory


z-Scores: S3 - PFPeS
Standard Deviation for Proficiency Assessment 0.10 µg/kg (Equivalent to 20% CV)
z-Score
-1.7 -0.9 -0.7 -0.7 -0.5 0.4 0.4 1.0 1.3 2.0
10 13 4 8 2 18 14 6 1 5
Laboratory

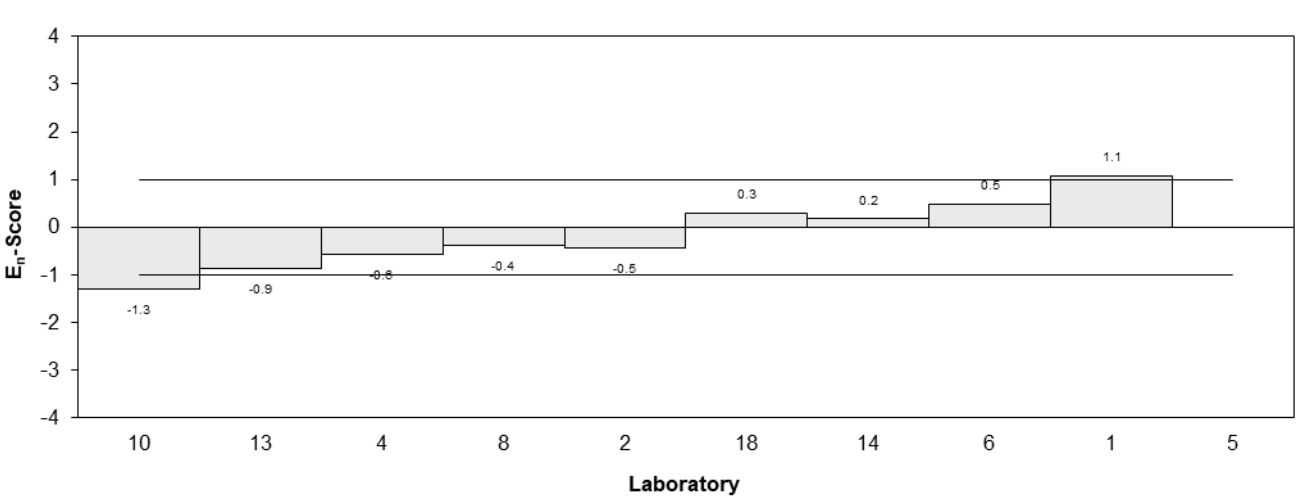

En-Scores: S3 - PFPeS
En-Score
-1.3 -0.9 -0.6 -0.4 -0.5 0.3 0.2 0.5 1.1
10 13 4 8 2 18 14 6 1 5
Laboratory

Figure 64

Table 67

Sample Details

Sample No.	S3
Matrix	Infant formula
Analyte	PFHxS (total)
Unit	µg/kg

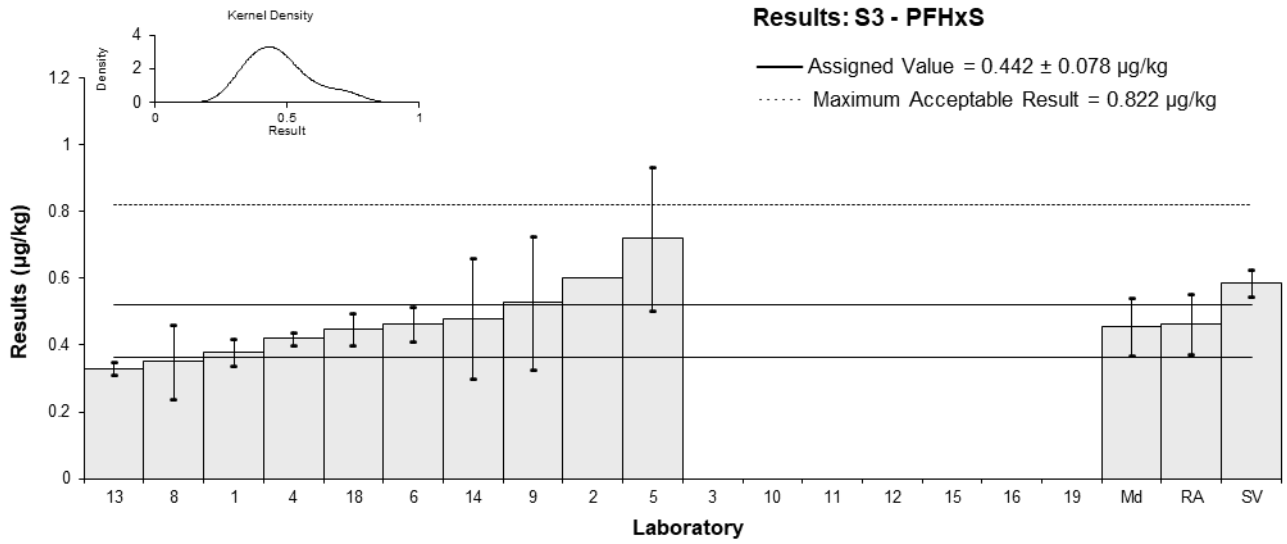
Participant Results

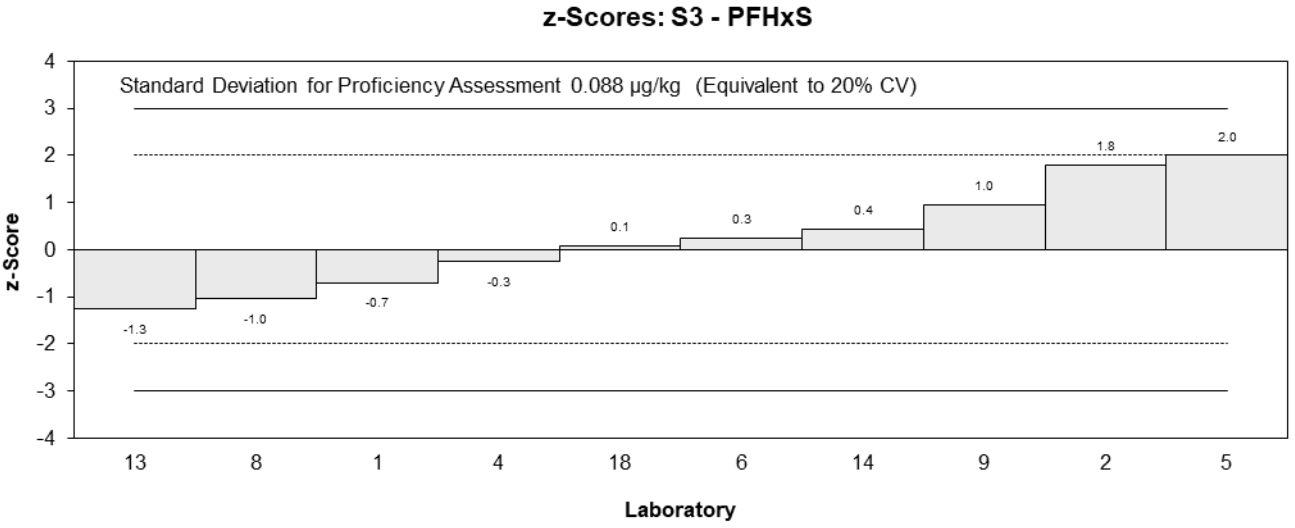
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.38	0.04	NR	-0.70	-0.71
2	0.6	NR	104	1.79	2.03
3	NS	NS	NS		
4	0.42	0.02	113	-0.25	-0.27
5*	0.72	0.216	90	2.00▼	
6	0.464	0.0524	72	0.25	0.23
8	0.35	0.11	135	-1.04	-0.68
9	0.527	0.2	75	0.96	0.40
10	NT	NT	NT		
11	NS	NS	NS		
12	< 2	1	75		
13	0.33	0.019	97	-1.27	-1.40
14	0.48	0.18	NT	0.43	0.19
15	NS	NS	NS		
16	<1	NR	102		
18	0.448	0.049	103.2	0.07	0.07
19	NS	NS	NS		

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

Statistics

Assigned Value	0.442	0.078
Spike Value	0.587	0.041
Robust Average	0.463	0.091
Max Acceptable Result	0.822	
Median	0.456	0.086
Mean	0.472	
N	10	
Max	0.72	
Min	0.33	
Robust SD	0.11	
Robust CV	25%	


Kernel Density
Density
Result
Results: S3 - PFHxS
Assigned Value = 0.442 ± 0.078 µg/kg
Maximum Acceptable Result = 0.822 µg/kg
Results (µg/kg)
13 8 1 4 18 6 14 9 2 5 3 10 11 12 15 16 19 Md RA SV
Laboratory


z-Scores: S3 - PFHxS
Standard Deviation for Proficiency Assessment 0.088 µg/kg (Equivalent to 20% CV)
z-Score
-1.3 -1.0 -0.7 -0.3 0.1 0.3 0.4 1.0 1.8 2.0
13 8 1 4 18 6 14 9 2 5
Laboratory

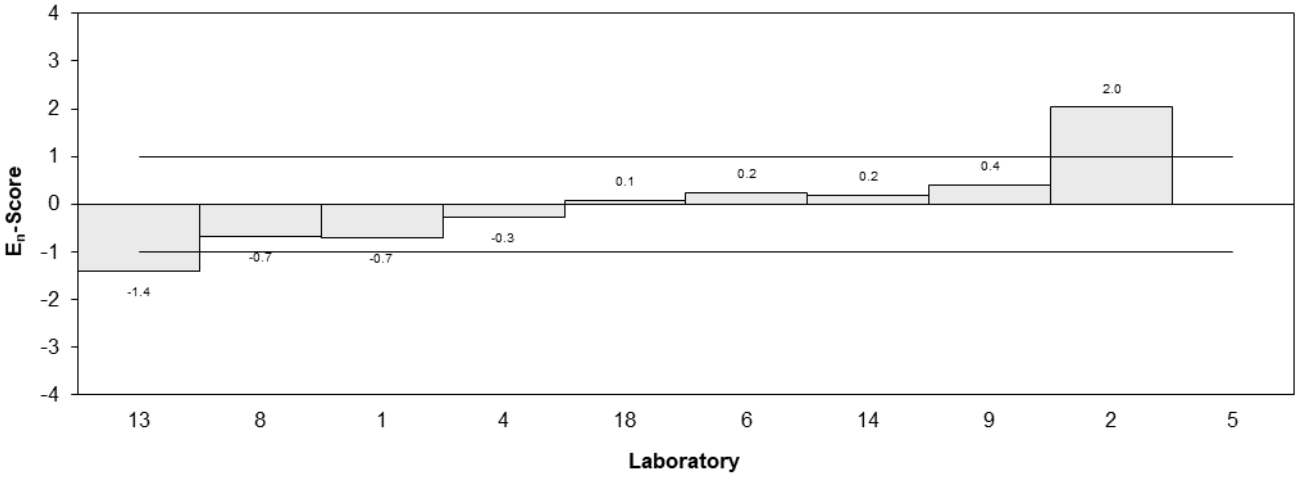

En-Scores: S3 - PFHxS
En-Score
-1.4 -0.7 -0.7 -0.3 0.1 0.2 0.2 0.4 2.0
13 8 1 4 18 6 14 9 2 5
Laboratory

Figure 65

Table 68

Sample Details

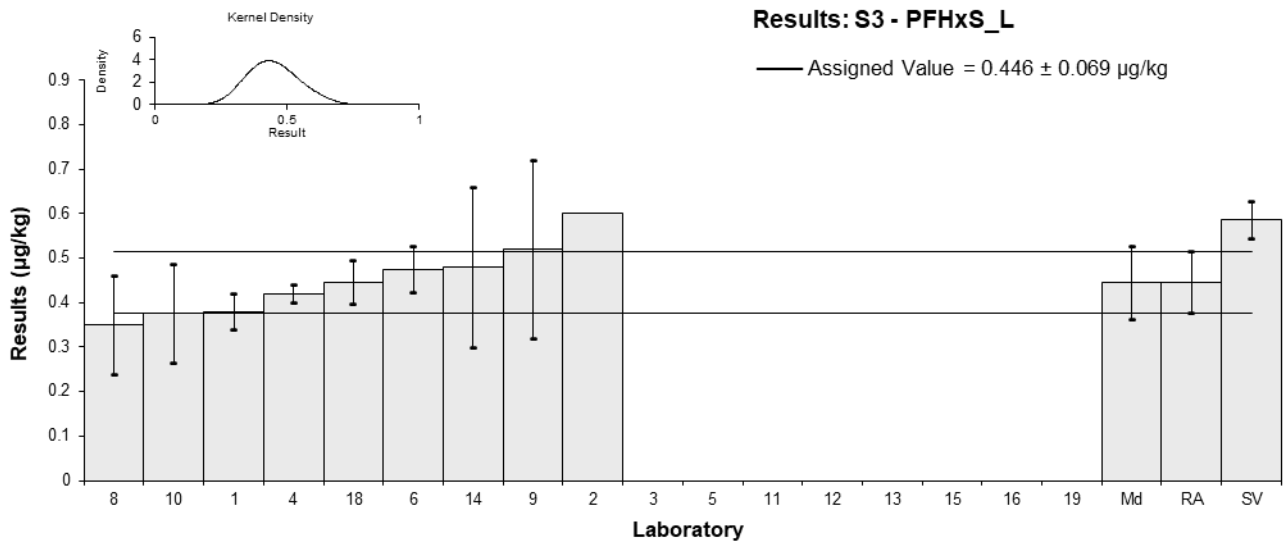
Sample No.	S3
Matrix	Infant formula
Analyte	PFHxS_L
Unit	µg/kg

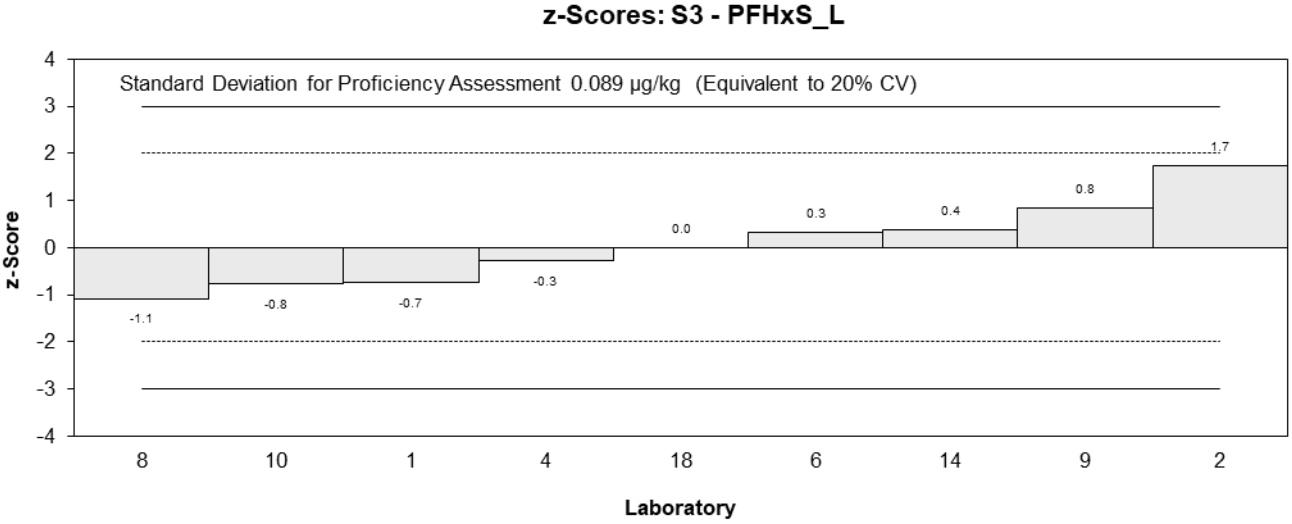
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.38	0.04	NR	-0.74	-0.83
2	0.6	NR	104	1.73	2.23
3	NS	NS	NS		
4	0.42	0.02	113	-0.29	-0.36
5	NT	NT	NT		
6	0.475	0.0525	72	0.33	0.33
8	0.35	0.11	135	-1.08	-0.74
9	0.521	0.2	NR	0.84	0.35
10	0.376	0.11	54.4	-0.78	-0.54
11	NS	NS	NS		
12	< 2	1	NR		
13	NT	NT	NT		
14	0.48	0.18	NT	0.38	0.18
15	NS	NS	NS		
16	NT	NT	NT		
18	0.446	0.049	103.2	0.00	0.00
19	NS	NS	NS		

Statistics

Assigned Value	0.446	0.069
Spike Value	0.587	0.041
Robust Average	0.446	0.069
Median	0.446	0.082
Mean	0.450	
N	9	
Max	0.6	
Min	0.35	
Robust SD	0.082	
Robust CV	18%	


Kernel Density
Density
Result
Results: S3 - PFHxS_L
Assigned Value = 0.446 ± 0.069 µg/kg
Results (µg/kg)
Laboratory
8 10 1 4 18 6 14 9 2 3 5 11 12 13 15 16 19 Md RA SV


z-Scores: S3 - PFHxS_L
Standard Deviation for Proficiency Assessment 0.089 µg/kg (Equivalent to 20% CV)
z-Score
-1.1
-0.8
-0.7
-0.3
0.0
0.3
0.4
0.8
1.7
Laboratory
8 10 1 4 18 6 14 9 2

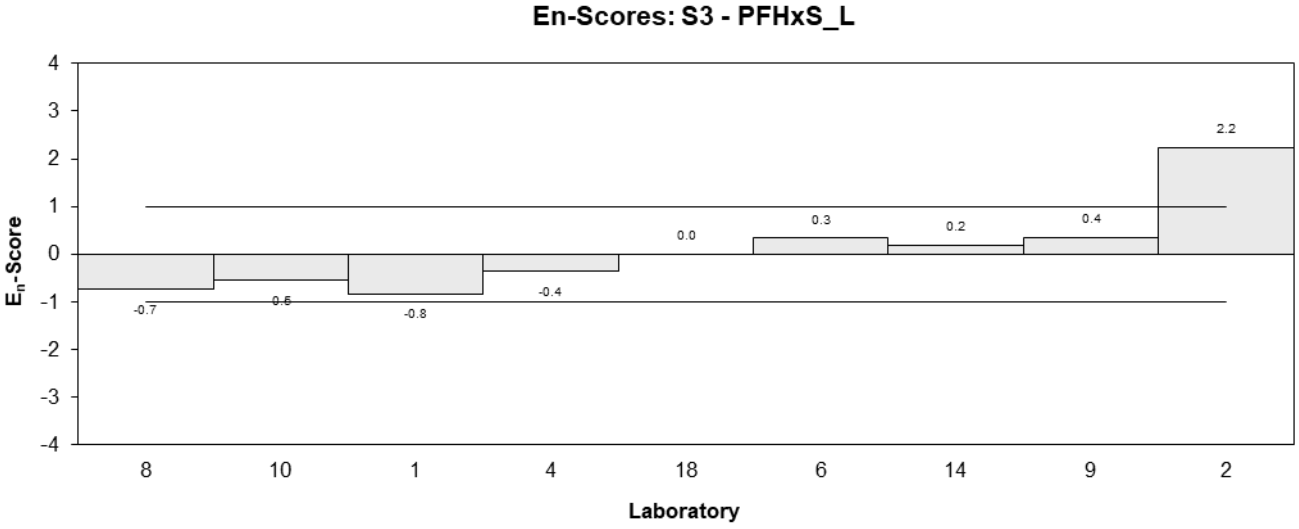

En-Scores: S3 - PFHxS_L
En-Score
-0.7
-0.6
-0.8
-0.4
0.0
0.3
0.2
0.4
2.2
Laboratory
8 10 1 4 18 6 14 9 2

Figure 66

Table 69

Sample Details

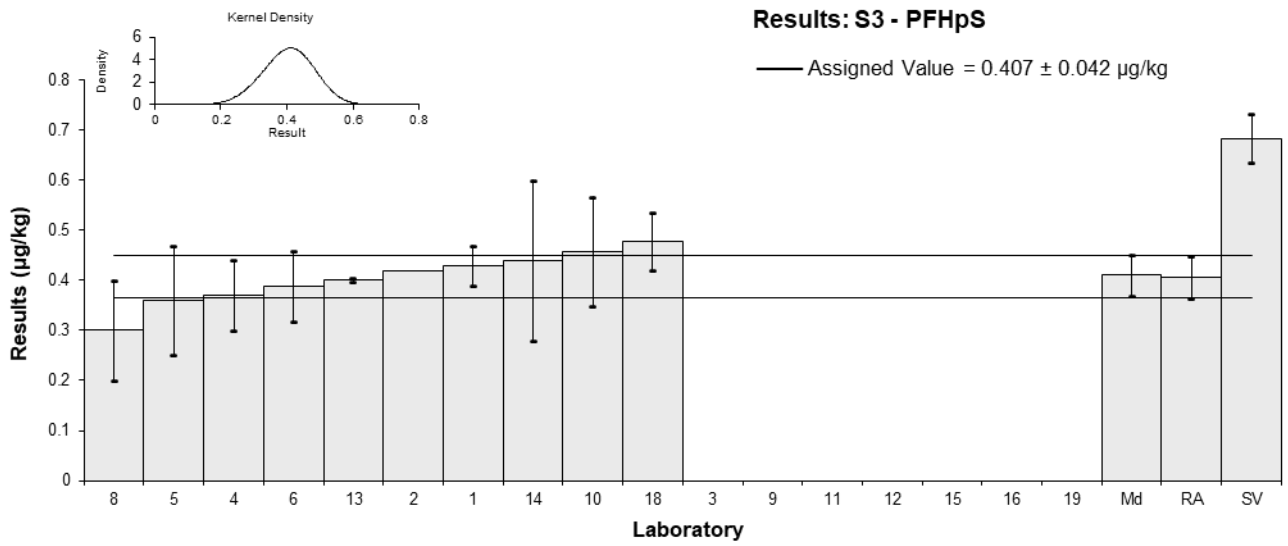
Sample No.	S3
Matrix	Infant formula
Analyte	PFHpS
Unit	µg/kg

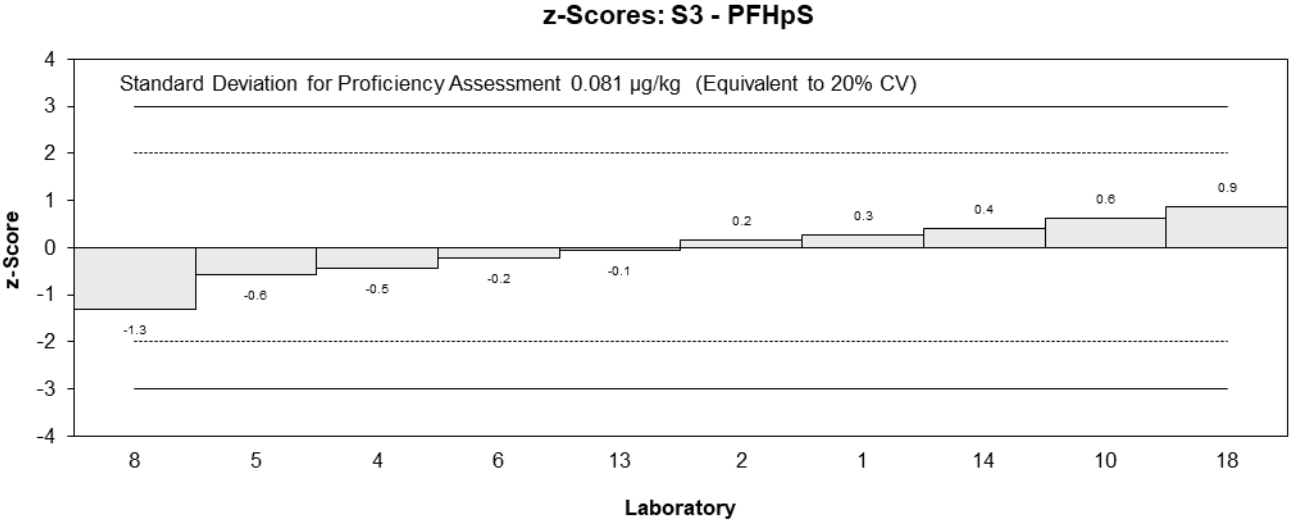
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.43	0.04	NR	0.28	0.40
2	0.42	NR	88	0.16	0.31
3	NS	NS	NS		
4	0.37	0.07	113	-0.45	-0.45
5	0.36	0.108	104	-0.58	-0.41
6	0.388	0.0702	72	-0.23	-0.23
8	0.30	0.10	135	-1.31	-0.99
9	<0.5	NR	NR		
10	0.458	0.109	74.9	0.63	0.44
11	NS	NS	NS		
12	<1	0.5	NR		
13	0.401	0.003	97	-0.07	-0.14
14	0.44	0.16	NT	0.41	0.20
15	NS	NS	NS		
16	<1	NR	117		
18	0.478	0.057	103.2	0.87	1.00
19	NS	NS	NS		

Statistics

Assigned Value	0.407	0.042
Spike Value	0.684	0.048
Robust Average	0.407	0.042
Median	0.411	0.041
Mean	0.405	
N	10	
Max	0.478	
Min	0.3	
Robust SD	0.053	
Robust CV	13%	


Kernel Density
Density
Result
Results: S3 - PFHpS
Assigned Value = 0.407 ± 0.042 µg/kg
Results (µg/kg)
Laboratory
8 5 4 6 13 2 1 14 10 18 3 9 11 12 15 16 19 Md RA SV


z-Scores: S3 - PFHpS
Standard Deviation for Proficiency Assessment 0.081 µg/kg (Equivalent to 20% CV)
z-Score
-1.3 -0.6 -0.5 -0.2 -0.1 0.2 0.3 0.4 0.6 0.9
Laboratory
8 5 4 6 13 2 1 14 10 18

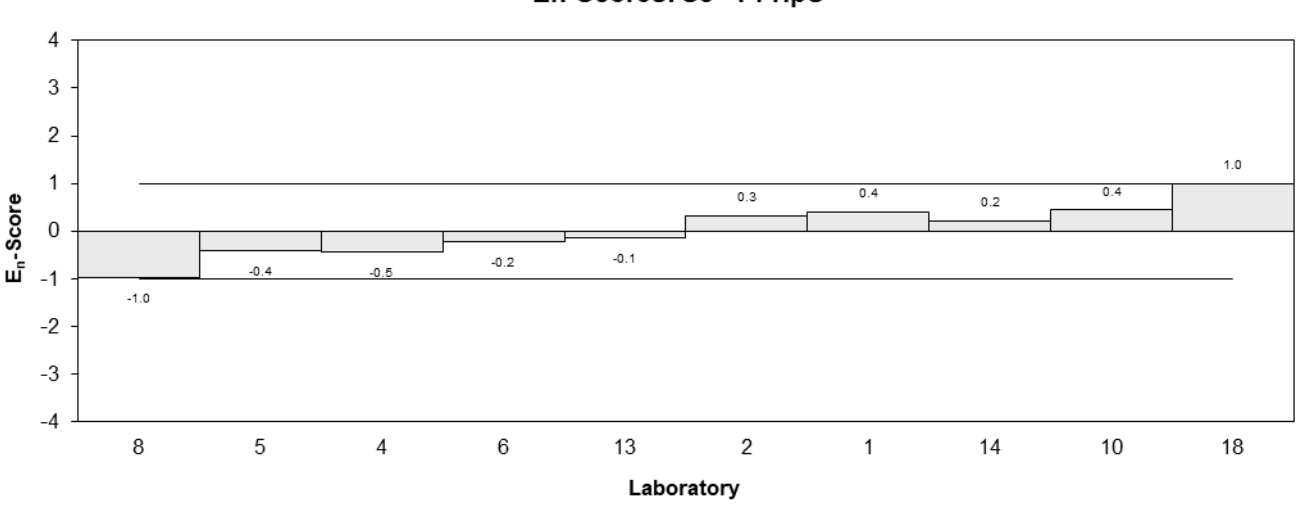

En-Scores: S3 - PFHpS
En-Score
-1.0 -0.4 -0.5 -0.2 -0.1 0.3 0.4 0.2 0.4 1.0
Laboratory
8 5 4 6 13 2 1 14 10 18

Figure 67

Table 70

Sample Details

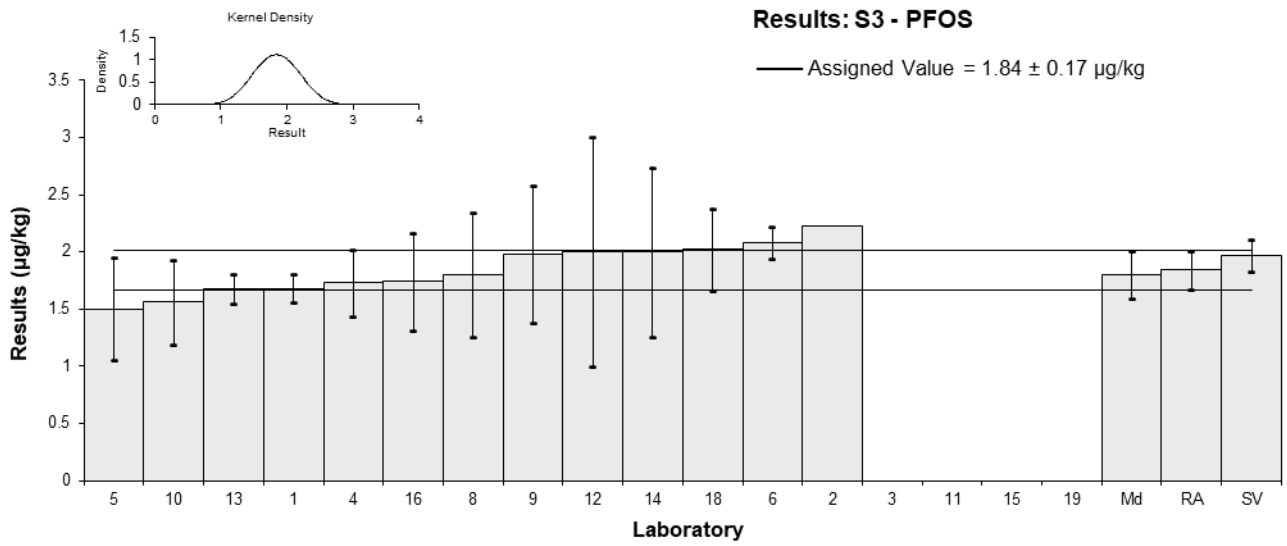
Sample No.	S3
Matrix	Infant formula
Analyte	PFOS (total)
Unit	µg/kg

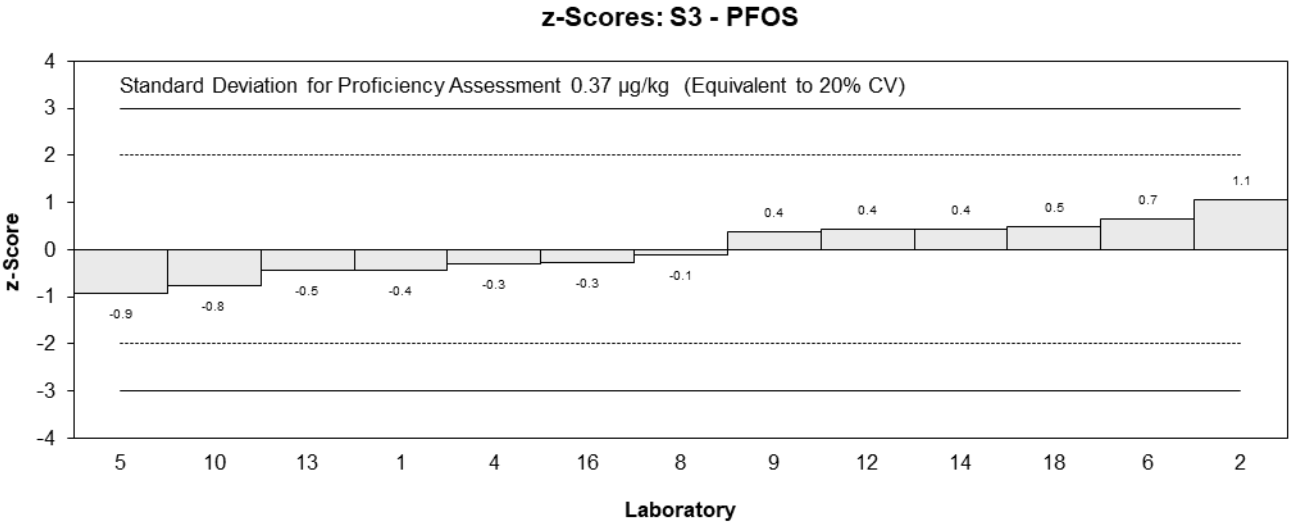
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	1.68	0.12	NR	-0.43	-0.77
2	2.23	NR	88	1.06	2.29
3	NS	NS	NS		
4	1.73	0.29	111	-0.30	-0.33
5	1.5	0.45	94	-0.92	-0.71
6	2.08	0.137	67	0.65	1.10
8	1.8	0.54	98	-0.11	-0.07
9	1.98	0.6	73	0.38	0.22
10	1.56	0.368	66.8	-0.76	-0.69
11	NS	NS	NS		
12	2	1	60	0.43	0.16
13	1.674	0.126	96	-0.45	-0.78
14	2	0.74	NT	0.43	0.21
15	NS	NS	NS		
16	1.74	0.43	117	-0.27	-0.22
18	2.02	0.363	99.6	0.49	0.45
19	NS	NS	NS		

Statistics

Assigned Value	1.84	0.17
Spike Value	1.97	0.14
Robust Average	1.84	0.17
Median	1.80	0.21
Mean	1.85	
N	13	
Max	2.23	
Min	1.5	
Robust SD	0.25	
Robust CV	13%	


Results: S3 - PFOS
Assigned Value = 1.84 ± 0.17 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
5 10 13 1 4 16 8 9 12 14 18 6 2 3 11 15 19 Md RA SV


z-Scores: S3 - PFOS
Standard Deviation for Proficiency Assessment 0.37 µg/kg (Equivalent to 20% CV)
z-Score
-0.9 -0.8 -0.5 -0.4 -0.3 -0.3 -0.1 0.4 0.4 0.4 0.5 0.7 1.1
Laboratory
5 10 13 1 4 16 8 9 12 14 18 6 2

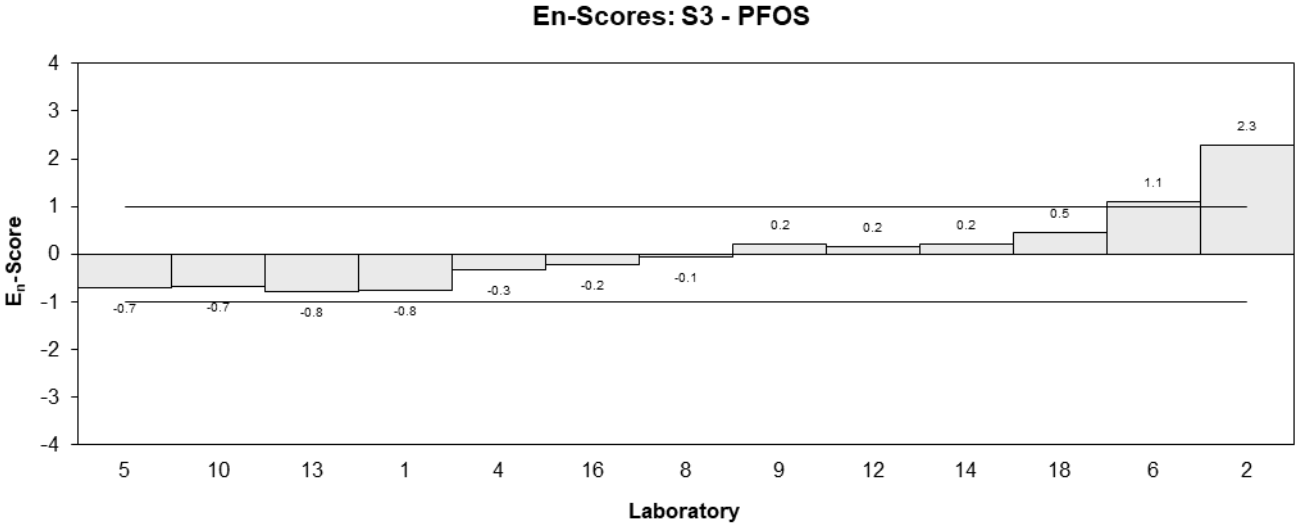

En-Scores: S3 - PFOS
En-Score
-0.7 -0.7 -0.8 -0.8 -0.3 -0.2 -0.1 0.2 0.2 0.2 0.5 1.1 2.3
Laboratory
5 10 13 1 4 16 8 9 12 14 18 6 2

Figure 68

Table 71

Sample Details

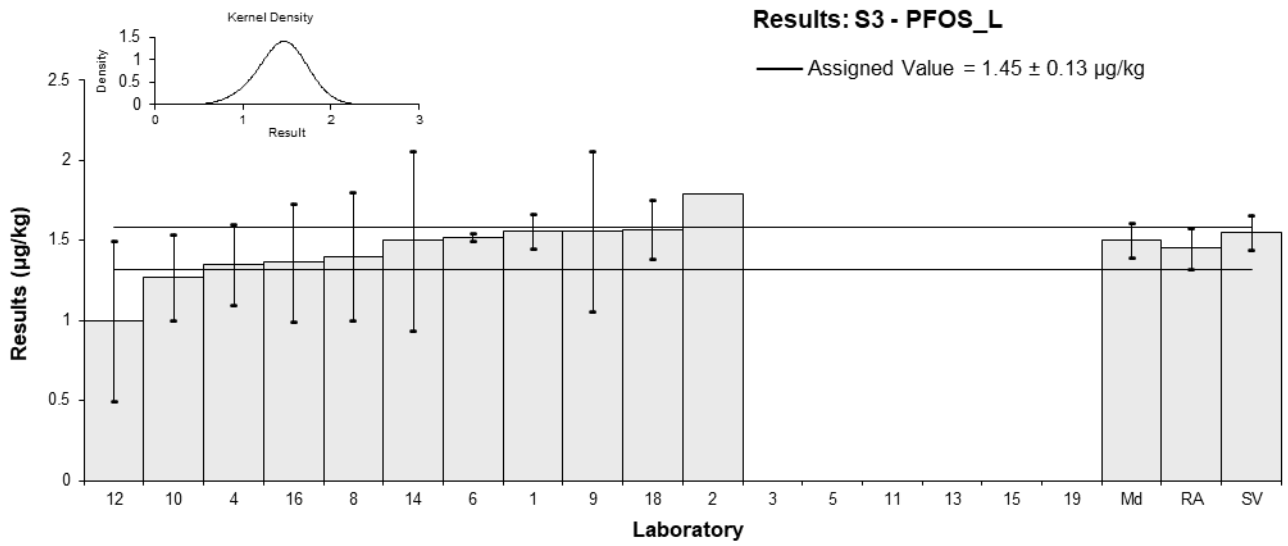
Sample No.	S3
Matrix	Infant formula
Analyte	PFOS_L
Unit	µg/kg

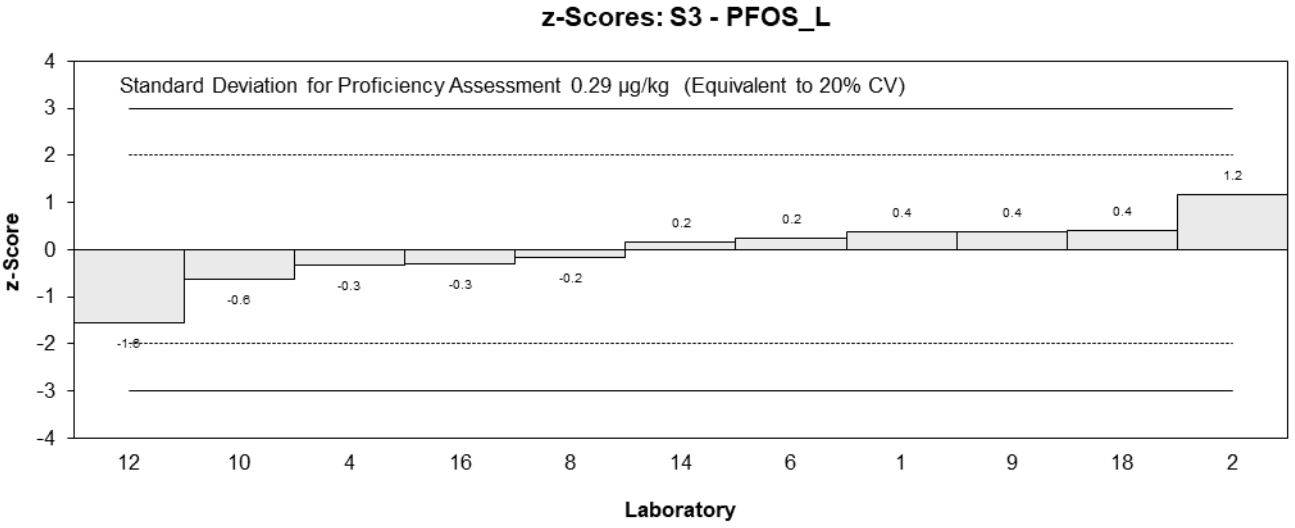
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	1.56	0.11	NR	0.38	0.65
2	1.79	NR	88	1.17	2.62
3	NS	NS	NS		
4	1.35	0.25	111	-0.34	-0.35
5	NT	NT	NT		
6	1.52	0.0252	67	0.24	0.53
8	1.4	0.40	98	-0.17	-0.12
9	1.56	0.5	NR	0.38	0.21
10	1.27	0.269	66.8	-0.62	-0.60
11	NS	NS	NS		
12	1	0.5	NR	-1.55	-0.87
13	NT	NT	NT		
14	1.5	0.56	NT	0.17	0.09
15	NS	NS	NS		
16	1.362	0.37	117	-0.30	-0.22
18	1.57	0.188	99.6	0.41	0.53
19	NS	NS	NS		

Statistics

Assigned Value	1.45	0.13
Spike Value	1.55	0.11
Robust Average	1.45	0.13
Median	1.50	0.11
Mean	1.44	
N	11	
Max	1.79	
Min	1	
Robust SD	0.17	
Robust CV	12%	


Kernel Density
Density
Result
Results: S3 - PFOS_L
Assigned Value = 1.45 ± 0.13 µg/kg
Results (µg/kg)
12 10 4 16 8 14 6 1 9 18 2 3 5 11 13 15 19 Md RA SV
Laboratory


z-Scores: S3 - PFOS_L
Standard Deviation for Proficiency Assessment 0.29 µg/kg (Equivalent to 20% CV)
z-Score
-1.6 -0.6 -0.3 -0.3 -0.2 0.2 0.2 0.4 0.4 0.4 1.2
12 10 4 16 8 14 6 1 9 18 2
Laboratory

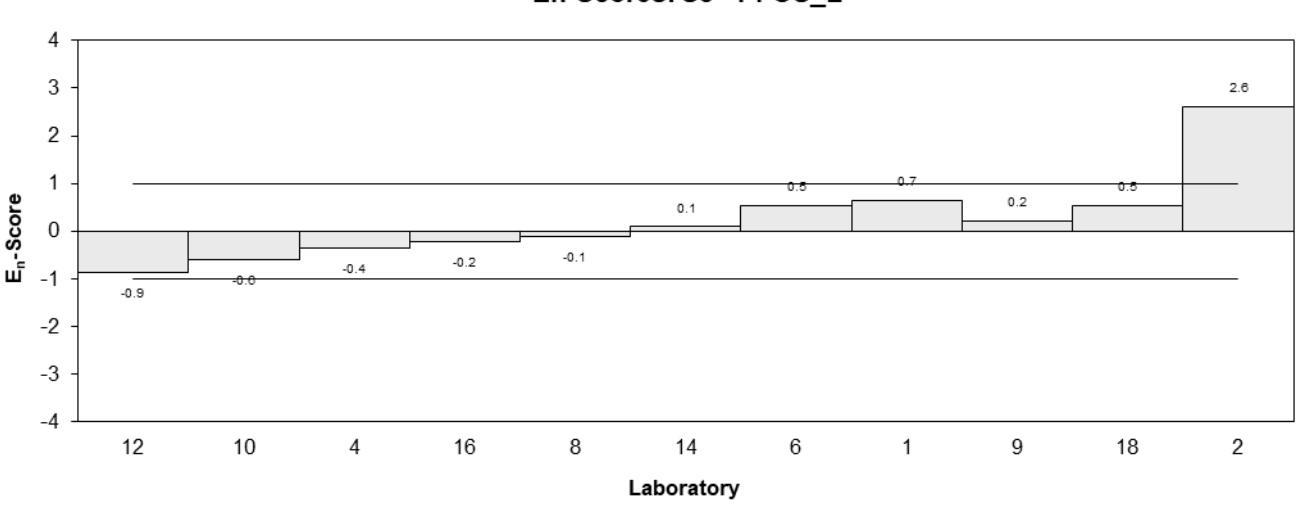

En-Scores: S3 - PFOS_L
En-Score
-0.9 -0.6 -0.4 -0.2 -0.1 0.1 0.5 0.7 0.2 0.5 2.6
12 10 4 16 8 14 6 1 9 18 2
Laboratory

Figure 69

Table 72

Sample Details

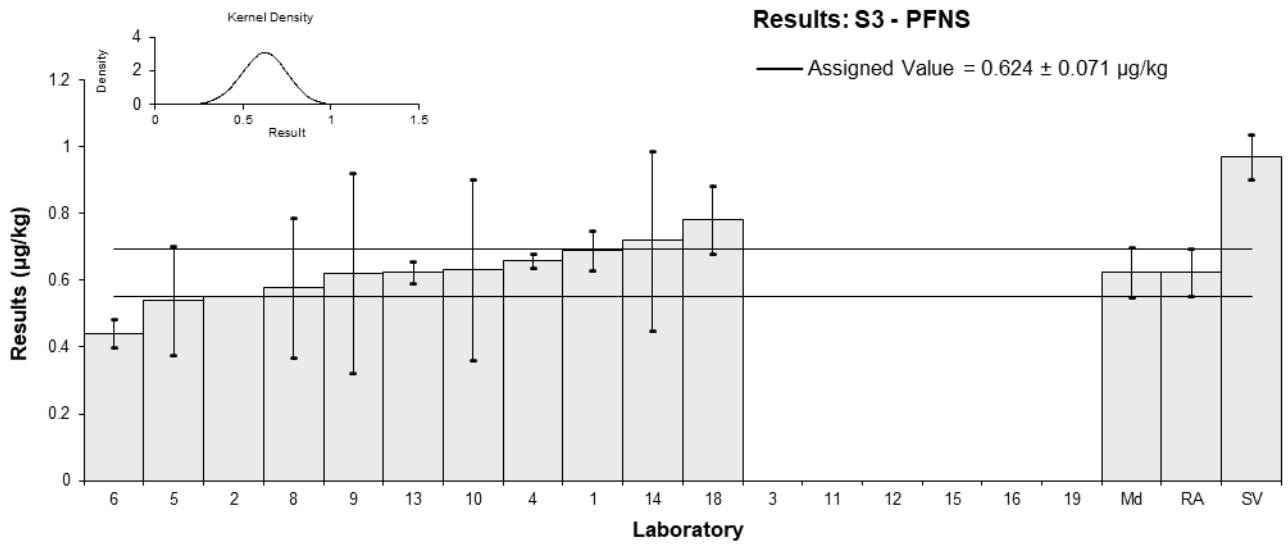
Sample No.	S3
Matrix	Infant formula
Analyte	PFNS
Unit	µg/kg

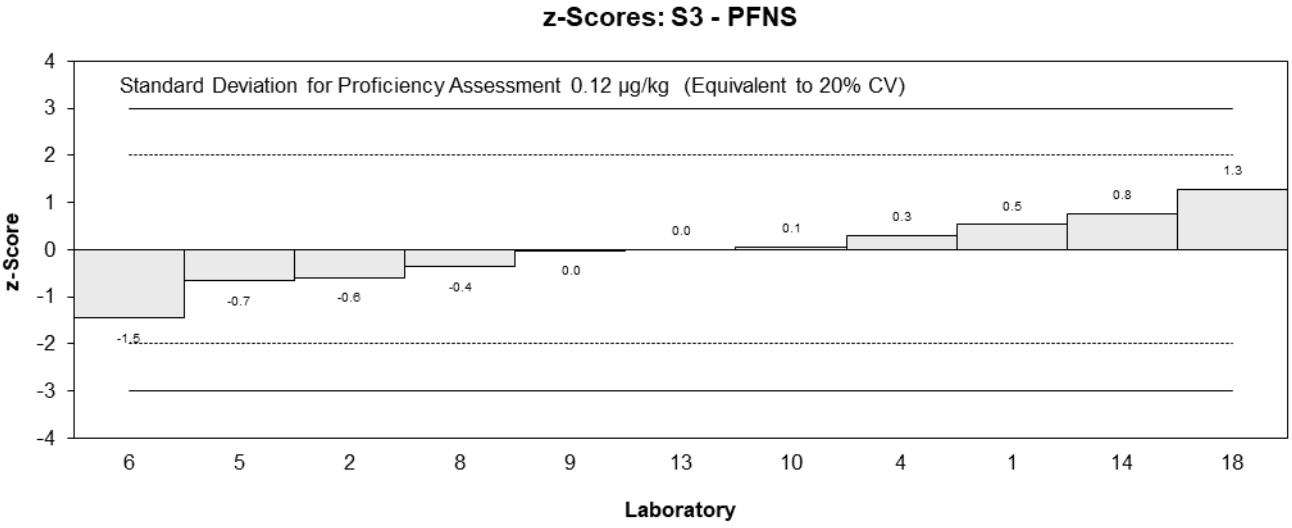
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	0.69	0.06	NR	0.53	0.71
2	0.55	NR	68	-0.59	-1.04
3	NS	NS	NS		
4	0.66	0.02	111	0.29	0.49
5	0.54	0.162	84	-0.67	-0.47
6	0.442	0.041	67	-1.46	-2.22
8	0.58	0.21	98	-0.35	-0.20
9	0.622	0.3	NR	-0.02	-0.01
10	0.632	0.271	66.8	0.06	0.03
11	NS	NS	NS		
12	< 2	1	NR		
13	0.624	0.033	96	0.00	0.00
14	0.72	0.27	NT	0.77	0.34
15	NS	NS	NS		
16	<1	NR	117		
18	0.784	0.102	99.6	1.28	1.29
19	NS	NS	NS		

Statistics

Assigned Value	0.624	0.071
Spike Value	0.972	0.068
Robust Average	0.624	0.071
Median	0.624	0.074
Mean	0.622	
N	11	
Max	0.784	
Min	0.442	
Robust SD	0.095	
Robust CV	15%	


Kernel Density
Density
Result
Results: S3 - PFNS
Assigned Value = 0.624 ± 0.071 µg/kg
Results (µg/kg)
Laboratory
6 5 2 8 9 13 10 4 1 14 18 3 11 12 15 16 19 Md RA SV


z-Scores: S3 - PFNS
Standard Deviation for Proficiency Assessment 0.12 µg/kg (Equivalent to 20% CV)
z-Score
-1.5 -0.7 -0.6 -0.4 0.0 0.0 0.1 0.3 0.5 0.8 1.3
Laboratory
6 5 2 8 9 13 10 4 1 14 18

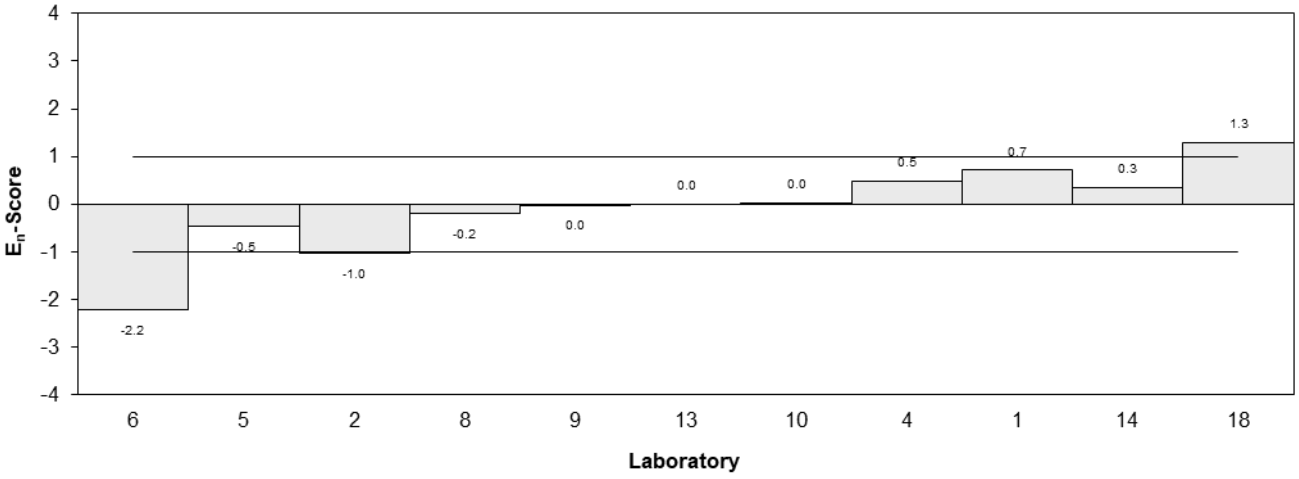

En-Scores: S3 - PFNS
En-Score
-2.2 -0.5 -1.0 -0.2 0.0 0.0 0.0 0.5 0.7 0.3 1.3
Laboratory
6 5 2 8 9 13 10 4 1 14 18

Figure 70

Table 73

Sample Details

Sample No.	S3
Matrix	Infant formula
Analyte	PFDS
Unit	µg/kg

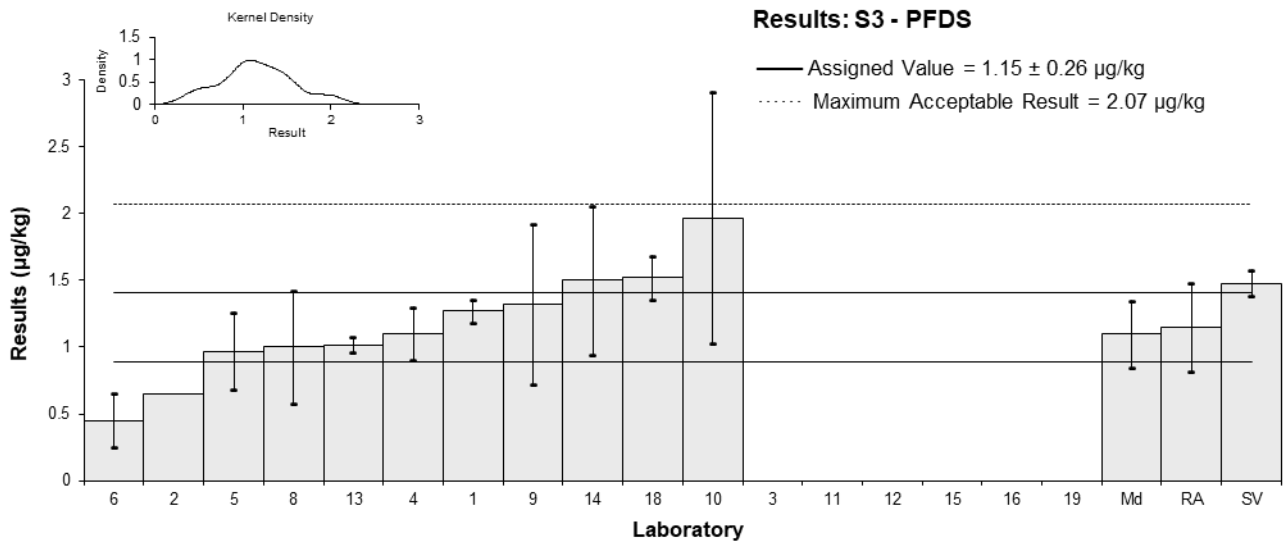
Participant Results

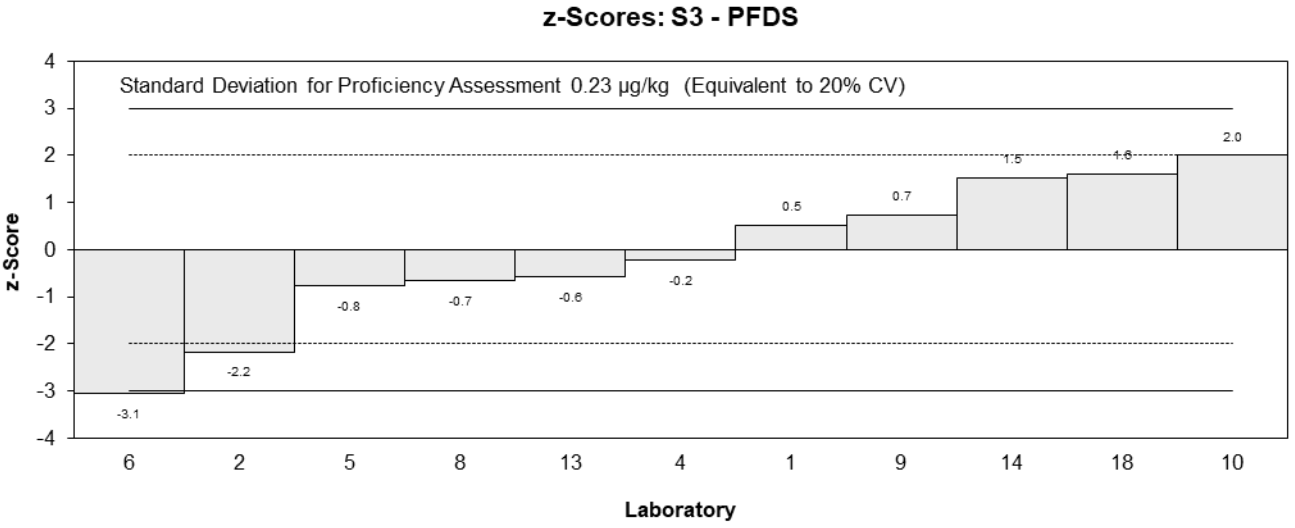
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	1.27	0.09	NR	0.52	0.44
2	0.65	NR	79	-2.17	-1.92
3	NS	NS	NS		
4	1.1	0.2	111	-0.22	-0.15
5	0.97	0.291	69	-0.78	-0.46
6*	0.449	0.203	67	-3.05	-2.13
8	1.0	0.42	98	-0.65	-0.30
9	1.32	0.6	NR	0.74	0.26
10*	1.97	0.944	62.9	2.00▼	
11	NS	NS	NS		
12	< 2	1	NR		
13	1.017	0.056	96	-0.58	-0.50
14	1.5	0.56	NT	1.52	0.57
15	NS	NS	NS		
16	<2	NR	117		
18	1.52	0.167	99.6	1.61	1.20
19	NS	NS	NS		

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

Statistics

Assigned Value	1.15	0.26
Spike Value	1.48	0.10
Robust Average	1.15	0.33
Max Acceptable Result	2.07	
Median	1.10	0.25
Mean	1.16	
N	11	
Max	1.97	
Min	0.449	
Robust SD	0.44	
Robust CV	38%	


Kernel Density
Density
Result
Results: S3 - PFDS
Assigned Value = 1.15 ± 0.26 µg/kg
Maximum Acceptable Result = 2.07 µg/kg
Results (µg/kg)
Laboratory
6 2 5 8 13 4 1 9 14 18 10 3 11 12 15 16 19 Md RA SV


z-Scores: S3 - PFDS
Standard Deviation for Proficiency Assessment 0.23 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
6 2 5 8 13 4 1 9 14 18 10
-3.1
-2.2
-0.8
-0.7
-0.6
-0.2
0.5
0.7
1.5
1.6
2.0

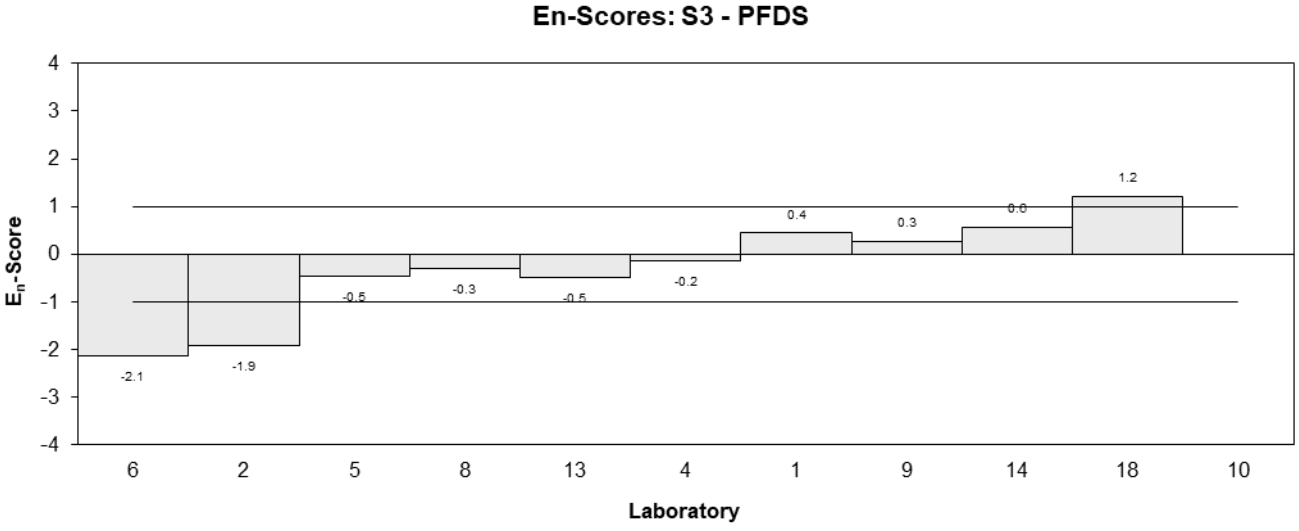

En-Scores: S3 - PFDS
En-Score
Laboratory
6 2 5 8 13 4 1 9 14 18 10
-2.1
-1.9
-0.5
-0.3
-0.5
-0.2
0.4
0.3
0.6
1.2

Figure 71

Table 74

Sample Details

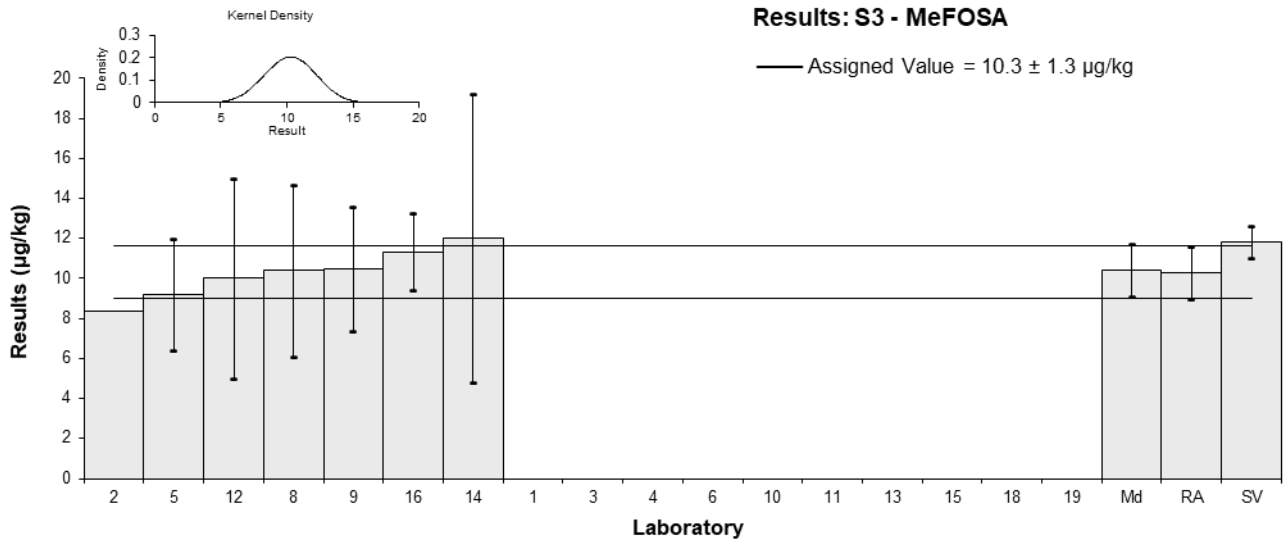
Sample No.	S3
Matrix	Infant formula
Analyte	N-MeFOSA
Unit	µg/kg

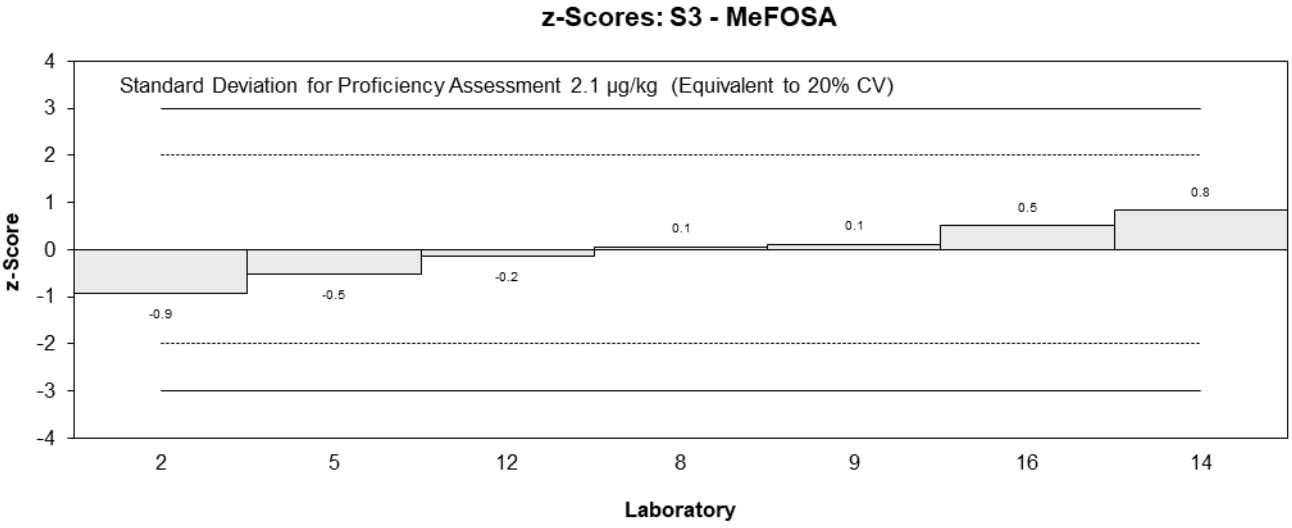
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	8.36	NR	15	-0.94	-1.49
3	NS	NS	NS		
4	NR	NR	68		
5	9.2	2.76	100	-0.53	-0.36
6	NR	NR	NR		
8	10.4	4.3	84	0.05	0.02
9	10.5	3.1	65	0.10	0.06
10	<0.073	NR	52.1		
11	NS	NS	NS		
12	10	5	46	-0.15	-0.06
13	NT	NT	NT		
14	12	7.2	NT	0.83	0.23
15	NS	NS	NS		
16	11.338	1.94	96	0.50	0.44
18	NT	NT	NT		
19	NS	NS	NS		

Statistics

Assigned Value	10.3	1.3
Spike Value	11.8	0.8
Robust Average	10.3	1.3
Median	10.4	1.3
Mean	10.3	
N	7	
Max	12	
Min	8.36	
Robust SD	1.4	
Robust CV	14%	


Kernel Density
Density
Result
Results: S3 - MeFOSA
Assigned Value = 10.3 ± 1.3 µg/kg
Results (µg/kg)
Laboratory
2 5 12 8 9 16 14 1 3 4 6 10 11 13 15 18 19 Md RA SV


z-Scores: S3 - MeFOSA
Standard Deviation for Proficiency Assessment 2.1 µg/kg (Equivalent to 20% CV)
z-Score
-0.9
-0.5
-0.2
0.1
0.1
0.5
0.8
Laboratory
2 5 12 8 9 16 14

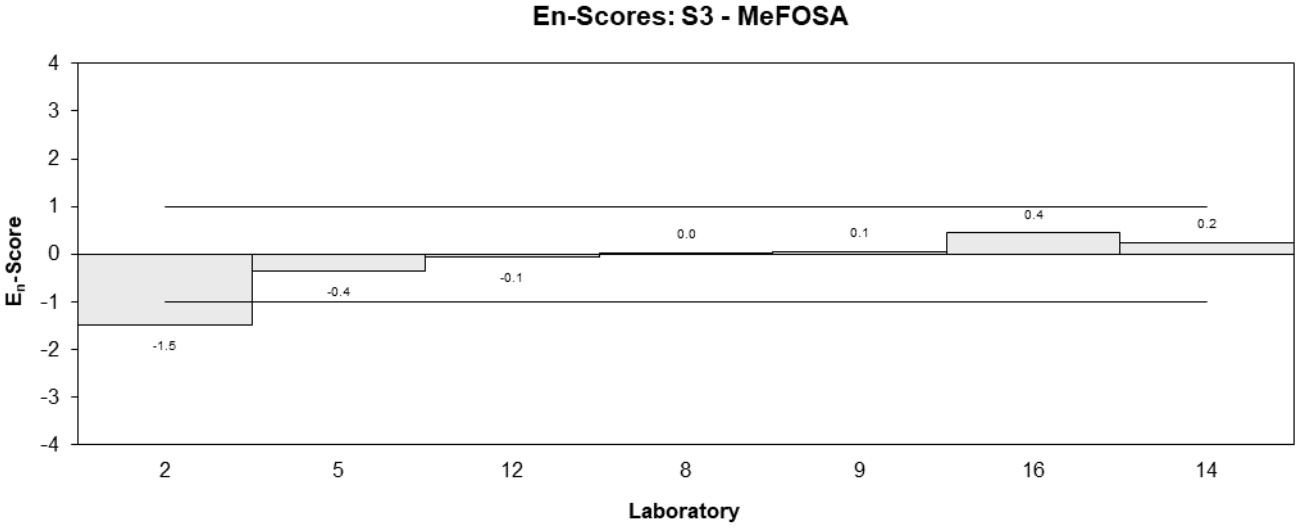

En-Scores: S3 - MeFOSA
En-Score
-1.5
-0.4
-0.1
0.0
0.1
0.4
0.2
Laboratory
2 5 12 8 9 16 14

Figure 72

Table 75

Sample Details

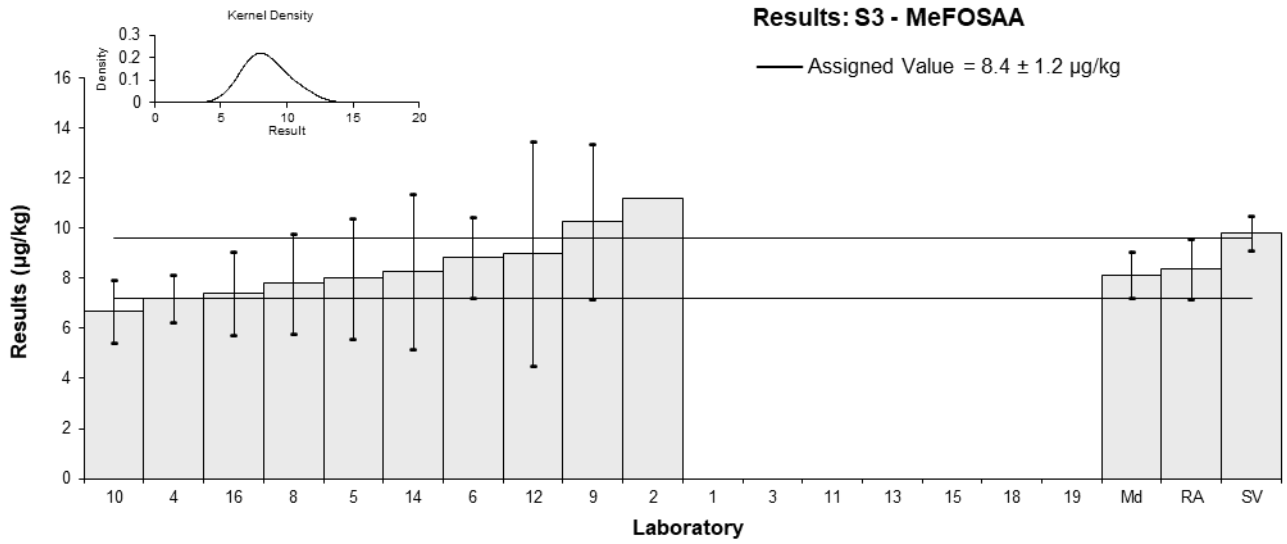
Sample No.	S3
Matrix	Infant formula
Analyte	N-MeFOSAA
Unit	µg/kg

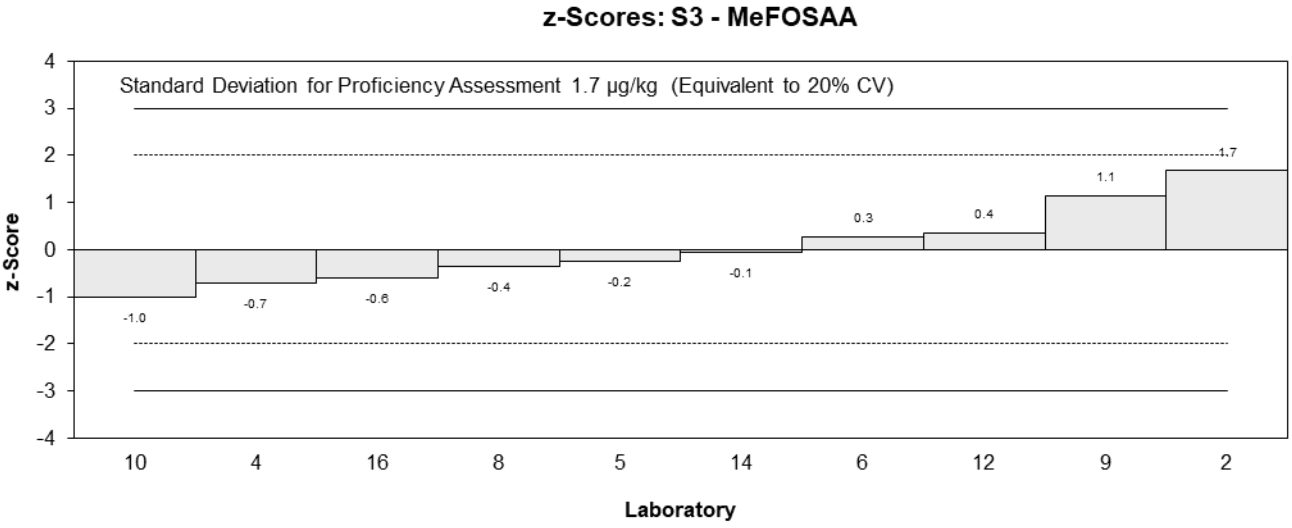
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	11.2	NR	79	1.67	2.33
3	NS	NS	NS		
4	7.2	0.93	119	-0.71	-0.79
5	8.00	2.4	85	-0.24	-0.15
6	8.85	1.62	13	0.27	0.22
8	7.8	2.0	137	-0.36	-0.26
9	10.3	3.1	138	1.13	0.57
10	6.69	1.24	28.7	-1.02	-0.99
11	NS	NS	NS		
12	9	4.5	NR	0.36	0.13
13	NT	NT	NT		
14	8.3	3.1	NT	-0.06	-0.03
15	NS	NS	NS		
16	7.4	1.68	136	-0.60	-0.48
18	NT	NT	NT		
19	NS	NS	NS		

Statistics

Assigned Value	8.4	1.2
Spike Value	9.80	0.69
Robust Average	8.4	1.2
Median	8.15	0.94
Mean	8.47	
N	10	
Max	11.2	
Min	6.69	
Robust SD	1.5	
Robust CV	17%	


Results: S3 - MeFOSAA
Assigned Value = 8.4 ± 1.2 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
10 4 16 8 5 14 6 12 9 2 1 3 11 13 15 18 19 Md RA SV


z-Scores: S3 - MeFOSAA
Standard Deviation for Proficiency Assessment 1.7 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 4 16 8 5 14 6 12 9 2
-1.0 -0.7 -0.6 -0.4 -0.2 -0.1 0.3 0.4 1.1 1.7

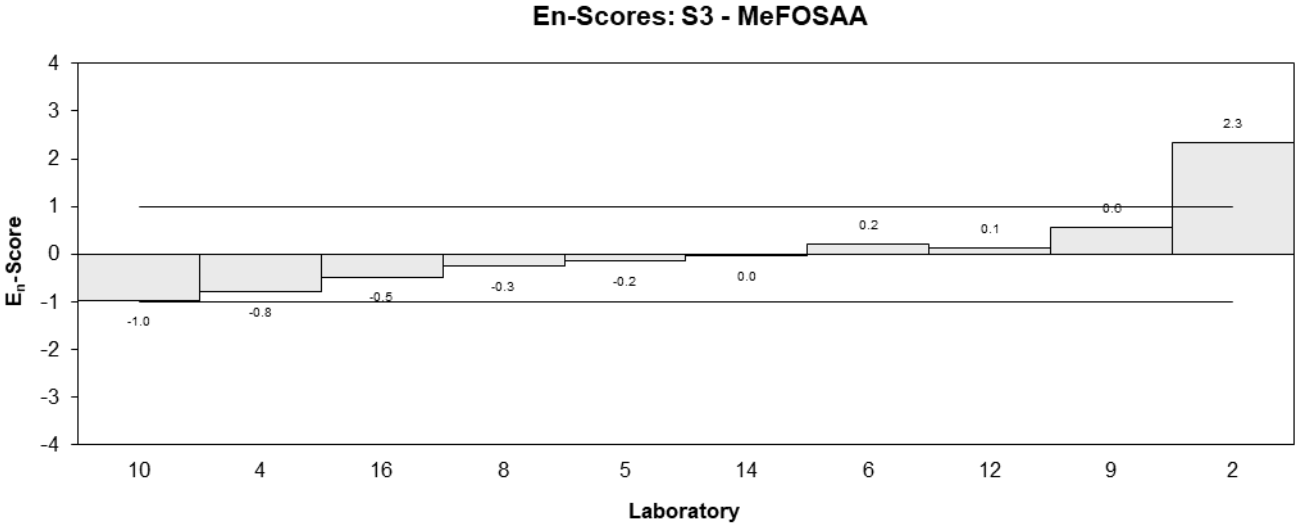

En-Scores: S3 - MeFOSAA
En-Score
Laboratory
10 4 16 8 5 14 6 12 9 2
-1.0 -0.8 -0.5 -0.3 -0.2 0.0 0.2 0.1 0.6 2.3

Figure 73

Table 76

Sample Details

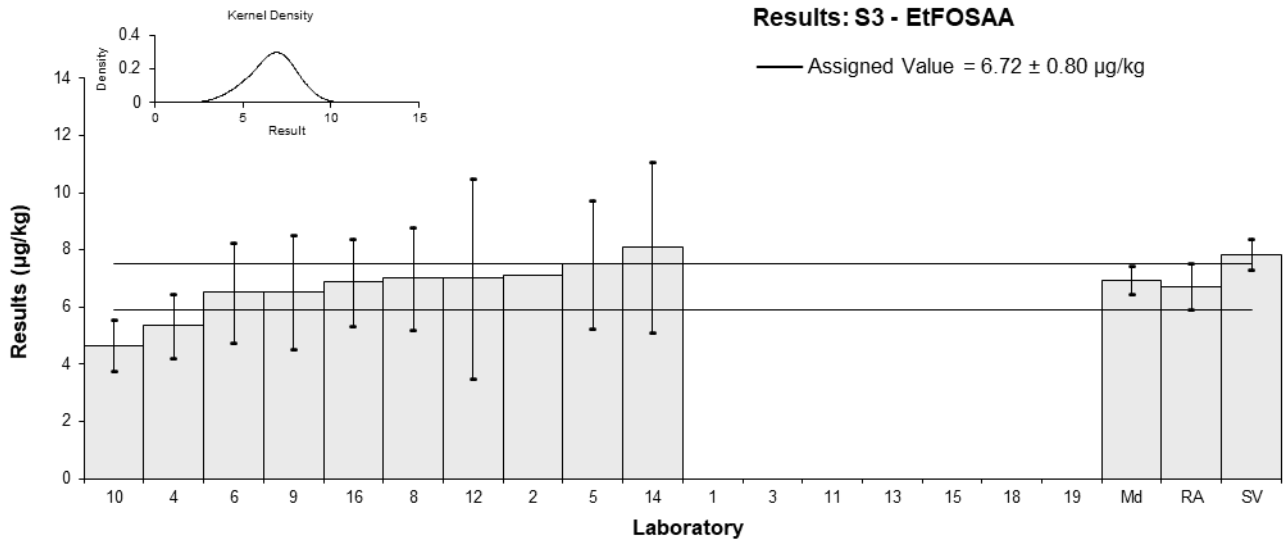
Sample No.	S3
Matrix	Infant formula
Analyte	N-EtFOSAA
Unit	µg/kg

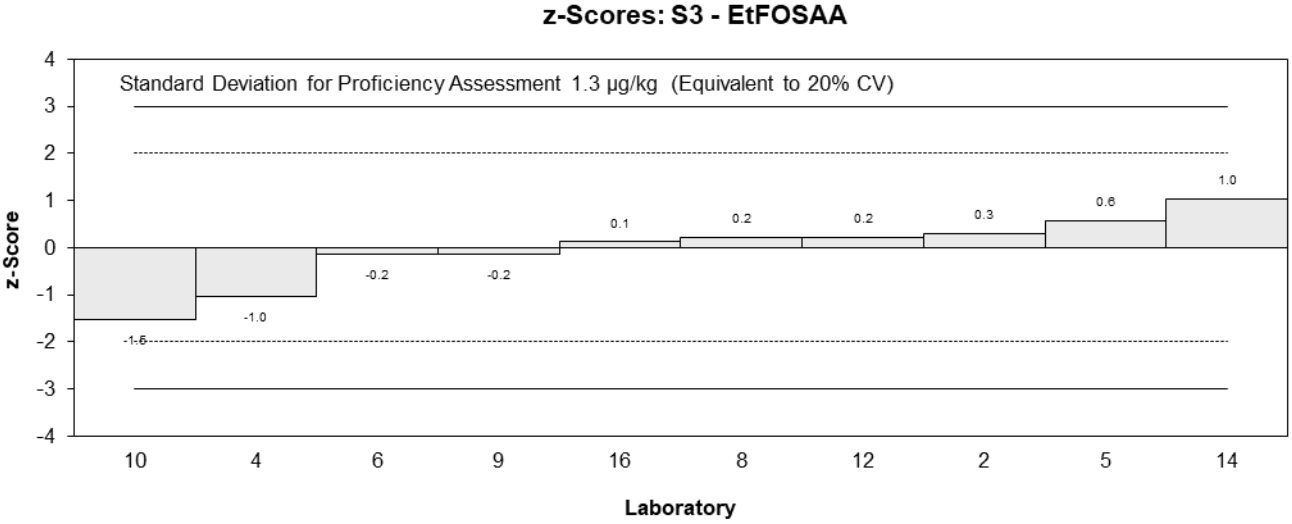
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	7.11	NR	98	0.29	0.49
3	NS	NS	NS		
4	5.34	1.12	107	-1.03	-1.00
5	7.5	2.25	103	0.58	0.33
6	6.52	1.75	15	-0.15	-0.10
8	7.0	1.8	145	0.21	0.14
9	6.52	2.0	213	-0.15	-0.09
10	4.66	0.905	28.7	-1.53	-1.71
11	NS	NS	NS		
12	7	3.5	40	0.21	0.08
13	NT	NT	NT		
14	8.1	3.0	NT	1.03	0.44
15	NS	NS	NS		
16	6.88	1.53	121	0.12	0.09
18	NT	NT	NT		
19	NS	NS	NS		

Statistics

Assigned Value	6.72	0.80
Spike Value	7.84	0.55
Robust Average	6.72	0.80
Median	6.94	0.49
Mean	6.66	
N	10	
Max	8.1	
Min	4.66	
Robust SD	1.0	
Robust CV	15%	


Kernel Density
Density
Result
Results: S3 - EtFOSAA
Assigned Value = 6.72 ± 0.80 µg/kg
Results (µg/kg)
Laboratory
10 4 6 9 16 8 12 2 5 14 1 3 11 13 15 18 19 Md RA SV


z-Scores: S3 - EtFOSAA
Standard Deviation for Proficiency Assessment 1.3 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 4 6 9 16 8 12 2 5 14
-1.6 -1.0 -0.2 -0.2 0.1 0.2 0.2 0.3 0.6 1.0

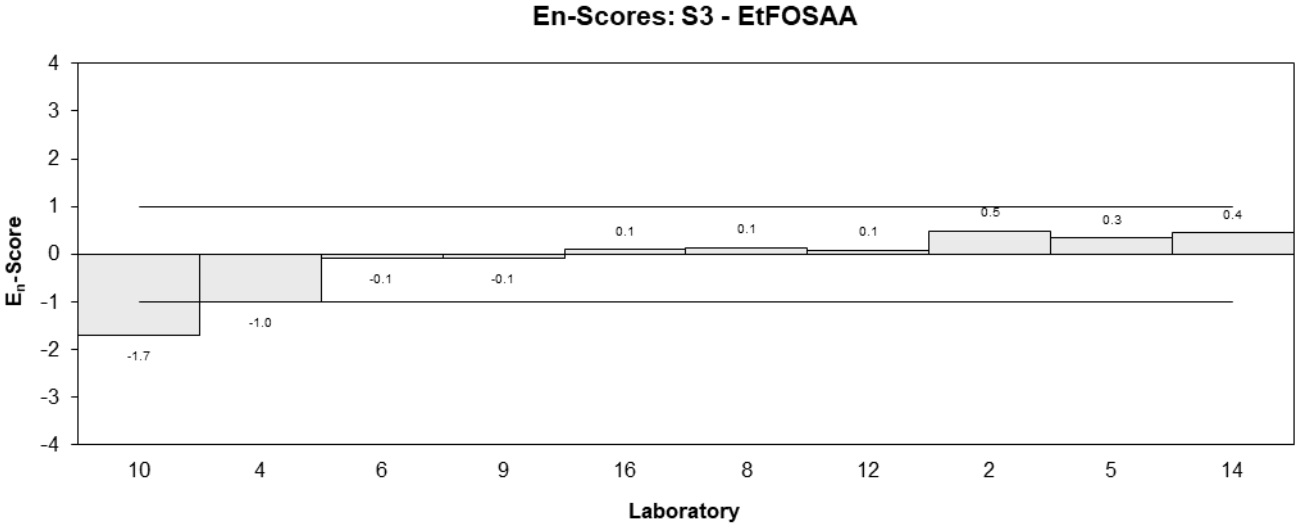

En-Scores: S3 - EtFOSAA
En-Score
Laboratory
10 4 6 9 16 8 12 2 5 14
-1.7 -1.0 -0.1 -0.1 0.1 0.1 0.1 0.5 0.3 0.4

Figure 74

Table 77

Sample Details

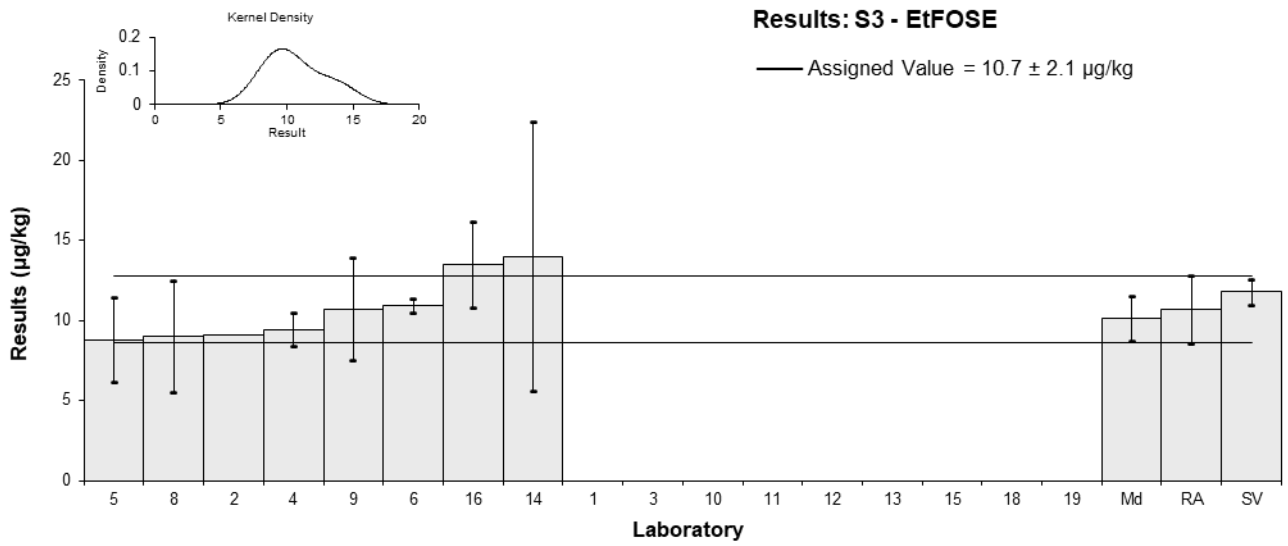
Sample No.	S3
Matrix	Infant formula
Analyte	EtFOSE
Unit	µg/kg

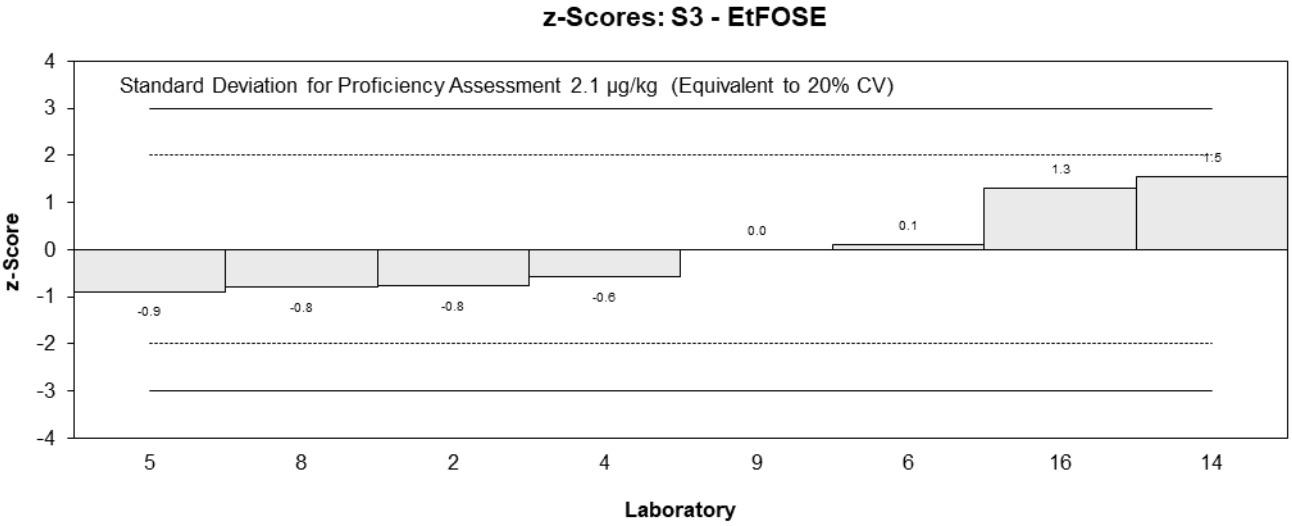
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	9.06	NR	16	-0.77	-0.78
3	NS	NS	NS		
4	9.45	1.02	65	-0.58	-0.54
5	8.8	2.64	74	-0.89	-0.56
6	10.91	0.431	12	0.10	0.10
8	9.0	3.5	51	-0.79	-0.42
9	10.7	3.2	35	0.00	0.00
10	NT	NT	NT		
11	NS	NS	NS		
12	< 5	2.5	55		
13	NT	NT	NT		
14	14	8.4	NT	1.54	0.38
15	NS	NS	NS		
16	13.5	2.71	81	1.31	0.82
18	NT	NT	NT		
19	NS	NS	NS		

Statistics

Assigned Value	10.7	2.1
Spike Value	11.8	0.8
Robust Average	10.7	2.1
Median	10.1	1.4
Mean	10.7	
N	8	
Max	14	
Min	8.8	
Robust SD	2.3	
Robust CV	22%	


Results: S3 - EtFOSE
Assigned Value = 10.7 ± 2.1 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
5 8 2 4 9 6 16 14 1 3 10 11 12 13 15 18 19 Md RA SV


z-Scores: S3 - EtFOSE
Standard Deviation for Proficiency Assessment 2.1 µg/kg (Equivalent to 20% CV)
z-Score
-0.9
-0.8
-0.8
-0.6
0.0
0.1
1.3
1.5
Laboratory
5 8 2 4 9 6 16 14

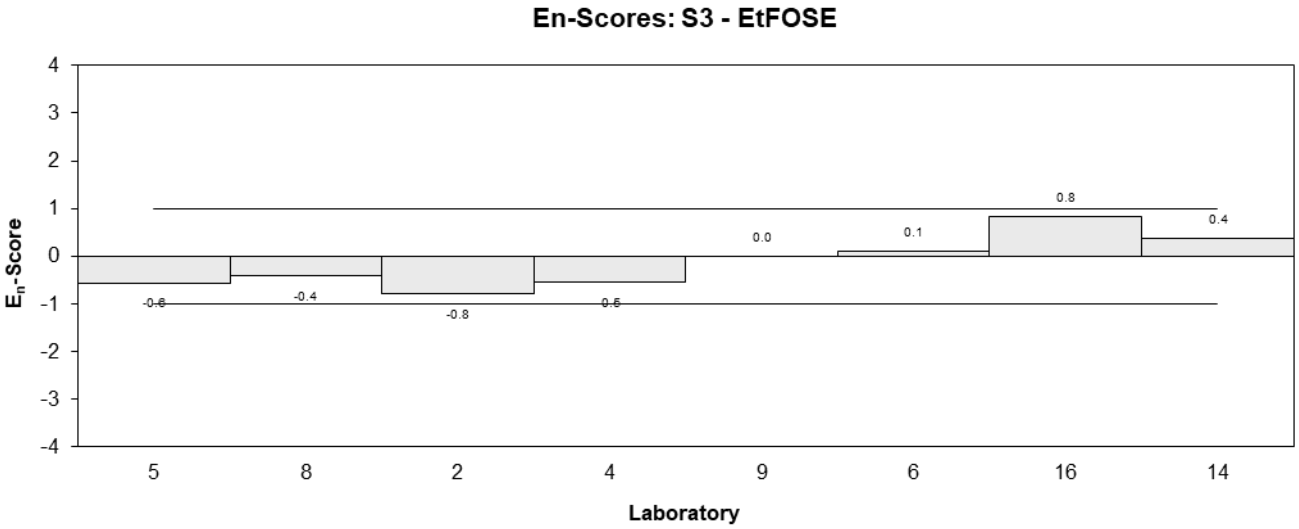

En-Scores: S3 - EtFOSE
En-Score
-0.6
-0.4
-0.8
-0.5
0.0
0.1
0.8
0.4
Laboratory
5 8 2 4 9 6 16 14

Figure 75

Table 78

Sample Details

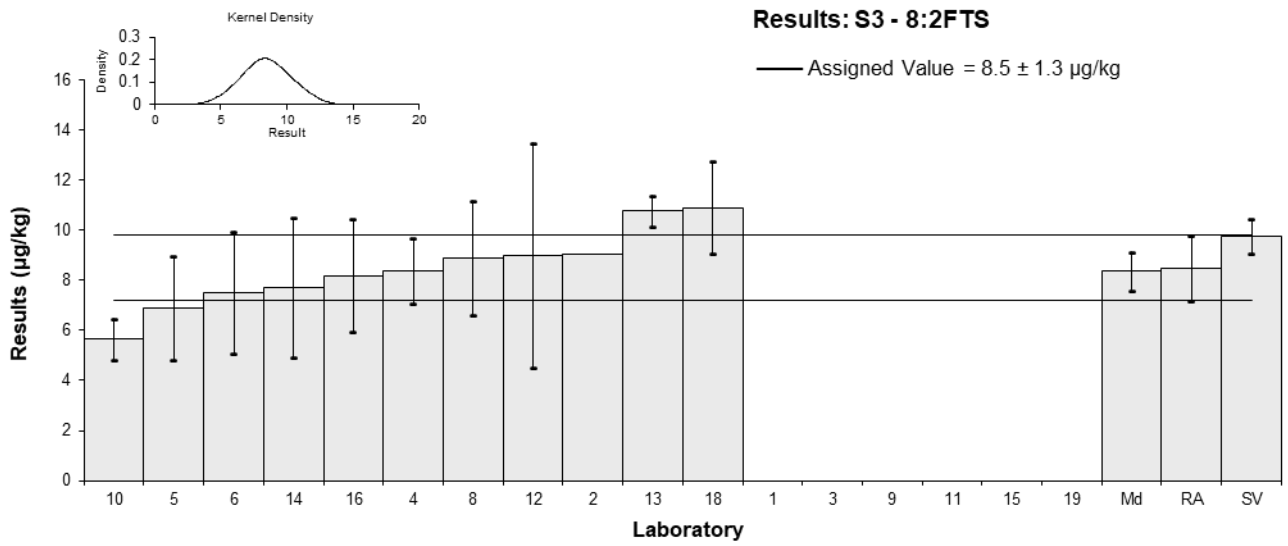
Sample No.	S3
Matrix	Infant formula
Analyte	8:2FTS
Unit	µg/kg

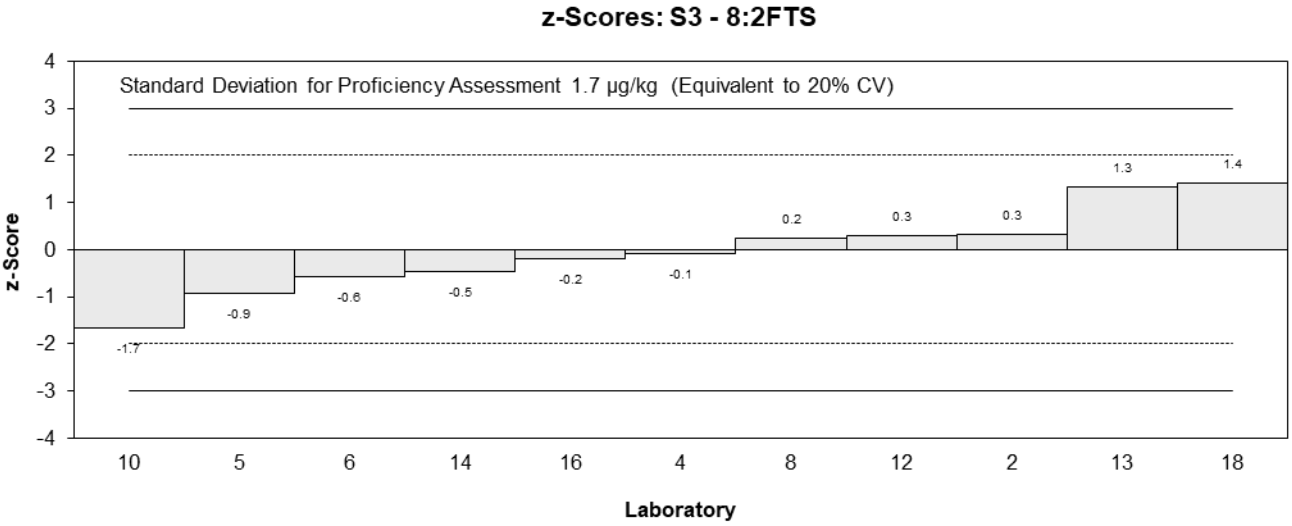
Participant Results

Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	9.05	NR	261	0.32	0.42
3	NS	NS	NS		
4	8.36	1.31	117	-0.08	-0.08
5	6.9	2.07	82	-0.94	-0.65
6	7.52	2.45	126	-0.58	-0.35
8	8.9	2.3	127	0.24	0.15
9	<0.5	NR	103		
10	5.66	0.822	62.1	-1.67	-1.85
11	NS	NS	NS		
12	9	4.5	41	0.29	0.11
13	10.767	0.62	71	1.33	1.57
14	7.7	2.8	NT	-0.47	-0.26
15	NS	NS	NS		
16	8.184	2.25	286	-0.19	-0.12
18	10.9	1.85	82.0	1.41	1.06
19	NS	NS	NS		

Statistics

Assigned Value	8.5	1.3
Spike Value	9.77	0.68
Robust Average	8.5	1.3
Median	8.36	0.77
Mean	8.45	
N	11	
Max	10.9	
Min	5.66	
Robust SD	1.7	
Robust CV	20%	


Results: S3 - 8:2FTS
Assigned Value = 8.5 ± 1.3 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
10 5 6 14 16 4 8 12 2 13 18 1 3 9 11 15 19 Md RA SV


z-Scores: S3 - 8:2FTS
Standard Deviation for Proficiency Assessment 1.7 µg/kg (Equivalent to 20% CV)
z-Score
-1.7 -0.9 -0.6 -0.5 -0.2 -0.1 0.2 0.3 0.3 1.3 1.4
Laboratory
10 5 6 14 16 4 8 12 2 13 18

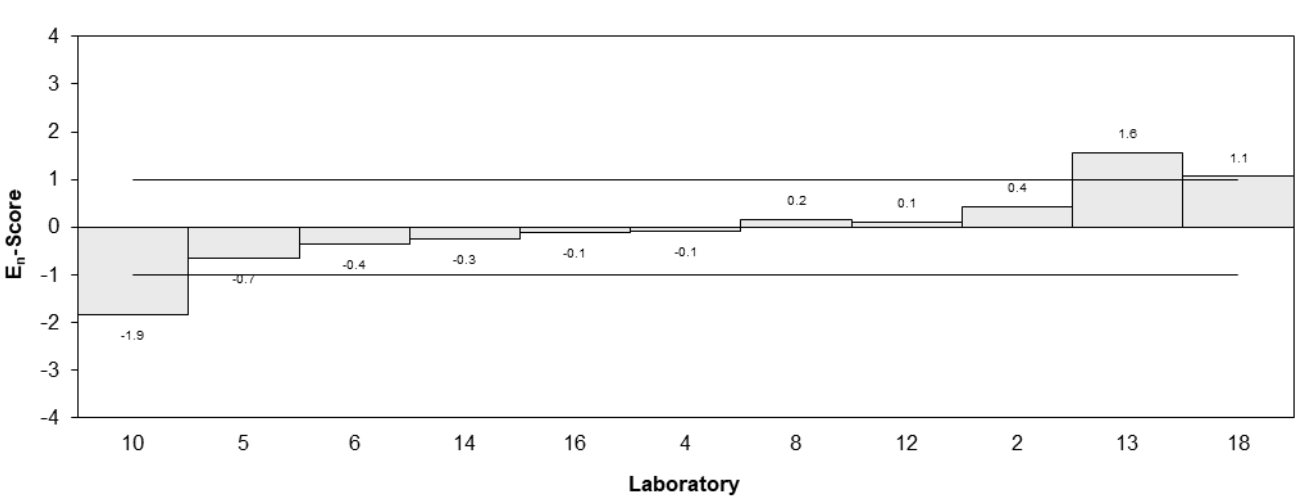

En-Scores: S3 - 8:2FTS
En-Score
-1.9 -0.7 -0.4 -0.3 -0.1 -0.1 0.2 0.1 0.4 1.6 1.1
Laboratory
10 5 6 14 16 4 8 12 2 13 18

Figure 76

Table 79

Sample Details

Sample No.	S3
Matrix	Infant formula
Analyte	10:2FTS
Unit	µg/kg

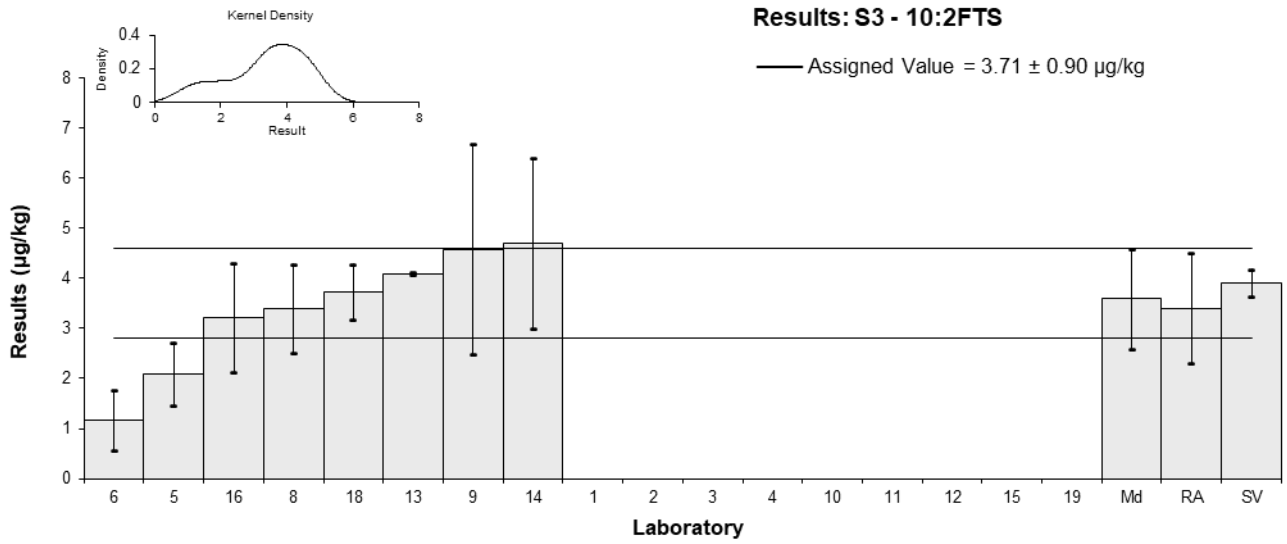
Participant Results

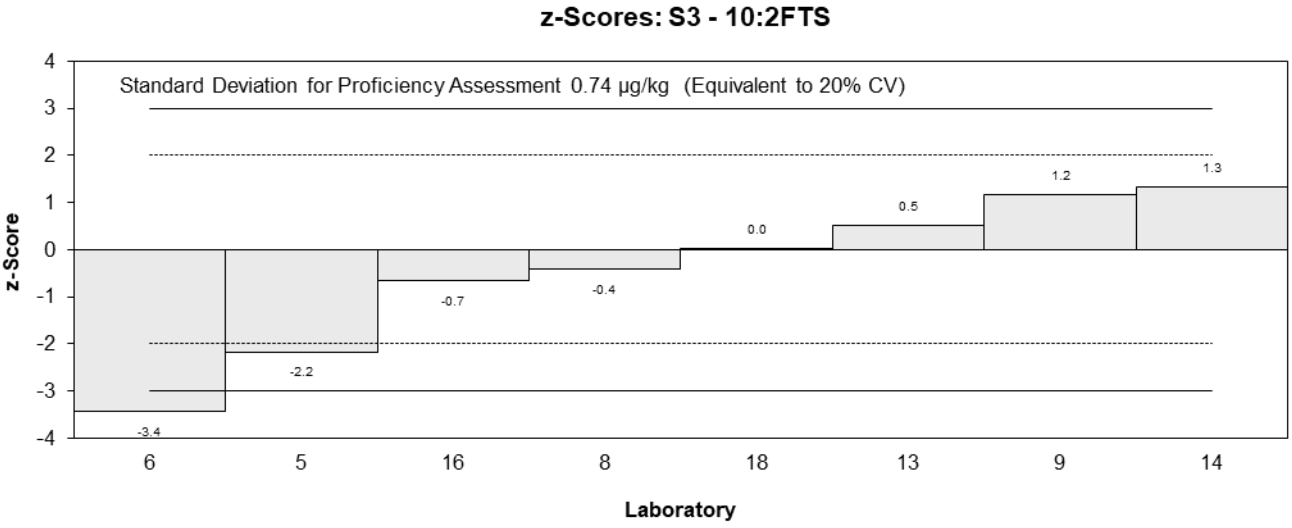
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	NT	NT	NT		
2	NT	NT	NT		
3	NS	NS	NS		
4	NR	NR	115		
5	2.1	0.63	75	-2.17	-1.47
6*	1.16	0.602	126	-3.44	-2.36
8	3.4	0.89	113	-0.42	-0.24
9	4.58	2.1	NR	1.17	0.38
10	NT	NT	NT		
11	NS	NS	NS		
12	< 10	5	NR		
13	4.091	0.024	72	0.51	0.42
14	4.7	1.7	NT	1.33	0.51
15	NS	NS	NS		
16	3.22	1.08	167	-0.66	-0.35
18	3.73	0.560	72.1	0.03	0.02
19	NS	NS	NS		

* Outlier, see Section 4.2

Statistics

Assigned Value	3.71	0.90
Spike Value	3.91	0.27
Robust Average	3.4	1.1
Median	3.6	1.0
Mean	3.37	
N	8	
Max	4.7	
Min	1.16	
Robust SD	1.3	
Robust CV	38%	


Kernel Density
Density
Result
Results: S3 - 10:2FTS
Assigned Value = 3.71 ± 0.90 µg/kg
Results (µg/kg)
6 5 16 8 18 13 9 14 1 2 3 4 10 11 12 15 19 Md RA SV
Laboratory


z-Scores: S3 - 10:2FTS
Standard Deviation for Proficiency Assessment 0.74 µg/kg (Equivalent to 20% CV)
z-Score
-3.4
-2.2
-0.7
-0.4
0.0
0.5
1.2
1.3
6 5 16 8 18 13 9 14
Laboratory

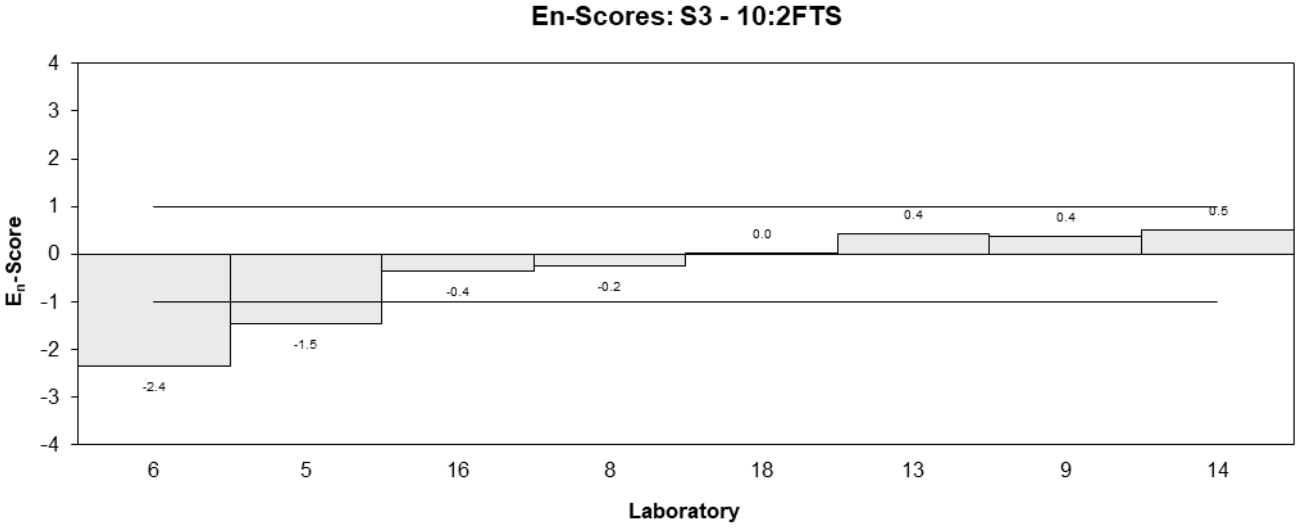

En-Scores: S3 - 10:2FTS
En-Score
-2.4
-1.5
-0.4
-0.2
0.0
0.4
0.4
0.5
6 5 16 8 18 13 9 14
Laboratory

Figure 77

Table 80

Sample Details

Sample No.	S3
Matrix	Infant formula
Analyte	GenX
Unit	µg/kg

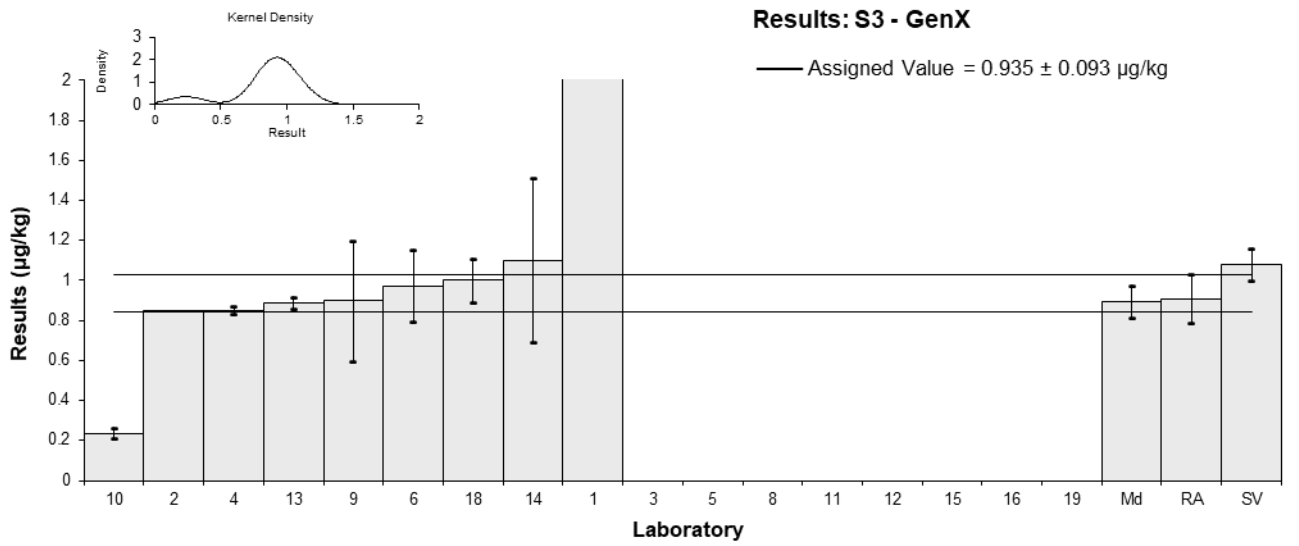
Participant Results

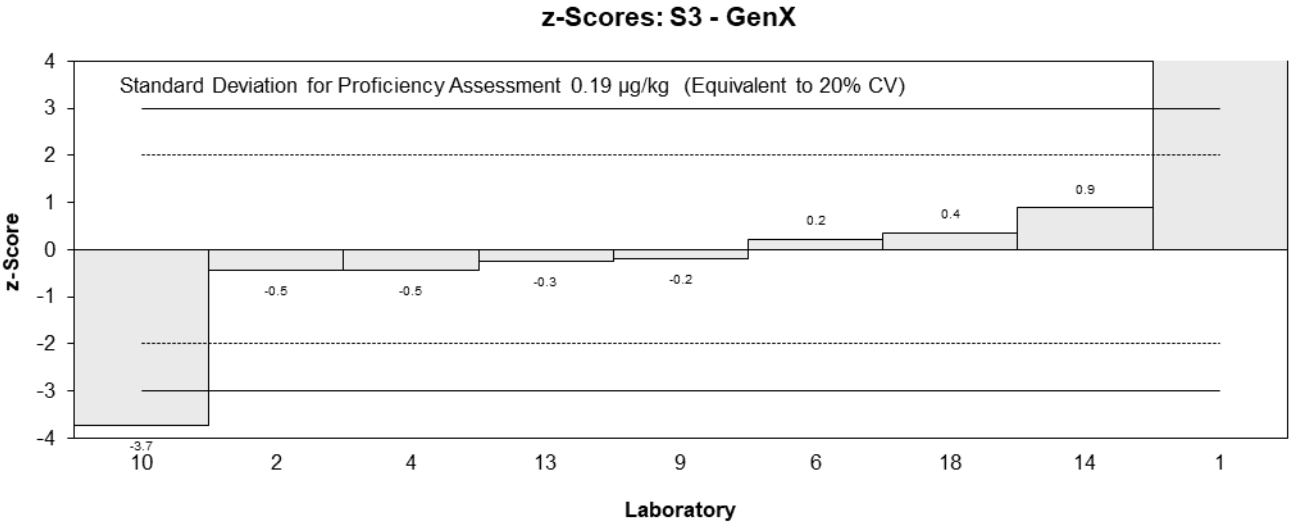
Lab. Code	Result	Uncertainty	Rec	z	E_n
1**	22.54	1.61	NR	115.53	13.40
2	0.85	NR	103	-0.45	-0.91
3	NS	NS	NS		
4	0.85	0.02	126	-0.45	-0.89
5	NT	NT	NT		
6	0.974	0.181	32	0.21	0.19
8	NT	NT	NT		
9	0.898	0.3	61	-0.20	-0.12
10*	0.236	0.027	1.4	-3.74	-7.22
11	NS	NS	NS		
12	< 2	1	NR		
13	0.889	0.029	83	-0.25	-0.47
14	1.1	0.41	NT	0.88	0.39
15	NS	NS	NS		
16	<2	NR	94		
18	1.00	0.110	85.3	0.35	0.45
19	NS	NS	NS		

* Outlier, ** Extreme Outlier, see Section 4.2

Statistics

Assigned Value	0.935	0.093
Spike Value	1.08	0.08
Robust Average	0.91	0.12
Median	0.894	0.081
Mean	0.85	
N	8	
Max	1.1	
Min	0.236	
Robust SD	0.13	
Robust CV	15%	


Results: S3 - GenX
Assigned Value = 0.935 ± 0.093 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
10 2 4 13 9 6 18 14 1 3 5 8 11 12 15 16 19 Md RA SV


z-Scores: S3 - GenX
Standard Deviation for Proficiency Assessment 0.19 µg/kg (Equivalent to 20% CV)
z-Score
-3.7 -0.5 -0.5 -0.3 -0.2 0.2 0.4 0.9
Laboratory
10 2 4 13 9 6 18 14 1

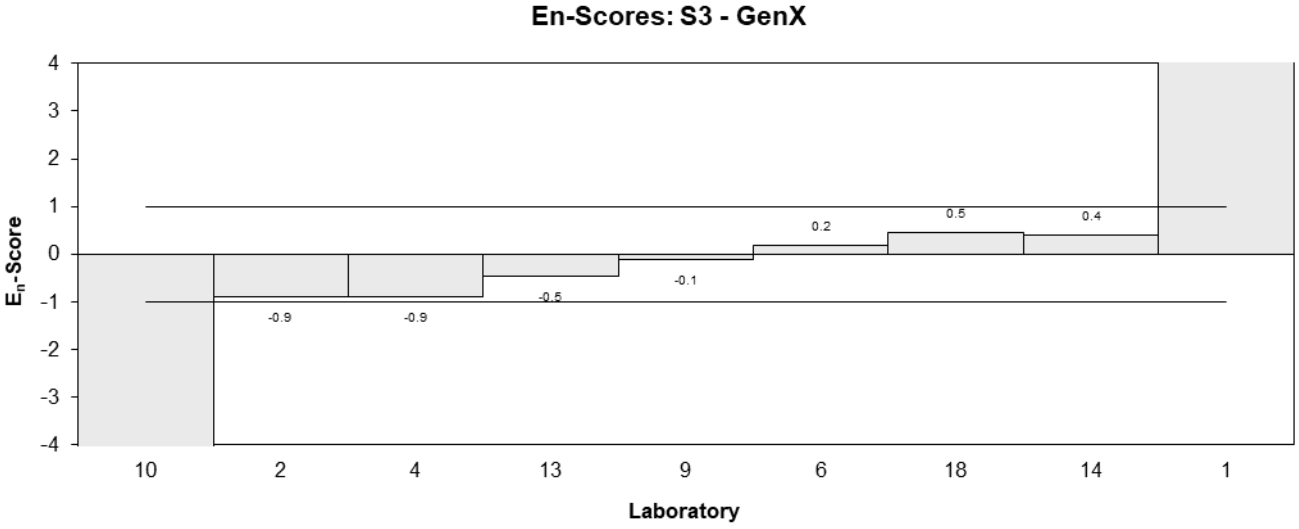

En-Scores: S3 - GenX
En-Score
-0.9 -0.9 -0.5 -0.1 0.2 0.5 0.4
Laboratory
10 2 4 13 9 6 18 14 1

Figure 78

Table 81

Sample Details

Sample No.	S3
Matrix	Infant formula
Analyte	11Cl-PF3OUdS
Unit	µg/kg

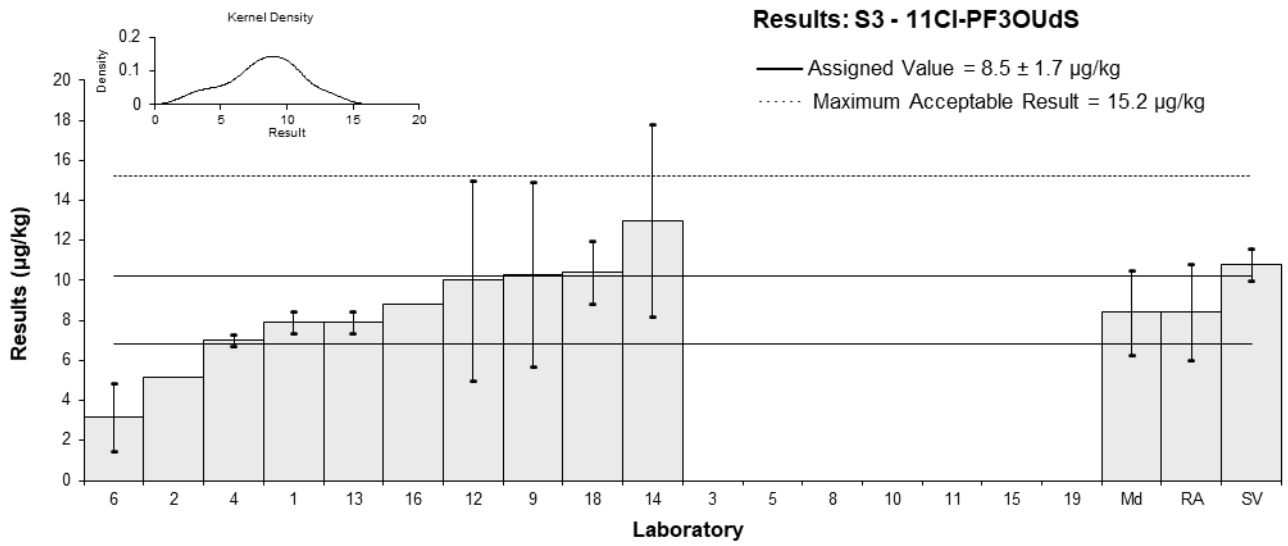
Participant Results

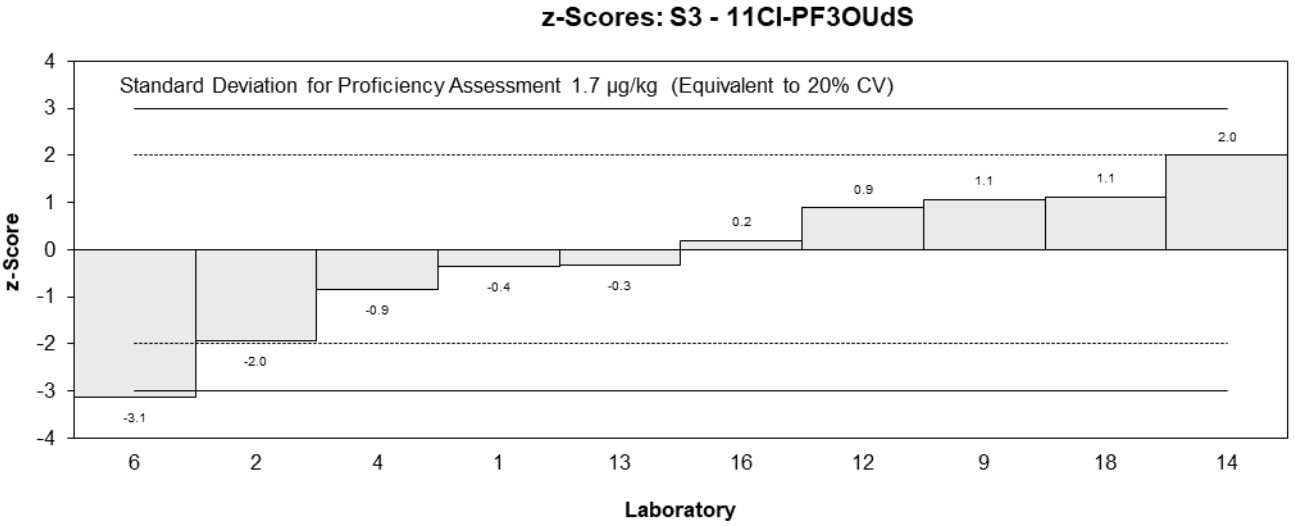
Lab. Code	Result	Uncertainty	Rec	z	E_n
1	7.90	0.56	NR	-0.35	-0.34
2	5.19	NR	79	-1.95	-1.95
3	NS	NS	NS		
4	7.03	0.3	115	-0.86	-0.85
5	NT	NT	NT		
6*	3.17	1.69	67	-3.14	-2.22
8	NT	NT	NT		
9	10.3	4.6	NR	1.06	0.37
10	NT	NT	NT		
11	NS	NS	NS		
12	10	5	NR	0.88	0.28
13	7.919	0.569	96	-0.34	-0.32
14*	13	4.8	NT	2.00▼	
15	NS	NS	NS		
16	8.818	NR	125	0.19	0.19
18	10.4	1.56	99.6	1.12	0.82
19	NS	NS	NS		

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

Statistics

Assigned Value	8.5	1.7
Spike Value	10.8	0.8
Robust Average	8.4	2.4
Max Acceptable Result	15.2	
Median	8.4	2.1
Mean	8.4	
N	10	
Max	13	
Min	3.17	
Robust SD	3.0	
Robust CV	36%	


Results: S3 - 11Cl-PF3OUdS
Assigned Value = 8.5 ± 1.7 µg/kg
Maximum Acceptable Result = 15.2 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
6 2 4 1 13 16 12 9 18 14 3 5 8 10 11 15 19 Md RA SV


z-Scores: S3 - 11Cl-PF3OUdS
Standard Deviation for Proficiency Assessment 1.7 µg/kg (Equivalent to 20% CV)
z-Score
-3.1
-2.0
-0.9
-0.4
-0.3
0.2
0.9
1.1
1.1
2.0
Laboratory
6 2 4 1 13 16 12 9 18 14

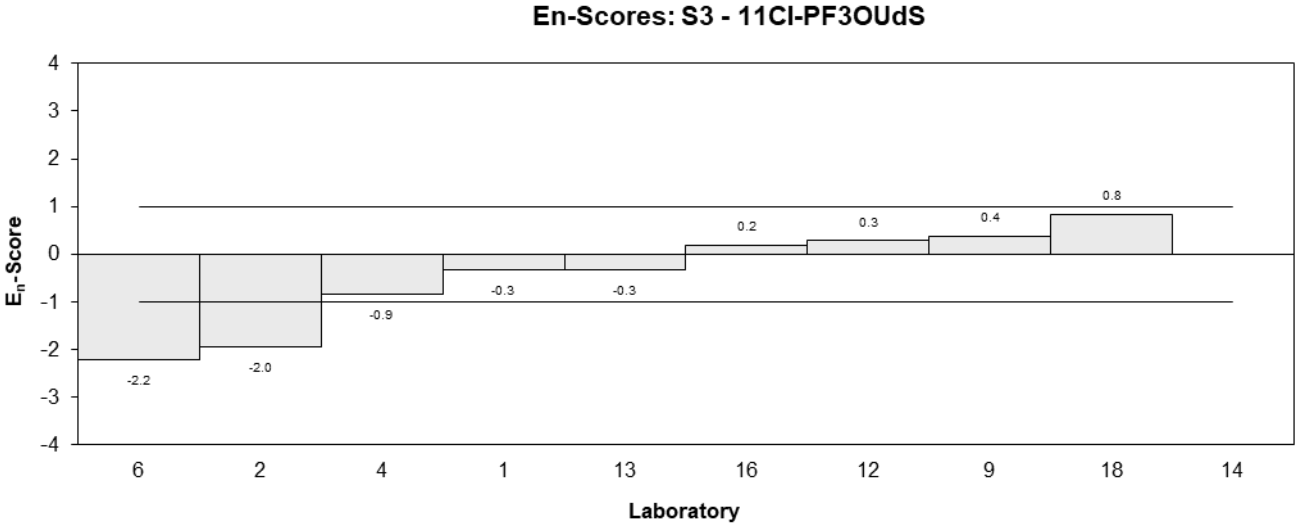

En-Scores: S3 - 11Cl-PF3OUdS
En-Score
-2.2
-2.0
-0.9
-0.3
-0.3
0.2
0.3
0.4
0.8
Laboratory
6 2 4 1 13 16 12 9 18 14

Figure 79

6 DISCUSSION OF RESULTS

6.1 Assigned Value

The assigned values for all scored analytes were the robust averages of participants' results. Results less than 50% or greater than 150% of the robust average, were excluded from the calculation of the assigned value.[3,4] The robust averages and associated expanded uncertainties were calculated using the procedure described in ISO 13528.[7] The calculation of the expanded uncertainty for the robust average is presented in Appendix 3.

No assigned value was set for PFODA in Sample S1 because too few numeric results were reported by participants. Similarly, no assigned value was set for 3:3FTCA in Sample S1 due to the high variability in reported results. For these analytes without assigned values, participants may still compare their results against the descriptive statistics and the spiked value provided in Section 5.

A comparison of the assigned value (or median value/robust average if no assigned value was set) and spiked value for all fortified analytes in the three samples is presented in Table 82. None of the spike values include the incurred amount if present.

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.

Table 82 Comparison of Assigned Values and Spiked Values

Sample	Analyte	Assigned Value (µg/kg)	Spiked Value (µg/kg)	Assigned Value / Spiked Value (%)
S1	PFBA	4.03	3.58	113
S1	PFPeA	0.894	0.901	99
S1	PFHxA	2.51	2.69	93
S1	PFHpA	5.44	5.34	102
S1	PFOA	1.05	0.938	112
S1	PFNA	1.42	1.33	107
S1	PFDA	4.88	4.92	99
S1	PFUdA	6.63	7.16	93
S1	PFDoA	6.7	7.16	94
S1	PFTrDA	6.39	7.16	89
S1	PFTeDA	6.2	7.16	87
S1	PFODA	16.0*	17.9	89
S1	PFBS	1.25	1.35	93
S1	PFPeS	3.32	3.14	106
S1	PFHxS (total)	2.27	2.24	101
S1	PFHxS_L	2.25	2.24	100
S1	PFHpS	1.42	1.36	104
S1	PFOS	2.22	2.24	99
S1	PFOS_L	1.76	1.77	99
S1	PFNS	1.25	1.33	94
S1	PFDS	5.49	6.30	87

Sample	Analyte	Assigned Value (µg/kg)	Spiked Value (µg/kg)	Assigned Value / Spiked Value (%)
S1	PFOSA	4.37	4.48	98
S1	N-MeFOSA	6.9	7.16	96
S1	N-MeFOSAA	4.87	5.37	91
S1	6:2FTS	8.4	8.06	104
S1	3:3FTCA	19.4**	31.3	62
S1	ADONA	19.2	19.6	98
S1	9Cl-PF3ONS	20.8	22.3	93
S2	PFBA	2.93	2.86	102
S2	PFPeA	0.959	0.933	103
S2	PFHxA	6.03	5.73	105
S2	PFHpA	2.16	1.91	113
S2	PFOA	3.84	3.33	115
S2	PFNA	2.52	2.38	106
S2	PFDA	6.94	7.62	91
S2	PFDoA	7.21	7.62	95
S2	PFTeDA	7.92	7.62	104
S2	PFBS	0.858	0.944	91
S2	PFPeS	5.21	4.67	112
S2	PFHxS (total)	0.840	0.764	110
S2	PFHxS_L	0.864	0.764	113
S2	PFHpS	1.44	1.43	101
S2	PFOS	1.83	1.90	96
S2	PFOS_L	1.50	1.50	100
S2	PFNS	1.88	2.11	89
S2	PFDS	3.77	4.12	92
S2	PFOSA	3.40	3.64	93
S2	8:2FTS	6.37	6.63	96
S2	10:2FTS	7.0	6.68	105
S2	ADONA	12.0	10.9	110
S2	11Cl-PF3OUdS	21.8	23.7	92
S3	PFBA	2.69	2.94	91
S3	PFPeA	1.16	1.22	95
S3	PFHxA	0.450	0.784	57
S3	PFHpA	1.06	1.17	91
S3	PFOA	1.79	1.77	101
S3	PFNA	0.423	0.491	86
S3	PFDA	8.37	7.85	107

Sample	Analyte	Assigned Value (µg/kg)	Spiked Value (µg/kg)	Assigned Value / Spiked Value (%)
S3	PFUdA	6.55	7.84	84
S3	PFTrDA	6.0	7.84	77
S3	PFTeDA	6.33	7.84	81
S3	PFBS	0.744	1.07	70
S3	PFPeS	0.52	0.675	77
S3	PFHxS (total)	0.442	0.587	75
S3	PFHxS_L	0.446	0.587	76
S3	PFHpS	0.407	0.684	60
S3	PFOS	1.84	1.97	93
S3	PFOS_L	1.45	1.55	94
S3	PFNS	0.624	0.972	64
S3	PFDS	1.15	1.48	78
S3	N-MeFOSA	10.3	11.8	87
S3	N-MeFOSAA	8.4	9.80	86
S3	N-EtFOSAA	6.72	7.84	86
S3	EtFOSE	10.7	11.8	91
S3	8:2FTS	8.5	9.77	87
S3	10:2FTS	3.71	3.91	95
S3	GenX	0.935	1.08	87
S3	11Cl-PF3OUdS	8.5	10.8	79

[*] Median value (assigned value not set). [**] Robust average (assigned value not set).

6.2 Measurement Uncertainty Reported by Participants

Participants were asked to report an evaluation of the expanded measurement uncertainty associated with their results. It is a requirement of ISO/IEC 17025 that laboratories have procedures to evaluate the uncertainty of chemical measurements and to report this in specific circumstances, including when the client's instruction so requires.[9] However, some laboratories that reported being accredited to ISO 17025 did not provide uncertainties for their numeric results.

Of 944 numeric results reported for spiked analytes in this study, 842 (89%) were reported with a measurement uncertainty. The magnitude of the reported expanded uncertainties was within the range 0% to 78% of the reported value. The participants used a wide variety of procedures to evaluate expanded measurement uncertainty. These are presented in Table 3. One participant reported using the NATA GAG Estimating and Reporting MU as their guide; this document has been officially removed from the NATA website and is considered obsolete.[11]

Laboratories 1, 4, 6, 10, 11, 13, 15, and 19 should review their procedure for evaluating measurement uncertainty as some of the relative uncertainties reported by them were lower than 10%, which the study coordinator considers unrealistically small for a routine PFAS measurement.

Uncertainties associated with results returning an acceptable *z*-score but an unacceptable E_n-score may also have been underestimated.

Laboratories 6, 10, 12, 14, and 16 reported some relative uncertainties greater than 50%; they should also review their procedure as it might not be fit-for-purpose.

Laboratory 12 attached an evaluation of the expanded measurement uncertainty to results less than their limit of reporting. An evaluation of uncertainty expressed as a numerical value cannot be attached to a result expressed as a range.[10]

In some cases, the 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, for a result of "5.242 ± 0.729 µg/kg", it is better to report "5.24 ± 0.73 µg/kg").[9]

6.3 z-Score

The z-score compares the participant's deviation from the assigned value based on the standard deviation for proficiency assessment (SDPA).

The SDPA defines acceptable performance in a proficiency test. SDPA's equivalent to 20% performance coefficient of variation (PCV) were used to calculate z-scores in this study. Unlike the standard deviation based on between-laboratory CV, setting the SDPA as a realistic value enables z-scores to be used as fixed reference value points for assessment of individual laboratory performance, independent of the group's performance.

The between-laboratory coefficient of variation predicted by the Thompson-Horwitz equation[8] and between-laboratory coefficient of variation from reported results in this study are presented for comparison in Table 83.

Table 83 Standard Deviation for Proficiency Assessment, Thompson/Horwitz and Between-Laboratory CV*

Sample	Analyte	Assigned Value (µg/kg)	SDPA (as PCV, %)	Thompson-Horwitz CV (%)	Between-Laboratory CV (%)
S1	PFBA	4.03	20	22	12
S1	PFPeA	0.894	20	22	13
S1	PFHxA	2.51	20	22	15
S1	PFHpA	5.44	20	22	10
S1	PFOA	1.05	20	22	11
S1	PFNA	1.42	20	22	13
S1	PFDA	4.88	20	22	11
S1	PFUdA	6.63	20	22	13
S1	PFDoA	6.7	20	22	24
S1	PFTrDA	6.39	20	22	22
S1	PFTeDA	6.2	20	22	29
S1	PFODA	16.0**	Not Set	22	42
S1	PFBS	1.25	20	22	10
S1	PFPeS	3.32	20	22	15
S1	PFHxS	2.27	20	22	11
S1	PFHxS_L	2.25	20	22	11
S1	PFHpS	1.42	20	22	11

Sample	Analyte	Assigned Value (µg/kg)	SDPA (as PCV, %)	Thompson-Horwitz CV (%)	Between-Laboratory CV (%)
S1	PFOS	2.22	20	22	14
S1	PFOS_L	1.76	20	22	13
S1	PFNS	1.25	20	22	14
S1	PFDS	5.49	20	22	20
S1	PFOSA	4.37	20	22	14
S1	N-MeFOSA	6.9	20	22	22
S1	N-MeFOSAA	4.87	20	22	21
S1	6:2FTS	8.4	20	22	20
S1	3:3FTCA	19.4**	Not Set	22	57
S1	ADONA	19.2	20	22	15
S1	9Cl-PF3ONS	20.8	20	22	16
S2	PFBA	2.93	20	22	13
S2	PFPeA	0.959	20	22	4.6
S2	PFHxA	6.03	20	22	8.8
S2	PFHpA	2.16	20	22	11
S2	PFOA	3.84	20	22	13
S2	PFNA	2.52	20	22	15
S2	PFDA	6.94	20	22	17
S2	PFDoA	7.21	20	22	16
S2	PFTeDA	7.92	20	22	15
S2	PFBS	0.858	20	22	16
S2	PFPeS	5.21	20	22	11
S2	PFHxS	0.840	20	22	11
S2	PFHxS_L	0.864	20	22	12
S2	PFHpS	1.44	20	22	20
S2	PFOS	1.83	20	22	15
S2	PFOS_L	1.50	20	22	11
S2	PFNS	1.88	20	22	18
S2	PFDS	3.77	20	22	20
S2	PFOSA	3.40	20	22	12
S2	8:2FTS	6.37	20	22	22
S2	10:2FTS	7.0	20	22	22
S2	ADONA	12.0	20	22	14
S2	11Cl-PF3OUdS	21.8	20	22	20
S3	PFBA	2.69	20	22	18
S3	PFPeA	1.16	20	22	12
S3	PFHxA	0.450	20	22	15

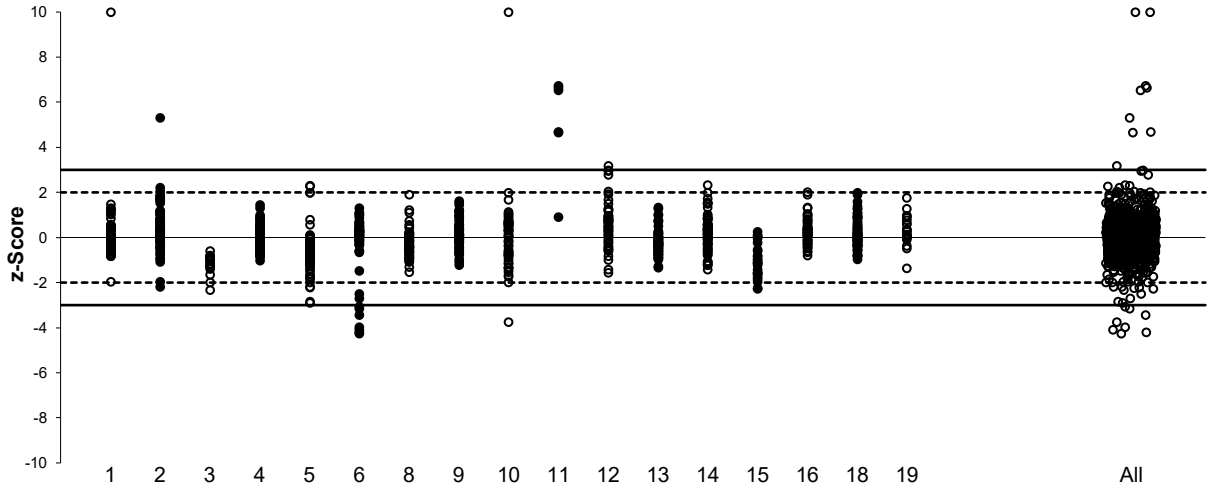
Sample	Analyte	Assigned Value (µg/kg)	SDPA (as PCV, %)	Thompson-Horwitz CV (%)	Between-Laboratory CV (%)
S3	PFHpA	1.06	20	22	12
S3	PFOA	1.79	20	22	14
S3	PFNA	0.423	20	22	18
S3	PFDA	8.37	20	22	15
S3	PFUdA	6.55	20	22	15
S3	PFTrDA	6.0	20	22	29
S3	PFTeDA	6.33	20	22	18
S3	PFBS	0.744	20	22	15
S3	PFPeS	0.52	20	22	26
S3	PFHxS	0.442	20	22	21
S3	PFHxS_L	0.446	20	22	18
S3	PFHpS	0.407	20	22	13
S3	PFOS	1.84	20	22	13
S3	PFOS_L	1.45	20	22	12
S3	PFNS	0.624	20	22	15
S3	PFDS	1.15	20	22	27
S3	N-MeFOSA	10.3	20	22	14
S3	N-MeFOSAA	8.4	20	22	17
S3	N-EtFOSAA	6.72	20	22	15
S3	EtFOSE	10.7	20	22	22
S3	8:2FTS	8.5	20	22	20
S3	10:2FTS	3.71	20	22	26
S3	GenX	0.935	20	22	11
S3	11Cl-PF3OUdS	8.5	20	22	23

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

To account for possible low bias in the consensus value due to laboratories using inefficient analytical or extraction techniques, z -scores were adjusted for: PFHxA, PFPeS, total PFHxS, PFDS, and 11Cl-PF3OUdS in Sample S3. Where the assigned value is less than 80% of the spiked value, a maximum acceptable result was set as the spiked value plus two SDPAs of the spiked value. Results lower than the maximum acceptable result but with a *z*-score greater than 2.0 had their *z*-score adjusted to 2.0. This ensured that any participants reporting results close to the spiked value were not penalised. *z*-Scores for results greater than the maximum acceptable result, and *z*-scores less than 2.0, were left unaltered.

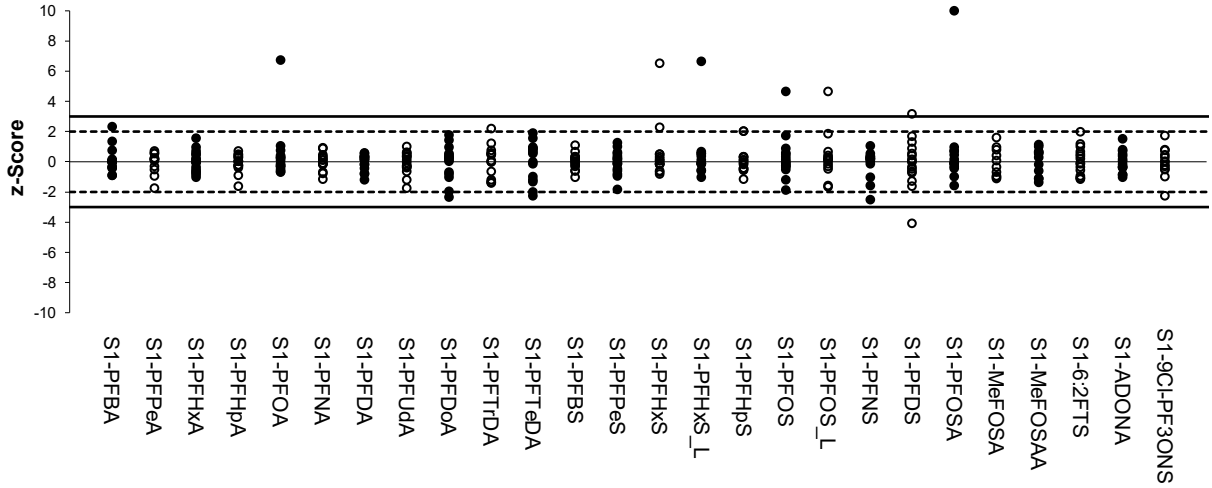
The dispersal of participants' *z*-scores is presented graphically by laboratory in Figure 80 and by analyte in Figures 81 to 83.

Of 932 results for which *z*-scores were calculated, 895 (96%) returned $|z| \leq 2.0$, indicating an acceptable performance.



z-Scores greater than 10 have been plotted at 10.

Figure 80 *z*-Score Dispersal by Laboratory



z-Scores greater than 10 have been plotted at 10.

Figure 81 *z*-Score Dispersal by Analyte for Sample S1 Fish Paste

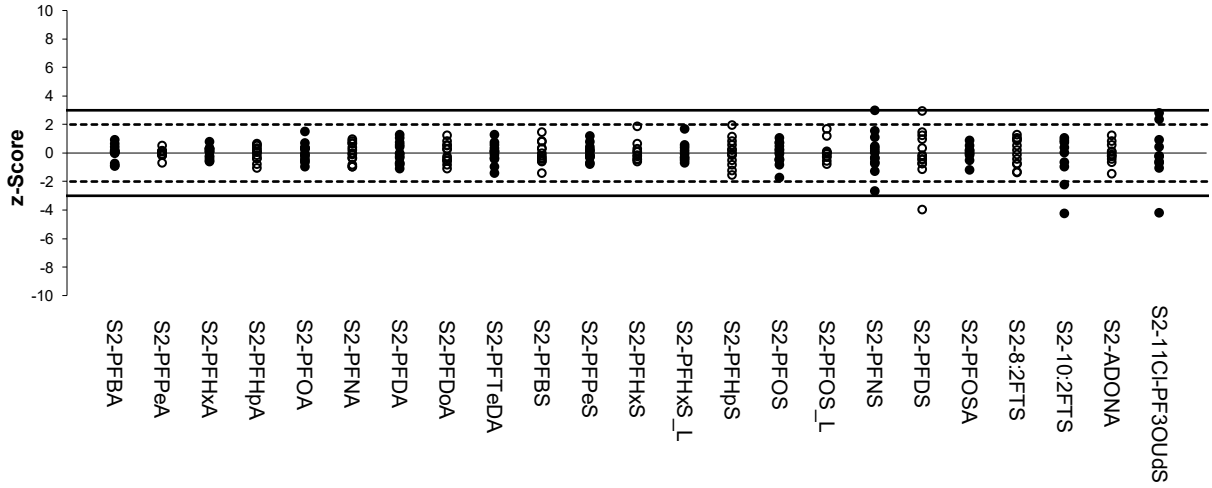
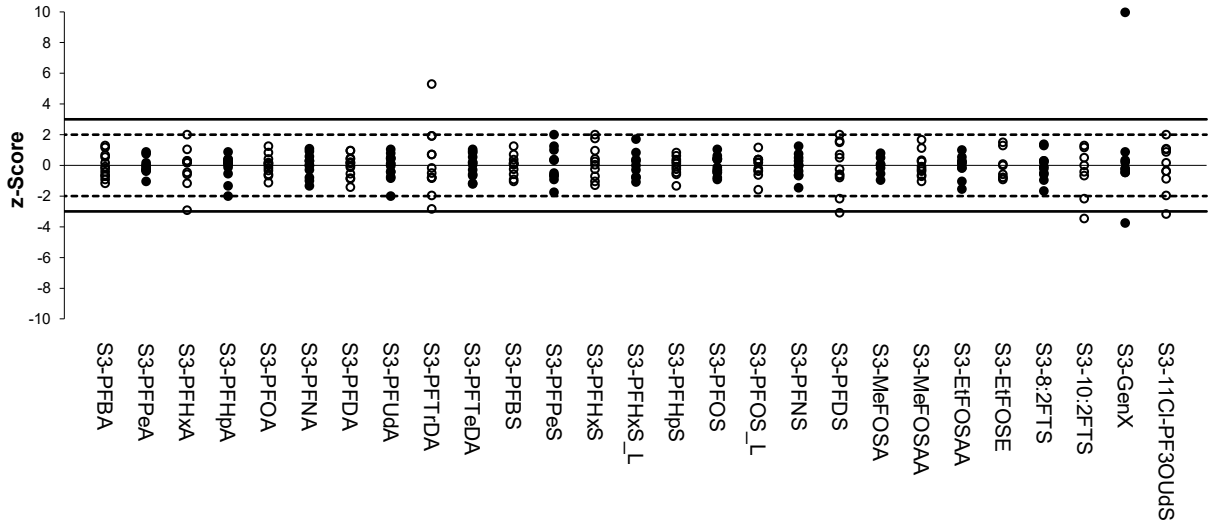


Figure 82 *z*-Score Dispersal by Analyte for Sample S2 Fruit Puree



z-Scores greater than 10 have been plotted at 10.

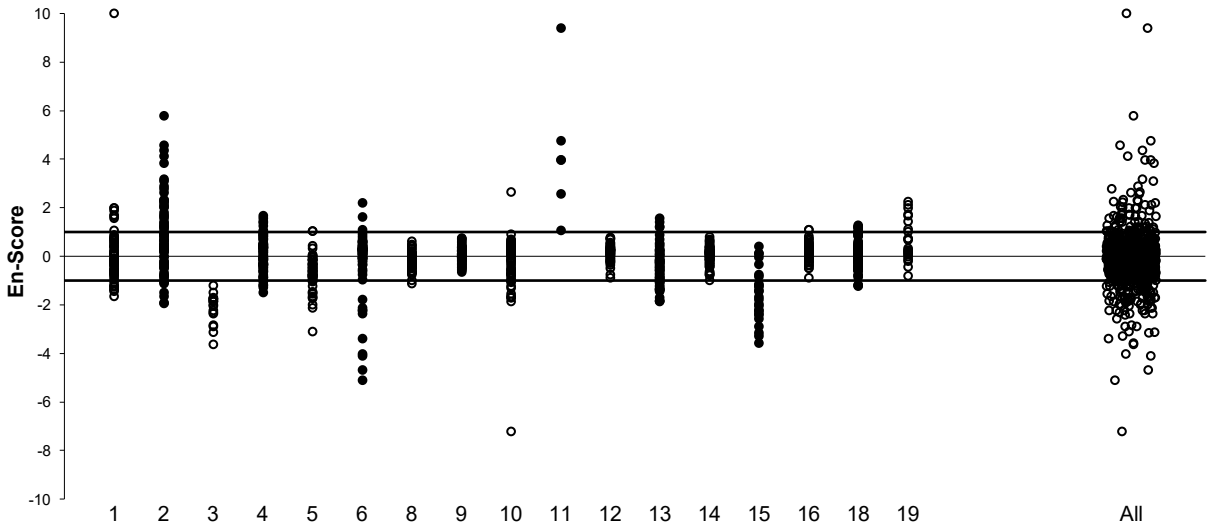
Figure 83 *z*-Score Dispersal by Analyte for Sample S3 Infant Formula

6.4 E_n-Score

E_n-Scores can be interpreted in conjunction with *z*-scores. The E_n-score indicates how closely a result agrees with the assigned value taking into consideration the respective uncertainties. An unacceptable E_n-score can either be caused by an inappropriate measurement, an inappropriate evaluation of measurement uncertainty, or both. For results whose *z*-scores were adjusted as discussed in Section 6.3, no E_n-score has been calculated.

Of 927 results for which E_n-scores were calculated, 743 (80%) returned $|E_n| < 1.0$, indicating agreement of the participant's result with the assigned value within their respective expanded uncertainties. 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.

All numeric results reported by Laboratories **9** (72) and **12** (53) returned acceptable E_n-scores. The dispersal of participants' E_n-scores is presented graphically in Figure 84



E_n-scores greater than 10 have been plotted at 10.

Figure 84 E_n-Score Dispersal by Laboratory

Table 84 Summary of Participants' Sample S1 Results*

Lab. Code	PFBA (µg/kg)	PFPeA (µg/kg)	PFHxA (µg/kg)	PFHpA (µg/kg)	PFOA (µg/kg)	PFNA (µg/kg)	PFDA (µg/kg)	PFUdA (µg/kg)	PFDoA (µg/kg)	PFTrDA (µg/kg)	PFTeDA (µg/kg)	PFODA (µg/kg)	PFBS (µg/kg)	PFPeS (µg/kg)
AV	4.03	0.894	2.51	5.44	1.05	1.42	4.88	6.63	6.7	6.39	6.2	Not Set	1.25	3.32
SV	3.58	0.901	2.69	5.34	0.938	1.33	4.92	7.16	7.16	7.16	7.16	17.9	1.35	3.14
1	3.76	0.8	2.14	5.12	0.92	1.38	5.22	6.78	7.16	6.51	7.28	NT	1.52	4
2	3.69	1.02	2.51	5.5	1.07	1.37	5.12	7.13	7.33	9.21	7.14	NT	1.42	3.73
3	3.32	<1	2.08	4.46	<1	<1	4.12	5.07	3.58	4.72	3.75	10.9	<1	2.78
4	4.05	0.94	2.79	5.77	1.02	1.39	4.46	5.81	7.08	7.14	7.3	NT	1.3	3.39
5	5.9	0.58	2.0	3.7	1.0	<0.001	4.1	6.3	5.8	6.4	5.0	21	1.2	2.1
6	4.01	0.922	2.34	5.94	1.12	1.49	5.42	7.95	NR	NR	NR	NT	1.33	3.25
8	3.3	0.73	2.2	5.2	0.91	1.2	5.1	6.2	5.6	6.4	6.2	NT	1.1	2.7
9	4.15	0.989	2.49	5.51	1.14	1.51	5.24	7.42	8.65	7.98	8.13	NT	1.29	3.28
10	4.64	<1.70	2.75	6.24	1.27	1.67	5.47	7.28	7.42	5.6	4.56	20	1.26	3.23
11	NT	NT	NT	NT	2.468	1.68	NT	NT	NT	NT	NT	NT	NT	NT
12	4	< 2	3	6	< 5	< 2	5	7	8	7	7	NT	1	3
13	4.057	0.921	2.255	5.156	0.98	1.22	4.704	6.107	7.022	7.364	6.017	NT	1.174	2.917
14	4.1	0.84	3.3	5.5	1.0	1.4	5.0	6.3	5.3	4.9	4.7	12	1.3	3.7
15	4.1	0.91	2.5	5.2	0.94	1.1	3.7	4.3	4.1	4.6	3.4	NT	1.1	3.5
16	5.108	<2	2.88	5.876	1.104	1.554	5.164	7.124	6.848	7.112	8.558	NT	1.338	3.568
18	3.76	0.928	2.62	5.00	1.10	1.45	4.71	6.58	6.75	7.03	6.87	NT	1.23	3.45
19	4.048	1	2.59	5.74	1.21	1.45	5.23	7.48	9.07	4.64	7.4	< 0.039	1.25	4.17

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

Table 84 Summary of Participants' Sample S1 Results (continued)*

Lab. Code	PFHxS (µg/kg)	PFHxS_L (µg/kg)	PFHpS (µg/kg)	PFOS (µg/kg)	PFOS_L (µg/kg)	PFNS (µg/kg)	PFDS (µg/kg)	PFOSA µg/kg	N-MeFOSA (µg/kg)	N-MeFOSAA (µg/kg)	6:2FTS (µg/kg)	3:3FTCA (µg/kg)	ADONA (µg/kg)	9Cl-PF3ONS (µg/kg)
AV	2.27	2.25	1.42	2.22	1.76	1.25	5.49	4.37	6.9	4.87	8.4	Not Set	19.2	20.8
SV	2.24	2.24	1.36	2.24	1.77	1.33	6.30	4.48	7.16	5.37	8.06	31.3	19.6	22.3
1	2.22	2.22	1.26	2.1	1.8	1.34	5.95	NT	NT	NT	NT	NT	16.03	19.85
2	2.19	2.19	2	2.99	2.42	1.3	5.49	4.28	5.61	5.5	6.58	25	17.9	22.8
3	NR	1.98	<1	<2.00	1.18	<1	4.1	3.51	5.46	3.53	6.47	22	15.3	16.8
4	2.22	2.22	1.42	2.44	1.91	1.39	6.92	4.99	7.5	5.85	9.23	33.25	22.26	24.19
5	3.3	NT	1.3	1.7	NT	1.0	4.7	4.00	5.4	3.8	7.5	NT	17.7	NT
6	2.42	2.43	1.51	2.36	1.79	0.627	1.01	4.77	NR	NR	8.21	11.83	18.57	19.6
8	2.5	2.5	1.4	2.3	1.8	1.3	5.0	4.1	7.0	4.7	7.8	NT	NT	NT
9	2.31	2.3	1.45	2.24	1.83	1.22	6.1	4.53	9.14	5.16	10.4	28.2	21.2	21
10	NT	2.55	1.52	2.49	1.87	1.51	7.35	14.6	5.93	5.42	9.52	NT	NT	NT
11	5.242	5.242	NT	4.289	3.408	NT	NT	NT	NT	NT	NT	NT	NT	NT
12	2	2	2	2	2	< 2	9	5	8	6	9	19	22	24
13	1.953	NT	1.28	2.179	NT	1.259	5.675	4.324	NT	NT	10.077	NT	17.92	21.988
14	2.5	2.5	1.5	2.1	1.6	1.3	4.8	4.3	6.4	4.3	6.6	3.3	25	28
15	1.9	1.8	1.1	1.4	1.2	0.86	3.7	3.0	<0.5	3.8	6.8	<0.5	16.0	11.5
16	2.372	NT	1.304	2.174	1.712	1.296	5.542	<5	8.258	5.518	11.78	12.78	19.8	18.79
18	2.20	2.20	1.37	2.08	1.66	1.33	6.47	4.30	NT	NT	8.79	NT	19.4	20.7
19	2.3	NT	1.45	2.62	NT	1.32	5.11	5.23	NT	NT	8.25	NT	20.64	18.77

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

Table 85 Summary of Participants' Sample S2 Results*

Lab. Code	PFBA (µg/kg)	PFPeA (µg/kg)	PFHxA (µg/kg)	PFHpA (µg/kg)	PFOA (µg/kg)	PFNA (µg/kg)	PFDA (µg/kg)	PFDoA (µg/kg)	PFTeDA (µg/kg)	PFBS (µg/kg)	PFPeS (µg/kg)	PFHxS (µg/kg)
AV	2.93	0.959	6.03	2.16	3.84	2.52	6.94	7.21	7.92	0.858	5.21	0.840
SV	2.86	0.933	5.73	1.91	3.33	2.38	7.62	7.62	7.62	0.944	4.67	0.764
1	2.96	0.93	5.37	2.18	3.40	2.34	6.86	7.98	8.78	1.11	6.44	0.85
2	3.19	1.06	6.14	2.19	4.06	2.85	8.38	8.41	7.73	0.99	5.38	1.15
3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4	2.94	0.98	6.34	2.38	3.81	2.46	5.96	7.61	8.09	0.91	5.48	0.81
5	2.5	0.82	5.8	1.7	3.1	2.5	5.4	6.0	6.4	0.78	5.3	0.86
6	3	0.979	6.12	2.26	4.08	2.87	8.74	NR	NR	0.918	5.66	0.947
8	2.4	0.93	5.5	2.0	3.5	2.1	6.9	6.4	7.2	0.75	5.0	0.77
9	3.04	0.987	5.68	2.09	3.33	2.32	6.6	8.04	8.45	0.822	4.41	0.74
10	3.48	<1.70	6.4	2.44	4.37	2.62	6.45	6.44	8.14	0.613	5.06	NT
11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
12	3	< 2	7	2	5	3	8	9	8	1	5	< 2
13	2.395	0.95	5.282	2.181	3.677	2.031	5.777	6.817	9.965	0.802	4.909	0.761
14	3.3	0.93	6.4	2.4	4.1	2.7	7.7	5.6	5.7	0.76	4.5	0.89
15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
16	<5	<2	6.41	2.298	4.144	2.938	7.548	7.554	9.082	<1	6.036	<1
18	2.91	0.983	6.17	1.81	3.72	2.04	5.89	6.67	7.37	0.853	4.92	0.797
19	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

* AV = Assigned Value; SV = Spiked Value, NS = Not Sent, NT = Not Tested, NR = Not Reported.

Table 85 Summary of Participants' Sample S2 Results (continued)*

Lab. Code	PFHxS_L (µg/kg)	PFHpS (µg/kg)	PFOS (µg/kg)	PFOS_L (µg/kg)	PFNS (µg/kg)	PFDS (µg/kg)	PFOSA (µg/kg)	8:2FTS (µg/kg)	10:2FTS (µg/kg)	ADONA (µg/kg)	11Cl-PF3OUdS (µg/kg)
AV	0.864	1.44	1.83	1.50	1.88	3.77	3.40	6.37	7.0	12.0	21.8
SV	0.764	1.43	1.90	1.50	2.11	4.12	3.64	6.63	6.68	10.9	23.7
1	0.85	1.41	1.53	1.41	1.89	3.66	NT	NT	NT	11.49	19.07
2	1.15	1.68	2.22	1.86	2.46	3.6	3.53	7.49	NT	11	18.7
3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4	0.81	1.43	1.91	1.48	2.06	4.87	3.75	7.02	7.52	13.32	25.77
5	NT	1.2	1.2	NT	1.4	2.9	2.6	4.6	3.9	8.5	NT
6	0.957	1.51	2.09	1.51	0.867	0.772	NR	6.65	1.03	10.44	3.46
8	0.77	1.0	2.1	1.5	2.3	4.7	3.5	6.2	7.0	NT	NT
9	0.74	1.09	1.66	1.33	1.64	3.42	3.36	5.80	5.66	12.2	17.2
10	0.933	1.77	1.84	1.43	1.74	4.01	<0.122	4.66	NT	NT	NT
11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
12	< 2	2	2	2	3	6	4	8	< 9	15	34
13	NT	1.387	1.672	NT	1.599	3.201	3.278	7.692	8.05	11.431	20.668
14	0.89	1.6	1.8	1.5	2	3.2	3.4	5.4	8.2	14	32
15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
16	NT	1.5	1.924	1.532	1.76	3.452	<5	7.586	8.498	12.24	20.97
18	0.796	1.29	1.64	1.26	1.94	4.50	3.03	5.34	6.11	11.7	23.7
19	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

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

Table 86 Summary of Participants' Sample S3 Results*

Lab. Code	PFBA (µg/kg)	PFPeA (µg/kg)	PFHxA (µg/kg)	PFHpA (µg/kg)	PFOA (µg/kg)	PFNA (µg/kg)	PFDA (µg/kg)	PFUdA (µg/kg)	PFTrDA (µg/kg)	PFTeDA (µg/kg)	PFBS (µg/kg)	PFPeS (µg/kg)	PFHxS (µg/kg)	PFHxS_L (µg/kg)
AV	2.69	1.16	0.450	1.06	1.79	0.423	8.37	6.55	6.0	6.33	0.744	0.52	0.442	0.446
SV	2.94	1.22	0.784	1.17	1.77	0.491	7.85	7.84	7.84	7.84	1.07	0.675	0.587	0.587
1	3.39	1.08	0.4	1.07	1.74	0.43	8.69	6.70	3.66	7.05	0.93	0.65	0.38	0.38
2	3.32	1.34	0.48	1.15	1.86	0.45	8.75	7.18	12.4	6.54	0.8	0.47	0.6	0.6
3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4	2.32	1.12	0.47	0.95	1.85	0.4	9.17	5.47	5.07	5.48	0.71	0.45	0.42	0.42
5	2.6	0.92	0.19	0.64	1.4	0.42	7.5	7.6	2.6	4.9	0.59	0.76	0.72	NT
6	2.37	1.15	0.547	1.25	1.68	0.517	8.63	7.24	NR	NR	0.756	0.624	0.464	0.475
8	2.2	1.1	0.41	1.1	1.8	0.34	9.1	6.0	8.3	5.6	0.77	0.45	0.35	0.35
9	2.66	1.2	<0.5	1.14	1.95	0.502	8.34	6.72	5.81	7.53	0.767	<0.5	0.527	0.521
10	2.07	<1.69	0.348	0.781	1.55	0.359	7	3.95	6.89	6.4	0.608	0.339	NT	0.376
11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
12	3	< 2	< 1	< 2	< 5	< 2	6	6	5	6	< 1	< 1	< 2	< 2
13	2.486	1.167	0.467	1.037	1.587	0.311	6.969	5.576	6.874	6.609	0.657	0.424	0.33	NT
14	2.8	1.1	0.48	1.1	2.1	0.45	10	7.1	5.4	4.8	0.76	0.56	0.48	0.48
15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
16	<5	<2	<1	1.138	1.822	<1	8.176	6.504	5.068	7.652	<1	<1	<1	NT
18	3.05	1.37	0.736	1.10	2.25	0.473	10.0	7.97	8.30	7.40	0.854	0.556	0.448	0.446
19	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

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

Table 86 Summary of Participants' Sample S3 Results (continued)*

Lab. Code	PFHpS (µg/kg)	PFOS (µg/kg)	PFOS_L (µg/kg)	PFNS (µg/kg)	PFDS (µg/kg)	N-MeFOSA (µg/kg)	N-MeFOSAA (µg/kg)	N-EtFOSAA (µg/kg)	EtFOSE (µg/kg)	8:2FTS (µg/kg)	10:2FTS (µg/kg)	GenX (µg/kg)	11Cl-PF3OUdS (µg/kg)
AV	0.407	1.84	1.45	0.624	1.15	10.3	8.4	6.72	10.7	8.5	3.71	0.935	8.5
SV	0.684	1.97	1.55	0.972	1.48	11.8	9.80	7.84	11.8	9.77	3.91	1.08	10.8
1	0.43	1.68	1.56	0.69	1.27	NT	NT	NT	NT	NT	NT	22.54	7.90
2	0.42	2.23	1.79	0.55	0.65	8.36	11.2	7.11	9.06	9.05	NT	0.85	5.19
3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4	0.37	1.73	1.35	0.66	1.1	NR	7.2	5.34	9.45	8.36	NR	0.85	7.03
5	0.36	1.5	NT	0.54	0.97	9.2	8.00	7.5	8.8	6.9	2.1	NT	NT
6	0.388	2.08	1.52	0.442	0.449	NR	8.85	6.52	10.91	7.52	1.16	0.974	3.17
8	0.30	1.8	1.4	0.58	1.0	10.4	7.8	7.0	9.0	8.9	3.4	NT	NT
9	<0.5	1.98	1.56	0.622	1.32	10.5	10.3	6.52	10.7	<0.5	4.58	0.898	10.3
10	0.458	1.56	1.27	0.632	1.97	<0.073	6.69	4.66	NT	5.66	NT	0.236	NT
11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
12	<1	2	1	< 2	< 2	10	9	7	< 5	9	< 10	< 2	10
13	0.401	1.674	NT	0.624	1.017	NT	NT	NT	NT	10.767	4.091	0.889	7.919
14	0.44	2	1.5	0.72	1.5	12	8.3	8.1	14	7.7	4.7	1.1	13
15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
16	<1	1.74	1.362	<1	<2	11.338	7.4	6.88	13.5	8.184	3.22	<2	8.818
18	0.478	2.02	1.57	0.784	1.52	NT	NT	NT	NT	10.9	3.73	1.00	10.4
19	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

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

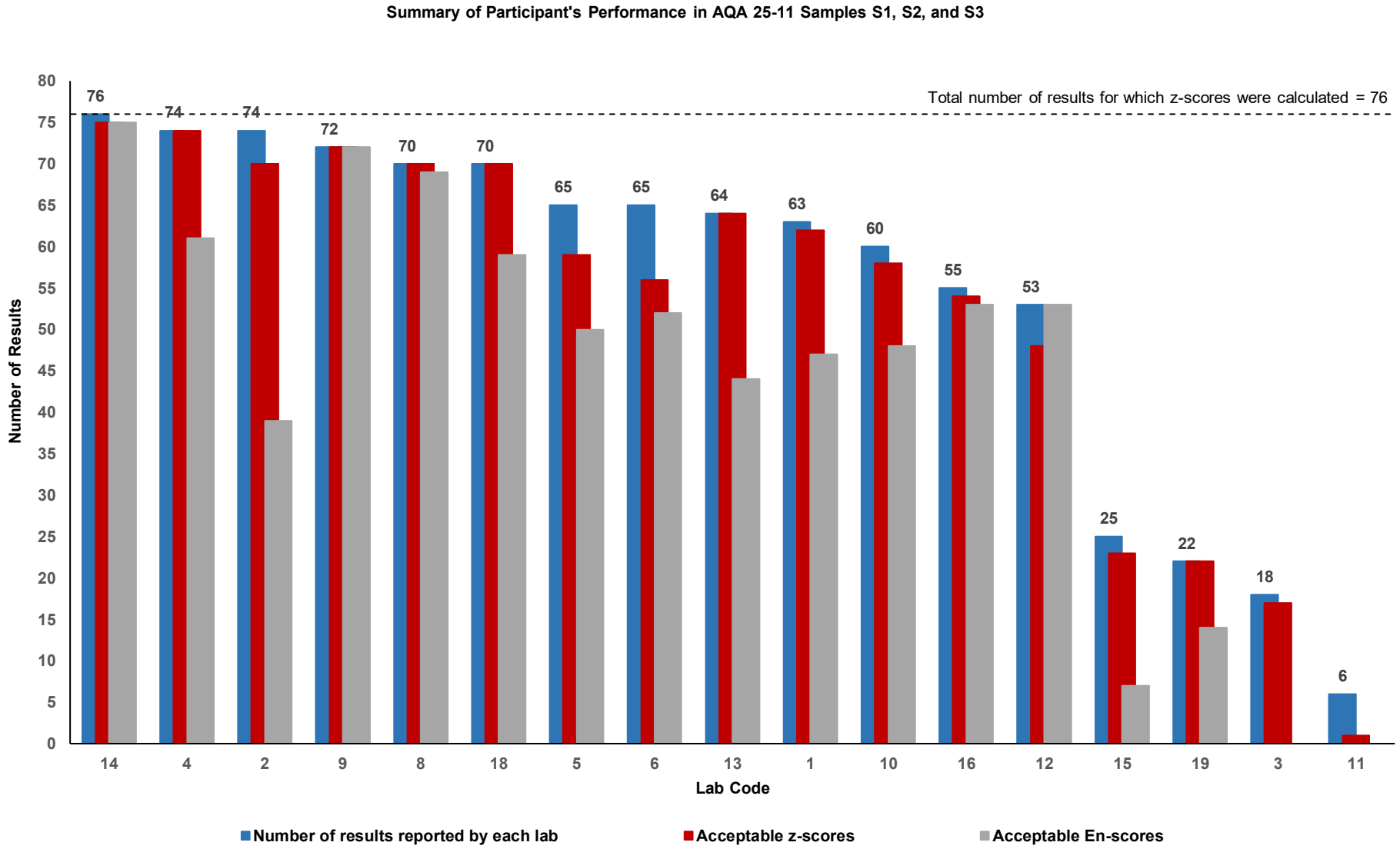


Figure 85 Summary of Participants' Performance

6.5 Summary of Participants' Results and Performances

Summaries of participants' results and performances are presented in Tables 84 to 86, and Figure 85.

Thirteen participants analysed all three matrices. Of these 13 participants, 5 returned acceptable z-scores for all scored reported results: Laboratories **4** (74), **8** (70), **9** (72), **13** (64), and **18** (70).

Laboratory **14** reported numeric results for all 78 spiked analytes across the three samples. They also returned the highest number of satisfactory z-scores, 75.

Four participants analysed Sample S1 Fish paste only. All scored numeric results (22) reported by Laboratory **19** in S1 returned acceptable z-scores.

Nine participants (Laboratories **3, 4, 5, 6, 9, 10, 12, 15** and **19**) did not report numeric results for analytes that they tested for and were spiked into the samples.

Seven participants reported analytes that were not spiked into the samples.

PFOA, PFNA, and PFOS in S1 were tested for by all participants

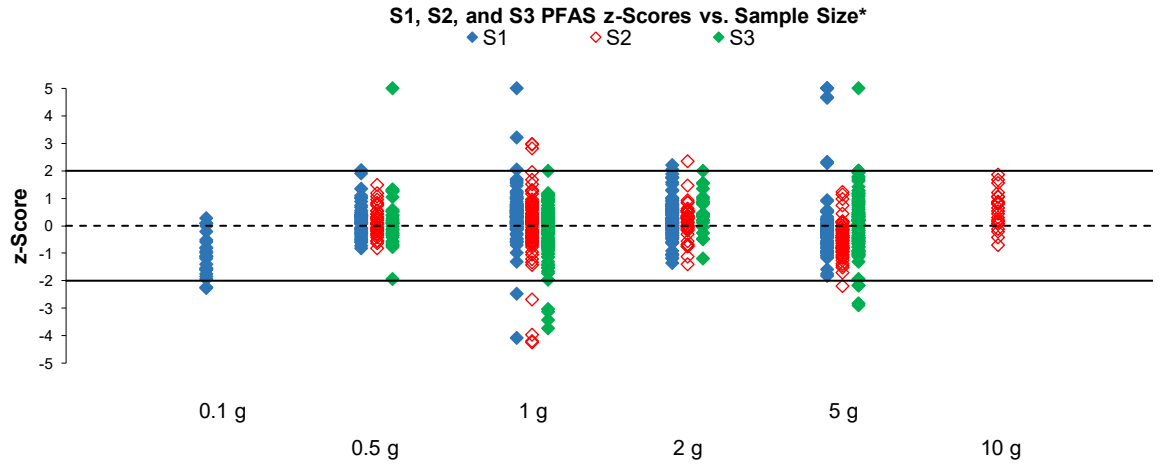
6.6 Participants' Results and Analytical Methods

Sample S1 was fish paste, Sample S2 was fruit puree while Sample S3 was infant formula. With the exception of sample size, all participants followed the same analysis procedure across all three matrices, except for two laboratories, Laboratories 6 and 4. The method descriptions provided by participants for PFAS measurements are presented in Appendix 6.

Overall, the between-laboratory coefficients of variation for PFAS analytes in Sample S3 were higher than those observed in S1 and S2, indicating that PFAS measurements in the infant formula sample posed greater challenges for participants compared to the fish paste and fruit puree samples. Additionally, the ratios of assigned values to spiked values for analytes in infant formula were generally lower than those for fish and fruit.

Extraction

Laboratory 18 reported adding 5 mL of reagent water acidified with 150 µL of formic acid to Sample S1, and 15 mL of reagent water acidified with 150 µL of formic acid to Samples S2 and S3 before extraction. Laboratory 14 also reported adding 4 mL of reagent water to Sample S3 before extraction. Overall, these laboratories recovered a higher percentage of the spiked analytes in the infant formula sample S3 than most other laboratories.



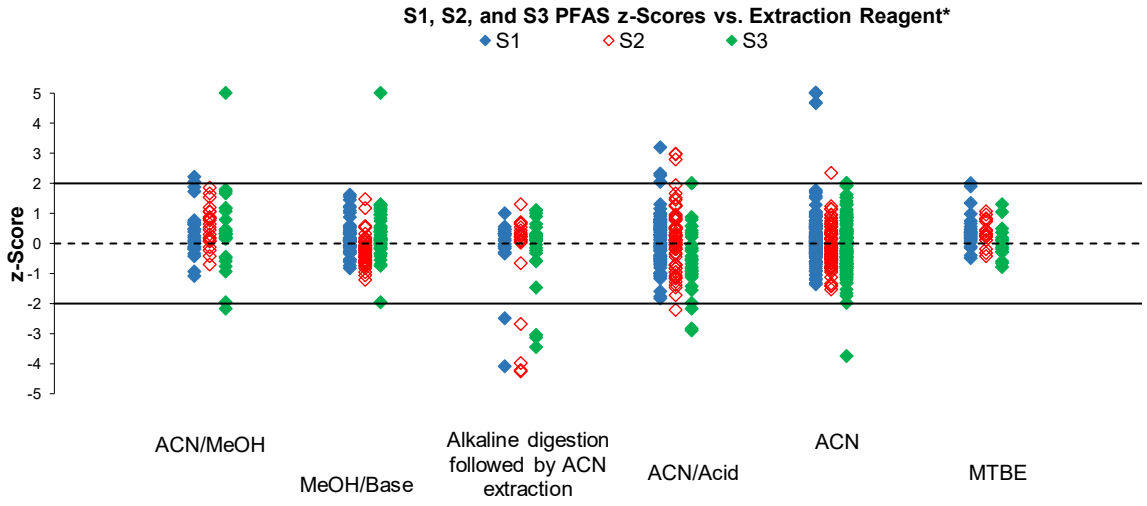
* Scores greater than 5 or smaller than -5 have been plotted as 5 and -5 respectively.

Figure 86 S1, S2, and S3 PFAS z-Scores vs Sample Size

Laboratories used a wide range of sample sizes, from 0.1 g to 10 g. Plots of participants' performance in the three study samples versus the amount of sample taken for analysis are presented in Figure 86. Results from a small sample size of 0.1 g were biased low. Caution should be exercised when a small sample size is taken for analysis, as it might not be representative of the whole sample.

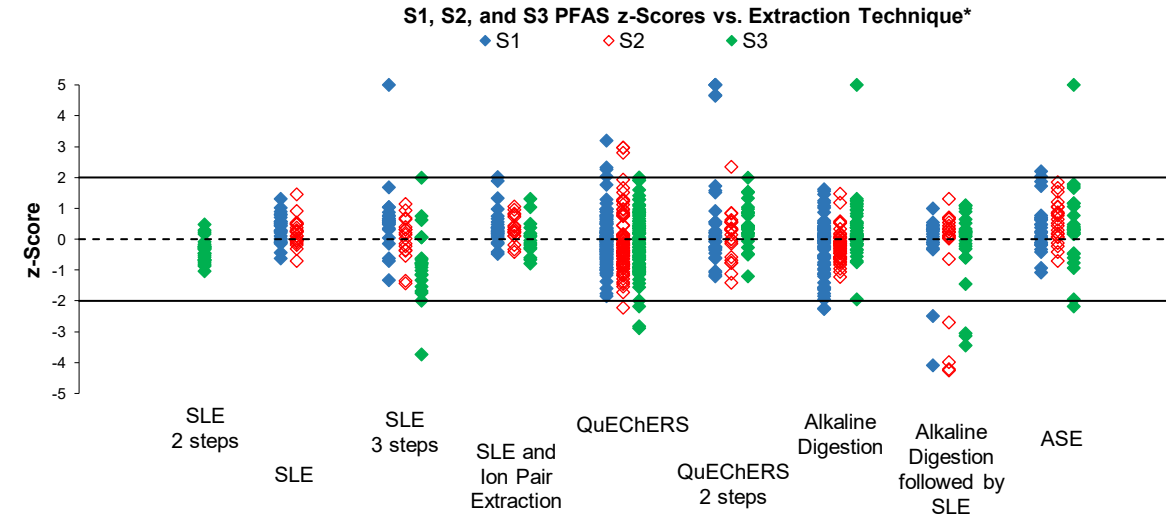
Of the 17 participants who reported results for at least one of the three samples, 14 reported adding labelled standards before extraction. The results reported by Laboratories 3, 13 and 15 were biased low. Not performing a standards recovery correction or not adding standards before extraction to adjust for errors that might be introduced during sample preparation, may explain this bias (Figure 80).

Acetonitrile or modified acetonitrile were the preferred extraction reagents. Three laboratories reported using acidified acetonitrile; the results reported by them in the infant formula samples appear to be slightly biased low (Figure 87). Laboratory 6 reported performing an alkaline digestion (200 mM NaOH in methanol) followed by extraction with acetonitrile. All results from this laboratory that returned an unacceptable z-score were biased low.



* Scores greater than 5 or smaller than -5 have been plotted as 5 and -5 respectively.

Figure 87 S1, S2, and S3 PFAS z-Scores vs Extraction Reagent



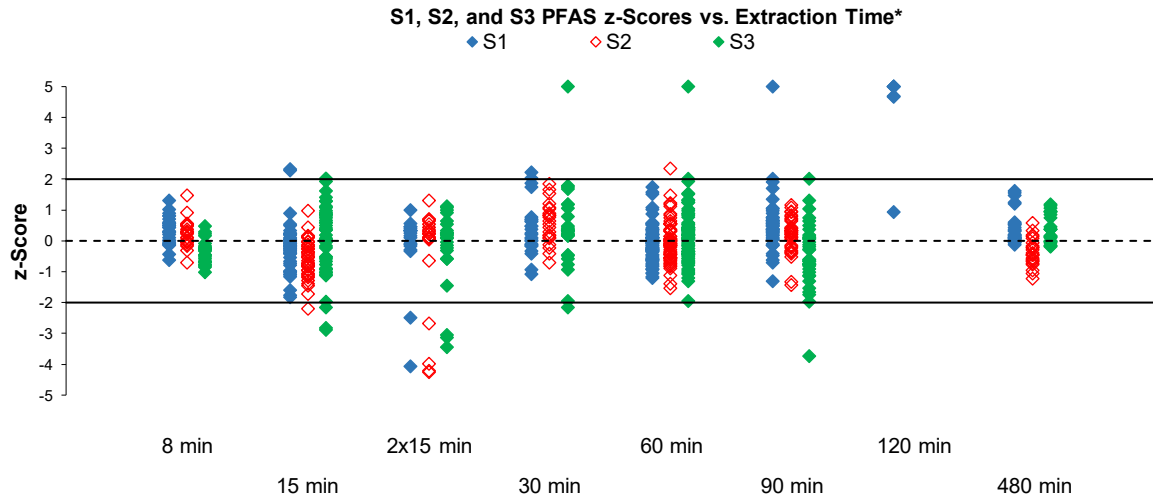
* Scores greater than 5 or smaller than -5 have been plotted as 5 and -5 respectively.

Figure 88 S1, S2, and S3 PFAS z-Scores vs Extraction Technique

Participants used a wide variety of extraction procedures based on solid-liquid extraction (SLE), alkaline digestion, Quick, Easy, Cheap, Effective, Rugged, and Safe extraction (QuEChERS), or accelerated solvent extraction (ASE). The use of mass labelled standards played a significant role in correcting the difference between these in-house analytical methods. There was no obvious trend between laboratories' performance and the extraction technique used (Figure 88).

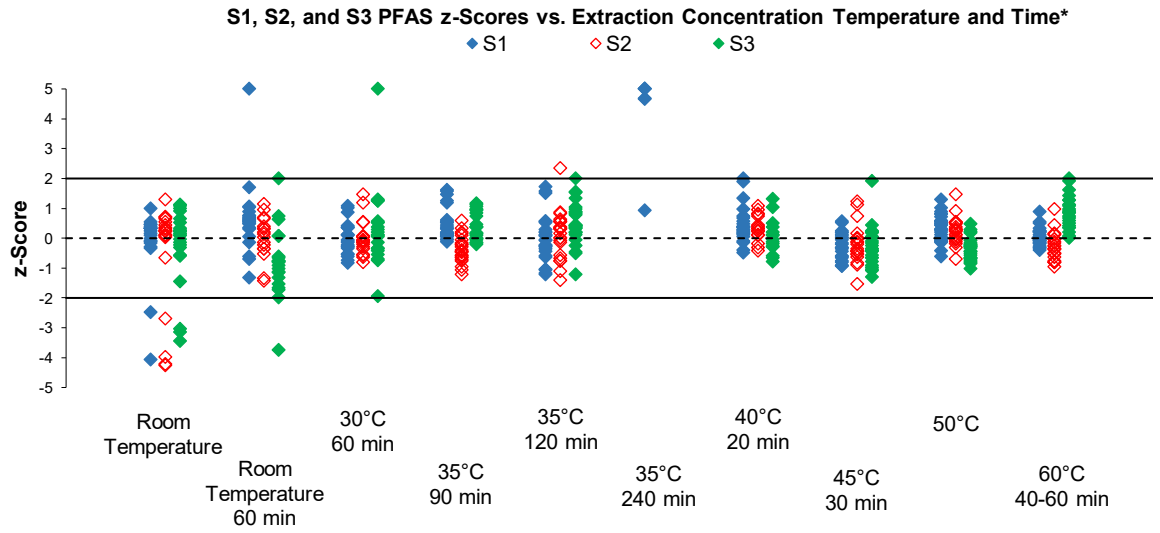
Three participants performed staggered extractions in 2 or 3 steps for all the samples they analysed, whereas Laboratory 4 applied a staggered extraction only to the infant formula sample. There was no apparent difference in performance between participants who used staggered extraction and those who did not.

Laboratories reported extraction times ranging from 8 to 480 minutes. A discrepancy may exist between the results for infant formula sample extracted for 8 minutes and those extracted for 480 minutes (Figure 89).



* Scores greater than 5 or smaller than -5 have been plotted as 5 and -5 respectively.

Figure 89 S1, S2, and S3 PFAS z-Scores vs Extraction Time

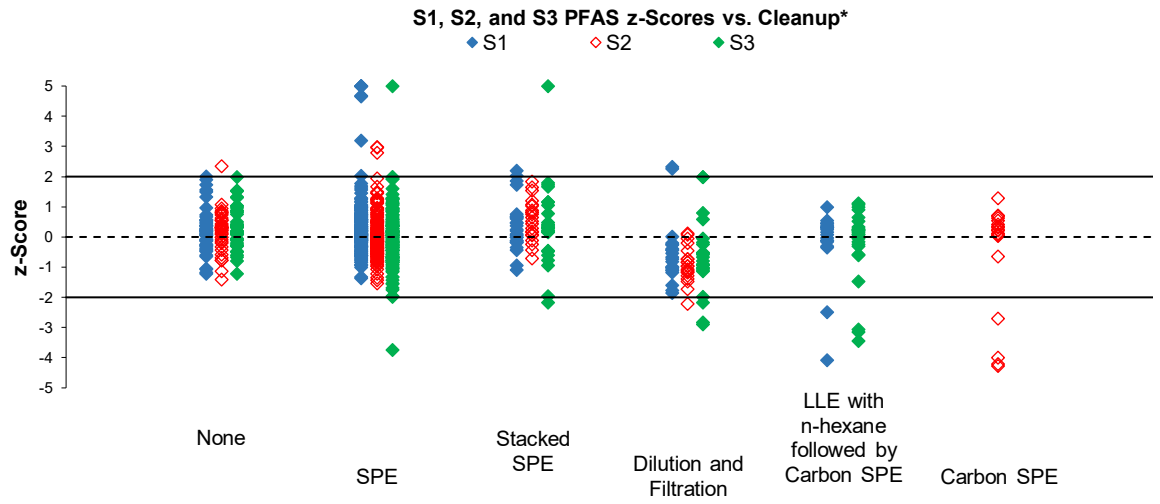


* Scores greater than 5 or smaller than -5 have been plotted as 5 and -5 respectively.

Figure 90 S1, S2, and S3 PFAS z-Scores vs Extraction Concentration Time and Extraction Concentration Temperature

Laboratories reported concentrating the extract for 20 to 240 min. The majority of laboratories however performed concentration for 60 minutes. They also reported concentrating the extract at room temperature or at temperatures between 30°C to 60°C (Figure 90). According to the USEPA Method 1633, if all methanol is evaporated then the extract can be too concentrated and/or losses of neutral compounds can occur (FOSEs and FOSAs). Alternatively, if excess methanol is present in the sample extract loaded onto the SPE column, the long-chain carboxylic acids and sulfonates are likely to have poor recovery.[5]

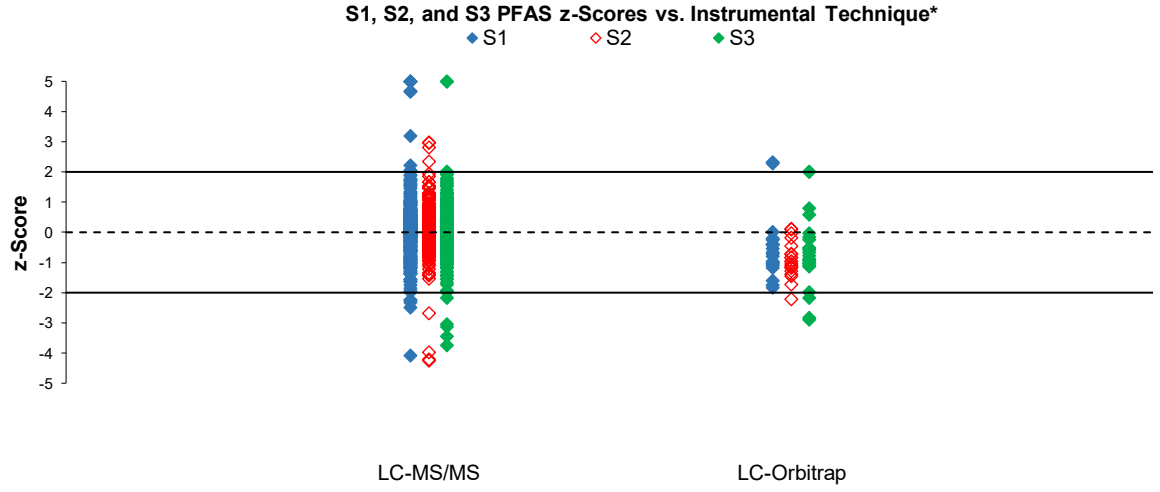
Cleanup of the crude extracts is an important step in the removal of matrix constituents that may interfere in instrumental determination. Of 17 laboratories, two did not cleanup after extraction (Figure 91).



* Scores greater than 5 or smaller than -5 have been plotted as 5 and -5 respectively.

Figure 91 S1, S2 and S3 PFAS z-Scores vs Extraction Cleanup Procedure

Laboratory 18 achieved overall the highest recovery of spiked analytes in the infant formula sample (S3). Their method involved weighing 5 g of sample and adding the internal standard prior to extraction, allowing it to equilibrate for 30–60 minutes. The sample was then reconstituted with 15 mL of reagent water acidified with 150 µL of formic acid before extraction. A QuEChERS extraction was performed over 15 minutes, followed by carbon clean-up. The extract was further concentrated at 60 °C for 40–60 minutes and then cleaned-up using SPE with NH_4OH/MeOH as the elution solvent**.**



* Scores greater than 5 or smaller than -5 have been plotted as 5 and -5 respectively.

Figure 92 Participants' Performance for PFAS in S1, S2 and S3 vs Instrumental Technique

Instrumental Technique

The analytical detection method of choice was LC-MS/MS (Figure 92). With one exception, all participants reported using LC-MS/MS for PFAS measurements. Laboratory 5, however, used the LC-Orbitrap instrumental technique.

6.6.1 Individual PFCA Analytes

PFODA, PFDoA, PFTrDA, PFTeDA were the analytes that challenged most participants' analytical techniques. PFDoA, PFTrDA, PFTeDA levels were similar to each other and comparable across the three study samples, ranging from 6.0 µg/kg to 7.92 µg/kg. However, measurements of PFDoA and PFTeDA in fish paste Sample S1 challenged more participants' analytical techniques than in the fruit puree Sample S2 and infant formula Sample S3. The between-laboratory CV for these two analytes in S1 was significantly larger than in S2 and S3, at 24% and 29% respectively (Table 83).
Figure 93 presents plots of participants' z-scores for PFDoA and PFTeDA in S1 versus the extraction reagent used. No trends were evident between the overall PFDoA and PFTeDA results and reagents used.

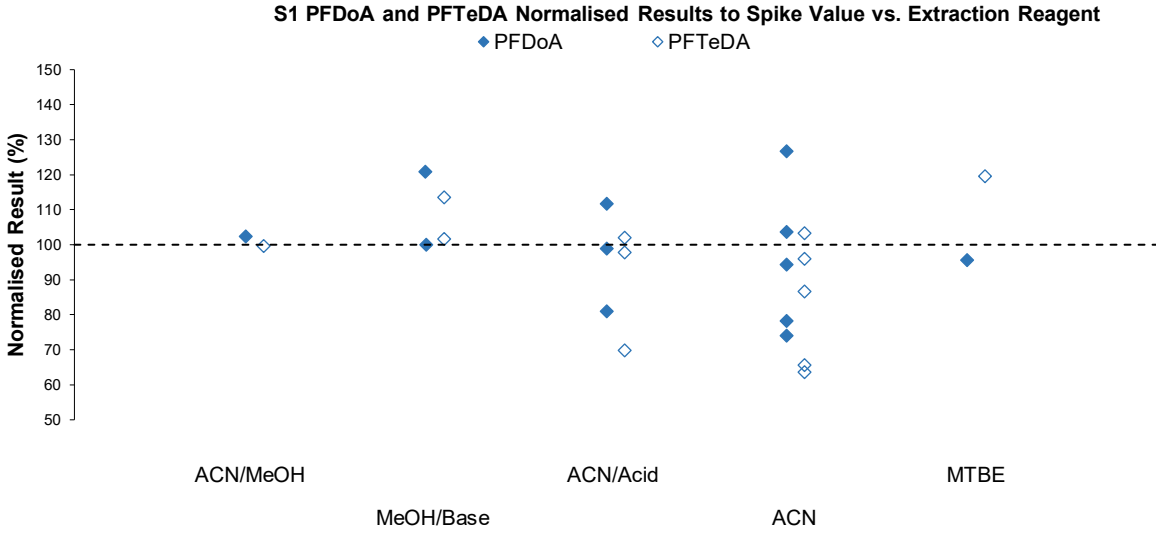


Figure 93 Participants' Results for PFDoA and PFTeDA Normalised Results to Spike Value vs. Extraction Reagent

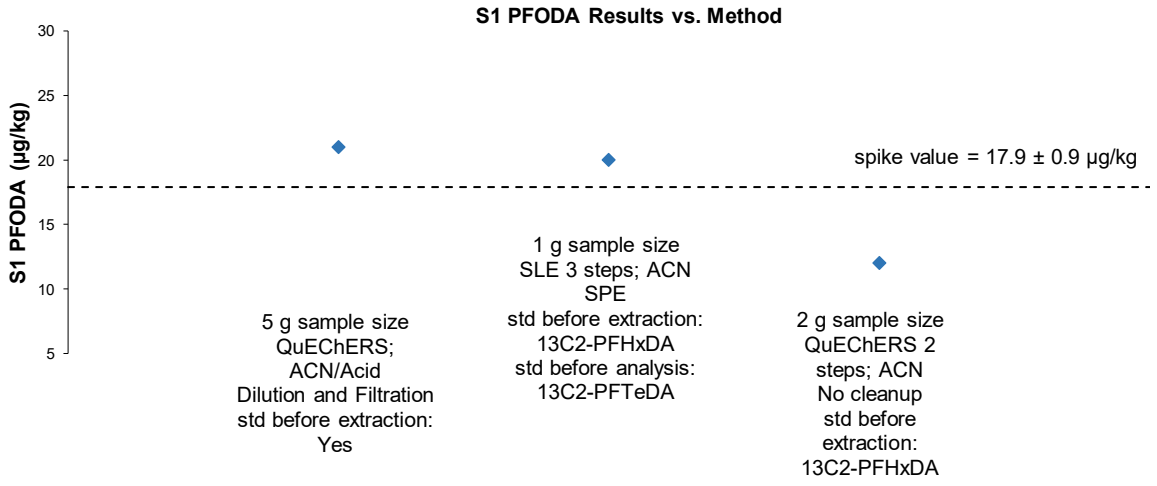


Figure 94 S1 PFODA Results vs. Method

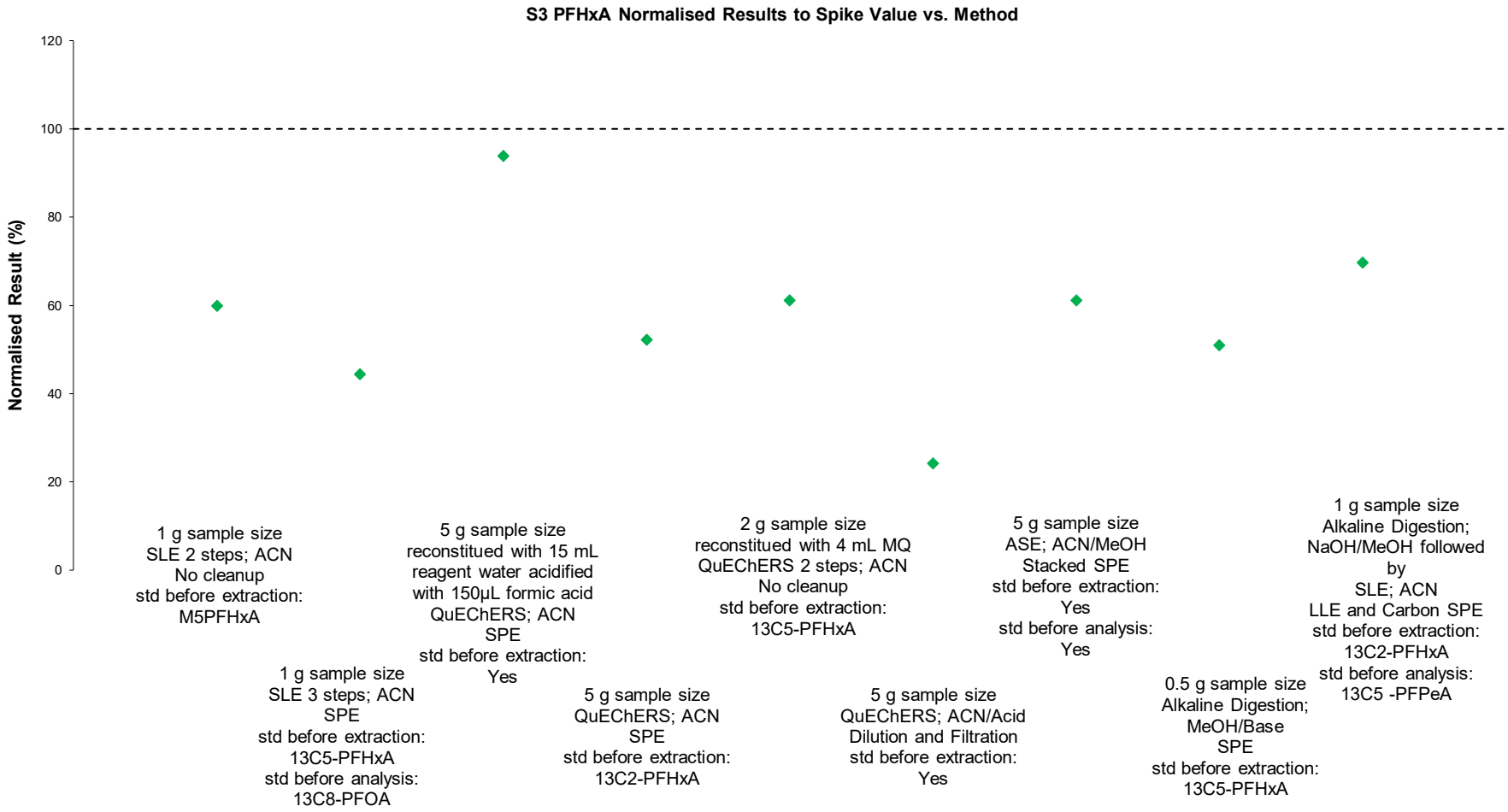


Figure 95 S3 PFHxA Normalised Results to Spike Value Versus Method

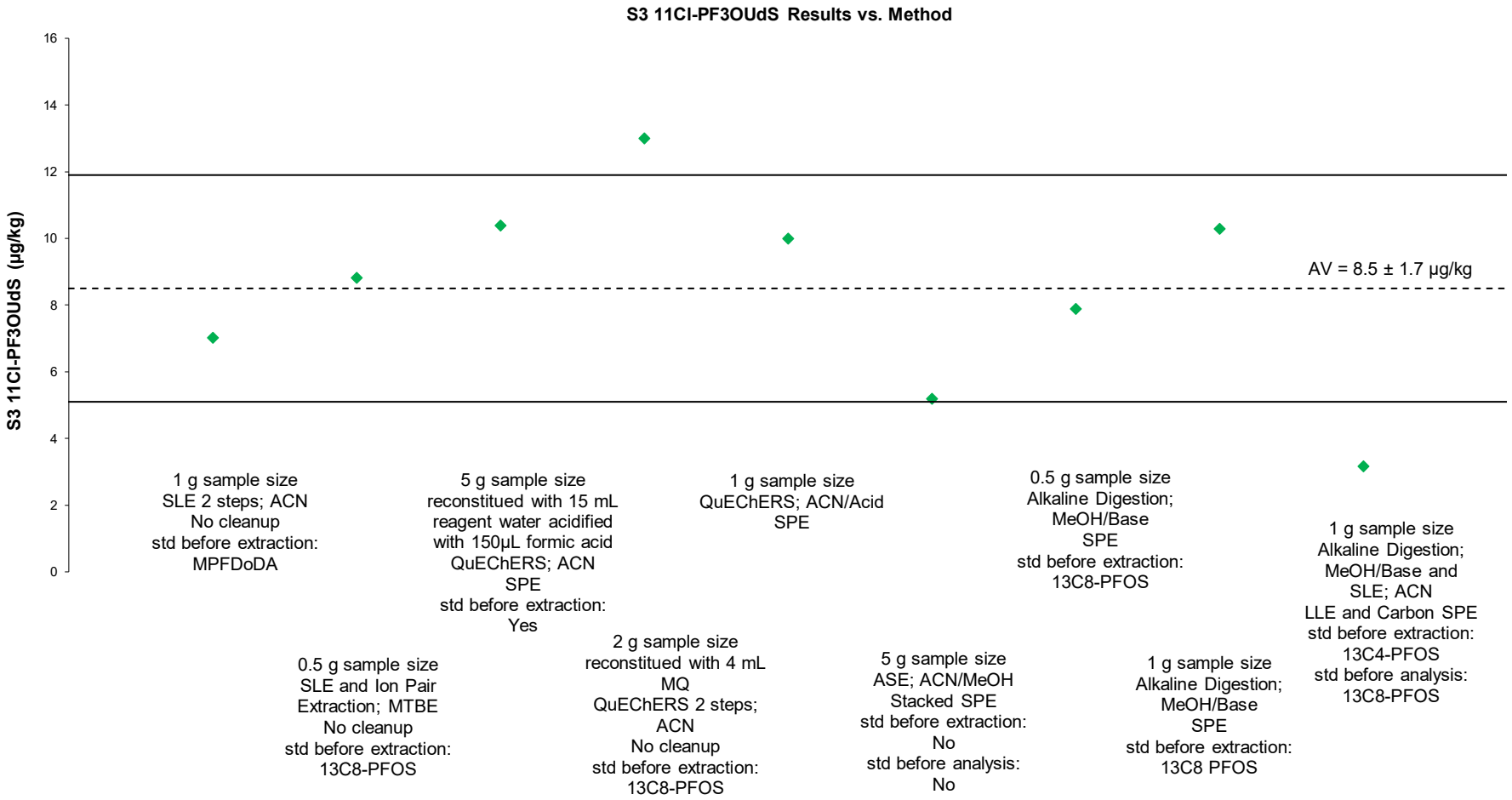


Figure 96 S3 11Cl-PF3OUdS Results Versus Method

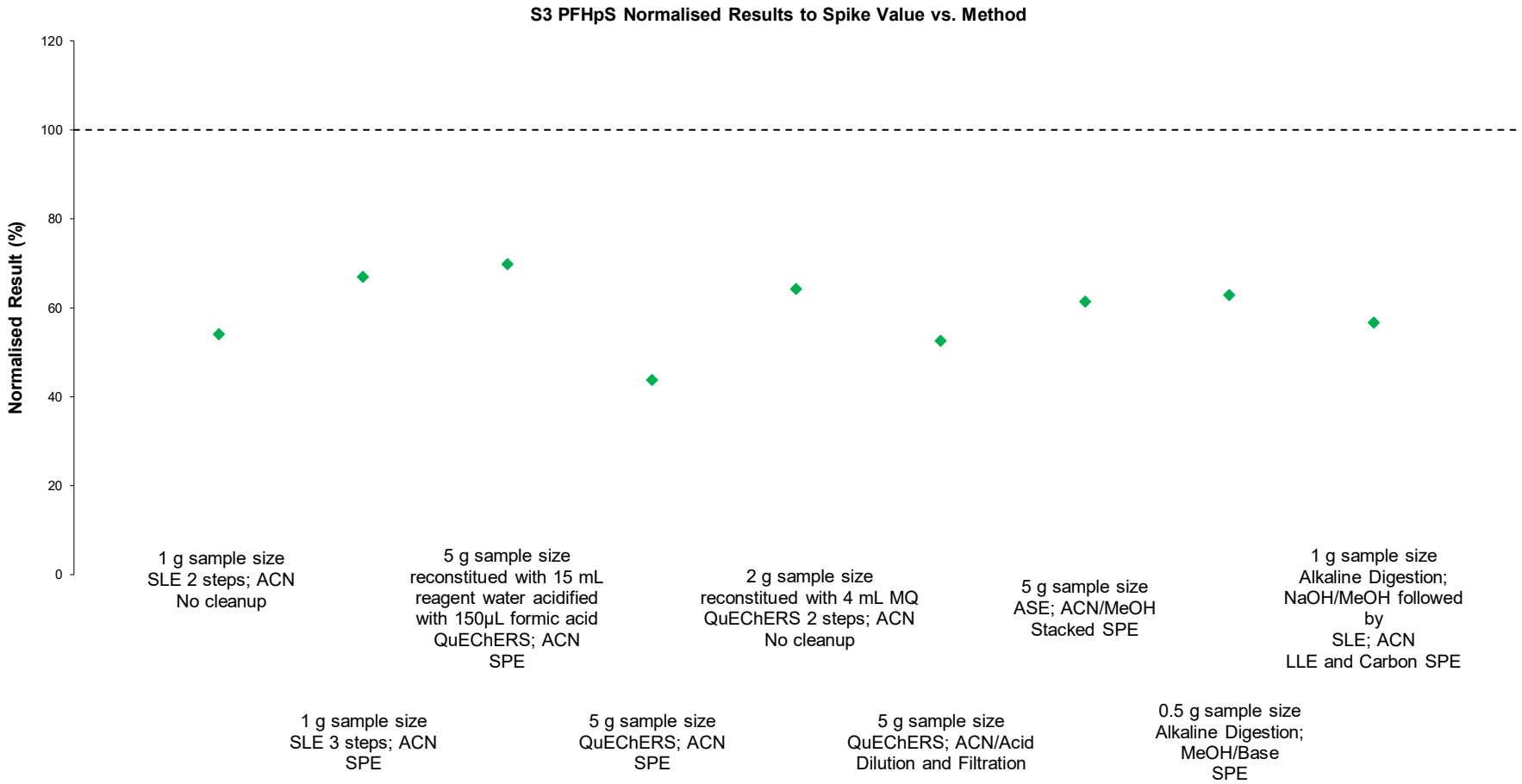


Figure 97 S3 PFHpS Results Versus Method

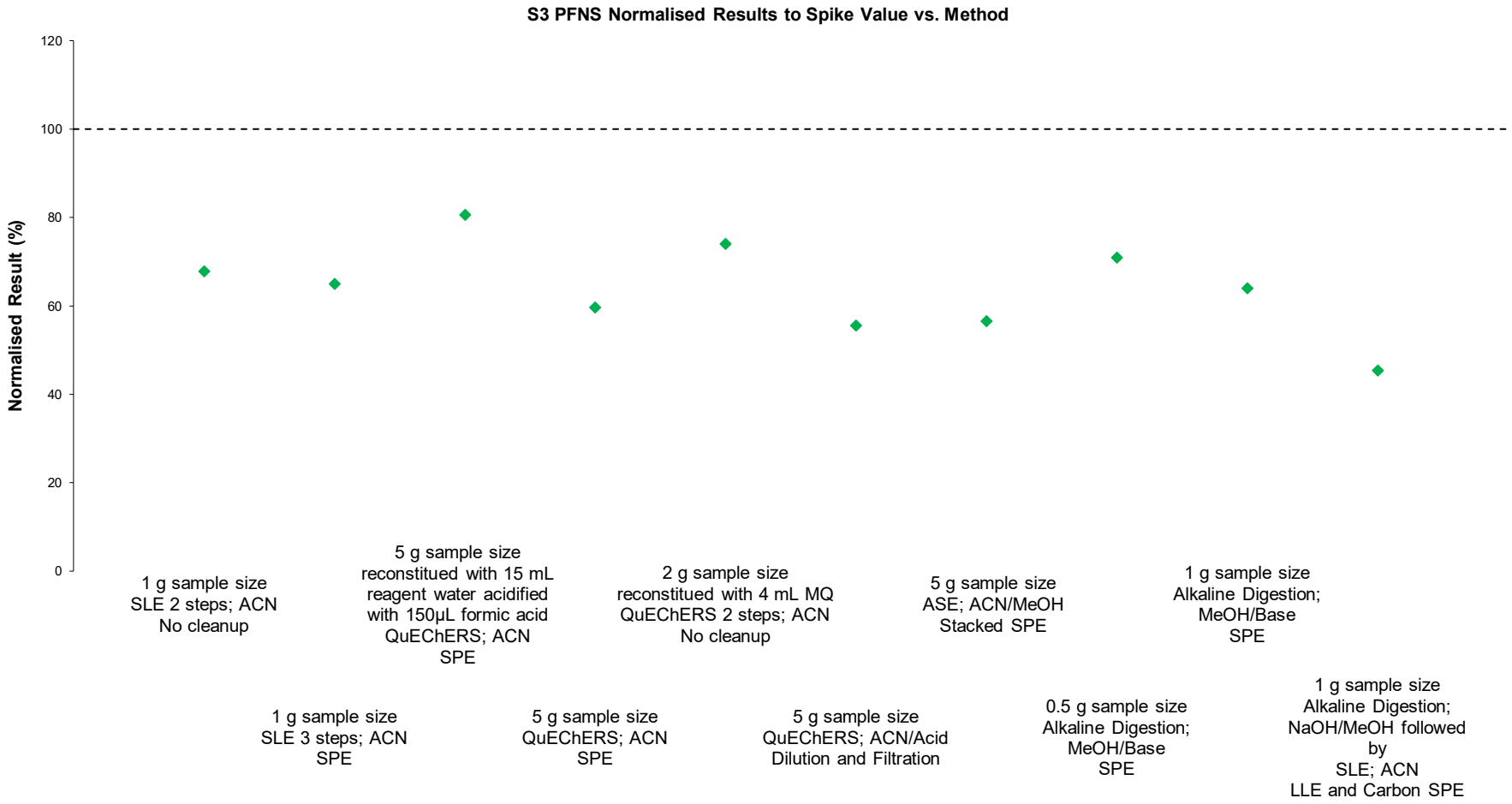


Figure 98 S3 PFNS Results Versus Method

PFODA is not in the analytical suite of many laboratories; only four participants reported results for this analyte in Sample S1. These results were in good agreement with each other and with the spiked value of 17.9 µg/kg. One laboratory reported a result below its reporting limit (0.039 µg/kg) and should review its methodology, as PFODA can be lost from extracts depending on solvent composition.

The method employed by participants for PFODA measurements in S1 is presented in Figure 94.

PFHxA results reported by participants in S3 were in excellent agreement with each other, the between-laboratory CV was 15%, However, the consensus value of participants results (assigned value) was only 57% of the spiked amount for this analyte. The PFHxA mass fraction in S3 was significantly lower than in Samples S1 and S2, which may have contributed to the overall low recoveries. The combination of a larger sample size and sample reconstitution may explain the better recovery achieved by laboratory 18 (94%).

Figure 95 presents PFHxA results normalized to the spiked value versus the methods employed.

6.6.2 Individual PFECA and PFESA Analytes

ADONA and GenX were first introduced in a NMIA PT study for PFAS in food in 2019. While most participants reported results for ADONA in S1 and S2, only eight reported GenX results in the infant formula sample (S3). Reported values for these analytes across the three study samples were in excellent agreement, with a between-laboratory CV of approximately 15%.

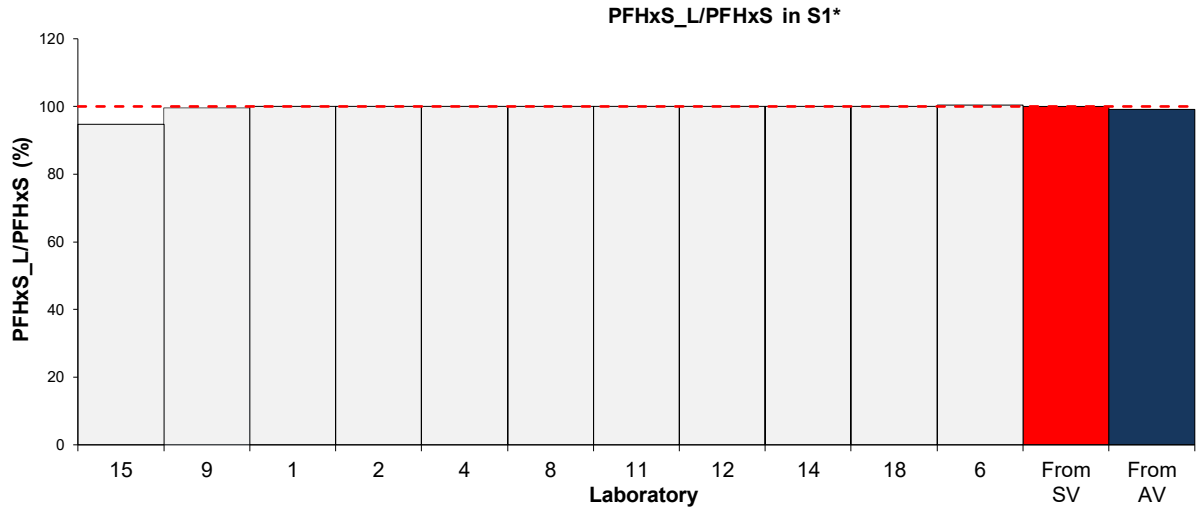
11Cl-PF3OUdS Plots of participants results 11Cl-PF3OUdS in S3 versus the method used are presented in Figure 96. 11Cl-PF3OUdS level in the infant formula sample was much lower than in the fruit puree samples. Increasing the sample size could effectively lower the method detection limit by increasing the amount of analyte extracted and its concentration in the final extract, thereby improving quantification in complex food matrices.

6.6.3 Individual PFSA Analytes

PFHpS and PFNS mass fraction in S3 was significantly lower than in Samples S1 and S2. As for PFHxA Laboratory 18 recovered the highest percentage of the spiked analytes in the infant formula sample S3 than most other laboratories. The combination of a larger sample size and sample reconstitution may also explain the better recovery achieved by them (Figures 97 and 98).

PFHxS and PFOS 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 isomer only) results.

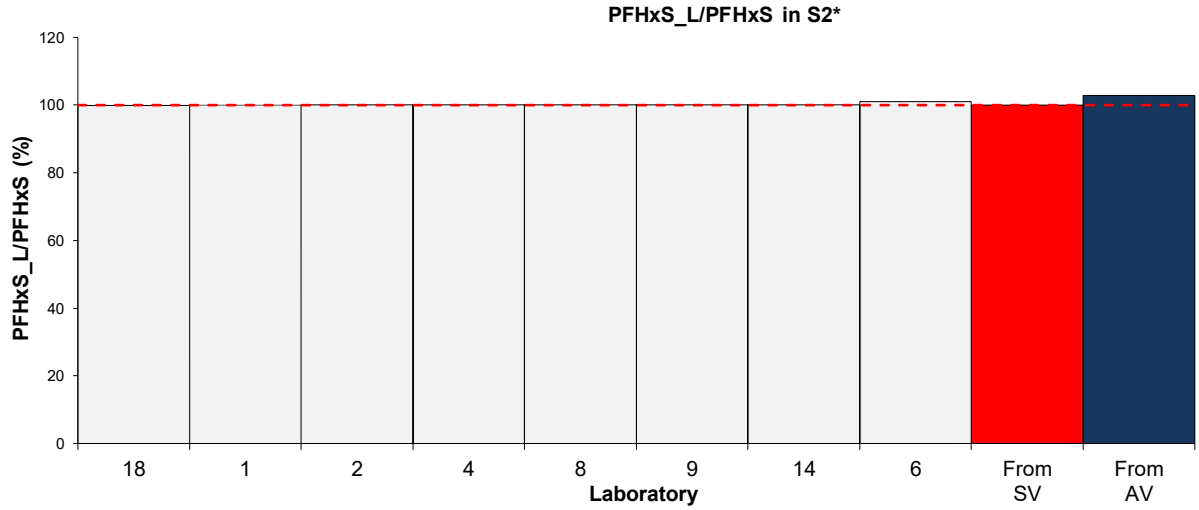
In Sample S1 the assigned value ratio between the two isomers was 99%. 11 participants reported results for both total and linear PFHxS, the ratios of linear PFHxS versus total PFHxS were between 95% and 100% (Figure 99).



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

Figure 99 Bar Charts of PFHxS_L/PFHxS in S1

The fruit puree sample S2 was spiked with linear PFHxS; the ratio of linear PFHxS to total was expected to be 100% for this sample.



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

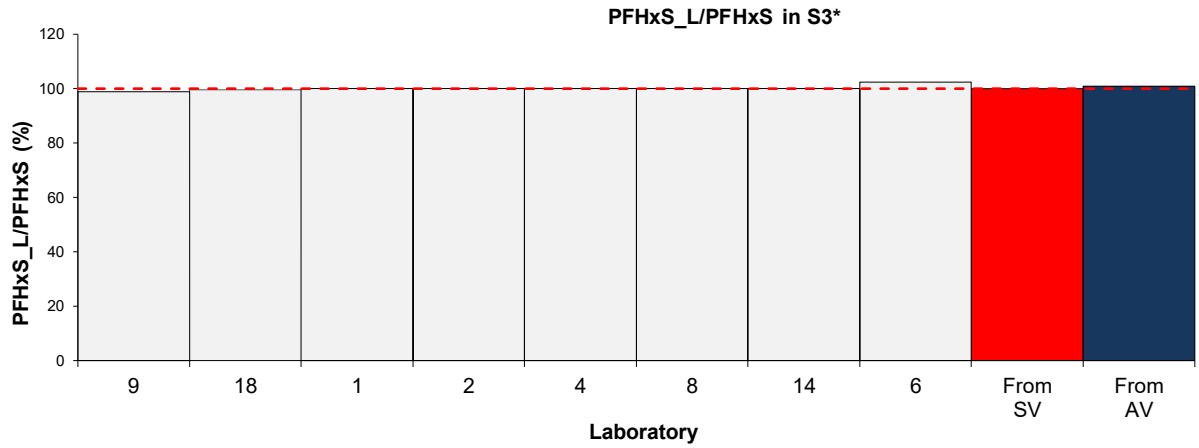
Figure 100 Bar Charts of PFHxS_L/PFHxS in S2

Eight participants reported results for both PFHxS (total) and PFHxS (linear) in Samples S2 and S3. For all participants, the ratio of linear to total PFHxS was either 100% or close to this value (Figurea 100 and 101).

The three study samples were spiked with a PFOS standard containing both linear and branched isomers. The expected ratio of linear PFOS to total PFOS after spiking was 79% for Samples S1 and S3 and 82% for Sample S2.

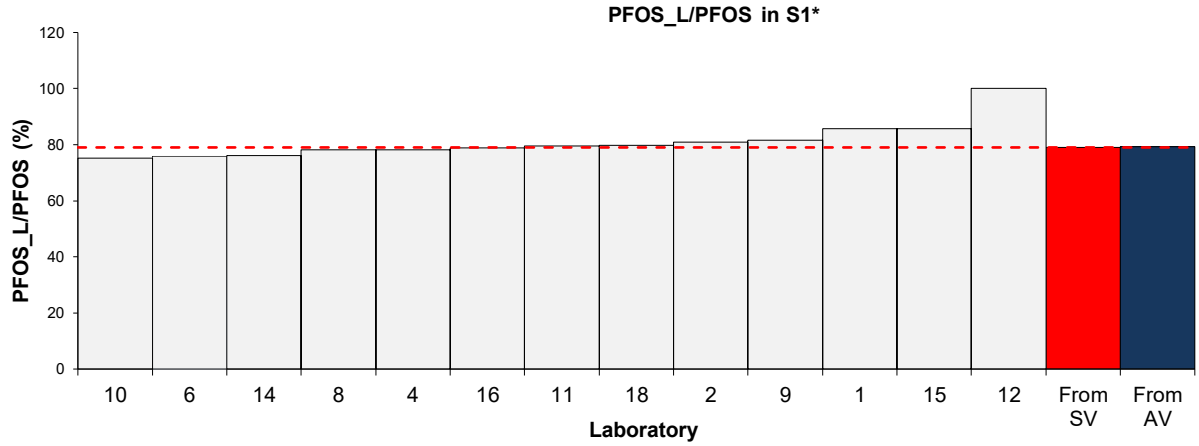
The reported ratios of linear PFOS versus total PFOS in S1 were between 75% and 100% (Figure 102), in S2 between 71% and 100% (Figure 103) and in S3 between 50% and 93% (Figure 104).

When a laboratory is using 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.[12]



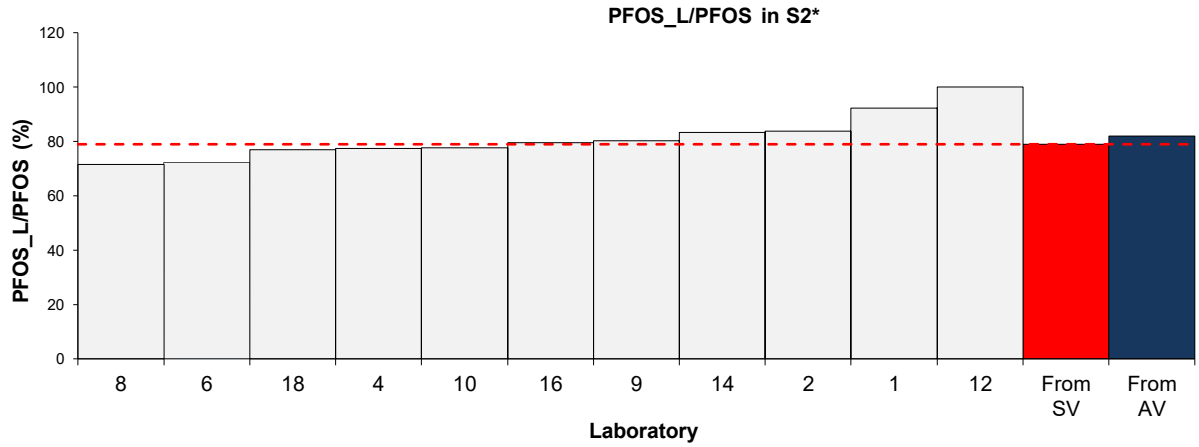
*The ratio from the AV is calculated based on the results reported by all participants including those who reported results for only one analyte

Figure 101 Bar Charts of PFHxS_L/PFHxS in S3



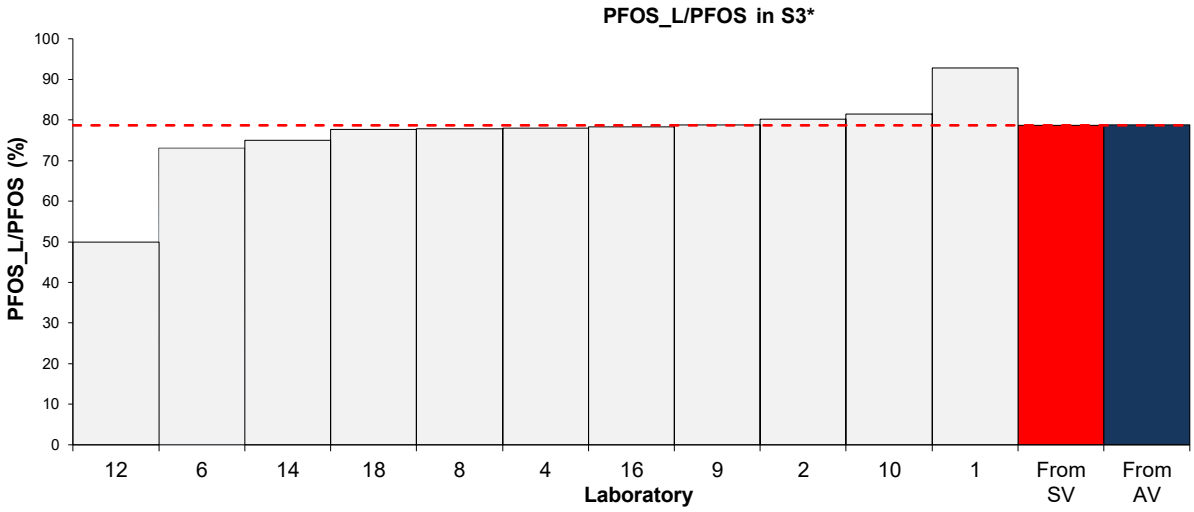
*The ratio from the AV is calculated based on the results reported by all participants including those who reported results for only one analyte

Figure 102 Bar Charts of PFOS_L/PFOS 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 103 Bar Charts of PFOS_L/PFOS 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 of PFOS_L/PFOS in S3

6.6.4 Individual PFAA Precursors or Related Compounds

10:2FTS measurements in S3 challenged participants' analytical techniques. Only 8 laboratories reported results. The between-laboratory CV was 26%, larger than 22% predicted by Thompson and Horwitz.

The telomer sulfonates are referenced to their $^{13}C_2$ labelled isotope dilution analogue (labelled internal standard added before extraction). The product ions of the telomer sulfonate dilution analogues would contain a small contribution from the 34S analogue of the native sulfonates if a correction equation is not used. [12]

Figure 105 presents plots of participants' results reported for 10:2FTS in S3 versus the labelled internal standard added before extraction. Two participants reported adding labelled internal standard before extraction without mentioning the standard. One laboratory added MPFDoDA as internal standard but did not report a result No laboratory reported adding a labelled internal standard before instrumental determination.

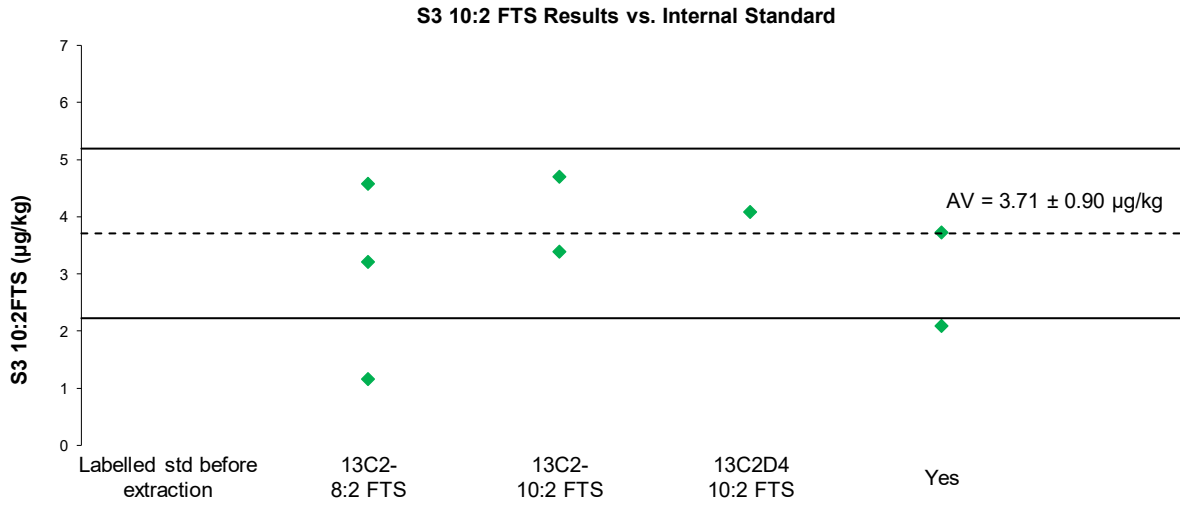


Figure 105 S3 10:2FTS Results vs Internal Standard

3:3FTCA is an important analyte as it is a major degradation product of fluorotelomer-based compounds, particularly 6:2 and 8:2 fluorotelomer alcohols and possibly 4:2 fluorotelomer sulfonates. This is the first time that this test has been introduced in a NMIA PT study in food. Eight laboratories reported results for this test in S1 and no assigned value could be set because the results were too variable. The zwitterionic PFAS can be expected to sorb matrices more strongly than anionic PFAS, but less strongly than cationic PFAS, owing to the mixed charges to the functional group. Without labelled FTCAs standards being commercially available, recovery of these analytes cannot be determined easily. Figure 106 presents plots of participants' results reported for 3:3FTCA versus the method used.

6.7 Effects of Sample Matrix

The samples in this study were spiked fish paste (Sample S1), fruit puree (Sample S2) and infant formula (Sample S3). A summary of the results reported, and *z*-scores obtained by matrix is presented in Table 87.

For this study, the proportion of numeric results reported by participants for fruit puree was only slightly higher when compared to fish paste and infant formula. Participants performance was comparable between the three matrices, with at least 95% of calculated z-scores being acceptable. However, the between-laboratory coefficients of variation for PFAS analytes in Sample S3 were notably higher than those observed in Samples S1 and S2. This suggests that participants found it more challenging to measure PFAS in the infant formula sample compared to the fish paste and fruit puree samples.

Table 87 Result Comparison by Matrix

Sample	Matrix	Expected Number of Results	Numeric Results Reported	*z*-Scores Calculated	Acceptable *z*-Scores
S1	Fish paste	476	389 (82%)	377	359 (95%)
S2	Fruit puree	299	269 (90%)	269	260 (97%)
S3	Infant formula	351	286 (81%)	286	276 (97%)

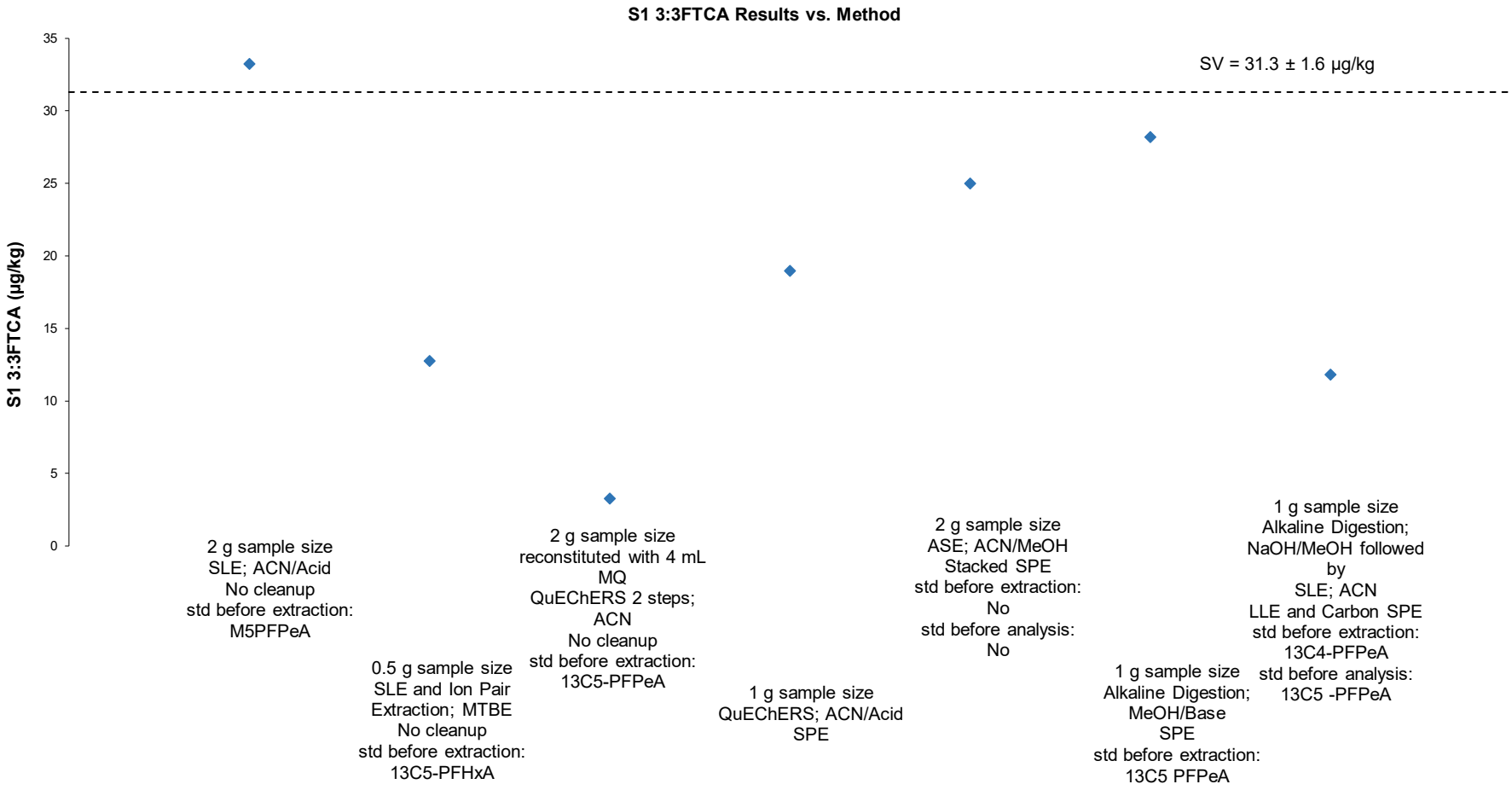


Figure 106 S1 3:3FTCA Results Versus Method

6.8 PFAS in Food Trigger Points

There are currently no maximum regulatory limits in Australia for PFAS contaminants in food. However, Food Standards Australia New Zealand (FSANZ) has proposed non-regulatory 'trigger points' in a variety of food products for three common PFAS compounds (PFOA, PFHxS, and PFOS) based on food consumption rates and set tolerable daily intakes for these analytes.[13]

To support laboratories to assess how they perform around the regulatory guidelines during the proficiency test, the study samples were spiked at levels close to trigger points for investigation as proposed by FSANZ The assigned values in this study and relevant FSANZ trigger points are given in Table 88.

Table 88 Spike Values, Assigned Values, and FSANZ Trigger Points for PFOA, PFHxS, and PFOS

Sample		S1	S2	S3
Matrix		Fish Paste	Fruit Puree	Infant Formula*
Classification		Finfish	Fruit	Cattle Milk
PFOA (µg/kg)	Spike Value	0.938 ± 0.047	3.33 ± 0.17	1.77 ± 0.12
	Assigned Value	1.05 ± 0.08	3.84 ± 0.34	1.79 ± 0.18
	Trigger Point	41	5.1	2.8
PFHxS (µg/kg)	Spike Value	2.24 ± 0.11	0.764 ± 0.038	0.587 ± 0.041
	Assigned Value	2.27 ± 0.16	0.840 ± 0.071	0.442 ± 0.078
	Trigger Point	5.2	0.6	0.4
PFOS (µg/kg)	Spike Value	2.24 ± 0.11	1.90 ± 0.10	1.97 ± 0.14
	Assigned Value	2.22 ± 0.20	1.83 ± 0.19	1.84 ± 0.17
	Trigger Point	5.2	0.6	0.4

*Infant Formula has been classified as cattle milk by NMI for the purposes of providing trigger points.

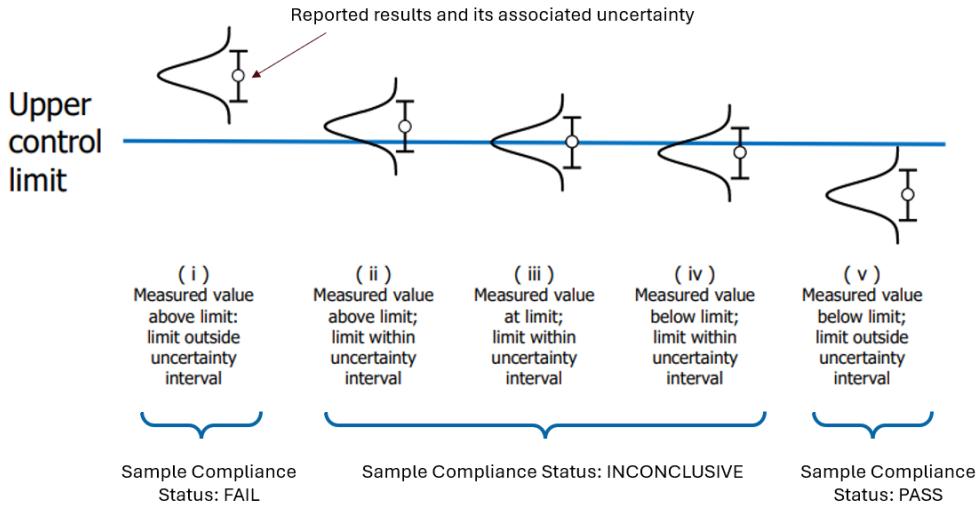


Image adapted from: Eurachem/CITAC Guide Use of Uncertainty Information in Compliance Assessment

Figure 107 Assessment of Compliance with an Upper Limit

When a test result is used to determine whether a sample complies with an upper control limit, the measurement uncertainty of that result is critical. ISO/IEC 17025 defines a decision rule

for such assessments as "a rule that describes how measurement uncertainty is considered when declaring conformity with specified requirements."[9] To determine whether a sample meets a regulatory limit, considering the reported result and its associated uncertainty, decision rules generally provide three possible outcomes: Pass, Fail, or Inconclusive when further testing may be required (Figure 107).[14]

Figures 108 to 115 show comparisons of the spike values (SV), assigned values (AV), participants' results, and FSANZ trigger points for these analytes. Where no numeric result was reported, or if a 'less-than' value (< *x*) was reported, these results have been excluded from discussion.

All reported PFHxS results for Sample S1 except for one, indicate that the sample complies with the FSANZ trigger points for this analyte in fish. The result reported by Laboratory 11 produced an unacceptable z-score, which also led to an inconclusive assessment of sample compliance, despite compliance being expected (Figure 108).

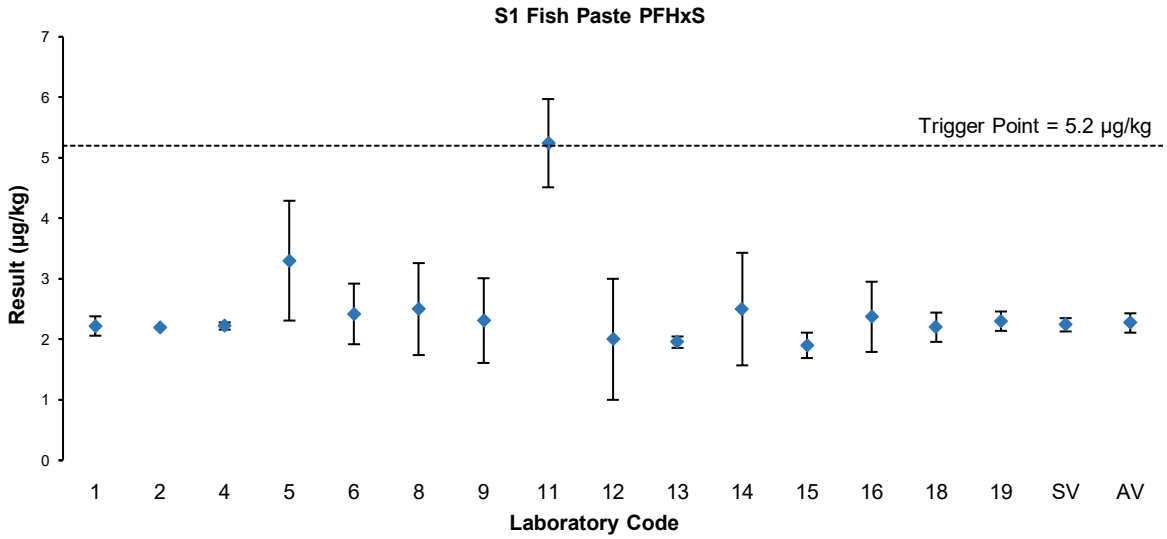


Figure 108 Sample S1 Fish Paste PFHxS Participant Results and Trigger Point

The trigger point for PFOS in S1 was 5.2 µg/kg while the assigned value was lower at 2.22 µg/kg. All reported results correctly indicate that this sample complies with FSANZ trigger point for PFOS in fish (Figure 109).

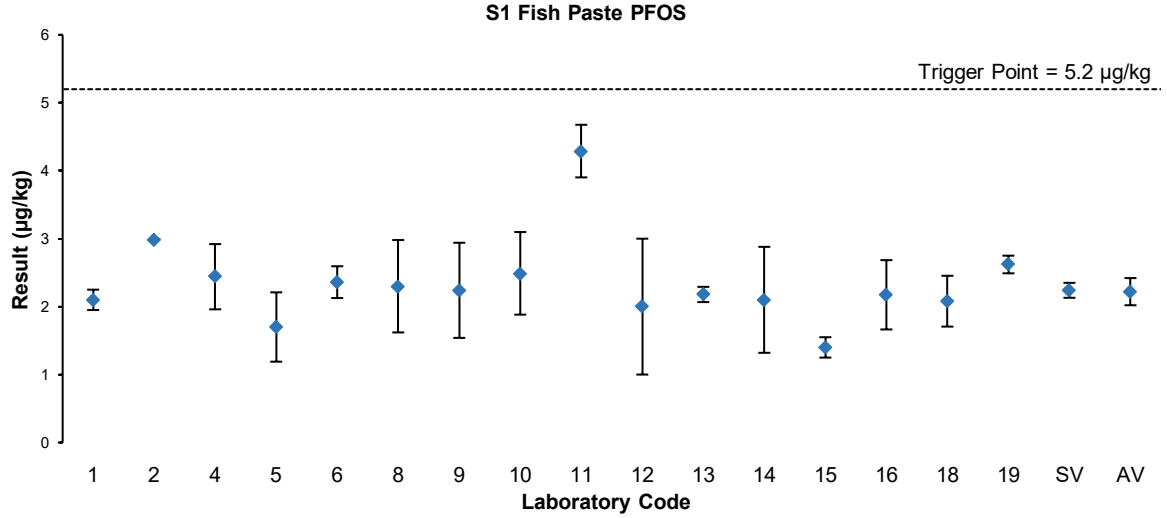


Figure 109 Sample S1 Fish Paste PFOS Participant Results and Trigger Point

Sample S2 complies with the FSANZ trigger point for PFOA in fruit puree samples. Both the spiked value and the assigned value for this sample were below the set trigger point of 5.1 µg/kg when their uncertainties are considered. However, although the results reported by Laboratories 10, 12, and 14 returned acceptable z-scores, a decision based on these results when uncertainty is taken in consideration, would deem the status of the sample inconclusive, leading to further unnecessary testing (Figure 110). Reporting realistic uncertainties or bias correction may help avoid making the wrong decision and incurring additional expenses.

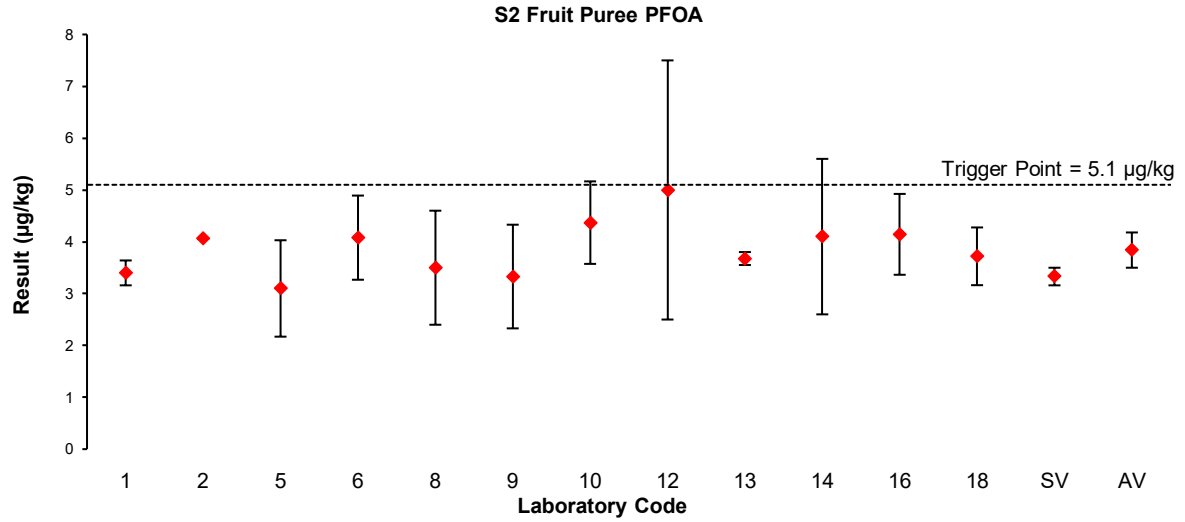


Figure 110 Sample S2 Fruit Puree PFOA Participant Results and Trigger Point

Similarly reporting realistic uncertainties and bias correction may help avoid making the wrong decision when assessing PFHxS level in fruit puree against the trigger points. Although both the spike value and assigned value for PFHxS in S2 were above the trigger point a decision based on the results reported by Laboratories 8, 9 and 14 will deem the status of this sample inconclusive (Figure 111).

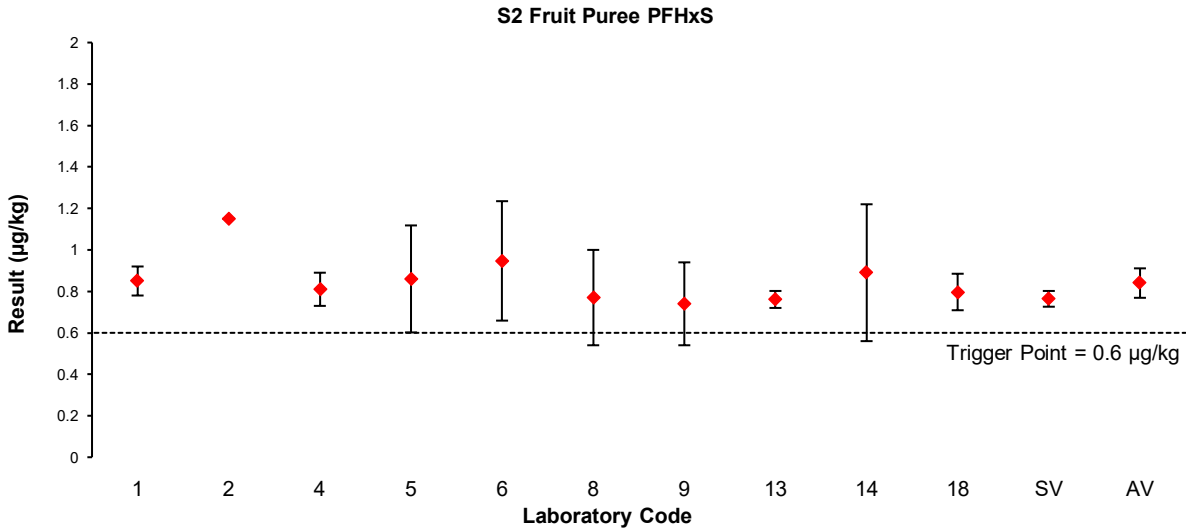


Figure 111 Sample S2 Fruit Puree PFHxS Participant Results and Trigger Point

All results reported for PFOA in S3 and their estimated of uncertainty correctly deem the status of this sample complaint (Figure 112).

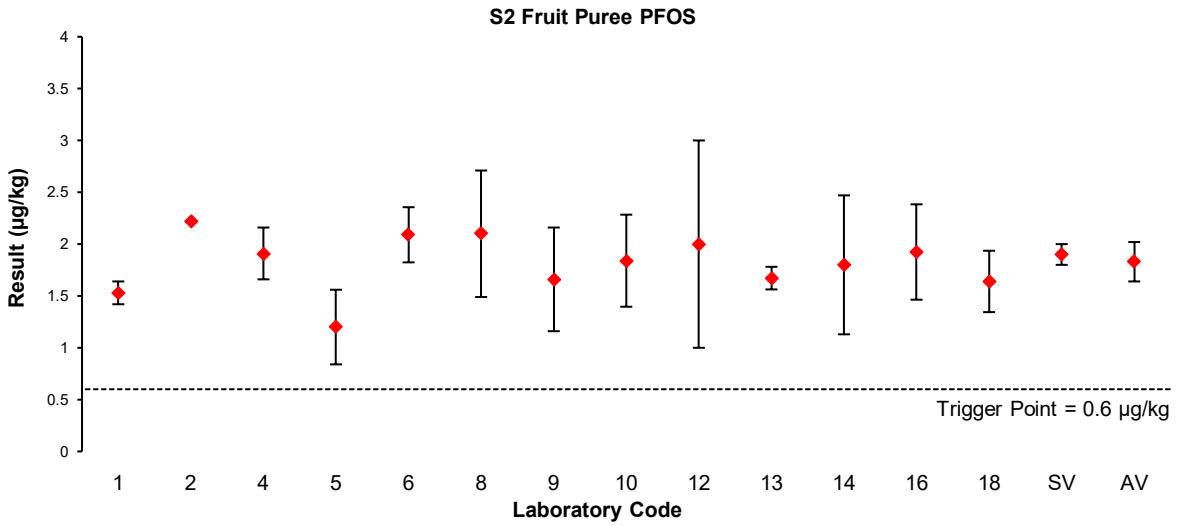
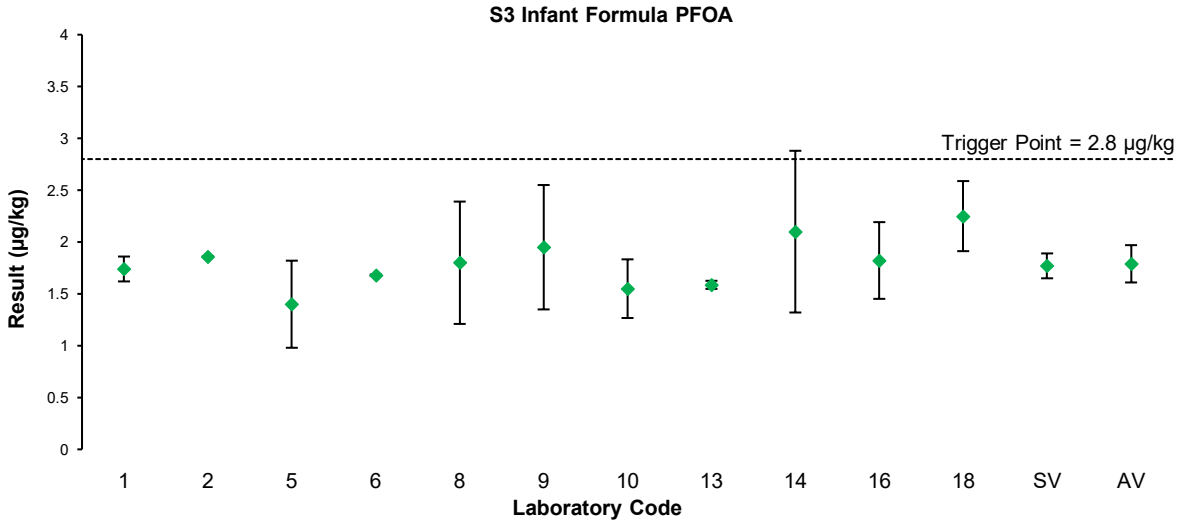


Figure 112 Sample S2 Fruit Puree PFOS Participant Results and Trigger Point

Although both the spike value and assigned value for PFOA in S3 were below the trigger point a decision based on the results reported by Laboratories 14 will deem the status of this sample inconclusive (Figure 113). This laboratory should assess its method and/or laboratory procedures for potential positive bias. If a significant bias is identified, corrective action should be taken. If the bias is not significant, it should be appropriately incorporated into the measurement uncertainty estimation.



*Laboratories 4 and 11 excluded as they reported only linear PFOA

Figure 113 Sample S3 Infant Formula PFOA Participant Results and Trigger Point

PFHxS in Sample S3 was spiked close to, but above the trigger point. However, a low recovery resulted in the AV spanning the trigger point within its relative uncertainty (Figure 114). Laboratory 13 reported a value inclusive of uncertainty below the trigger point. A more realistic evaluation of uncertainty would have spanned the trigger point meaning it would have been inconclusive below rather than incorrectly below.

The uncertainty reported by Laboratory 4 for PFHxS in S3 was lower than both, the uncertainty of the assigned value and the 10% threshold, which the study coordinator considers unrealistically small for a routine PFHxS measurement. A more realist uncertainty

reported by them would have resulted in the sample compliance status being assessed as inconclusive.

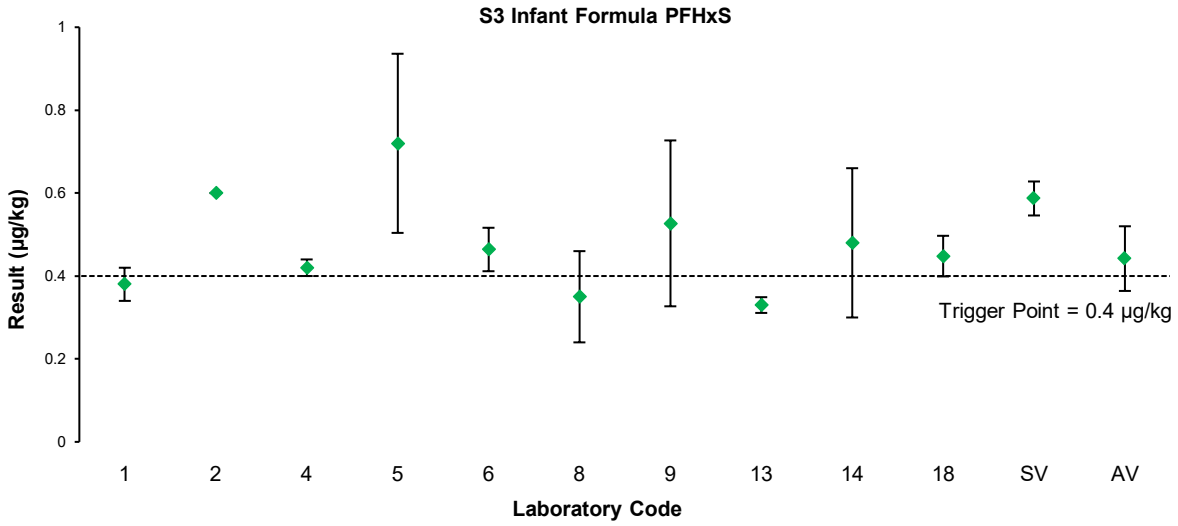


Figure 114 Sample S3 Infant Formula PFHxS Participant Results and Trigger Point

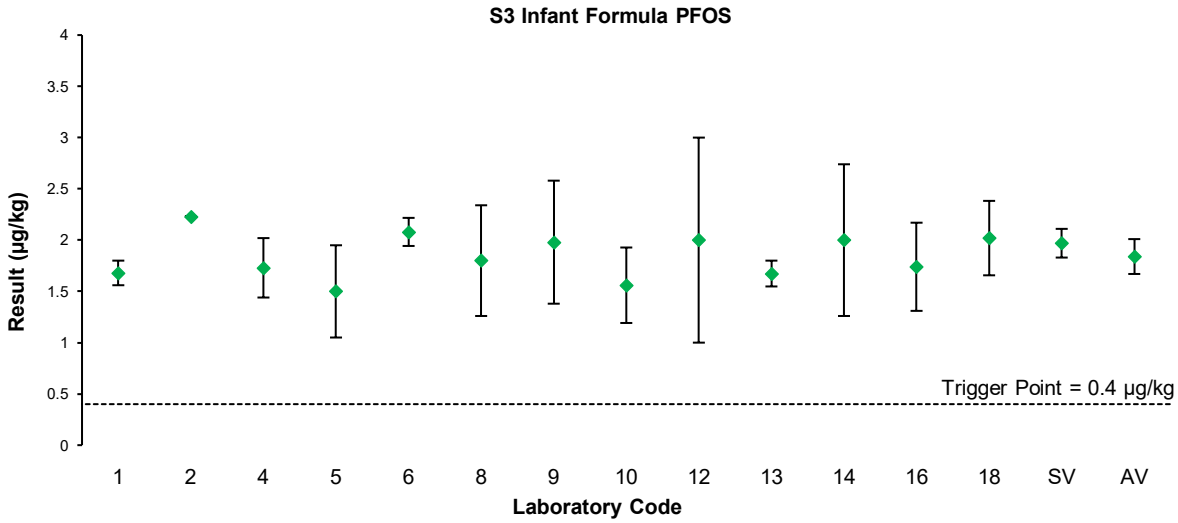


Figure 115 Sample S3 Infant Formula PFOS Participant Results and Trigger Point

6.9 Reporting of Additional Analytes

Appendix 4 presents results reported by participants for analytes that were not spiked into the test samples by the study coordinator. Participants should take care to avoid any potential cross-contamination between samples during analysis.

6.10 False Negatives

Appendix 5 presents false negative results. These are analytes present in the samples which a participant tested for but did not report a 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, results reported as NR may or may not be false negatives as this depends on the participant's actual LOR. For analytes where no assigned

value was set, results have only been considered false negatives where the consensus value and spiked value were significantly higher than the participants' LOR (i.e. the consensus value minus the expanded uncertainty and the spiked value minus the expanded uncertainty were both greater than the LOR).

6.11 Comparison with Previous PFAS in Food and Biota Studies

NMIA has run PFAS in Food and Biota PT studies since 2016. A summary of participation and reported results rates over the last ten studies (2016 to 2025) is presented in Figure 116. Proportions of PFAS analysed and numeric results reported have remained steady over this period, despite the increased number of spiked analytes as compared to the original studies.

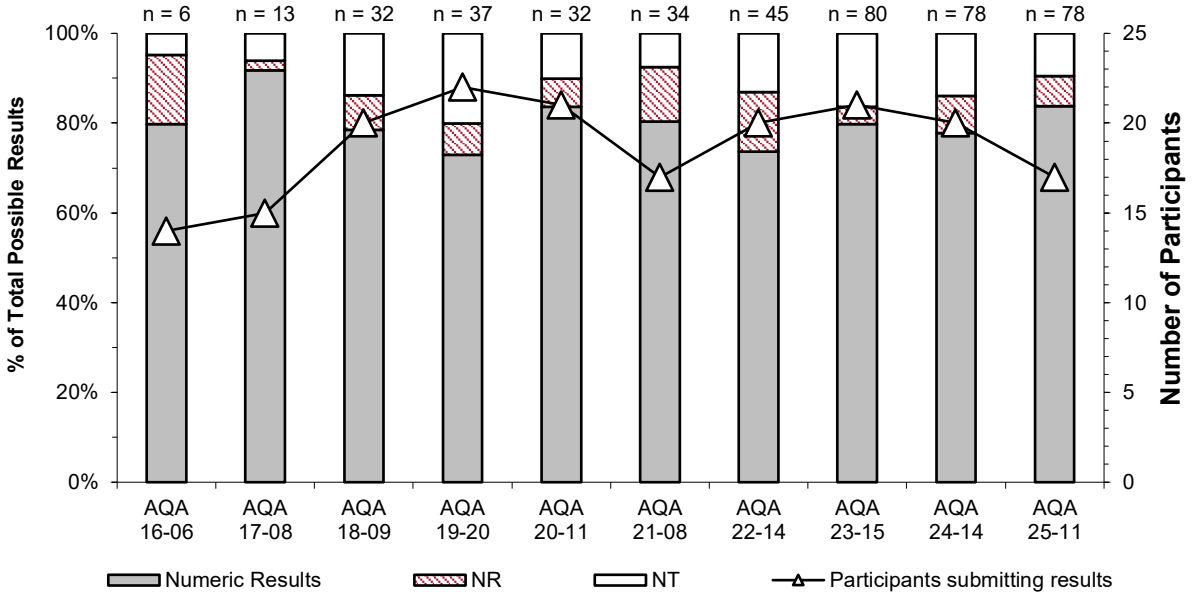


Figure 116 Summary of Participation and Reported Results in PFAS in Food and Biota PT Studies (n = number of spiked analytes)

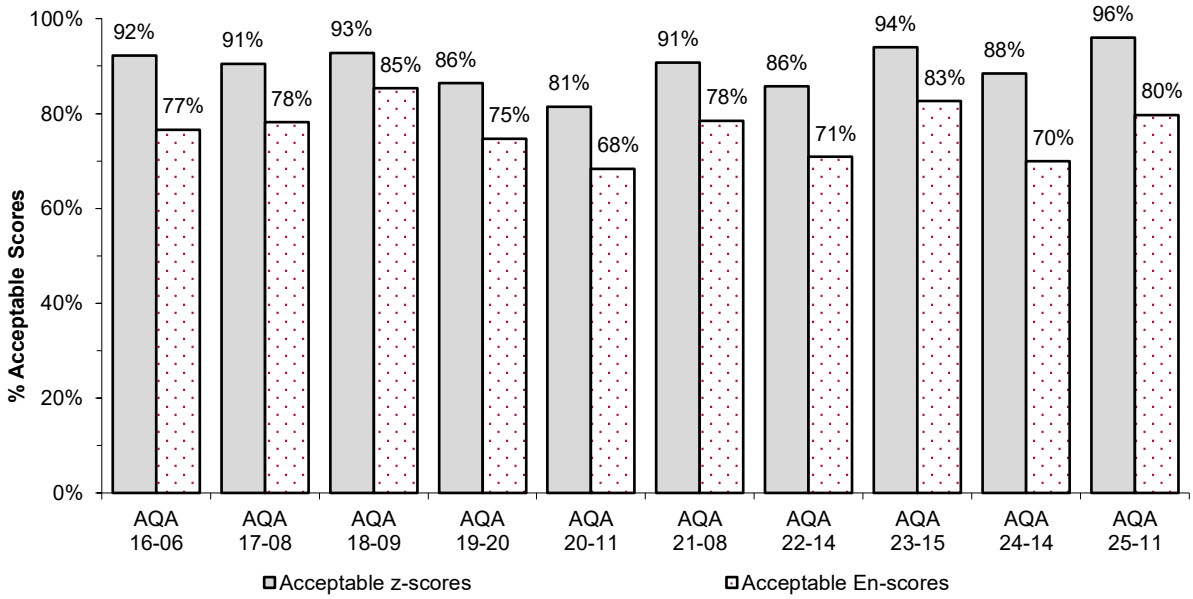


Figure 117 Summary of Participants' Performance for PFAS in Food and Biota PT Studies

A summary of the acceptable performance (presented as a percentage of the total number of scores for each study) in PFAS in Food and Biota PT studies over the last ten studies (2016 to 2025) is presented in Figure 117. The SDPA used to calculate *z*-scores has been kept constant

at 20% PCV, which enables comparison between different studies. Proportions of acceptable scores has remained relatively consistent. The average proportion of acceptable scores over this period being 90% for *z*-scores and 76% for E_n-scores.

The number of analytes assessed in each study has increased significantly as compared to the initial PFAS in Biota and Food study, and the studies have increased in size and complexity. As a point of comparison, PFOS and PFOA have been assessed in every study, and a summary of the proportion of acceptable scores for these analytes over the last ten studies is presented in Figure 118.

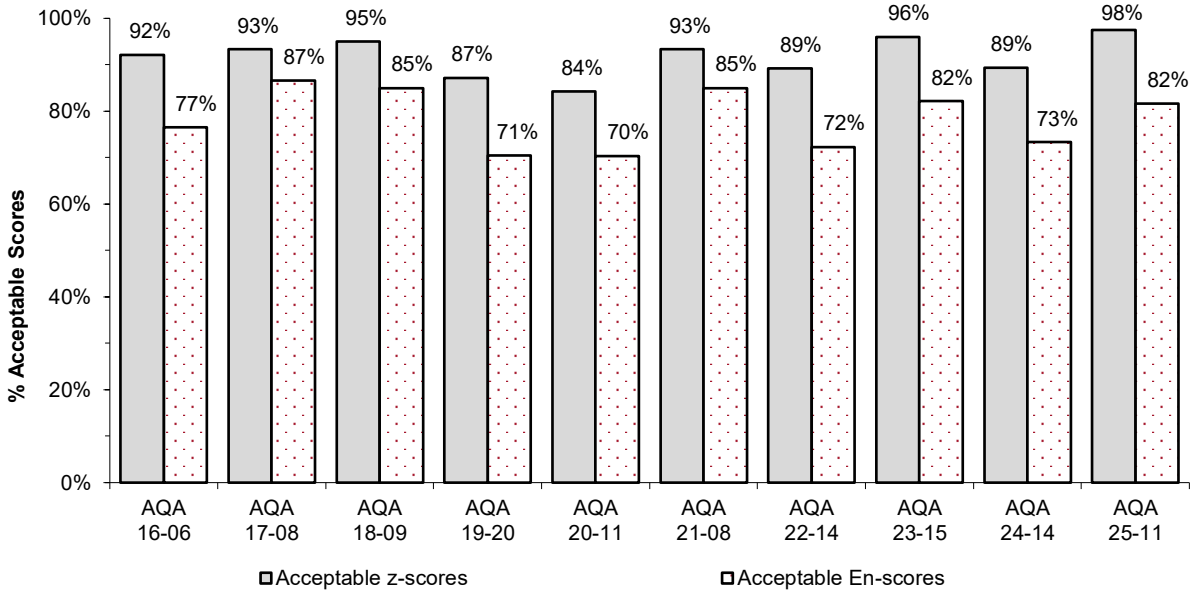


Figure 118 Summary of Participants' Performance for PFOS and PFOA in Food and Biota PT Studies

Individual performance history reports are emailed to participants at the end of each PT study; the consideration of *z*-scores over time provides much more useful information than a single *z*-score. Over time, laboratories should expect at least 95% of their *z*-scores to lie 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.

As discussed in Section 6.2, it is a requirement of ISO/IEC 17025 that laboratories report their uncertainty when the client's instruction so requires.[9] Figure 119 presents a summary of relative uncertainties as reported by participants over the last ten studies (2016 to 2025). Over this period, most numeric results (95%) were reported with uncertainties, despite only an average of 56% of participants in each study reporting that they were accredited to ISO/IEC 17025. A few participants are still reporting non-numeric results with numeric uncertainties.

Over the last few studies, there has been an increasing number of participants reporting potentially unrealistically small or large relative uncertainties for routine PFAS measurements (i.e. less than 10% or larger than 50% relative). However, this year has remained consistent to 2024. Participants reporting results with acceptable *z*-scores, but with smaller relative uncertainties and unacceptable E_n-scores, may need to assess whether their uncertainties have been underestimated.

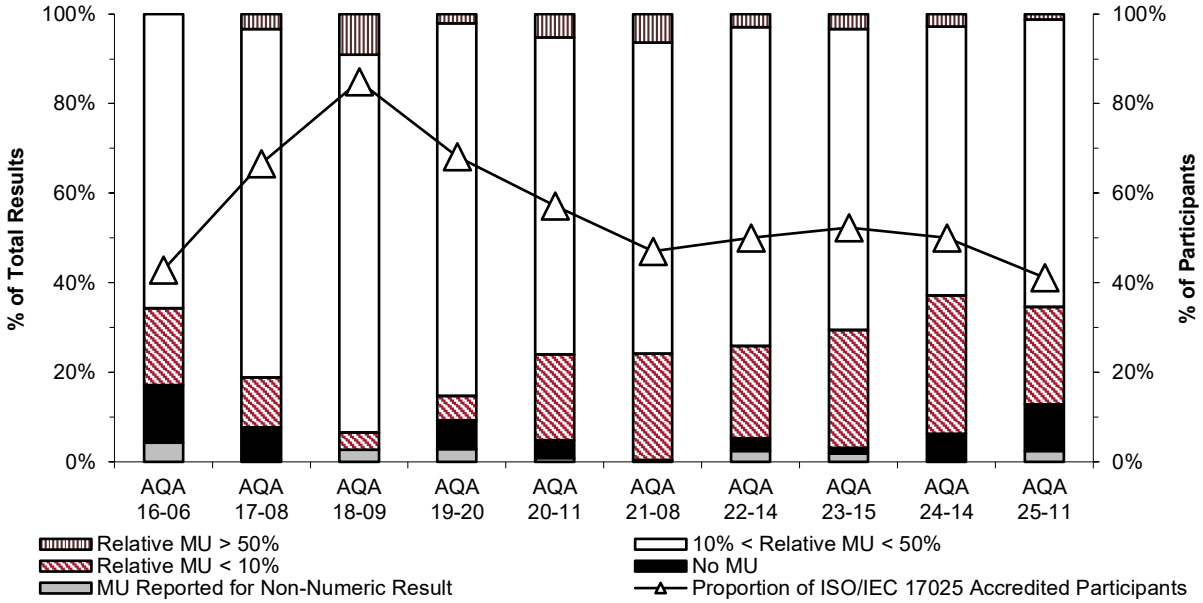


Figure 119 Summary of Participants' Relative Uncertainties for PFAS in Food and Biota PT Studies

7 REFERENCES

Please note that for all undated references, the latest edition of the referenced document (including any amendments) applies.

[1] ISO/IEC 17043, *Conformity assessment — General requirements for the competence of proficiency testing providers*.

[2] Commonwealth of Australia, Department of Industry, Science and Resources, NMIA, 2024, *Study Protocol for Proficiency Testing*, viewed January 2026, <https://www.industry.gov.au/sites/default/files/2020-10/cpt_study_protocol.pdf>.

[3] Commonwealth of Australia, Department of Industry, Science and Resources, NMIA, 2024, *Chemical Proficiency Testing Statistical Manual*, viewed January 2026, <https://www.industry.gov.au/sites/default/files/2019-07/cpt_statistical_manual.pdf>.

[4] Thompson, M., Ellison, S.L.R. and Wood, R., 2006, 'The International Harmonized Protocol for the Proficiency Testing of Analytical Chemistry Laboratories', *Pure Appl. Chem.,* vol. 78, pp. 145-196.

[5] USEPA, 2024, *Method 1633 Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS.*

[6] NMIA, 2025, *Proficiency Test Final Report AQA 24-14 PFAS in Biota and Food.*

[7] ISO 13528, *Statistical methods for use in proficiency testing by interlaboratory comparison*.

[8] Thompson, M., 2000, 'Recent trends in inter-laboratory precision at ppb and sub-ppb concentrations in relation to fitness for purpose criteria in proficiency testing', *Analyst*, vol. 125, pp. 385-386.

[9] ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories.*

[10] Eurachem/CITAC Guide CG 4, QUAM:2012.P1, *Quantifying Uncertainty in Analytical Measurement*, 3rd ed., viewed January 2026, <http://www.eurachem.org/images/stories/Guides/pdf/QUAM2012_P1.pdf>.

[11] NATA, 2020, *Update to Measurement Uncertainty resources*, viewed January 2026, <https://nata.com.au/news/update-to-measurement-uncertainty-resources/>

[12] USEPA Office of Water, 2024, Analysis of PFAS in Aqueous, Solid, Biosolid, and Tissue Samples by LC-MS/MS

[13] FSANZ, 2017, *Perfluorinated Chemicals in Food – Supporting Document 2 – Assessment of potential dietary exposure to perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonate (PFHxS) occurring in foods sampled from contaminated sites.*

[14] Eurachem/CITAC Guide *Use of Uncertainty Information in Compliance Assessment,* 2nd ed., viewed December 2025 < https://www.eurachem.org/images/stories/Guides/pdf/MUC2021_P1_EN.pdf>

[15] Thompson, M. and Fearn, T., 2001, 'A new test for 'sufficient homogeneity'', *Analyst*, vol. 126, pp. 1414-1417.

APPENDIX 1 - SAMPLE PREPARATION

Sample S1: Basa fish fillets were washed and blended before being fortified for 28 analytes and divided into portions of 5 g each.

Sample S2: A puree of sieved banana and apple was prepared and fortified with 23 analytes before being divided into 30 g portions.

Sample S3: Infant formula was fortified for 27 analytes before being divided into portions of 20 g each.

APPENDIX 2 - HOMOGENEITY AND STABILITY ASSESSMENT

A2.1 Homogeneity Assessment

Sample S2 Homogeneity Analysis and Assessment

Homogeneity analyses were conducted for Sample S2 as this is the first time when a fruit pure matrix has been introduced in a NMIA PFAS PT study. Testing was performed by the Australian Ultra Trace Laboratory of NMIA for all analytes in the sample except for PFTeDA, PFDS, 10:2FTS, and 11Cl-PF3OUdS. Duplicate samples were prepared by accurately weighing 1 g of the fruit puree material and spiking each with 100 µL of labelled internal standard in methanol. The samples were extracted by overnight tumbling in alkaline methanol (0.01 N potassium hydroxide), followed by centrifugation. A portion of the extract was purified by passing through activated carbon and eluted with methanol. After evaporation under nitrogen, the concentrated extract was adjusted to 600 µL with mobile phase and spiked with 20 µL of labelled recovery standard in methanol. Instrumental analysis was performed using Ultra Performance Liquid Chromatography (UPLC) coupled to a QTRAP mass spectrometer operating in multiple reaction monitoring mode. A 2 µL aliquot of extract was injected onto a C18 column with a mobile phase gradient of water and methanol containing 2 mM ammonium acetate. Two mass transitions were monitored for each target analyte and labelled internal standard, and abundance ratios checked. A solvent batch blank was extracted and analysed with each batch. Quantification was based on the use of the labelled internal standards using relative retention factors from the multipoint calibration and was corrected for internal standard recoveries. The analysis was based on USEPA Method 1633 and used calibration, internal and recovery standards supplied by Wellington Laboratories.

Homogeneity assessment for this sample was based on that described by Thompson and Fearn,[15] which is also the procedure as described in the International Harmonised Protocol for Proficiency Testing.[4] Seven bottles from S2 were selected at random. Duplicate test-portions were taken from each bottle and the mass fraction of targeted analytes measured. The fruit puree sample was found to be sufficiently homogeneous for use in a PT study for all analytes of interest (Tables 89 to 107).

Table 89 Sample S2 PFBA Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	3.79	3.44
11	3.77	3.79
25	4.03	3.36
31	4.17	4.25
32	4.12	3.52
41	3.91	4.20
45	4.15	3.97
Mean	3.89	
CV	14%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.43	0.73	**Pass**
s_{an}/σ	0.35	0.50	**Pass**
s^2_{sam}	0.010	0.22	**Pass**

Table 90 Sample S2 PFPeA Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	1.17	1.13
11	1.29	1.11
25	1.29	1.19
31	1.30	1.23
32	1.36	1.11
41	1.20	1.18
45	1.34	1.27
Mean	1.23	
CV	15%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.52	0.73	**Pass**
s_{an}/σ	0.39	0.50	**Pass**
s^2_{sam}	0.00001	0.024	**Pass**

Table 91 Sample S2 PFHxA Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	6.9	6.3
11	7.3	6.3
25	7.1	6.5
31	7.0	7.0
32	8.0	6.2
41	6.7	6.8
45	8.2	7.3
Mean	7.0	
CV	19%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.58	0.73	**Pass**
s_{an}/σ	0.46	0.50	**Pass**
s^2_{sam}	0.00001	0.97	**Pass**

Table 92 Sample S2 PFHpA Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	2.29	2.23
11	2.49	2.26
25	2.36	2.41
31	2.64	2.51
41	2.33	2.44
45	2.66	2.63
Mean	2.44	
CV	7%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.62	0.78	**Pass**
s_{an}/σ	0.18	0.50	**Pass**
s^2_{sam}	0.017	0.060	**Pass**

Table 93 Sample S2 PFOA Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	3.80	3.47
11	4.20	3.54
25	4.04	4.03
31	4.22	3.83
32	4.27	3.54
41	3.99	3.56
45	4.34	4.25
Mean	3.93	
CV	16%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.38	0.73	**Pass**
s_{an}/σ	0.40	0.50	**Pass**
s^2_{sam}	0.00001	0.26	**Pass**

Table 94 Sample S2 PFNA Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	2.47	2.35
11	2.57	2.24
25	2.75	2.61
31	2.89	2.54
32	3.12	2.42
41	2.62	2.58
45	2.75	2.80
Mean	2.62	
CV	18%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.64	0.73	**Pass**
s_{an}/σ	0.45	0.50	**Pass**
s^2_{sam}	0.00001	0.13	**Pass**

Table 95 Sample S2 PFDA Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	7.4	6.6
11	7.4	6.1
25	7.5	8.0
31	7.9	7.7
41	7.5	7.0
45	9.3	8.5
Mean	7.6	
CV	14%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.44	0.78	**Pass**
s_{an}/σ	0.36	0.50	**Pass**
s^2_{sam}	0.46	0.95	**Pass**

Table 96 Sample S2 PFDoA Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	8.6	8.9
11	10.3	9.3
25	9.8	10.2
31	10.6	9.7
41	9.3	9.6
45	11.6	11.3
Mean	9.9	
CV	14%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.46	0.78	**Pass**
s_{an}/σ	0.20	0.50	**Pass**
s^2_{sam}	0.74	1.1	**Pass**

Table 97 Sample S2 PFBS Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	0.91	0.96
11	0.97	0.94
25	1.12	0.96
31	1.08	1.04
32	1.09	0.95
41	0.96	0.93
45	1.03	1.08
Mean	1.00	
CV	13%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.48	0.73	**Pass**
s_{an}/σ	0.31	0.50	**Pass**
s^2_{sam}	0.0012	0.013	**Pass**

Table 98 Sample S2 PFPeS Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	5.0	5.3
11	5.7	5.0
25	6.2	5.6
31	5.8	5.9
32	6.4	5.0
41	5.5	5.1
45	5.8	6.1
Mean	5.6	
CV	17%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.58	0.73	**Pass**
s_{an}/σ	0.42	0.50	**Pass**
s^2_{sam}	0.00001	0.55	**Pass**

Table 99 Sample S2 PFHxS Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	0.73	0.75
11	0.90	0.75
25	0.81	0.80
31	1.00	0.87
32	0.89	0.78
41	0.86	0.79
45	1.01	0.83
Mean	0.84	
CV	19%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.36	0.73	**Pass**
s_{an}/σ	0.47	0.50	**Pass**
s^2_{sam}	0.0011	0.014	**Pass**

Table 100 Sample S2 PFHxS_L Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	0.73	0.75
11	0.90	0.75
25	0.81	0.80
31	1.00	0.87
32	0.89	0.78
41	0.86	0.79
45	1.01	0.83
Mean	0.84	
CV	19%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.36	0.73	**Pass**
s_{an}/σ	0.47	0.50	**Pass**
s^2_{sam}	0.0011	0.014	**Pass**

Table 101 Sample S2 PFHpS Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	1.25	1.23
11	1.40	1.18
25	1.38	1.41
31	1.64	1.45
32	1.66	1.40
45	1.66	1.41
Mean	1.42	
CV	19%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.32	0.78	**Pass**
s_{an}/σ	0.47	0.50	**Pass**
s^2_{sam}	0.0090	0.047	**Pass**

Table 102 Sample S2 PFOS Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	1.80	1.71
11	2.02	1.58
25	1.82	1.87
31	2.00	2.07
32	2.33	1.63
41	1.97	1.93
45	2.12	2.06
Mean	1.92	
CV	23%	

Thompson and Fearn Homogeneity Tests*

Test	Value	Critical	Result
Cochran	0.69	0.73	**Pass**
s_{an}/σ	0.59	0.50	**Fail**
s^2_{sam}	0.00001	0.10	**Pass**

*The test for analytical variance (s_{an}/σ) failed, meaning the analytical technique used was not precise enough to detect inhomogeneity in the sample. Participants' results for PFOS in S2 gave no reason to question homogeneity.

Table 103 Sample S2 PFOS_L Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	1.43	1.34
11	1.53	1.27
25	1.46	1.47
31	1.51	1.59
41	1.60	1.55
45	1.65	1.63
Mean	1.50	
CV	11%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.77	0.78	**Pass**
s_{an}/σ	0.28	0.50	**Pass**
s^2_{sam}	0.0068	0.030	**Pass**

Table 104 Sample S2 PFNS Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	1.97	1.84
11	1.57	1.94
25	2.25	1.91
31	2.32	2.78
41	2.01	2.06
45	1.89	1.83
Mean	2.03	
CV	20%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.44	0.78	**Pass**
s_{an}/σ	0.50	0.50	**Pass**
s^2_{sam}	0.058	0.10	**Pass**

Table 105 Sample S2 PFOSA Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	3.50	3.73
11	4.20	3.69
25	3.99	3.54
31	4.38	4.41
32	4.49	3.60
41	3.74	3.59
45	5.12	4.28
Mean	4.02	
CV	19%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.39	0.73	**Pass**
s_{an}/σ	0.47	0.50	**Pass**
s^2_{sam}	0.089	0.33	**Pass**

Table 106 Sample S2 8:2FTS Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	9.4	9.2
11	10.4	8.3
25	9.6	9.2
31	10.9	10.2
32	10.3	9.6
41	9.6	8.9
45	8.8	8.2
Mean	9.5	
CV	15%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.68	0.73	**Pass**
s_{an}/σ	0.36	0.50	**Pass**
s^2_{sam}	0.15	1.3	**Pass**

Table 107 Sample S2 ADONA Homogeneity Testing

Container Number	Result (µg/kg)	
	Replicate 1	Replicate 2
5	12.0	11.9
11	14.6	12.1
25	13.2	13.3
31	13.8	13.7
32	14.3	11.8
41	13.7	12.8
45	15.5	14.4
Mean	13.4	
CV	15%	

Thompson and Fearn Homogeneity Tests

Test	Value	Critical	Result
Cochran	0.43	0.73	**Pass**
s_{an}/σ	0.38	0.50	**Pass**
s^2_{sam}	0.27	2.8	**Pass**

A2.2 Sample S2 Stability Assessment

The stability testing of the fruit pure Sample S2, was performed by Australian Ultra Trace Laboratory of NMIA using the same procedure as described in Section A2.1 Homogeneity Assessment.

Two main factors were considered to affect the stability of PFAS analytes in the fruit pure sample: storage condition and time.

To test for storage stability, the results from a sample stored at -20°C and analysed prior to sample's dispatch (Initial) was compared with the results from one sample packaged in the same way as the samples dispatched to participants and stored at ambient conditions for the same amount of time as for the longest participant sample delivery time (Stability).

To assess sample stability during the study, results from the sample stored at −20 °C and analysed prior to dispatch (Initial) were compared with those obtained at the end of the study after submission of results (Stability). The Stability sample, which had been stored at ambient temperature during the study, was refrozen after all samples were delivered and analysed once all results had been submitted.

The results were in good agreement with each other and with the assigned value (or the participant consensus value where no assigned value was established) within their respective uncertainties for all analytes (Figures 120 to 140).

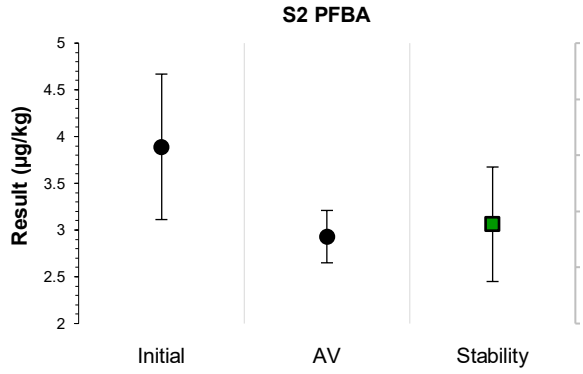


Figure 120 S2 PFBA Stability Testing

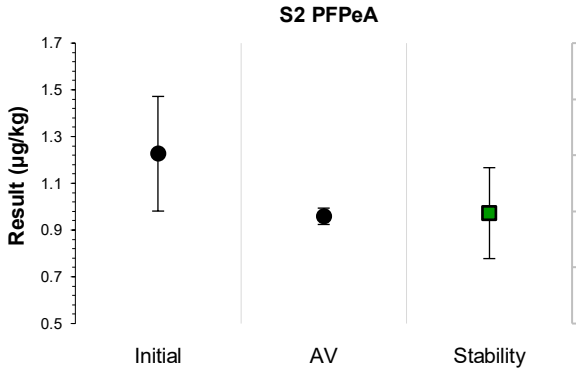


Figure 121 S2 PFPeA Stability Testing

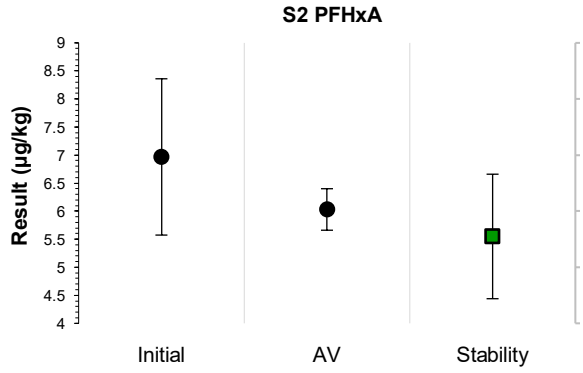


Figure 122 S2 PFHxA Stability Testing

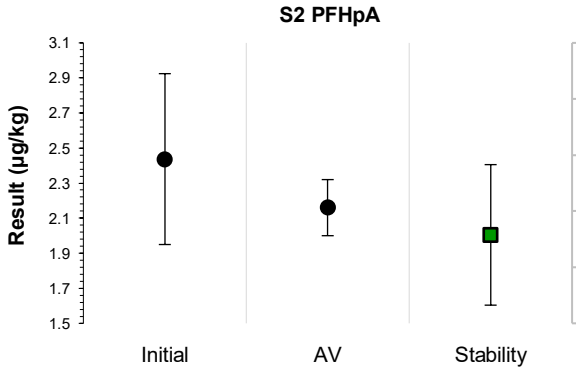


Figure 123 S2 PFHpA Stability Testing

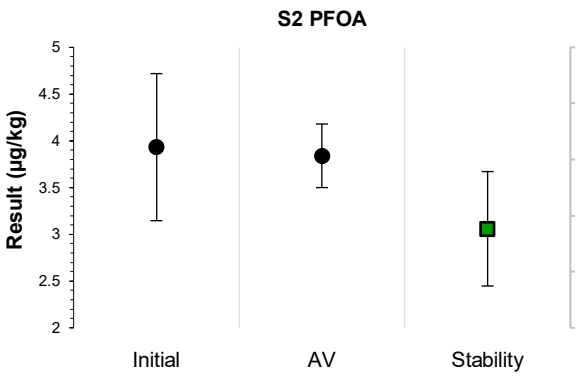


Figure 124 S2 PFOA Stability Testing

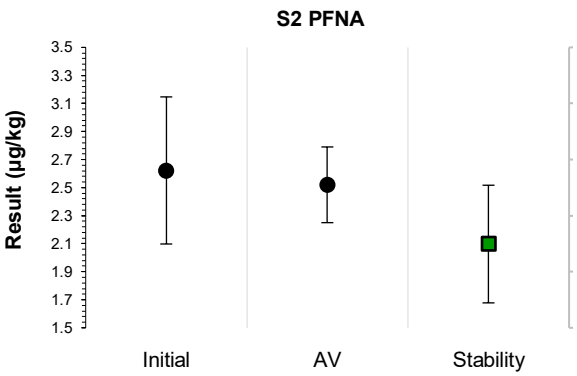


Figure 125 S2 PFNA Stability Testing

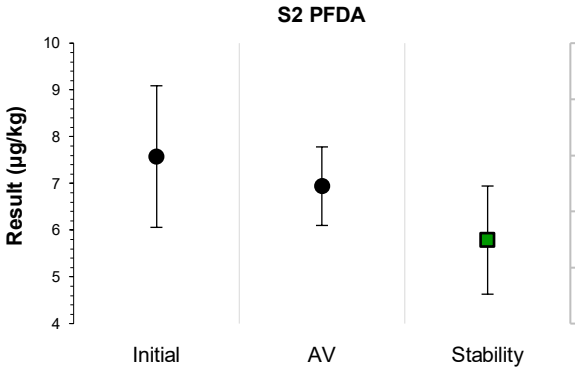


Figure 126 S2 PFDA Stability Testing

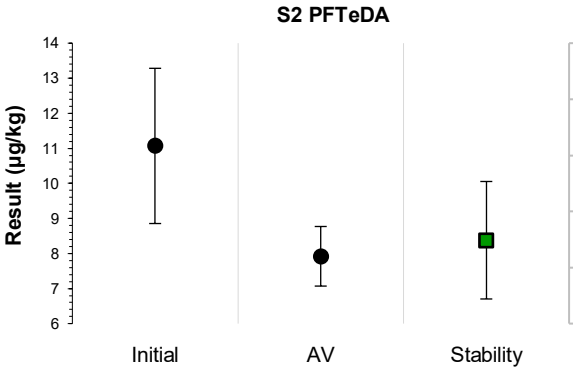


Figure 127 S2 PFTeDA Stability Testing

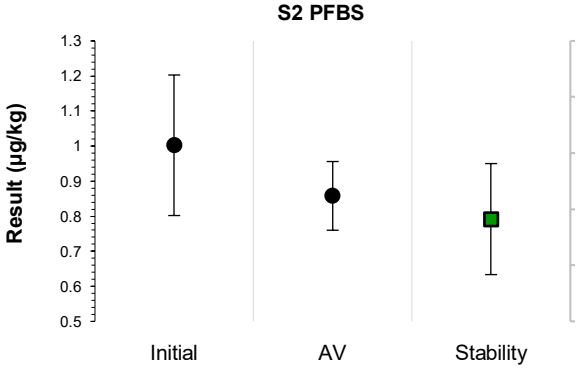


Figure 128 S2 PFBS Stability Testing

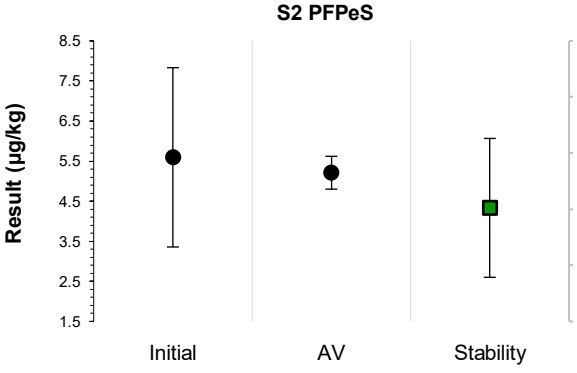


Figure 129 S2 PFPeS Stability Testing

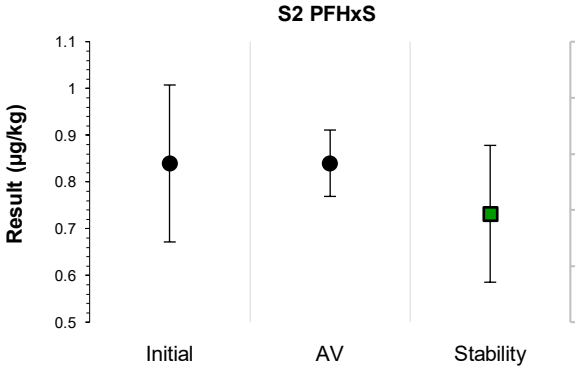


Figure 130 S2 PFHxS Stability Testing

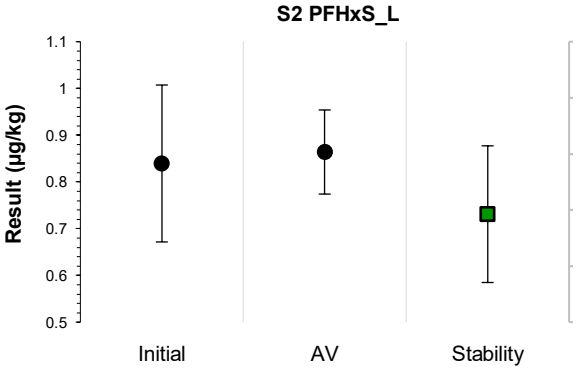


Figure 131 S2 PFHxS_L Stability Testing

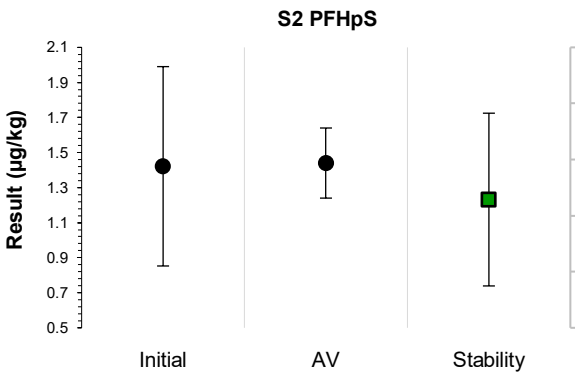


Figure 132 S2 PFHpS Stability Testing

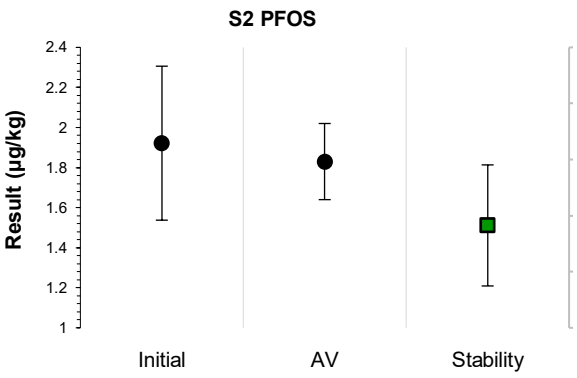


Figure 133 S2 PFOS Stability Testing

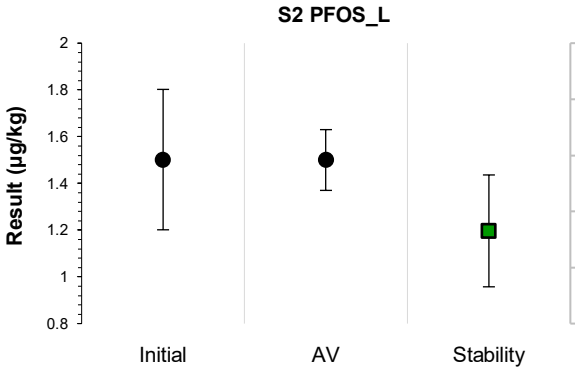


Figure 134 S2 PFOS_L Stability Testing

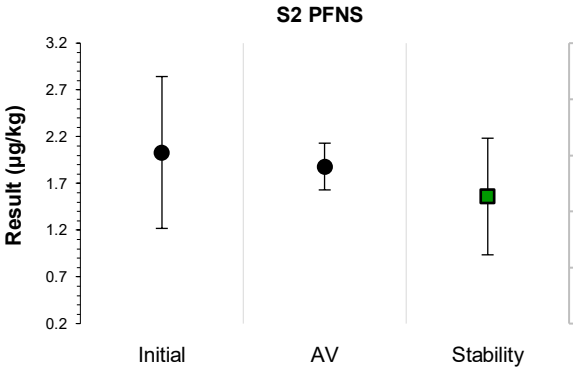


Figure 135 S2 PFNS Stability Testing

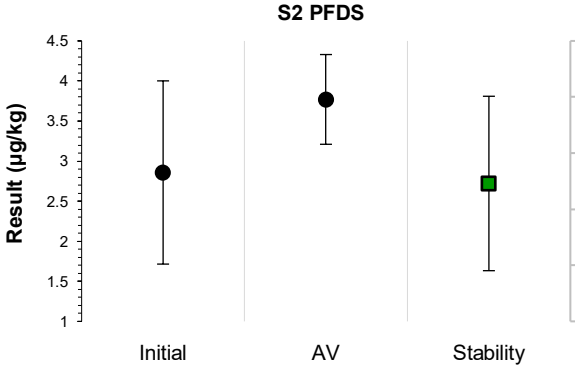


Figure 136 S2 PFDS Stability Testing

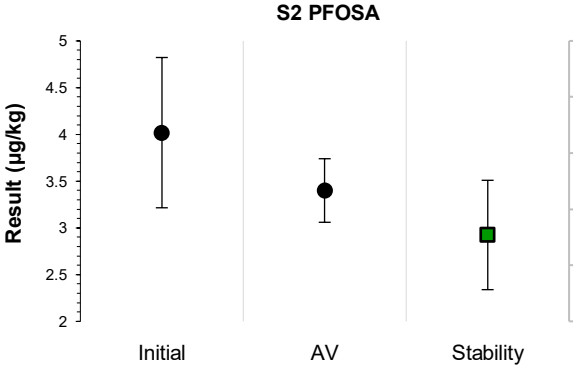


Figure 137 S2 PFOSA Stability Testing

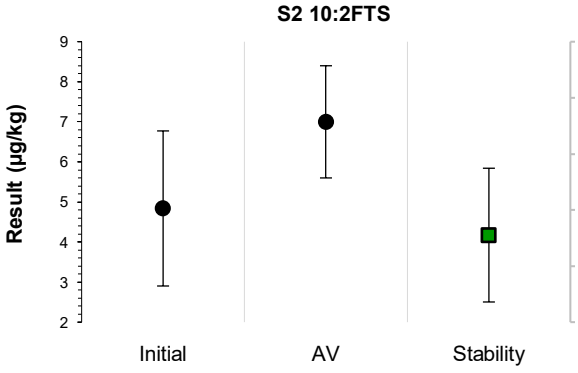


Figure 138 S2 10:2FTS Stability Testing

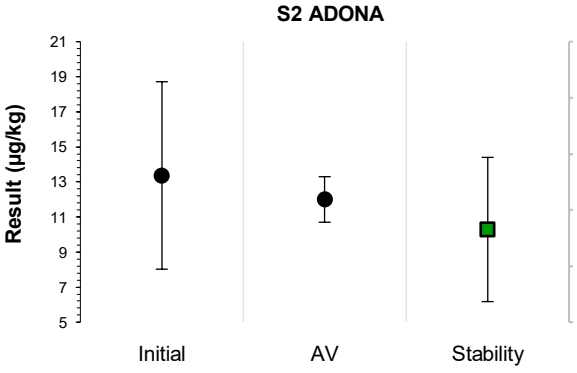


Figure 139 S2 ADONA Stability Testing

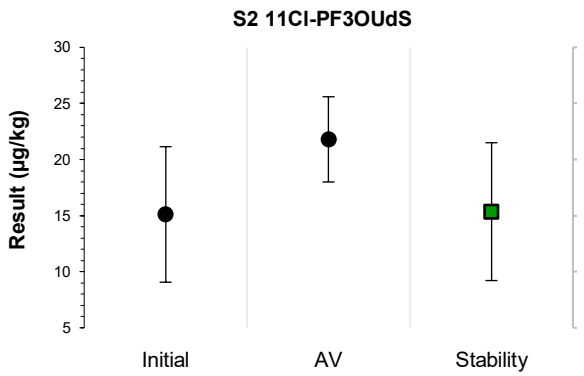


Figure 140 S2 11Cl-PF3OUdS Stability Testing

No analysis of stability was conducted for PFDoA and for 8:2FTS. However comparison of z-scores for PFDoA and 8:2FTS against the number of days samples spent in transit are presented in Figures 141 to 142. No trend was evident between participants performance and the number of days spent in transit.

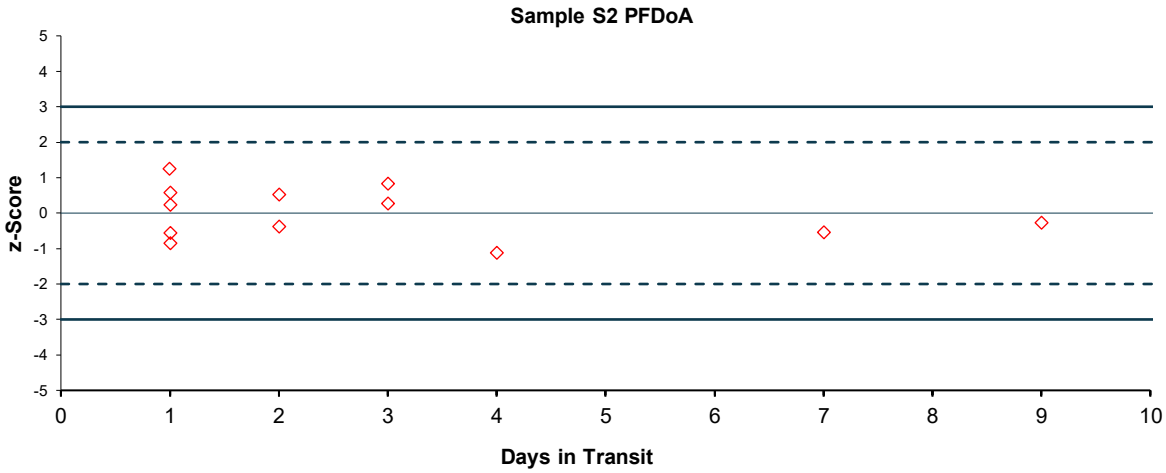


Figure 141 Sample S2 Fruit puree PFDoA *z*-Score vs Days in Transit

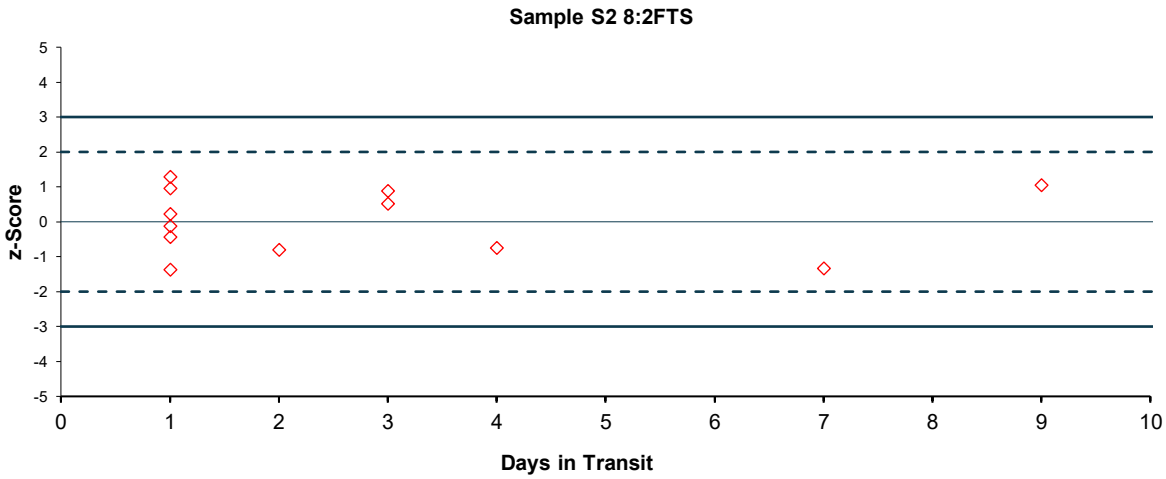


Figure 142 Sample S2 Fruit puree 8:2FTS *z*-Score vs Days in Transit

APPENDIX 3 - ROBUST AVERAGE AND ASSOCIATED UNCERTAINTY, Z-SCORE AND E_N-SCORE CALCULATIONS

A3.1 Robust Average and Associated Uncertainty

When the robust average is calculated using the procedure described in ISO 13528,[7] the uncertainty is evaluated as:

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

where:

$u_{rob\ av}$	is the standard uncertainty of the robust average
$S_{rob\ av}$	is the standard deviation of the robust average
p	is the number of results

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

A worked example is set out below in Table 108.

Table 108 Uncertainty Evaluation for Robust Average of Sample S2 PFBA

Number of Results (p)	12
Robust Average	2.93 µg/kg
$S_{rob\ av}$	0.39 µg/kg
$u_{rob\ av}$	0.14 µg/kg
k	2
$U_{rob\ av}$	0.28 µg/kg

Therefore, the robust average for Sample S2 PFBA is 2.93 ± 0.28 µg/kg.

A3.2 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 (Section 4).

A worked example is set out below in Table 109.

Table 109 z-Score and E_n-Score for Sample S2 PFBA Result Reported by Laboratory 1

Participant Result (µg/kg)	Assigned Value (µg/kg)	Standard Deviation for Proficiency Assessment	z-Score	E_n-Score
2.96 ± 0.21	2.93 ± 0.28	20% as PCV, or: 0.2 × 2.93 = 0.586 µg/kg	$z = \frac{2.96 - 2.93}{0.586} = 0.05$	$E_n = \frac{2.96 - 2.93}{\sqrt{0.21^2 + 0.28^2}} = 0.09$

APPENDIX 4 - ADDITIONAL ANALYTES

Table 110 Additional Analytes

Lab. Code	Sample	Analyte	Result (µg/kg)	Uncertainty (µg/kg)	Recovery (%)
1	S3	PFDoA	0.04	0.04	NR
4	S2	4:2FTS	0.41	0.01	74
9	S3	6:2diPAP	0.758	0.3	NR
10	S1	PFHxDA	0.029	0.007	121.3
	S2	PFUdA	0.105	0.0379	92.6
		PFTrDA	0.043	0.016	65.1
		PFDoS	0.072	0.038	65.1
		N-EtFOSA	5.91	4.63	86.9
	S3	PFDoA	0.062	0.013	41.9
		PFOSA	5.46	1.1	52.1
		6:2FTS	0.064	0.048	62.1
13	S3	PFDoA	0.14	0.024	72
14	S1	PFHxDA	0.015	0.0056	NT
	S2	9Cl-PF3ONS	0.013	0.0048	NT
	S3	PFDoA	0.037	0.014	NT
18	S3	PFDoA	0.048	0.006	85.2
		PFDoS	0.048	0.024	99.6

APPENDIX 5 - FALSE NEGATIVES

Table 111 False Negatives

Lab. Code	Sample	Analyte	Assigned Value (µg/kg)	Spiked Value (µg/kg)	Result* (µg/kg)
3	S1	PFOA	1.05	0.938	<1
		PFNA	1.42	1.33	<1
		PFBS	1.25	1.35	<1
		PFHxS	2.27	2.24	NR
		PFHpS	1.42	1.36	<1
		PFOS	2.22	2.24	<2.00
		PFNS	1.25	1.33	<1
4	S3	N-MeFOSA	10.3	11.8	NR
		10:2FTS	3.71	3.91	NR
5	S1	PFNA	1.42	1.33	<0.001
6	S1	PFDoA	6.7	7.16	NR
		PFTrDA	6.39	7.16	NR
		PFTeDA	6.2	7.16	NR
		N-MeFOSA	6.9	7.16	NR
		N-MeFOSAA	4.87	5.37	NR
	S2	PFDoA	7.21	7.62	NR
		PFTeDA	7.92	7.62	NR
		PFOSA	3.4	3.64	NR
	S3	PFTrDA	6.0	7.84	NR
		PFTeDA	6.33	7.84	NR
		N-MeFOSA	10.3	11.8	NR
9	S3	PFPeS	0.52	0.675	<0.5
		8:2FTS	8.5	9.77	<0.5
10	S2	PFOSA	3.40	3.64	<0.122
	S3	N-MeFOSA	10.3	11.8	<0.073
12	S3	EtFOSE	10.7	11.8	< 5
15	S1	N-MeFOSA	6.9	7.16	<0.5
	S1	3:3FTCA	19.4**	31.3	<0.5
19	S1	PFODA	16.0**	17.9	< 0.039

* NR results may or may not be false negatives, depending on the participant's actual LOR.

** Robust Average or Median Value as applicable (assigned value not set).

APPENDIX 6 - PARTICIPANTS' TEST METHODS

Participants' responses to the methodology questionnaire are presented in Tables 112 to 204. Some responses may have been modified so that the participant cannot be identified.

A6.1 Sample S1 Fish Paste Methodology

Table 112 Participant Methodology – Sample S1 Fish Paste Sample Preparation and Extraction

Lab. Code	Sample Weight (g)	Labelled Standard(s) Added Before Extraction?	Equilibration Time for Labelled Standard (min)	Sample Pre-treatment, if other	Extraction Technique	Number of Steps (if staggered extraction)	Extraction Solvent(s)	Total Extraction Time (min)
1	0.5	Yes			Alkaline Digestion		NaOH/MeOH	60
2	2.05	Yes	10		Accelerated Solvent Extraction		ACN/MeOH	30
3								
4*	2	Yes	15	NA	Solid-Liquid Extraction (vortexed and centrifuged)	NA	2% formic acid in acetonitrile	8 min
5	5	Yes			QuEChERS		ACN:1%H2SO4	15
6*	1 g	Yes	30		Multiple		ACN	2 x 15 min
8	5g	Yes	30		QuEChERS		ACN	60
9	1	Yes	30	N/A	Alkaline Digestion	N/A	KOH/MeOH	480
10	1.0354	Yes	30 minutes	no	Solid-Liquid Extraction (vortexed and centrifuged)	3	ACN	90 minutes
11	5	Yes	10		QuEChERS	2	ACN	120
12	1	Yes		Homogenisation	QuEChERS		Acetonitrile with 1% Acetic Acid	
13								
14	2	Yes	No		QuEChERS	2	ACN	60

Lab. Code	Sample Weight (g)	Labelled Standard(s) Added Before Extraction?	Equilibration Time for Labelled Standard (min)	Sample Pre-treatment, if other	Extraction Technique	Number of Steps (if staggered extraction)	Extraction Solvent(s)	Total Extraction Time (min)
15								
16	0.5	Yes			Ion Pair Extraction with Solid-Liquid Extraction		MTBE	90
18	5	Yes	30-60	5 mL reagent water acidified with 150µL formic acid added prior to extraction	QuEChERS		ACN	15
19	2	Yes			QuEChERS		ACN	

*Additional information in Table 114.

Table 113 Participant Methodology – Sample S1 Fish Paste Sample Clean-Up and Concentration

Lab. Code	Carbon Clean-Up?	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Clean-Up	Elution Solvent	Final pH Adjustment
1	No	30	60	Solid-Phase Extraction	NH4OH/MeOH	No
2*	Yes			Solid-Phase Extraction	0.1 % NH4OH in MeOH	No
3						
4	Yes	50°C	Variable	None	Not Applicable	No
5	No			Dilution and Filtration		No
6*	Yes	Room temperature		Liquid-liquid extraction	MeOH	No
8	Yes	45	30	Solid-Phase Extraction	Basic ACN and Acetone	No
9*	Yes	35	90	Solid-Phase Extraction	MeOH	No

Lab. Code	Carbon Clean-Up?	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Clean-Up	Elution Solvent	Final pH Adjustment
10	No	room temp	60 minutes	Solid-Phase Extraction	NaOH/MeOH	No
11	Yes	35	240	Solid-Phase Extraction	NH4OH/MeOH	Yes
12	No			Solid-Phase Extraction	10:89:1 IPA/ACN/Ammonium hydroxide	Yes
13						
14	Yes	35	120	None		No
15						
16	No	40	20	None	Not Applicable	No
18	Yes	60	40-60	Solid-Phase Extraction	NH4OH/MeOH	No
19				EMR cartridge	pass thru cartridge	

*Additional Information in Table 114.

Table 114 Participant Methodology – Sample S1 Fish Paste Preparation, Extraction, Clean-Up and Concentration Additional Information

Lab. Code	Additional Information
2	Stacked SPE cartridge was used, no loose carbon.
4	Extraction using Merris-Minimix shaker.
6	Digestion with 200mM NaOH in methanol, then extraction with acetonitrile. Clean up: liquid-liquid extraction with n-hexane, then Bond Elut Carbon SPE. NR - No result reported due to poor recovery (less than 10%) of the internal standard.
9	Extract centrifuged after digestion @ 3500 RPM.

Table 115 Participant Methodology – Sample S1 Fish Paste Instrumental Technique

Lab. Code	Instrument	Dilution Before Analysis and Dilution Factor	Blank Correction?	Additional Information
1	LC-MSMS or LC-QQQ		Yes	
2	LC-MSMS or LC-QQQ	No	No	
3	LC-MSMS or LC-QQQ		Yes	
4	LC-MSMS or LC-QQQ	No	Yes	NA
5	LC-Orbitrap	8	Yes	
6	LC-MSMS or LC-QQQ	No	No	
8	LC-MSMS or LC-QQQ		no	
9	LC-MSMS or LC-QQQ	No	No	
10	LC-MSMS or LC-QQQ	no	Yes	
11	LC-MSMS or LC-QQQ	1	Yes	
12	LC-MSMS or LC-QQQ		No	In this method the linear standards are used to quantify both the linear as well as the branched isomers
13				
14	LC-MSMS or LC-QQQ	0.00015	Yes	
15				
16	LC-MSMS or LC-QQQ	No	No	
18	LC-MSMS or LC-QQQ		No	C-18 LC column (3µm, 150mm x 2mm)
19	LC-MSMS or LC-QQQ	concentration factor of 2	Yes	

Table 116 Participant Methodology – Sample S1 Fish Paste Labelled Standards

Lab. Code	Labelled Standard Source	Secondary Source Used to Check Standard?	Recovery Correction?	Standard Method Used?	Additional Information
1	Wellington		No		
2	Wellington	No	Yes		
3	Wellington	Yes	No		
4	Wellington Laboratory	No	Yes	No	NA
5	Wellington Laboratories		Yes		
6	Wellington	No	Yes	Isotopic dilution	
8	Wellington	Yes		In-House Method	
9	Wellington	Yes	Yes	No	N/A
10	Wellington	No	Yes	No	
11	Wellington	No	Yes		
12	Wellington		Yes		
13	Wellington, Cambridge Isotopes		Yes	US FDA Foods Program Compendium of Analytical Laboratory Methods: Method C-010.03	d5NN N-EtFOSAA added before instrument analysis
14	Greyhound, Wellington, TLC, LGC		No	Anal. Methods, 2018, 10, 5715–5722 mod.	
15					
16	Wellington Laboratories		Yes	In-House	
18	Cambridge (FTS compounds); Wellington (remainder)	yes	Yes		
19	Wellington, Cambridge Isotopes		Yes	New method in development	

Table 117 Labelled Standards for Sample S1 Fish paste PFBA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFBA	
2	Yes	Yes
3	Yes	
4	M4PFBA	NA
5	Yes	
6	13C4-PFBA	13C3-PFBA
8	13C4-PFBA	
9	13C4 PFBA	13C3 PFBA
10	13c4-PFBA	13C8-PFOA
11	NT	NT
12	Perfluoro-n-[13C4]butanoic acid MPFBA	Perfluoro-n-[2,3,4-13C4]butanoic acid M3PFBA
13	M3 PFBA	
14	13C4-PFBA	
15		
16	13C4-PFBA	
18	yes	
19	M3 PFBA	M4 PFOA

Table 118 Labelled Standards for Sample S1 Fish paste PFPeA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C5-PFPeA	
2	Yes	No
3	Yes	
4	M5PFPeA	NA
5	Yes	
6	13C4-PFPeA	13C5 -PFPeA
8	13C5-PFPeA	
9	13C5 PFPeA	
10	13C5-PFPeA	13C8-PFOA
11	NT	NT
12	Perfluoro-n-[13C5]pentanoic acid M5PFPeA	
13	M3 PFPeA	
14	13C5-PFPeA	
15		
16	13C5-PFPeA	
18	yes	
19	M3 PFPeA	M4 PFOA

Table 119 Labelled Standards for Sample S1 Fish paste PFHxA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C5-PFHxA	
2	Yes	Yes
3	Yes	
4	M5PFHxA	NA
5	Yes	
6	13C2-PFHxA	13C5 -PFPeA
8	13C2-PFHxA	
9	13C5 PFHxA	13C2 PFHxA
10	13C5-PFHxA	13C8-PFOA
11	NT	NT
12	Perfluoro-n-[1,2,3,4,6-13C5]hexanoic acid M5PFHxA	Perfluoro-n-[1,2-13C5]hexanoic acid MPFHxA
13	M5 PFHxA	
14	13C5-PFHxA	
15		
16	13C5-PFHxA	
18	yes	
19	M5 PFHxA	M4 PFOA

Table 120 Labelled Standards for Sample S1 Fish paste PFHpA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFHpA	
2	Yes	No
3	Yes	
4	MPFHpA	NA
5	Yes	
6	13C3-PFHpA	13C8-PFOA
8	13C4-PFHpA	
9	13C4 PFHpA	
10	13C4-PFHpA	13C8-PFOA
11	NT	NT
12	Perfluoro-n-[1,2,3,4-13C4]heptanoic acid M4PFHpA	
13	M5 PFHxA	
14	13C4-PFHpA	
15		
16	13C4-PFHpA	
18		
19	M4 PFHpA	M4 PFOA

Table 121 Labelled Standards for Sample S1 Fish paste PFOA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOA	
2	Yes	Yes
3	Yes	
4	M8PFOA	NA
5	Yes	
6	13C4-PFOA	13C8-PFOA
8	13C8-PFOA	
9	13C8 PFOA	13C4 PFOA
10	13C4-PFOA	13C8-PFOA
11	M8PFOA	M4PFOA
12	Perfluoro-n-[13C8]octanoic acid M8PFOA	Perfluoro-n-[1,2,3,4-13C8]octanoic acid MPFOA
13	13C PFOA	
14	13C4-PFOA	
15		
16	13C8-PFOA	
18	yes	yes
19	13C PFOA	M4 PFOA

Table 122 Labelled Standards for Sample S1 Fish paste PFNA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C9-PFNA	
2	Yes	Yes
3	Yes	
4	M9PFNA	NA
5		
6	13C5-PFNA	13C8-PFOA
8	13C5-PFNA	
9	13C9 PFNA	13C5 PFNA
10	13C9-PFNA	13C5-PFNA
11	M9PFNA	M5PFNA
12	Perfluoro-n-[13C9]nonanoic acid M9PFNA	Perfluoro-n-[1,2,3,4,5-13C9]nonanoic acid MPFNA
13	13C PFOA	
14	13C5-PFNA	
15		
16	13C5-PFNA	
18		
19	M5PFNA	M4 PFOA

Table 123 Labelled Standards for Sample S1 Fish paste PFDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C6-PFDA	
2	Yes	Yes
3	Yes	
4	M6PFDA	NA
5	Yes	
6	13C2-PFDA	13C8-PFOA
8	13C6-PFDA	
9	13C6 PFDA	13C2 PFDA
10	13C2-PFDA	13C5-PFNA
11	NT	NT
12	Perfluoro-n-[1,2,3,4,6-13C6]decanoic acid M6PFDA	Perfluoro-n-[1,2-13C6]decanoic acid MPFDA
13	13C PFOA	
14	13C6-PFDA	
15		
16	13C6-PFDA	
18		
19	M2PFDA	M4 PFOA

Table 124 Labelled Standards for Sample S1 Fish paste PFUdA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C7-PFUnA	
2	Yes	No
3	Yes	
4	M7PFUnDA	NA
5	Yes	
6	13C2-PFUdA	13C8-PFOA
8	13C2-PFUnA	
9	13C7 PFUnA	
10	13C2-PFUdA	13C5-PFNA
11	NT	NT
12	Perfluoro-n-[1,2,3,4,6,7-13C7]undecanoic acid M7PFUdA	
13	MPFUdA	
14	13C7-PFUdA	
15		
16	13C2-PFUnDA	
18	yes	yes
19	MPFUdA	M4 PFOA

Table 125 Labelled Standards for Sample S1 Fish paste PFDoA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFDoA	
2	Yes	No
3	Yes	
4	MPFDoDA	NA
5	Yes	
6	13C2-PFDoA	13C8-PFOA
8	13C2-PFDoA	
9	13C2 PFDoA	
10	13C2-PFDoA	13C5-PFNA
11	NT	NT
12	Perfluoro-n-[1,2 13C2]dodecanoic acid MPFDoA	
13	MPFDoA	
14	13C2-PFDoA	
15		
16	13C2-PFDoDA	
18	yes	
19	MPFDoA	M4 PFOA

Table 126 Labelled Standards for Sample S1 Fish paste PFTrDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFDoA	
2	No	No
3	Yes	
4	MPFDoDA	NA
5	Yes	
6	13C2-PFDoA	13C8-PFOA
8	13C2-PFTeDA	
9	13C2 PFDoA	
10	13C2-PFHxDA	13C2-PFTeDA
11	NT	NT
12		
13	MPFDoA	
14	13C2-PFTrDA	
15		
16	13C2-PFTeDA	
18		
19	MPFDoA	M4 PFOA

Table 127 Labelled Standards for Sample S1 Fish paste PFTeDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFTeDA	
2	Yes	No
3	Yes	
4	MPFTeDA	NA
5	Yes	
6	13C2-PFTeDA	13C8-PFOA
8	13C2-PFTeDA	
9	13C2 PFTeDA	
10	13C2-PFHxDA	13C2-PFTeDA
11	NT	NT
12	Perfluoro-n-[1,2 13C2]tetradecanoic acid M2PFTeDA	
13	MPFTeDA	
14	13C2-PFTeDA	
15		
16	13C2-PFTeDA	
18	yes	
19	MPFTeDA	M4 PFOA

Table 128 Labelled Standards for Sample S1 Fish paste PFODA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	No	No
3	Yes	
4	NA	NA
5	Yes	
6	13C2-PFHxDA	13C8-PFOA
8		
9	NT	
10	13C2-PFHxDA	13C2-PFTeDA
11	NT	NT
12		
13		
14	13C2-PFHxDA	
15		
16	Not applicable	
18		
19		

Table 129 Labelled Standards for Sample S1 Fish paste PFBS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFBS	
2	Yes	No
3	Yes	
4	M3PFBS	NA
5	Yes	
6	13C3-PFBS	13C3-PFHxS
8	13C3-PFBS	
9	13C3 PFBS	
10	18O2-PFHxS	18O2-PFOS
11	NT	NT
12	Sodium perfluoro-1-[2,3,4 13C3] butanesulfonate M3PFBS	
13	M3 PFBS	
14	13C3-PFBS	
15		
16	13C3-PFBS	
18	yes	
19	M3 PFBS	M4 PFOA

Table 130 Labelled Standards for Sample S1 Fish paste PFPeS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFBS	
2	No	No
3	Yes	
4	M5PFHxA	NA
5	Yes	
6	18O2-PFHxS	13C3-PFHxS
8	13C3-PFBS	
9	13C3 PFBS	
10	18O2-PFHxS	18O2-PFOS
11	NT	NT
12		
13	M3 PFBS	
14	13C3-PFBS	
15		
16	16O2-PFHxS	
18		
19	M3 PFBS	M4 PFOA

Table 131 Labelled Standards for Sample S1 Fish paste PFHxS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFHxS	
2	No	No
3	Yes	
4	M3PFHxS	NA
5	Yes	
6	18O2-PFHxS	13C3-PFHxS
8	18O2-PFHxS	
9	13C3 PFHxS	PFHxS18O2
10		
11	M3PFHxS	18O-PFHxS
12	Sodium perfluoro-1-[1,2,3 13C3] hexanesulfonate M3PFHxS	Sodium perfluoro-1-hexane (1O2) sulfonate MPFHxS
13	M3 PFHxS	
14	18O2-PFHxS	
15		
16	16O2-PFHxS	
18		
19	M3 PFHxS	M4 PFOA

Table 132 Labelled Standards for Sample S1 Fish paste PFHxS_L

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFHxS	
2	Yes	Yes
3	Yes	
4	M3PFHxS	NA
5		
6	18O2-PFHxS	13C3-PFHxS
8	18O2-PFHxS	
9	13C3 PFHxS	
10	18O2-PFHxS	18O2-PFOS
11	M3PFHxS	18O-PFHxS
12		
13		
14	18O2-PFHxS	
15		
16	Not applicable	
18	yes	
19		

Table 133 Labelled Standards for Sample S1 Fish paste PFHpS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFHxS	
2	No	No
3	Yes	
4	M3PFHxS	NA
5	Yes	
6	18O2-PFHxS	13C3-PFHxS
8	18O2-PFHxS	
9	13C3 PFHxS	
10	18O2-PFHxS	18O2-PFOS
11	NT	NT
12		
13	M3 PFHxS	
14	18O2-PFHxS	
15		
16	13C8-PFOS	
18		
19	M3 PFHxS	M4 PFOA

Table 134 Labelled Standards for Sample S1 Fish paste PFOS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	No	No
3	Yes	
4	M8PFOS	NA
5	Yes	
6	13C4-PFOS	13C8-PFOS
8	13C8-PFOS	
9	13C8 PFOS	13C4 PFOS
10	13C4-PFOS	18O2-PFOS
11	M8PFOS	M4PFOS
12	Sodium perfluoro-1-[13C8] ocatanesulfonate M8PFOS	Sodium perfluoro-1-[1,2,3,4-13C4] ocatanesulfonate MPFOS
13	13C PFOS	
14	13C8-PFOS	
15		
16	13C4-PFOS	
18		
19	13C PFOS	M4 PFOA

Table 135 Labelled Standards for Sample S1 Fish paste PFOS_L

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	Yes	Yes
3	Yes	
4	M8PFOS	NA
5		
6	13C4-PFOS	13C8-PFOS
8	13C8-PFOS	
9	13C8 PFOS	
10	13C4-PFOS	18O2-PFOS
11	M8PFOS	M4PFOS
12		
13		
14	13C8-PFOS	
15		
16	13C8-PFOS	
18	yes	yes
19		

Table 136 Labelled Standards for Sample S1 Fish paste PFNS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	No	No
3	Yes	
4	M8PFOS	NA
5	Yes	
6	13C4-PFOS	13C8-PFOS
8	13C8-PFOS	
9	13C8 PFOS	
10	13C4-PFOS	18O2-PFOS
11	NT	NT
12		
13	13C PFOS	
14	13C8-PFOS	
15		
16	13C8-PFOS	
18		
19	13C PFOS	M4 PFOA

Table 137 Labelled Standards for Sample S1 Fish paste PFDS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	No	No
3	Yes	
4	M8PFOS	NA
5	Yes	
6	13C4-PFOS	13C8-PFOS
8	13C8-PFOS	
9	13C8 PFOS	
10	13C4-PFOS	18O2-PFOS
11	NT	NT
12		
13	13C PFOS	
14	13C2-PFDoA	
15		
16	13C8-PFOS	
18		
19	13C PFOS	M4 PFOA

Table 138 Labelled Standards for Sample S1 Fish paste PFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Yes	No
3	Yes	
4	MPFOSA	NA
5	Yes	
6	13C8-FOSA	
8	13C8-FOSA	
9	13C8 PFOSA	
10	13C8-PFOSA	13C2-PFTeDA
11	NT	NT
12	N-methyl-d3-perfluoro-1-octancesulfonamide M8FOSA	
13	M8 FOSA	
14	13C8-PFOSA	
15		
16	13C8-FOSA	
18	yes	
19	M8 FOSA	M4 PFOA

Table 139 Labelled Standards for Sample S1 Fish paste N-MeFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Yes	No
3	Yes	
4	d-NN-MeFOSA-M	NA
5	Yes	
6	D3-N-Me FOSA	
8	d3-N-N-MeFOSA	
9	d3-N-N-MeFOSA	
10	13C8-PFOSA	13C2-PFTeDA
11	NT	NT
12	N-methyl-d3-perfluoro-1-octanesulfonamide d-N-N-MeFOSA	
13		
14	d3-N-MeFOSA	
15		
16	d3-N-MeFOSA	
18		
19		

Table 140 Labelled Standards for Sample S1 Fish paste N-MeFOSAA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Yes	No
3	Yes	
4	d3-NN-MeFOSAA	NA
5	Yes	
6	D3-N-Me FOSAA	
8	d3-N-N-MeFOSAA	
9	d3-N-N-MeFOSAA	
10	d3-N-MeFOSAA	d5-N-EtFOSAA
11	NT	NT
12	N-methyl-d3-perfluoro-1-octanesulfonamidoacetic acid d3-N-N-MeFOSAA	
13		
14	d3-N-MeFOSAA	
15		
16	d3-N-MeFOSAA	
18		
19		

Table 141 Labelled Standards for Sample S1 Fish paste 6:2FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Yes	No
3	Yes	
4	M6:2 FTS	NA
5	Yes	
6	13C2-6:2 FTS	
8	13C2-6-2 FTS	
9	13C2 6:2 FTS	
10	13C2-6:2 FTS	13C2-8:2 FTS
11	NT	NT
12	Sodium 1H,1H,2H,2H-perfluoro1-[1,2-13C2]-octane sulfonate M2-6:2FTS	
13	13C2D4 6:2 FTS	
14	13C2-6:2FTS	
15		
16	13C2-6:2 FTS	
18	yes	
19	13C2D4 6:2 FTS	M4 PFOA

Table 142 Labelled Standards for Sample S1 Fish paste 3:3FTCA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	No	No
3	Yes	
4	M5PFPeA	NA
5		
6	13C4-PFPeA	13C5 -PFPeA
8	d9-N-EtFOSE	
9	13C5 PFPeA	
10	NT	NT
11	NT	NT
12		
13		
14	13C5-PFPeA	
15		
16	13C5-PFHxA	
18		
19		

Table 143 Labelled Standards for Sample S1 Fish paste ADONA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOA	
2	No	No
3	Yes	
4	MPFHpA	NA
5	Yes	
6	13C3-PFHpA	13C8-PFOA
8		
9	13C3 HFPO-DA	
10	NT	NT
11	NT	NT
12		
13	13C PFOA	
14	13C4-PFHpA	
15		
16	13C4-PFHpA	
18		
19	13C PFOA	M4 PFOA

Table 144 Labelled Standards for Sample S1 Fish paste 9Cl-PF3ONS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	No	No
3	Yes	
4	M8PFOS	NA
5		
6	13C4-PFOS	13C8-PFOS
8		
9	13C8 PFOS	
10	NT	NT
11	NT	NT
12		
13	13C PFOS	
14	13C8-PFOS	
15		
16	13C8-PFOS	
18		
19	13C PFOS	M4 PFOA

A6.2 Sample S2 Fruit Puree Methodology

Table 145 Participant Methodology – Sample S2 Fruit Puree Sample Preparation and Extraction

Lab. Code	Sample Weight (g)	Labelled Standard(s) Added Before Extraction?	Equilibration Time for Labelled Standard (min)	Sample Pre-treatment, if other	Extraction Technique	Number of Steps (if staggered extraction)	Extraction Solvent(s)	Total Extraction Time (min)
1	0.5	Yes			Alkaline Digestion		NaOH/MeOH	60
2	10.49	Yes	10		Accelerated Solvent Extraction		ACN/MeOH	30
3	NS	NS	NS	NS	NS	NS	NS	NS
4*	2	Yes	15	NA	Solid-Liquid Extraction (vortexed and centrifuged)	NA	2% formic acid in acetonitrile	8 min
5	5	Yes			QuEChERS		ACN:1%H2SO4	15
6*	1 g	Yes	30		Multiple		ACN	2 x 15 min
8	5g	Yes	30		QuEChERS		ACN	60
9	1	Yes	30	N/A	Alkaline Digestion	N/A	KOH/MeOH	480
10	1.0354	Yes	30 minutes	no	Solid-Liquid Extraction (vortexed and centrifuged)	3	ACN	90 minutes
11	NS	NS	NS	NS	NS	NS	NS	NS
12	1	Yes		Homogenisation	QuEChERS		Acetonitrile with 1% Acetic Acid	
13								
14	2	Yes	No		QuEChERS	2	ACN	60
15	NS	NS	NS	NS	NS	NS	NS	NS
16	0.5	Yes			Ion Pair Extraction with Solid-Liquid Extraction		MTBE	90

Lab. Code	Sample Weight (g)	Labelled Standard(s) Added Before Extraction?	Equilibration Time for Labelled Standard (min)	Sample Pre-treatment, if other	Extraction Technique	Number of Steps (if staggered extraction)	Extraction Solvent(s)	Total Extraction Time (min)
18	5	Yes	30-60	15 mL reagent water acidified with 150µL formic acid added prior to extraction	QuEChERS		ACN	15
19	NS	NS	NS	NS	NS	NS	NS	NS

*Additional Information in Table 147.

Table 146 Participant Methodology – Sample S2 Fruit Puree Sample Clean-Up and Concentration

Lab. Code	Carbon Clean-Up?	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Clean-Up	Elution Solvent	Final pH Adjustment
1	No	30	60	Solid-Phase Extraction	NH4OH/MeOH	No
2*	Yes			Solid-Phase Extraction	0.1 % NH4OH in MeOH	No
3	NS	NS	NS	NS	NS	NS
4*	Yes	50°C	Variable	None	Not Applicable	No
5	No			Dilution and Filtration		No
6*	Yes	Room temperature		Carbon clean up	MeOH	No
8	Yes	45	30	Solid-Phase Extraction	Basic ACN and Acetone	No
9*	Yes	35	90	Solid-Phase Extraction	MeOH	No
10	No	room temperature	60 minutes	Solid-Phase Extraction	NH4OH/MeOH	No
11	NS	NS	NS	NS	NS	NS
12	No			Solid-Phase Extraction	10:89:1 IPA/ACN/Ammonium hydroxide	Yes
13						
14	Yes	35	120	None		No
15	NS	NS	NS	NS	NS	NS

Lab. Code	Carbon Clean-Up?	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Clean-Up	Elution Solvent	Final pH Adjustment
16	No	40	20	None	Not Applicable	No
18	Yes	60	40-60	Solid-Phase Extraction	NH4OH/MeOH	No
19	NS	NS	NS	NS	NS	NS

*Additional Information in Table 147.

Table 147 Participant Methodology – Sample S2 Fruit Puree Preparation, Extraction, Clean-Up and Concentration Additional Information

Lab. Code	Additional Information
2	Stacked SPE cartridge was used, no loose carbon.
4	Extraction using Merris-Minimix shaker. Carbon clean up using dSPE (C18, Envicarb, $MgSO_4$).
6	Digestion with 200mM NaOH in methanol, then extraction with acetonitrile. Clean up: Bond Elut Carbon SPE. NR - No result reported due to poor recovery (less than 10%) of the internal standard.
9	Extract centrifuged after digestion @ 3500 RPM.

Table 148 Participant Methodology – Sample S2 Fruit Puree Instrumental Technique

Lab. Code	Instrument	Dilution Before Analysis and Dilution Factor	Blank Correction?	Additional Information
1	LC-MSMS or LC-QQQ		Yes	
2	LC-MSMS or LC-QQQ	No	No	
3	NS	NS	NS	NS
4	LC-MSMS or LC-QQQ	No	Yes	NA
5	LC-Orbitrap	8	Yes	
6	LC-MSMS or LC-QQQ	No	No	
8	LC-MSMS or LC-QQQ		no	
9	LC-MSMS or LC-QQQ	No	No	
10	LC-MSMS or LC-QQQ	NO	Yes	
11	NS	NS	NS	NS

Lab. Code	Instrument	Dilution Before Analysis and Dilution Factor	Blank Correction?	Additional Information
12	LC-MSMS or LC-QQQ		No	In this method the linear standards are used to quantify both the linear as well as the branched isomers
13				
14	LC-MSMS or LC-QQQ	0.00015	Yes	
15	NS	NS	NS	NS
16	LC-MSMS or LC-QQQ	No	No	
18	LC-MSMS or LC-QQQ		No	C-18 LC column (3µm, 150mm x 2mm)
19	NS	NS	NS	NS

Table 149 Participant Methodology – Sample S2 Fruit Puree Labelled Standards

Lab. Code	Labelled Standard Source	Secondary Source Used to Check Standard?	Recovery Correction?	Standard Method Used?	Additional Information
1	Wellington		No		
2	Wellington	No	Yes		
3	NS	NS	NS	NS	NS
4	Wellington Laboratory	No	Yes	No	NA
5	Wellington Laboratories		Yes		
6	Wellington	No	Yes	Isotopic dilution	
8	Wellington	Yes		In-House Method	
9	Wellington	Yes	Yes	No	N/A
10	Wellington	No	Yes	No	
11	NS	NS	NS	NS	NS
12	Wellington		Yes		

Lab. Code	Labelled Standard Source	Secondary Source Used to Check Standard?	Recovery Correction?	Standard Method Used?	Additional Information
13	Wellington, Cambridge Isotopes		Yes	US FDA Foods Program Compendium of Analytical Laboratory Methods: Method C-010.03	d5NN N-EtFOSAA added before instrument analysis
14	Greyhound, Wellington, TLC, LGC		No	Anal. Methods, 2018, 10, 5715–5722 mod.	
15	NS	NS	NS	NS	NS
16	Wellington Laboratories		Yes	In-House	
18	Cambridge (FTS compounds); Wellington (remainder)	yes	Yes		
19	NS	NS	NS	NS	NS

Table 150 Labelled Standards for Sample S2 Fruit puree PFBA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFBA	
2	Yes	Yes
3	NS	NS
4	M4PFBA	NA
5	Yes	
6	13C4-PFBA	13C3-PFBA
8	13C4-PFBA	
9	13C4 PFBA	13C3 PFBA
10	13c4-PFBA	13C8-PFOA
11	NS	NS
12	Perfluoro-n-[13C4]butanoic acid MPFBA	Perfluoro-n-[2,3,4-13C4]butanoic acid M3PFBA
13	M3 PFBA	
14	13C4-PFBA	
15	NS	NS
16	13C4-PFBA	
18	yes	
19	NS	NS

Table 151 Labelled Standards for Sample S2 Fruit puree PFPeA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C5-PFPeA	
2	Yes	No
3	NS	NS
4	M5PFPeA	NA
5	Yes	
6	13C4-PFPeA	13C5 -PFPeA
8	13C5-PFPeA	
9	13C5 PFPeA	
10	13C5-PFPeA	13C8-PFOA
11	NS	NS
12	Perfluoro-n-[13C5]pentanoic acid M5PFPeA	
13	M3 PFPeA	
14	13C5-PFPeA	
15	NS	NS
16	13C5-PFPeA	
18	yes	
19	NS	NS

Table 152 Labelled Standards for Sample S2 Fruit puree PFHxA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C5-PFHxA	
2	Yes	Yes
3	NS	NS
4	M5PFHxA	NA
5	Yes	
6	13C2-PFHxA	13C5 -PFPeA
8	13C2-PFHxA	
9	13C5 PFHxA	13C2 PFHxA
10	13C5-PFHxA	13C8-PFOA
11	NS	NS
12	Perfluoro-n-[1,2,3,4,6-13C5]hexanoic acid M5PFHxA	Perfluoro-n-[1,2-13C5]hexanoic acid MPFHxA
13	M5 PFHxA	
14	13C5-PFHxA	
15	NS	NS
16	13C5-PFHxA	
18	yes	
19	NS	NS

Table 153 Labelled Standards for Sample S2 Fruit puree PFHpA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFHpA	
2	Yes	No
3	NS	NS
4	MPFHpA	NA
5	Yes	
6	13C3-PFHpA	13C8-PFOA
8	13C4-PFHpA	
9	13C4 PFHpA	
10	13C4-PFHpA	13C8-PFOA
11	NS	NS
12	Perfluoro-n-[1,2,3,4-13C4]heptanoic acid M4PFHpA	
13	M5 PFHxA	
14	13C4-PFHpA	
15	NS	NS
16	13C4-PFHpA	
18		
19	NS	NS

Table 154 Labelled Standards for Sample S2 Fruit puree PFOA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOA	
2	Yes	Yes
3	NS	NS
4	M8PFOA	NA
5	Yes	
6	13C4-PFOA	13C8-PFOA
8	13C8-PFOA	
9	13C8 PFOA	13C4 PFOA
10	13C4-PFOA	13C8-PFOA
11	NS	NS
12	Perfluoro-n-[13C8]octanoic acid M8PFOA	Perfluoro-n-[1,2,3,4-13C8]octanoic acid MPFOA
13	13C PFOA	
14	13C4-PFOA	
15	NS	NS
16	13C8-PFOA	
18	yes	yes
19	NS	NS

Table 155 Labelled Standards for Sample S2 Fruit puree PFNA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C9-PFNA	
2	Yes	Yes
3	NS	NS
4	M9PFNA	NA
5	Yes	
6	13C5-PFNA	13C8-PFOA
8	13C5-PFNA	
9	13C9 PFNA	13C5 PFNA
10	13C9-PFNA	13C5-PFNA
11	NS	NS
12	Perfluoro-n-[13C9]nonanoic acid M9PFNA	Perfluoro-n-[1,2,3,4,5-13C9]nonanoic acid MPFNA
13	13C PFOA	
14	13C5-PFNA	
15	NS	NS
16	13C5-PFNA	
18		
19	NS	NS

Table 156 Labelled Standards for Sample S2 Fruit puree PFDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C6-PFDA	
2	Yes	Yes
3	NS	NS
4	M6PFDA	NA
5	Yes	
6	13C2-PFDA	13C8-PFOA
8	13C6-PFDA	
9	13C6 PFDA	13C2 PFDA
10	13C2-PFDA	13C5-PFNA
11	NS	NS
12	Perfluoro-n-[1,2,3,4,6-13C6]decanoic acid M6PFDA	Perfluoro-n-[1,2-13C6]decanoic acid MPFDA
13	13C PFOA	
14	13C6-PFDA	
15	NS	NS
16	13C6-PFDA	
18		
19	NS	NS

Table 157 Labelled Standards for Sample S2 Fruit puree PFDoA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFDoA	
2	Yes	No
3	NS	NS
4	MPFDoDA	NA
5	Yes	
6	13C2-PFDoA	13C8-PFOA
8	13C2-PFDoA	
9	13C2 PFDoA	
10	13C2-PFDoA	13C5-PFNA
11	NS	NS
12	Perfluoro-n-[1,2 13C2]dodecanoic acid MPFDoA	
13	MPFDoA	
14	13C2-PFDoA	
15	NS	NS
16	13C2-PFDoDA	
18	yes	
19	NS	NS

Table 158 Labelled Standards for Sample S2 Fruit puree PFTeDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFTeDA	
2	Yes	No
3	NS	NS
4	MPFTeDA	NA
5	Yes	
6	13C2-PFTeDA	13C8-PFOA
8	13C2-PFTeDA	
9	13C2 PFTeDA	
10	13C2-PFHxDA	13C2-PFTeDA
11	NS	NS
12	Perfluoro-n-[1,2 13C2]tetradecanoic acid M2PFTeDA	
13	MPFTeDA	
14	13C2-PFTeDA	
15	NS	NS
16	13C2-PFTeDA	
18	yes	
19	NS	NS

Table 159 Labelled Standards for Sample S2 Fruit puree PFBS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFBS	
2	Yes	No
3	NS	NS
4	M3PFBS	NA
5	Yes	
6	13C3-PFBS	13C3-PFHxS
8	13C3-PFBS	
9	13C3 PFBS	
10	18O2-PFHxS	18O2-PFOS
11	NS	NS
12	Sodium perfluoro-1-[2,3,4 13C3] butanesulfonate M3PFBS	
13	M3 PFBS	
14	13C3-PFBS	
15	NS	NS
16	13C3-PFBS	
18	yes	
19	NS	NS

Table 160 Labelled Standards for Sample S2 Fruit puree PFPeS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFBS	
2	No	No
3	NS	NS
4	M5PFHxA	NA
5	Yes	
6	18O2-PFHxS	13C3-PFHxS
8	13C3-PFBS	
9	13C3 PFBS	
10	18O2-PFHxS	18O2-PFOS
11	NS	NS
12		
13	M3 PFBS	
14	13C3-PFBS	
15	NS	NS
16	16O2-PFHxS	
18		
19	NS	NS

Table 161 Labelled Standards for Sample S2 Fruit puree PFHxS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFHxS	
2	No	No
3	NS	NS
4	M3PFHxS	NA
5	Yes	
6	18O2-PFHxS	13C3-PFHxS
8	18O2-PFHxS	
9	13C3 PFHxS	PFHxS18O2
10		
11	NS	NS
12	Sodium perfluoro-1-[1,2,3 13C3] hexanesulfonate M3PFHxS	Sodium perfluoro-1-hexane (1O2) sulfonate MPFHxS
13	M3 PFHxS	
14	18O2-PFHxS	
15	NS	NS
16	16O2-PFHxS	
18		
19	NS	NS

Table 162 Labelled Standards for Sample S2 Fruit puree PFHxS_L

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFHxS	
2	Yes	Yes
3	NS	NS
4	M3PFHxS	NA
5		
6	18O2-PFHxS	13C3-PFHxS
8	18O2-PFHxS	
9	13C3 PFHxS	
10	18O2-PFHxS	18O2-PFOS
11	NS	NS
12		
13		
14	18O2-PFHxS	
15	NS	NS
16	Not applicable	
18	yes	
19	NS	NS

Table 163 Labelled Standards for Sample S2 Fruit puree PFHpS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFHxS	
2	No	No
3	NS	NS
4	M3PFHxS	NA
5	Yes	
6	18O2-PFHxS	13C3-PFHxS
8	18O2-PFHxS	
9	13C3 PFHxS	
10	18O2-PFHxS	18O2-PFOS
11	NS	NS
12		
13	M3 PFHxS	
14	18O2-PFHxS	
15	NS	NS
16	13C8-PFOS	
18		
19	NS	NS

Table 164 Labelled Standards for Sample S2 Fruit puree PFOS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	No	No
3	NS	NS
4	M8PFOS	NA
5	Yes	
6	13C4-PFOS	13C8-PFOS
8	13C8-PFOS	
9	13C8 PFOS	13C4 PFOS
10	13C4-PFOS	18O2-PFOS
11	NS	NS
12	Sodium perfluoro-1-[13C8] ocatanesulfonate M8PFOS	Sodium perfluoro-1-[1,2,3,4-13C4] ocatanesulfonate MPFOS
13	13C PFOS	
14	13C8-PFOS	
15	NS	NS
16	13C4-PFOS	
18		
19	NS	NS

Table 165 Labelled Standards for Sample S2 Fruit puree PFOS_L

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	Yes	Yes
3	NS	NS
4	M8PFOS	NA
5		
6	13C4-PFOS	13C8-PFOS
8	13C8-PFOS	
9	13C8 PFOS	
10	13C4-PFOS	18O2-PFOS
11	NS	NS
12		
13		
14	13C8-PFOS	
15	NS	NS
16	13C8-PFOS	
18	yes	yes
19	NS	NS

Table 166 Labelled Standards for Sample S2 Fruit puree PFNS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	No	No
3	NS	NS
4	M8PFOS	NA
5	Yes	
6	13C4-PFOS	13C8-PFOS
8	13C8-PFOS	
9	13C8 PFOS	
10	13C4-PFOS	18O2-PFOS
11	NS	NS
12		
13	13C PFOS	
14	13C8-PFOS	
15	NS	NS
16	13C8-PFOS	
18		
19	NS	NS

Table 167 Labelled Standards for Sample S2 Fruit puree PFDS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	No	No
3	NS	NS
4	M8PFOS	NA
5	Yes	
6	13C4-PFOS	13C8-PFOS
8	13C8-PFOS	
9	13C8 PFOS	
10	13C4-PFOS	18O2-PFOS
11	NS	NS
12		
13	13C PFOS	
14	13C2-PFDoA	
15	NS	NS
16	13C8-PFOS	
18		
19	NS	NS

Table 168 Labelled Standards for Sample S2 Fruit puree PFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Yes	No
3	NS	NS
4	MPFOSA	NA
5	Yes	
6	13C8-FOSA	
8	13C8-FOSA	
9	13C8 PFOSA	
10	13C8-PFOSA	13C2-PFTeDA
11	NS	NS
12	N-methyl-d3-perfluoro-1-octancesulfonamide M8FOSA	
13	M8 FOSA	
14	13C8-PFOSA	
15	NS	NS
16	13C8-FOSA	
18	yes	
19	NS	NS

Table 169 Labelled Standards for Sample S2 Fruit puree 8:2FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Yes	No
3	NS	NS
4	M8:2 FTS	NA
5	Yes	
6	13C2-8:2 FTS	
8	13C2-8-2 FTS	
9	13C2 8:2 FTS	
10	13C2-6:2 FTS	13C2-8:2 FTS
11	NS	NS
12	Sodium 1H,1H,2H,2H-perfluoro1-[1,2-13C2]-decane sulfonate M2-9:2FTS	
13	13C2D4 8:2 FTS	
14	13C2-8:2FTS	
15	NS	NS
16	13C2-8:2 FTS	
18	yes	
19	NS	NS

Table 170 Labelled Standards for Sample S2 Fruit puree 10:2FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	No	No
3	NS	NS
4	MPFDoDA	NA
5	Yes	
6	13C2-8:2 FTS	
8	13C2-10-2 FTS	
9	13C2 8:2 FTS	
10	NT	NT
11	NS	NS
12		
13	13C2D4 10:2 FTS	
14	13C2-10:2FTS	
15	NS	NS
16	13C2-8:2 FTS	
18	yes	
19	NS	NS

Table 171 Labelled Standards for Sample S2 Fruit puree ADONA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOA	
2	No	No
3	NS	NS
4	MPFHpA	NA
5	Yes	
6	13C3-PFHpA	13C8-PFOA
8		
9	13C3 HFPO-DA	
10	NT	NT
11	NS	NS
12		
13	13C PFOA	
14	13C4-PFHpA	
15	NS	NS
16	13C4-PFHpA	
18		
19	NS	NS

Table 172 Labelled Standards for Sample S2 Fruit puree 11Cl-PF3OUdS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	No	No
3	NS	NS
4	MPFDoDA	NA
5		
6	13C4-PFOS	13C8-PFOS
8		
9	13C8 PFOS	
10	NT	NT
11	NS	NS
12		
13	13C PFOS	
14	13C8-PFOS	
15	NS	NS
16	13C8-PFOS	
18		
19	NS	NS

A6.3 Sample S3 Infant Formula Methodology

Table 173 Participant Methodology – Sample S3 Infant Formula Sample Preparation and Extraction

Lab. Code	Sample Weight (g)	Labelled Standard(s) Added Before Extraction?	Equilibration Time for Labelled Standard (min)	Sample Pre-treatment, if other	Extraction Technique	Number of Steps (if staggered extraction)	Extraction Solvent(s)	Total Extraction Time (min)
1	0.5	Yes			Alkaline Digestion		NaOH/MeOH	60
2	5.17	Yes	10		Accelerated Solvent Extraction		ACN/MeOH	30
3	NS	NS	NS	NS	NS	NS	NS	NS
4*	1	Yes	15	NA	Solid-Liquid Extraction (vortexed and centrifuged)	2	ACN	8 min
5	5	Yes			QuEChERS		ACN:1%H2SO4	15
6*	1 g	Yes	30		Multiple		ACN	2 x 15 min
8	5g	Yes	30		QuEChERS		ACN	60
9	1	Yes	30	N/A	Alkaline Digestion	N/A	KOH/MeOH	480
10	1.043	Yes	30 minutes	No	Solid-Liquid Extraction (vortexed and centrifuged)	3	ACN	90 minutes
11	NS	NS	NS	NS	NS	NS	NS	NS
12	1	Yes		Homogenisation	QuEChERS		Acetonitrile with 1% Acetic Acid	
13								
14	2	Yes	No	4 ml MilliQ	QuEChERS	2	ACN	60
15	NS	NS	NS	NS	NS	NS	NS	NS
16	0.5	Yes			Ion Pair Extraction with Solid-Liquid Extraction		MTBE	90

Lab. Code	Sample Weight (g)	Labelled Standard(s) Added Before Extraction?	Equilibration Time for Labelled Standard (min)	Sample Pre-treatment, if other	Extraction Technique	Number of Steps (if staggered extraction)	Extraction Solvent(s)	Total Extraction Time (min)
18	5	Yes	30-60	15 mL reagent water acidified with 150µL formic acid added prior to extraction	QuEChERS		ACN	15
19	NS	NS	NS	NS	NS	NS	NS	NS

*Additional Information in Table 175.

Table 174 Participant Methodology – Sample S3 Infant Formula Sample Clean-Up and Concentration

Lab. Code	Carbon Clean-Up?	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Clean-Up	Elution Solvent	Final pH Adjustment
1	No	30	60	Solid-Phase Extraction	NH4OH/MeOH	No
2*	Yes			Solid-Phase Extraction	0.1 % NH4OH in MeOH	No
3	NS	NS	NS	NS	NS	NS
4	No	50°C	Variable	None	Not Applicable	No
5	No			Dilution and Filtration		No
6*	Yes	Room temperature		Liquid-liquid extraction	MeOH	No
8	Yes	45	30	Solid-Phase Extraction	Basic ACN and Acetone	No
9*	Yes	35	90	Solid-Phase Extraction	MeOH	No
10	No	room temperature	60 minutes	Solid-Phase Extraction	NH4OH/MeOH	No
11	NS	NS	NS	NS	NS	NS

Lab. Code	Carbon Clean-Up?	Extract Concentration Temperature (°C)	Extract Concentration Time (min)	Clean-Up	Elution Solvent	Final pH Adjustment
12	No			Solid-Phase Extraction	10:89:1 IPA/ACN/Ammonium hydroxide	Yes
13						
14	Yes	35	120	None		No
15	NS	NS	NS	NS	NS	NS
16	No	40	20	None	Not Applicable	No
18	Yes	60	40-60	Solid-Phase Extraction	NH4OH/MeOH	No
19	NS	NS	NS	NS	NS	NS

*Additional Information in Table 175.

Table 175 Participant Methodology – Sample S3 Infant Formula Preparation, Extraction, Clean-Up and Concentration Additional Information

Lab. Code	Additional Information
2	Stacked SPE cartridge was used, no loose carbon.
4	Extraction using horizontal shaker. QC criteria were not met for NN-MeFOSA-M, NN-EtFOSA-M, 10:2 FTS, 3:3FTCA and 5:3FTCA so these components are Not Reportable (NR).
6	Digestion with 200mM NaOH in methanol, then extraction with acetonitrile. Clean up: liquid-liquid extraction with n-hexane, then Bond Elut Carbon SPE. NR - No result reported due to poor recovery (less than 10%) of the internal standard.
9	Extract centrifuged after digestion @ 3500 RPM.

Table 176 Participant Methodology – Sample S3 Infant Formula Instrumental Technique

Lab. Code	Instrument	Dilution Before Analysis and Dilution Factor	Blank Correction?	Additional Information
1	LC-MSMS or LC-QQQ		Yes	
2	LC-MSMS or LC-QQQ	No	No	
3	NS	NS	NS	NS

Lab. Code	Instrument	Dilution Before Analysis and Dilution Factor	Blank Correction?	Additional Information
4	LC-MSMS or LC-QQQ	No	Yes	NA
5	LC-Orbitrap	8	Yes	
6	LC-MSMS or LC-QQQ	No	No	
8	LC-MSMS or LC-QQQ		no	
9	LC-MSMS or LC-QQQ	No	No	
10	LC-MSMS or LC-QQQ	No	Yes	
11	NS	NS	NS	NS
12	LC-MSMS or LC-QQQ		No	In this method the linear standards are used to quantify both the linear as well as the branched isomers
13				
14	LC-MSMS or LC-QQQ	0.00015	Yes	
15	NS	NS	NS	NS
16	LC-MSMS or LC-QQQ	No	No	
18	LC-MSMS or LC-QQQ		No	C-18 LC column (3µm, 150mm x 2mm)
19	NS	NS	NS	NS

Table 177 Participant Methodology – Sample S3 Infant Formula Labelled Standards

Lab. Code	Labelled Standard Source	Secondary Source Used to Check Standard?	Recovery Correction?	Standard Method Used?	Additional Information
1	Wellington		No		
2	Wellington	No	Yes		
3	NS	NS	NS	NS	NS
4	Wellington Laboratory	No	Yes	No	NA
5	Wellington Laboratories		Yes		
6	Wellington	No	Yes	Isotopic dilution	

Lab. Code	Labelled Standard Source	Secondary Source Used to Check Standard?	Recovery Correction?	Standard Method Used?	Additional Information
8	Wellington	Yes		In-House Method	
9	Wellington	Yes	Yes	No	N/A
10	Wellington	No	Yes	No	
11	NS	NS	NS	NS	NS
12	Wellington		Yes		
13	Wellington, Cambridge Isotopes		Yes	US FDA Foods Program Compendium of Analytical Laboratory Methods: Method C-010.03	d5NN N-EtFOSAA added before instrument analysis
14	Greyhound, Wellington, TLC, LGC		No	Anal. Methods, 2018, 10, 5715–5722 mod.	
15	NS	NS	NS	NS	NS
16	Wellington Laboratories		Yes	In-House	
18	Cambridge (FTS compounds); Wellington (remainder)	yes	Yes		
19	NS	NS	NS	NS	NS

Table 178 Labelled Standards for Sample S3 Infant formula PFBA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFBA	
2	Yes	Yes
3	NS	NS
4	M4PFBA	NA
5	Yes	
6	13C4-PFBA	13C3-PFBA
8	13C4-PFBA	
9	13C4 PFBA	13C3 PFBA
10	13c4-PFBA	13C8-PFOA
11	NS	NS
12	Perfluoro-n-[13C4]butanoic acid MPFBA	Perfluoro-n-[2,3,4-13C4]butanoic acid M3PFBA
13	M3 PFBA	
14	13C4-PFBA	
15	NS	NS
16	13C4-PFBA	
18	yes	
19	NS	NS

Table 179 Labelled Standards for Sample S3 Infant formula PFPeA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C5-PFPeA	
2	Yes	No
3	NS	NS
4	M5PFPeA	NA
5	Yes	
6	13C4-PFPeA	13C5 -PFPeA
8	13C5-PFPeA	
9	13C5 PFPeA	
10	13C5-PFPeA	13C8-PFOA
11	NS	NS
12	Perfluoro-n-[13C5]pentanoic acid M5PFPeA	
13	M3 PFPeA	
14	13C5-PFPeA	
15	NS	NS
16	13C5-PFPeA	
18	yes	
19	NS	NS

Table 180 Labelled Standards for Sample S3 Infant formula PFHxA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C5-PFHxA	
2	Yes	Yes
3	NS	NS
4	M5PFHxA	NA
5	Yes	
6	13C2-PFHxA	13C5 -PFPeA
8	13C2-PFHxA	
9	13C5 PFHxA	13C2 PFHxA
10	13C5-PFHxA	13C8-PFOA
11	NS	NS
12	Perfluoro-n-[1,2,3,4,6-13C5]hexanoic acid M5PFHxA	Perfluoro-n-[1,2-13C5]hexanoic acid MPFHxA
13	M5 PFHxA	
14	13C5-PFHxA	
15	NS	NS
16	13C5-PFHxA	
18	yes	
19	NS	NS

Table 181 Labelled Standards for Sample S3 Infant formula PFHpA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C4-PFHpA	
2	Yes	No
3	NS	NS
4	MPFHpA	NA
5	Yes	
6	13C3-PFHpA	13C8-PFOA
8	13C4-PFHpA	
9	13C4 PFHpA	
10	13C4-PFHpA	13C8-PFOA
11	NS	NS
12	Perfluoro-n-[1,2,3,4-13C4]heptanoic acid M4PFHpA	
13	M5 PFHxA	
14	13C4-PFHpA	
15	NS	NS
16	13C4-PFHpA	
18		
19	NS	NS

Table 182 Labelled Standards for Sample S3 Infant formula PFOA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOA	
2	Yes	Yes
3	NS	NS
4	M8PFOA	NA
5	Yes	
6	13C4-PFOA	13C8-PFOA
8	13C8-PFOA	
9	13C8 PFOA	13C4 PFOA
10	13C4-PFOA	13C8-PFOA
11	NS	NS
12	Perfluoro-n-[13C8]octanoic acid M8PFOA	Perfluoro-n-[1,2,3,4-13C8]octanoic acid MPFOA
13	13C PFOA	
14	13C4-PFOA	
15	NS	NS
16	13C8-PFOA	
18	yes	yes
19	NS	NS

Table 183 Labelled Standards for Sample S3 Infant formula PFNA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C9-PFNA	
2	Yes	Yes
3	NS	NS
4	M9PFNA	NA
5	Yes	
6	13C5-PFNA	13C8-PFOA
8	13C5-PFNA	
9	13C9 PFNA	13C5 PFNA
10	13C9-PFNA	13C5-PFNA
11	NS	NS
12	Perfluoro-n-[13C9]nonanoic acid M9PFNA	Perfluoro-n-[1,2,3,4,5-13C9]nonanoic acid MPFNA
13	13C PFOA	
14	13C5-PFNA	
15	NS	NS
16	13C5-PFNA	
18		
19	NS	NS

Table 184 Labelled Standards for Sample S3 Infant formula PFDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C6-PFDA	
2	Yes	Yes
3	NS	NS
4	M6PFDA	NA
5	Yes	
6	13C2-PFDA	13C8-PFOA
8	13C6-PFDA	
9	13C6 PFDA	13C2 PFDA
10	13C2-PFDA	13C5-PFNA
11	NS	NS
12	Perfluoro-n-[1,2,3,4,6-13C6]decanoic acid M6PFDA	Perfluoro-n-[1,2-13C6]decanoic acid MPFDA
13	13C PFOA	
14	13C6-PFDA	
15	NS	NS
16	13C6-PFDA	
18		
19	NS	NS

Table 185 Labelled Standards for Sample S3 Infant formula PFUdA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C7-PFUnA	
2	Yes	No
3	NS	NS
4	M7PFUnDA	NA
5	Yes	
6	13C2-PFUdA	13C8-PFOA
8	13C2-PFUnA	
9	13C7 PFUnA	
10	13C2-PFUdA	13C5-PFNA
11	NS	NS
12	Perfluoro-n-[1,2,3,4,6,7-13C7]undecanoic acid M7PFUdA	
13	MPFUdA	
14	13C7-PFUdA	
15	NS	NS
16	13C2-PFUnDA	
18	yes	yes
19	NS	NS

Table 186 Labelled Standards for Sample S3 Infant formula PFTrDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFDoA	
2	No	No
3	NS	NS
4	MPFDoDA	NA
5	Yes	
6	13C2-PFDoA	13C8-PFOA
8	13C2-PFTeDA	
9	13C2 PFDoA	
10	13C2-PFHxDA	13C2-PFTeDA
11	NS	NS
12		
13	MPFDoA	
14	13C2-PFTrDA	
15	NS	NS
16	13C2-PFTeDA	
18		
19	NS	NS

Table 187 Labelled Standards for Sample S3 Infant formula PFTeDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C2-PFTeDA	
2	Yes	No
3	NS	NS
4	MPFTeDA	NA
5	Yes	
6	13C2-PFTeDA	13C8-PFOA
8	13C2-PFTeDA	
9	13C2 PFTeDA	
10	13C2-PFHxDA	13C2-PFTeDA
11	NS	NS
12	Perfluoro-n-[1,2 13C2]tetradecanoic acid M2PFTeDA	
13	MPFTeDA	
14	13C2-PFTeDA	
15	NS	NS
16	13C2-PFTeDA	
18	yes	
19	NS	NS

Table 188 Labelled Standards for Sample S3 Infant formula PFBS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFBS	
2	Yes	No
3	NS	NS
4	M3PFBS	NA
5	Yes	
6	13C3-PFBS	13C3-PFHxS
8	13C3-PFBS	
9	13C3 PFBS	
10	18O2-PFHxS	18O2-PFOS
11	NS	NS
12	Sodium perfluoro-1-[2,3,4 13C3] butanesulfonate M3PFBS	
13	M3 PFBS	
14	13C3-PFBS	
15	NS	NS
16	13C3-PFBS	
18	yes	
19	NS	NS

Table 189 Labelled Standards for Sample S3 Infant formula PFPeS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFBS	
2	No	No
3	NS	NS
4	M5PFHxA	NA
5	Yes	
6	18O2-PFHxS	13C3-PFHxS
8	13C3-PFBS	
9	13C3 PFBS	
10	18O2-PFHxS	18O2-PFOS
11	NS	NS
12		
13	M3 PFBS	
14	13C3-PFBS	
15	NS	NS
16	16O2-PFHxS	
18		
19	NS	NS

Table 190 Labelled Standards for Sample S3 Infant formula PFHxS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFHxS	
2	No	No
3	NS	NS
4	M3PFHxS	NA
5	Yes	
6	18O2-PFHxS	13C3-PFHxS
8	18O2-PFHxS	
9	13C3 PFHxS	PFHxS18O2
10		
11	NS	NS
12	Sodium perfluoro-1-[1,2,3 13C3] hexanesulfonate M3PFHxS	Sodium perfluoro-1-hexane (1O2) sulfonate MPFHxS
13	M3 PFHxS	
14	18O2-PFHxS	
15	NS	NS
16	16O2-PFHxS	
18		
19	NS	NS

Table 191 Labelled Standards for Sample S3 Infant formula PFHxS_L

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFHxS	
2	Yes	Yes
3	NS	NS
4	M3PFHxS	NA
5		
6	18O2-PFHxS	13C3-PFHxS
8	18O2-PFHxS	
9	13C3 PFHxS	
10	18O2-PFHxS	18O2-PFOS
11	NS	NS
12		
13		
14	18O2-PFHxS	
15	NS	NS
16	Not applicable	
18	yes	
19	NS	NS

Table 192 Labelled Standards for Sample S3 Infant formula PFHpS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C3-PFHxS	
2	No	No
3	NS	NS
4	M3PFHxS	NA
5	Yes	
6	18O2-PFHxS	13C3-PFHxS
8	18O2-PFHxS	
9	13C3 PFHxS	
10	18O2-PFHxS	18O2-PFOS
11	NS	NS
12		
13	M3 PFHxS	
14	18O2-PFHxS	
15	NS	NS
16	13C8-PFOS	
18		
19	NS	NS

Table 193 Labelled Standards for Sample S3 Infant formula PFOS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	No	No
3	NS	NS
4	M8PFOS	NA
5	Yes	
6	13C4-PFOS	13C8-PFOS
8	13C8-PFOS	
9	13C8 PFOS	13C4 PFOS
10	13C4-PFOS	18O2-PFOS
11	NS	NS
12	Sodium perfluoro-1-[13C8] ocatanesulfonate M8PFOS	Sodium perfluoro-1-[1,2,3,4-13C4] ocatanesulfonate MPFOS
13	13C PFOS	
14	13C8-PFOS	
15	NS	NS
16	13C4-PFOS	
18		
19	NS	NS

Table 194 Labelled Standards for Sample S3 Infant formula PFOS_L

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	Yes	Yes
3	NS	NS
4	M8PFOS	NA
5		
6	13C4-PFOS	13C8-PFOS
8	13C8-PFOS	
9	13C8 PFOS	
10	13C4-PFOS	18O2-PFOS
11	NS	NS
12		
13		
14	13C8-PFOS	
15	NS	NS
16	13C8-PFOS	
18	yes	yes
19	NS	NS

Table 195 Labelled Standards for Sample S3 Infant formula PFNS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	No	No
3	NS	NS
4	M8PFOS	NA
5	Yes	
6	13C4-PFOS	13C8-PFOS
8	13C8-PFOS	
9	13C8 PFOS	
10	13C4-PFOS	18O2-PFOS
11	NS	NS
12		
13	13C PFOS	
14	13C8-PFOS	
15	NS	NS
16	13C8-PFOS	
18		
19	NS	NS

Table 196 Labelled Standards for Sample S3 Infant formula PFDS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	No	No
3	NS	NS
4	M8PFOS	NA
5	Yes	
6	13C4-PFOS	13C8-PFOS
8	13C8-PFOS	
9	13C8 PFOS	
10	13C4-PFOS	18O2-PFOS
11	NS	NS
12		
13	13C PFOS	
14	13C2-PFDoA	
15	NS	NS
16	13C8-PFOS	
18		
19	NS	NS

Table 197 Labelled Standards for Sample S3 Infant formula N-MeFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Yes	No
3	NS	NS
4	d-NN-MeFOSA-M	NA
5	Yes	
6	D3-N-Me FOSA	
8	d3-N-N-MeFOSA	
9	d3-N-N-MeFOSA	
10	13C8-PFOSA	13C2-PFTeDA
11	NS	NS
12	N-methyl-d3-perfluoro-1-octanesulfonamide d-N-N-MeFOSA	
13		
14	d3-N-MeFOSA	
15	NS	NS
16	d3-N-MeFOSA	
18		
19	NS	NS

Table 198 Labelled Standards for Sample S3 Infant formula N-MeFOSAA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Yes	No
3	NS	NS
4	d3-NN-MeFOSAA	NA
5	Yes	
6	D3-N-Me FOSAA	
8	d3-N-N-MeFOSAA	
9	d3-N-N-MeFOSAA	
10	d3-N-MeFOSAA	d5-N-EtFOSAA
11	NS	NS
12	N-methyl-d3-perfluoro-1-octanesulfonamidoacetic acid d3-N-N-MeFOSAA	
13		
14	d3-N-MeFOSAA	
15	NS	NS
16	d3-N-MeFOSAA	
18		
19	NS	NS

Table 199 Labelled Standards for Sample S3 Infant formula N-EtFOSAA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Yes	No
3	NS	NS
4	d5-NN-EtFOSAA	NA
5	Yes	
6	D5-N-Et FOSAA	
8	d5-NN-EtFOSAA	
9	d5-N-N-EtFOSAA	
10	d3-N-MeFOSAA	d5-N-EtFOSAA
11	NS	NS
12	N-ethyl-d5-perfluoro-1-octanesulfonamidoacetic acid d5-N-N-EtFOSAA	
13		
14	d5-N-EtFOSAA	
15	NS	NS
16	d5-N-EtFOSAA	
18		yes

19	NS	NS

Table 200 Labelled Standards for Sample S3 Infant formula EtFOSE

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Yes	No
3	NS	NS
4	d9-NEtFOSE-M	NA
5	Yes	
6	D9-N-Et FOSE	
8	d9-N-EtFOSE	
9	d9-N-EtFOSE	
10	NT	NT
11	NS	NS
12	2-(N-ethyl-d9-perfluoro-1-octanesulfonamido) ethan-d4-ol d9-N-EtFOSE	
13		
14	d9-EtFOSE	
15	NS	NS
16	d3-EtFOSE	
18		
19	NS	NS

Table 201 Labelled Standards for Sample S3 Infant formula 8:2FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Yes	No
3	NS	NS
4	M8:2 FTS	NA
5	Yes	
6	13C2-8:2 FTS	
8	13C2-8-2 FTS	
9	13C2 8:2 FTS	
10	13C2-6:2 FTS	13C2-8:2 FTS
11	NS	NS
12	Sodium 1H,1H,2H,2H-perfluoro1-[1,2-13C2]-decane sulfonate M2-9:2FTS	
13	13C2D4 8:2 FTS	
14	13C2-8:2FTS	
15	NS	NS
16	13C2-8:2 FTS	
18	yes	
19	NS	NS

Table 202 Labelled Standards for Sample S3 Infant formula 10:2FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	No	No
3	NS	NS
4	MPFDoDA	NA
5	Yes	
6	13C2-8:2 FTS	
8	13C2-10-2 FTS	
9	13C2 8:2 FTS	
10	NT	NT
11	NS	NS
12		
13	13C2D4 10:2 FTS	
14	13C2-10:2FTS	
15	NS	NS
16	13C2-8:2 FTS	
18	yes	
19	NS	NS

Table 203 Labelled Standards for Sample S3 Infant formula GenX

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOA	
2	Yes	No
3	NS	NS
4	M3HFPO-DA	NA
5		
6	13C3-GenX	
8		
9	13C3 HFPO-DA	
10	13C2-GenX	13C8-PFOA
11	NS	NS
12	2 3 3 3-tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)(13C8)propanoic acid M3HFPO-DA	
13	M3 HFPO	
14	13C3-GenX	
15	NS	NS
16	M3HFPO-DA	
18	yes	
19	NS	NS

Table 204 Labelled Standards for Sample S3 Infant formula 11Cl-PF3OUdS

Lab. Code	Before Extraction	Before Instrument Analysis
1	13C8-PFOS	
2	No	No
3	NS	NS
4	MPFDoDA	NA
5		
6	13C4-PFOS	13C8-PFOS
8		
9	13C8 PFOS	
10	NT	NT
11	NS	NS
12		
13	13C PFOS	
14	13C8-PFOS	
15	NS	NS
16	13C8-PFOS	
18		
19	NS	NS

APPENDIX 7 - ACRONYMS AND ABBREVIATIONS

3:3FTCA	3-Perfluoropropyl propanoic acid
4:2FTS	4:2 Fluorotelomer sulfonate
5:3FTCA	2H,2H,3H,3H-Perfluorooctanoic acid
6:2diPAP	Bis[2-(perfluorodecyl)ethyl] phosphate
6:2FTOH	2-Perfluorohexyl ethanol
6:2FTS	6:2 Fluorotelomer sulfonate
7:3FTCA	3-Perfluoroheptyl propanoic acid
8:2diPAP	Bis[2-(perfluorooctyl)ethyl] phosphate
8:2FTOH	2-Perfluorooctyl ethanol
8:2FTS	8:2 Fluorotelomer sulfonate
9Cl-PF3ONS	9-chlorohexadecafluoro-3-oxanonane-1-sulfonate
10:2FTOH	2-Perfluorodecyl ethanol
10:2FTS	10:2 Fluorotelomer sulfonate
11Cl-PF3OUdS	11-chloroeicosafluoro-3-oxaundecane-1-sulfonate
ACN	Acetonitrile
ADONA	4,8-dioxa-3H-perfluorononanoate
ASE	Accelerated Solvent Extraction
AV	Assigned Value
CITAC	Cooperation on International Traceability in Analytical Chemistry
CRM	Certified Reference Material
CV	Coefficient of Variation
N-EtFOSA	N-Ethyl perfluorooctane sulfonamide
N-EtFOSAA	N-Ethyl perfluorooctane sulfonamido acetic acid
EtFOSE	N-Ethyl perfluorooctane sulfonamido ethanol
FOUEA	2H-Perfluoro-2-decenoic acid
FSANZ	Food Standards Australia New Zealand
GAG	General Accreditation Guidance (NATA)
GenX	2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid
GUM	Guide to the Expression of Uncertainty in Measurement
HV	Homogeneity Value
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
k	Coverage factor
LC	Liquid Chromatography

LLE	Liquid-Liquid Extraction
LOR	Limit of Reporting
Max	Maximum
Md	Median
N-MeFOSA	N-Methyl perfluorooctane sulfonamide
N-MeFOSAA	N-Methyl perfluorooctane sulfonamido acetic acid
MeFOSE	N-Methyl perfluorooctane sulfonamido ethanol
MeOH	Methanol
Min	Minimum
MQ	Milli-Q water
MS	Mass Spectrometry
MS/MS	Tandem Mass Spectrometry
MTBE	Methyl tert-butyl ether
MU	Measurement Uncertainty
N	Number of numeric results
NA	Not Applicable
NATA	National Association of Testing Authorities, Australia
NFDHA	Nonafluoro-3,6-dioxaheptanoic acid
NMIA	National Measurement Institute, Australia
NR	Not Reported
NS	Not Supplied
NT	Not Tested
PCV	Performance Coefficient of Variation
PFAA	Perfluoroalkyl acid
PFAS	Per- and polyfluoroalkyl Substances
PFBA	Perfluorobutanoic acid
PFBS	Perfluorobutane sulfonate
PFCA	Perfluoroalkyl carboxylic acid
PFDA	Perfluorodecanoic acid
PFDoA	Perfluorododecanoic acid
PFDoS	Perfluorododecane sulfonate
PFDS	Perfluorodecane sulfonate
PFECA	Per- and polyfluoroether carboxylic acid
PFECHS	Perfluoro-4-ethylcyclohexanesulfonate
PFEESA	Perfluoro(2-ethoxyethane) sulfonic acid

PFESA	Per- and polyfluoroether sulfonate
PFHpA	Perfluoroheptanoic acid
PFHpS	Perfluoroheptane sulfonate
PFHxA	Perfluorohexanoic acid
PFHxDA	Perfluorohexadecanoic acid
PFHxS	Perfluorohexane sulfonate
PFMBA	Perfluoro-4-methoxybutanoic acid
PFMPA	Perfluoro-3-methoxypropanoic acid
PFNA	Perfluorononanoic acid
PFNS	Perfluorononane sulfonate
PFOA	Perfluorooctanoic acid
PFODA	Perfluorooctadecanoic acid
PFOS	Perfluorooctane sulfonate
PFOSA	Perfluorooctane sulfonamide
PFPeA	Perfluoropentanoic acid
PFPeS	Perfluoropentane sulfonate
PFSA	Perfluoroalkane sulfonate
PFTeDA	Perfluorotetradecanoic acid
PFTrDA	Perfluorotridecanoic acid
PFTrDS	Perfluorotridecane sulfonate
PFUdA	Perfluoroundecanoic acid
PFUdS	Perfluoroundecane sulfonate
PT	Proficiency Testing
QQQ	Triple Quadrupole Mass Spectrometry
QuEChERS	Quick, Easy, Cheap, Effective, Rugged and Safe extraction method
RA	Robust Average
Rec	Recovery
RM	Reference Material
s_{an}	Analytical standard deviation
SD	Standard Deviation
SDPA	Standard Deviation for Proficiency Assessment
SI	International System of Units
SLE	Solid-Liquid Extraction
SPE	Solid-Phase Extraction
SS	Spiked Samples

s_{sam}	Between-sample standard deviation
SV	Spiked Value (or formulated concentration of a PT sample)
UPLC	Ultra Performance Liquid Chromatography
USEPA	United States Environmental Protection Agency

END OF REPORT