Australian Government
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National Measurement Institute

Proficiency Test Report AQA 18-09 PFAS in soil, water, fish and prawn

December 2018

ACKNOWLEDGMENTS

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

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

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TABLE OF CONTENTS

SUMMARY

AQA 18-09 was conducted in June 2018. Thirty-three laboratories participated and thirty-one submitted results by the due date.

This study focused on the measurement of sixteen per- and polyfluorinated alkyl substances (PFAS) - PFOS, PFOA, PFHxS, PFOSA, PFBS, PFBA, PFPeA, PFHxA, PFHpA, PFNA, PFDA, PFTeDA, MeFOSA, EtFOSE, 6:2 FTS and 8:2 FTS in soil, water, fish and prawn. Six test samples were prepared at the NMI North Ryde laboratory and consisted of:

- two soil samples, Sample S1 spiked with 16 individual PFAS components and Sample S2 with incurred PFAS contaminants and spiked with additional 4 PFAS components;
- two water samples, Sample S3 with incurred PFAS contaminants and spiked with additional 6 PFAS components and Sample S4 spiked with 16 individual PFAS components.
- one fish sample spiked with 15 individual PFAS components.
- one prawn sample spiked with 15 individual PFAS components.

The samples were sufficiently homogeneous and stable for evaluation of participants' performance.

Of a possible 2303 expected numeric results a total of 1813 (79%) were submitted.

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

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

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

- *to compare the performances of participant laboratories and to assess their accuracy in the measurement of PFOS, PFOA, PFHxS, PFOSA, PFBS, PFBA, PFPeA, PFHxA, PFHpA, PFNA, PFDA, PFTeDA, MeFOSA, EtFOSE, 6:2 FTS and 8:2 FTS in soil, water, fish and prawn matrices;*

  Laboratory performance was assessed using both z-scores and E_n-scores.
  Of 1744 z-scores, 1544 (89%) were satisfactory with $|z| \leq 2$.
  Of 1744 E_n-scores, 1425 (82%) were satisfactory with $|E_n| \leq 1$.

  Eighteen laboratories analysed all three matrices, seven laboratories analysed two matrices and six laboratories analysed one matrix only. No laboratories returned both satisfactory z and E_n-scores for all analytes (84) for which scores were calculated.

  Laboratories **12** and **18** reported the highest number of results for which z-scores were calculated (83 out of 84).

  Laboratory **12** had the highest number of satisfactory z and E_n-scores 81 out of 83.

  All the results reported by laboratories **23** (80), **11** (76), **27** (72), **3** (52), **8** (50), **16** (46), **31** (24), **15** (22) and **9** (8) returned satisfactory z-scores.

  Laboratories **11** (76), **31** (24), **32** (26) and **9** (8) returned satisfactory E_n-scores for all results reported.

- *to evaluate the laboratories' methods;*

  Participants used a variety of methods for extraction. No correlation between results and method was evident. The analytical detection method of choice was LC-MS/MS.

  Water matrix was more challenging than soil and biota especially for MeFOSA, EtFOSE, PFOSA and PFTeDA. Adsorption on the wall of the sample container and inefficient extraction methodology are possible reasons for low recoveries of these analytes in the spiked samples. Prawn matrix was more difficult than fish, with lower recoveries for all analytes except PFBA. The reported level of this analyte was enhanced in fish matrix likely due to the presence of matrix interference.

  Not all participants used a corresponding PFAS labelled internal standard for quantification. From the total number of 194 unsatisfactory z-scores, 70 (36%) were from participants that did not use the corresponding labelled internal standard

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

  All 1813 numeric results (100%) were reported with an associated estimate of expanded measurement uncertainty.

  The magnitude of the reported expanded uncertainties was within the range 0% to 518% of the reported value. Eighty-seven (5%) were less than 10% relative, which the study coordinator believes is unrealistically small for a routine PFAS measurement and one hundred and seventeen (6.5%) were larger than 50% relative.

1 INTRODUCTION

1.1 NMI Proficiency Testing Program

The National Measurement Institute (NMI) is responsible for Australia's national measurement infrastructure, providing a range of services including a chemical proficiency testing program. Proficiency testing (PT) is: 'evaluation of participant performance against pre-established criteria by means of interlaboratory comparison.'[1] NMI PT studies target chemical testing in areas of high public significance such as trade, environment, law enforcement and food safety. NMI offers studies in:

- pesticide residues in fruit and vegetables, soil and water;
- per- and polyfluorinated alkyl substances (PFAS);
- petroleum hydrocarbons in soil and water;
- metals in soil, water, food and pharmaceuticals;
- controlled drug assay;
- folic acid in flour; and
- allergens in food.

1.2 Study Background

Per- and polyfluorinated alkyl substances (PFAS) are chemicals found in industrial products such as fire-fighting foams and non-stick coatings. Their resistance to degradation makes them a growing global environmental concern. These complex contaminants are challenging to measure. PFOS, the most commonly reported PFAS, was added in 2010 to the list of chemicals regulated under the international Stockholm Convention for Persistent Organic Pollutants, to which Australia is a signatory.

1.3 Study Aims

The aims of the study were to:

- compare the performances of participant laboratories and assess their accuracy in the measurement of PFAS in soil, water, fish and prawn matrices;
- evaluate the laboratories' test methods; and
- develop the practical application of traceability and measurement uncertainty and provide participants with information that will be useful in assessing their uncertainty estimates.

1.4 Study Conduct

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

The study falls within the scope of NMI's accreditation as a proficiency testing provider.

2 STUDY INFORMATION

2.1 Study Timetable

The timetable of the study was:

Invitation issued	27 April 2018
Samples dispatched	04 June 2018
Results due	12 July 2018
Interim report issued	01 August 2018

2.2 Participation

One hundred and nineteen Australian and international laboratories were invited to participate. Thirty-three laboratories participated (see Appendix 1) and thirty-one submitted results by the due date.

2.3 Test Material Preparation

Six test samples were prepared in April-May 2018. Care was taken to avoid any Teflon contamination during sample preparation.

- Two soil samples S1 and S2 each 20 g
  - Sample S1 spiked with 16 individual PFAS components, and
  - Sample S2 with incurred PFAS contaminants and spiked with 4 PFAS components.
- Two water samples S3 and S4 each 2 x 50 mL
  - Sample S3 with incurred PFAS contaminants and spiked with 6 PFAS components, and
  - Sample S4 spiked with 16 individual PFAS components.
- One fish sample spiked with 15 individual PFAS components.
- One prawn sample spiked with 15 individual PFAS components.

PFTeDA, MeFOSA and EtFOSE were introduced for the first time in this PT study.

Sixteen analytical standards used for spiking samples in AQA 18-09 were purchased from HPC Standards GmbH, Toronto Research Chemicals, Sigma-Aldrich and Wellington Laboratories Canada.

Details of the spiked analytes and levels are presented in Table 1.

Table 1 Formulated concentrations of test samples

	Soil µg/kg		Water µg/L		Fish µg/kg	Prawn µg/kg
PFAS	S1 spiked	S2 Incurred + spiked	S3 Incurred + spiked	S4 spiked	S5 spiked	S5 spiked
PFOS	6.97	Incurred	Incurred	0.059	3.17	32.0
PFHxS	16.10	Incurred	Incurred	0.050	5.50	8.70
PFOSA	10.28	Incurred	Incurred	0.108	10.43	9.08
PFBS	9.39	Incurred	Incurred	0.052	3.47	4.73
PFOA	6.96	Incurred + 66.3	Incurred	0.037	14.95	13.32
PFBA	7.74	Incurred	Incurred	0.478	6.64	8.03
PFPeA	7.20	Incurred	Incurred	0.046	5.50	6.60
PFHxA	11.80	Incurred	Incurred	0.045	7.00	7.00
PFHpA	14.90	Incurred	Incurred	0.030	15.10	11.00
PFNA	18.27	Incurred	0.066	0.065	Not spiked	Not spiked
PFDA	16.51	Incurred	Incurred	0.098	4.52	8.39
PFTeDA	8.90	Incurred	0.078	0.079	3.00	5.50
6:2 FTS	5.49	5.55	0.047	0.048	4.78	5.61
8:2 FTS	0.178	Incurred	0.102	0.100	8.10	9.50
EtFOSE	5.46	5.24	0.029	0.029	8.01	5.28
MeFOSA	5.04	2.40	0.030	0.031	12.18	14.94

2.4 Test Material Homogeneity and Stability Testing

The preparation of the study samples is described in Appendix 2. No homogeneity or stability testing was conducted on soil, water and fish samples. These samples were prepared and packaged using a process that has been demonstrated to produce homogeneous and stable samples for previous NMI PFAS PT. The results of the study gave no reason to question the homogeneity or stability of these samples.

Prawn samples were introduced for the first time in this PT study. The preparation, homogeneity testing and stability check is presented in Apendix 3.

A stability study of the test samples kept at room temperature was carried out over the period of three months, starting early June 2018 when the test samples were dispatched.

Prawn samples were demonstrated to be sufficiently homogeneous and stable for use in this PT study.

2.5 Laboratory Code

All laboratories that agreed to participate were assigned a confidential code number.

2.6 Sample Storage, Dispatch and Receipt

Prior to dispatch, soil and water samples were refrigerated at 4°C, while fish and prawn samples were kept frozen at -80 °C.

Participants were sent 20 g soil in Greiner tubes for each of Samples S1 and S2, two 50 mL water in HDPE bottles for each of Samples S3 and S4 and 5 g fish and 5 g prawn in Greiner tubes for Samples S5 and S6. The samples were packed in a foam box with a cooler brick and sent by courier on 04 June 2018.

The following items were packaged with the samples:

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

An Excel spreadsheet for the electronic reporting of results was e-mailed to participants.

2.7 Instructions to Participants

Participants were instructed as follows:

- Quantitatively analyse the samples using your normal test method. For water samples **use** the entire contents of the bottle for analysis.
- Report results in units of **µg/kg** on **as received basis** for soil and biota samples.
- Report results in units of **µg/L** for water samples.
- For each analyte in each sample report a single result expressed as if reporting to a client (ie correct for recovery or not, according to your standard procedure). This figure will be used in all statistical analysis in the study report.
- For each analyte in each sample report the associated expanded measurement uncertainty (eg 0.50 ± 0.02 µg/kg).
- Report any analyte not tested as NT.
- 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 the basis of your uncertainty estimates (eg uncertainty budget, repeatability precision, long term result variability).
- Return the completed results sheet by e-mail to proficiency@measurement.gov.au
- **Please return completed result sheet by 12 July 2018. Late results may not be included in the study report.**

2.8 Interim Report

An interim report was emailed to participants on 01 August 2018.

3 PARTICIPANT LABORATORY INFORMATION

3.1 Test Methods Reported by Participants

Table 2 Test methods – Samples S1 and S2 Soil

Lab Code	Sample weight (g)	Sample pretreatment	Extraction technique	Extraction solvent(s):	Clean-up	Equipment	Column type	Column Specifications:	Extra column for blank separation
1	2		Sonication	Methanol/water 1:1	None	LCMSMS QQQ	C18	50 x2.1 mm x 1.8um	Yes
2	1		SLE then SPE	0.1% NH3 in methanol	SPE (Oasis WAX)	LC-MSMS QqQ	C18	50mm x 3.0mm x 1.8µm	Yes
4	2	ph adjust 6.5	tumble + spe	MeOH	spe	lc-msms		eclipse	yes
6	2		Solvent extraction	Methanol:Water	EnviCarb	Agilent/Shimadzu LC-MS/MS	C18	50 x 2.1 mm, 1.8 µm	yes
7	1		Solvent extraction	Water/Acetonitrile	None	LC-MS Q-Exactive	C18	50mmx3.0mmx2.7um	yes
8	2		LLE with ion pairing	MTBE	None	LC-MSMS	C18	1.6µm, 2.0mm x 50mm	no
9			Sonication	Methanol	SPE	LC-MS/MS	C8	3.0 x 100 mm, 3.5 micron	no
10	1		Alkaline digestion	0.01M KOH in MeOH	Centrifugation	LC-MSMS	C18	10cm x 2.1mm x 2.7mm	yes
11	5	homogenise	Alkaline Extraction	MeOH	Envicarb clean up	LC-MSMS	C18	50 mm x 2.1mm x 1.8um	yes
12	2		SLE	Acetonitrile	SPE	LC-MS-Orbitrap	C18	C18 100mmX2.1mm 1.7µm	yes
13	5.05		Shaker/Sonication	KOH/methanol	SPE	LC/MS/MS	C18	5 cm x 2.0 mm x 3.0 µm	no
14	0,02	Homogenisation	ultrasonic bath	Methanol	active carbon	LC-MS/MS	Nucleodur Shinx RP 3µm		no
16	0.5	Nil	Alkaline digestion	Ammonium hydroxide in methanol	Carbon SPE	LC-MS/MS QqQ	C18	5 cm x 2.0 mm x 1.6 µm	yes

Lab Code	Sample weight (g)	Sample pretreatment	Extraction technique	Extraction solvent(s):	Clean-up	Equipment	Column type	Column Specifications:	Extra column for blank separation
17	5			1% NH4OH in methanol	centrifugation and solvent exchange to MQ water	LC MS/MS	Shim-pack XR-ODS	with agilent extend-C18 trapping column	
18	2		LLE with ion pairing	MTBE	None	LC-MSMS	C18	1.6µm, 2.0mm x 50mm	no
19	5		soxhlet extraction	methanol	centrifugation	LC-MS/MS	biphenyl	15 cm x 2.1 mm x 3.5 µm	yes
20	5.05	Acidification	Mechanical agitation	Methanolic potassium hydroxide	SPE (Oasis, WAX)	LC-MSMS	C18	5 cm x 2.1 mm x 1.7 µm	no
21	1		Extracted with 99:1 MeOH/Ammonium hydroxide (v/v) Adjusted pH to 5-6 before SPE	Extracted with 99:1 MeOH/Ammonium hydroxide (v/v) Adjusted pH to 5-6 before SPE	Strata X-AW 33um polymeric Weak Anion	LCMS-orbitrap	Kinetex C18	100x3mm 2.6 um	no
23	2		dispersive SPE	NaOH-methanol	Graphitised Carbon	LC-MSMS QqQ	C18	100 x 2.1 mm x 1.8 µm	yes
24	1	keep cool >0 to 6°C in glass container free of teflon	Organic Extraction	CAN/MeOH	SPE	LC-MS/MS	C18	4.6x100mm,2.6µm	yes
26	1.055	Samples are homogenized prior to extraction.	Solid-liquid extraction	1% acetic acid in MeOH	Nylon filter	LC-MS-MS	C18	100mm × 4.6mm × 2.6µm	Yes
27	1		Extraction with solvent	Methanol/KOH	N/A	LC/MS/MS	C18	1.7 µm X 2.1 mm X 50 mm	No
29	5		solvent extraction	Methanol	SPE (Oasis WAX)	LC-MSMS QqQ	Phenomenex Luna® Omega PS C18	5 cm x 2,1mm 1,6µm	no

Table 3 Test methods – Samples S1 and S2 Soil (cont'd)

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
1	PFOS: 13C4-PFOS PFOA: 13C4 PFOA PFBA: 13C4 PFBA PFhxA: 13C2 PFHxA PFHxS: 18O2 PFHxS PFNoA: 13C5 PFNoA PFDeA: 13C2 PFDeA PFOSA: 13C4-PFOS		no		no	no
2	(13C4)PFBA (13C6)PFPeA 1,2,3,4,6-(13C5)PFHxA 1,2,3,4-(13C4)PFHpA (13C8)PFOA (13C9)PFNA 1,2,3,4,5,6-(13C6)PFDA 1,2,3,4,5,6,7-(13C7)PFUdA 1,2-(13C2)PFDoA 1,2-(13C2)PFTeDA 2,3,4-(13C3)PFBS 1,2,3-(13C3)PFHxS (13C8)PFOS	2,3,4-(13C3)PFBA 1,2-(13C2)PFOA 1,2-(13C2)PFDA 1,2,3,4-(13C4)PFOS	no		Yes; EPA-821-R-11-007	No
4	all compounds	6		isotope dilution	Yes; EPA	no
6	Wellington Laboratories		yes	Isotope dilution	Yes; US EPA 821	no
7	PFBA-C4 PFOS-C8 PFOSA-C8 6:2FTS-C2	N/A	yes	Internal std	Yes; 0-068 Inhouse method	no
8	13C4-PFOS 13C8-PFOA	13C3-PFBS, 16O2-PFHxS, 13C8-PFOS, 13C4-PFBA, 13C5-PFPeA, 13C5-PFHxA, 13C4-PFHpA, 13C4-PFOA, 13C5-PFNA, 13C6-	no		no	no

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
		PFDA, 13C2-PFUnDA, 13C2-PFDoDA, 13C2-PFTeDA, 13C2-PFHxDA, 13C8-FOSA, d3-MeFOSA, d5-EtFOSA, d7-MeFOSE, d3EtFOSE, d3-MeFOSAA, d5-EtFOSAA, 13C2-4:2 FTS, 13C2-6:2 FTS, 13C2-8:2 FTS				
9	[13C8]-PFOA [13C8]-PFOS	[13C7]-PFUdA [13C3]-PFHxS	no		no	no
10	13C4PFOS 13C4PFOA etc as per Wellington Labs MPFAC-MXA	13C8PFOA 13C8PFOS	yes	Isotope dilution	no	no
11	All analytes had their own extracted internal standard	13C8 PFOS 13C5 PFPeA 13C2 12C6 PFOA	yes	Corrected vs Extracted Internal Standards (added before extraction)	Yes; ASTM D7968	no
12	PFNA-C5	PFOS-C4; PFOS-C4 PFHXS-O2; PFHXS-O2 PFOSA-C8; PFOSA-C8 PFBA-C4; PFBA-C4 PFOA-C4; PFOA-C4 PFOA-C8; PFOA-C8 PFDA-C2; PFDA-C2 N-MeFOSA-D3; N-MeFOSA-D3 N-MeFOSE-D7; N-MeFOSE-D7 PFDoDA-C2; PFDoDA-C2 6:2-FTS-C2; 6:2-FTS-C2	yes	Int.std	no	no
13	PFOS: 13C4PFOS PFOA: 13C4PFOA PFHxA: 13C2PFHxA PFHxS: 13C-PFHxS PFOSA: 13C8-PFOSA	All labelled IS: 13C2PFOA	Yes	Isotope Dilution	no	no

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
	PFBA: 13C4 PFBA PFPeA: 13C5-PFPeA PFHpA: 13C4-PFHpA PFNA: 13C5-PFNA PFDA: 13C2-PFDA 6:2 FTS: 13C2-6:2 FTS 8:2 FTS: 13C2-8:2 FTS PFBS: 13C3-PFBS PFTeDA: 13C2-PFTeDA					
14	H4PFOS: 13C2-6:2FTS PFBA: 13C4-PFBA PFPeA: 13C5-PFPeA PFHxA: 13C2-PFHxA PFHxS: 18O2-PFHxS PFHpA: 13C4-PFHpA PFOA: 13C8-PFOA PFOS: 13C4-PFOS PFOSA: 13C8-PFOSA PFNA: 13C5-PFNA PFDA: 13C2-PFDA PFBS: 13C3-PFBS PFTeA: 13C2-PFTeDA 42 FTS: 13C2-PFHXA	13C8-PFOA	yes	13C Int.std.	no	yes
16	PFOS: 13C4PFOS PFOA: 13C4PFOA Other: 13C2PFHxA, 18O2PFHxS, 13C2 6:2 FTS, 13C5PFNA, 13C2 8:2 FTS, 13C2PFDA	PFOS 13C8PFOS PFOA 13C8PFOA	yes	isotope dilution	no	no
17	MPFAC-MXA MFTS (Telomer)					no
18	13C4-PFOS 13C8-PFOA	13C3-PFBS, 16O2-PFHxS, 13C8-PFOS, 13C4-PFBA, 13C5-PFPeA, 13C5-PFHxA, 13C4-PFHpA, 13C4-PFOA, 13C5-PFNA, 13C6-PFDA, 13C2-PFUnDA, 13C2-PFDoDA, 13C2-PFTeDA, 13C2-PFHxDA, 13C8-FOSA, d3-MeFOSA, d5-EtFOSA, d7-MeFOSE,	no		no	no

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
		d3EtFOSE, d3-MeFOSAA, d5-EtFOSAA, 13C2-4:2 FTS, 13C2-6:2 FTS, 13C2-8:2 FTS				
19	no	all labeled PFBuA; PFHxA; PFOA; PFNoA; PFDeA; PFUdA; PFDoA PFHxS; PFOS	yes	13C Int Std. correction	no	yes
20	PFOS; 13C8-PFOS PFHxS; 13C3-PFHXS PFOSA; 13C8-PFOSA PFBS; 13C3-PFBS PFOA; 13C8-PFOA PFBA; 13C4-PFBA PFPeA; 13C5-PFPEA PFHxA; 13C5-PFHXA PFHpA; 13C4-PFHPA PFNA; 13C9-PFNA PFDA; 13C6-PFDA MeFOSA; D3-N-MEFOSA EtFOSE; D9-N-ETFOSE PFTeDA; 13C2-PFTEDA 6:2 FTS; 13C 6:2 FTS 8:2 FTS; 13C 8:2 FTS	13C8-PFOS; 13C4-PFOS 13C3-PFHXS; 18O2-PFHXS 13C8-PFOSA; 13C4-PFOS 13C3-PFBS; 18O2-PFHXS 13C8-PFOA; 13C4-PFOA 13C4-PFBA; 13C3-PFBA 13C5-PFPEA; 13C2-PFHXA 13C5-PFHXA; 13C2-PFHXA 13C4-PFHPA; 13C4-PFOA 13C9-PFNA; 13C5-PFNA 13C6-PFDA; 13C2-PFDA D3-N-MEFOSA; 13C4-PFOS D9-N-ETFOSE; 13C4-PFOS 13C2-PFTEDA; 13C2-PFDA 13C 6:2 FTS; 18O2-PFHXS 13C 8:2 FTS; 18O2-PFHXS	yes	isotope dilution	no	no
21	Perfluoro-n-[13C4]butanoic acid MPFBA Perfluoro-n-[13C5]pentanoic acid M5PFPeA Perfluoro-n-[1,2,3,4,6-13C5]hexanoic acid M5PFHxA Perfluoro-n-[1,2,3,4-13C4]heptanoic acid M4PFHpA Perfluoro-n-[13C8]octanoic acid M8PFOA Perfluoro-n-[13C9]nonanoic acid M9PFNA Perfluoro-n-[1,2,3,4,6-13C6]decanoic acid M6PFDA		yes	Isotope dilution	Yes; ASTM D7968	yes

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
	Perfluoro-n-[1,2,3,4,6,7-13C7]undecanoic acid M7PFUdA Perfluoro-n-[1,2 13C2]dodecanoic acid MPFDoA Perfluoro-n-[1,2 13C2]tetradecanoic acid M2PFTeDA Sodium perfluoro-1-[2,3,4 13C3] butanesulfonate M3PFBS Sodium perfluoro-1-[1,2,3 13C3] hexanesulfonate M3PFHxS Sodium perfluoro-1-[13C8] ocatanesulfonate M8PFOS					
23	PFOS: 13C8PFOS PFHxS: 13C3PFHxS PFOSA: 13C8PFOSA PFBS: 13C3PFBS PFOA: 13C8PFOA PFBA: 13C4PFBA PFPeA: 13C5PFPeA PFHxA: 13C5PFHxA PFHpA: 13C4PFHpA PFNA: 13C9PFNA PFDA: 13C6PFDA MeFOSA: d3-NMeFOSA-M EtFOSE: d9-NEtFOSE-M PFTeDA: 13C2PFTeDA 6:2 FTS: 13C26:2FTS 8:2 FTS: 13C28:2FTS		yes	Isotope Dilution	no	no
24	13C4PFOS 13C4PFOA 13C3PFHxS 13C5PFNA 13C2PFUndA 13C2PFDoA 13C4PFBA		yes	13C Internal Standard	no	no

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
	13C4PFDA d7-n-MeFOSE 13C2PFHxA 13C8FOSA d3-MeFOSA d5-EtFOSA d9-EtFOSE d5-EtFOSSA 13C26:2FTS 13C24:2FTS					
26	PFBA: 13C4-PFBA, PFBS: 13C3-PFBS, PFHxS: 18O2-PFHxS, PFOS: 13C4-PFOS, PFPeA: 13C5-PFPeA, PFHxA: 13C2-PFHxA, PFHpA: 13C4-PFHpA, PFOA: 13C4-PFOA, PFNA: 13C5-PFNA, PFDA: 13C2-PFDA, PFTeDA: 13C2-PFTeDA, FOSA: 13C8-FOSA, MeFOSA: D7-MeFOSE, EtFOSE: D9-NEtFOSE, 6:2 FTS: 13C2-6:2 FTS, 8:2 FTS: 13C2-8:2 FTS	All extracted internal standards: D3-MeFOSA	yes	Isotope dilution	no	no
27	MPFBA M5PFPeA M5PFHxA M4PFHpA M8PFOA M9PFNA M6PFDA M7PFUdA MPFDoA M2PFTeDA M2PFHxDA MFOUEA M8FOSA-I	M3PFBA M2PFOA MPFDA MPFOS	Yes	Isotope dilution	Yes; Adapted USEPA	No

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
	d-N-MeFOSA-M d-N-EtFOSA-M d3-N-MeFOSAA d3-N-EtFOSAA d7-N-MeFOSE-M d9-N-EtFOSE-M M3PFBS M3PFHxS M8PFOS M2-4:2 FTS M2-6:2 FTS M2-8:2 FTS M4-8:2 diPAP					
29	PFOS: 13C4PFOS PFOA: 13C4PFOA	PFOS: 13C4PFOS PFOA: 13C4PFOA	no		Yes; EPA 3550C 2007 + EPA 537 2009	no

Note: * Internal standard refers to a labelled compound which is spiked directly into samples prior to extraction.

** Recovery standard refers to a labelled compound which is added to the final sample extract prior to instrumental analysis.[5]

Table 4 Test methods – Samples S3 and S4 Water

Lab Code	Sample volume (mL)	Sample pretreatment	Extraction technique	Extraction solvent(s):	Mode	Temperature (Time)	Clean-up	Equipment	Column type	Column Specifications:	Extra column for blank separation
1	5	Dilute sample 1:1 with methanol	Direct Injection		Vortex	room 2 min	None	LCMS QQQ	C18	50 x 2.1mm id x 1.8um	yes
2	60		Direct injection and SPE	0.3% NH3 in methanol			SPE (Oasis WAX)	LC-MSMS QqQ	C18	50mm x 3.0mm x 1.8µm	Yes
3	2						SPE (Oasis, WAX)	LC-MSMS	HSS PFP	15cm×2.1mm ×1.8µm	yes
4	50	ph adjust 6.5	spe	MeOH		room	spe	lc-msms		eclipse	yes
5	25		SPE (Oasis HLB)	Methanol		Room		LC-MSMS	C18	100mm x 2,1mm x 5µm	no
6	50	Nil	SPE				WAX SPE	Agilent/Shimadzu LC-MS/MS	C18	50 x 2.1 mm, 1.8 µm	yes
7	10	Noe	SPE	Methanol	Sonicating/ vortex mixing	Room	SPE (oasis HLB)	LC-MS Q-Exactive	C18	50mmx3.0mm x2.7um	yes
8	1	None	Direct Injection	Methanol (1:1 with sample)	Vortex	Room (0.5-1 min)	None	LC-MSMS	C18	1.6µm, 2.0mm x 50mm	no
9		Nil	Sonication	Methanol	Sonication	Room	SPE	LC-MS/MS	C8	3.0 x 100 mm, 3.5 micron	no
10	60	None	SPE + Direct Injection	MeOH + 0.1% ammonia in MeOH		Room	SPE (Oasis, WAX)	LC-MSMS	C18	10cm x 2.1mm x 2.7mm	yes
11	1 DI and 50 SPE	sonicate, pH adjust	Direct Injection and SPE	MeOH		Room Temp	SPE	LC-MSMS	C18	50 mm x 2.1mm x 1.8um	yes
12	10	Sonication	SPE				SPE	LC-MS-Orbitrap	C18	C18 100mmX2.1mm 1.7µm	yes

Lab Code	Sample volume (mL)	Sample pretreatment	Extraction technique	Extraction solvent(s):	Mode	Temperature (Time)	Clean-up	Equipment	Column type	Column Specifications:	Extra column for blank separation
13	56.7	No Pretreatment	SPE	NH4OH/methanol		Room		LC/MS/MS	C18	5 cm x 2.0 mm x 3.0 µm	no
14	0,4	adjust pH 7	SPE Methanol	Methanol				LC-MS/MS	Nucleodur Shinx RP 3µm		no
16	5 and 50		SPE		SPE	Room temp	SPE (WAX)	LC-MS/MS QqQ	C18	5 cm x 2.0 mm x 1.6 µm	yes
17	1		"direct injection (SPE if direct injection is not suitable)"			room temperature		LC MS/MS	Shim-pack XR-ODS	with agilent extend-C18 trapping column	
18	1		Direct Injection	Methanol (1:1 with sample)	Vortex	Room (0.5-1 min)	None	LC-MSMS	C18	1.6µm, 2.0mm x 50mm	no
20	58.8	adjust pH to be 6.5±0.5	SPE	Basic Methanol		Room (20 min)	SPE (Oasis, WAX)	LC-MSMS	C18	5 cm x 2.1 mm x 1.7 µm	no
21	70	Adjust PH 5-6	Strata X-AW 33um polymeric Weak Anion				Strata X-AW 33um polymeric Weak Anion	LCMS-orbitrap	Kinetex C18	100x3mm 2.6 um	no
23	100		SPE				SPE OASIS WAX	LC-MSMS QqQ	C18	100 x 2.1 mm x 1.8 µm	yes
24	50	Sample need to be in polypropylene bottle free of teflon	Filter through glass microfibre filters				SPE	LC-MS/MS	C18	4.6x100mm,2.6µm	yes
25	59.25		SPE	Methanol				LC-MSMS	BEH Shield RP18	1,7 µm, 2,1 x 100 mm	-

Lab Code	Sample volume (mL)	Sample pretreatment	Extraction technique	Extraction solvent(s):	Mode	Temperature (Time)	Clean-up	Equipment	Column type	Column Specifications:	Extra column for blank separation
26	63	Samples are pH-adjusted to 3.5±0.1 prior to extraction.	Solid phase extraction: polymeric anion exchange	MeOH/0.1% NH4OH in MeOH	Elution	Room temp	Nylon filter	LC-MS-MS	C18	100mm × 4.6mm × 2.6µm	yes
27	50	acidification	SPE			Room temp	SPE (WAX)	LC/MS/MS	C18	1.7 µm X 2.1 mm X 50 mm	No
29	50		Direct injection for PFOS and PFHxS in Sample S3, SPE for others compounds				SPE (Oasis WAX)	LC-MSMS QqQ	Phenomenex Luna® Omega PS C18	5 cm x 2,1mm 1,6µm	no
31	1		Direct Injection	Methanol (1:1 with sample)	Vortex	Room (0.5-1 min)		LC-MSMS	C18	1.6µm, 2.0mm x 50mm	no
32	59.4		SPE	NH4OH/methanol		Room		LC/MS/MS	C18	100 mm x 2.1 mm x 5.0 µm	no

Table 5 Test methods – Samples S3 and S4 Water (Continued)

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
1	PFHxS: 18O2 PFHxS PfNoA: 13C5 PFNoA PFDeA: 13C2 PfDeA PFOSA: 13C$-PFOS PFHxS: 18O2 PFHxS PFNoA: 13C5 PFNoA PFDeA: 13C2 PFDeA PFOSA: 13C4-PFOS		no		no	no
2	(13C4)PFBA (13C6)PFPeA 1,2,3,4,6-(13C5)PFHxA 1,2,3,4-(13C4)PFHpA (13C8)PFOA (13C9)PFNA 1,2,3,4,5,6-(13C6)PFDA 1,2,3,4,5,6,7-(13C7)PFUdA 1,2-(13C2)PFDoA 1,2-(13C2)PFTeDA 2,3,4-(13C3)PFBS 1,2,3-(13C3)PFHxS (13C8)PFOS	2,3,4-(13C3)PFBA 1,2-(13C2)PFOA 1,2-(13C2)PFDA 1,2,3,4-(13C4)PFOS	no		Yes; EPA 537	No
3	PFOS: 13C8-PFOS PFOA:13C8-PFOA PFBA: 13C4-PFBA PFPeA:13C5-PFPeA PFHxA:13C5-PFHxA PFHpA:13C4-PFHpA PFNA:13C9-PFNA PFDA:13C6-PFDA PFBS:13C3-PFBS PFHxS:13C3-PFHxS 6:2FTS: 13C2-6:2FTS 8:2FTS: 13C2-8:2FTS FOSA:13C8-FOSA	PFBA: 13C3-PFBA PFBA: 13C3-PFBA PFOA: 13C2-PFOA PFOA: 13C2-PFOA PFDA: 13C2-PFDA PFDA: 13C2-PFDA PFOS:13C4-PFOS PFOS:13C4-PFOS	yes	13C Int.std., isotope dilution	no	no

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
4	all compounds			isotope dilution	Yes; EPA	no
5	18O2PFHxS, 13C4PFOS, 13C4PFBA, 13C2PFHxA, 13C4PFOA, 13C5PFNA, 13C2PFDA, 13C8PFOSA		yes	internal standard	no	no
6	Wellington Laboratories		yes	Isotope dilution	Yes; US EPA 537	no
7	PFBA-C4 PFOS-C8 PFOSA-C8 6:2FTS-C2	N/A	yes	Internal std	Inhouse method	no
8	13C4-PFOS 13C8-PFOA	13C3-PFBS, 16O2-PFHxS, 13C8-PFOS, 13C4-PFBA, 13C5-PFPeA, 13C5-PFHxA, 13C4-PFHpA, 13C4-PFOA, 13C5-PFNA, 13C6-PFDA, 13C2-PFUnDA, 13C2-PFDoDA, 13C2-PFTeDA, 13C2-PFHxDA, 13C8-FOSA, d3-MeFOSA, d5-EtFOSA, d7-MeFOSE, d3EtFOSE, d3-MeFOSAA, d5-EtFOSAA, 13C2-4:2 FTS, 13C2-6:2 FTS, 13C2-8:2 FTS	no		no	no
9	[13C8]-PFOA [13C8]-PFOS	[13C7]-PFUdA [13C3]-PFHxS	no		no	no
10	13C4PFOS 13C4PFOA etc as per Wellington Labs MPFAC-MXA	13C8PFOA 13C8PFOS	yes	Isotope dilution	Yes; EPA 537	no
11	All analytes had their own extracted internal standard	13C8 PFOS 13C5 PFPeA 13C2 12C6 PFOA	yes	Corrected vs Extracted Internal Standards	Yes; ASTM7979 USEPA537	no
12	PFNA-C5	PFOS-C4 PFHXS-O2 PFOSA-C8	yes	Int.std	no	no

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
		PFBA-C4 PFOA-C4 PFOA-C8 PFDA-C2 N-MeFOSA-D3 N-MeFOSE-D7 PFDoDA-C2 6:2-FTS-C2				
13	PFOS: 13C4PFOS PFOA: 13C4PFOA PFHxA: 13C2PFHxA PFHxS: 13C-PFHxS PFOSA: 13C8-PFOSA PFBA: 13C4 PFBA PFPeA: 13C5-PFPeA PFHpA: 13C4-PFHpA PFNA: 13C5-PFNA PFDA: 13C2-PFDA 6:2 FTS: 13C2-6:2 FTS 8:2 FTS: 13C2-8:2 FTS PFBS: 13C3-PFBS PFTeDA: 13C2-PFTeDA	All labelled IS: 13C2PFOA	Yes	Isotope Dilution	no	no
14	H4PFOS: 13C2-6:2FTS PFBA: 13C4-PFBA PFPeA: 13C5-PFPeA PFHxA: 13C2-PFHxA PFHxS: 18O2-PFHxS PFHpA: 13C4-PFHpA PFOA: 13C8-PFOA PFOS: 13C4-PFOS PFOSA: 13C8-PFOSA PFNA: 13C5-PFNA PFDA: 13C2-PFDA PFBS: 13C3-PFBS PFTeA: 13C2-PFTeDA 42 FTS: 13C2-PFHXA	13C8-PFOA	yes	13C Int.std.	no	yes

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
16	PFOS: 13C4PFOS PFOA: 13C4PFOA Other: 13C2PFHxA, 18O2PFHxS, 13C2 6:2 FTS, 13C5PFNA, 13C2 8:2 FTS, 13C2PFDA	PFOS 13C8PFOS PFOA 13C8PFOA	yes	Isotope dilution	no	no
17	MPFAC-MXA MFTS (Telomer)					no
18	13C4-PFOS 13C8-PFOA	13C3-PFBS, 16O2-PFHxS, 13C8-PFOS, 13C4-PFBA, 13C5-PFPeA, 13C5-PFHxA, 13C4-PFHpA, 13C4-PFOA, 13C5-PFNA, 13C6-PFDA, 13C2-PFUnDA, 13C2-PFDoDA, 13C2-PFTeDA, 13C2-PFHxDA, 13C8-FOSA, d3-MeFOSA, d5-EtFOSA, d7-MeFOSE, d3EtFOSE, d3-MeFOSAA, d5-EtFOSAA, 13C2-4:2 FTS, 13C2-6:2 FTS, 13C2-8:2 FTS	no		no	no
19						
20	PFOS13C8-PFOS PFHxS13C3-PFHXS PFOSA13C8-PFOSA PFBS13C3-PFBS PFOA13C8-PFOA PFBA13C4-PFBA PFPeA13C5-PFPEA PFHxA13C5-PFHXA PFHpA13C4-PFHPA PFNA13C9-PFNA PFDA13C6-PFDA MeFOSAD3-N-MEFOSA EtFOSED9-N-ETFOSE PFTeDA13C2-PFTEDA 6:2 FTS13C 6:2 FTS 8:2 FTS13C 8:2 FTS	13C8-PFOS13C4-PFOS 13C3-PFHXS18O2-PFHXS 13C8-PFOSA13C4-PFOS 13C3-PFBS18O2-PFHXS 13C8-PFOA13C4-PFOA 13C4-PFBA13C3-PFBA 13C5-PFPEA13C2-PFHXA 13C5-PFHXA13C2-PFHXA 13C4-PFHPA13C4-PFOA 13C9-PFNA13C5-PFNA 13C6-PFDA13C2-PFDA D3-N-MEFOSA13C4-PFOS D9-N-ETFOSE13C4-PFOS 13C2-PFTEDA13C2-PFDA 13C 6:2 FTS18O2-PFHXS 13C 8:2 FTS18O2-PFHXS	yes	isotope dilution	no	no
21	Perfluoro-n-[13C4]butanoic acid MPFBA Perfluoro-n-[13C5]pentanoic acid M5PFPeA		yes	Isotope dilution	no	yes

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
	Perfluoro-n-[1,2,3,4,6-13C5]hexanoic acid M5PFHxA Perfluoro-n-[1,2,3,4-13C4]heptanoic acid M4PFHpA Perfluoro-n-[13C8]octanoic acid M8PFOA Perfluoro-n-[13C9]nonanoic acid M9PFNA Perfluoro-n-[1,2,3,4,6-13C6]decanoic acid M6PFDA Perfluoro-n-[1,2,3,4,6,7-13C7]undecanoic acid M7PFUdA Perfluoro-n-[1,2 13C2]dodecanoic acid MPFDoA Perfluoro-n-[1,2 13C2]tetradecanoic acid M2PFTeDA Sodium perfluoro-1-[2,3,4 13C3] butanesulfonate M3PFBS Sodium perfluoro-1-[1,2,3 13C3] hexanesulfonate M3PFHxS Sodium perfluoro-1-[13C8] ocatanesulfonate M8PFOS					
23	PFOS: 13C8PFOS PFHxS: 13C3PFHxS PFOSA: 13C8PFOSA PFBS: 13C3PFBS PFOA: 13C8PFOA PFBA: 13C4PFBA PFPeA: 13C5PFPeA PFHxA: 13C5PFHxA PFHpA: 13C4PFHpA PFNA: 13C9PFNA PFDA: 13C6PFDA MeFOSA: d3-NMeFOSA-M EtFOSE: d9-NEtFOSE-M PFTeDA: 13C2PFTeDA 6:2 FTS: 13C26:2FTS 8:2 FTS: 13C28:2FTS	N/A	yes	Isotope Dilution	no	no
24	13C4PFOS 13C4PFOA 13C3PFHxS 13C5PFNA 13C2PFUndA 13C2PFDoA 13C4PFBA 13C4PFDA		yes	13C Internal Standard	no	no

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
	d7-n-MeFOSE 13C2PFHxA 13C8FOSA d3-MeFOSA d5-EtFOSA d9-EtFOSE d5-EtFOSSA 13C26:2FTS 13C24:2FTS					
25	C13-PFBA = PFBA C13-PFPeA = PFPeA C13-PFHxA = PFHxA, PFHpA C13-PFOA = PFOA C13-PFNA = PFNA C13-PFDA = PFDA 18O-PFHxS = PFBS, PFHxS, 6:2 FTS, 8:2 FTS C13-PFOS = PFOS C13-PFOSA = PFOSA	-	yes	13C Int.std.	Yes; ISO25101:2009	no
26	PFBA: 13C4-PFBA, PFBS: 13C3-PFBS, PFHxS: 18O2-PFHxS, PFOS: 13C4-PFOS, PFPeA: 13C5-PFPeA, PFHxA: 13C2-PFHxA, PFHpA: 13C4-PFHpA, PFOA: 13C4-PFOA, PFNA: 13C5-PFNA, PFDA: 13C2-PFDA, PFTeDA: 13C2-PFTeDA, FOSA: 13C8-FOSA, MeFOSA: D7-MeFOSE, EtFOSE: D9-NEtFOSE, 6:2 FTS: 13C2-6:2 FTS, 8:2 FTS: 13C2-8:2 FTS	All extracted internal standards: D3-MeFOSA	yes	Isotope dilution	No; Modification of USEPA 537	no
27	MPFBA M5PFPeA M5PFHxA M4PFHpA M8PFOA M9PFNA M6PFDA M7PFUdA MPFDoA M2PFTeDA M2PFHxDA MFOUEA	M3PFBA M2PFOA MPFDA MPFOS	Yes	Isotope dilution	Yes; Adapted USEPA537	No

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
	M8FOSA-I d-N-MeFOSA-M d-N-EtFOSA-M d3-N-MeFOSAA d3-N-EtFOSAA d7-N-MeFOSE-M d9-N-EtFOSE-M M3PFBS M3PFHxS M8PFOS M2-4:2 FTS M2-6:2 FTS M2-8:2 FTS M4-8:2 diPAP					
29	PFOS: 13C4PFOS PFOA: 13C4PFOA	PFOS: 13C4PFOS PFOA: 13C4PFOA	no		Yes; ISO 25101:2009	no
31	13C3-PFBS, 16O2-PFHxS, 13C8-PFOS, 13C4-PFBA, 13C5-PFPeA, 13C5-PFHxA, 13C4-PFHpA, 13C4-PFOA, 13C5-PFNA, 13C6-PFDA, 13C2-PFUnDA, 13C2-PFDoDA, 13C2-PFTeDA, 13C2-PFHxDA, 13C8-FOSA, d3-MeFOSA, d5-EtFOSA, d7-MeFOSE, d3EtFOSE, d3-MeFOSAA, d5-EtFOSAA, 13C2-4:2 FTS, 13C2-6:2 FTS, 13C2-8:2 FTS	13C4-PFOS 13C8-PFOA	no		no	no
32	PFOS: 13C4PFOS PFOA: 13C4PFOA PFHxA: 13C2PFHxA PFHxS: 13C-PFHxS	No recovery standards are used.	Yes	Isotope Dilution	no	no

Note: * Internal standard refers to a labelled compound which is spiked directly into samples prior to extraction.

** Recovery standard refers to a labelled compound which is added to the final sample extract prior to instrumental analysis.[5]

Table 6 Test methods – Sample S5 (Fish) and Sample S6 (Prawn)

Lab Code	Sample weight (g)	Sample pretreatment	Extraction technique	Extraction solvent(s):	Mode	Temp. (time)	Clean-up	Equipment	Column type	Column Specifications:	Extra column for blank separation
3	0.2	alkalization	LLE	50mM NaOH MeOH	tumbling	Room (16h)	SPE (Oasis, WAX)	LC-MSMS	HSS PFP	15cm×2.1mm× 1.8µm	yes
4	2	ph adjust	tumble + spe	MeOH	shaking, tumbling, vortex mixing	Room (16h)	spe	lc-msms		eclipse	yes
6	5		QuEChERS		Vortex		QuEChERS	Agilent/Shimadzu LC-MS/MS	C18	50 x 2.1 mm, 1.8 µm	yes
7	1		Solvent Extraction	Water/ ACN	Shaking	Room	None	LC-MS Q-Exactive	C18	50mmx3.0mmx 2.7um	yes
10	1		Alkaline digestion	0.01M KOH in MeOH	Tumbling	Room (16h)	Centrifugation	LC-MSMS	C18	10cm x 2.1mm x 2.7mm	yes
11	2	homogenised	Alkaline Extraction	MeOH	Sonicate/Tumble	Room Temp/Overnight	Envicarb clean up	LC-MSMS	C18	50 mm x 2.1mm x 1.8um	yes
12	1		SLE	ACN	Sonication, shaking, tumbling, vortex mixing	Room (20 min)	SPE	LC-MS-Orbitrap	C18	C18 100mmX2.1mm 1.7µm	yes
13	1		Shaker/Sonication	KOH/ methanol	Shaking/ sonication	Room (3 h shake, 12 h sonication bath)	SPE	LC/MS/MS	C18	5 cm x 2.0 mm x 3.0 µm	no
14	0.2	Homogenised	ultrasonic bath	Methanol/ Acetonitril	Sonication	40°C (30 min)	active carbon	LC-MS/MS	Nucleodur Shinx RP 3µm		no
15	1		LLE	ACN	vortex, sonication	Room (20 min)	SPE (Oasis, WAX),	LC-MSMS QQQ	NX-C18	150mm x 2mm x 3 µm	No

Lab Code	Sample weight (g)	Sample pretreatment	Extraction technique	Extraction solvent(s):	Mode	Temp. (time)	Clean-up	Equipment	Column type	Column Specifications:	Extra column for blank separation
					and tumbling		ultracentrifugation				
16	1		Alkaline digestion	NaOH-acetonitrile	Sonication	Room (20 minutes x 2)	SPE (WAX)	LC-MS/MS QqQ	C18	5 cm x 2.0 mm x 1.6 µm	yes
17	2			acidified ACN:H_2O	manual shaking,	room temperature	centrifugation, C18 SPE cleanup, concetration and filtration	LC MS/MS	Shim-pack XR-ODS	with agilent extend-C18 trapping column	
18	0.5		QuEChERS	acetonitrile	Shaking/mixing	Room (30 min)	dSPE (C-18/Carbon)	LC-MSMS	C18	1.6µm, 2.0mm x 50mm	no
20	2.02		Mechanical agitation	Methanolic potassium hydroxide	Sonication	Room (20 min)	SPE (Oasis, WAX)	LC-MSMS	C18	5 cm x 2.1 mm x 1.7 µm	no
21	1		QuEChERS extraction	acetonitrile	Vortex, sonication, centrifuge	Sonicate 30 min at 30-35 degrees	None	LCMS- orbitrap	Kinetex C18	100x3mm 2.6 um	no
23	2		dispersive SPE	Formic Acid-acetonitrile	Homogeniser, shaking	Room (5 minutes)	C18, graphitised carbon	LC-MSMS QqQ	C18	100 x 2.1 mm x 1.8 µm	yes
24	1	Keep Frozen until extraction		acetonitrile	Vortex/Sonicate/Shaker	Room (30seconds/20min/20min)	SPE	LC-MS/MS	C18	4.6x100mm,2.6 µm	yes
26	0.5056 g freeze-dried 2.647 g wet weight	Samples are homogenised and freeze dried prior to extraction.	Solid-liquid extraction	1% acetic acid in acetonitrile	Sonication	Room (1 hour)	SPE HLB, Nylon filter	LC-MS-MS	C18	75mm × 4.6mm × 2.6µm	yes
27	1		alkaline digestion	KOH-methanol	tumbling	Room	active carbon	LC-MSMS	C18	10 cm x 2.1 x 3.5 µm (130Å)	no

Table 7 Test methods – Sample S5 (Fish) and Sample S6 (Prawn) (continued)

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
3	PFOS: 13C8-PFOS PFOA:13C8-PFOA PFBA: 13C4-PFBA PFPeA:13C5-PFPeA PFHxA:13C5-PFHxA PFHpA:13C4-PFHpA PFNA:13C9-PFNA PFDA:13C6-PFDA PFBS:13C3-PFBS PFHxS:13C3-PFHxS 6:2FTS: 13C2-6:2FTS 8:2FTS: 13C2-8:2FTS FOSA:13C8-FOSA	PFBA: 13C3-PFBA PFOA: 13C2-PFOA PFDA: 13C2-PFDA PFOS:13C4-PFOS	yes	13C Int.std., isotope dilution	no	yes
4	all compounds			isotope dilution	Yes; EPA	no
6	Wellington Laboratories		yes	Isotope dilution	no	no
7	PFBA-C4 PFOS-C8 PFOSA-C8 6:2FTS-C2	N/A	yes	Internal std	04-068 Inhouse method	no
10	13C4PFOS 13C4PFOA etc as per Wellington Labs MPFAC-MXA	13C8PFOA 13C8PFOS	yes	Isotope dilution	no	no
11	All analytes had their own extracted internal standard	13C8 PFOS 13C5 PFPeA 13C2 12C6 PFOA	yes	Corrected vs Extracted Internal Standards (added before extraction)	No; ASTM D7968 (based on soil method)	no
12	PFNA-C5	PFOS-C4 PFHXS-O2 PFOSA-C8 PFBA-C4 PFOA-C4 PFOA-C8 PFDA-C2 N-MeFOSA-D3 N-MeFOSE-D7 PFDoDA-C2 6:2-FTS-C2	yes	Int.std	no	no

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
13	PFOSA: 13C8-PFOSA PFBA: 13C4 PFBA PFPeA: 13C5-PFPeA PFHpA: 13C4-PFHpA PFNA: 13C5-PFNA PFDA: 13C2-PFDA 6:2 FTS: 13C2-6:2 FTS 8:2 FTS: 13C2-8:2 FTS PFBS: 13C3-PFBS PFTeDA: 13C2-PFTeDA PFOS: 13C4PFOS PFOA: 13C4PFOA PFHxA: 13C2PFHxA PFHxS: 13C-PFHxS	All labelled IS: 13C2PFOA	yes	Isotope dilution	no	no
14	H4PFOS: 13C2-6:2FTS PFBA: 13C4-PFBA PFPeA: 13C5-PFPeA PFHxA: 13C2-PFHxA PFHxS: 18O2-PFHxS PFHpA: 13C4-PFHpA PFOA: 13C8-PFOA PFOS: 13C4-PFOS PFOSA: 13C8-PFOSA PFNA: 13C5-PFNA PFDA: 13C2-PFDA PFBS: 13C3-PFBS PFTeA: 13C2-PFTeDA 42 FTS: 13C2-PFHXA	13C8-PFOA	yes	13C Int.std.	Yes; ISO	yes
15	PFOS: 13C4-PFOS PFHxS: 18O2-PFHxS PFOSA: 13C8-FOSA PFBS: 18O2-PFHxS PFOA: 13C4-PFOA PFBA: 13C4-PFBA PFPeA: 13C5-PFPeA	13C4-PFOS: 18O2-PFOS 18O2-PFHxS: 18O2-PFOS 13C8-FOSA: 13C2-PFTeDA 13C4-PFOA: 13C8-PFOA 13C4-PFBA: 13C8-PFOA 13C5-PFPeA: 13C8-PFOA 13C5-PFHxA: 13C8-PFOA	Yes	13C Int. Std	No	Yes

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
	PFHxA: 13C5-PFHxA PFHpA: 13C4-PFHpA PFNA: 13C9-PFNA PFDA: 13C2-PFDA PFTeDA:13C2-PFHxDA	13C5-PFHpA: 13C8-PFOA 13C9-PFNA: 13C5-PFNA 13C2-PFDA: 13C5-PFNA 13C2-PFHxDA: 13C2-PFTeDA				
16	PFOS: 13C4PFOS; PFOA: 13C4PFOA; 13C2PFHxA, 18O2PFHxS, 13C2 6:2 FTS, 13C5PFNA, 13C2 8:2 FTS, 13C2PFDA	PFOS 13C8PFOS; PFOA 13C8PFOA	yes	Isotope dilution	no	no
17	MPFAC-MXA; MFTS (Telomer)					no
18	13C4-PFOS 13C8-PFOA	13C3-PFBS, 16O2-PFHxS, 13C8-PFOS, 13C4-PFBA, 13C5-PFPeA, 13C5-PFHxA, 13C4-PFHpA, 13C4-PFOA, 13C5-PFNA, 13C6-PFDA, 13C2-PFUnDA, 13C2-PFDoDA, 13C2-PFTeDA, 13C2-PFHxDA, 13C8-FOSA, d3-MeFOSA, d5-EtFOSA, d7-MeFOSE, d3EtFOSE, d3-MeFOSAA, d5-EtFOSAA, 13C2-4:2 FTS, 13C2-6:2 FTS, 13C2-8:2 FTS	no		no	no
20	PFOS:13C4-PFOS; PFOS:13C4-PFOS PFHxS:18O2-PFHxS; PFHxS:18O2-PFHxS PFOSA:13C8-PFOSA; PFOSA:13C8-PFOSA PFBS:18O2-PFHxS; PFBS:18O2-PFHxS PFOA:13C2-PFOA; PFOA:13C2-PFOA PFBA:13C4-PFBA; PFBA:13C4-PFBA PFPeA:13C2-PFHxA; PFPeA:13C2-PFHxA PFHxA:13C2-PFHxA; PFHxA:13C2-PFHxA PFHpA:13C2-PFHxA; PFHpA:13C2-PFHxA PFNA:13C5-PFNA; PFNA:13C5-PFNA PFDA:13C2-PFDA; PFDA:13C2-PFDA	all surrogates: 13C4-PFOA; all surrogates: 13C4-PFOA	yes	isotope dilution	no	no
21	Perfluoro-n-[13C4]butanoic acid MPFBA Perfluoro-n-[13C5]pentanoic acid M5PFPeA Perfluoro-n-[1,2,3,4,6-13C5]hexanoic acid M5PFHxA Perfluoro-n-[1,2,3,4-13C4]heptanoic acid M4PFHpA		yes	Isotope dilution	no	yes

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
	Perfluoro-n-[13C8]octanoic acid M8PFOA Perfluoro-n-[13C9]nonanoic acid M9PFNA Perfluoro-n-[1,2,3,4,6-13C6]decanoic acid M6PFDA Perfluoro-n-[1,2,3,4,6,7-13C7]undecanoic acid M7PFUdA Perfluoro-n-[1,2 13C2]dodecanoic acid MPFDoA Perfluoro-n-[1,2 13C2]tetradecanoic acid M2PFTeDA Sodium perfluoro-1-[2,3,4 13C3] butanesulfonate M3PFBS Sodium perfluoro-1-[1,2,3 13C3] hexanesulfonate M3PFHxS Sodium perfluoro-1-[13C8] ocatanesulfonate M8PFOS					
23	PFOS: 13C8PFOS PFHxS: 13C3PFHxS PFOSA: 13C8PFOSA PFBS: 13C3PFBS PFOA: 13C8PFOA PFBA: 13C4PFBA PFPeA: 13C5PFPeA PFHxA: 13C5PFHxA PFHpA: 13C4PFHpA PFNA: 13C9PFNA PFDA: 13C6PFDA MeFOSA: d3-NMeFOSA-M EtFOSE: d9-NEtFOSE-M PFTeDA: 13C2PFTeDA 6:2 FTS: 13C26:2FTS 8:2 FTS: 13C28:2FTS		yes	Isotope dilution	no	no
24	13C4PFOS; 13C4PFOS; 13C4PFOA; 13C4PFOA; 13C3PFxS; 13C3PFxS; 13C5PFNA; 13C5PFNA; 13C2PFUdA; 13C2PFUdA; 13C2PFDoA; 13C2PFDoA; 13C4PFBA; 13C4PFBA; 13C4PFDA; 13C4PFDA; d7-n-MeFOSE; d7-n-MeFOSE; 13C2PFHxA; 13C2PFHxA; 13C8FOSA; 13C8FOSA; d3-MeFOSA; d3-MeFOSA; d5-EtFOSA; d5-EtFOSA		yes	13C Internal Standard	no	no

Lab code	Internal std*	Recovery std**	Recovery correction	If yes, which method?	Standard Method used	Blank corrected
26	PFBS: 13C3-PFBS, PFHxS: 18O2-PFHxS, PFOS: 13C4-PFOS, PFPeA: 13C5-PFPeA, PFHxA: 13C2-PFHxA, PFHpA: 13C4-PFHpA, PFOA: 13C4-PFOA, PFNA: 13C5-PFNA, PFDA: 13C2-PFDA, FOSA: 13C8-FOSA	All extracted internal standards: D3-MeFOSA	yes	Isotope dilution	No; Modification of USEPA 537	no
27	PFPeA : 13C5PFPeA PFHxA : 13C5PFHxA PFHpA : 13C4PFHpA PFOA : 13C8PFOA PFNA : 13C9PFNA PFDA : 13C6PFDA PFTeDA : 13C2PFTeDA PFBS : 13C3PFBS PFHxS : 13C3PFHxS PFOS : 13C8PFOS PFOSA : 13C8PFOSA 6:2 FTS : (1,2 -13C2) 6:2 FTS 8:2 FTS : (1,2 -13C2) 8:2 FTS	13C2PFOA 13C2PFDA 13C4PFOS	yes	13C Int Std	no	no

Note: * Internal standard refers to a labelled compound which is spiked directly into samples prior to extraction.

** Recovery standard refers to a labelled compound which is added to the final sample extract prior to instrumental analysis.[5]

3.2 Basis of Participants' Measurement Uncertainty Estimates

Table 8 Basis of Participants' Uncertainty Estimate

Lab Code	Approach to Estimating MU	Information Sources for MU Estimation		Guide Document for Estimating MU
		Precision	Method Bias	
1	Top Down - precision and estimates of the method and laboratory bias	Control Samples – SS	Recoveries of SS Instrument Calibration Standard Purity	Eurachem/CITAC Guide
2	Bottom Up (ISO/GUM, fish bone/ cause and effect diagram)	Duplicate analysis	CRM Recoveries of SS Instrument Calibration	ISO/GUM
3	Bottom Up (ISO/GUM, fish bone/ cause and effect diagram)	Duplicate analysis	Instrument Calibration Standard Purity	ISO/GUM
4	Standard deviation of replicate analyses multiplied by 2 or 3	Control Samples – SS Duplicate analysis	Recoveries of SS	NMI Uncertainty Course
5	Top Down - precision and estimates of the method and laboratory bias	Duplicate analysis	Recoveries of SS	Eurachem/CITAC Guide
6	Top Down - precision and estimates of the method and laboratory bias		Recoveries of SS	ISO/GUM
7	Standard deviation of replicate analyses multiplied by 2 or 3	Control Samples – SS Duplicate analysis	Recoveries of SS Instrument Calibration Standard Purity	Nata Technical Note 33
8	Top Down - precision and estimates of the method and laboratory bias	Control Samples – SS Duplicate analysis	Recoveries of SS	Eurachem/CITAC Guide
9	Top Down - precision and estimates of the method and laboratory bias	Control Samples – Spare samples of AQA16-06 Duplicate analysis	Recoveries of SS Standard Purity	Eurachem/CITAC Guide
10	Top Down - precision and estimates of the method and laboratory bias	Control Samples – SS Duplicate analysis	Laboratory bias from PT studies Recoveries of SS	Nata Technical Note 33
11	Top Down - precision and estimates of the method and laboratory bias	Control Samples – SS Duplicate analysis	Recoveries of SS	Nata Technical Note 33
12	Standard deviation of replicate analyses multiplied by 2 or 3	Control Samples – SS	CRM Recoveries of SS Standard Purity	Nata Technical Note 33
13	Standard deviation of replicate analyses multiplied by 2 or 3	Control Samples – SS	Recoveries of SS	USEPA SW-846
14	Standard deviation of replicate analyses multiplied by 2 or 3	Control Samples – RM	Laboratory bias from PT studies	ISO/GUM
15	Standard deviation of replicate analyses multiplied by 2 or 3	Duplicate analysis	CRM Recoveries of SS Instrument Calibration	
16	Top Down - precision and estimates of the method and laboratory bias	Control Samples – SS Duplicate analysis Instrument calibration	Recoveries of SS Instrument Calibration Standard Purity	Nata Technical Note 33

Lab Code	Approach to Estimating MU	Information Sources for MU Estimation		Guide Document for Estimating MU
		Precision	Method Bias	
17	Standard deviation of replicate analyses multiplied by 2 or 3		Instrument Calibration	ISO/GUM
18	Top Down - precision and estimates of the method and laboratory bias	Control Samples – SS Duplicate analysis	Recoveries of SS	Eurachem/CITAC Guide
19	Standard deviation of replicate analyses multiplied by 2 or 3	Duplicate analysis	CRM Recoveries of SS	Eurolab Technical Report No1/2007
20	Standard deviation of replicate analyses multiplied by 2 or 3	Control Samples – SS		ISO/GUM
21	Standard deviation of replicate analyses multiplied by 2 or 3	Control Samples – SS Duplicate analysis Instrument calibration	Laboratory bias from PT studies Recoveries of SS	NATA GAG Estimating and reporting measurement uncertainty of chemical test results January 2018
22	Top Down - precision and estimates of the method and laboratory bias	Control Samples – SS Duplicate analysis Instrument calibration	Laboratory bias from PT studies Recoveries of SS Instrument Calibration Standard Purity	Nata Technical Note 33
23	Standard deviation of replicate analyses multiplied by 2 or 3	Control Samples – SS	Recoveries of SS	
24	Bottom Up (ISO/GUM, fish bone/ cause and effect diagram)	Control Samples – CRM Duplicate analysis	CRM	Eurachem/CITAC Guide
25	2 times within laboratory reproducibility and bias of the method	Control Samples – SS	Recoveries of SS	WAC/VI/A/001 and WAC/VI/A/002
26	Standard deviation of replicate analyses multiplied by 2 or 3	Control Samples – SS	Recoveries of SS	Eurachem/CITAC Guide
27	Top Down - precision and estimates of the method and laboratory bias	Control Samples – SS Duplicate analysis	CRM	Nata Technical Note 33
29	Top Down - precision and estimates of the method and laboratory bias	Control Samples – SS Instrument calibration	Laboratory bias from PT studies Recoveries of SS Instrument Calibration Standard Purity	Eurachem/CITAC Guide
31	Top Down - precision and estimates of the method and laboratory bias	Control Samples – SS Duplicate analysis	Recoveries of SS	Eurachem/CITAC Guide
32	Standard deviation of replicate analyses multiplied by 2 or 3	Control Samples - SS	Recoveries of SS	USEPA SW-846
33	Professional judgment	Instrument calibration	CRM Laboratory bias from PT studies Recoveries of SS Instrument Calibration Standard Purity	

3.3 Participants' Comments

The study co-ordinator welcomes comments or suggestions from participants about this study or possible future studies. Participants' comments are reproduced in Table 9.

Table 9 Participants' Comments

Lab Code	Sample	Participants' Comments	Study manager response
7	S1, S2, S5, S6	"Due to high concetration of the analytes in the sample, 1g sample was used rather than 10g of sample as per the method. N/A- External standards are used for calculations"	
	S3, S4	"Sample dilutions were required as some of the anlytes were detected outside the calibration. N/A- Ext. stds are used for calculations"	
13	S1	Detection of 0.839 µg/kg 6:2 FTS in the method blank.	
	S2	Detection of 0.839 µg/kg 6:2 FTS in the method blank. PFOA, PFOS, PFHXs from a 100x dilution.	
	S3	PFOS, PFHxA, PFHxS reported from 100x dilution. Method Blank Detection of 0.000259 µg/L PFHxS	
	S4	Method Blank Detection of 0.000259 µg/L PFHxS	
	S5	Detection of 8.903 µg/kg 6:2 FTS in the method blank. M2-6:2FTS & M2-8:2FTS recoveries higher than upper limit of 150%.	
	S6	Detection of 8.903 µg/kg 6:2 FTS in the method blank. M2-6:2FTS & M2-8:2FTS recoveries higher than upper limit of 150%.	
16	S6	Prawn matrix outside of method scope	
18	All	Definitions appear to be the wrong way around. Internal Standard should be 'added before instrument analysis' and Recovery Standard should be 'added before extraction.	NMI PT uses the definition provided in USEPA 821 and ISO 25101 for internal standard. "A labeled compound used as a reference for quantitation of native compounds. This compound is spiked into the sample prior to extraction." To avoid any confusion with this terminology the study coordinator qualified each term in the result sheet.
20	All	Samples were received at ambient temperature (above laboratory method specifications)	A stability study was conducted for all analytes and matrices. Samples were confirmed stable at room temperature for at least three months.
21	S1	The following compounds were detected below the limit of reporting: PFOSA 7 µg/kg, PFTeDA 7 µg/kg, EtFOSE 4 µg/kg	
	S2	The following compounds were detected below the limit of reporting: PFOSA 3 µg/kg. The following extra compounds were detected PFPeS 4 µg/kg,PFHpS 4 µg/kg, PFNS 11 µg/kg,PFDS 2 µg/kg, PFDoS 1 µg/kg.	

Lab Code	Sample	Participants' Comments	Study manager response
	S3	The following compounds were detected below the limit of reporting: PFOSA 0.01 µg/L. The following extra compounds were detected: PFPeS 0.43 µg/L,PFHpS 0.34 µg/L, PFNS 0.14 µg/L.	
	S4	The following compound was detected below the limit of reporting: PFOSA 0.037 µg/L	
23	S1	The presence of potential branched isomers of PFOSA and EtFOSE noted eluting earlier than the linear isomer. Only the linear isomer is quantified as this is the only isomer for which calibration standards are available. For PFOS and PFHxS, branched isomers are quantified from branched calibration standards.	
	S2	The presence of potential branched isomers of PFHpA, PFOA, PFOSA and EtFOSE noted eluting earlier than the linear isomer. Only the linear isomer is quantified as this is the only isomer for which calibration standards are available. For PFOS and PFHxS, branched isomers are quantified from branched calibration standards.	
	S3	The presence of potential branched isomers of PFPeA, PFHxA, PFHpA, and PFOA noted eluting earlier than the linear isomer. Only the linear isomer is quantified as this is the only isomer for which calibration standards are available. For PFOS and PFHxS, branched isomers are quantified from branched calibration standards.	
	S5, S6	The presence of potential branched isomers of PFOSA and EtFOSE noted eluting earlier than the linear isomer. Only the linear isomer is quantified as this is the only isomer for which calibration standards are available. For PFOS and PFHxS, branched isomers are quantified from branched calibration standards.	
26	S5, S6	Samples were freeze-dried prior to sample preparation. The reported concentrations have been corrected to reflect reporting on an "as received" ("wet weight") basis.	
	All	An isolator column is installed between the LC pumps and autosampler to allow separation of contaminants originating in the LC system from analytes in the injected sample.	
27	S1, S2	"PFOS and PFHxS are quantified using a combined branched and linear standard, linear and branched isomers are totalled for reporting. All results corrected for labelled internal standard recoveries. LOR raised for PFBA due to laboratory contamination."	
	S3, S4, S5, S6	"PFOS and PFHxS are quantified using a combined branched and linear standard, linear and branched isomers are totalled for reporting. All results corrected for labelled internal standard recoveries."	
32	S3, S4	The associated method blank contained Perfluoroheptanoic acid (PFHpA), Perfluorooctanoic acid (PFOA), Perfluorononanoic acid (PFNA), Perfluorohexanesulfonic acid (PFHxS), Perfluorobutanoic acid (PFBA), Perfluoropentanoic acid (PFPeA), Perfluorohexanoic acid (PFHxA), Perfluorooctane Sulfonamide (FOSA), N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA) and 8:2 FTS above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, data is considered acceptable	

4 PRESENTATION OF RESULTS AND STATISTICAL ANALYSIS

4.1 Results Summary

Participant results are listed in Tables 10 to 105 with the summary statistics robust average, mean, median, 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 94.

An example chart with interpretation guide is shown in Figure 1.

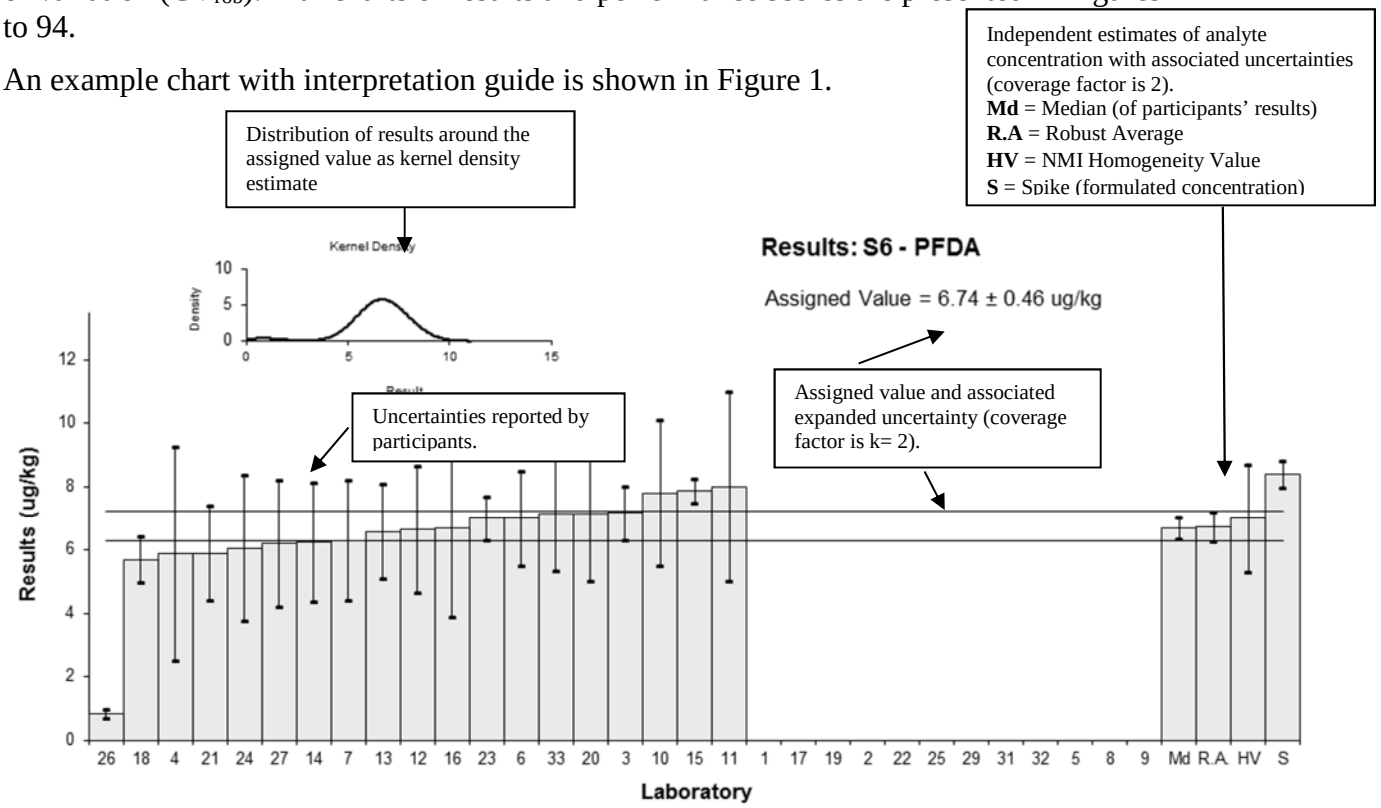


Figure 1 Guide to Presentation of Results

4.2 Assigned Value

The assigned value is defined[1] as: 'value attributed to a particular property of a proficiency test item.' In this study the property is the mass fraction of analyte. Assigned values were the robust average of participants' results; the expanded uncertainties were estimated from the associated robust standard deviations.

4.3 Performance Coefficient of Variation (PCV)

The performance coefficient of variation (PCV) is a measure of the between laboratory variation that in the judgement of the study coordinator would be expected from participants given the analyte concentration. It is important to note that this is a performance measure set by the study coordinator; it is not the coefficient of variation of participant results.

4.4 Target Standard Deviation

The target standard deviation (σ) is the product of the assigned value (*X)* and the performance coefficient of variation (PCV). This value is used for calculation of each participant z-score.

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

4.5 z-Score

For each participant result a z-score is calculated according to Equation 2 below:

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

where:

z is z-score
χ is participant result
X is the study assigned value
σ is the target standard deviation from equation 1

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

- $|z| \leq 2$ is satisfactory;
- $2 < |z| < 3$ is questionable;
- $|z| \geq 3$ is unsatisfactory.

4.6 E_n-Score

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:

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

where:

E_n is E_n-score
χ is a participant's result
X is the assigned value
U_χ is the expanded uncertainty of the participant's result
U_X is the expanded uncertainty of the assigned value

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

- $|E_n| \leq 1$ is satisfactory;
- $|E_n| > 1$ is unsatisfactory.

4.7 Traceability and Measurement Uncertainty

Laboratories accredited to ISO/IEC Standard 17025:2017[5] 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.[6]

4.8 Robust Average

The robust averages and associated expanded measurement uncertainties were calculated using the procedure described in 'ISO13528:2015(E), Statistical methods for use in proficiency testing by interlaboratory comparisons'.[7]

5 TABLES AND FIGURES

Table 10

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	EtFOSE
Units	µg/kg

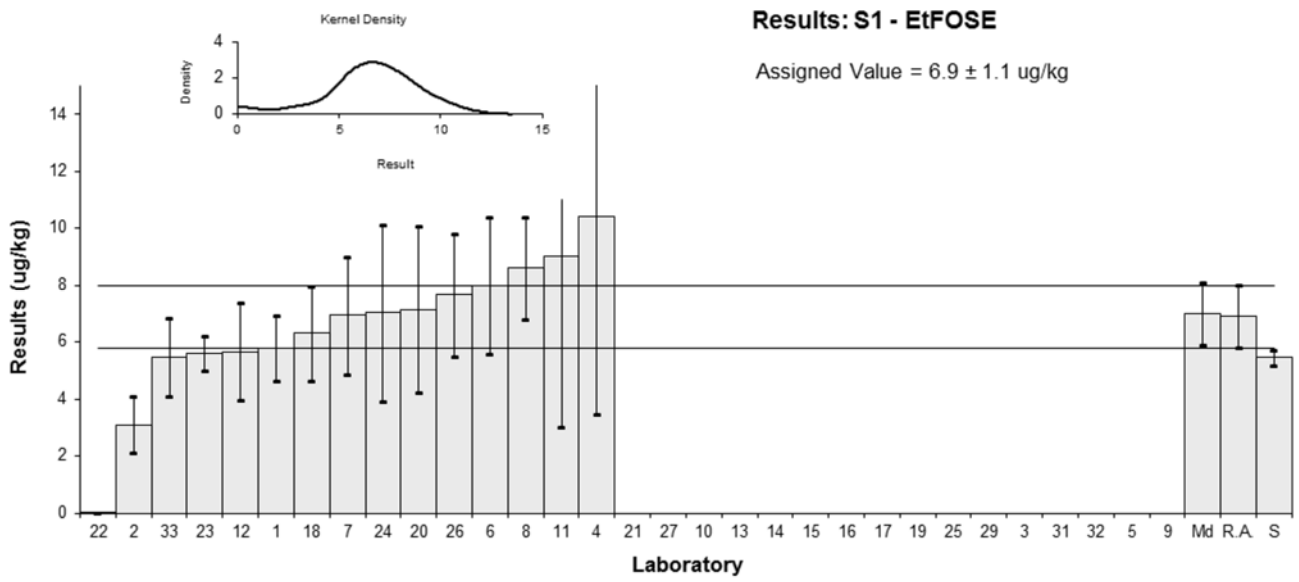
Participant Results

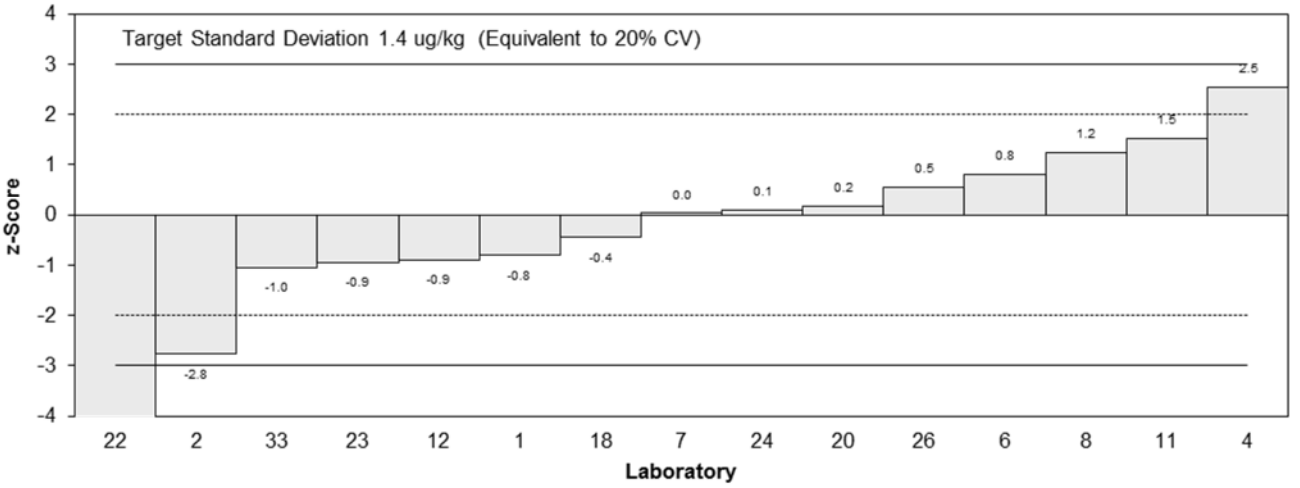
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	5.79	1.16	NR	-0.80	-0.69
2	3.1	1.0	NR	-2.75	-2.56
3	NT	NT	NT		
4	10.4	6.94	33	2.54	0.50
5	NT	NT	NT		
6	8.0	2.4	85	0.80	0.42
7	6.94	2.08	64	0.03	0.02
8	8.6	1.8	108.1	1.23	0.81
9	NT	NT	NT		
10	NT	NT	NT		
11	9	6	110	1.52	0.34
12	5.67	1.70	75	-0.89	-0.61
13	NT	NT	NT		
14	NT	NT	NT		
15	NT	NT	NT		
16	NT	NT	NT		
17	NT	NT	NT		
18	6.3	1.66	102	-0.43	-0.30
19	NT	NT	NT		
20	7.14	2.93	14.9	0.17	0.08
21	< 5	0	NR		
22	0.017	0.004	NR	-4.99	-6.26
23	5.6	0.6	101	-0.94	-1.04
24	7.03	3.1	4.09	0.09	0.04
25	NT	NT	NT		
26	7.65	2.16	79	0.54	0.31
27	<5.0	NR	102		
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	5.4596	1.3649	61.9	-1.04	-0.82

Statistics

Assigned Value	6.9	1.1
Spike	5.46	0.27
Robust Average*	6.9	1.1
Median*	7.0	1.1
Mean*	6.9	
N	15	
Max.	10.4	
Min.	0.017	
Robust SD*	1.7	
Robust CV*	24%	

* Results from laboratory 22 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S1 - EtFOSE
Assigned Value = 6.9 ± 1.1 ug/kg
Results (ug/kg)
Laboratory
22 2 33 23 12 1 18 7 24 20 26 6 8 11 4 21 27 10 13 14 15 16 17 19 25 29 3 31 32 5 9 Md R.A. S


z-Scores: S1 - EtFOSE
Target Standard Deviation 1.4 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 2 33 23 12 1 18 7 24 20 26 6 8 11 4
-2.8 -1.0 -0.9 -0.9 -0.8 -0.4 0.0 0.1 0.2 0.5 0.8 1.2 1.5 2.5

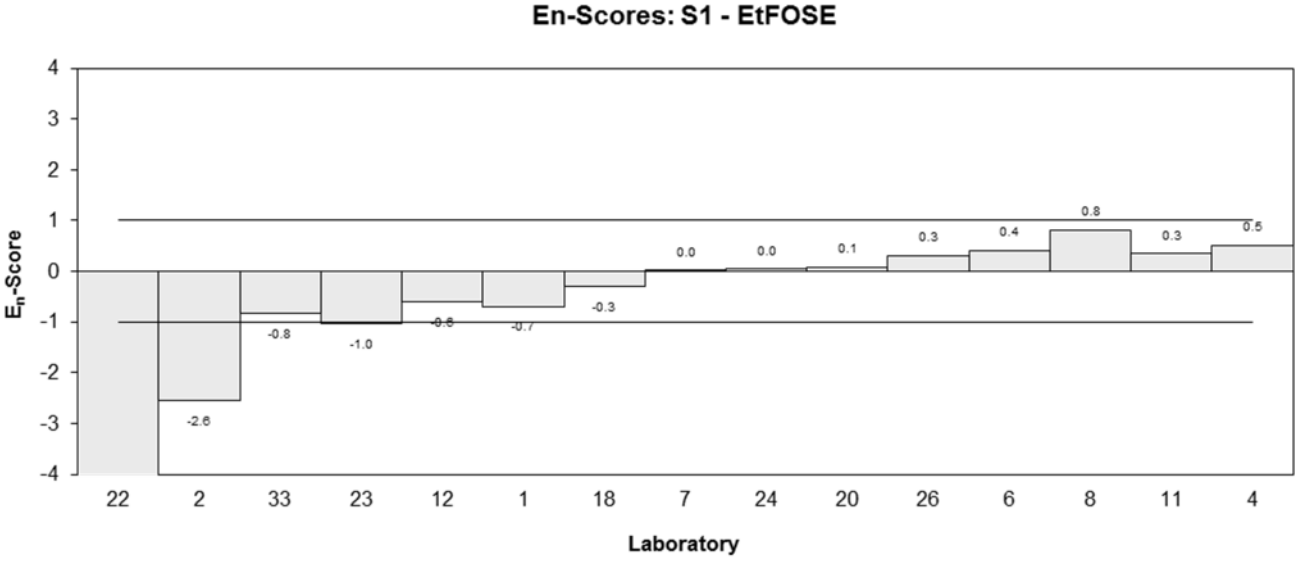

En-Scores: S1 - EtFOSE
En-Score
Laboratory
22 2 33 23 12 1 18 7 24 20 26 6 8 11 4
-2.6 -0.8 -1.0 -0.6 -0.7 -0.3 0.0 0.0 0.1 0.3 0.4 0.8 0.3 0.5

Figure 2

Table 11

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	6:2 FTS
Units	µg/kg

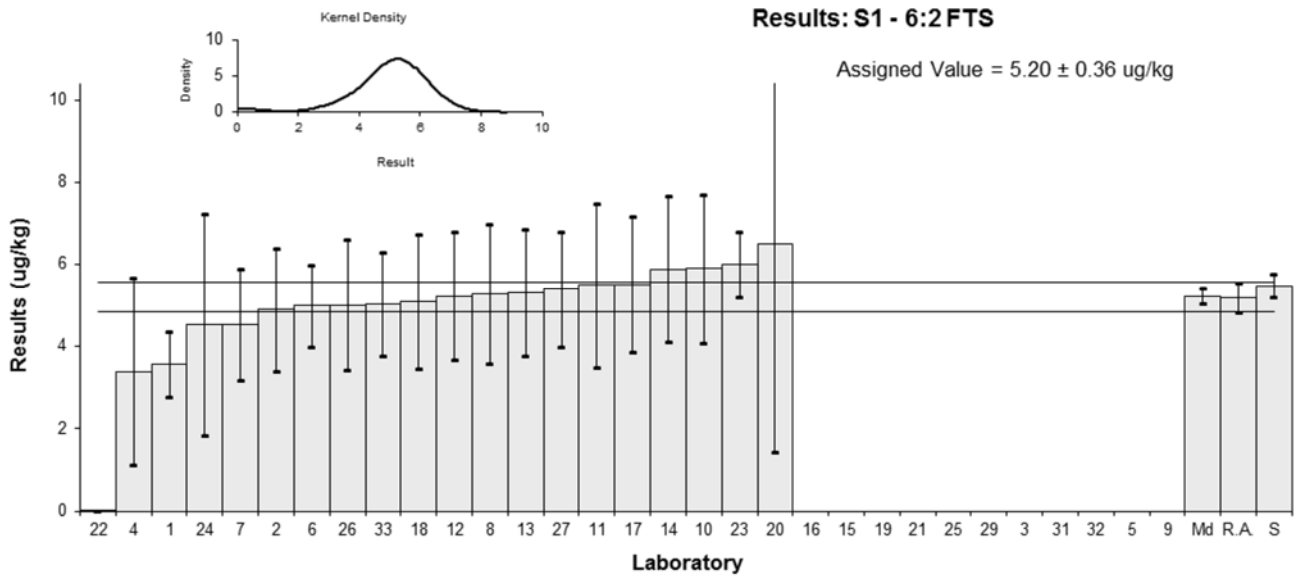
Participant Results

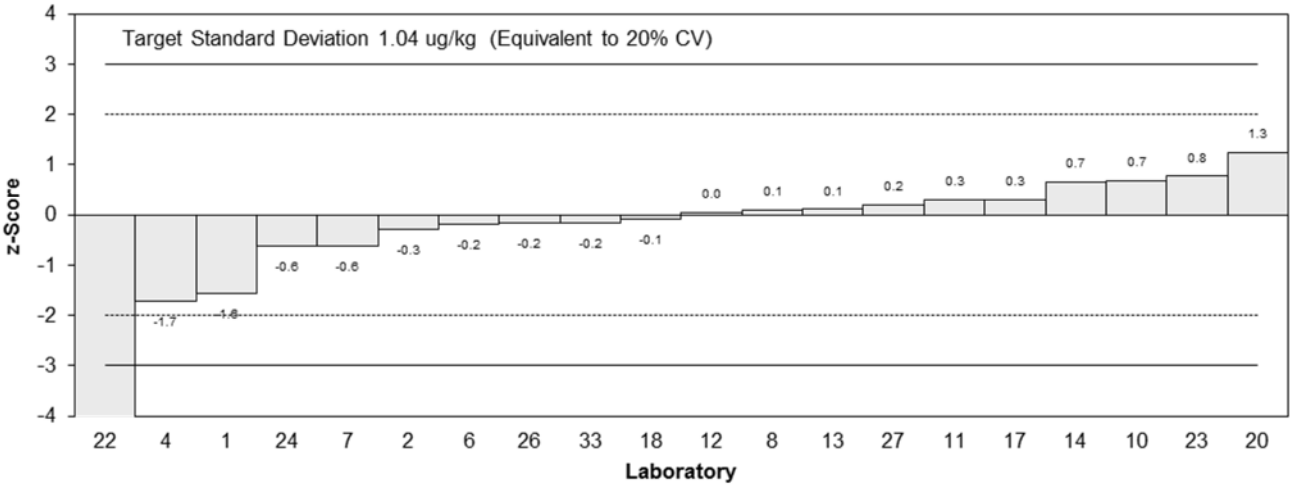
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	3.57	0.79	NR	-1.57	-1.88
2	4.9	1.5	NR	-0.29	-0.19
3	NT	NT	NT		
4	3.4	2.29	86	-1.73	-0.78
5	NT	NT	NT		
6	5.0	1.0	112	-0.19	-0.19
7	4.55	1.36	76	-0.63	-0.46
8	5.3	1.7	87.8	0.10	0.06
9	NT	NT	NT		
10	5.9	1.8	NR	0.67	0.38
11	5.5	2	121	0.29	0.15
12	5.24	1.57	83	0.04	0.02
13	5.31	1.55	93	0.11	0.07
14	5.89	1.77	107	0.66	0.38
15	NT	NT	NT		
16	<10	NR	95		
17	5.51	1.65	NR	0.30	0.18
18	5.1	1.63	113	-0.10	-0.06
19	NT	NT	NT		
20	6.50	5.07	122	1.25	0.26
21	NT	NT	NT		
22	0.010	0.002	NR	-4.99	-14.42
23	6.0	0.8	101	0.77	0.91
24	4.55	2.7	11.73	-0.63	-0.24
25	NT	NT	NT		
26	5.02	1.60	88	-0.17	-0.11
27	5.4	1.4	92	0.19	0.14
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	5.0399	1.2600	86.0	-0.15	-0.12

Statistics

Assigned Value	5.20	0.36
Spike	5.49	0.27
Robust Average*	5.20	0.36
Median*	5.24	0.19
Mean*	5.14	
N	20	
Max.	6.5	
Min.	0.01	
Robust SD*	0.63	
Robust CV*	12%	

* Results from laboratory 22 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S1 - 6:2 FTS
Assigned Value = 5.20 ± 0.36 ug/kg
Results (ug/kg)
Laboratory
22 4 1 24 7 2 6 26 33 18 12 8 13 27 11 17 14 10 23 20 16 15 19 21 25 29 3 31 32 5 9 Md R.A. S


z-Scores: S1 - 6:2 FTS
Target Standard Deviation 1.04 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 4 1 24 7 2 6 26 33 18 12 8 13 27 11 17 14 10 23 20

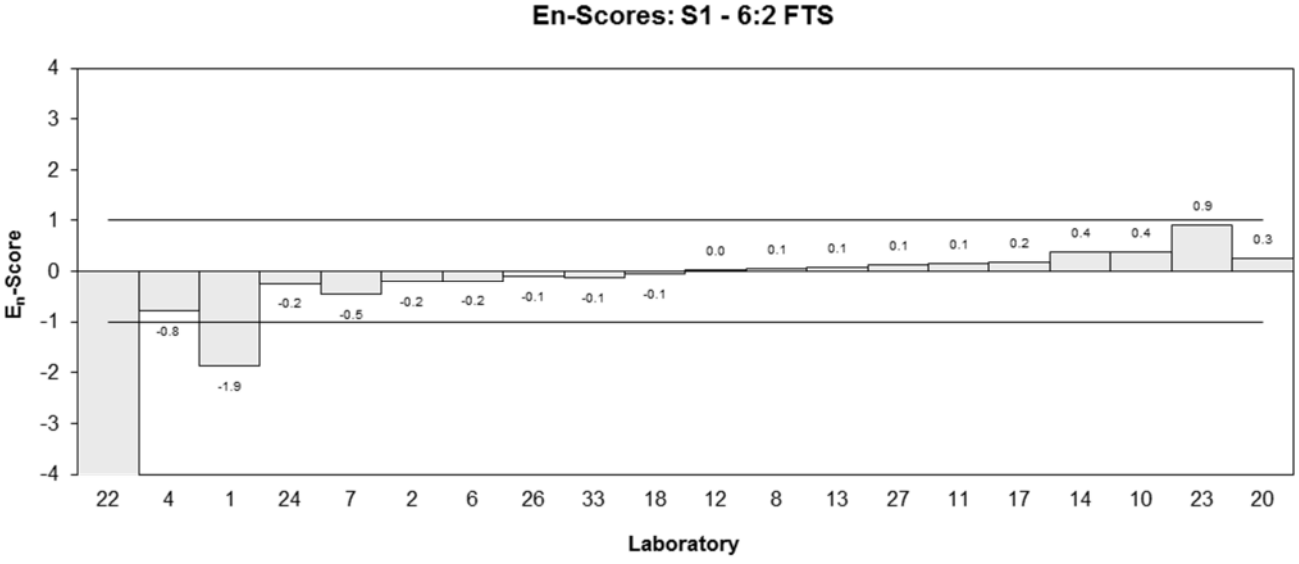

En-Scores: S1 - 6:2 FTS
En-Score
Laboratory
22 4 1 24 7 2 6 26 33 18 12 8 13 27 11 17 14 10 23 20

Figure 3

Table 12

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	8:2 FTS
Units	µg/kg

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	<0.1	NR	NR
2	<0.4	NR	NR
3	NT	NT	NT
4	<5	2.76	52
5	NT	NT	NT
6	0.19	0.05	131
7	<0.5	NR	90
8	<0.5	0.04	92.8
9	NT	NT	NT
10	0.17	0.05	NR
11	0.2	0.2	126
12	<0.5	NR	81
13	< 1.98	NT	71
14	< 4.12	1.24	80
15	NT	NT	NT
16	<2	NR	80
17	0.26	0.08	NR
18	<0.5	0.14	127
19	NT	NT	NT
20	0.351	0.116	95.2
21	< 5	2.4	NR
22	NR	0	NR
23	<1.0	NR	91
24	0.13	0.08	240.56
25	NT	NT	NT
26	<0.948	NR	82
27	<1	NR	88
29	NT	NT	NT
31	NT	NT	NT
32	NT	NT	NT
33	NR	NR	76.8

Statistics

Assigned Value	Not Set	
Spike	0.178	0.009
Robust Average	0.216	0.089
Median	0.195	0.070
Mean	0.217	
N	6	
Max.	0.351	
Min.	0.13	
Robust SD	0.087	
Robust CV	40%	

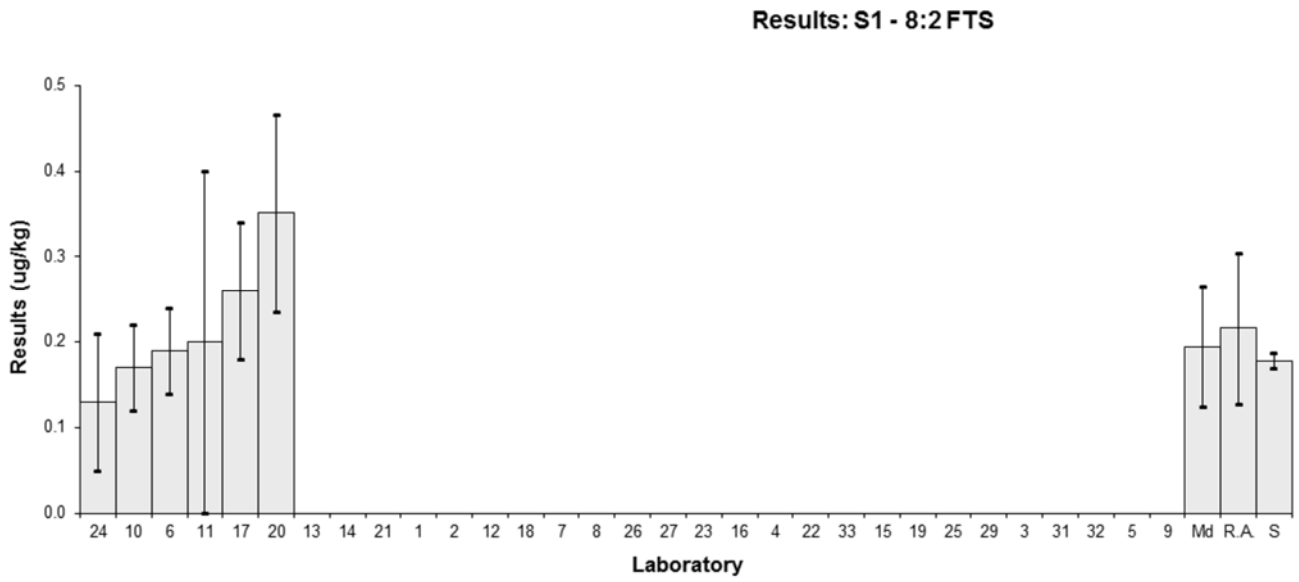

Results: S1 - 8:2 FTS
Results (ug/kg)
0.5
0.4
0.3
0.2
0.1
0.0
24 10 6 11 17 20 13 14 21 1 2 12 18 7 8 26 27 23 16 4 22 33 15 19 25 29 3 31 32 5 9 Md R.A. S
Laboratory

Figure 4

Table 13

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	MeFOSA
Units	µg/kg

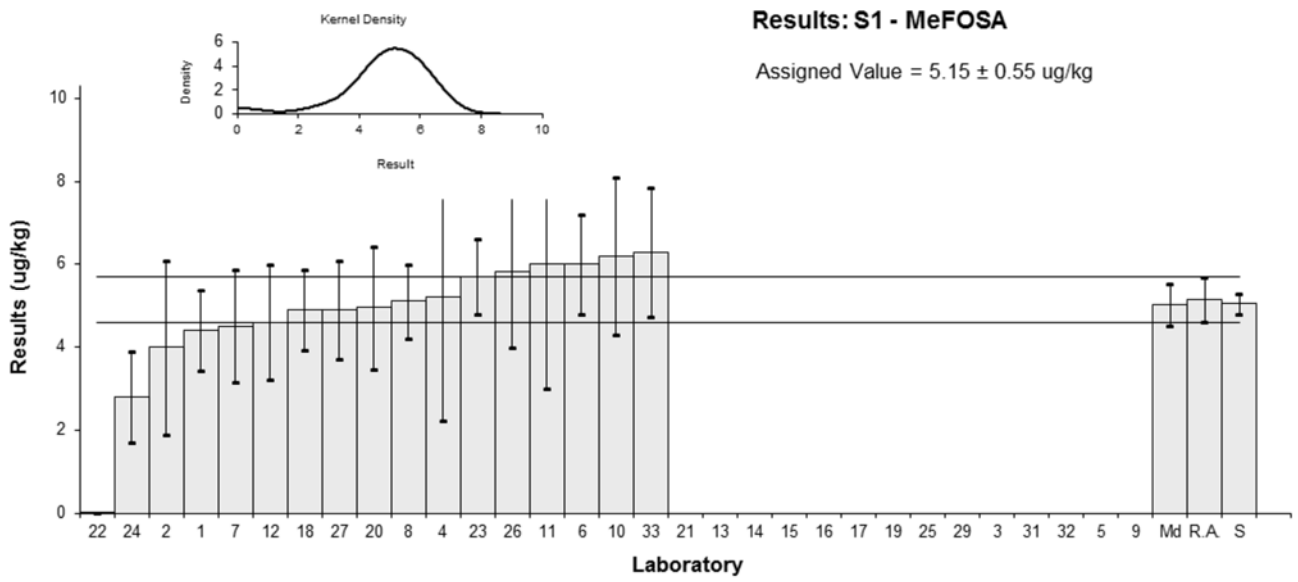
Participant Results

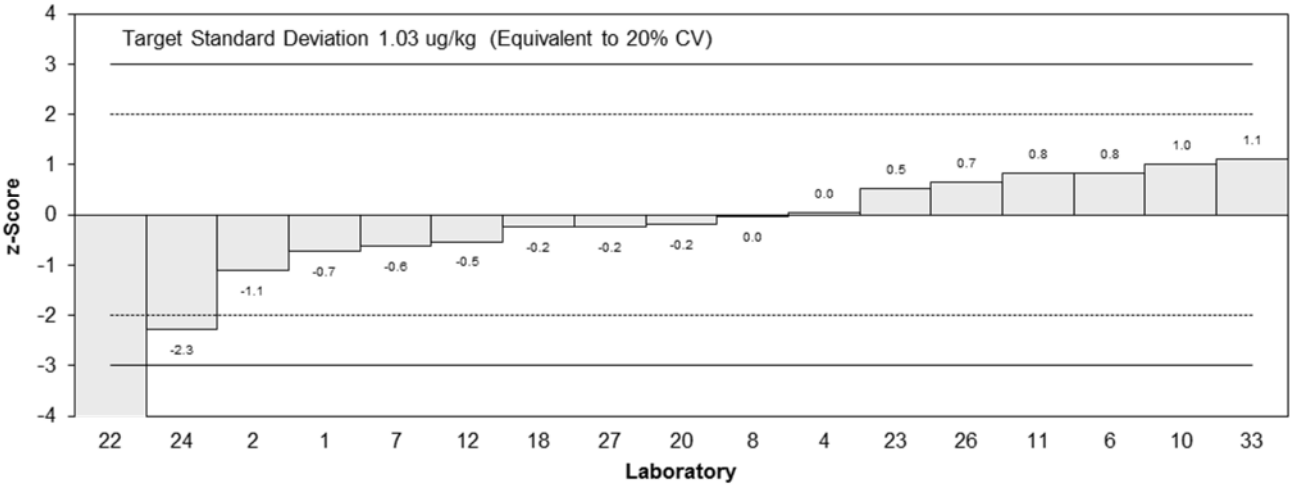
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	4.40	0.97	NR	-0.73	-0.67
2	4.0	2.1	NR	-1.12	-0.53
3	NT	NT	NT		
4	5.2	2.97	40	0.05	0.02
5	NT	NT	NT		
6	6.0	1.2	111	0.83	0.64
7	4.51	1.35	70	-0.62	-0.44
8	5.1	0.9	85.4	-0.05	-0.05
9	NT	NT	NT		
10	6.2	1.9	NR	1.02	0.53
11	6	3	75	0.83	0.28
12	4.60	1.38	81	-0.53	-0.37
13	NT	NT	NT		
14	NT	NT	NT		
15	NT	NT	NT		
16	NT	NT	NT		
17	NT	NT	NT		
18	4.9	0.98	101	-0.24	-0.22
19	NT	NT	NT		
20	4.95	1.48	26.4	-0.19	-0.13
21	< 5	1.9	NR		
22	0.013	0.003	NR	-4.99	-9.34
23	5.7	0.9	107	0.53	0.52
24	2.79	1.1	21.99	-2.29	-1.92
25	NT	NT	NT		
26	5.83	1.83	85	0.66	0.36
27	4.9	1.2	102	-0.24	-0.19
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	6.2872	1.5718	17.4	1.10	0.68

Statistics

Assigned Value	5.15	0.55
Spike	5.04	0.25
Robust Average*	5.15	0.55
Median*	5.03	0.51
Mean*	5.09	
N	17	
Max.	6.29	
Min.	0.013	
Robust SD*	0.89	
Robust CV*	17%	

* Results from laboratory 22 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S1 - MeFOSA
Assigned Value = 5.15 ± 0.55 ug/kg
Results (ug/kg)
22 24 2 1 7 12 18 27 20 8 4 23 26 11 6 10 33 21 13 14 15 16 17 19 25 29 3 31 32 5 9 Md R.A. S
Laboratory


z-Scores: S1 - MeFOSA
Target Standard Deviation 1.03 ug/kg (Equivalent to 20% CV)
z-Score
-2.3 -1.1 -0.7 -0.6 -0.5 -0.2 -0.2 -0.2 0.0 0.5 0.7 0.8 0.8 1.0 1.1
22 24 2 1 7 12 18 27 20 8 4 23 26 11 6 10 33
Laboratory

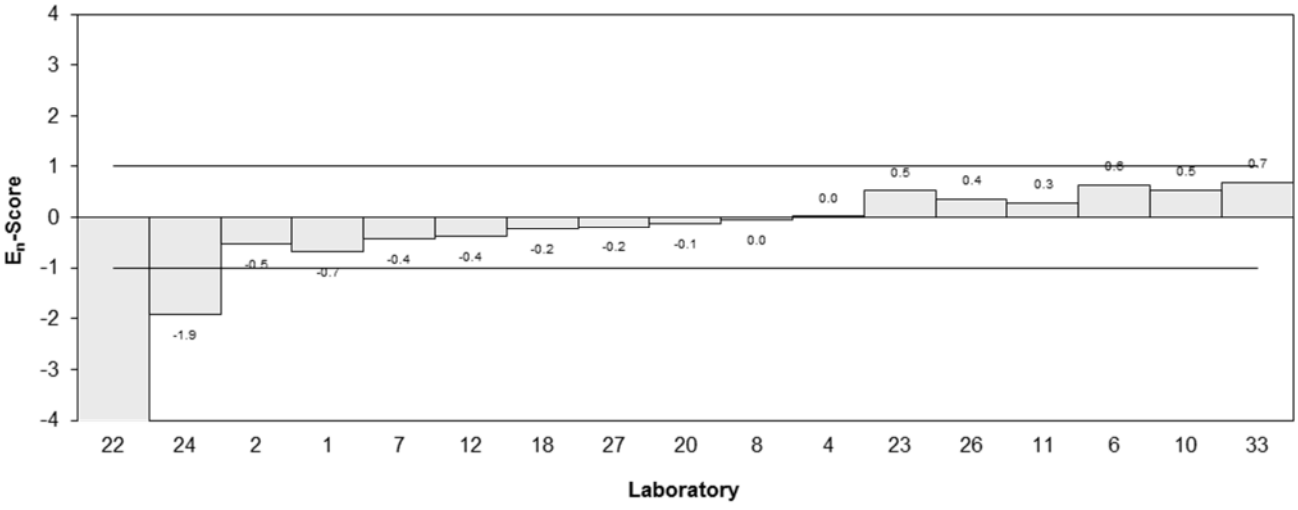

En-Scores: S1 - MeFOSA
En-Score
-1.9 -0.5 -0.7 -0.4 -0.4 -0.2 -0.2 -0.1 0.0 0.0 0.5 0.4 0.3 0.6 0.5 0.7
22 24 2 1 7 12 18 27 20 8 4 23 26 11 6 10 33
Laboratory

Figure 5

Table 14

Sample Details

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

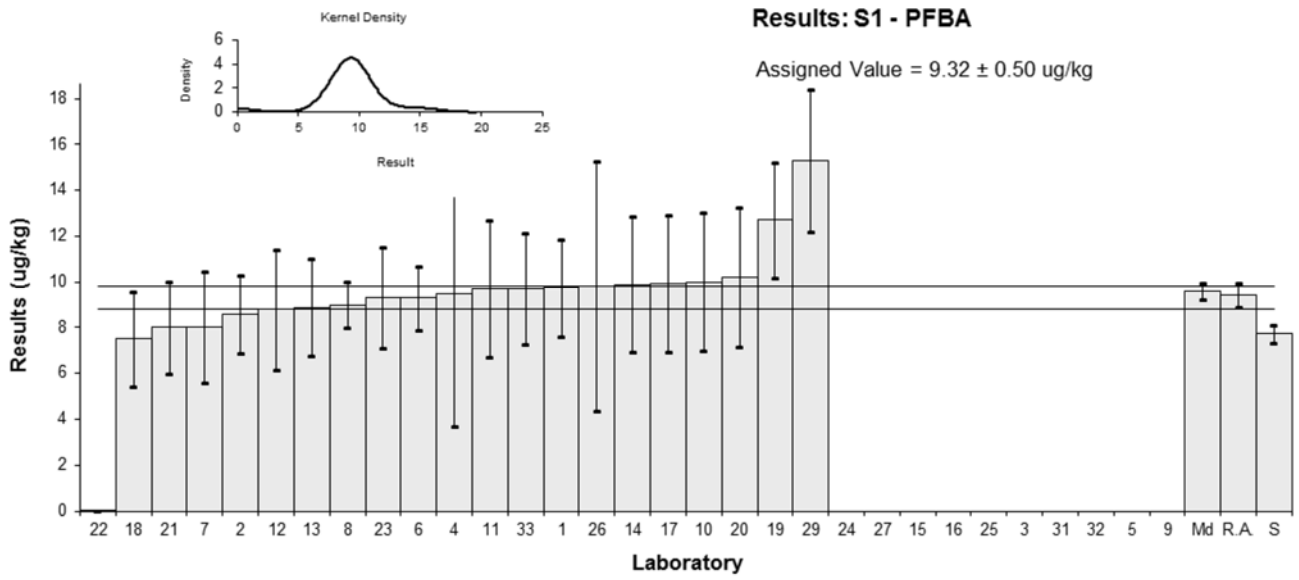
Participant Results

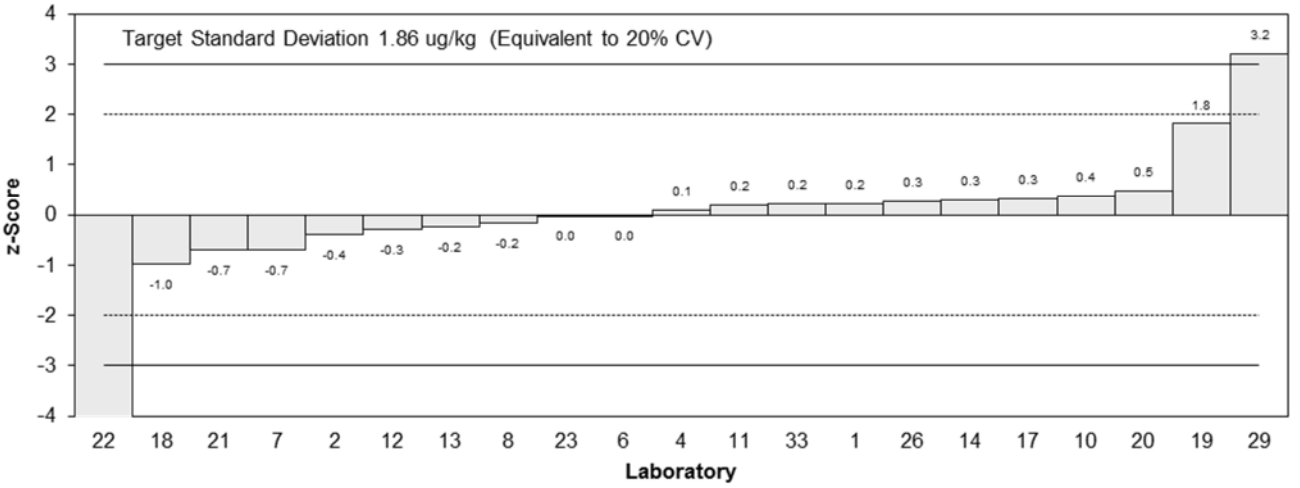
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	9.74	2.14	NR	0.23	0.19
2	8.6	1.7	NR	-0.39	-0.41
3	NT	NT	NT		
4	9.5	5.80	98	0.10	0.03
5	NT	NT	NT		
6	9.3	1.4	105	-0.01	-0.01
7	8.03	2.41	87	-0.69	-0.52
8	9.0	1.0	97.3	-0.17	-0.29
9	NT	NT	NT		
10	10.0	3.0	NR	0.36	0.22
11	9.7	3	112	0.20	0.12
12	8.78	2.63	80	-0.29	-0.20
13	8.87	2.13	68	-0.24	-0.21
14	9.89	2.97	63	0.31	0.19
15	NT	NT	NT		
16	NT	NT	NT		
17	9.93	2.98	NR	0.33	0.20
18	7.5	2.07	121	-0.98	-0.85
19	12.7	2.5	99.5	1.81	1.33
20	10.2	3.06	92.0	0.47	0.28
21	8	2.0	114	-0.71	-0.64
22	0.015	0.005	NR	-4.99	-18.61
23	9.3	2.2	100	-0.01	-0.01
24	<300	NR	51.99		
25	NT	NT	NT		
26	9.81	5.47	70	0.26	0.09
27	<50	NR	108		
29	15.3	3.1	NR	3.21	1.90
31	NT	NT	NT		
32	NT	NT	NT		
33	9.7239	2.4310	91.1	0.22	0.16

Statistics

Assigned Value	9.32	0.50
Spike	7.74	0.39
Robust Average*	9.40	0.53
Median*	9.60	0.35
Mean*	9.69	
N	21	
Max.	15.3	
Min.	0.015	
Robust SD*	0.96	
Robust CV*	10%	

* Results from laboratory 22 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S1 - PFBA
Assigned Value = 9.32 ± 0.50 ug/kg
Results (ug/kg)
Laboratory
22 18 21 7 2 12 13 8 23 6 4 11 33 1 26 14 17 10 20 19 29 24 27 15 16 25 3 31 32 5 9 Md R.A. S


z-Scores: S1 - PFBA
Target Standard Deviation 1.86 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 18 21 7 2 12 13 8 23 6 4 11 33 1 26 14 17 10 20 19 29
-1.0 -0.7 -0.7 -0.4 -0.3 -0.2 -0.2 0.0 0.0 0.1 0.2 0.2 0.2 0.3 0.3 0.3 0.4 0.5 1.8 3.2

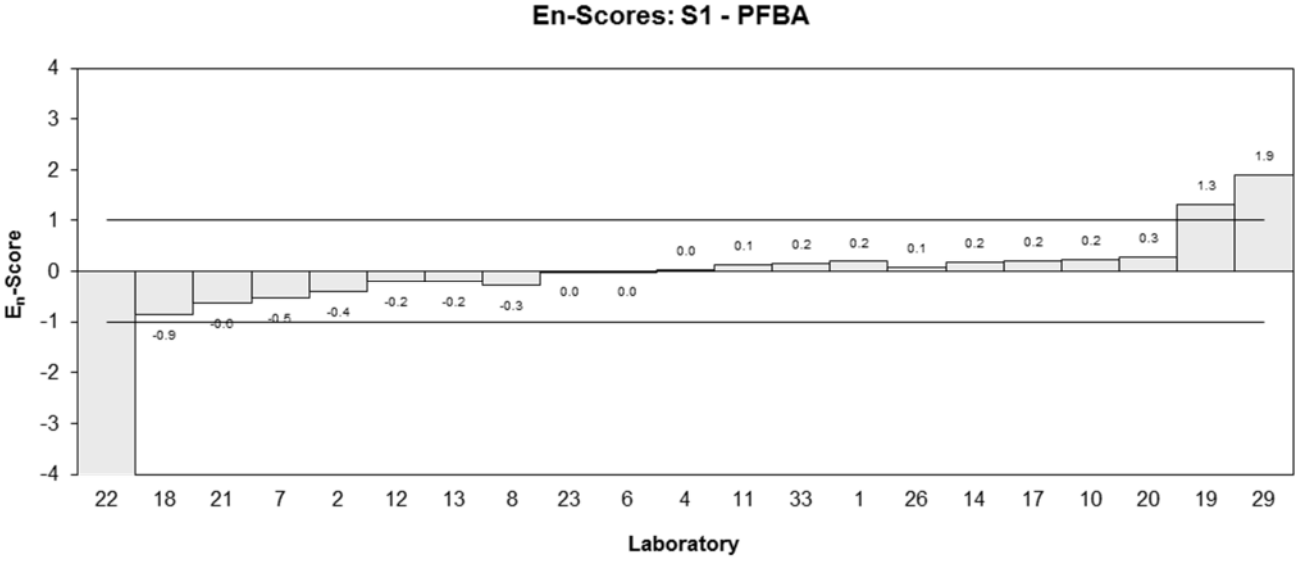

En-Scores: S1 - PFBA
En-Score
Laboratory
22 18 21 7 2 12 13 8 23 6 4 11 33 1 26 14 17 10 20 19 29
-0.9 -0.6 -0.5 -0.4 -0.2 -0.2 -0.3 0.0 0.0 0.0 0.1 0.2 0.2 0.1 0.2 0.2 0.2 0.3 1.3 1.9

Figure 6

Table 15

Sample Details

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

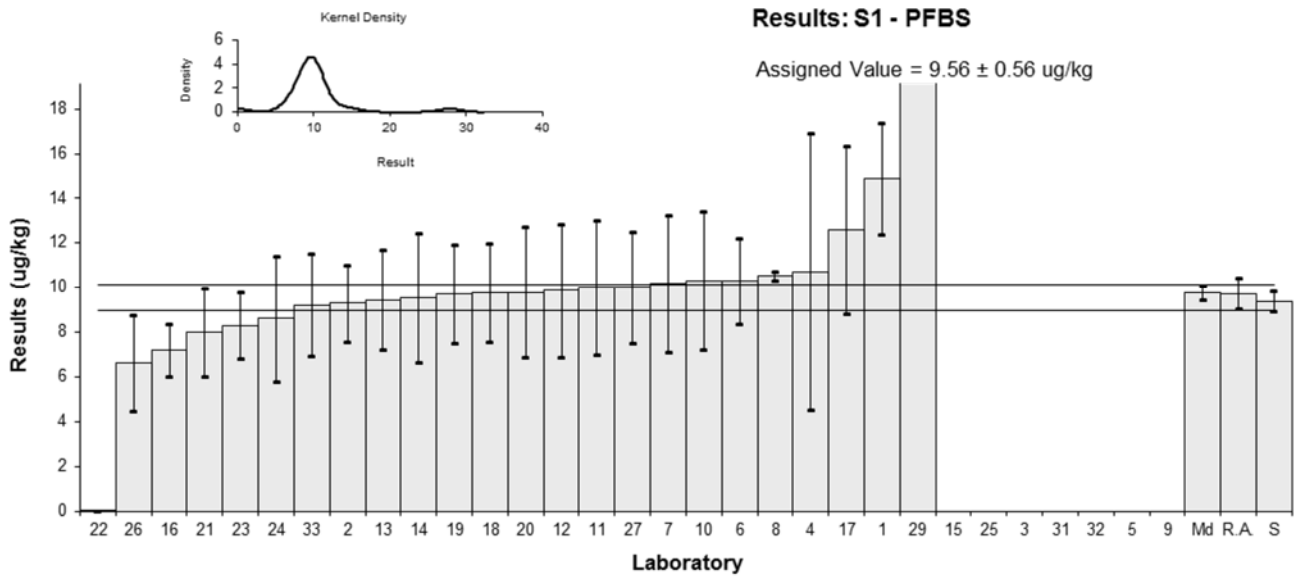
Participant Results

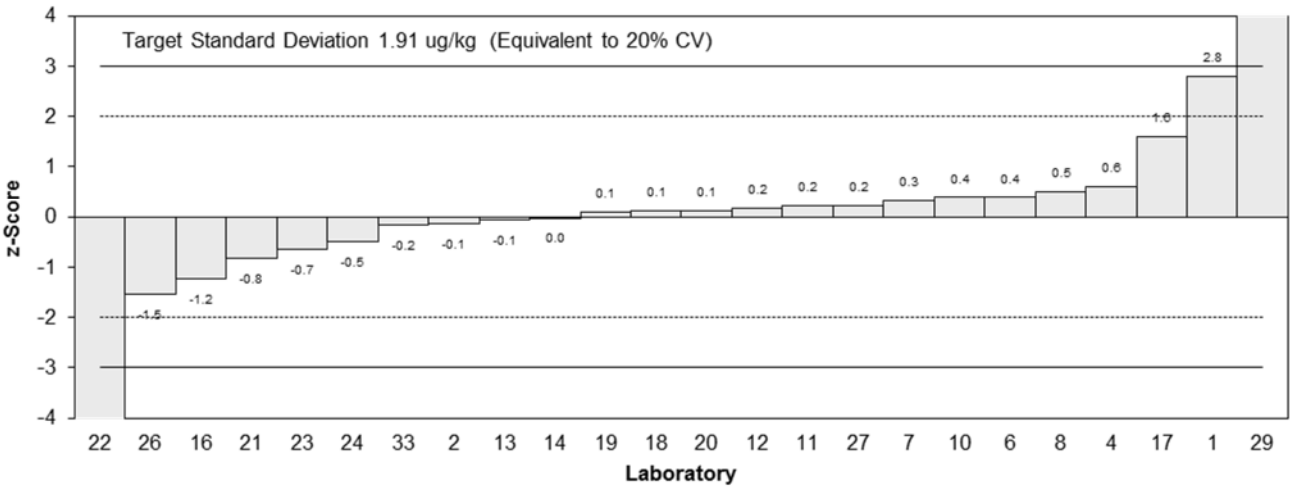
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	14.9	2.5	NR	2.79	2.08
2	9.3	1.7	NR	-0.14	-0.15
3	NT	NT	NT		
4	10.7	6.19	75	0.60	0.18
5	NT	NT	NT		
6	10.3	1.9	100	0.39	0.37
7	10.17	3.05	80	0.32	0.20
8	10.5	0.2	99.1	0.49	1.58
9	NT	NT	NT		
10	10.3	3.1	NR	0.39	0.23
11	10	3	92	0.23	0.14
12	9.87	2.96	92	0.16	0.10
13	9.44	2.24	70	-0.06	-0.05
14	9.55	2.87	83	-0.01	0.00
15	NT	NT	NT		
16	7.2	1.2	83	-1.23	-1.78
17	12.6	3.77	NR	1.59	0.80
18	9.8	2.21	51	0.13	0.11
19	9.74	2.2	NR	0.09	0.08
20	9.80	2.94	103	0.13	0.08
21	8	2.0	112	-0.82	-0.75
22	0.021	0.004	NR	-4.99	-17.03
23	8.3	1.5	96	-0.66	-0.79
24	8.61	2.8	6.78	-0.50	-0.33
25	NT	NT	NT		
26	6.63	2.15	72	-1.53	-1.32
27	10	2.5	106	0.23	0.17
29	27.9	5.0	NR	9.59	3.65
31	NT	NT	NT		
32	NT	NT	NT		
33	9.2316	2.3079	95.1	-0.17	-0.14

Statistics

Assigned Value**	9.56	0.56
Spike	9.39	0.47
Robust Average	9.75	0.66
Median*	9.80	0.32
Mean*	10.56	
N	24	
Max.	27.9	
Min.	0.021	
Robust SD*	1.26	
Robust CV*	13%	

* Results from laboratory 22 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 1, 22 and 29.


Kernel Density
Density
Result
Results: S1 - PFBS
Assigned Value = 9.56 ± 0.56 ug/kg
Results (ug/kg)
Laboratory
22 26 16 21 23 24 33 2 13 14 19 18 20 12 11 27 7 10 6 8 4 17 1 29 15 25 3 31 32 5 9 Md R.A. S


z-Scores: S1 - PFBS
Target Standard Deviation 1.91 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 26 16 21 23 24 33 2 13 14 19 18 20 12 11 27 7 10 6 8 4 17 1 29

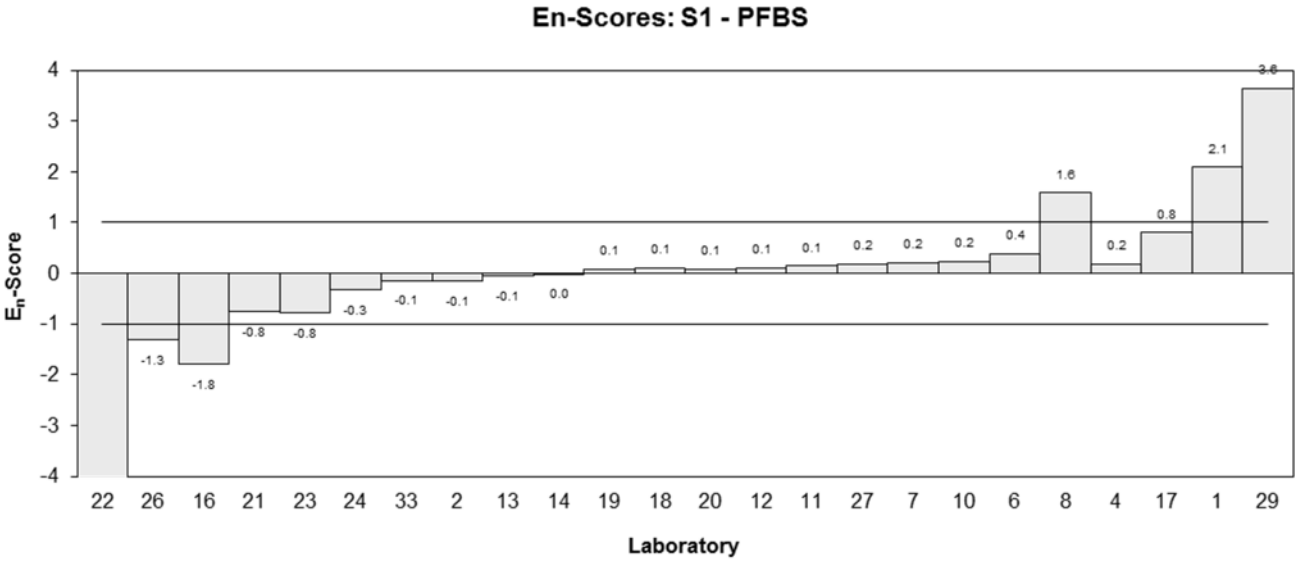

En-Scores: S1 - PFBS
En-Score
Laboratory
22 26 16 21 23 24 33 2 13 14 19 18 20 12 11 27 7 10 6 8 4 17 1 29

Figure 7

Table 16

Sample Details

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

Participant Results

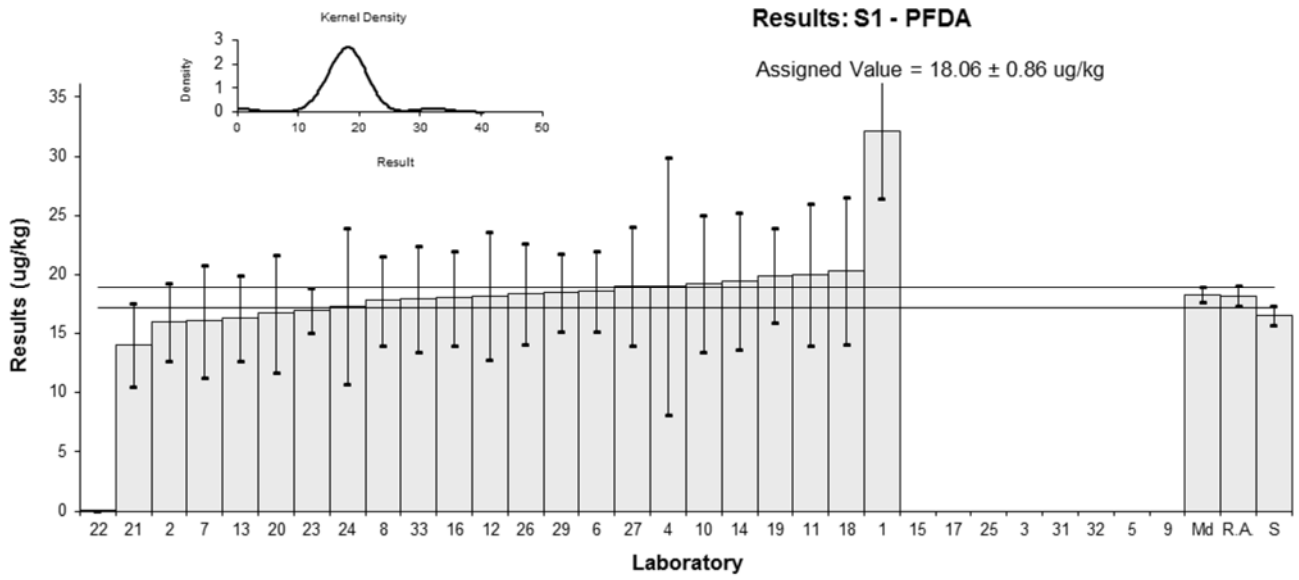
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	32.1	5.7	NR	3.89	2.44
2	16	3.3	NR	-0.57	-0.60
3	NT	NT	NT		
4	19	10.9	59	0.26	0.09
5	NT	NT	NT		
6	18.6	3.4	107	0.15	0.15
7	16.04	4.81	86	-0.56	-0.41
8	17.8	3.8	97.4	-0.07	-0.07
9	NT	NT	NT		
10	19.2	5.8	NR	0.32	0.19
11	20	6	90	0.54	0.32
12	18.2	5.45	96	0.04	0.03
13	16.3	3.67	79	-0.49	-0.47
14	19.4	5.8	80	0.37	0.23
15	NT	NT	NT		
16	18	4	81	-0.02	-0.01
17	NT	NT	NT		
18	20.3	6.23	104	0.62	0.36
19	19.9	4.0	89.2	0.51	0.45
20	16.7	5.00	62.5	-0.38	-0.27
21	14	3.5	104	-1.12	-1.13
22	0.046	0.012	NR	-4.99	-20.94
23	17	1.9	97	-0.29	-0.51
24	17.3	6.6	6.42	-0.21	-0.11
25	NT	NT	NT		
26	18.4	4.26	71	0.09	0.08
27	19	5.0	112	0.26	0.19
29	18.5	3.3	NR	0.12	0.13
31	NT	NT	NT		
32	NT	NT	NT		
33	17.9105	4.4776	78.9	-0.04	-0.03

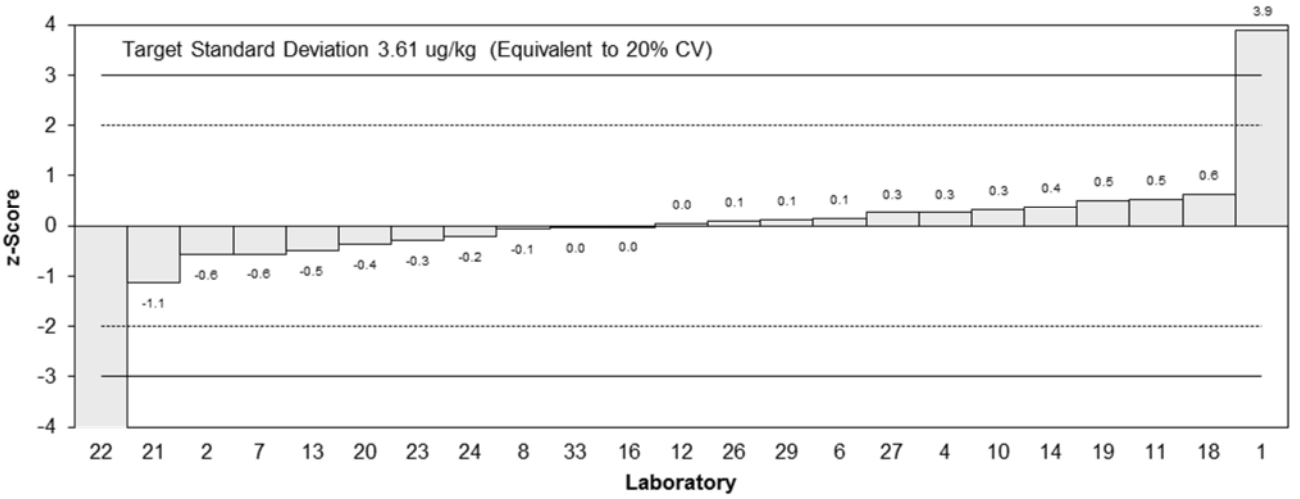
Statistics

Assigned Value**	18.06	0.86
Spike	16.51	0.83
Robust Average*	18.18	0.88
Median*	18.30	0.69
Mean*	18.62	
N	23	
Max.	32.1	
Min.	0.046	
Robust SD*	1.66	
Robust CV*	9.1%	

* Results from laboratory 22 were omitted from the statistical calculations.

** Assigned value is the robust average excluding laboratories 1 and 22.


Kernel Density
Density
Result
Results: S1 - PFDA
Assigned Value = 18.06 ± 0.86 ug/kg
Results (ug/kg)
Laboratory
22 21 2 7 13 20 23 24 8 33 16 12 26 29 6 27 4 10 14 19 11 18 1 15 17 25 3 31 32 5 9 Md R.A. S


z-Scores: S1 - PFDA
Target Standard Deviation 3.61 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 21 2 7 13 20 23 24 8 33 16 12 26 29 6 27 4 10 14 19 11 18 1
3.9
-1.1 -0.6 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0.0 0.0 0.0 0.1 0.1 0.1 0.3 0.3 0.3 0.4 0.5 0.5 0.6

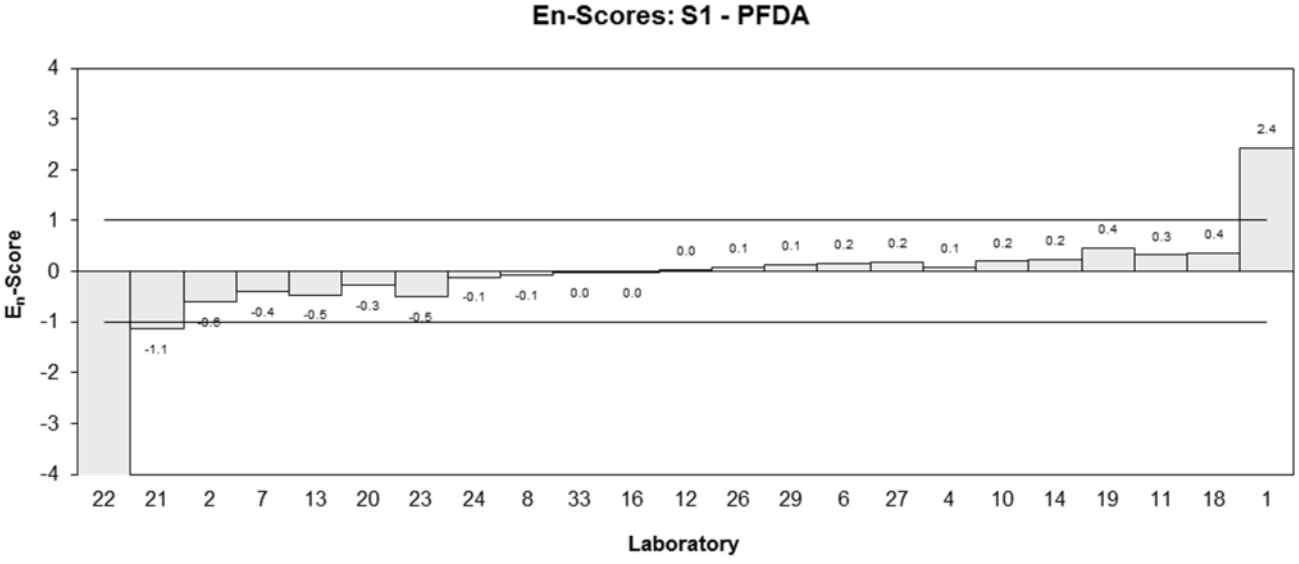

En-Scores: S1 - PFDA
En-Score
Laboratory
22 21 2 7 13 20 23 24 8 33 16 12 26 29 6 27 4 10 14 19 11 18 1
2.4
-1.1 -0.6 -0.4 -0.5 -0.3 -0.5 -0.1 -0.1 0.0 0.0 0.0 0.1 0.1 0.2 0.2 0.1 0.2 0.2 0.4 0.3 0.4

Figure 8

Table 17

Sample Details

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

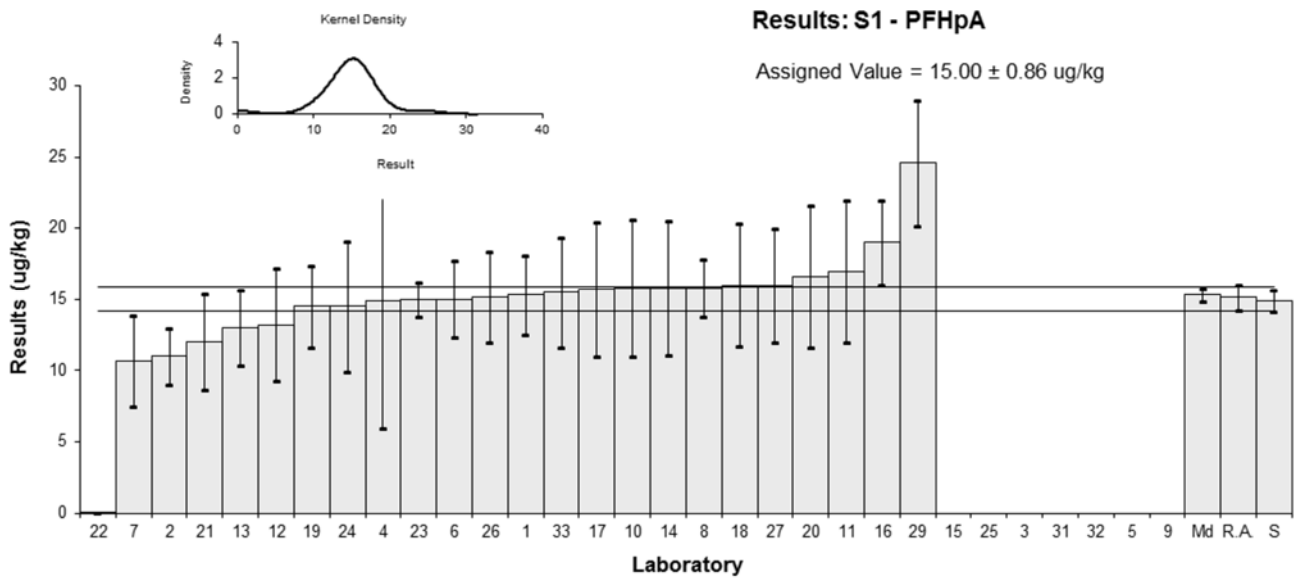
Participant Results

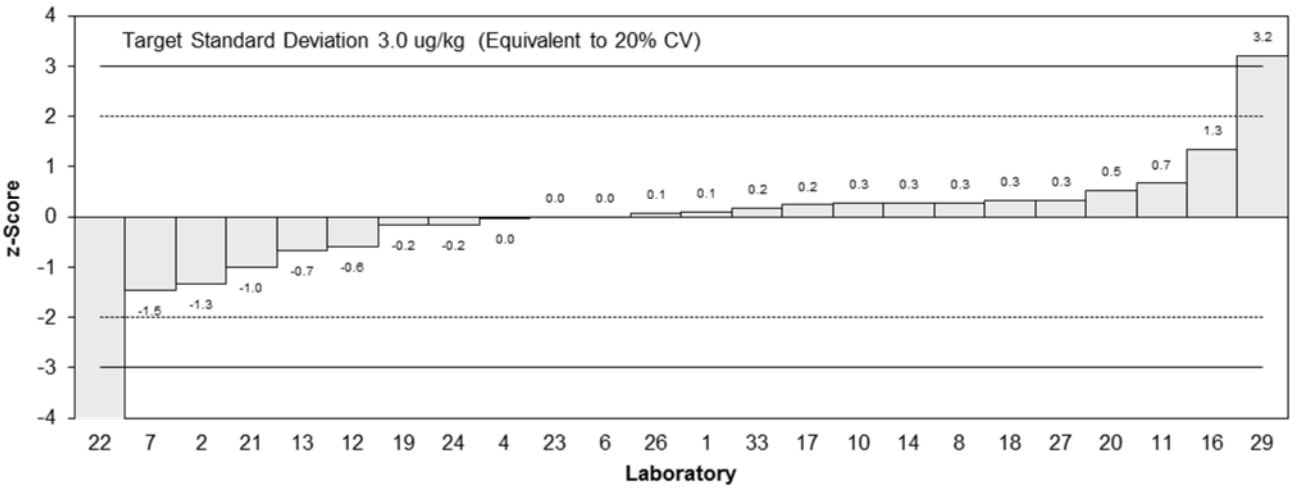
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	15.3	2.8	NR	0.10	0.10
2	11	2.0	NR	-1.33	-1.84
3	NT	NT	NT		
4	14.9	9.0	106	-0.03	-0.01
5	NT	NT	NT		
6	15.0	2.7	117	0.00	0.00
7	10.64	3.19	100	-1.45	-1.32
8	15.8	2.0	84.6	0.27	0.37
9	NT	NT	NT		
10	15.8	4.8	NR	0.27	0.16
11	17	5	71	0.67	0.39
12	13.2	3.96	102	-0.60	-0.44
13	13.0	2.69	84	-0.67	-0.71
14	15.8	4.7	74	0.27	0.17
15	NT	NT	NT		
16	19	3	56	1.33	1.28
17	15.7	4.70	NR	0.23	0.15
18	16.0	4.31	106	0.33	0.23
19	14.5	2.9	NR	-0.17	-0.17
20	16.6	4.97	91.0	0.53	0.32
21	12	3.4	99	-1.00	-0.86
22	0.024	0.004	NR	-4.99	-17.41
23	15	1.2	97	0.00	0.00
24	14.5	4.6	6.20	-0.17	-0.11
25	NT	NT	NT		
26	15.2	3.19	76	0.07	0.06
27	16	4.0	104	0.33	0.24
29	24.6	4.4	NR	3.20	2.14
31	NT	NT	NT		
32	NT	NT	NT		
33	15.4982	3.8746	93.1	0.17	0.13

Statistics

Assigned Value**	15.00	0.86
Spike	14.90	0.75
Robust Average	15.12	0.92
Median*	15.30	0.45
Mean*	15.31	
N	24	
Max.	24.6	
Min.	0.024	
Robust SD*	1.76	
Robust CV*	12%	

* Results from laboratory 22 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 22 and 29.


Kernel Density
Density
Result
Results: S1 - PFHpA
Assigned Value = 15.00 ± 0.86 ug/kg
Results (ug/kg)
Laboratory
22 7 2 21 13 12 19 24 4 23 6 26 1 33 17 10 14 8 18 27 20 11 16 29 15 25 3 31 32 5 9 Md R.A. S


z-Scores: S1 - PFHpA
Target Standard Deviation 3.0 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 7 2 21 13 12 19 24 4 23 6 26 1 33 17 10 14 8 18 27 20 11 16 29
-1.5 -1.3 -1.0 -0.7 -0.6 -0.2 -0.2 0.0 0.0 0.0 0.1 0.1 0.2 0.2 0.3 0.3 0.3 0.3 0.3 0.5 0.7 1.3 3.2

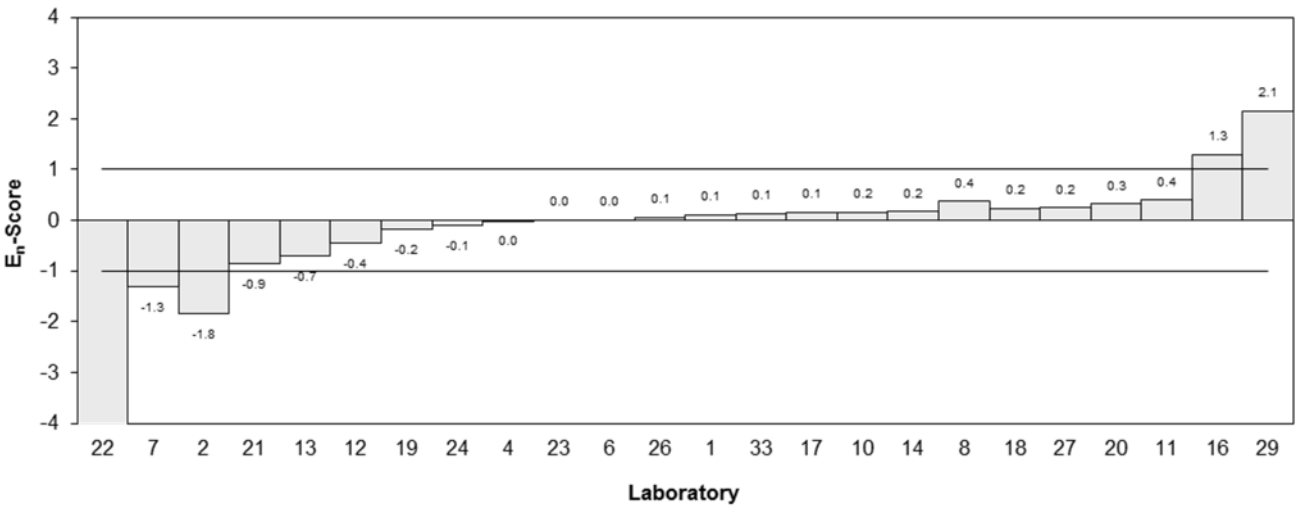

En-Scores: S1 - PFHpA
En-Score
Laboratory
22 7 2 21 13 12 19 24 4 23 6 26 1 33 17 10 14 8 18 27 20 11 16 29
-1.3 -1.8 -0.9 -0.7 -0.4 -0.2 -0.1 0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.2 0.2 0.4 0.2 0.2 0.3 0.4 1.3 2.1

Figure 9

Table 18

Sample Details

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

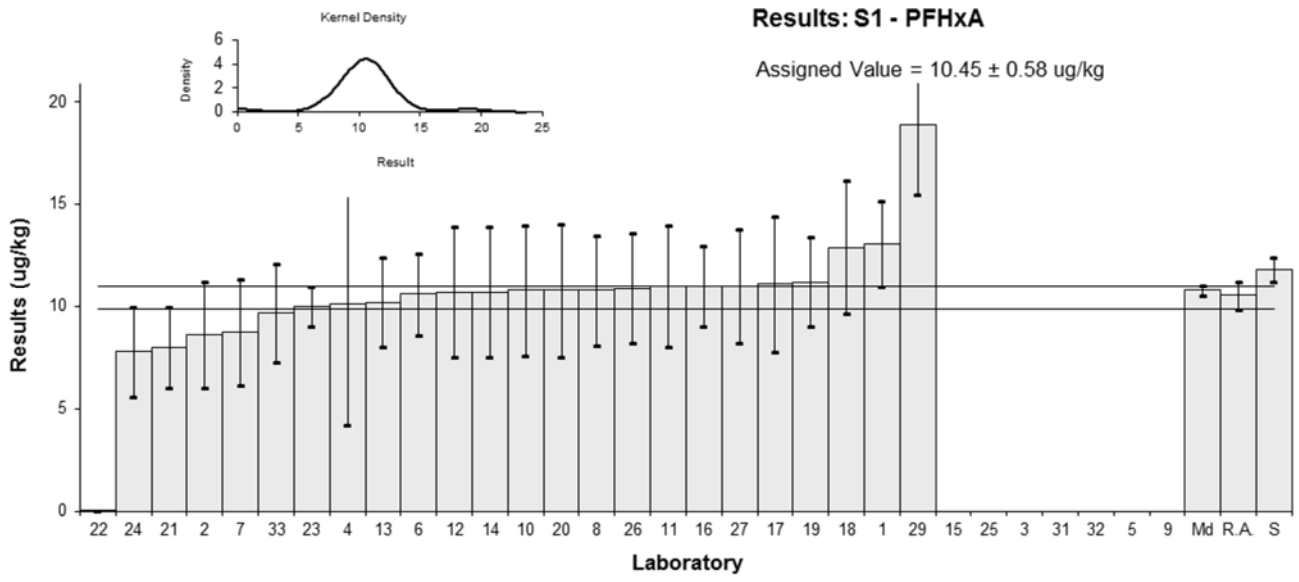
Participant Results

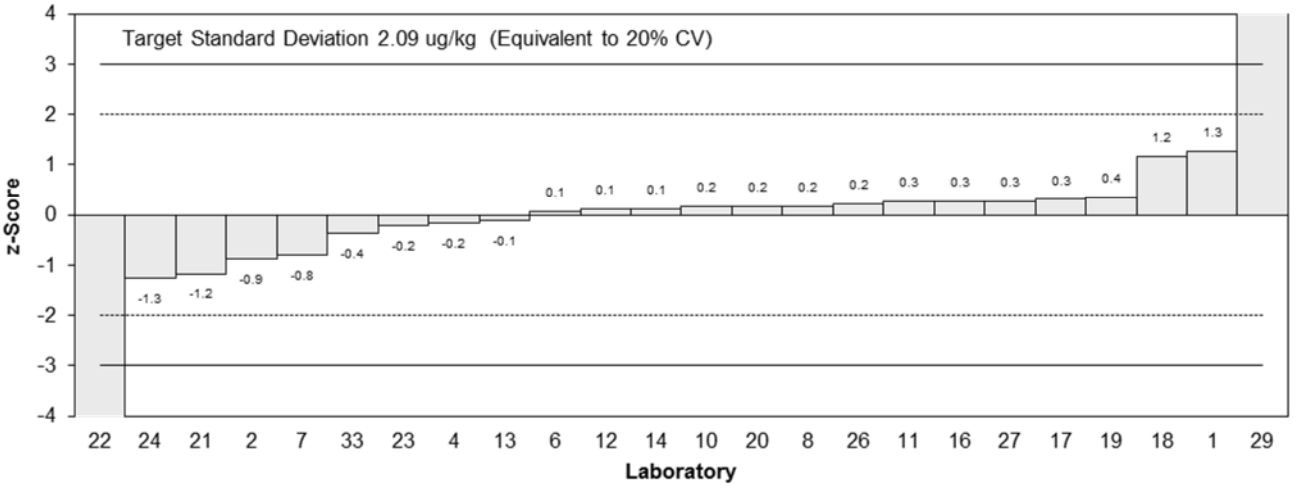
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	13.1	2.1	NR	1.27	1.22
2	8.6	2.6	NR	-0.89	-0.69
3	NT	NT	NT		
4	10.1	5.90	102	-0.17	-0.06
5	NT	NT	NT		
6	10.6	2.0	137	0.07	0.07
7	8.75	2.62	95	-0.81	-0.63
8	10.8	2.7	92.1	0.17	0.13
9	NT	NT	NT		
10	10.8	3.2	NR	0.17	0.11
11	11	3	75	0.26	0.18
12	10.7	3.20	96	0.12	0.08
13	10.2	2.2	79	-0.12	-0.11
14	10.7	3.2	71	0.12	0.08
15	NT	NT	NT		
16	11	2	56	0.26	0.26
17	11.1	3.33	NR	0.31	0.19
18	12.9	3.25	80	1.17	0.74
19	11.2	2.2	96.4	0.36	0.33
20	10.8	3.25	94.7	0.17	0.11
21	8	2.0	107	-1.17	-1.18
22	0.017	0.003	NR	-4.99	-17.99
23	10	1.0	101	-0.22	-0.39
24	7.80	2.2	7.23	-1.27	-1.16
25	NT	NT	NT		
26	10.9	2.71	73	0.22	0.16
27	11	2.8	116	0.26	0.19
29	18.9	3.4	NR	4.04	2.45
31	NT	NT	NT		
32	NT	NT	NT		
33	9.6819	2.4205	92.4	-0.37	-0.31

Statistics

Assigned Value**	10.45	0.58
Spike	11.80	0.59
Robust Average*	10.55	0.68
Median*	10.80	0.26
Mean*	10.81	
N	24	
Max.	18.9	
Min.	0.017	
Robust SD*	1.30	
Robust CV*	12%	

* Results from laboratory 22 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 22 and 29.


Kernel Density
Density
Result
Results: S1 - PFHxA
Assigned Value = 10.45 ± 0.58 ug/kg
Results (ug/kg)
Laboratory
22 24 21 2 7 33 23 4 13 6 12 14 10 20 8 26 11 16 27 17 19 18 1 29 15 25 3 31 32 5 9 Md R.A. S


z-Scores: S1 - PFHxA
Target Standard Deviation 2.09 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 24 21 2 7 33 23 4 13 6 12 14 10 20 8 26 11 16 27 17 19 18 1 29
-1.3 -1.2 -0.9 -0.8 -0.4 -0.2 -0.2 -0.1 0.1 0.1 0.1 0.2 0.2 0.2 0.2 0.3 0.3 0.3 0.3 0.4 1.2 1.3

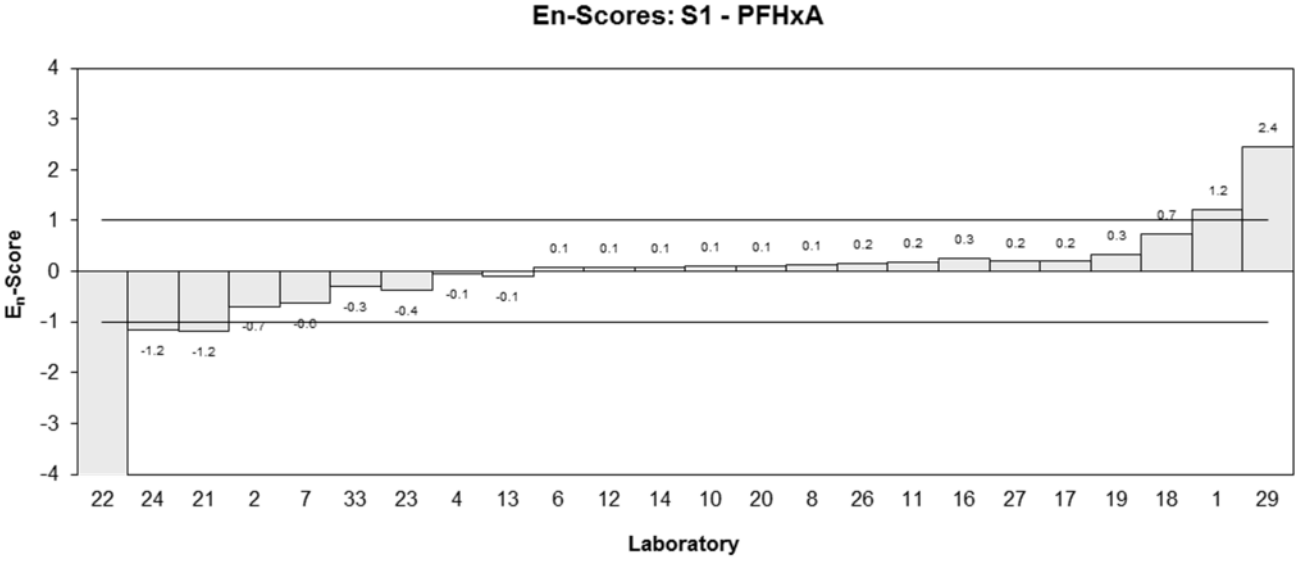

En-Scores: S1 - PFHxA
En-Score
Laboratory
22 24 21 2 7 33 23 4 13 6 12 14 10 20 8 26 11 16 27 17 19 18 1 29
-1.2 -1.2 -0.7 -0.6 -0.3 -0.4 -0.1 -0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.2 0.2 0.3 0.2 0.2 0.3 0.7 1.2 2.4

Figure 10

Table 19

Sample Details

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

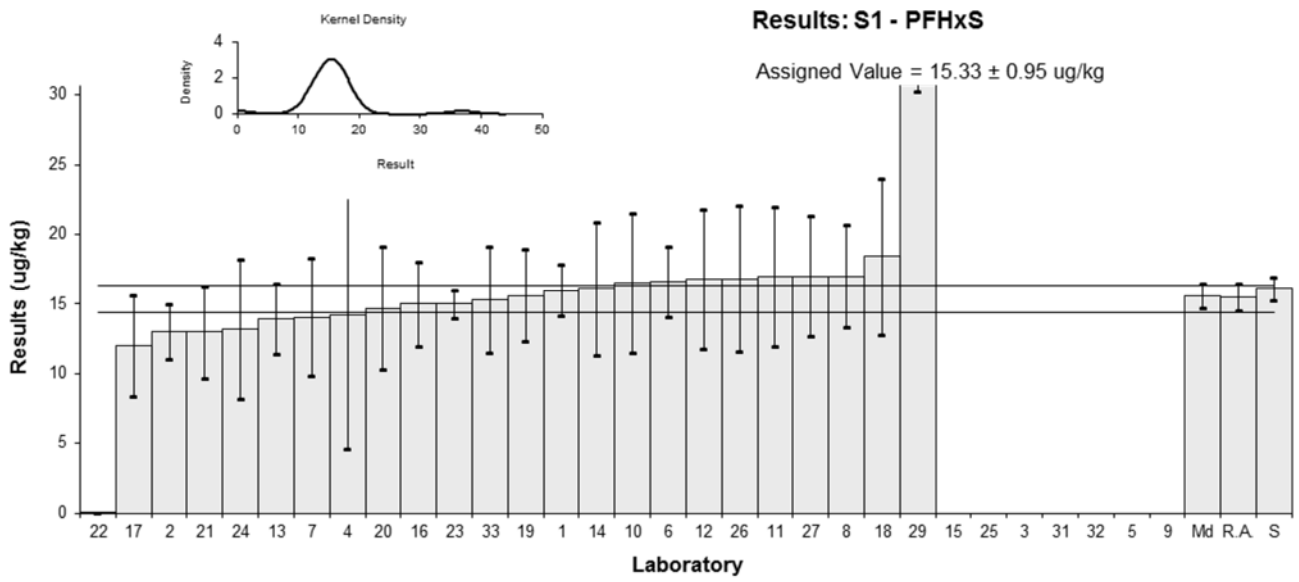
Participant Results

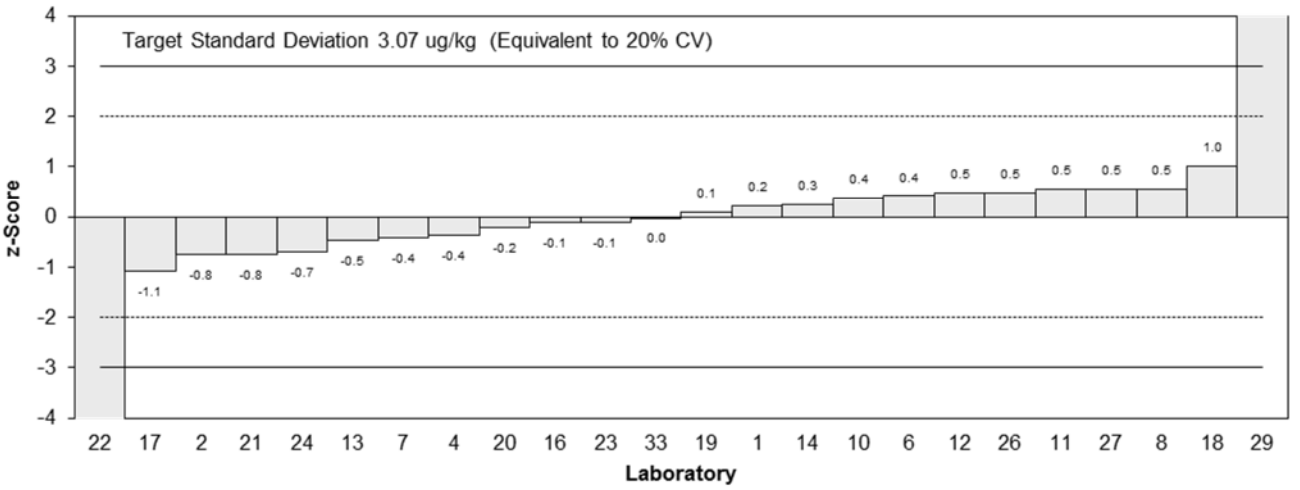
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	16.0	1.80	NR	0.22	0.33
2	13	2.0	NR	-0.76	-1.05
3	NT	NT	NT		
4	14.2	9.62	94	-0.37	-0.12
5	NT	NT	NT		
6	16.6	2.5	92	0.41	0.47
7	14.05	4.21	95	-0.42	-0.30
8	17.0	3.7	86.9	0.54	0.44
9	NT	NT	NT		
10	16.5	5.0	NR	0.38	0.23
11	17	5	84	0.54	0.33
12	16.8	5.04	85	0.48	0.29
13	13.9	2.54	70	-0.47	-0.53
14	16.1	4.8	77	0.25	0.16
15	NT	NT	NT		
16	15	3	83	-0.11	-0.10
17	12.0	3.59	NR	-1.09	-0.90
18	18.4	5.64	94	1.00	0.54
19	15.6	3.3	92.9	0.09	0.08
20	14.7	4.42	97.2	-0.21	-0.14
21	13	3.3	104	-0.76	-0.68
22	0.038	0.007	NR	-4.99	-16.10
23	15	1.0	95	-0.11	-0.24
24	13.2	5.0	6.78	-0.69	-0.42
25	NT	NT	NT		
26	16.8	5.25	83	0.48	0.28
27	17	4.3	100	0.54	0.38
29	36.9	6.6	NR	7.04	3.23
31	NT	NT	NT		
32	NT	NT	NT		
33	15.2903	3.8226	94.4	-0.01	-0.01

Statistics

Assigned Value**	15.33	0.95
Spike	16.10	0.81
Robust Average*	15.48	1.00
Median*	15.60	0.90
Mean*	16.26	
N	24	
Max.	36.9	
Min.	0.038	
Robust SD*	1.92	
Robust CV*	12%	

* Results from laboratory 22 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 22 and 29.


Kernel Density
Density
Result
Results: S1 - PFHxS
Assigned Value = 15.33 ± 0.95 ug/kg
Results (ug/kg)
Laboratory
22 17 2 21 24 13 7 4 20 16 23 33 19 1 14 10 6 12 26 11 27 8 18 29 15 25 3 31 32 5 9 Md R.A. S


z-Scores: S1 - PFHxS
Target Standard Deviation 3.07 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 17 2 21 24 13 7 4 20 16 23 33 19 1 14 10 6 12 26 11 27 8 18 29
-1.1 -0.8 -0.8 -0.7 -0.5 -0.4 -0.4 -0.2 -0.1 -0.1 0.0 0.1 0.2 0.3 0.4 0.4 0.5 0.5 0.5 0.5 0.5 1.0

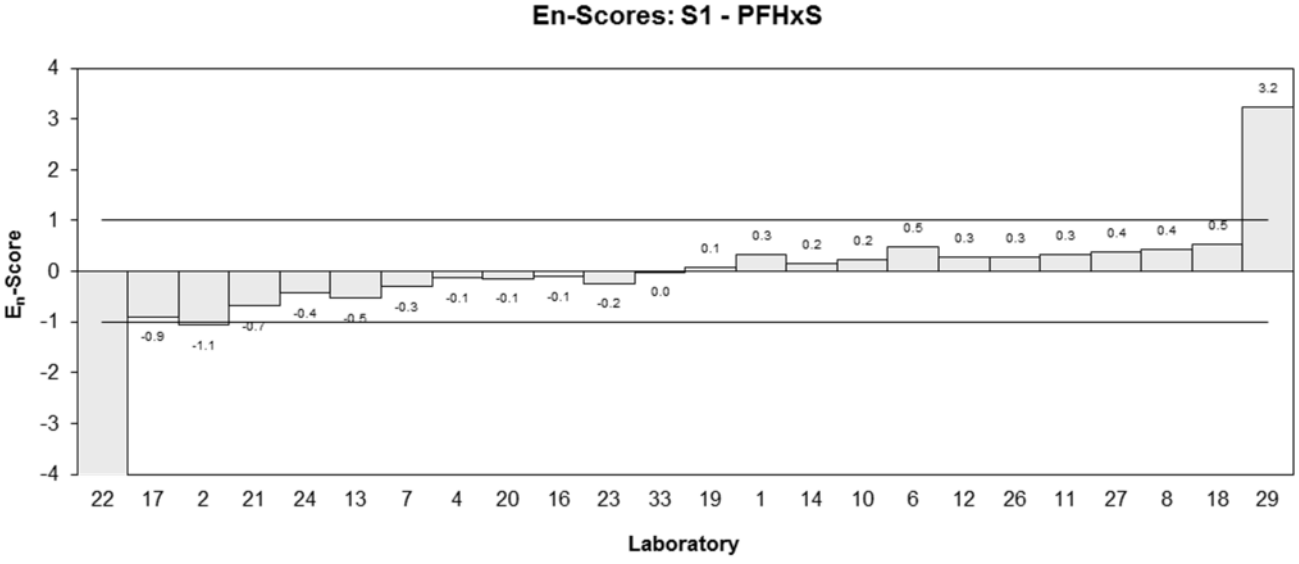

En-Scores: S1 - PFHxS
En-Score
Laboratory
22 17 2 21 24 13 7 4 20 16 23 33 19 1 14 10 6 12 26 11 27 8 18 29
-0.9 -1.1 -0.7 -0.4 -0.5 -0.3 -0.1 -0.1 -0.1 -0.2 0.0 0.1 0.3 0.2 0.2 0.5 0.3 0.3 0.3 0.4 0.4 0.5 3.2

Figure 11

Table 20

Sample Details

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

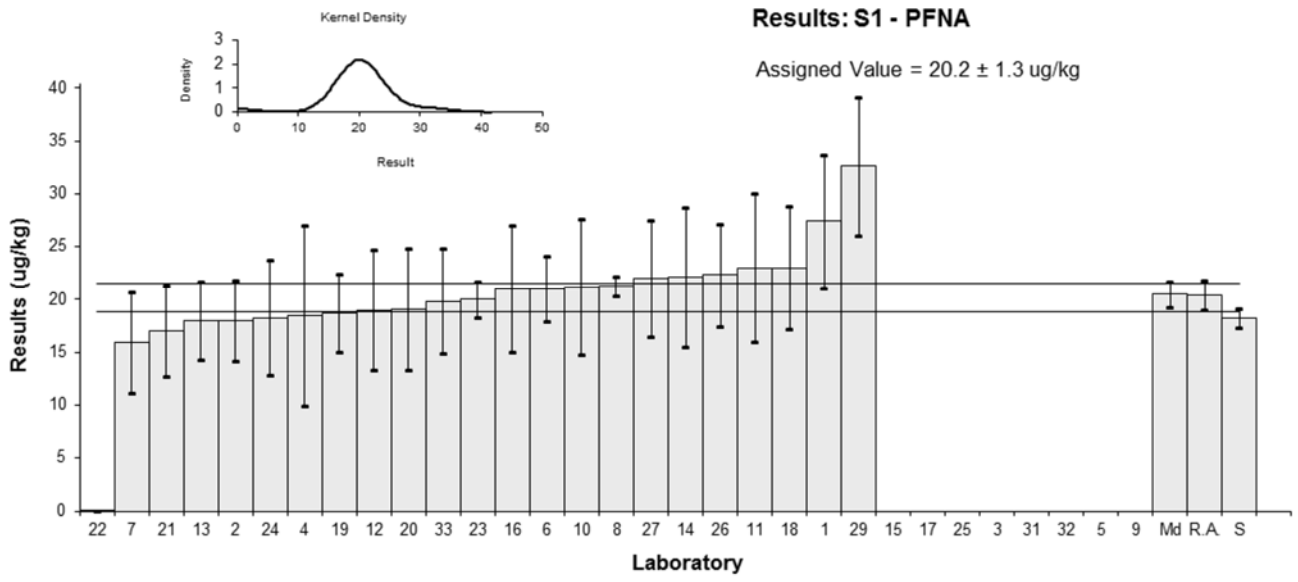
Participant Results

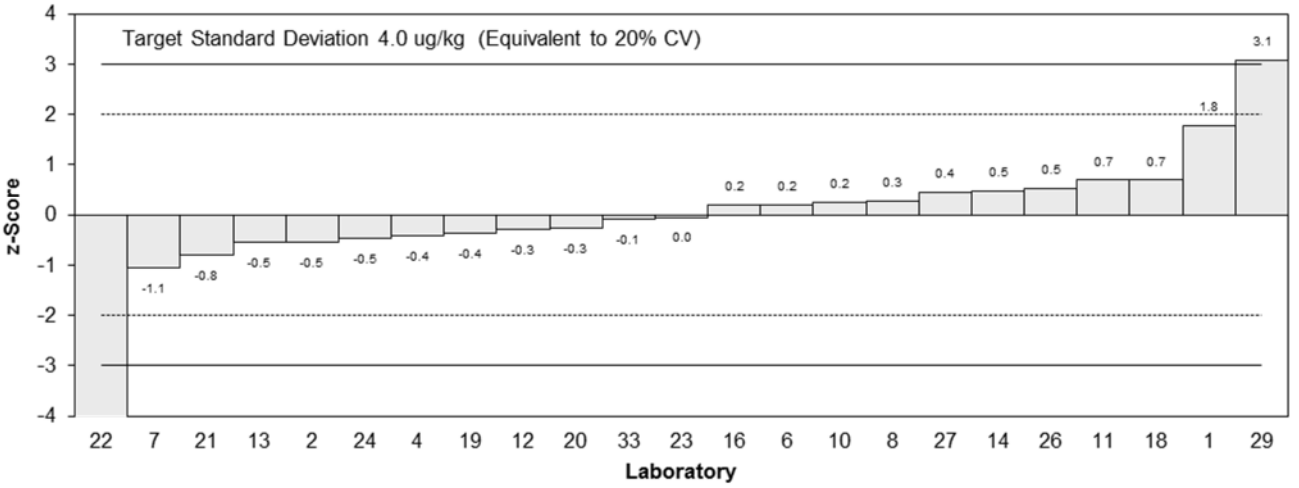
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	27.4	6.3	NR	1.78	1.12
2	18	3.8	NR	-0.54	-0.55
3	NT	NT	NT		
4	18.5	8.5	66	-0.42	-0.20
5	NT	NT	NT		
6	21.0	3.1	118	0.20	0.24
7	15.95	4.78	88	-1.05	-0.86
8	21.3	0.9	89.9	0.27	0.70
9	NT	NT	NT		
10	21.2	6.4	NR	0.25	0.15
11	23	7	94	0.69	0.39
12	19.0	5.70	89	-0.30	-0.21
13	18.0	3.73	80	-0.54	-0.56
14	22.1	6.6	93	0.47	0.28
15	NT	NT	NT		
16	21	6	81	0.20	0.13
17	NT	NT	NT		
18	23.0	5.8	102	0.69	0.47
19	18.7	3.7	100	-0.37	-0.38
20	19.1	5.74	81.0	-0.27	-0.19
21	17	4.3	NR	-0.79	-0.71
22	0.043	0.011	NR	-4.99	-15.50
23	20	1.7	98	-0.05	-0.09
24	18.3	5.5	7.74	-0.47	-0.34
25	NT	NT	NT		
26	22.3	4.79	73	0.52	0.42
27	22	5.5	108	0.45	0.32
29	32.6	6.5	NR	3.07	1.87
31	NT	NT	NT		
32	NT	NT	NT		
33	19.8665	4.9666	82.6	-0.08	-0.06

Statistics

Assigned Value**	20.2	1.3
Spike	18.27	0.91
Robust Average*	20.4	1.4
Median*	20.5	1.2
Mean*	20.9	
N	23	
Max.	32.6	
Min.	0.043	
Robust SD*	2.56	
Robust CV*	13%	

* Results from laboratory 22 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 22 and 29.


Kernel Density
Density
Result
Results: S1 - PFNA
Assigned Value = 20.2 ± 1.3 ug/kg
Results (ug/kg)
Laboratory
22 7 21 13 2 24 4 19 12 20 33 23 16 6 10 8 27 14 26 11 18 1 29 15 17 25 3 31 32 5 9 Md R.A. S


z-Scores: S1 - PFNA
Target Standard Deviation 4.0 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 7 21 13 2 24 4 19 12 20 33 23 16 6 10 8 27 14 26 11 18 1 29
-1.1 -0.8 -0.5 -0.5 -0.5 -0.4 -0.4 -0.3 -0.3 -0.1 0.0 0.2 0.2 0.2 0.3 0.4 0.5 0.5 0.7 0.7 1.8 3.1

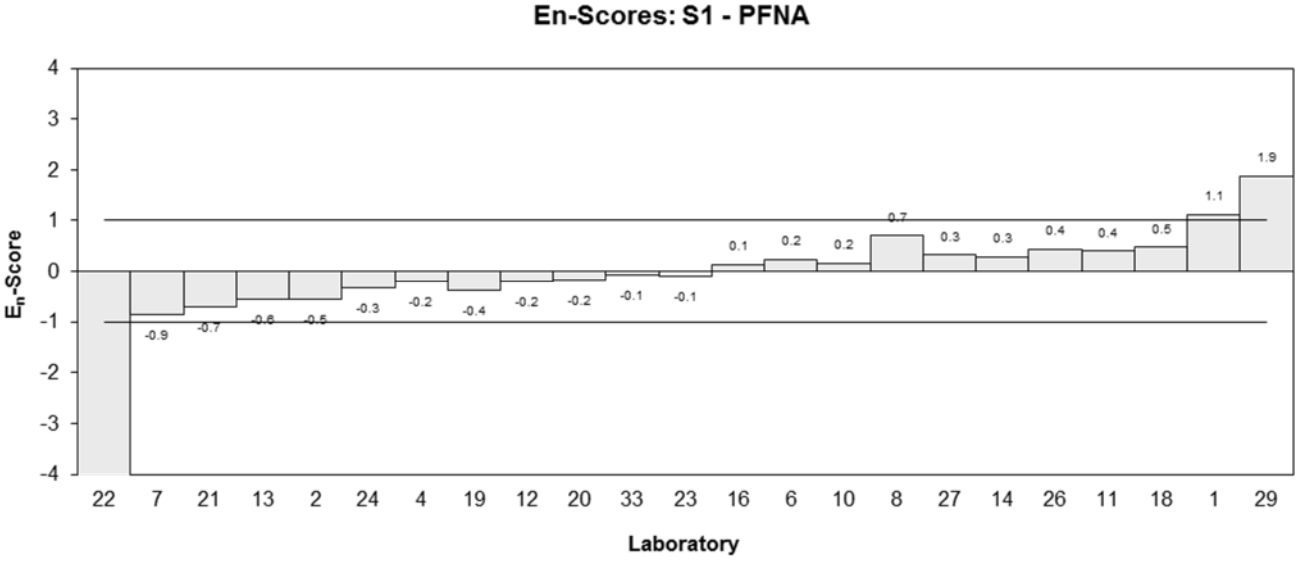

En-Scores: S1 - PFNA
En-Score
Laboratory
22 7 21 13 2 24 4 19 12 20 33 23 16 6 10 8 27 14 26 11 18 1 29
-0.9 -0.7 -0.6 -0.5 -0.3 -0.2 -0.4 -0.2 -0.2 -0.1 -0.1 0.1 0.2 0.2 0.7 0.3 0.3 0.4 0.4 0.5 1.1 1.9

Figure 12

Table 21

Sample Details

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

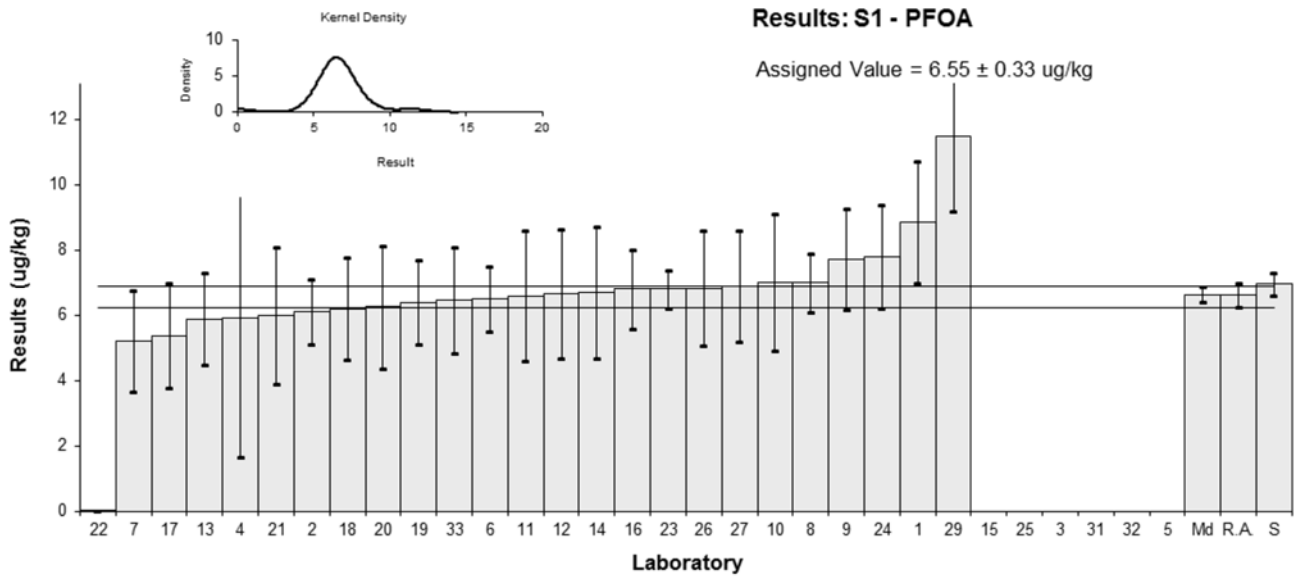
Participant Results

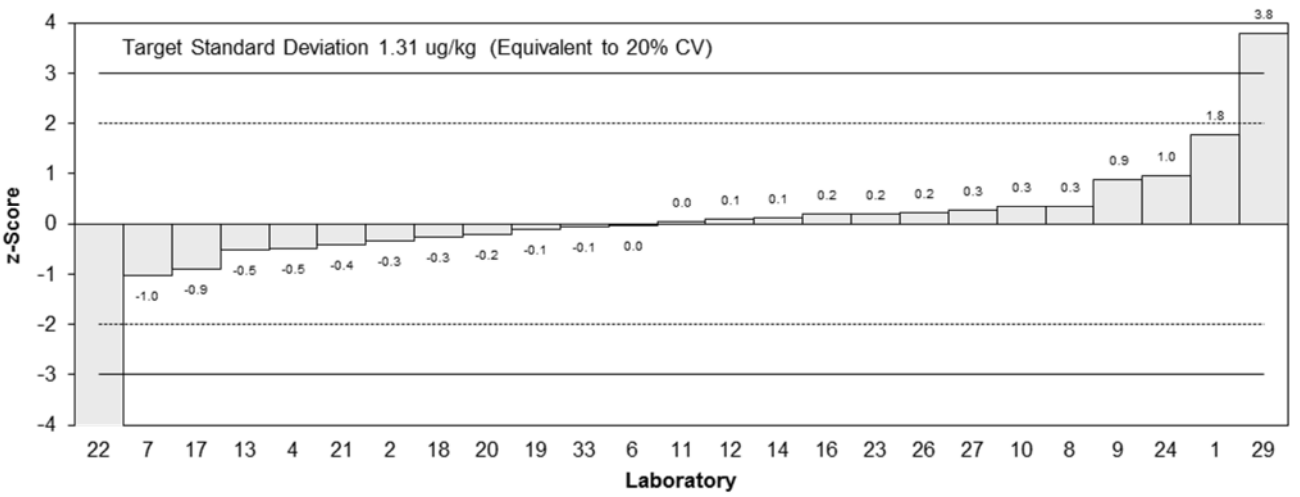
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	8.87	1.86	NR	1.77	1.23
2	6.1	1.0	NR	-0.34	-0.43
3	NT	NT	NT		
4	5.9	4.26	103	-0.50	-0.15
5	NT	NT	NT		
6	6.5	1.0	116	-0.04	-0.05
7	5.21	1.56	94	-1.02	-0.84
8	7.0	0.9	93.5	0.34	0.47
9	7.72	1.54	99.1	0.89	0.74
10	7.0	2.1	105	0.34	0.21
11	6.6	2	101	0.04	0.02
12	6.66	2.00	90	0.08	0.05
13	5.88	1.41	83	-0.51	-0.46
14	6.7	2.01	85	0.11	0.07
15	NT	NT	NT		
16	6.8	1.2	84	0.19	0.20
17	5.37	1.61	NR	-0.90	-0.72
18	6.2	1.57	106	-0.27	-0.22
19	6.39	1.3	96.1	-0.12	-0.12
20	6.26	1.88	84.7	-0.22	-0.15
21	6	2.1	104	-0.42	-0.26
22	0.014	0.004	NR	-4.99	-19.80
23	6.8	0.6	101	0.19	0.37
24	7.80	1.6	6.20	0.95	0.77
25	NT	NT	NT		
26	6.83	1.77	79	0.21	0.16
27	6.9	1.7	104	0.27	0.20
29	11.5	2.3	NR	3.78	2.13
31	NT	NT	NT		
32	NT	NT	NT		
33	6.4668	1.6167	81.3	-0.06	-0.05

Statistics

Assigned Value	6.55	0.33
Spike	6.96	0.35
Robust Average*	6.62	0.39
Median*	6.63	0.23
Mean*	6.81	
N	25	
Max.	11.5	
Min.	0.014	
Robust SD*	0.76	
Robust CV*	11%	

* Results from laboratory 22 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 22 and 29.


Kernel Density
Density
Result
Results: S1 - PFOA
Assigned Value = 6.55 ± 0.33 ug/kg
Results (ug/kg)
22 7 17 13 4 21 2 18 20 19 33 6 11 12 14 16 23 26 27 10 8 9 24 1 29 15 25 3 31 32 5 Md R.A. S
Laboratory


z-Scores: S1 - PFOA
Target Standard Deviation 1.31 ug/kg (Equivalent to 20% CV)
z-Score
22 7 17 13 4 21 2 18 20 19 33 6 11 12 14 16 23 26 27 10 8 9 24 1 29
Laboratory

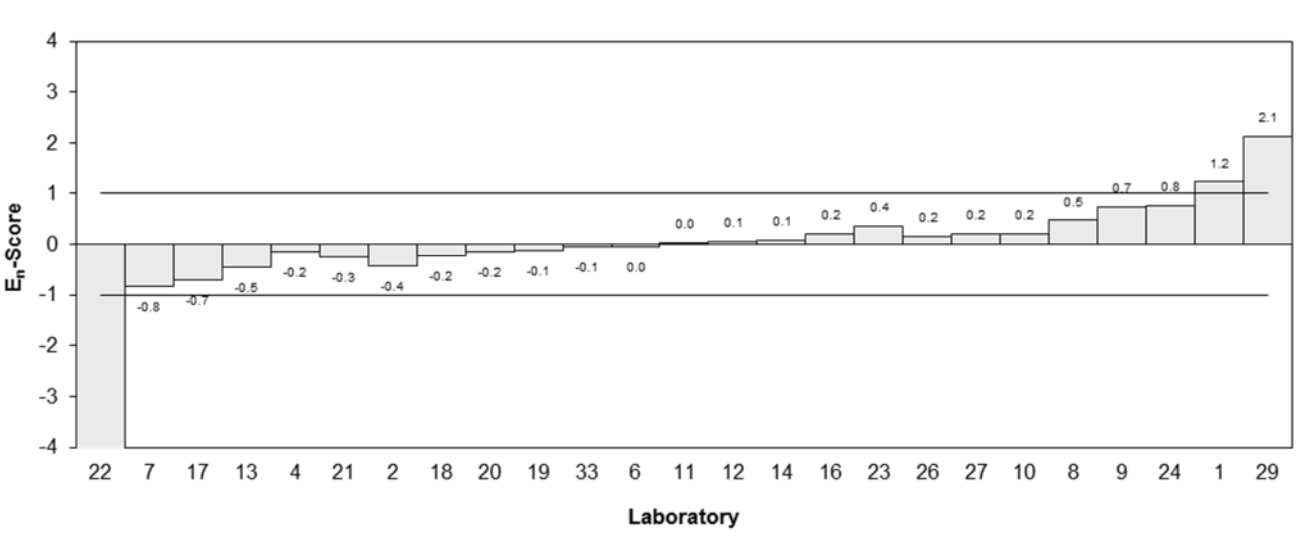

En-Scores: S1 - PFOA
En-Score
22 7 17 13 4 21 2 18 20 19 33 6 11 12 14 16 23 26 27 10 8 9 24 1 29
Laboratory

Figure 13

Table 22

Sample Details

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

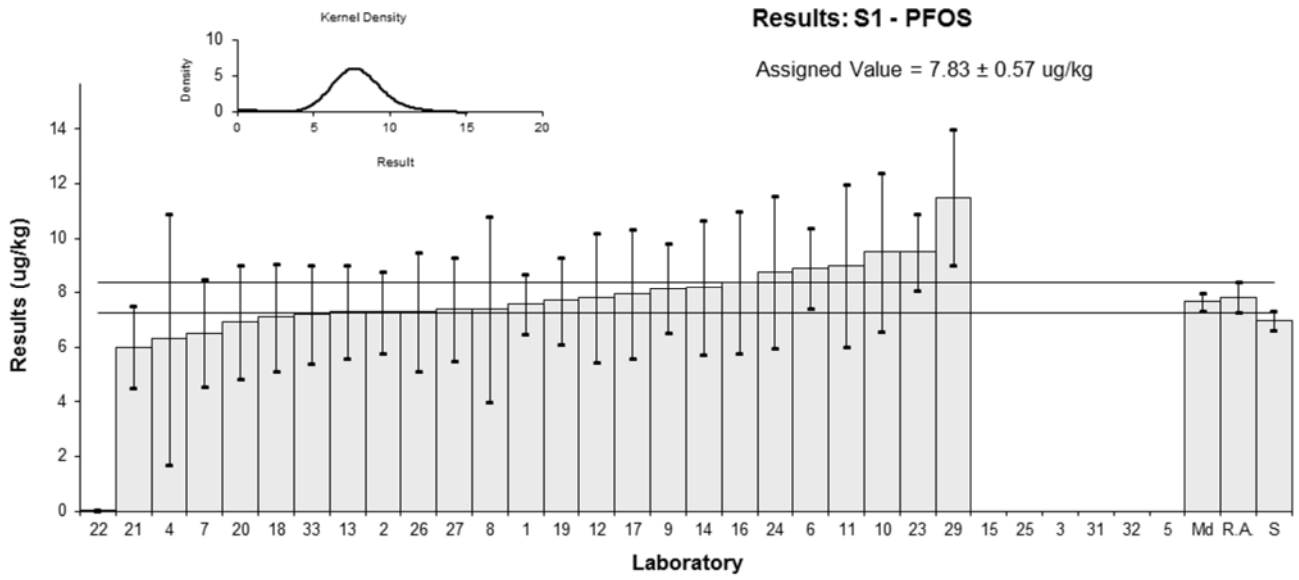
Participant Results

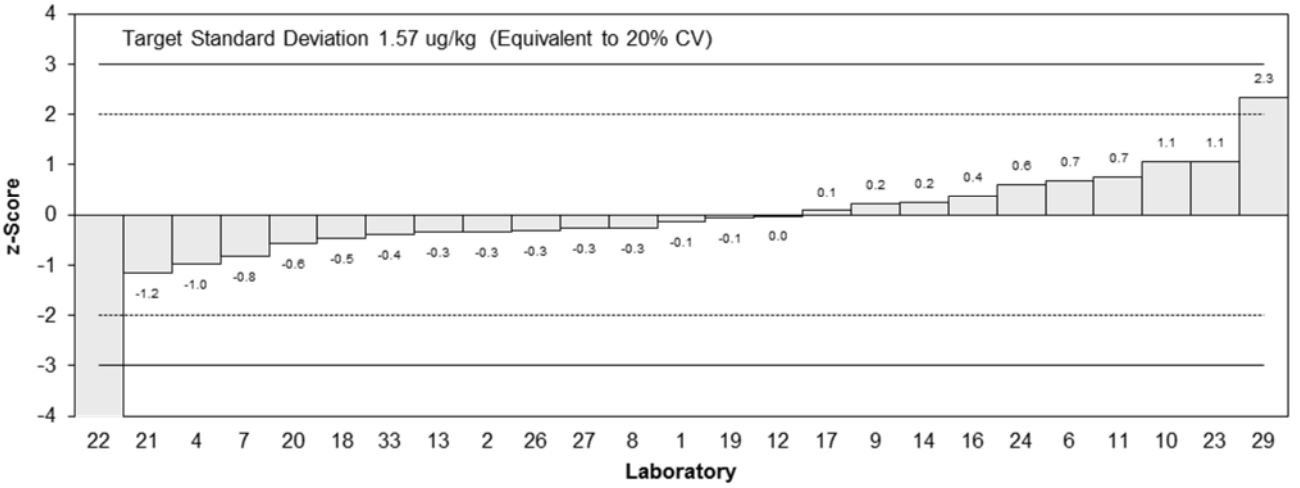
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	7.60	1.1	NR	-0.15	-0.19
2	7.3	1.5	NR	-0.34	-0.33
3	NT	NT	NT		
4	6.3	4.61	72	-0.98	-0.33
5	NT	NT	NT		
6	8.9	1.5	94	0.68	0.67
7	6.52	1.96	93	-0.84	-0.64
8	7.4	3.4	99.1	-0.27	-0.12
9	8.17	1.63	97.5	0.22	0.20
10	9.5	2.9	101	1.07	0.57
11	9.0	3	99	0.75	0.38
12	7.82	2.35	86	-0.01	0.00
13	7.30	1.73	65	-0.34	-0.29
14	8.2	2.46	99	0.24	0.15
15	NT	NT	NT		
16	8.4	2.6	81	0.36	0.21
17	7.96	2.39	NR	0.08	0.05
18	7.1	1.96	96	-0.47	-0.36
19	7.72	1.6	78.4	-0.07	-0.06
20	6.94	2.08	85.3	-0.57	-0.41
21	6	1.5	103	-1.17	-1.14
22	0.018	0.009	NR	-4.99	-13.70
23	9.5	1.4	99	1.07	1.10
24	8.77	2.8	NR	0.60	0.33
25	NT	NT	NT		
26	7.32	2.18	79	-0.33	-0.23
27	7.4	1.9	108	-0.27	-0.22
29	11.5	2.5	NR	2.34	1.43
31	NT	NT	NT		
32	NT	NT	NT		
33	7.2278	1.8070	91.3	-0.38	-0.32

Statistics

Assigned Value	7.83	0.57
Spike	6.97	0.35
Robust Average*	7.83	0.57
Median*	7.66	0.34
Mean*	7.91	
N	25	
Max.	11.5	
Min.	0.018	
Robust SD*	1.11	
Robust CV*	14%	

* Results from laboratory 22 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S1 - PFOS
Assigned Value = 7.83 ± 0.57 ug/kg
Results (ug/kg)
Laboratory
22 21 4 7 20 18 33 13 2 26 27 8 1 19 12 17 9 14 16 24 6 11 10 23 29 15 25 3 31 32 5 Md R.A. S


z-Scores: S1 - PFOS
Target Standard Deviation 1.57 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 21 4 7 20 18 33 13 2 26 27 8 1 19 12 17 9 14 16 24 6 11 10 23 29
-1.2 -1.0 -0.8 -0.6 -0.5 -0.4 -0.3 -0.3 -0.3 -0.3 -0.3 -0.1 -0.1 0.0 0.1 0.2 0.2 0.4 0.6 0.7 0.7 1.1 1.1 2.3

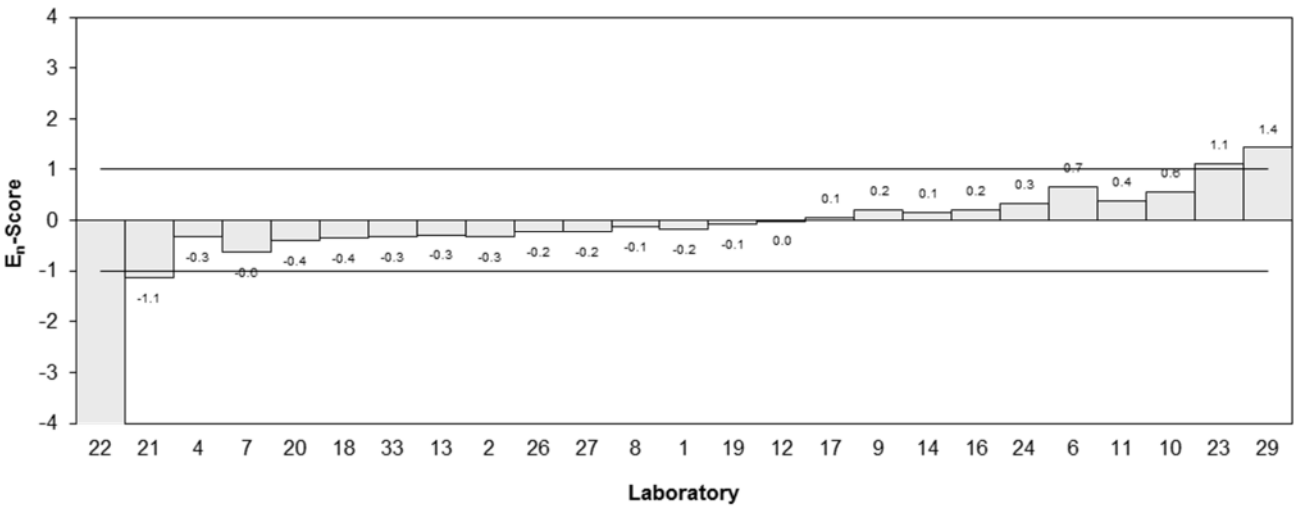

En-Scores: S1 - PFOS
En-Score
Laboratory
22 21 4 7 20 18 33 13 2 26 27 8 1 19 12 17 9 14 16 24 6 11 10 23 29
-1.1 -0.3 -0.6 -0.4 -0.4 -0.3 -0.3 -0.3 -0.2 -0.2 -0.1 -0.2 -0.1 0.0 0.1 0.2 0.1 0.2 0.3 0.7 0.4 0.6 1.1 1.4

Figure 14

Table 23

Sample Details

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

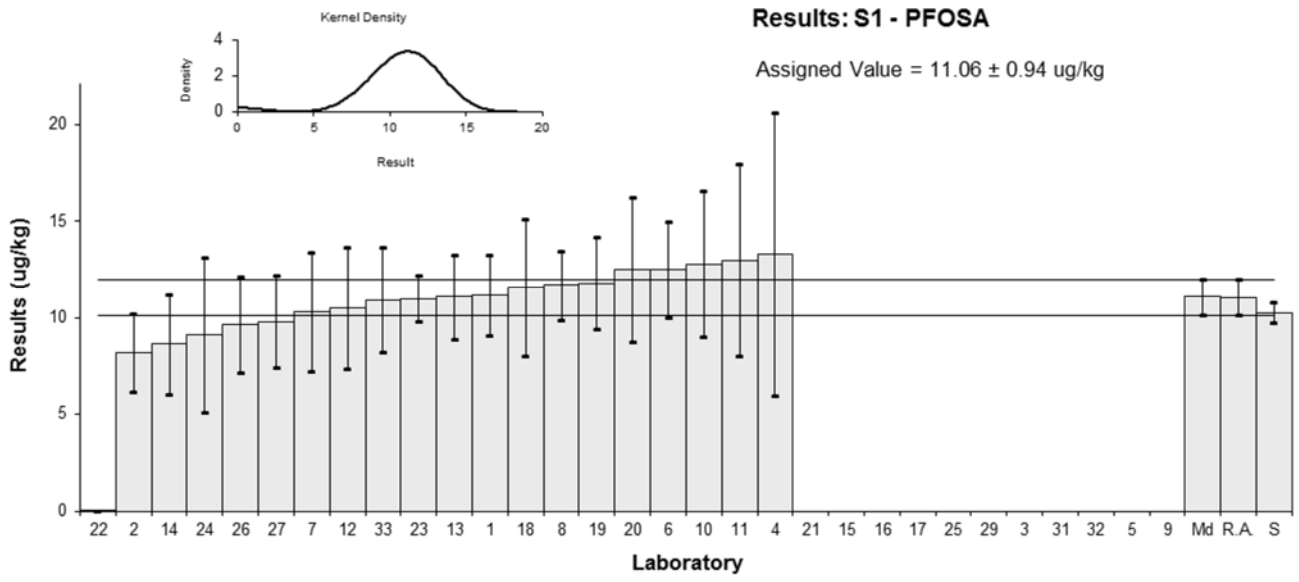
Participant Results

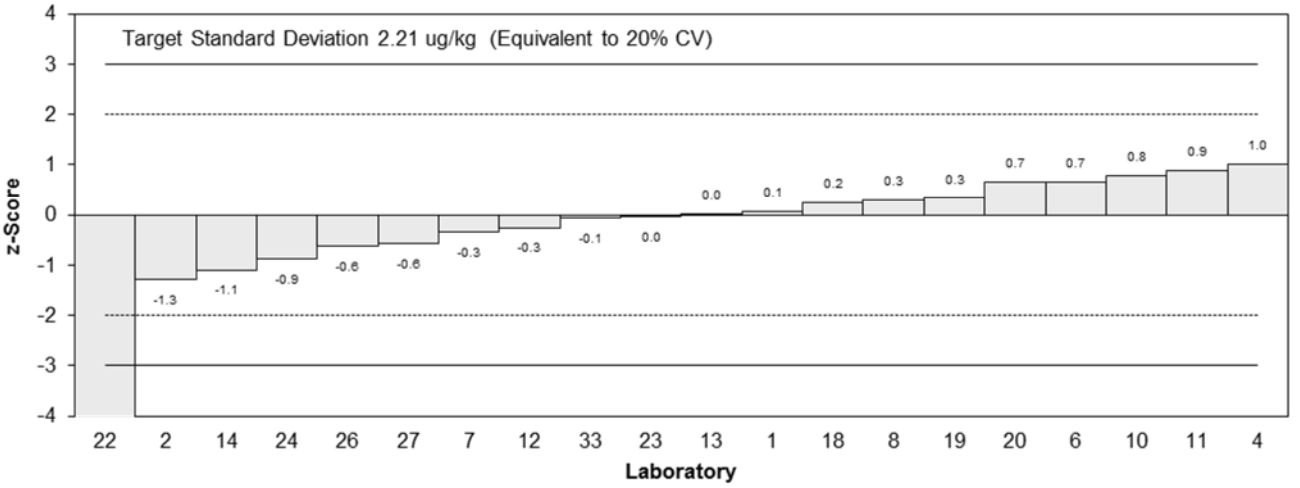
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	11.2	2.1	NR	0.06	0.06
2	8.2	2.0	NR	-1.29	-1.29
3	NT	NT	NT		
4	13.3	7.31	53	1.01	0.30
5	NT	NT	NT		
6	12.5	2.5	93	0.65	0.54
7	10.30	3.09	80	-0.34	-0.24
8	11.7	1.8	97.8	0.29	0.32
9	NT	NT	NT		
10	12.8	3.8	NR	0.79	0.44
11	13	5	84	0.88	0.38
12	10.5	3.16	80	-0.25	-0.17
13	11.1	2.2	61	0.02	0.02
14	8.64	2.59	49	-1.09	-0.88
15	NT	NT	NT		
16	NT	NT	NT		
17	NT	NT	NT		
18	11.6	3.56	112	0.24	0.15
19	11.8	2.4	NR	0.33	0.29
20	12.5	3.74	53.3	0.65	0.37
21	< 9	3.0	NR		
22	0.022	0.004	NR	-4.99	-11.74
23	11	1.2	100	-0.03	-0.04
24	9.12	4.0	4.54	-0.88	-0.47
25	NT	NT	NT		
26	9.67	2.50	75	-0.63	-0.52
27	9.8	2.4	108	-0.57	-0.49
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	10.9341	2.7335	66.7	-0.06	-0.04

Statistics

Assigned Value	11.06	0.94
Spike	10.28	0.51
Robust Average*	11.06	0.94
Median*	11.10	0.93
Mean*	11.04	
N	20	
Max.	13.3	
Min.	0.022	
Robust SD*	1.63	
Robust CV*	15%	

* Results from laboratory 22 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S1 - PFOSA
Assigned Value = 11.06 ± 0.94 ug/kg
Results (ug/kg)
Laboratory
22 2 14 24 26 27 7 12 33 23 13 1 18 8 19 20 6 10 11 4 21 15 16 17 25 29 3 31 32 5 9 Md R.A. S


z-Scores: S1 - PFOSA
Target Standard Deviation 2.21 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 2 14 24 26 27 7 12 33 23 13 1 18 8 19 20 6 10 11 4
-1.3 -1.1 -0.9 -0.6 -0.6 -0.3 -0.3 -0.1 0.0 0.0 0.1 0.2 0.3 0.3 0.7 0.7 0.8 0.9 1.0

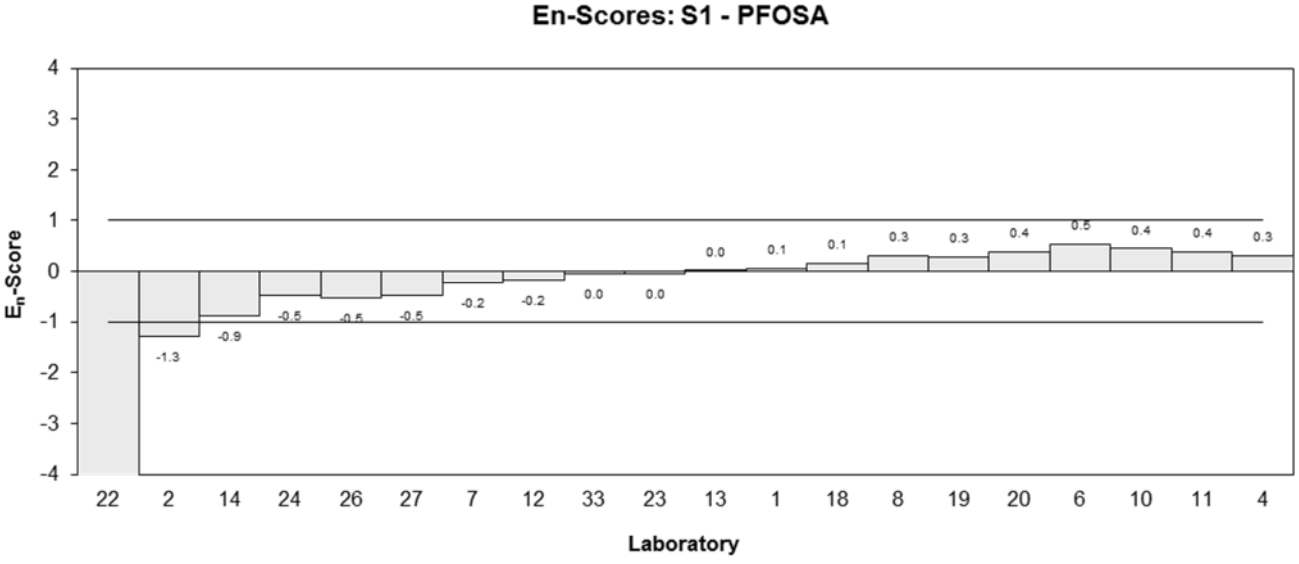

En-Scores: S1 - PFOSA
En-Score
Laboratory
22 2 14 24 26 27 7 12 33 23 13 1 18 8 19 20 6 10 11 4
-1.3 -0.9 -0.5 -0.5 -0.5 -0.2 -0.2 0.0 0.0 0.0 0.1 0.1 0.3 0.3 0.4 0.5 0.4 0.4 0.3

Figure 15

Table 24

Sample Details

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

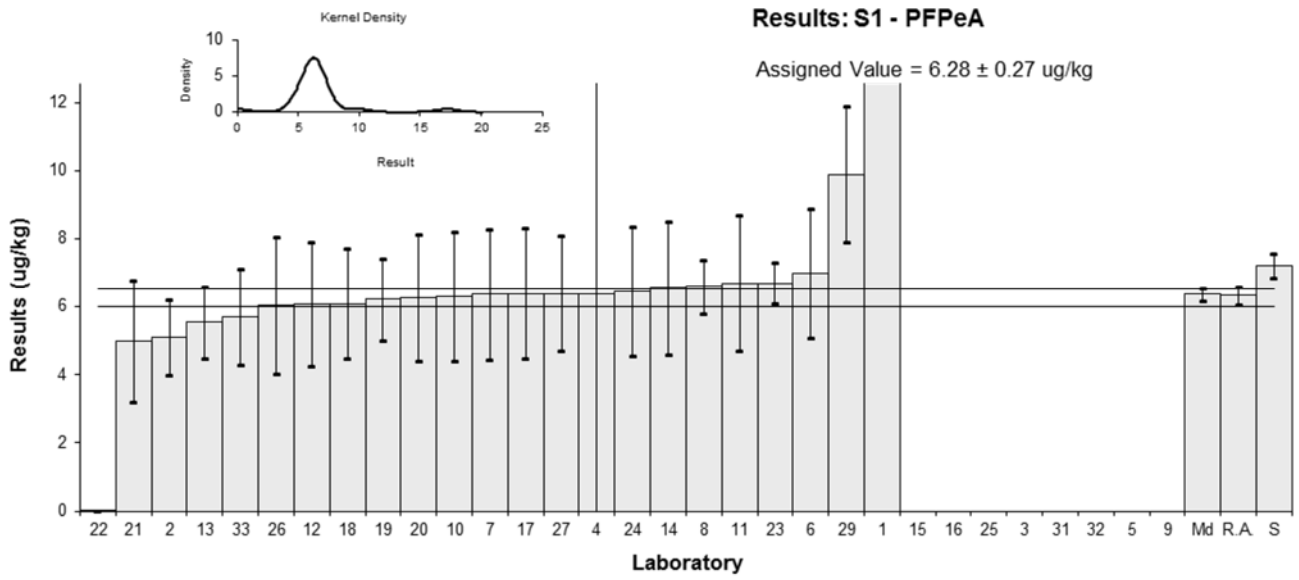
Participant Results

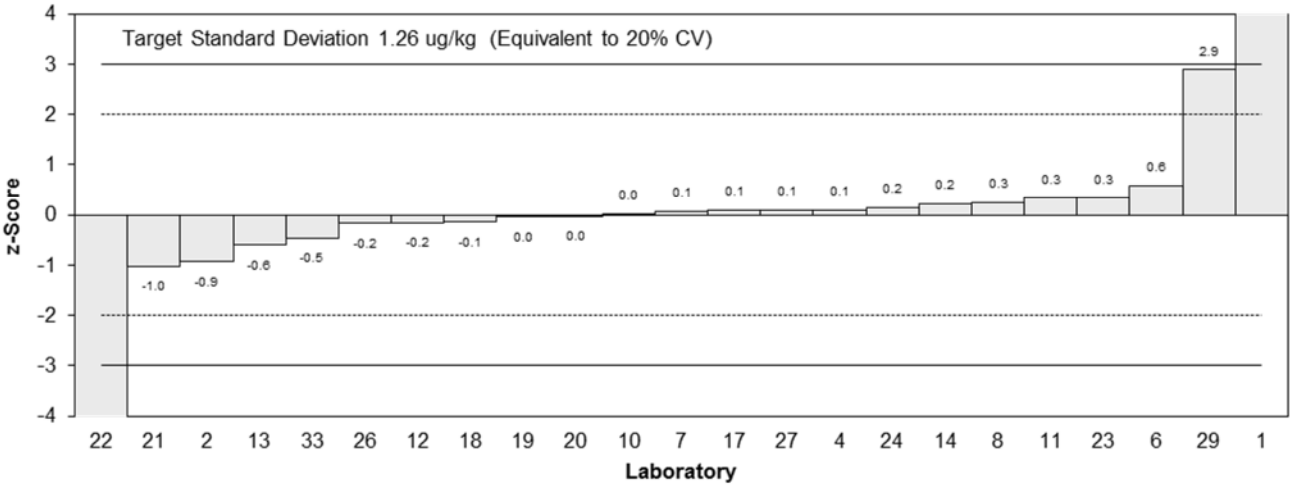
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	17.2	3.1	NR	8.69	3.51
2	5.1	1.1	NR	-0.94	-1.04
3	NT	NT	NT		
4	6.4	6.66	114	0.10	0.02
5	NT	NT	NT		
6	7.0	1.9	115	0.57	0.38
7	6.37	1.91	66	0.07	0.05
8	6.6	0.8	95.9	0.25	0.38
9	NT	NT	NT		
10	6.3	1.9	NR	0.02	0.01
11	6.7	2	106	0.33	0.21
12	6.09	1.83	101	-0.15	-0.10
13	5.54	1.05	76	-0.59	-0.68
14	6.56	1.97	74	0.22	0.14
15	NT	NT	NT		
16	NT	NT	NT		
17	6.39	1.92	NR	0.09	0.06
18	6.1	1.61	95	-0.14	-0.11
19	6.22	1.2	NR	-0.05	-0.05
20	6.27	1.88	99.2	-0.01	-0.01
21	5	1.8	110	-1.02	-0.70
22	0.010	0.003	NR	-4.99	-23.22
23	6.7	0.6	94	0.33	0.64
24	6.47	1.9	6.20	0.15	0.10
25	NT	NT	NT		
26	6.06	2.02	80	-0.18	-0.11
27	6.4	1.7	110	0.10	0.07
29	9.9	2.0	NR	2.88	1.79
31	NT	NT	NT		
32	NT	NT	NT		
33	5.7043	1.4261	95.1	-0.46	-0.40

Statistics

Assigned Value**	6.28	0.27
Spike	7.20	0.36
Robust Average*	6.33	0.28
Median*	6.38	0.19
Mean*	6.87	
N	23	
Max.	17.2	
Min.	0.01	
Robust SD*	0.53	
Robust CV*	8.4%	

* Results from laboratory 22 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 1 and 22.


Kernel Density
Density
Result
Results: S1 - PFPeA
Assigned Value = 6.28 ± 0.27 ug/kg
Results (ug/kg)
Laboratory
22 21 2 13 33 26 12 18 19 20 10 7 17 27 4 24 14 8 11 23 6 29 1 15 16 25 3 31 32 5 9 Md R.A. S


z-Scores: S1 - PFPeA
Target Standard Deviation 1.26 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 21 2 13 33 26 12 18 19 20 10 7 17 27 4 24 14 8 11 23 6 29 1

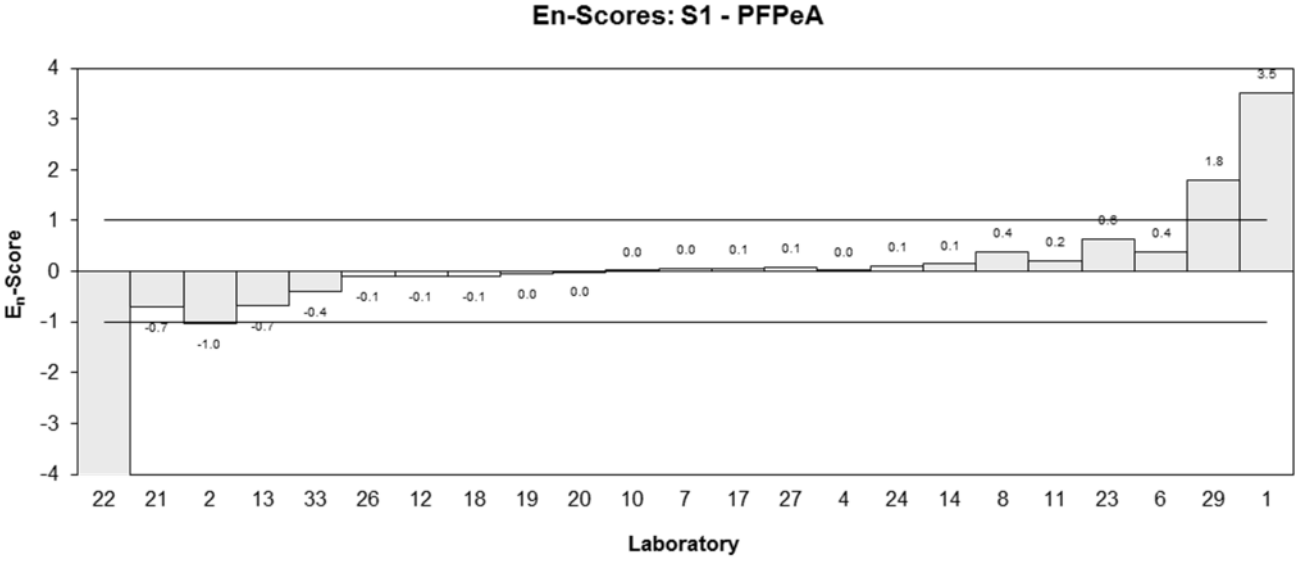

En-Scores: S1 - PFPeA
En-Score
Laboratory
22 21 2 13 33 26 12 18 19 20 10 7 17 27 4 24 14 8 11 23 6 29 1

Figure 16

Table 25

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	PFTeDA
Units	µg/kg

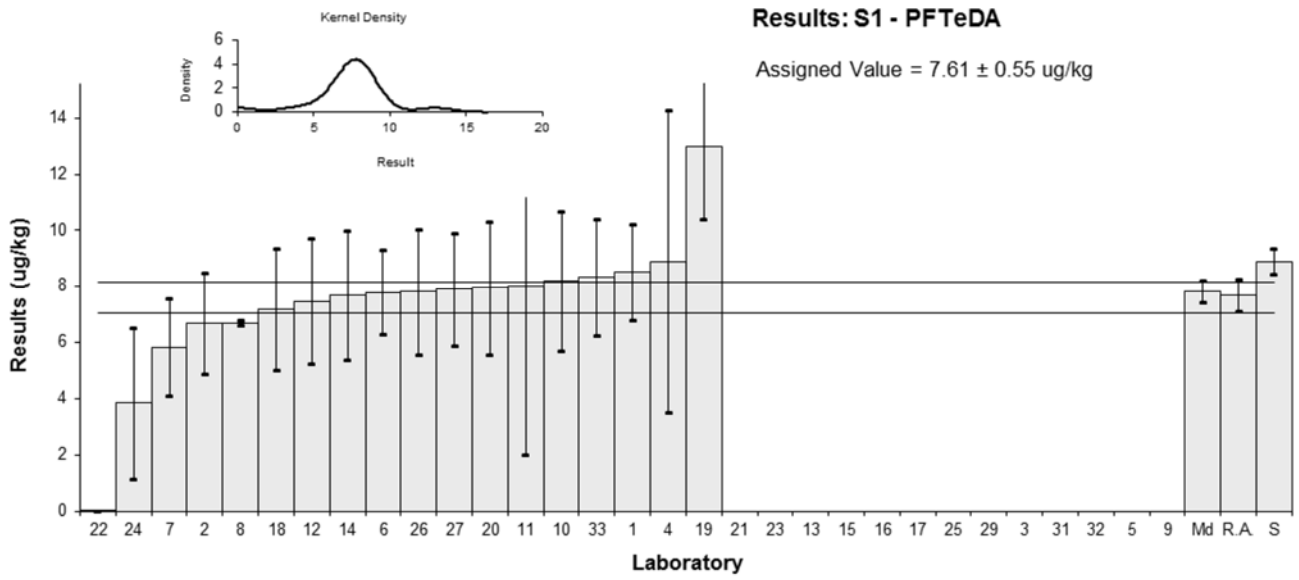
Participant Results

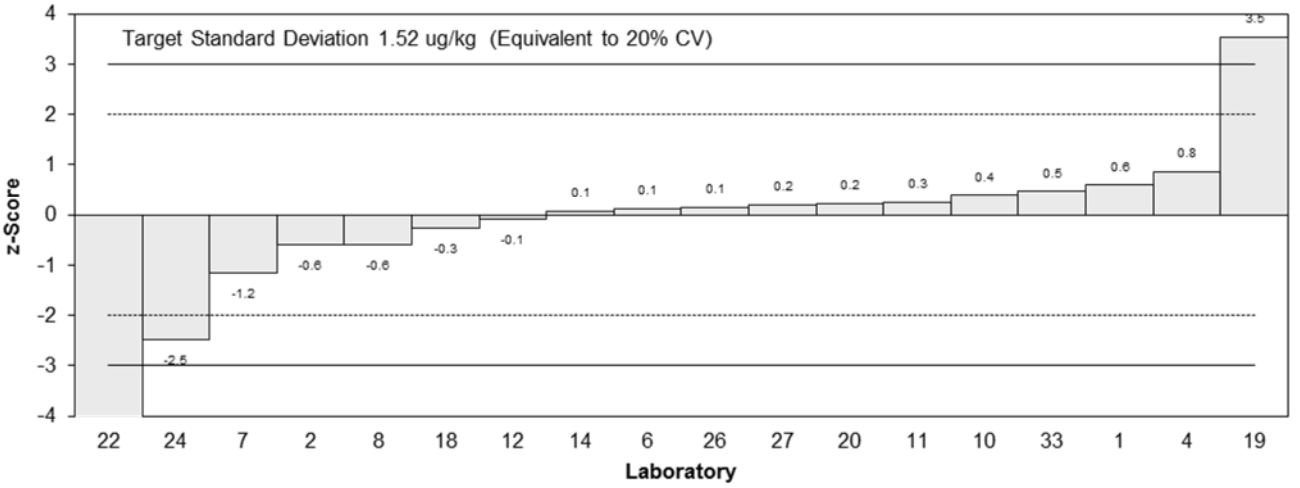
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	8.51	1.70	NR	0.59	0.50
2	6.7	1.8	NR	-0.60	-0.48
3	NT	NT	NT		
4	8.9	5.40	24	0.85	0.24
5	NT	NT	NT		
6	7.8	1.5	120	0.12	0.12
7	5.84	1.75	74	-1.16	-0.96
8	6.7	0.1	108.1	-0.60	-1.63
9	NT	NT	NT		
10	8.2	2.5	NR	0.39	0.23
11	8	6	95	0.26	0.06
12	7.48	2.24	74	-0.09	-0.06
13	NT	NT	NT		
14	7.71	2.31	108	0.07	0.04
15	NT	NT	NT		
16	NT	NT	NT		
17	NT	NT	NT		
18	7.2	2.17	80	-0.27	-0.18
19	13.0	2.6	128	3.54	2.03
20	7.95	2.38	25.7	0.22	0.14
21	< 9	0	NR		
22	0.014	0.005	NR	-4.99	-13.81
23	NR	NR	97		
24	3.84	2.7	60.69	-2.48	-1.37
25	NT	NT	NT		
26	7.82	2.23	75	0.14	0.09
27	7.9	2.0	106	0.19	0.14
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	8.3171	2.0793	79.9	0.46	0.33

Statistics

Assigned Value**	7.61	0.55
Spike	8.90	0.45
Robust Average*	7.70	0.58
Median*	7.82	0.38
Mean*	7.76	
N	18	
Max.	13	
Min.	0.014	
Robust SD*	0.96	
Robust CV*	12%	

* Results from laboratory 22 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 19 and 22.


Kernel Density
Density
Result
Results: S1 - PFTeDA
Assigned Value = 7.61 ± 0.55 ug/kg
Results (ug/kg)
22 24 7 2 8 18 12 14 6 26 27 20 11 10 33 1 4 19 21 23 13 15 16 17 25 29 3 31 32 5 9 Md R.A. S
Laboratory


z-Scores: S1 - PFTeDA
Target Standard Deviation 1.52 ug/kg (Equivalent to 20% CV)
z-Score
3.5
0.8
0.6
0.5
0.4
0.3
0.2
0.2
0.1
0.1
0.1
0.1
-0.1
-0.3
-0.6
-0.6
-1.2
-2.5
22 24 7 2 8 18 12 14 6 26 27 20 11 10 33 1 4 19
Laboratory

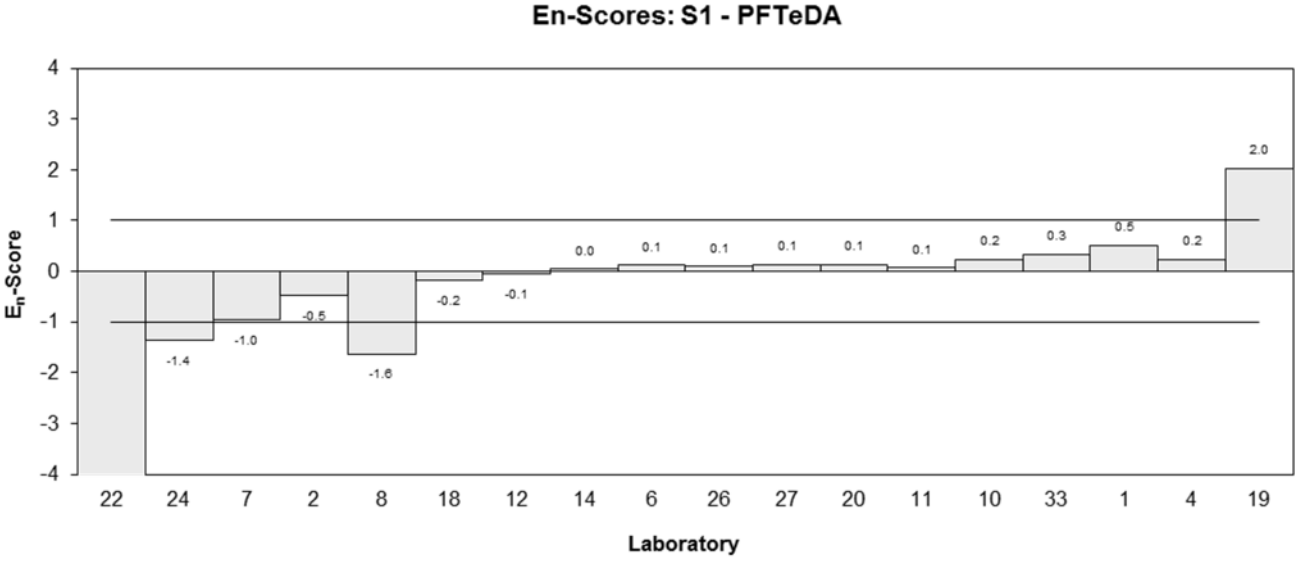

En-Scores: S1 - PFTeDA
En-Score
2.0
0.5
0.3
0.2
0.2
0.1
0.1
0.1
0.1
0.0
0.1
-0.1
-0.2
-0.5
-1.0
-1.4
-1.6
22 24 7 2 8 18 12 14 6 26 27 20 11 10 33 1 4 19
Laboratory

Figure 17

Table 26

Sample Details

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

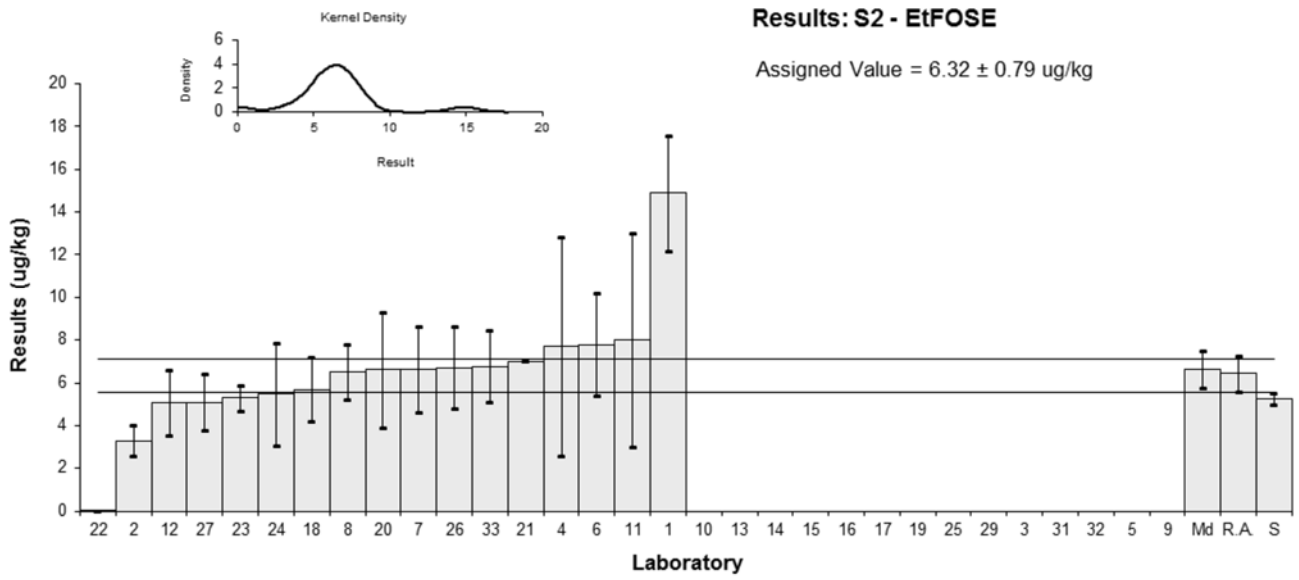
Participant Results

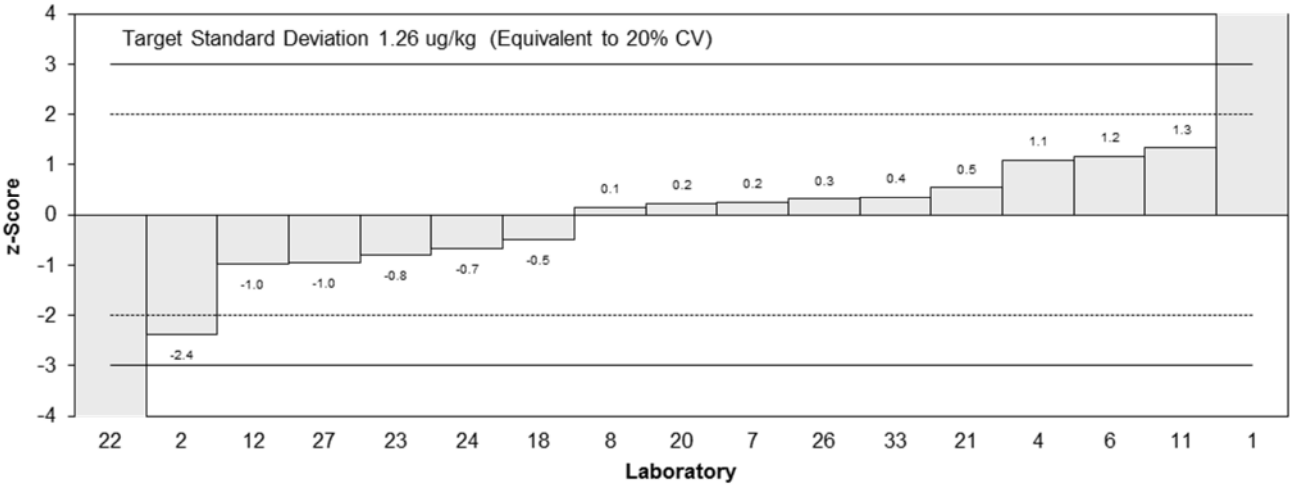
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	14.9	2.7	NR	6.79	3.05
2	3.3	0.7	NR	-2.39	-2.86
3	NT	NT	NT		
4	7.7	5.14	37	1.09	0.27
5	NT	NT	NT		
6	7.8	2.4	86	1.17	0.59
7	6.62	1.99	64	0.24	0.14
8	6.5	1.3	102.1	0.14	0.12
9	NT	NT	NT		
10	NT	NT	NT		
11	8	5	105	1.33	0.33
12	5.09	1.53	70	-0.97	-0.71
13	NT	NT	NT		
14	NT	NT	NT		
15	NT	NT	NT		
16	NT	NT	NT		
17	NT	NT	NT		
18	5.7	1.52	103	-0.49	-0.36
19	NT	NT	NT		
20	6.61	2.71	29.4	0.23	0.10
21	7	0	NR	0.54	0.86
22	0.018	0.005	NR	-4.99	-7.98
23	5.3	0.6	120	-0.81	-1.03
24	5.47	2.4	4.30	-0.67	-0.34
25	NT	NT	NT		
26	6.71	1.90	97	0.31	0.19
27	5.1	1.3	78	-0.97	-0.80
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	6.7661	1.6915	55.6	0.35	0.24

Statistics

Assigned Value**	6.32	0.79
Spike	5.24	0.26
Robust Average*	6.45	0.84
Median*	6.62	0.88
Mean*	6.79	
N	17	
Max.	14.9	
Min.	0.018	
Robust SD*	1.34	
Robust CV*	21%	

* Results from laboratory 22 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 1 and 22.


Results: S2 - EtFOSE
Assigned Value = 6.32 ± 0.79 ug/kg
Kernel Density
Density
Result
Results (ug/kg)
Laboratory
22 2 12 27 23 24 18 8 20 7 26 33 21 4 6 11 1 10 13 14 15 16 17 19 25 29 3 31 32 5 9 Md R.A. S


z-Scores: S2 - EtFOSE
Target Standard Deviation 1.26 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 2 12 27 23 24 18 8 20 7 26 33 21 4 6 11 1
-2.4 -1.0 -1.0 -0.8 -0.7 -0.5 0.1 0.2 0.2 0.3 0.4 0.5 1.1 1.2 1.3

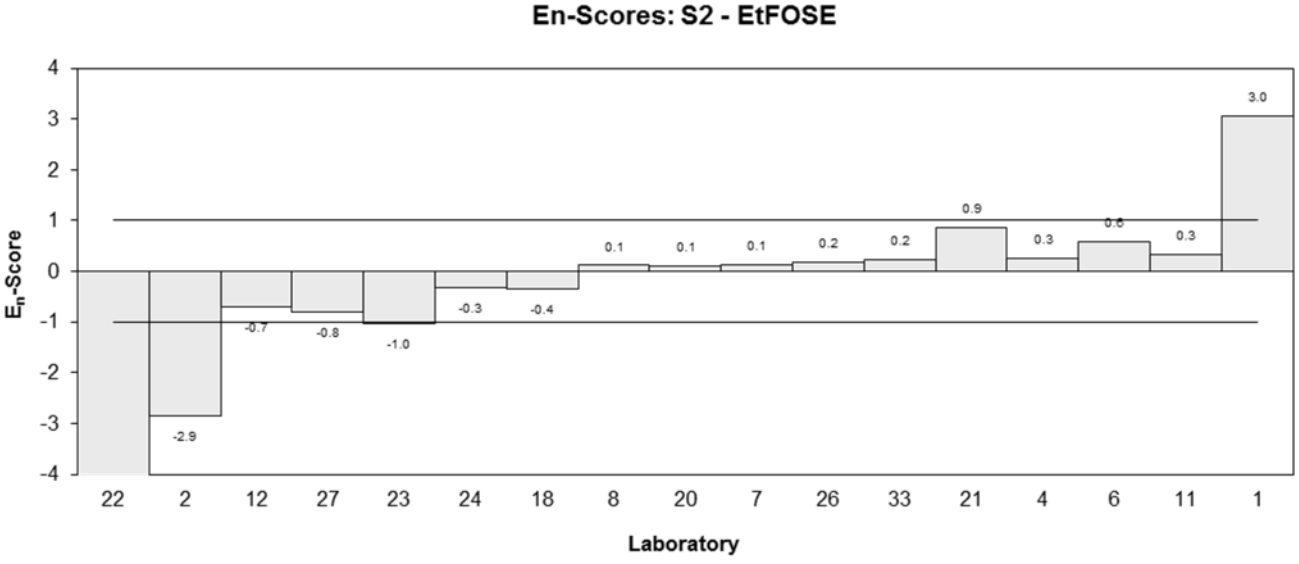

En-Scores: S2 - EtFOSE
En-Score
Laboratory
22 2 12 27 23 24 18 8 20 7 26 33 21 4 6 11 1
-2.9 -0.7 -0.8 -1.0 -0.3 -0.4 0.1 0.1 0.1 0.2 0.2 0.9 0.3 0.6 0.3 3.0

Figure 18

Table 27

Sample Details

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

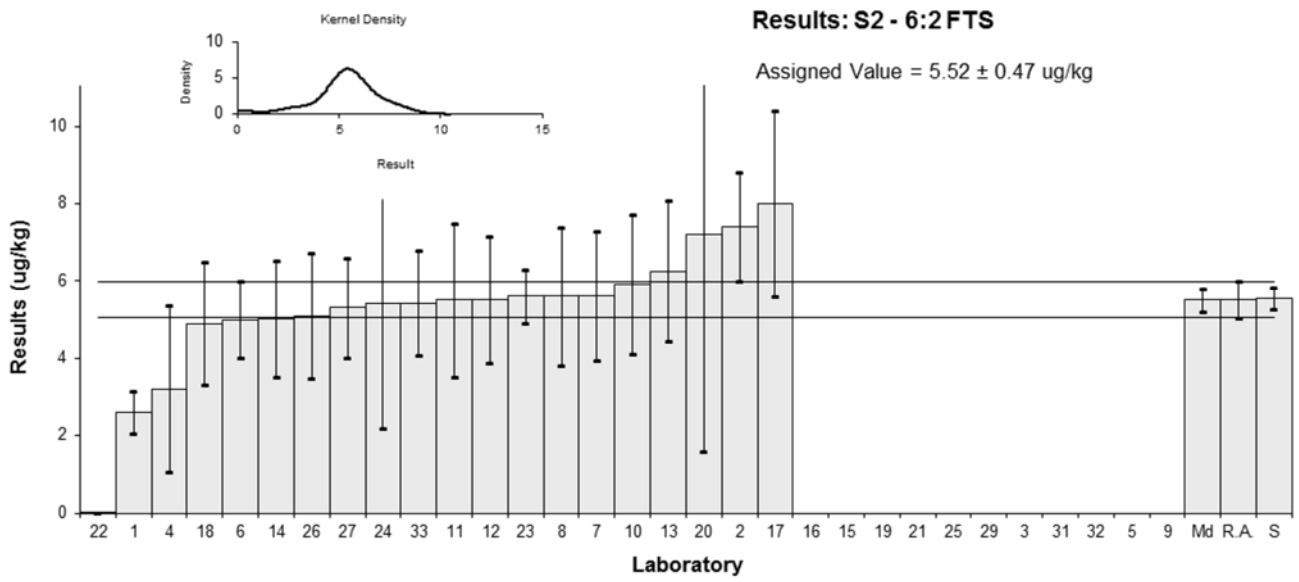
Participant Results

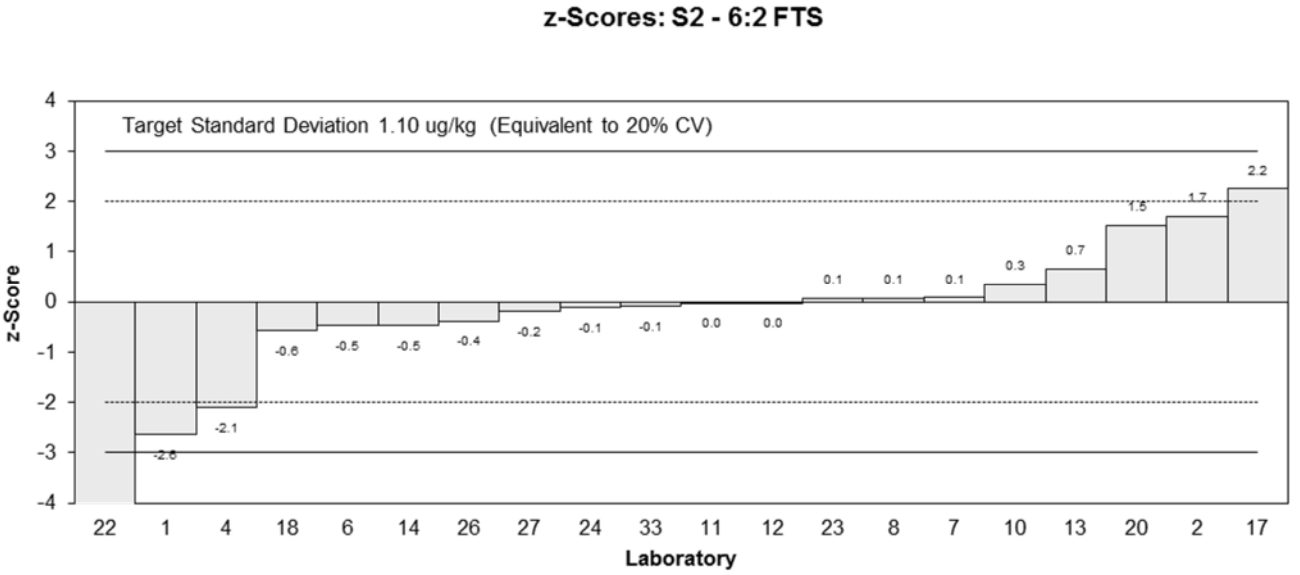
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	2.60	0.55	NR	-2.64	-4.04
2	7.4	1.4	NR	1.70	1.27
3	NT	NT	NT		
4	3.2	2.15	51	-2.10	-1.05
5	NT	NT	NT		
6	5.0	1	119	-0.47	-0.47
7	5.61	1.68	76	0.08	0.05
8	5.6	1.8	84.8	0.07	0.04
9	NT	NT	NT		
10	5.9	1.8	NR	0.34	0.20
11	5.5	2	100	-0.02	-0.01
12	5.51	1.65	92	-0.01	-0.01
13	6.25	1.82	85	0.66	0.39
14	5.01	1.5	96	-0.46	-0.32
15	NT	NT	NT		
16	<100	NR	102		
17	8.00	2.40	NR	2.25	1.01
18	4.9	1.58	108	-0.56	-0.38
19	NT	NT	NT		
20	7.20	5.62	138	1.52	0.30
21	NT	NT	NT		
22	0.013	0.002	NR	-4.99	-11.72
23	5.6	0.7	100	0.07	0.09
24	5.40	3.2	9.32	-0.11	-0.04
25	NT	NT	NT		
26	5.10	1.62	95	-0.38	-0.25
27	5.3	1.3	78	-0.20	-0.16
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	5.4191	1.3548	92	-0.09	-0.07

Statistics

Assigned Value	5.52	0.47
Spike	5.55	0.28
Robust Average*	5.52	0.47
Median*	5.50	0.29
Mean*	5.50	
N	20	
Max.	8	
Min.	0.013	
Robust SD*	0.82	
Robust CV*	15%	

* Results from laboratory 22 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S2 - 6:2 FTS
Assigned Value = 5.52 ± 0.47 ug/kg
Results (ug/kg)
Laboratory
22 1 4 18 6 14 26 27 24 33 11 12 23 8 7 10 13 20 2 17 16 15 19 21 25 29 3 31 32 5 9 Md R.A. S


z-Scores: S2 - 6:2 FTS
Target Standard Deviation 1.10 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 1 4 18 6 14 26 27 24 33 11 12 23 8 7 10 13 20 2 17
-2.6 -2.1 -0.6 -0.5 -0.5 -0.4 -0.2 -0.1 -0.1 0.0 0.0 0.1 0.1 0.1 0.3 0.7 1.5 1.7 2.2

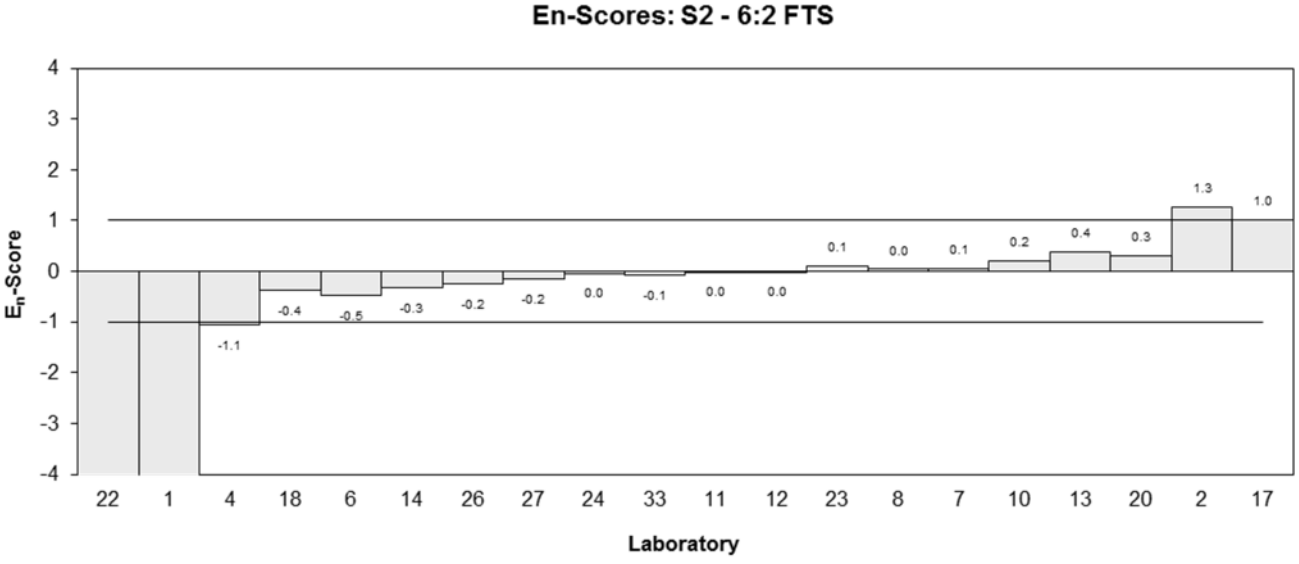

En-Scores: S2 - 6:2 FTS
En-Score
Laboratory
22 1 4 18 6 14 26 27 24 33 11 12 23 8 7 10 13 20 2 17
-1.1 -0.4 -0.5 -0.3 -0.2 -0.2 0.0 -0.1 0.0 0.0 0.1 0.0 0.1 0.2 0.4 0.3 1.3 1.0

Figure 19

Table 28

Sample Details

Sample No.	S2
Matrix.	Soil
Analyte.	8:2 FTS
Units	µg/kg

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	<0.1	NR	NR
2	<0.4	NR	NR
3	NT	NT	NT
4	<5	2.76	45
5	NT	NT	NT
6	0.15	0.04	133
7	<0.5	NR	90
8	<0.5	0.04	99.0
9	NT	NT	NT
10	0.21	0.06	NR
11	0.2	0.2	115
12	<0.5	NR	83
13	0.251	0.0557	109
14	< 4.39	1.3	78
15	NT	NT	NT
16	<20	NR	90
17	0.27	0.08	NR
18	<0.5	0.14	117
19	NT	NT	NT
20	< 0.317	NR	91.8
21	< 5	2.4	NR
22	NR	0	NR
23	<1.0	NR	92
24	0.45	0.22	81.19
25	NT	NT	NT
26	<0.948	NR	104
27	<1.0	NR	82
29	NT	NT	NT
31	NT	NT	NT
32	NT	NT	NT
33	NR	NR	NR

Statistics

Assigned Value	Not Set	
Spike	Not Spiked	
Robust Average	0.24	0.09
Median	0.23	0.05
Mean	0.26	
N	6	
Max.	0.45	
Min.	0.15	
Robust SD	0.09	
Robust CV	38%	

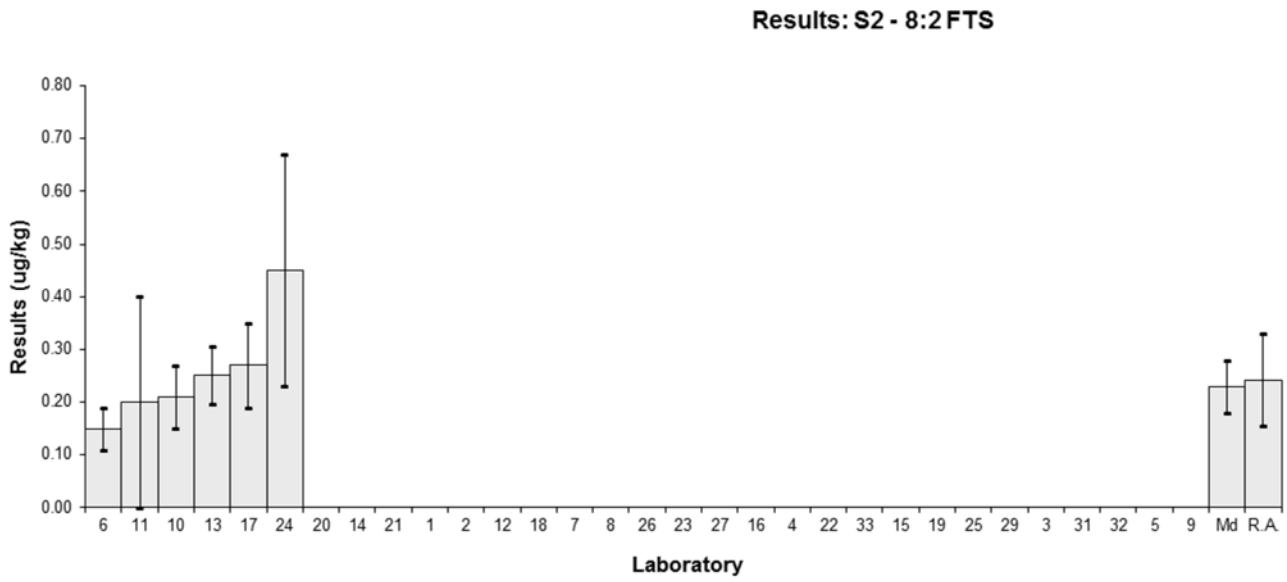

Results: S2 - 8:2 FTS
Results (ug/kg)
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
6 11 10 13 17 24 20 14 21 1 2 12 18 7 8 26 23 27 16 4 22 33 15 19 25 29 3 31 32 5 9 Md R.A.
Laboratory

Figure 20

Table 29

Sample Details

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

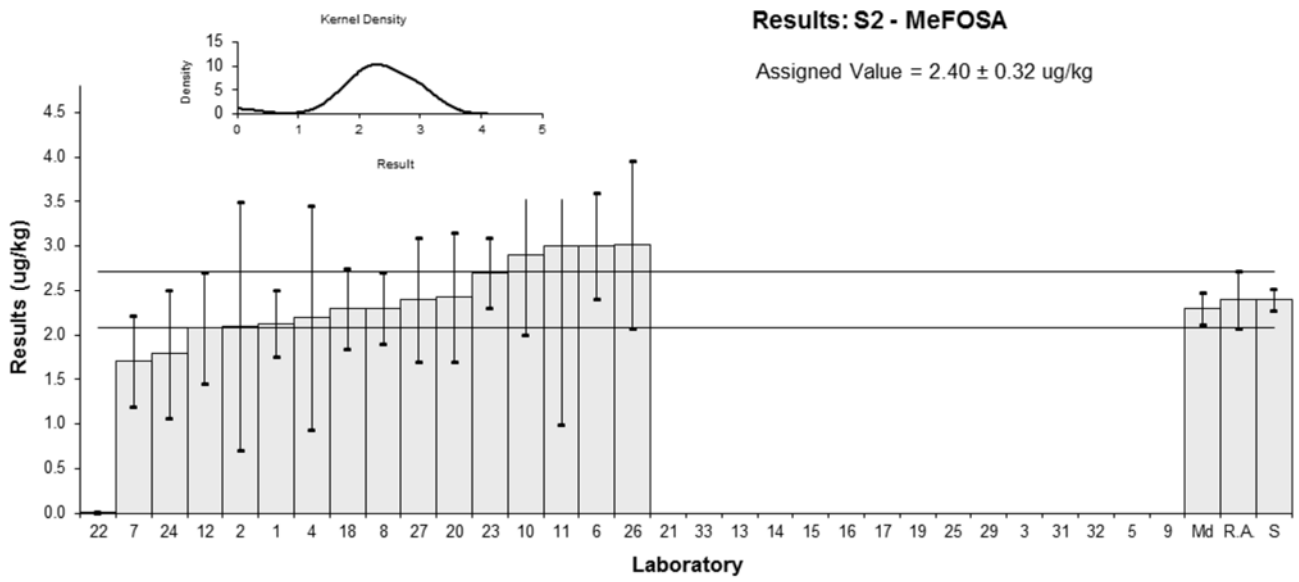
Participant Results

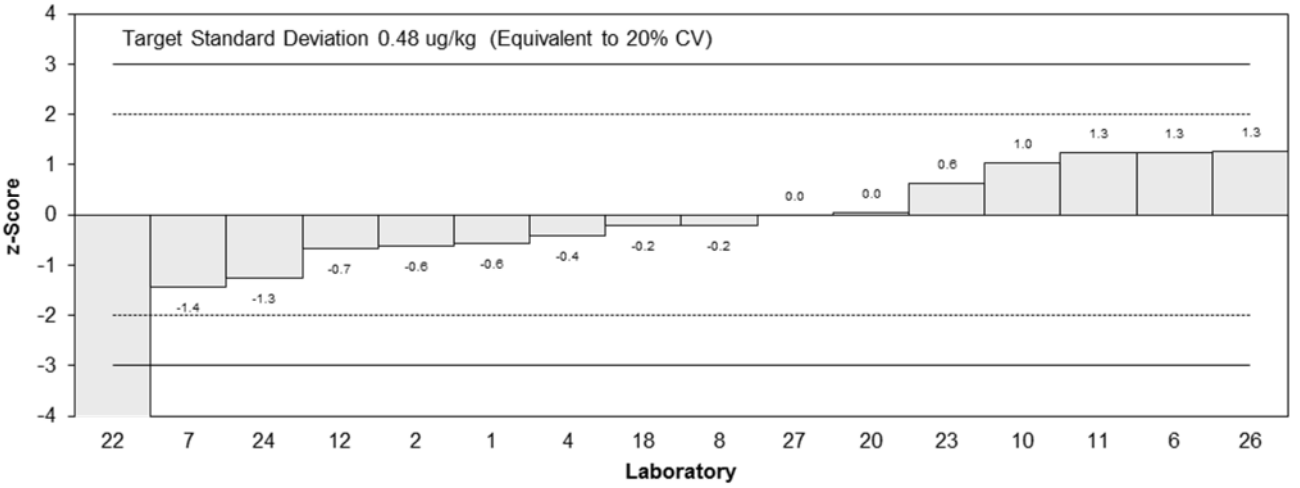
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	2.13	0.38	NR	-0.56	-0.54
2	2.1	1.4	NR	-0.62	-0.21
3	NT	NT	NT		
4	2.2	1.26	39	-0.42	-0.15
5	NT	NT	NT		
6	3.0	0.6	108	1.25	0.88
7	1.71	0.51	70	-1.44	-1.15
8	2.3	0.4	97.2	-0.21	-0.20
9	NT	NT	NT		
10	2.9	0.9	NR	1.04	0.52
11	3	2	82	1.25	0.30
12	2.08	0.625	73	-0.67	-0.46
13	NT	NT	NT		
14	NT	NT	NT		
15	NT	NT	NT		
16	NT	NT	NT		
17	NT	NT	NT		
18	2.3	0.45	103	-0.21	-0.18
19	NT	NT	NT		
20	2.42	0.727	46.8	0.04	0.03
21	< 5	1.9	NR		
22	0.007	0.002	NR	-4.99	-7.48
23	2.7	0.4	105	0.63	0.59
24	1.79	0.72	24.01	-1.27	-0.77
25	NT	NT	NT		
26	3.01	0.943	100	1.27	0.61
27	2.4	0.7	106	0.00	0.00
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	NR	NR	15.7		

Statistics

Assigned Value	2.40	0.32
Spike	2.40	0.12
Robust Average*	2.40	0.32
Median*	2.30	0.18
Mean*	2.40	
N	16	
Max.	3.01	
Min.	0.007	
Robust SD*	0.49	
Robust CV*	20%	

* Results from laboratory 22 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S2 - MeFOSA
Assigned Value = 2.40 ± 0.32 ug/kg
Results (ug/kg)
Laboratory
22 7 24 12 2 1 4 18 8 27 20 23 10 11 6 26 21 33 13 14 15 16 17 19 25 29 3 31 32 5 9 Md R.A. S


z-Scores: S2 - MeFOSA
Target Standard Deviation 0.48 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 7 24 12 2 1 4 18 8 27 20 23 10 11 6 26
-1.4 -1.3 -0.7 -0.6 -0.6 -0.4 -0.2 -0.2 0.0 0.0 0.6 1.0 1.3 1.3 1.3

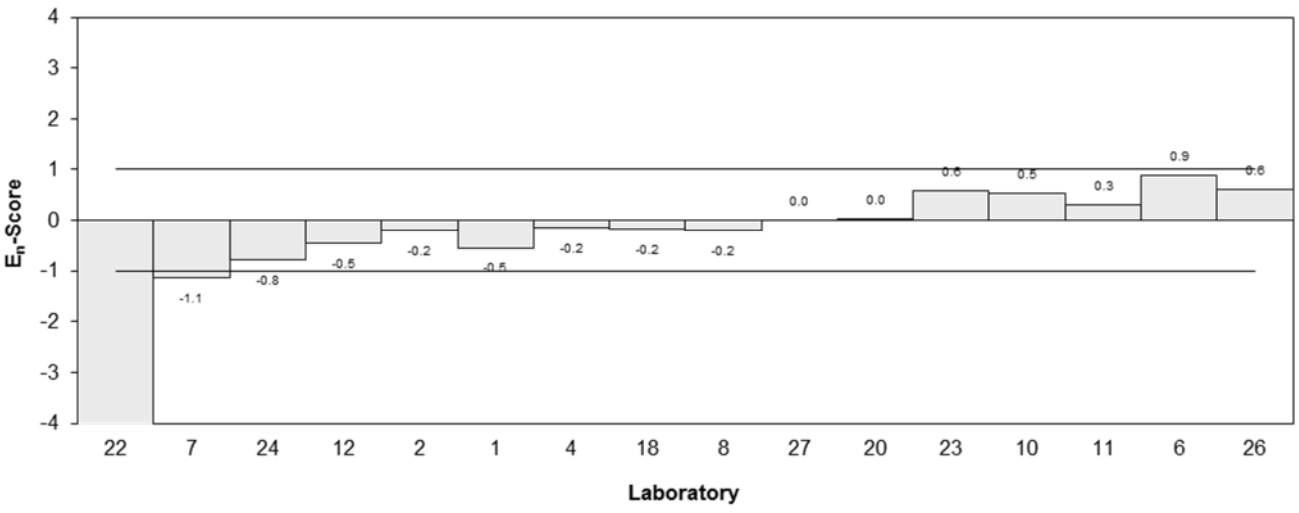

En-Scores: S2 - MeFOSA
En-Score
Laboratory
22 7 24 12 2 1 4 18 8 27 20 23 10 11 6 26
-1.1 -0.8 -0.5 -0.2 -0.5 -0.2 -0.2 -0.2 0.0 0.0 0.6 0.5 0.3 0.9 0.6

Figure 21

Table 30

Sample Details

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

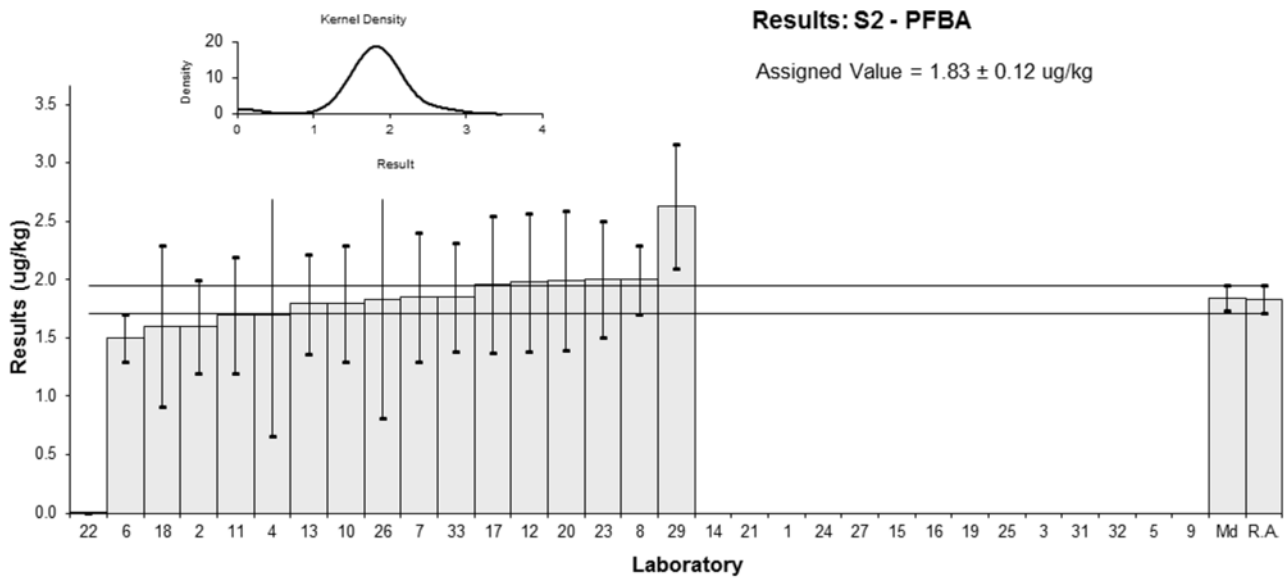
Participant Results

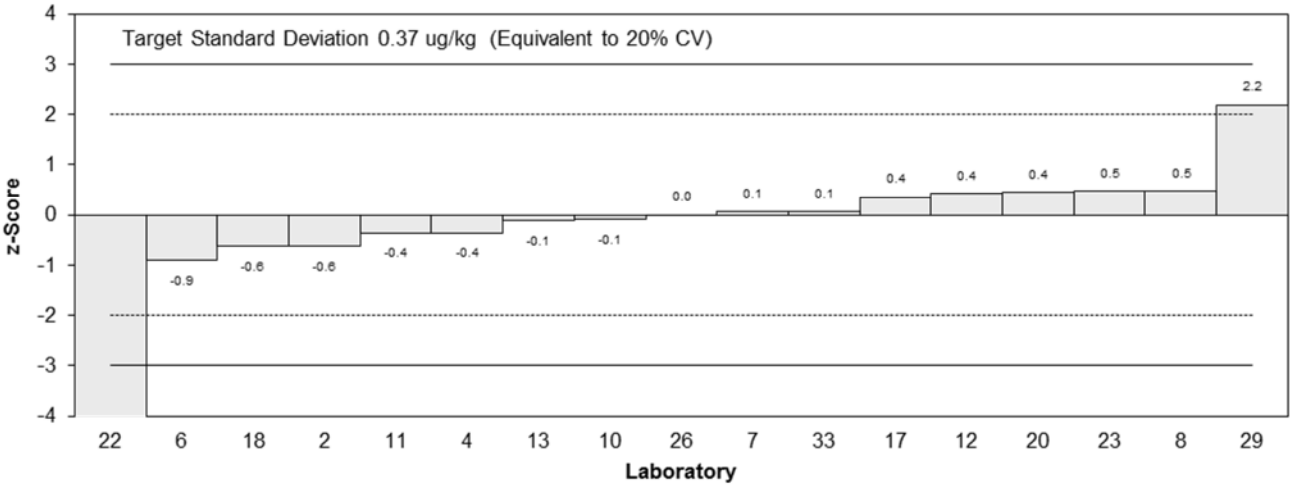
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	<0.1	NR	NR		
2	1.6	0.4	NR	-0.63	-0.55
3	NT	NT	NT		
4	1.7	1.04	61	-0.36	-0.12
5	NT	NT	NT		
6	1.5	0.2	105	-0.90	-1.41
7	1.85	0.55	87	0.05	0.04
8	2.0	0.3	99.4	0.46	0.53
9	NT	NT	NT		
10	1.8	0.5	NR	-0.08	-0.06
11	1.7	0.5	115	-0.36	-0.25
12	1.98	0.594	80	0.41	0.25
13	1.79	0.43	100	-0.11	-0.09
14	< 2.20	0.66	68		
15	NT	NT	NT		
16	NT	NT	NT		
17	1.96	0.59	NR	0.36	0.22
18	1.6	0.69	109	-0.63	-0.33
19	NT	NT	NT		
20	1.99	0.596	91.2	0.44	0.26
21	< 5	1.3	104		
22	0.003	0.001	NR	-4.99	-15.22
23	2.0	0.5	97	0.46	0.33
24	<300	NR	54.35		
25	NT	NT	NT		
26	1.83	1.02	86	0.00	0.00
27	<50	NR	106		
29	2.63	0.53	NR	2.19	1.47
31	NT	NT	NT		
32	NT	NT	NT		
33	1.8507	0.4627	94.4	0.06	0.04

Statistics

Assigned Value	1.83	0.12
Spike	Not Spiked	
Robust Average*	1.83	0.12
Median*	1.84	0.11
Mean*	1.86	
N	17	
Max.	2.63	
Min.	0.003	
Robust SD*	0.19	
Robust CV*	11%	

* Results from laboratory 22 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S2 - PFBA
Assigned Value = 1.83 ± 0.12 ug/kg
Results (ug/kg)
Laboratory
22 6 18 2 11 4 13 10 26 7 33 17 12 20 23 8 29 14 21 1 24 27 15 16 19 25 3 31 32 5 9 Md R.A.


z-Scores: S2 - PFBA
Target Standard Deviation 0.37 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 6 18 2 11 4 13 10 26 7 33 17 12 20 23 8 29
-0.9 -0.6 -0.6 -0.4 -0.4 -0.1 -0.1 0.0 0.1 0.1 0.4 0.4 0.4 0.5 0.5 2.2

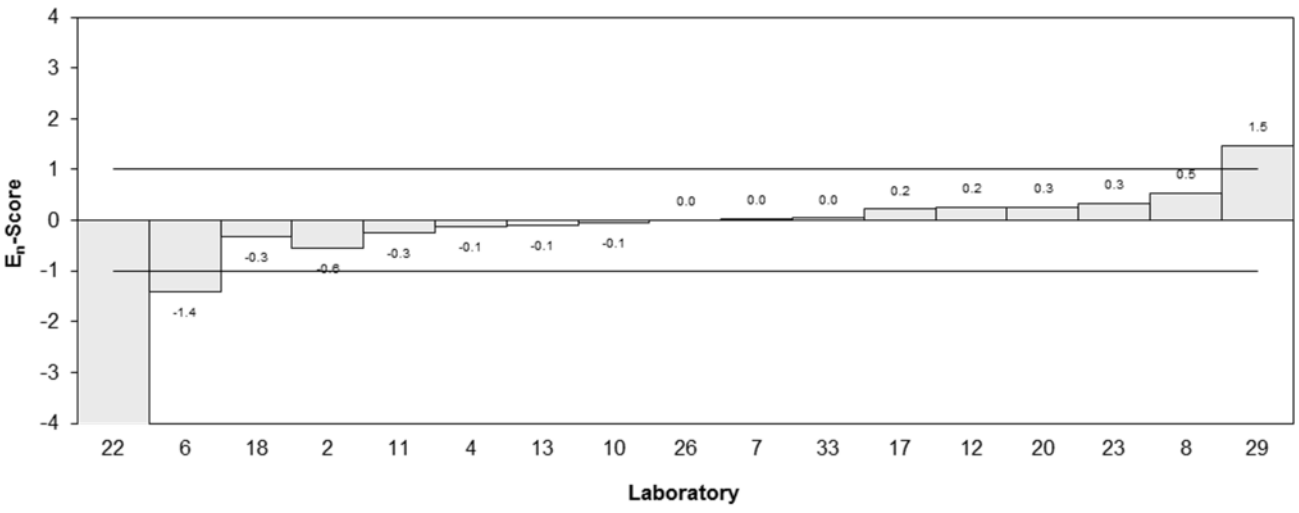

En-Scores: S2 - PFBA
En-Score
Laboratory
22 6 18 2 11 4 13 10 26 7 33 17 12 20 23 8 29
-1.4 -0.3 -0.6 -0.3 -0.1 -0.1 -0.1 0.0 0.0 0.0 0.2 0.2 0.3 0.3 0.5 1.5

Figure 22

Table 31

Sample Details

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

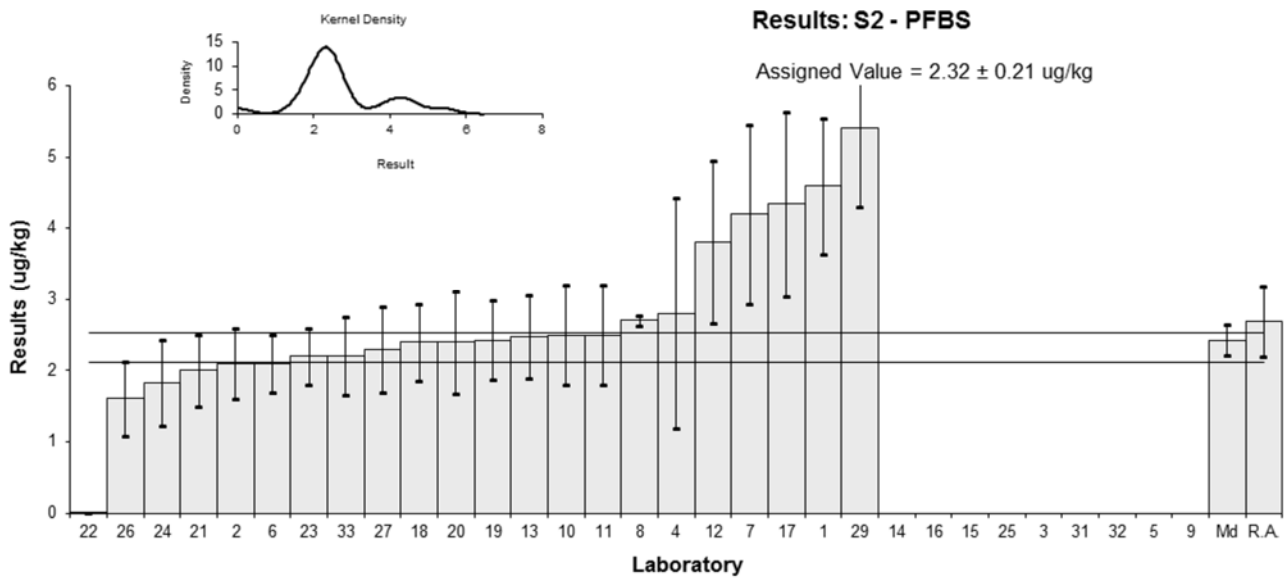
Participant Results

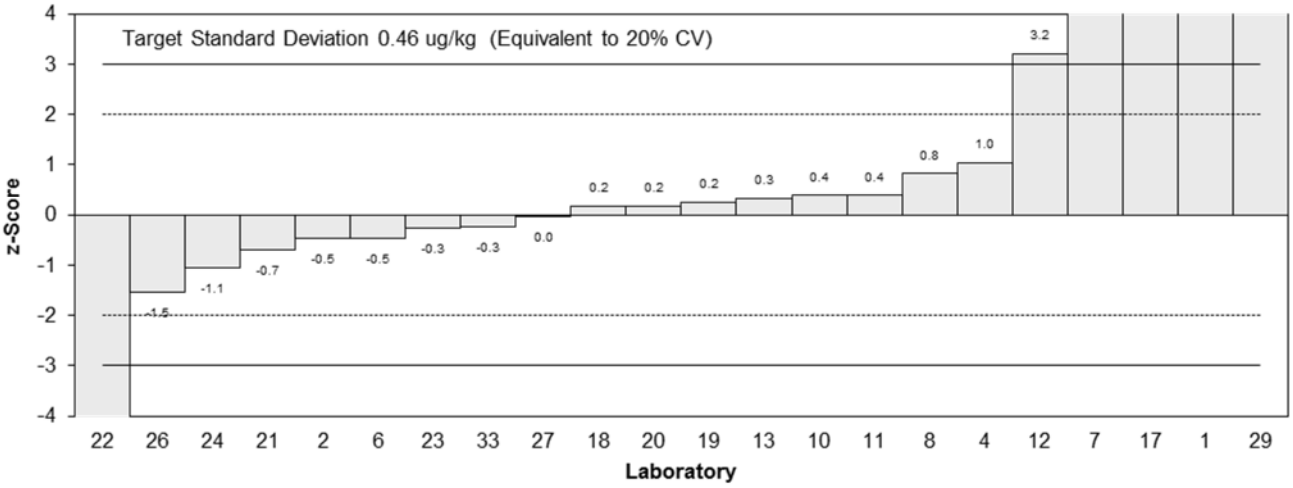
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	4.59	0.96	NR	4.89	2.31
2	2.1	0.5	NR	-0.47	-0.41
3	NT	NT	NT		
4	2.8	1.62	79	1.03	0.29
5	NT	NT	NT		
6	2.1	0.4	99	-0.47	-0.49
7	4.20	1.26	80	4.05	1.47
8	2.7	0.07	102.7	0.82	1.72
9	NT	NT	NT		
10	2.5	0.7	NR	0.39	0.25
11	2.5	0.7	99	0.39	0.25
12	3.81	1.14	100	3.21	1.29
13	2.47	0.585	102	0.32	0.24
14	< 3.29	0.99	82		
15	NT	NT	NT		
16	<5	NR	97		
17	4.34	1.30	NR	4.35	1.53
18	2.4	0.54	59	0.17	0.14
19	2.43	0.55	NR	0.24	0.19
20	2.40	0.719	102	0.17	0.11
21	2	0.5	104	-0.69	-0.59
22	0.005	0.001	NR	-4.99	-11.02
23	2.2	0.4	96	-0.26	-0.27
24	1.83	0.6	7.98	-1.06	-0.77
25	NT	NT	NT		
26	1.61	0.522	86	-1.53	-1.26
27	2.3	0.6	104	-0.04	-0.03
29	5.4	1.1	NR	6.64	2.75
31	NT	NT	NT		
32	NT	NT	NT		
33	2.2032	0.5508	101.0	-0.25	-0.20

Statistics

Assigned Value**	2.32	0.21
Spike	Not Spiked	
Robust Average*	2.69	0.49
Median*	2.43	0.22
Mean*	2.80	
N	22	
Max.	5.4	
Min.	0.005	
Robust SD*	0.90	
Robust CV*	33%	

* Results from laboratory 22 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 1, 7, 17, 22 and 29.


Kernel Density
Density
Result
Results: S2 - PFBS
Assigned Value = 2.32 ± 0.21 ug/kg
Results (ug/kg)
Laboratory
22 26 24 21 2 6 23 33 27 18 20 19 13 10 11 8 4 12 7 17 1 29 14 16 15 25 3 31 32 5 9 Md R.A.


z-Scores: S2 - PFBS
Target Standard Deviation 0.46 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 26 24 21 2 6 23 33 27 18 20 19 13 10 11 8 4 12 7 17 1 29

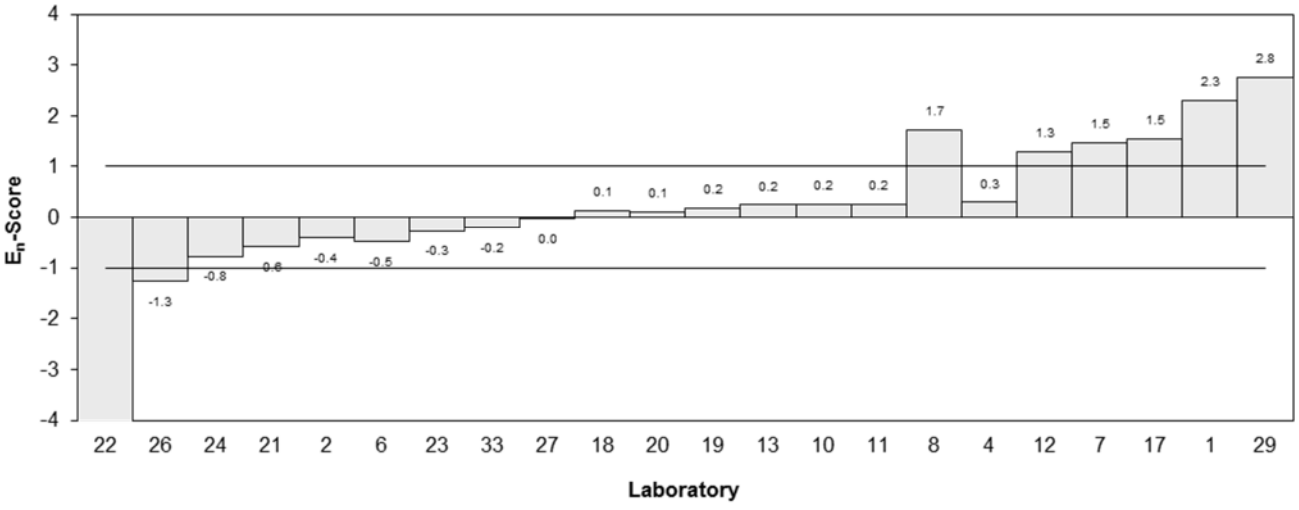

En-Scores: S2 - PFBS
En-Score
Laboratory
22 26 24 21 2 6 23 33 27 18 20 19 13 10 11 8 4 12 7 17 1 29

Figure 23

Table 32

Sample Details

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

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	0.30	0.07	NR
2	<0.2	NR	NR
3	NT	NT	NT
4	<5	5.71	53
5	NT	NT	NT
6	<1	0.19	109
7	<0.5	NR	86
8	<0.2	0.05	94.7
9	NT	NT	NT
10	<1	NR	NR
11	<0.5	NR	93
12	<0.5	NR	89
13	0.169	0.038	115
14	< 2.20	0.66	78
15	NT	NT	NT
16	<1	NR	91
17	NT	NT	NT
18	0.2	0.07	108
19	0.22	0.04	92.3
20	0.145	0.0435	63.3
21	< 1	0.3	94
22	NR	0	NR
23	<1.0	NR	87
24	<0.50	NR	70.31
25	NT	NT	NT
26	<0.948	NR	85
27	<1.0	NR	118
29	< 1	NR	NR
31	NT	NT	NT
32	NT	NT	NT
33	NR	NR	78.3

Statistics

Assigned Value	Not Set	
Spike	Not Spiked	
Robust Average	0.21	0.08
Median	0.20	0.06
Mean	0.21	
N	5	
Max.	0.3	
Min.	0.145	
Robust SD	0.068	
Robust CV	33%	

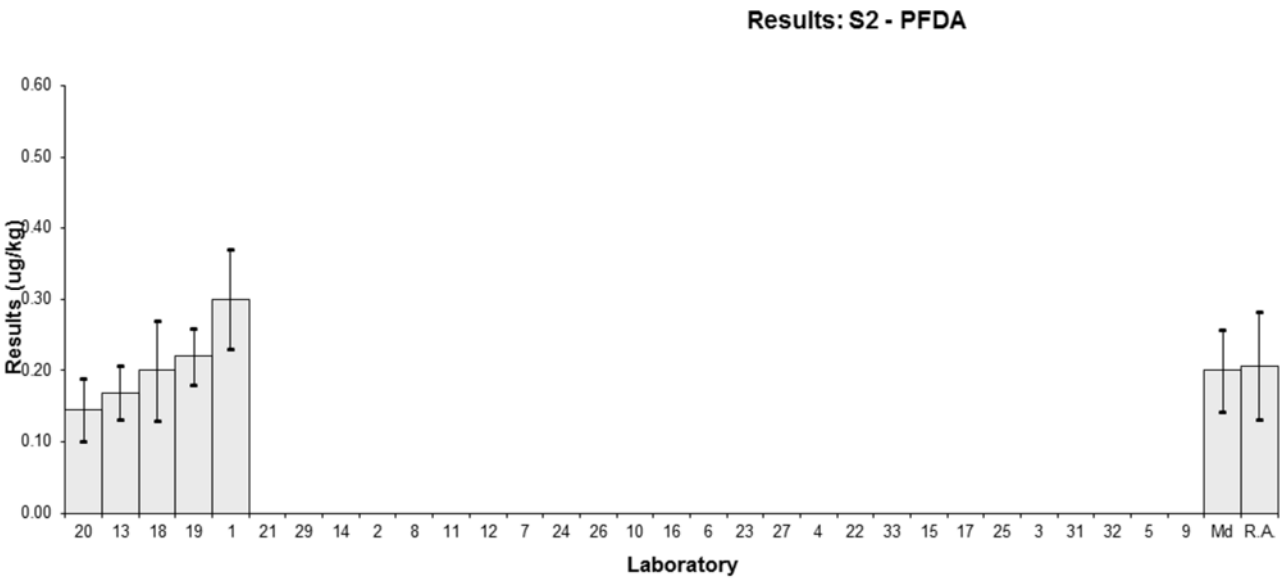

Results: S2 - PFDA
Results (ug/kg)
0.60
0.50
0.40
0.30
0.20
0.10
0.00
20 13 18 19 1 21 29 14 2 8 11 12 7 24 26 10 16 6 23 27 4 22 33 15 17 25 3 31 32 5 9 Md R.A.
Laboratory

Figure 24

Table 33

Sample Details

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

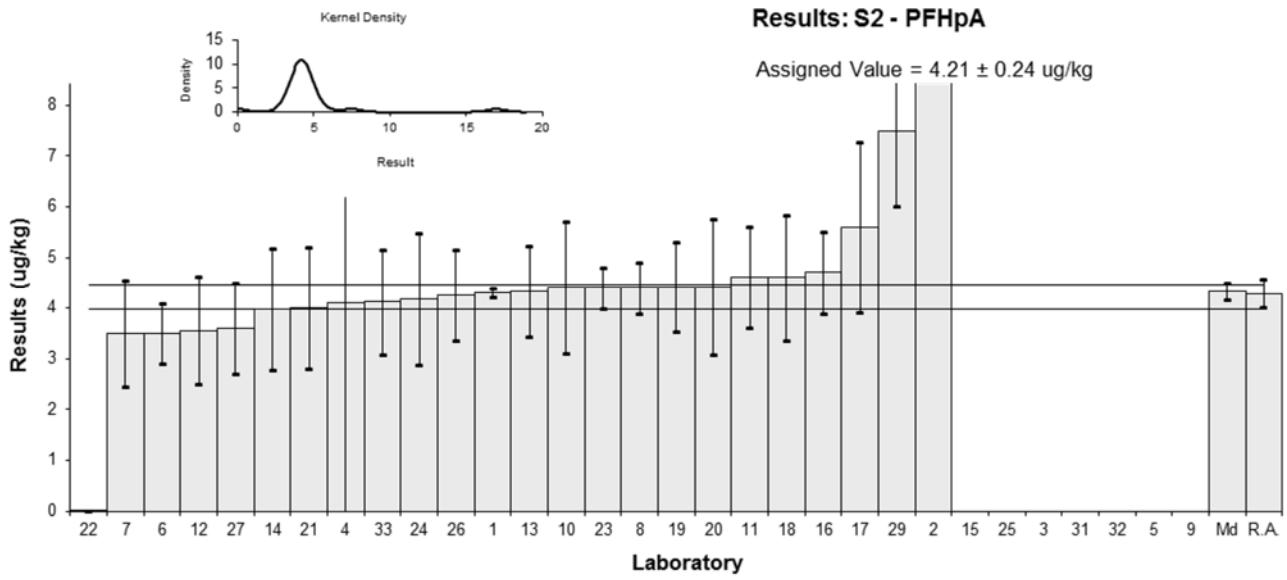
Participant Results

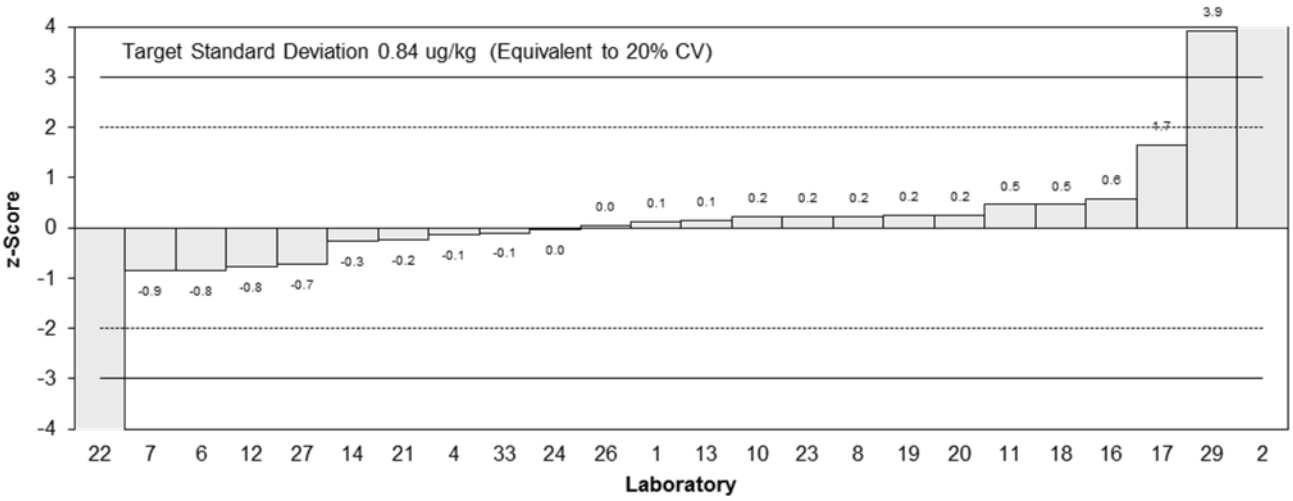
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	4.31	0.09	NR	0.12	0.39
2	17	3.6	NR	15.19	3.54
3	NT	NT	NT		
4	4.1	4.93	59	-0.13	-0.02
5	NT	NT	NT		
6	3.5	0.6	117	-0.84	-1.10
7	3.49	1.05	100	-0.86	-0.67
8	4.4	0.5	85.8	0.23	0.34
9	NT	NT	NT		
10	4.4	1.3	NR	0.23	0.14
11	4.6	1	91	0.46	0.38
12	3.56	1.07	107	-0.77	-0.59
13	4.33	0.896	107	0.14	0.13
14	3.98	1.19	72	-0.27	-0.19
15	NT	NT	NT		
16	4.7	0.8	58	0.58	0.59
17	5.60	1.68	NR	1.65	0.82
18	4.6	1.23	104	0.46	0.31
19	4.42	0.88	NR	0.25	0.23
20	4.42	1.33	105	0.25	0.16
21	4	1.2	97	-0.25	-0.17
22	0.008	0.001	NR	-4.99	-17.51
23	4.4	0.4	93	0.23	0.41
24	4.18	1.3	6.21	-0.04	-0.02
25	NT	NT	NT		
26	4.25	0.891	87	0.05	0.04
27	3.6	0.9	116	-0.72	-0.65
29	7.5	1.5	NR	3.91	2.17
31	NT	NT	NT		
32	NT	NT	NT		
33	4.1258	1.0315	94.1	-0.10	-0.08

Statistics

Assigned Value**	4.21	0.24
Spike	Not Spiked	
Robust Average*	4.29	0.29
Median*	4.33	0.17
Mean*	4.93	
N	24	
Max.	17	
Min.	0.008	
Robust SD*	0.53	
Robust CV*	12%	

* Results from laboratory 22 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 2, 22 and 29.


Results: S2 - PFHpA
Assigned Value = 4.21 ± 0.24 ug/kg
Kernel Density
Density
Result
Results (ug/kg)
Laboratory
22 7 6 12 27 14 21 4 33 24 26 1 13 10 23 8 19 20 11 18 16 17 29 2 15 25 3 31 32 5 9 Md R.A.


z-Scores: S2 - PFHpA
Target Standard Deviation 0.84 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 7 6 12 27 14 21 4 33 24 26 1 13 10 23 8 19 20 11 18 16 17 29 2

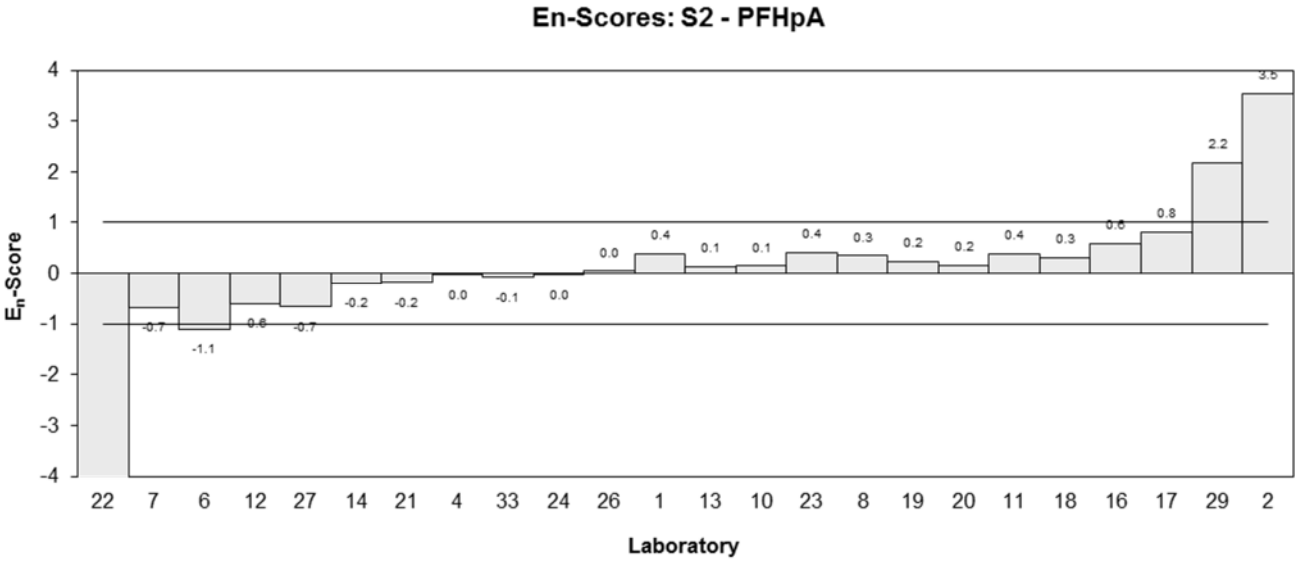

En-Scores: S2 - PFHpA
En-Score
Laboratory
22 7 6 12 27 14 21 4 33 24 26 1 13 10 23 8 19 20 11 18 16 17 29 2

Figure 25

Table 34

Sample Details

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

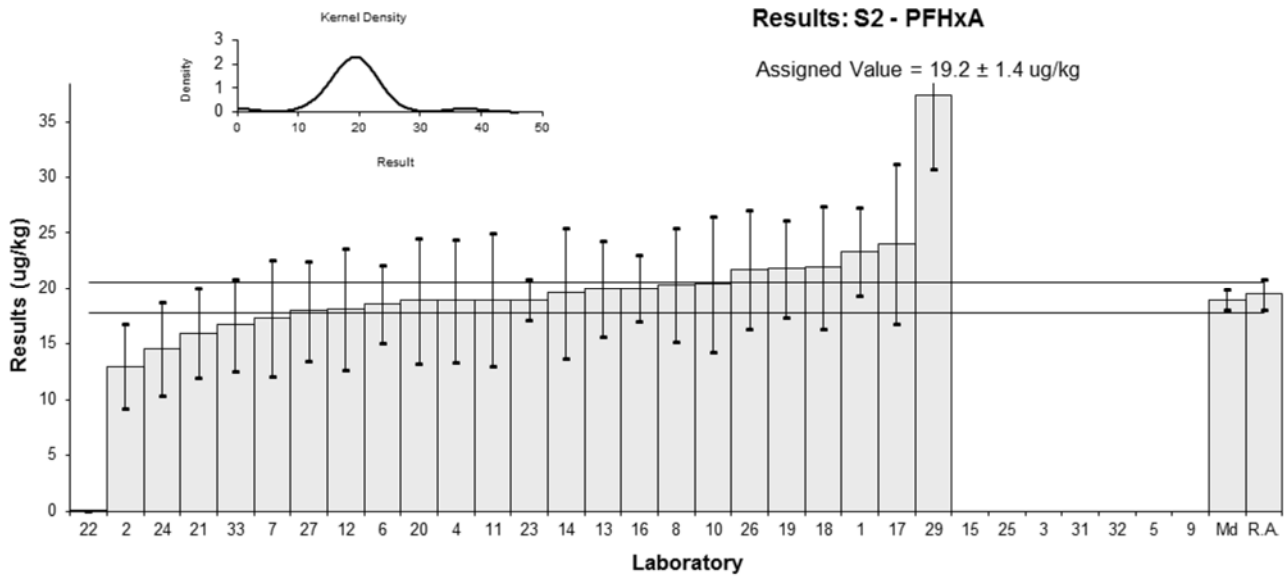
Participant Results

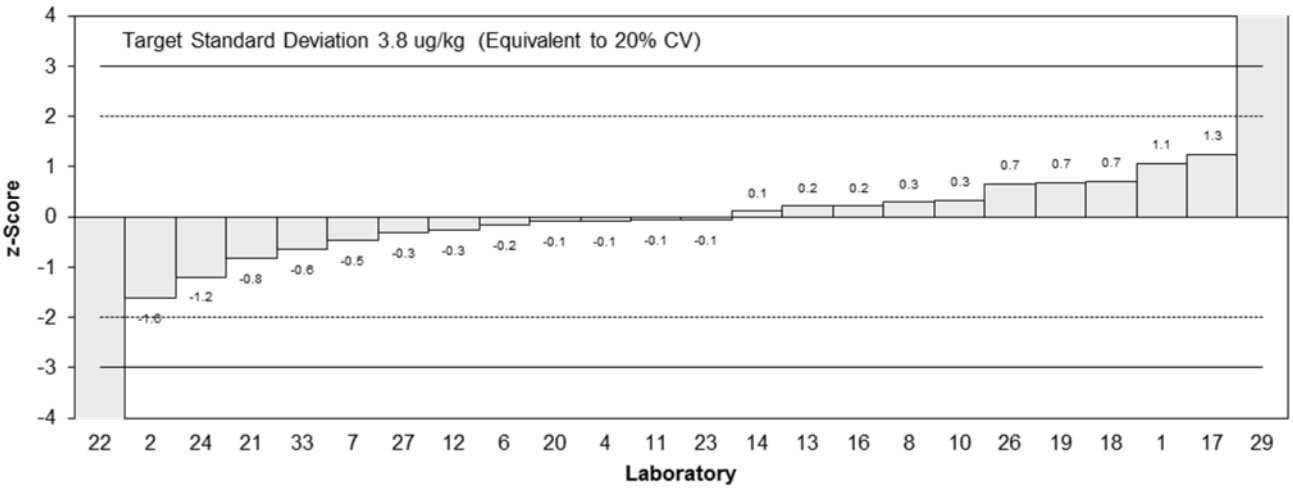
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	23.3	4.0	NR	1.07	0.97
2	13	3.8	NR	-1.61	-1.53
3	NT	NT	NT		
4	18.9	5.52	68	-0.08	-0.05
5	NT	NT	NT		
6	18.6	3.5	139	-0.16	-0.16
7	17.36	5.21	95	-0.48	-0.34
8	20.3	5.1	91.1	0.29	0.21
9	NT	NT	NT		
10	20.4	6.1	NR	0.31	0.19
11	19	6	75	-0.05	-0.03
12	18.2	5.47	103	-0.26	-0.18
13	20.0	4.32	109	0.21	0.18
14	19.6	5.9	65	0.10	0.07
15	NT	NT	NT		
16	20	3	58	0.21	0.24
17	24.0	7.21	NR	1.25	0.65
18	21.9	5.52	75	0.70	0.47
19	21.8	4.4	95.2	0.68	0.56
20	18.9	5.67	97.2	-0.08	-0.05
21	16	4.0	103	-0.83	-0.76
22	0.036	0.007	NR	-4.99	-13.69
23	19	1.8	111	-0.05	-0.09
24	14.6	4.2	7.51	-1.20	-1.04
25	NT	NT	NT		
26	21.7	5.39	90	0.65	0.45
27	18	4.5	114	-0.31	-0.25
29	37.4	6.7	NR	4.74	2.66
31	NT	NT	NT		
32	NT	NT	NT		
33	16.7164	4.1791	90.7	-0.65	-0.56

Statistics

Assigned Value**	19.2	1.4
Spike	Not Spiked	
Robust Average*	19.5	1.4
Median*	19.0	0.9
Mean*	19.9	
N	24	
Max.	37.4	
Min.	0.036	
Robust SD*	2.8	
Robust CV*	14%	

* Results from laboratory 22 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 22 and 29.


Kernel Density
Density
Result
Results: S2 - PFHxA
Assigned Value = 19.2 ± 1.4 ug/kg
Results (ug/kg)
Laboratory
22 2 24 21 33 7 27 12 6 20 4 11 23 14 13 16 8 10 26 19 18 1 17 29 15 25 3 31 32 5 9 Md R.A.


z-Scores: S2 - PFHxA
Target Standard Deviation 3.8 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 2 24 21 33 7 27 12 6 20 4 11 23 14 13 16 8 10 26 19 18 1 17 29

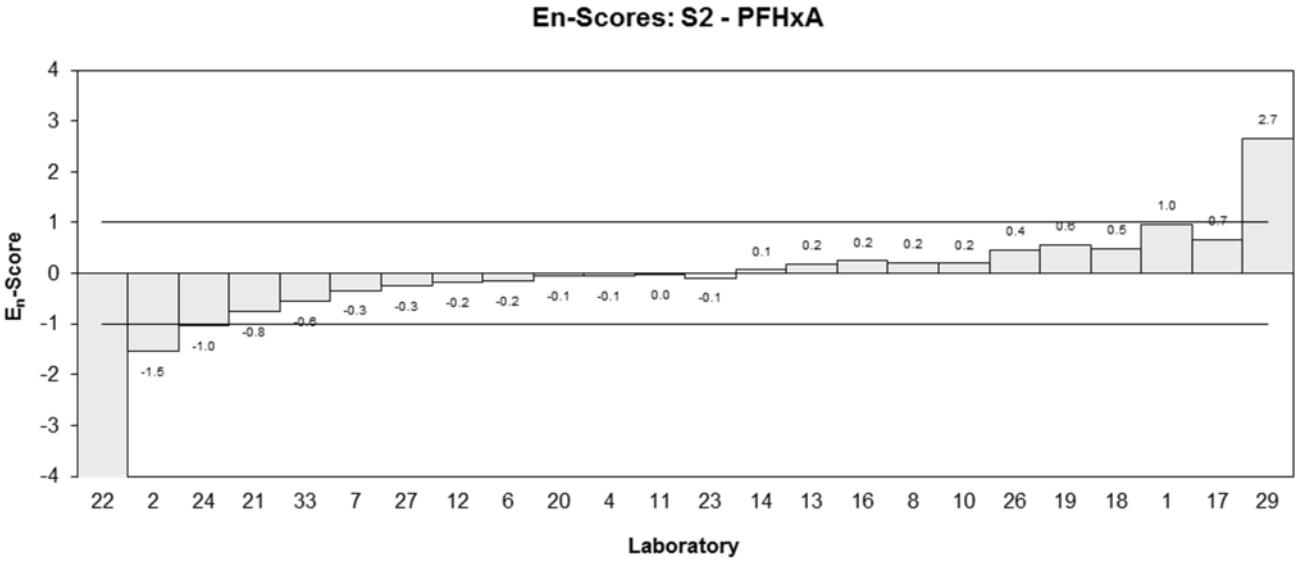

En-Scores: S2 - PFHxA
En-Score
Laboratory
22 2 24 21 33 7 27 12 6 20 4 11 23 14 13 16 8 10 26 19 18 1 17 29

Figure 26

Table 35

Sample Details

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

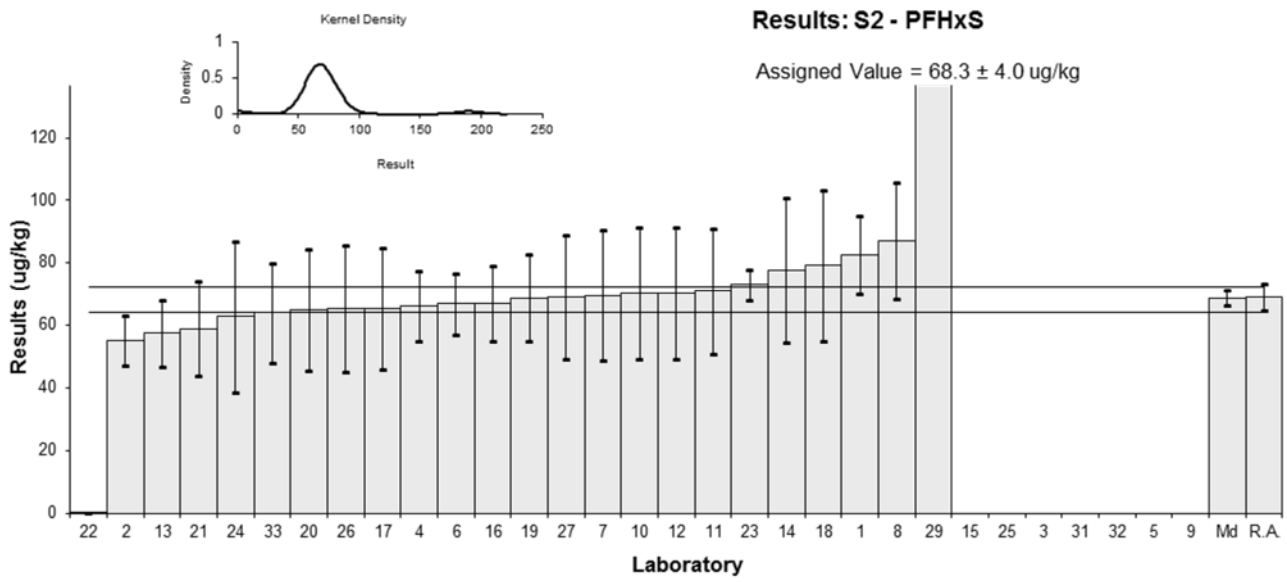
Participant Results

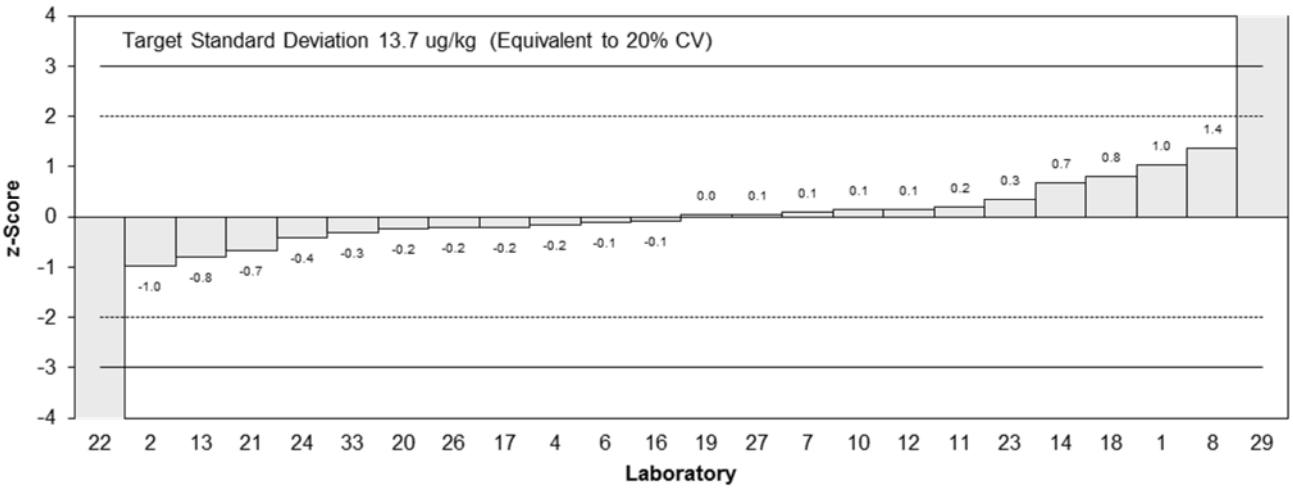
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	82.5	12.4	NR	1.04	1.09
2	55	8.0	NR	-0.97	-1.49
3	NT	NT	NT		
4	66.2	11.2	61	-0.15	-0.18
5	NT	NT	NT		
6	66.8	10	90	-0.11	-0.14
7	69.60	20.88	95	0.10	0.06
8	87.1	18.8	80.7	1.38	0.98
9	NT	NT	NT		
10	70.2	21.1	NR	0.14	0.09
11	71	20	70	0.20	0.13
12	70.3	21.1	91	0.15	0.09
13	57.4	10.5	89	-0.80	-0.97
14	77.5	23.2	72	0.67	0.39
15	NT	NT	NT		
16	67	12	97	-0.10	-0.10
17	65.4	19.6	NR	-0.21	-0.14
18	79.2	24.22	87	0.80	0.44
19	68.8	14	96	0.04	0.03
20	64.9	19.5	91.5	-0.25	-0.17
21	59	15	100	-0.68	-0.60
22	0.162	0.031	NR	-4.99	-17.03
23	73	4.8	84	0.34	0.75
24	62.7	24	0.65	-0.41	-0.23
25	NT	NT	NT		
26	65.3	20.4	106	-0.22	-0.14
27	69	20	104	0.05	0.03
29	190	34	NR	8.91	3.55
31	NT	NT	NT		
32	NT	NT	NT		
33	63.9469	15.9867	91.5	-0.32	-0.26

Statistics

Assigned Value**	68.3	4.0
Spike	Not Spiked	
Robust Average*	69.1	4.3
Median*	68.8	2.5
Mean*	74.0	
N	24	
Max.	190	
Min.	0.162	
Robust SD*	8.3	
Robust CV*	12%	

* Results from laboratory 22 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 22 and 29.


Kernel Density
Density
Result
Results: S2 - PFHxS
Assigned Value = 68.3 ± 4.0 ug/kg
Results (ug/kg)
Laboratory
22 2 13 21 24 33 20 26 17 4 6 16 19 27 7 10 12 11 23 14 18 1 8 29 15 25 3 31 32 5 9 Md R.A.


z-Scores: S2 - PFHxS
Target Standard Deviation 13.7 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 2 13 21 24 33 20 26 17 4 6 16 19 27 7 10 12 11 23 14 18 1 8 29

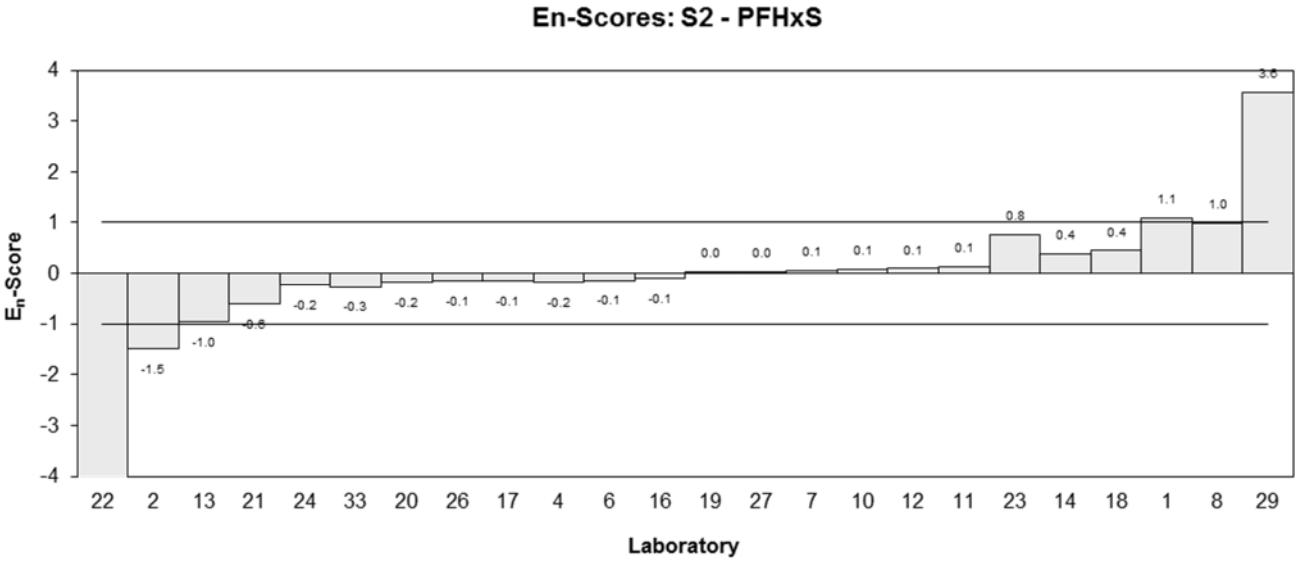

En-Scores: S2 - PFHxS
En-Score
Laboratory
22 2 13 21 24 33 20 26 17 4 6 16 19 27 7 10 12 11 23 14 18 1 8 29

Figure 27

Table 36

Sample Details

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

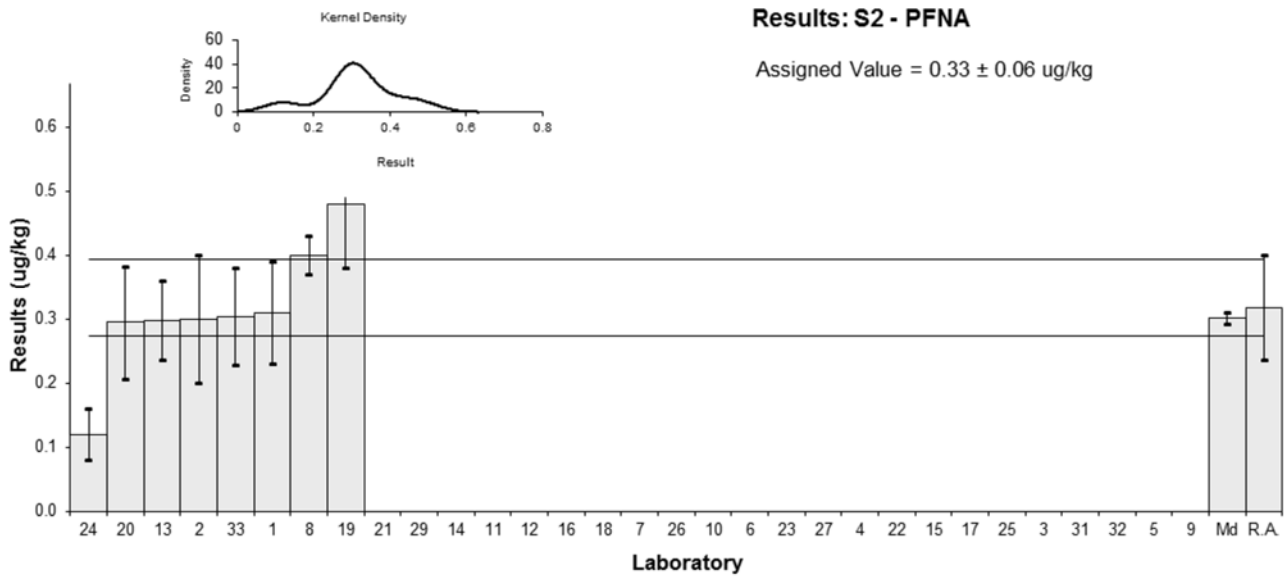
Participant Results

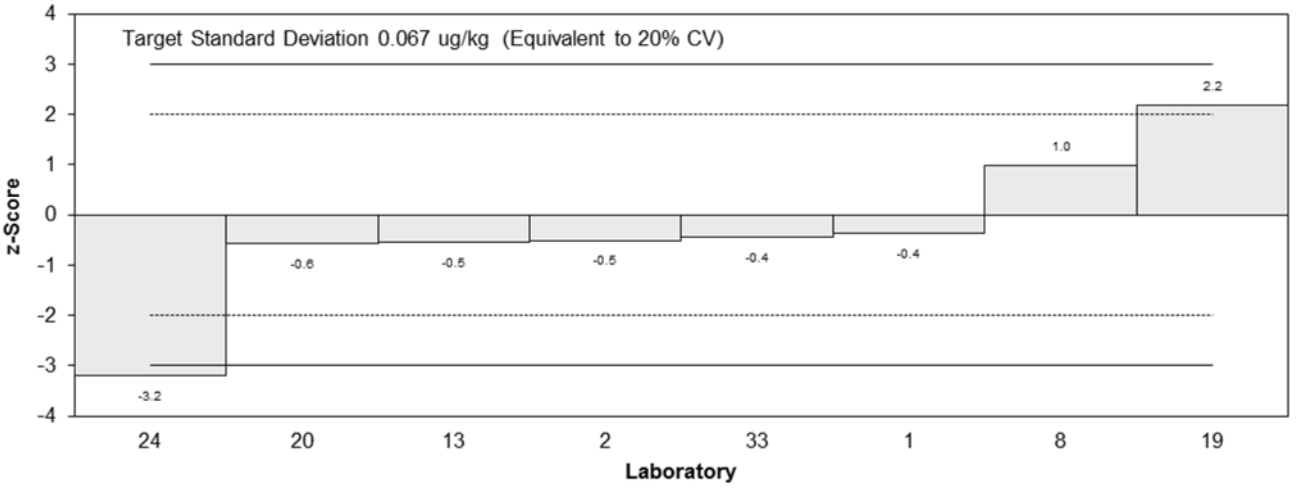
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.31	0.08	NR	-0.36	-0.24
2	0.3	0.1	NR	-0.51	-0.29
3	NT	NT	NT		
4	<5	9.13	64		
5	NT	NT	NT		
6	<1	0.15	119		
7	<0.5	NR	88		
8	0.4	0.03	85.1	0.99	0.98
9	NT	NT	NT		
10	<1	NR	NR		
11	<0.2	NR	86		
12	<0.5	NR	90		
13	0.298	0.0617	39	-0.54	-0.42
14	< 2.20	0.66	48		
15	NT	NT	NT		
16	<0.5	NR	39		
17	NT	NT	NT		
18	<0.5	0.13	89		
19	0.48	0.1	87.5	2.19	1.25
20	0.295	0.0884	93.9	-0.58	-0.37
21	< 1	0.3	NR		
22	NR	0	NR		
23	<1.0	NR	70		
24	0.12	0.04	19.77	-3.20	-2.97
25	NT	NT	NT		
26	<0.948	NR	48		
27	<1.0	NR	104		
29	< 1	NR	NR		
31	NT	NT	NT		
32	NT	NT	NT		
33	0.3043	0.0761	80.2	-0.44	-0.31

Statistics

Assigned Value*	0.33	0.06
Spike	Not Spiked	
Robust Average	0.32	0.08
Median	0.30	0.01
Mean	0.31	
N	8	
Max.	0.48	
Min.	0.12	
Robust SD	0.09	
Robust CV	28%	

* Assigned value is the robust average excluding laboratory 24.


Kernel Density
Density
Result
Results: S2 - PFNA
Assigned Value = 0.33 ± 0.06 ug/kg
Results (ug/kg)
Laboratory
24 20 13 2 33 1 8 19 21 29 14 11 12 16 18 7 26 10 6 23 27 4 22 15 17 25 3 31 32 5 9 Md R.A.


z-Scores: S2 - PFNA
Target Standard Deviation 0.067 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
24 20 13 2 33 1 8 19
-3.2
-0.6
-0.5
-0.5
-0.4
-0.4
1.0
2.2

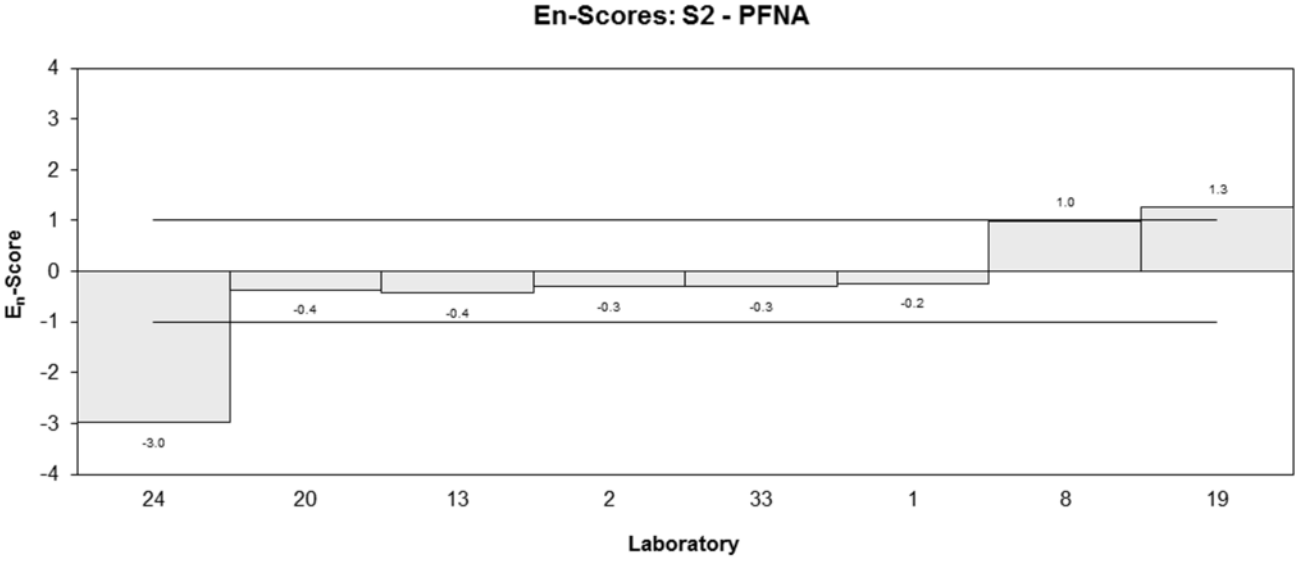

En-Scores: S2 - PFNA
En-Score
Laboratory
24 20 13 2 33 1 8 19
-3.0
-0.4
-0.4
-0.3
-0.3
-0.2
1.0
1.3

Figure 28

Table 37

Sample Details

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

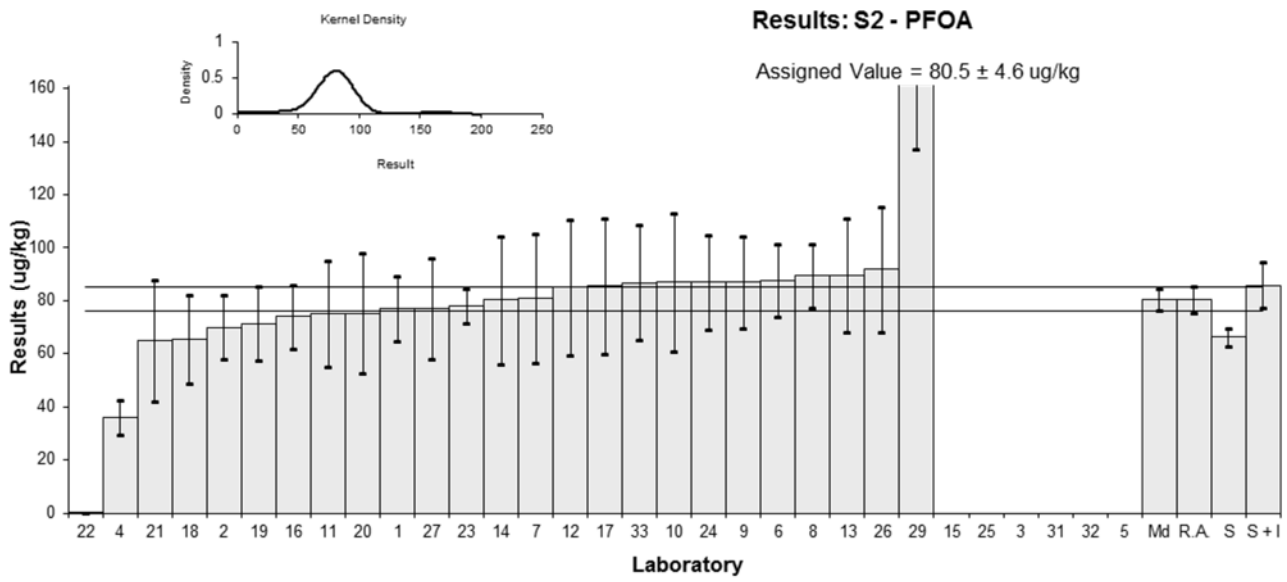
Participant Results

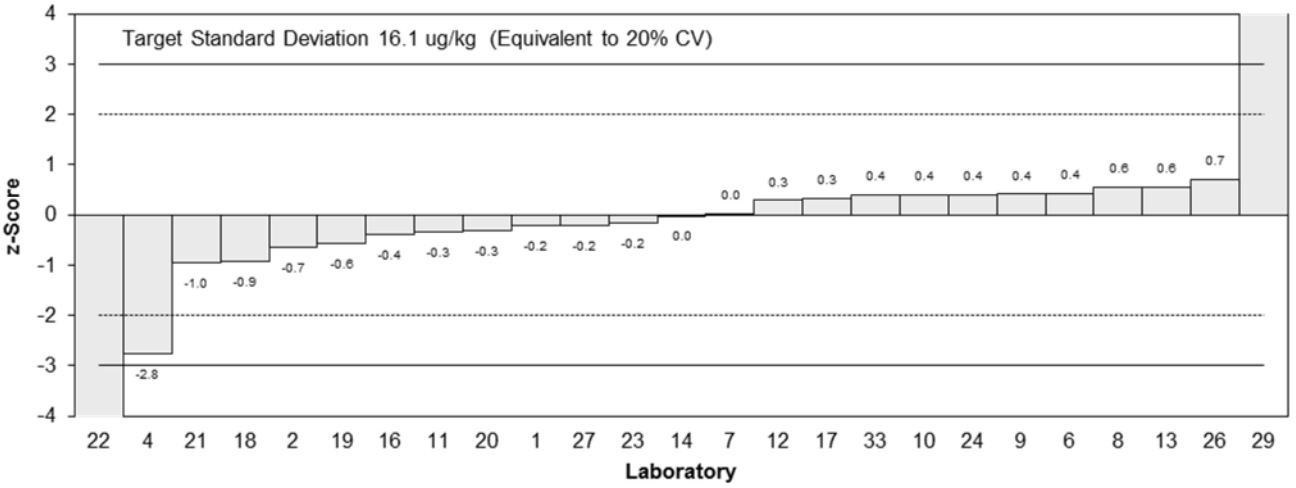
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	77.0	12.3	NR	-0.22	-0.27
2	70	12	NR	-0.65	-0.82
3	NT	NT	NT		
4	36	6.5	66	-2.76	-5.59
5	NT	NT	NT		
6	87.5	13.8	103	0.43	0.48
7	80.84	24.25	94	0.02	0.01
8	89.4	12.1	81.5	0.55	0.69
9	87.1	17.4	99.4	0.41	0.37
10	87.0	26.1	102	0.40	0.25
11	75	20	81	-0.34	-0.27
12	85.1	25.5	84	0.29	0.18
13	89.5	21.5	88	0.56	0.41
14	80.2	24.1	80	-0.02	-0.01
15	NT	NT	NT		
16	74	12	89	-0.40	-0.51
17	85.6	25.7	NR	0.32	0.20
18	65.4	16.6	89	-0.94	-0.88
19	71.3	14	106	-0.57	-0.62
20	75.2	22.6	96.2	-0.33	-0.23
21	65	23	99	-0.96	-0.66
22	0.197	0.051	NR	-4.99	-17.46
23	78	6.3	93	-0.16	-0.32
24	87.0	18	0.66	0.40	0.35
25	NT	NT	NT		
26	91.8	23.8	83	0.70	0.47
27	77	19	106	-0.22	-0.18
29	163	26	NR	5.12	3.12
31	NT	NT	NT		
32	NT	NT	NT		
33	86.8952	21.7238	84.6	0.40	0.29

Statistics

Assigned Value	80.5	4.6
Spike* **	66.3	3.3
Robust Average*	80.3	5.1
Median*	80.5	4.1
Mean*	81.9	
N	25	
Max.	163	
Min.	0.197	
Robust SD*	10.7	
Robust CV*	13%	

* Results from laboratory 22 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 4, 22 and 29.
***Incurred value of 19.6 µg/kg was not included.


Kernel Density
Density
Result
Results: S2 - PFOA
Assigned Value = 80.5 ± 4.6 ug/kg
Results (ug/kg)
Laboratory
22 4 21 18 2 19 16 11 20 1 27 23 14 7 12 17 33 10 24 9 6 8 13 26 29 15 25 3 31 32 5 Md R.A. S S+I


z-Scores: S2 - PFOA
Target Standard Deviation 16.1 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 4 21 18 2 19 16 11 20 1 27 23 14 7 12 17 33 10 24 9 6 8 13 26 29

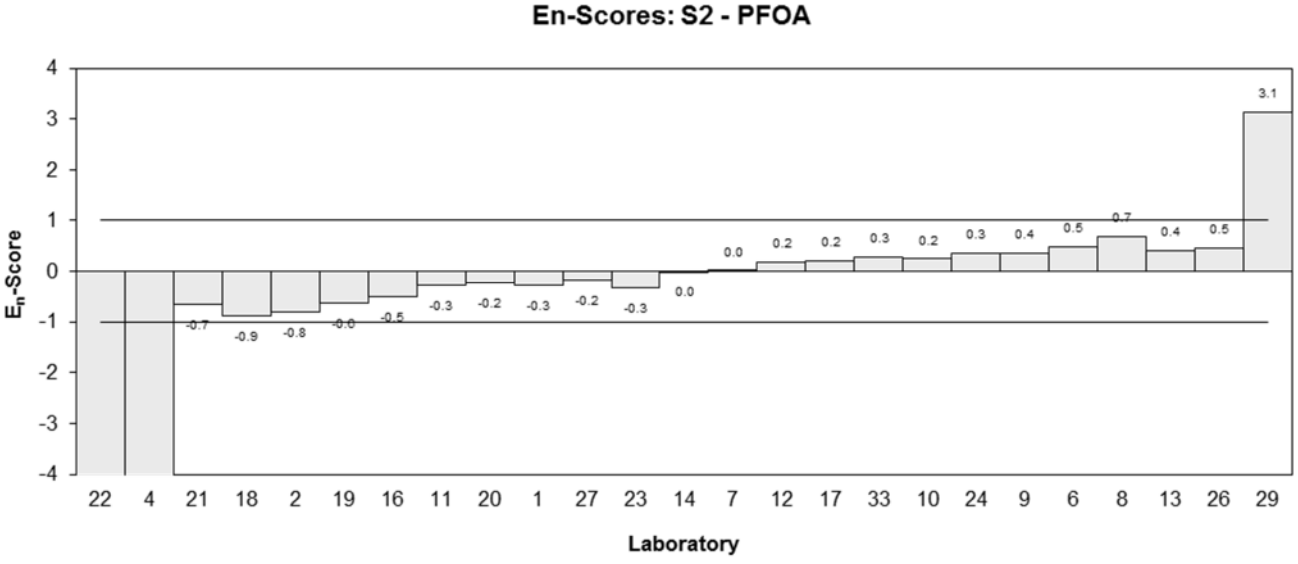

En-Scores: S2 - PFOA
En-Score
Laboratory
22 4 21 18 2 19 16 11 20 1 27 23 14 7 12 17 33 10 24 9 6 8 13 26 29

Figure 29

Table 38

Sample Details

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

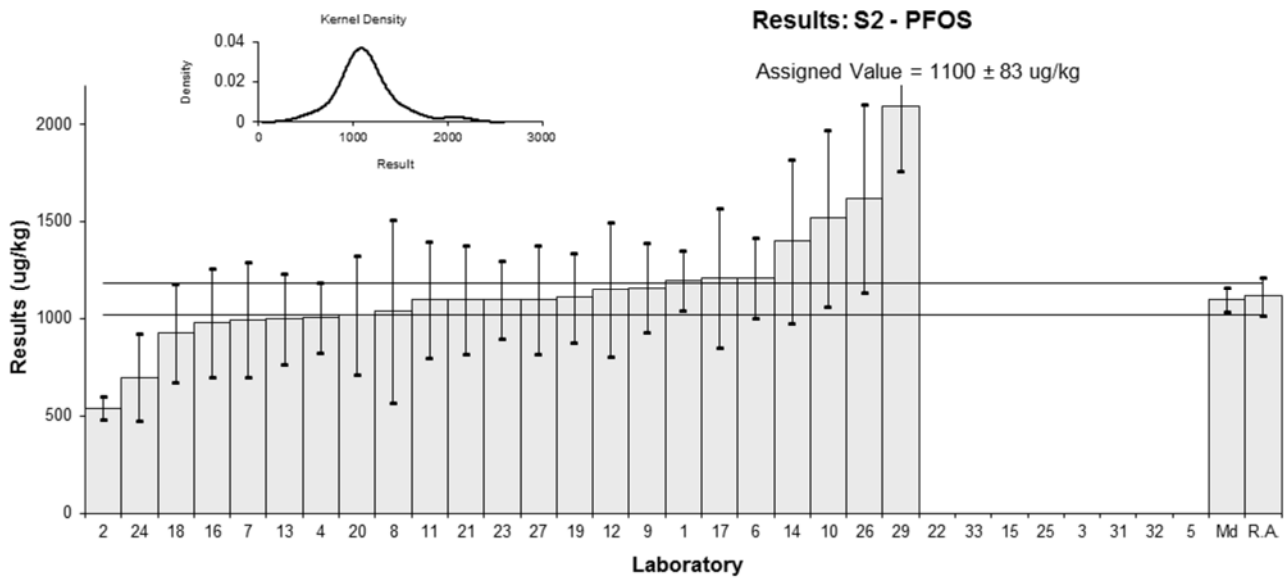
Participant Results

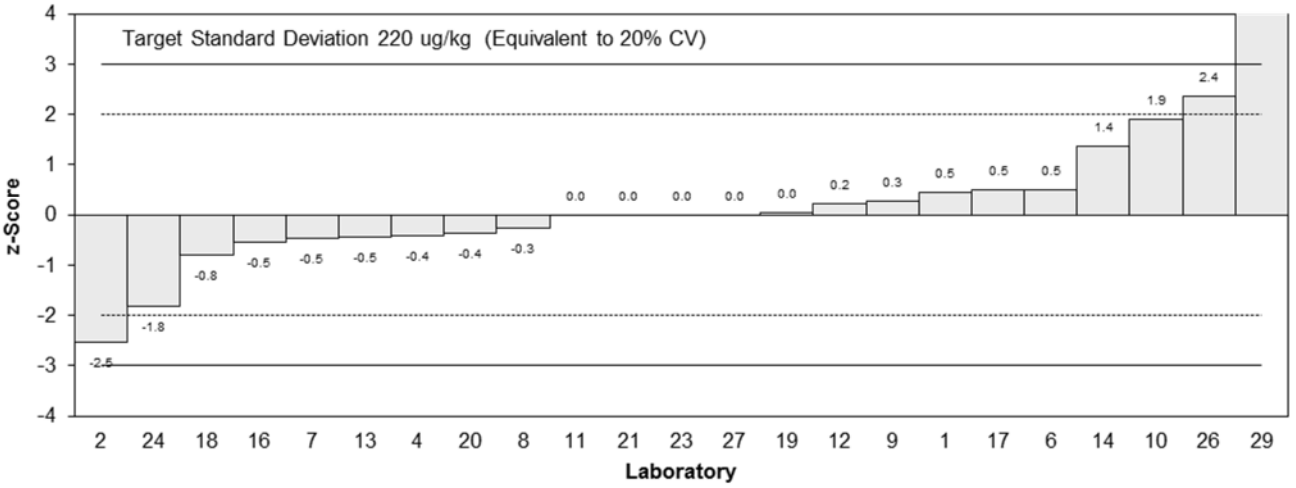
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	1199	156	NR	0.45	0.56
2	540	60	NR	-2.55	-5.47
3	NT	NT	NT		
4	1006	184.0	65	-0.43	-0.47
5	NT	NT	NT		
6	1210	210	58	0.50	0.49
7	995.49	298.65	93	-0.48	-0.34
8	1040	474	85.5	-0.27	-0.12
9	1160	232	96.2	0.27	0.24
10	1520	455	97	1.91	0.91
11	1100	300	83	0.00	0.00
12	1150	345	90	0.23	0.14
13	1000	237	83	-0.45	-0.40
14	1400	420	47	1.36	0.70
15	NT	NT	NT		
16	980	280	87	-0.55	-0.41
17	1210	360	NR	0.50	0.30
18	926	253.88	82	-0.79	-0.65
19	1110	230	75.5	0.05	0.04
20	1020	306	82.9	-0.36	-0.25
21	1100	280	98	0.00	0.00
22	2.455	1.252	NR		
23	1100	200	70	0.00	0.00
24	699	224	NR	-1.82	-1.68
25	NT	NT	NT		
26	1620	482	51	2.36	1.06
27	1100	280	104	0.00	0.00
29	2092	330	NR	4.51	2.92
31	NT	NT	NT		
32	NT	NT	NT		
33	NR	NR	87.5		

Statistics

Assigned Value**	1100	83
Spike	Not Spiked	
Robust Average*	1116	101
Median*	1100	64
Mean*	1143	
N	23	
Max.	2092	
Min.	2.455	
Robust SD*	193	
Robust CV*	17%	

* Results from laboratory 22 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 22 and 29.


Results: S2 - PFOS
Assigned Value = 1100 ± 83 ug/kg
Kernel Density
Density
Result
Results (ug/kg)
Laboratory
2 24 18 16 7 13 4 20 8 11 21 23 27 19 12 9 1 17 6 14 10 26 29 22 33 15 25 3 31 32 5 Md R.A.


z-Scores: S2 - PFOS
Target Standard Deviation 220 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
2 24 18 16 7 13 4 20 8 11 21 23 27 19 12 9 1 17 6 14 10 26 29

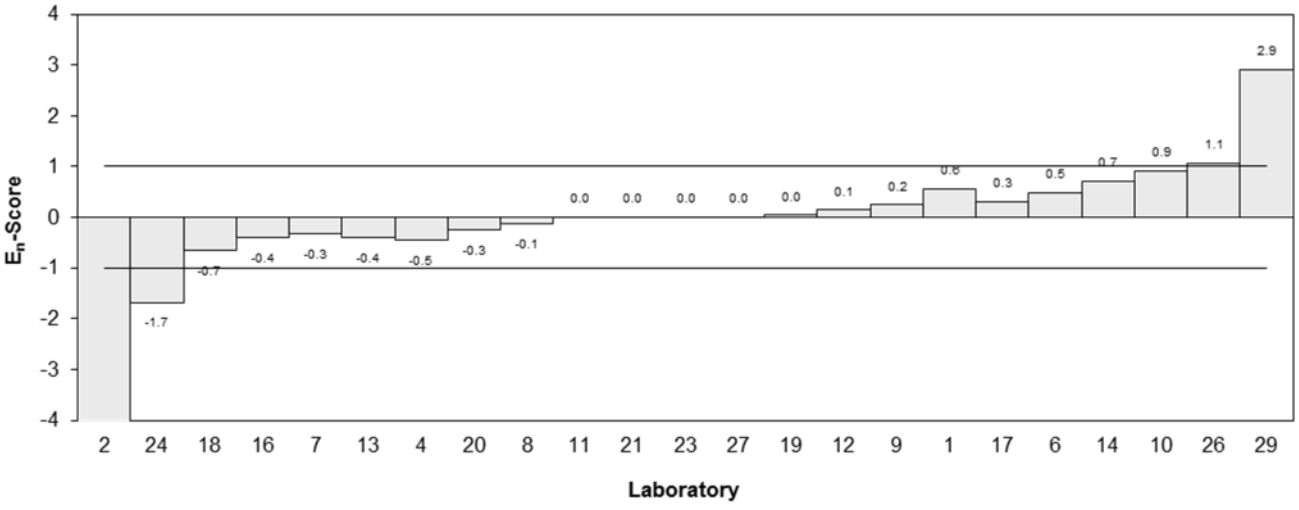

En-Scores: S2 - PFOS
En-Score
Laboratory
2 24 18 16 7 13 4 20 8 11 21 23 27 19 12 9 1 17 6 14 10 26 29

Figure 30

Table 39

Sample Details

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

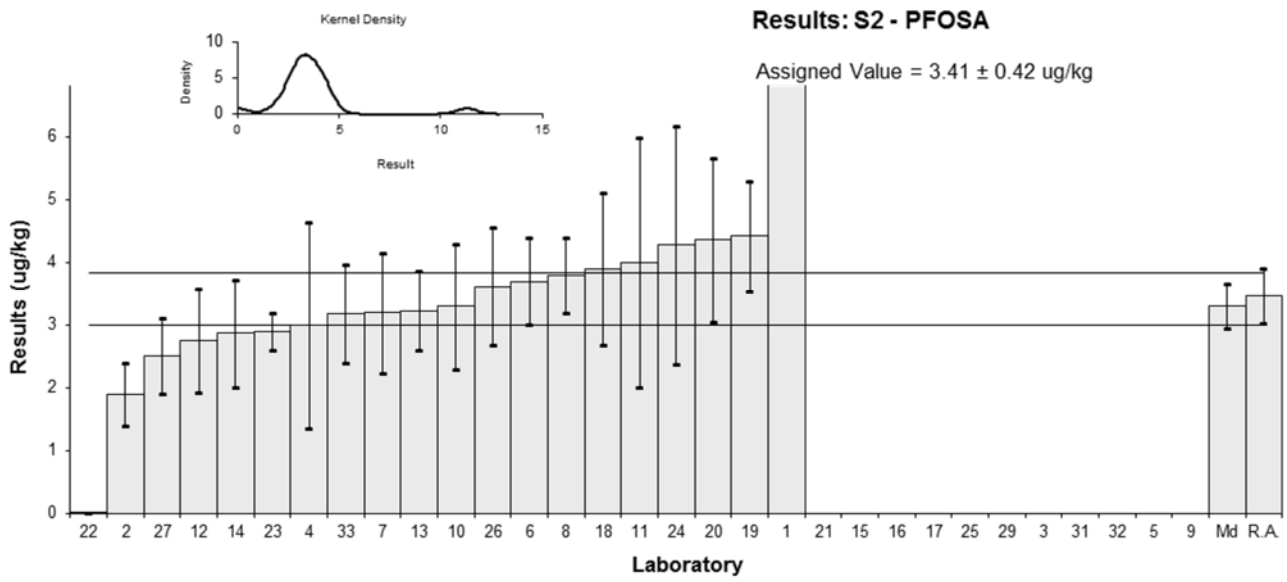
Participant Results

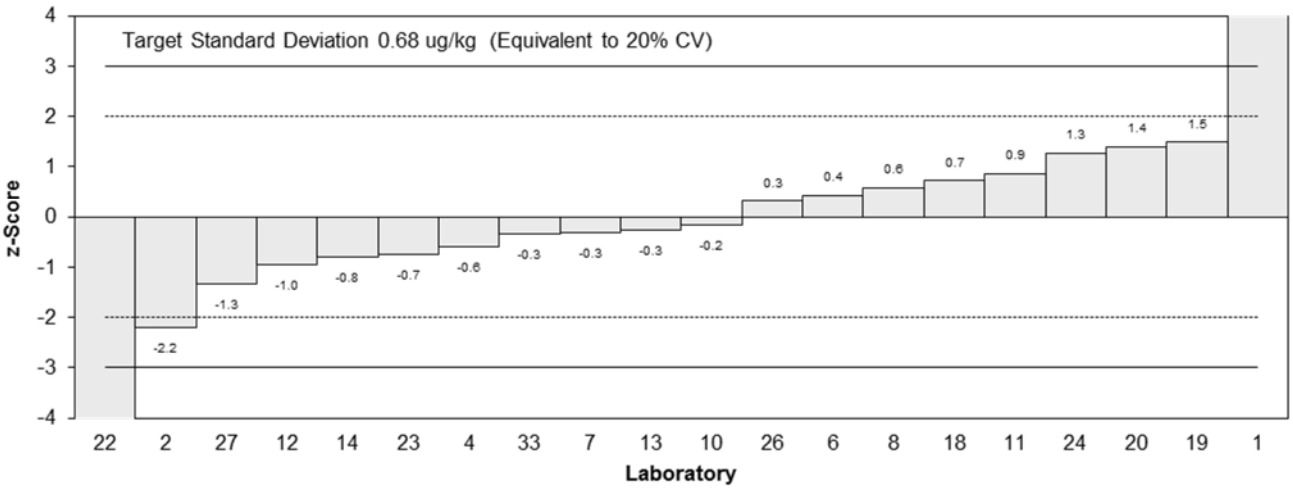
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	11.3	2.15	NR	11.57	3.60
2	1.9	0.5	NR	-2.21	-2.31
3	NT	NT	NT		
4	3	1.65	69	-0.60	-0.24
5	NT	NT	NT		
6	3.7	0.7	91	0.43	0.36
7	3.20	0.96	80	-0.31	-0.20
8	3.8	0.6	100.4	0.57	0.53
9	NT	NT	NT		
10	3.3	1.0	NR	-0.16	-0.10
11	4	2	81	0.87	0.29
12	2.76	0.829	81	-0.95	-0.70
13	3.23	0.64	90	-0.26	-0.24
14	2.87	0.86	54	-0.79	-0.56
15	NT	NT	NT		
16	NT	NT	NT		
17	NT	NT	NT		
18	3.9	1.21	113	0.72	0.38
19	4.42	0.88	NR	1.48	1.04
20	4.36	1.31	87.6	1.39	0.69
21	< 9	3.0	NR		
22	0.007	0.001	NR	-4.99	-8.10
23	2.9	0.3	99	-0.75	-0.99
24	4.28	1.9	4.58	1.28	0.45
25	NT	NT	NT		
26	3.62	0.938	85	0.31	0.20
27	2.5	0.6	104	-1.33	-1.24
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	3.1801	0.7950	56.6	-0.34	-0.26

Statistics

Assigned Value**	3.41	0.42
Spike	Not Spiked	
Robust Average*	3.47	0.44
Median*	3.30	0.36
Mean*	3.80	
N	20	
Max.	11.3	
Min.	0.007	
Robust SD*	0.77	
Robust CV*	22%	

* Results from laboratory 22 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 1 and 22.


Kernel Density
Density
Result
Results: S2 - PFOSA
Assigned Value = 3.41 ± 0.42 ug/kg
Results (ug/kg)
22 2 27 12 14 23 4 33 7 13 10 26 6 8 18 11 24 20 19 1 21 15 16 17 25 29 3 31 32 5 9 Md R.A.
Laboratory


z-Scores: S2 - PFOSA
Target Standard Deviation 0.68 ug/kg (Equivalent to 20% CV)
z-Score
22 2 27 12 14 23 4 33 7 13 10 26 6 8 18 11 24 20 19 1
Laboratory

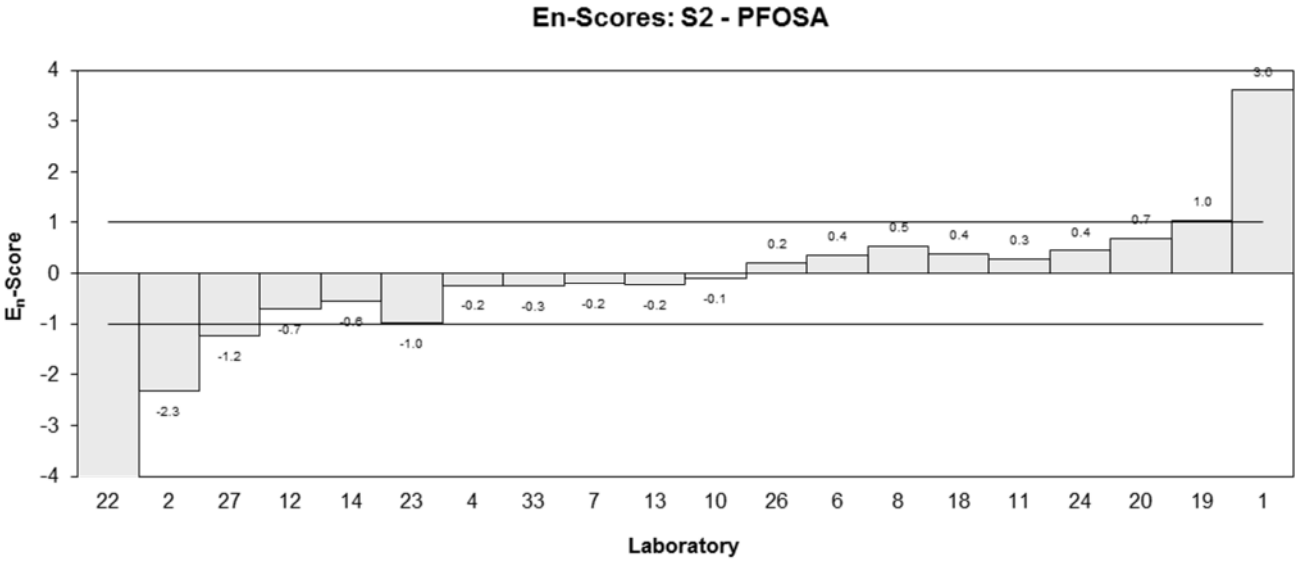

En-Scores: S2 - PFOSA
En-Score
22 2 27 12 14 23 4 33 7 13 10 26 6 8 18 11 24 20 19 1
Laboratory

Figure 31

Table 40

Sample Details

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

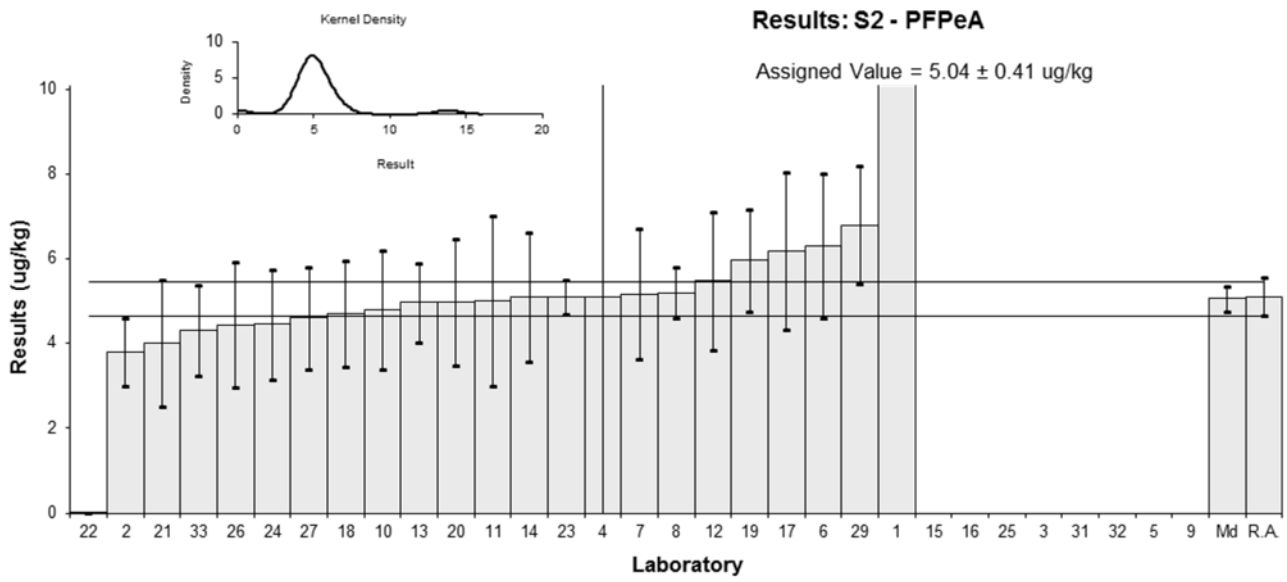
Participant Results

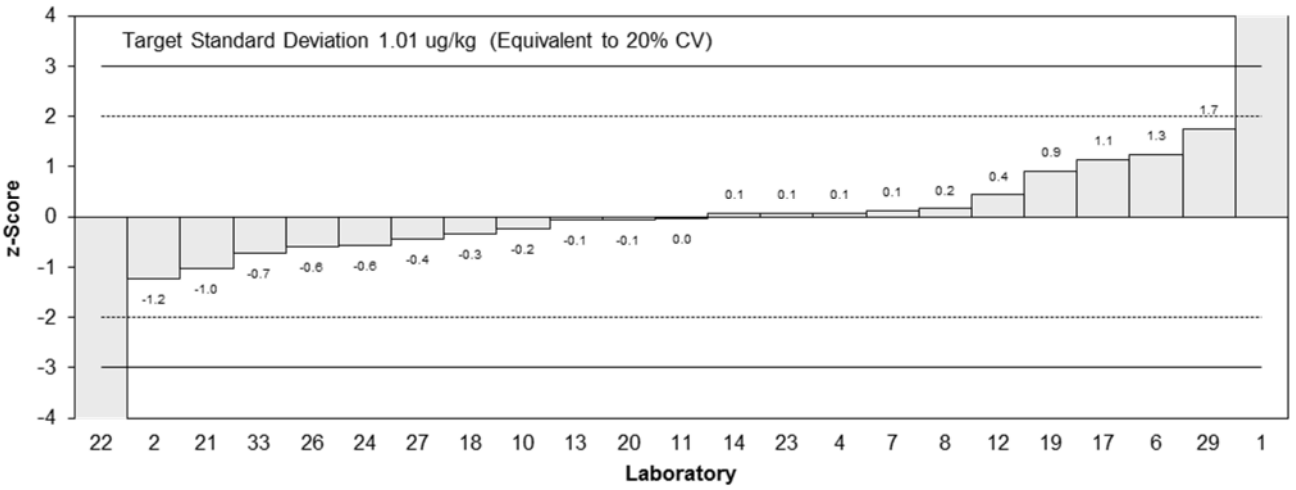
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	13.8	2.6	NR	8.69	3.33
2	3.8	0.8	NR	-1.23	-1.38
3	NT	NT	NT		
4	5.1	5.31	72	0.06	0.01
5	NT	NT	NT		
6	6.3	1.7	100	1.25	0.72
7	5.17	1.55	66	0.13	0.08
8	5.2	0.6	96.5	0.16	0.22
9	NT	NT	NT		
10	4.8	1.4	NR	-0.24	-0.16
11	5.0	2	110	-0.04	-0.02
12	5.48	1.64	114	0.44	0.26
13	4.97	0.939	105	-0.07	-0.07
14	5.1	1.53	78	0.06	0.04
15	NT	NT	NT		
16	NT	NT	NT		
17	6.19	1.86	NR	1.14	0.60
18	4.7	1.26	93	-0.34	-0.26
19	5.96	1.2	NR	0.91	0.73
20	4.98	1.49	105	-0.06	-0.04
21	4	1.5	103	-1.03	-0.67
22	0.008	0.002	NR	-4.99	-12.27
23	5.1	0.4	94	0.06	0.10
24	4.46	1.3	6.21	-0.58	-0.43
25	NT	NT	NT		
26	4.44	1.48	99	-0.60	-0.39
27	4.6	1.2	108	-0.44	-0.35
29	6.8	1.4	NR	1.75	1.21
31	NT	NT	NT		
32	NT	NT	NT		
33	4.3110	1.0778	93.4	-0.72	-0.63

Statistics

Assigned Value	5.04	0.41
Spike	Not Spiked	
Robust Average	5.11	0.45
Median	5.05	0.29
Mean	5.47	
N	23	
Max.	13.8	
Min.	0.008	
Robust SD	0.84	
Robust CV	16%	

* Results from laboratory 22 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 1 and 22.


Kernel Density
Density
Result
Results: S2 - PFPeA
Assigned Value = 5.04 ± 0.41 ug/kg
Results (ug/kg)
Laboratory
22 2 21 33 26 24 27 18 10 13 20 11 14 23 4 7 8 12 19 17 6 29 1 15 16 25 3 31 32 5 9 Md R.A.


z-Scores: S2 - PFPeA
Target Standard Deviation 1.01 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 2 21 33 26 24 27 18 10 13 20 11 14 23 4 7 8 12 19 17 6 29 1
-1.2 -1.0 -0.7 -0.6 -0.6 -0.4 -0.3 -0.2 -0.1 -0.1 0.0 0.1 0.1 0.1 0.1 0.2 0.4 0.9 1.1 1.3 1.7

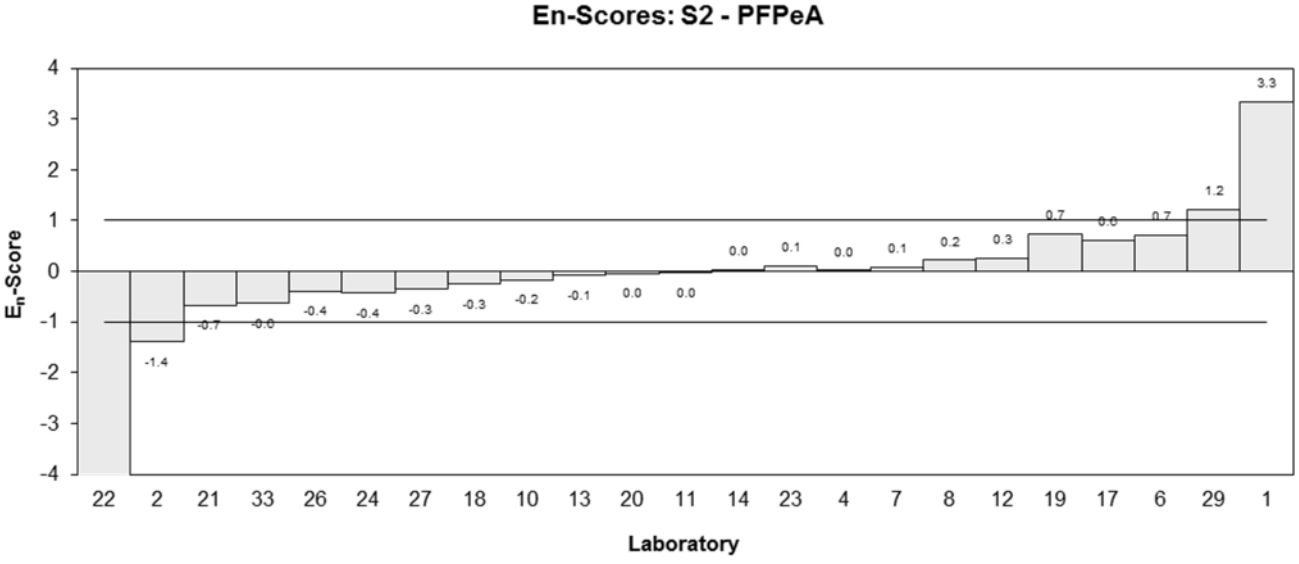

En-Scores: S2 - PFPeA
En-Score
Laboratory
22 2 21 33 26 24 27 18 10 13 20 11 14 23 4 7 8 12 19 17 6 29 1
-1.4 -0.7 -0.6 -0.4 -0.4 -0.3 -0.3 -0.2 -0.1 0.0 0.0 0.0 0.1 0.0 0.1 0.2 0.3 0.7 0.6 0.7 1.2 3.3

Figure 32

Table 41

Sample Details

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

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	<0.1	NR	NR
2	<0.2	NR	NR
3	NT	NT	NT
4	<5	3.03	19
5	NT	NT	NT
6	<1	0.2	113
7	<0.5	NR	74
8	<0.5	0.08	108.9
9	NT	NT	NT
10	<1	NR	NR
11	<5	NR	90
12	<0.5	NR	75
13	NT	NT	NT
14	< 2.20	0.66	94
15	NT	NT	NT
16	NT	NT	NT
17	NT	NT	NT
18	<0.5	0.16	71
19	<1	NR	NR
20	< 0.0792	NR	26.1
21	< 9	0	NR
22	NR	0	NR
23	NR	NR	NR
24	<0.50	NR	60.99
25	NT	NT	NT
26	<0.948	NR	92
27	<2.0	NR	126
29	NT	NT	NT
31	NT	NT	NT
32	NT	NT	NT
33	NR	NR	86.8

Statistics

Assigned Value	Not Set	
Spike	Not Spiked	

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Table 42

Sample Details

Sample No.	S3
Matrix.	water
Analyte.	EtFOSE
Units	µg/L

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	<0.02	NR	NR
2	0.011	0.005	NR
3	NT	NT	NT
4	<0.01	0.0059	79
5	NT	NT	NT
6	<0.05	0.01	42
7	0.025	0.008	76
8	<0.05	0.001	111.3
9	NT	NT	NT
10	NT	NT	NT
11	<0.5	NR	91
12	0.0190	0.010	54
13	NT	NT	NT
14	NT	NT	NT
15	NT	NT	NT
16	NT	NT	NT
17	NT	NT	NT
18	<0.005	0.002	115
19	NT	NT	NT
20	< 0.04	NR	51.3
21	< 0.07	0.02	NR
22	0.011	0.001	NR
23	0.0060	0.002	101
24	0.0056	0.0021	40.31
25	NT	NT	NT
26	0.0209	0.00429	68
27	<0.05	NR	84
29	NT	NT	NT
31	<0.05	0.01	99
32	NT	NT	NT
33	NR	NR	61

Statistics

Assigned Value	Not Set	
Spike	0.029	0.001
Robust Average	0.014	0.009
Median	0.011	0.007
Mean	0.014	
N	7	
Max.	0.025	
Min.	0.0056	
Robust SD	0.010	
Robust CV	57%	

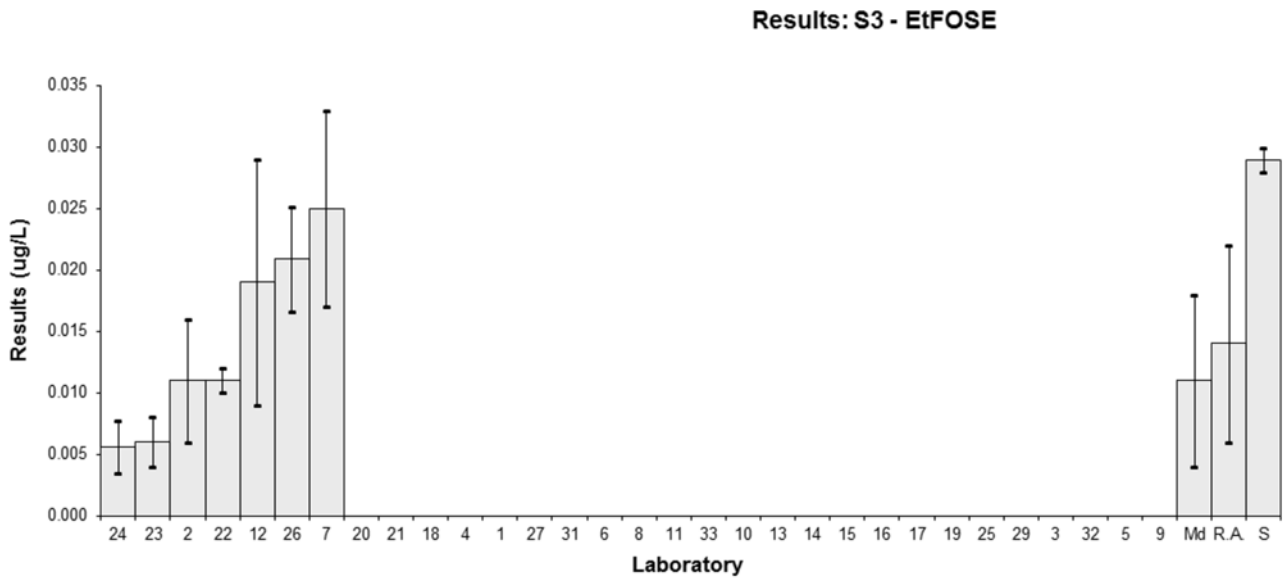

Results: S3 - EtFOSE
Results (ug/L)
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
24 23 2 22 12 26 7 20 21 18 4 1 27 31 6 8 11 33 10 13 14 15 16 17 19 25 29 3 32 5 9 Md R.A. S
Laboratory

Figure 33

Table 43

Sample Details

Sample No.	S3
Matrix.	water
Analyte.	6:2 FTS
Units	µg/L

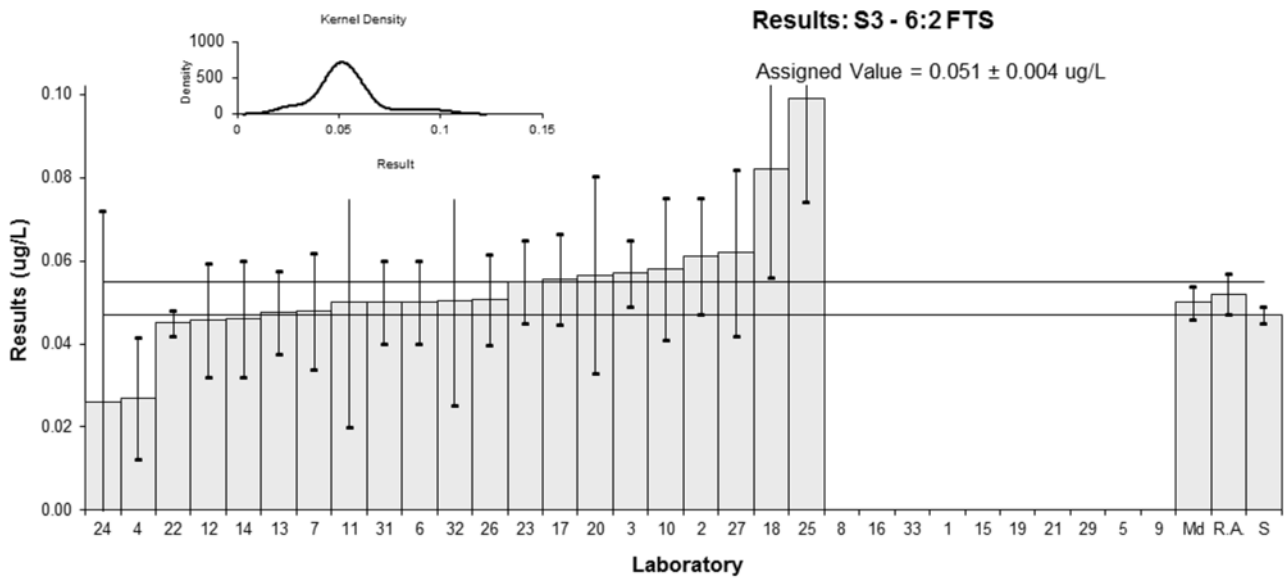
Participant Results

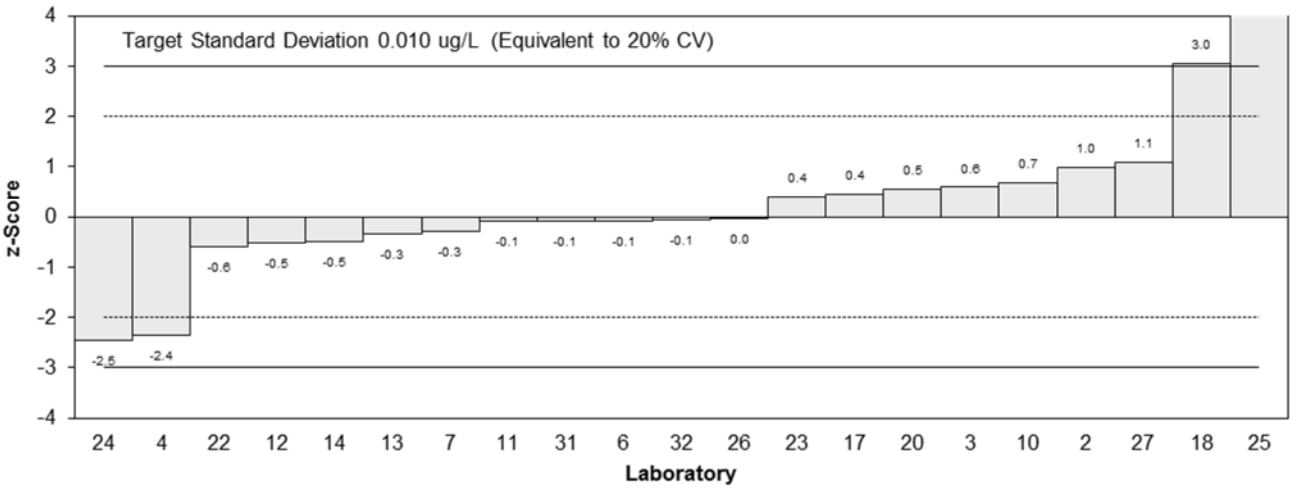
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	0.061	0.014	NR	0.98	0.69
3	0.057	0.008	NR	0.59	0.67
4	0.027	0.0146	94	-2.35	-1.59
5	NT	NT	NT		
6	0.05	0.01	62	-0.10	-0.09
7	0.048	0.014	88	-0.29	-0.21
8	<0.05	0.02	82.7		
9	NT	NT	NT		
10	0.058	0.017	NR	0.69	0.40
11	0.05	0.03	95	-0.10	-0.03
12	0.0456	0.0137	93	-0.53	-0.38
13	0.0475	0.0101	95	-0.34	-0.32
14	0.046	0.014	60	-0.49	-0.34
15	NT	NT	NT		
16	<0.3	NR	142		
17	0.0555	0.011	NR	0.44	0.38
18	0.082	0.026	101	3.04	1.18
19	NT	NT	NT		
20	0.0566	0.0238	118	0.55	0.23
21	NT	NT	NT		
22	0.045	0.003	NR	-0.59	-1.20
23	0.055	0.01	79	0.39	0.37
24	0.026	0.046	90.75	-2.45	-0.54
25	0.099	0.0248	46	4.71	1.91
26	0.0506	0.0108	55	-0.04	-0.03
27	0.062	0.02	76	1.08	0.54
29	NT	NT	NT		
31	0.05	0.01	98	-0.10	-0.09
32	0.0503	0.02515	87	-0.07	-0.03
33	NR	NR	76.2		

Statistics

Assigned Value*	0.051	0.004
Spike	0.047	0.002
Robust Average	0.052	0.005
Median	0.050	0.004
Mean	0.053	
N	21	
Max.	0.099	
Min.	0.026	
Robust SD	0.010	
Robust CV	17%	

* Assigned value is the robust average excluding laboratories 18 and 25.


Kernel Density
Density
Result
Results: S3 - 6:2 FTS
Assigned Value = 0.051 ± 0.004 ug/L
Results (ug/L)
Laboratory
24 4 22 12 14 13 7 11 31 6 32 26 23 17 20 3 10 2 27 18 25 8 16 33 1 15 19 21 29 5 9 Md R.A. S


z-Scores: S3 - 6:2 FTS
Target Standard Deviation 0.010 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
24 4 22 12 14 13 7 11 31 6 32 26 23 17 20 3 10 2 27 18 25

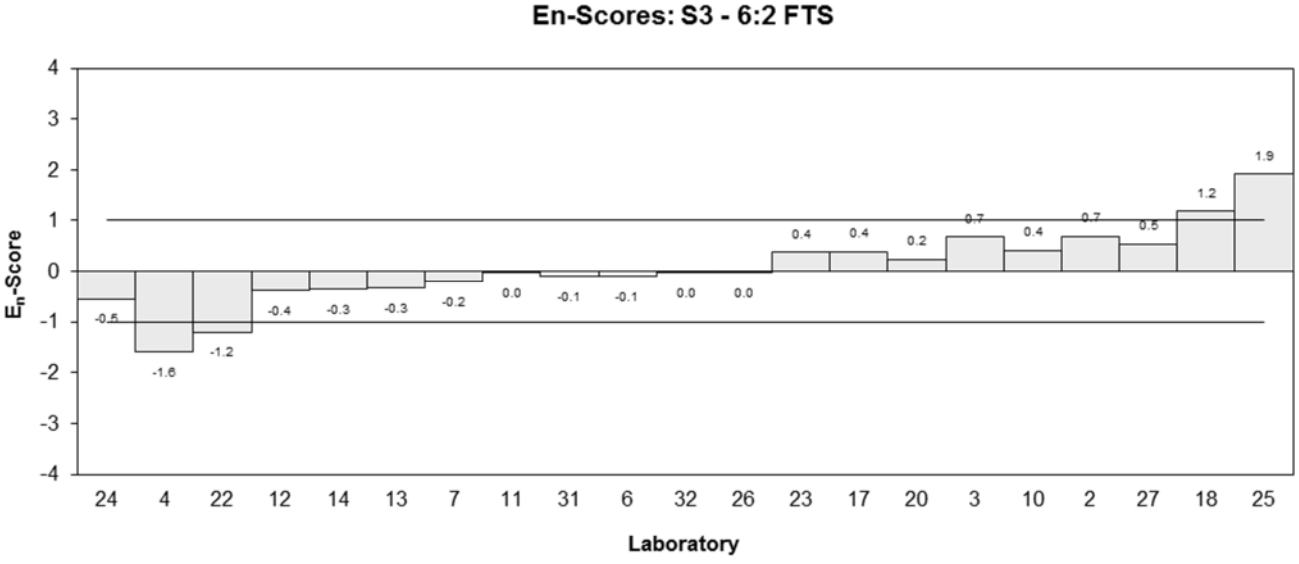

En-Scores: S3 - 6:2 FTS
En-Score
Laboratory
24 4 22 12 14 13 7 11 31 6 32 26 23 17 20 3 10 2 27 18 25

Figure 34

Table 44

Sample Details

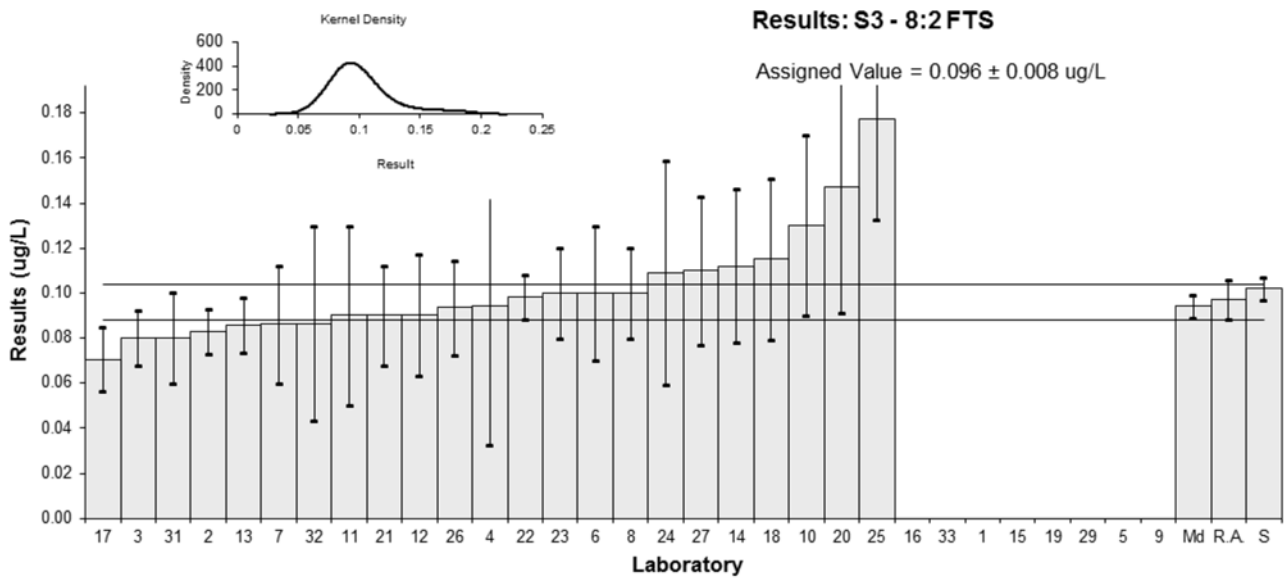
Sample No.	S3
Matrix.	water
Analyte.	8:2 FTS
Units	µg/L

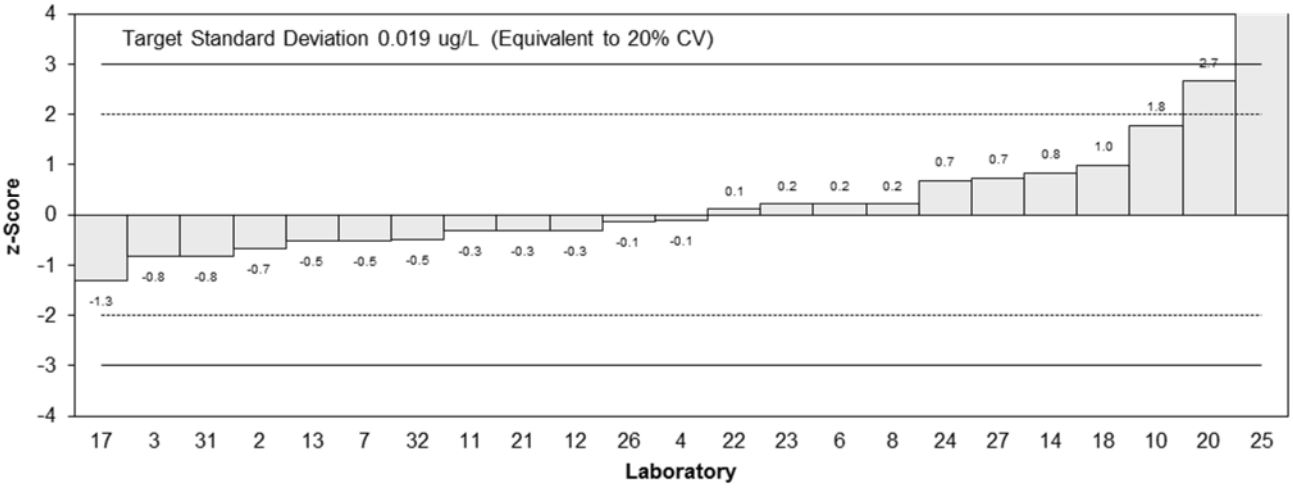
Participant Results

Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	0.083	0.010	NR	-0.68	-1.02
3	0.080	0.012	NR	-0.83	-1.11
4	0.094	0.0612	93	-0.10	-0.03
5	NT	NT	NT		
6	0.10	0.03	68	0.21	0.13
7	0.086	0.026	66	-0.52	-0.37
8	0.10	0.02	102.1	0.21	0.19
9	NT	NT	NT		
10	0.13	0.04	NR	1.77	0.83
11	0.09	0.04	92	-0.31	-0.15
12	0.0901	0.0270	76	-0.31	-0.21
13	0.0858	0.0124	101	-0.53	-0.69
14	0.112	0.034	86	0.83	0.46
15	NT	NT	NT		
16	<0.4	NR	124		
17	0.0706	0.014	NR	-1.32	-1.58
18	0.115	0.036	115	0.99	0.52
19	NT	NT	NT		
20	0.147	0.0557	111	2.66	0.91
21	0.090	0.022	NR	-0.31	-0.26
22	0.098	0.010	NR	0.10	0.16
23	0.10	0.02	193	0.21	0.19
24	0.109	0.05	27.5	0.68	0.26
25	0.177	0.0443	46	4.22	1.80
26	0.0935	0.0212	64	-0.13	-0.11
27	0.11	0.033	78	0.73	0.41
29	NT	NT	NT		
31	0.08	0.02	103	-0.83	-0.74
32	0.0864	0.0432	82	-0.50	-0.22
33	NR	NR	122.1		

Statistics

Assigned Value	0.096	0.008
Spike	0.102	0.005
Robust Average	0.097	0.009
Median	0.094	0.005
Mean	0.101	
N	23	
Max.	0.177	
Min.	0.0706	
Robust SD	0.017	
Robust CV	17%	


Kernel Density
Density
Result
Results: S3 - 8:2 FTS
Assigned Value = 0.096 ± 0.008 ug/L
Results (ug/L)
Laboratory
17 3 31 2 13 7 32 11 21 12 26 4 22 23 6 8 24 27 14 18 10 20 25 16 33 1 15 19 29 5 9 Md R.A. S


z-Scores: S3 - 8:2 FTS
Target Standard Deviation 0.019 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
17 3 31 2 13 7 32 11 21 12 26 4 22 23 6 8 24 27 14 18 10 20 25

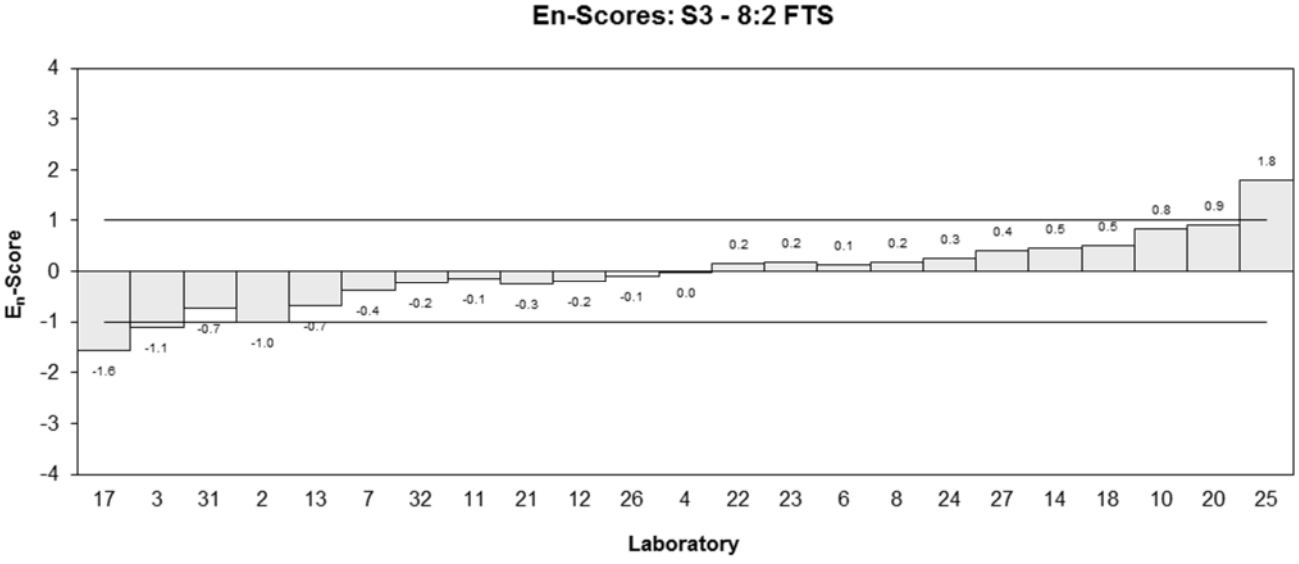

En-Scores: S3 - 8:2 FTS
En-Score
Laboratory
17 3 31 2 13 7 32 11 21 12 26 4 22 23 6 8 24 27 14 18 10 20 25

Figure 35

Table 45

Sample Details

Sample No.	S3
Matrix.	water
Analyte.	MeFOSA
Units	µg/L

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	<0.03	NR	NR
2	0.018	0.008	NR
3	NT	NT	NT
4	<0.008	0.0037	80
5	NT	NT	NT
6	<0.05	0.01	91
7	0.018	0.006	92
8	<0.05	0.005	88.1
9	NT	NT	NT
10	0.013	0.008	NR
11	<0.05	NR	85
12	0.0137	0.010	64
13	NT	NT	NT
14	NT	NT	NT
15	NT	NT	NT
16	NT	NT	NT
17	NT	NT	NT
18	<0.005	0.002	105
19	NT	NT	NT
20	0.0126	0.00403	52.3
21	< 0.05	0.02	NR
22	0.005	0.002	NR
23	<0.005	NR	107
24	<0.005	NR	17.24
25	NT	NT	NT
26	<0.0198	NR	68
27	0.022	0.006	100
29	NT	NT	NT
31	<0.05	0.01	106
32	NT	NT	NT
33	NR	NR	34.2

Statistics

Assigned Value	Not Set	
Spike	0.030	0.002
Robust Average	0.015	0.006
Median	0.014	0.006
Mean	0.015	
N	7	
Max.	0.022	
Min.	0.005	
Robust SD	0.010	
Robust CV	39%	

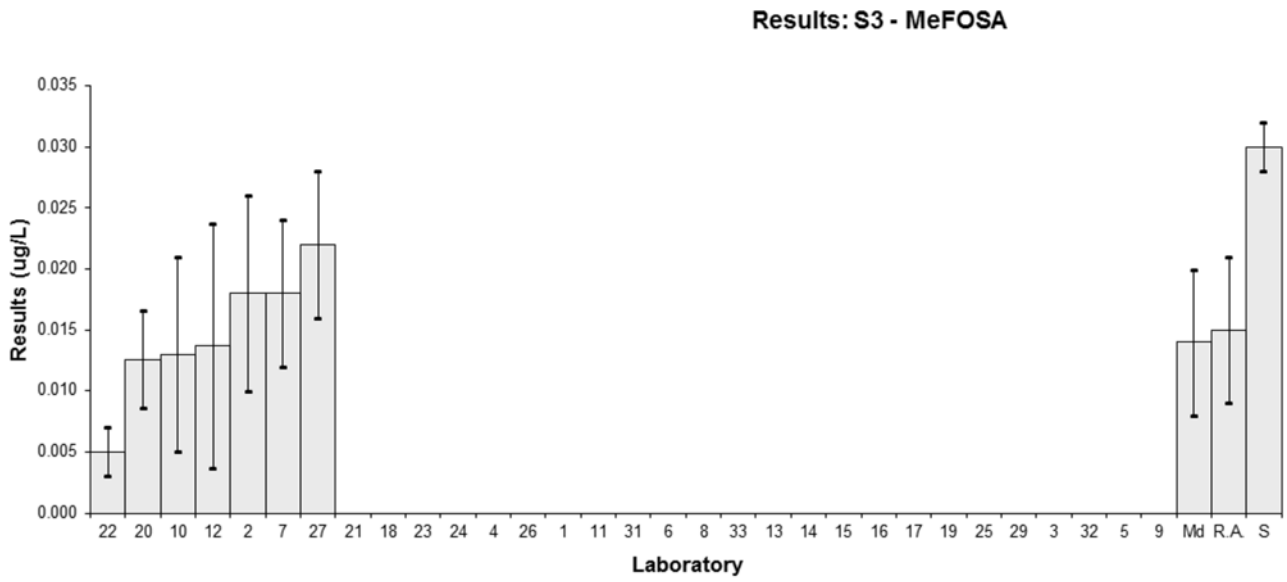

Results: S3 - MeFOSA
Results (ug/L)
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
22 20 10 12 2 7 27 21 18 23 24 4 26 1 11 31 6 8 33 13 14 15 16 17 19 25 29 3 32 5 9 Md R.A. S
Laboratory

Figure 36

Table 46

Sample Details

Sample No.	S3
Matrix.	water
Analyte.	PFBA
Units	µg/L

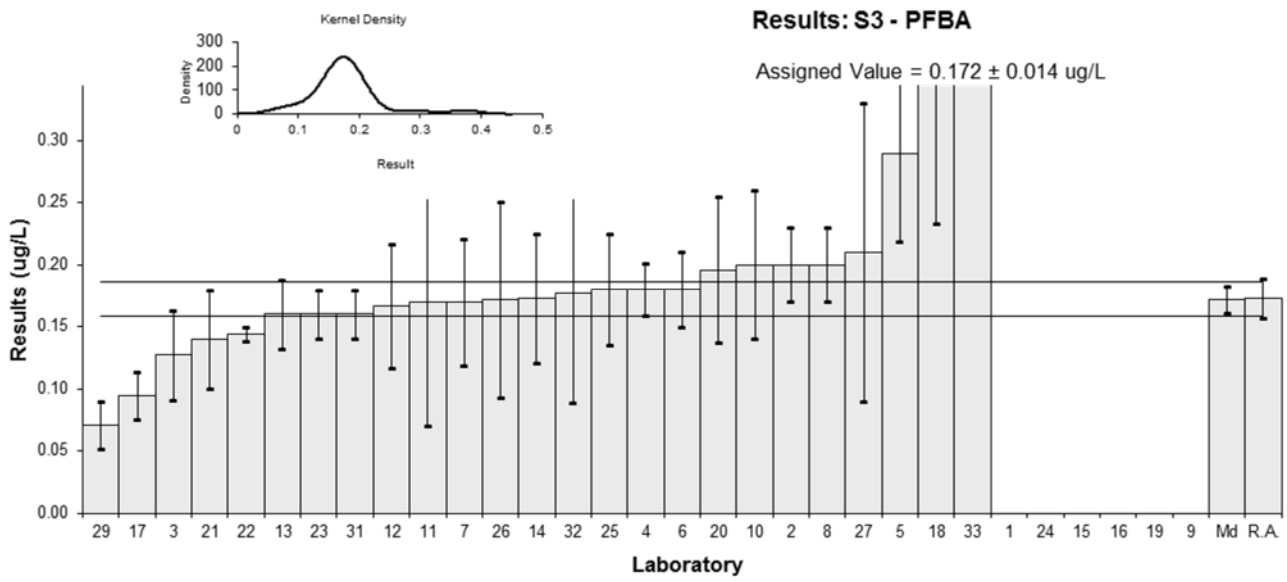
Participant Results

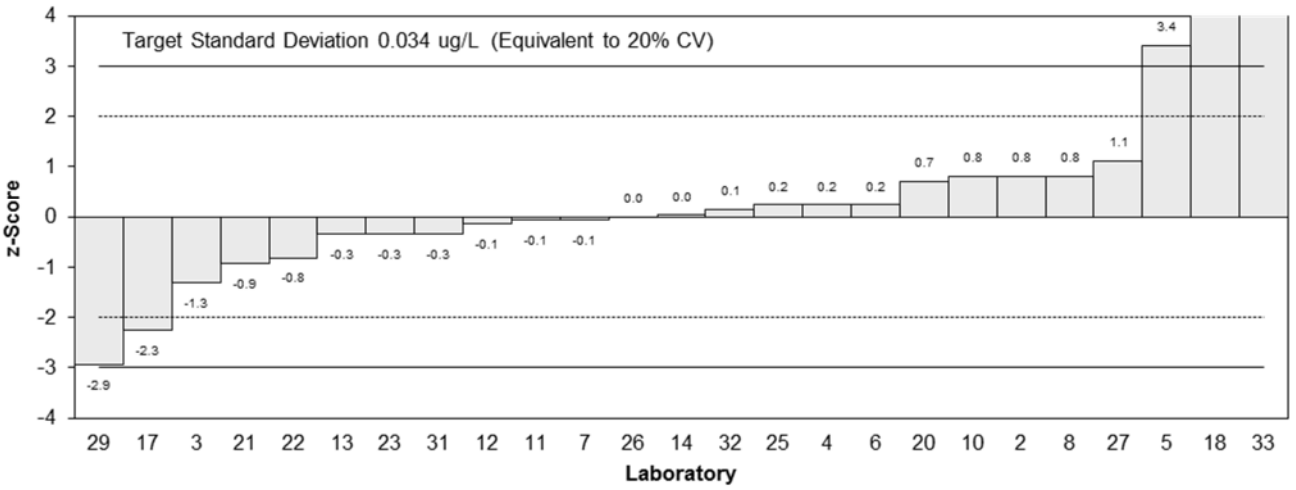
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	<0.05	NR	NR		
2	0.20	0.03	NR	0.81	0.85
3	0.127	0.036	80.96	-1.31	-1.17
4	0.18	0.0215	90	0.23	0.31
5	0.289	0.070	62.8	3.40	1.64
6	0.18	0.03	79	0.23	0.24
7	0.170	0.051	90	-0.06	-0.04
8	0.2	0.03	94.8	0.81	0.85
9	NT	NT	NT		
10	0.20	0.06	NR	0.81	0.45
11	0.17	0.1	114	-0.06	-0.02
12	0.167	0.0501	88	-0.15	-0.10
13	0.160	0.0278	130	-0.35	-0.39
14	0.173	0.052	78	0.03	0.02
15	NT	NT	NT		
16	NT	NT	NT		
17	0.0945	0.019	NR	-2.25	-3.28
18	0.373	0.140	104	5.84	1.43
19	NT	NT	NT		
20	0.196	0.0587	101	0.70	0.40
21	0.14	0.04	118	-0.93	-0.76
22	0.144	0.006	NR	-0.81	-1.84
23	0.16	0.02	100	-0.35	-0.49
24	<2.0	NR	110.49		
25	0.18	0.0450	91	0.23	0.17
26	0.172	0.0792	67	0.00	0.00
27	0.21	0.12	106	1.10	0.31
29	0.071	0.019	NR	-2.94	-4.28
31	0.16	0.02	98	-0.35	-0.49
32	0.177	0.0885	82	0.15	0.06
33	225.2193	'56.3048	84.3	6542.07	16074.81

Statistics

Assigned Value**	0.172	0.014
Spike	Not Spiked	
Robust Average*	0.173	0.016
Median*	0.172	0.011
Mean*	0.179	
N	25	
Max.	225.2193	
Min.	0.071	
Robust SD*	0.032	
Robust CV*	18%	

* Results from laboratory 33 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 5, 18, 29 and 33.


Kernel Density
Density
Result
Results: S3 - PFBA
Assigned Value = 0.172 ± 0.014 ug/L
Results (ug/L)
Laboratory
29 17 3 21 22 13 23 31 12 11 7 26 14 32 25 4 6 20 10 2 8 27 5 18 33 1 24 15 16 19 9 Md R.A.


z-Scores: S3 - PFBA
Target Standard Deviation 0.034 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
29 17 3 21 22 13 23 31 12 11 7 26 14 32 25 4 6 20 10 2 8 27 5 18 33

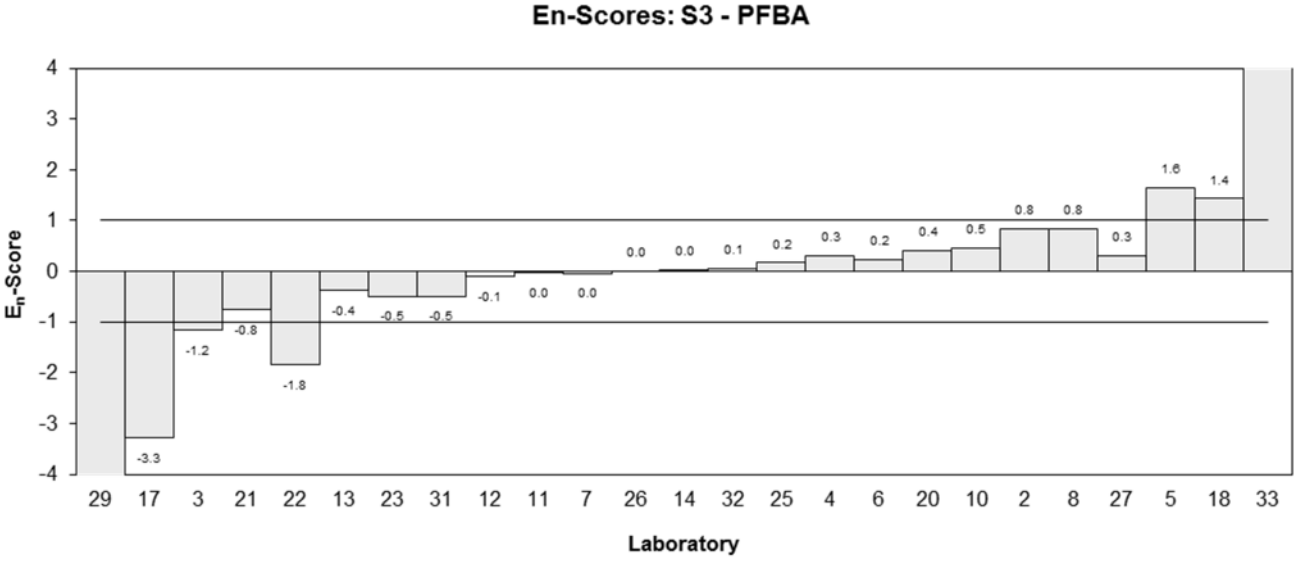

En-Scores: S3 - PFBA
En-Score
Laboratory
29 17 3 21 22 13 23 31 12 11 7 26 14 32 25 4 6 20 10 2 8 27 5 18 33

Figure 37

Table 47

Sample Details

Sample No.	S3
Matrix.	water
Analyte.	PFBS
Units	µg/L

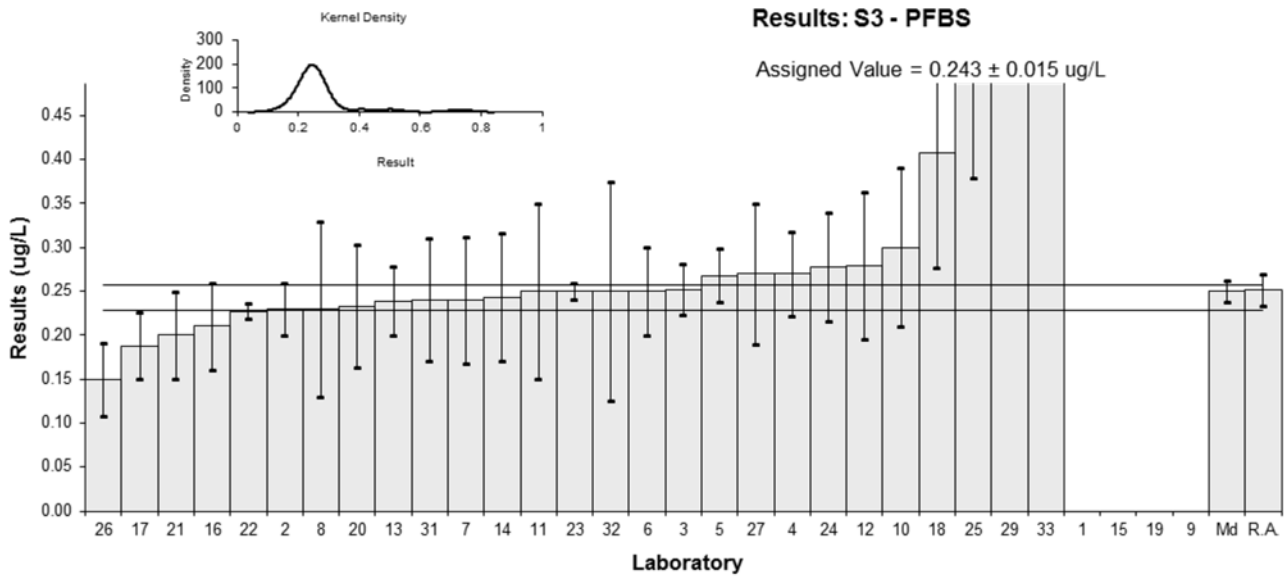
Participant Results

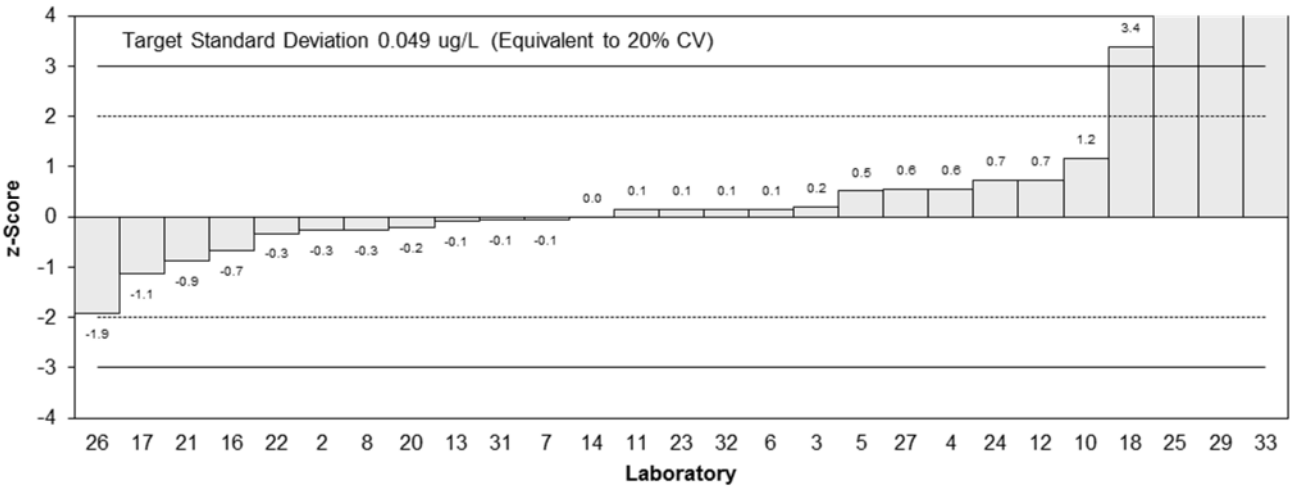
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	<0.02	NR	NR		
2	0.23	0.03	NR	-0.27	-0.39
3	0.252	0.029	NR	0.19	0.28
4	0.27	0.0485	91	0.56	0.53
5	0.268	0.031	93.0	0.51	0.73
6	0.25	0.05	91	0.14	0.13
7	0.240	0.072	98	-0.06	-0.04
8	0.23	0.10	97.4	-0.27	-0.13
9	NT	NT	NT		
10	0.30	0.09	NR	1.17	0.62
11	0.25	0.1	96	0.14	0.07
12	0.279	0.0838	99	0.74	0.42
13	0.239	0.0394	118	-0.08	-0.09
14	0.243	0.073	88	0.00	0.00
15	NT	NT	NT		
16	0.21	0.05	100	-0.68	-0.63
17	0.188	0.038	NR	-1.13	-1.35
18	0.407	0.130	74	3.37	1.25
19	NT	NT	NT		
20	0.233	0.0700	114	-0.21	-0.14
21	0.2	0.05	112	-0.88	-0.82
22	0.227	0.009	NR	-0.33	-0.91
23	0.25	0.01	106	0.14	0.39
24	0.278	0.062	67.61	0.72	0.55
25	0.505	0.126	46	5.39	2.06
26	0.149	0.0418	65	-1.93	-2.12
27	0.27	0.08	82	0.56	0.33
29	0.73	0.23	NR	10.02	2.11
31	0.24	0.07	109	-0.06	-0.04
32	0.25	0.125	89	0.14	0.06
33	255.4347	'63.8587	75.2	5250.86	17012.78

Statistics

Assigned Value	0.243	0.015
Spike	Not Spiked	
Robust Average*	0.251	0.018
Median*	0.250	0.012
Mean*	0.277	
N	27	
Max.	255.4347	
Min.	0.149	
Robust SD*	0.037	
Robust CV*	15%	

* Results from laboratory 33 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 18, 25, 29 and 33.


Kernel Density
Density
Result
Results: S3 - PFBS
Assigned Value = 0.243 ± 0.015 ug/L
Results (ug/L)
Laboratory
26 17 21 16 22 2 8 20 13 31 7 14 11 23 32 6 3 5 27 4 24 12 10 18 25 29 33 1 15 19 9 Md R.A.


z-Scores: S3 - PFBS
Target Standard Deviation 0.049 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
26 17 21 16 22 2 8 20 13 31 7 14 11 23 32 6 3 5 27 4 24 12 10 18 25 29 33

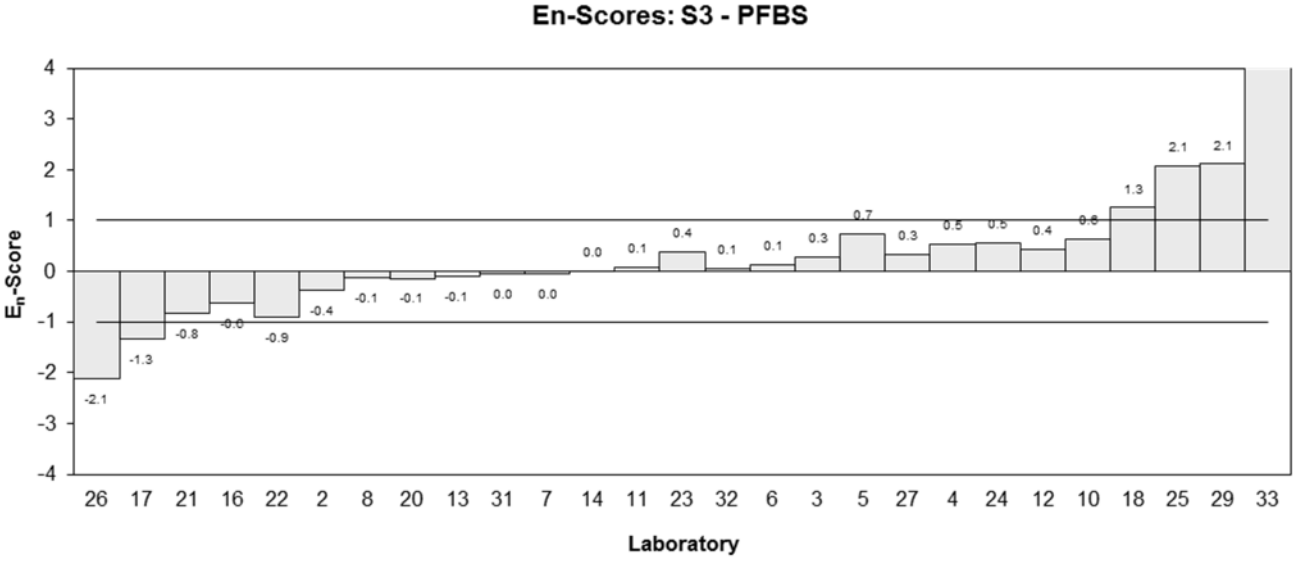

En-Scores: S3 - PFBS
En-Score
Laboratory
26 17 21 16 22 2 8 20 13 31 7 14 11 23 32 6 3 5 27 4 24 12 10 18 25 29 33

Figure 38

Table 48

Sample Details

Sample No.	S3
Matrix.	water
Analyte.	PFDA
Units	µg/L

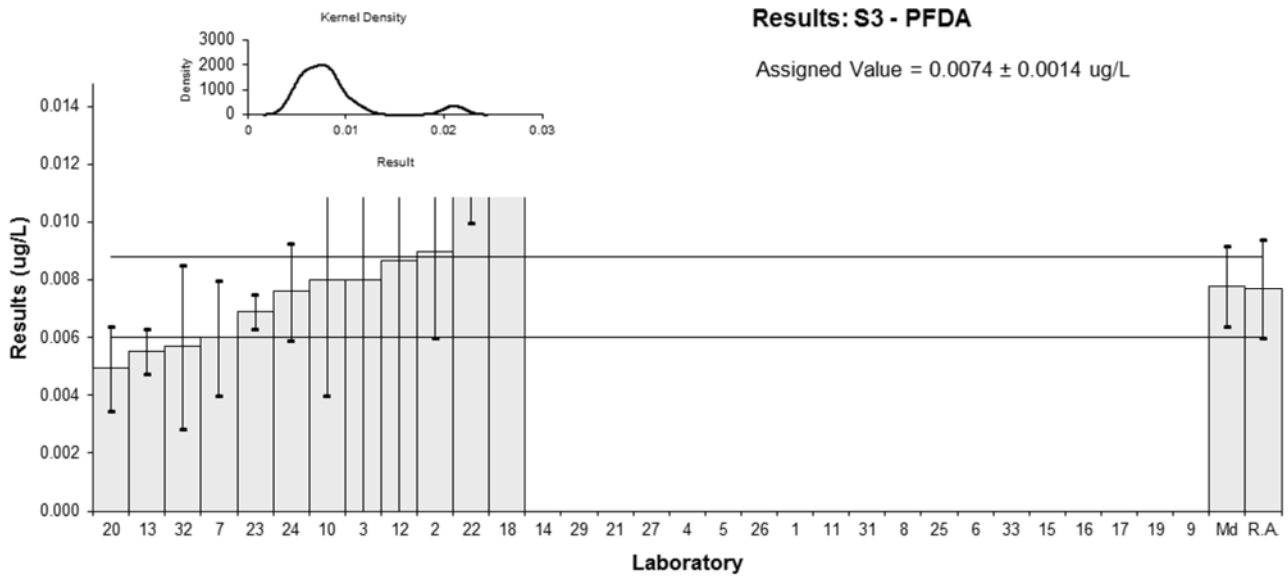
Participant Results

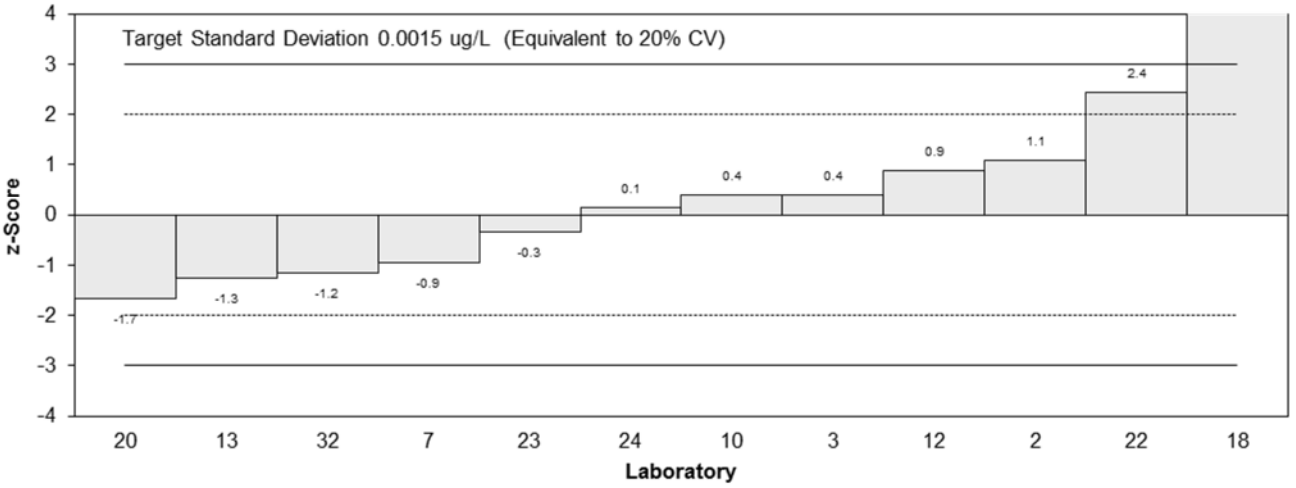
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	<0.02	NR	NR		
2	0.009	0.003	NR	1.08	0.48
3	0.008	0.013	95.55	0.41	0.05
4	<0.01	0.0030	94		
5	<0.013	0.001	100.2		
6	<0.05	0.01	55		
7	0.006	0.002	108	-0.95	-0.57
8	<0.02	0.002	100.2		
9	NT	NT	NT		
10	0.008	0.004	NR	0.41	0.14
11	<0.02	NR	92		
12	0.0087	0.010	101	0.88	0.13
13	0.00553	0.00078	120	-1.26	-1.17
14	< 0.005	0.002	86		
15	NT	NT	NT		
16	NT	NT	NT		
17	NT	NT	NT		
18	0.021	0.006	74	9.19	2.21
19	NT	NT	NT		
20	0.00493	0.00148	112	-1.67	-1.21
21	< 0.04	0.02	96		
22	0.011	0.001	NR	2.43	2.09
23	0.0069	0.0006	180	-0.34	-0.33
24	0.0076	0.0017	85.26	0.14	0.09
25	<0.0200	NR	84		
26	<0.0198	NR	66		
27	<0.01	NR	94		
29	< 0.01	NR	NR		
31	<0.02	0.01	107		
32	0.00569	0.002845	67	-1.16	-0.54
33	NR	NR	76.7		

Statistics

Assigned Value*	0.0074	0.0014
Spike	Not Spiked	
Robust Average	0.0077	0.0016
Median	0.0078	0.0014
Mean	0.0085	
N	12	
Max.	0.021	
Min.	0.00493	
Robust SD	0.0023	
Robust CV	30%	

* Assigned value is the robust average excluding laboratory 18.


Kernel Density
Density
Result
Results: S3 - PFDA
Assigned Value = 0.0074 ± 0.0014 ug/L
Results (ug/L)
Laboratory
20 13 32 7 23 24 10 3 12 2 22 18 14 29 21 27 4 5 26 1 11 31 8 25 6 33 15 16 17 19 9 Md R.A.


z-Scores: S3 - PFDA
Target Standard Deviation 0.0015 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
20 13 32 7 23 24 10 3 12 2 22 18

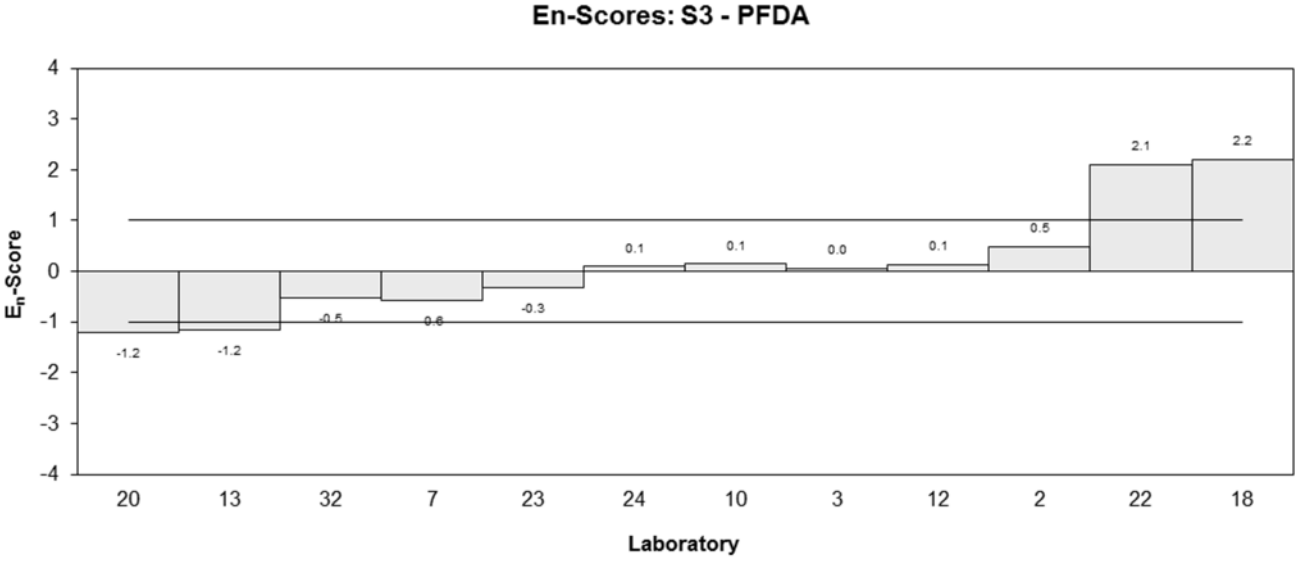

En-Scores: S3 - PFDA
En-Score
Laboratory
20 13 32 7 23 24 10 3 12 2 22 18

Figure 39

Table 49

Sample Details

Sample No.	S3
Matrix.	water
Analyte.	PFHpA
Units	µg/L

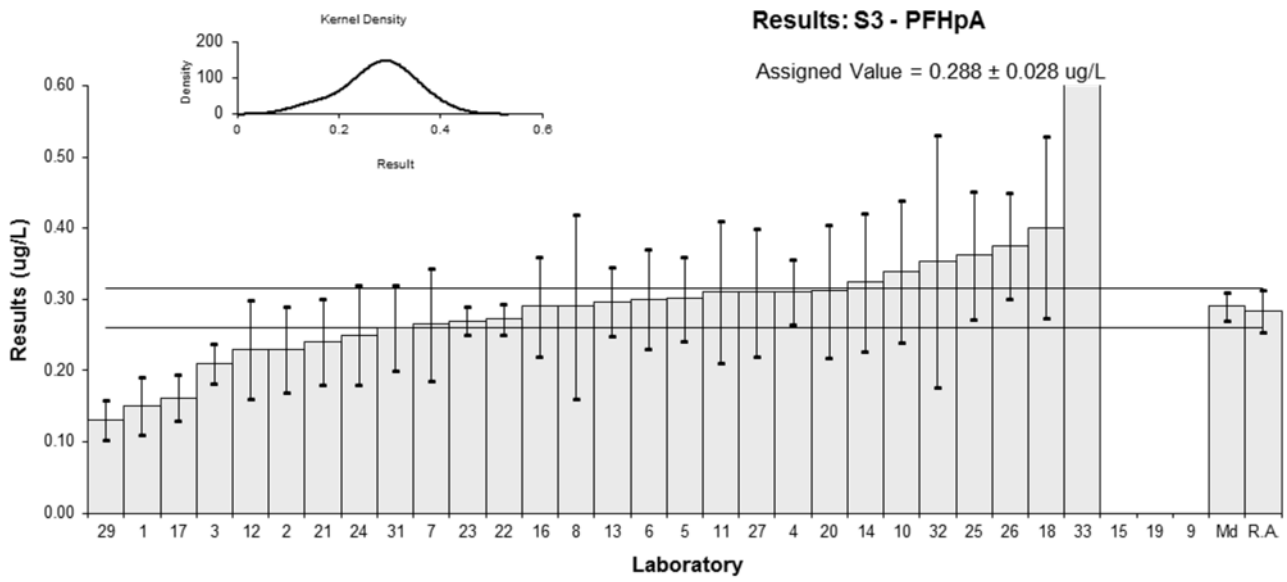
Participant Results

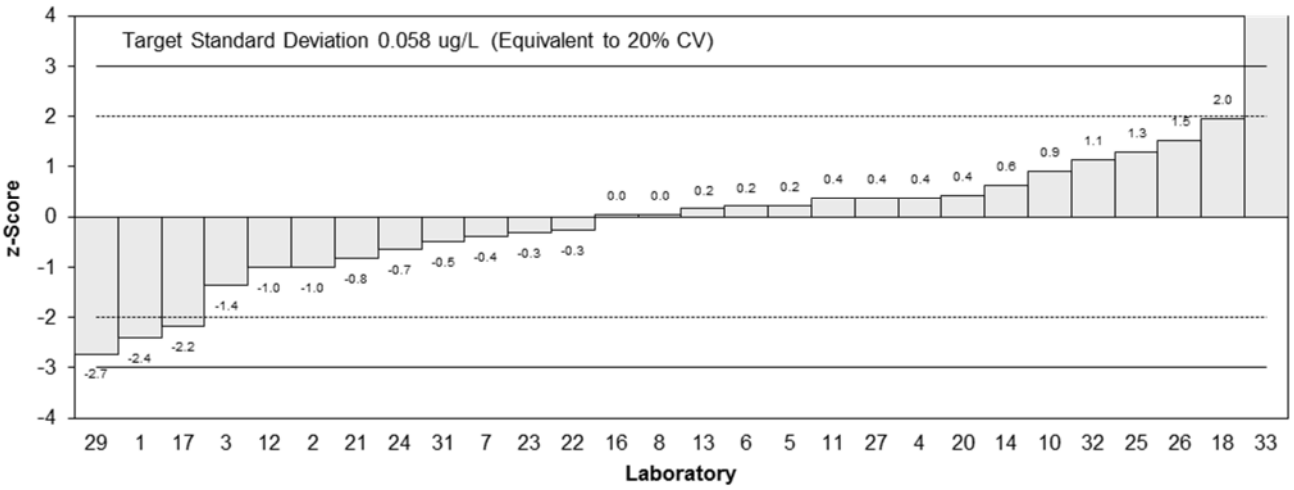
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.15	0.04	NR	-2.40	-2.83
2	0.23	0.06	NR	-1.01	-0.88
3	0.209	0.028	NR	-1.37	-2.00
4	0.31	0.0460	82	0.38	0.41
5	0.301	0.059	90.9	0.23	0.20
6	0.30	0.07	75	0.21	0.16
7	0.265	0.079	94	-0.40	-0.27
8	0.29	0.13	92.3	0.03	0.02
9	NT	NT	NT		
10	0.34	0.10	NR	0.90	0.50
11	0.31	0.1	78	0.38	0.21
12	0.230	0.0690	89	-1.01	-0.78
13	0.297	0.0481	103	0.16	0.16
14	0.324	0.097	81	0.63	0.36
15	NT	NT	NT		
16	0.29	0.07	56	0.03	0.03
17	0.162	0.032	NR	-2.19	-2.96
18	0.401	0.128	105	1.96	0.86
19	NT	NT	NT		
20	0.312	0.0937	111	0.42	0.25
21	0.24	0.06	93	-0.83	-0.72
22	0.272	0.022	NR	-0.28	-0.45
23	0.27	0.02	89	-0.31	-0.52
24	0.25	0.07	100.61	-0.66	-0.50
25	0.362	0.0905	72	1.28	0.78
26	0.375	0.0743	41	1.51	1.10
27	0.31	0.09	84	0.38	0.23
29	0.131	0.028	NR	-2.73	-3.96
31	0.26	0.06	89	-0.49	-0.42
32	0.354	0.177	47	1.15	0.37
33	322.1797	'80.5449	82.9	5588.40	11496.13

Statistics

Assigned Value**	0.288	0.028
Spike	Not Spiked	
Robust Average*	0.283	0.030
Median*	0.290	0.020
Mean*	0.279	
N	28	
Max.	322.1797	
Min.	0.131	
Robust SD*	0.062	
Robust CV*	22%	

* Results from laboratory 33 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 29 and 33.


Kernel Density
Density
Result
Results: S3 - PFHpA
Assigned Value = 0.288 ± 0.028 ug/L
Results (ug/L)
Laboratory
29 1 17 3 12 2 21 24 31 7 23 22 16 8 13 6 5 11 27 4 20 14 10 32 25 26 18 33 15 19 9 Md R.A


z-Scores: S3 - PFHpA
Target Standard Deviation 0.058 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
29 1 17 3 12 2 21 24 31 7 23 22 16 8 13 6 5 11 27 4 20 14 10 32 25 26 18 33

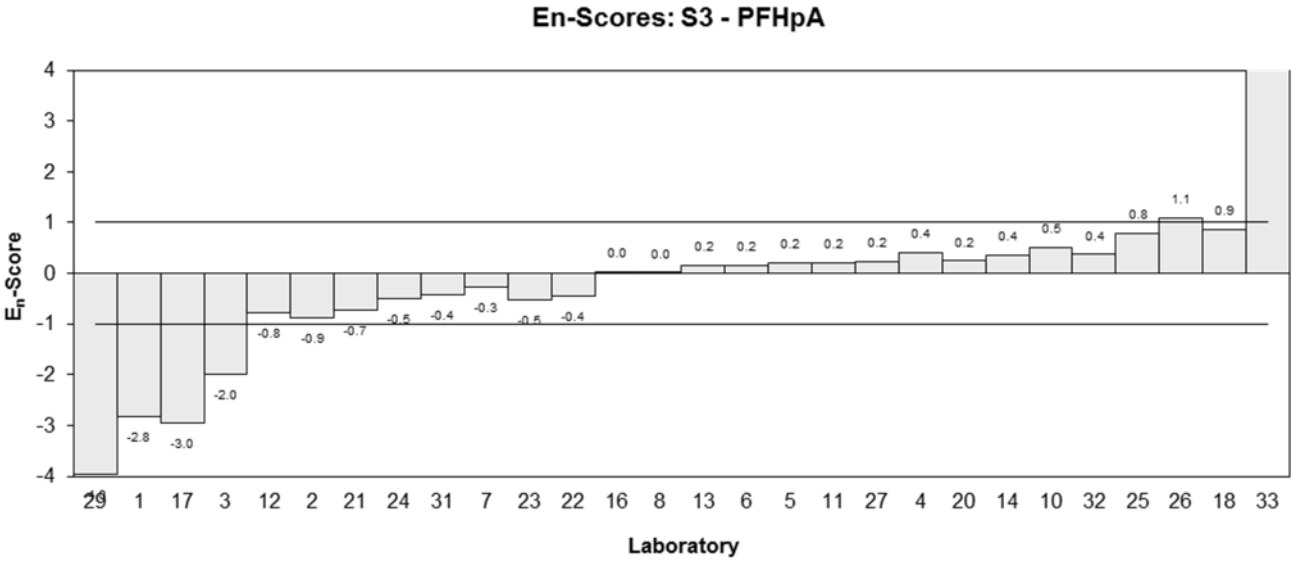

En-Scores: S3 - PFHpA
En-Score
Laboratory
29 1 17 3 12 2 21 24 31 7 23 22 16 8 13 6 5 11 27 4 20 14 10 32 25 26 18 33

Figure 40

Table 50

Sample Details

Sample No.	S3
Matrix.	water
Analyte.	PFHxA
Units	µg/L

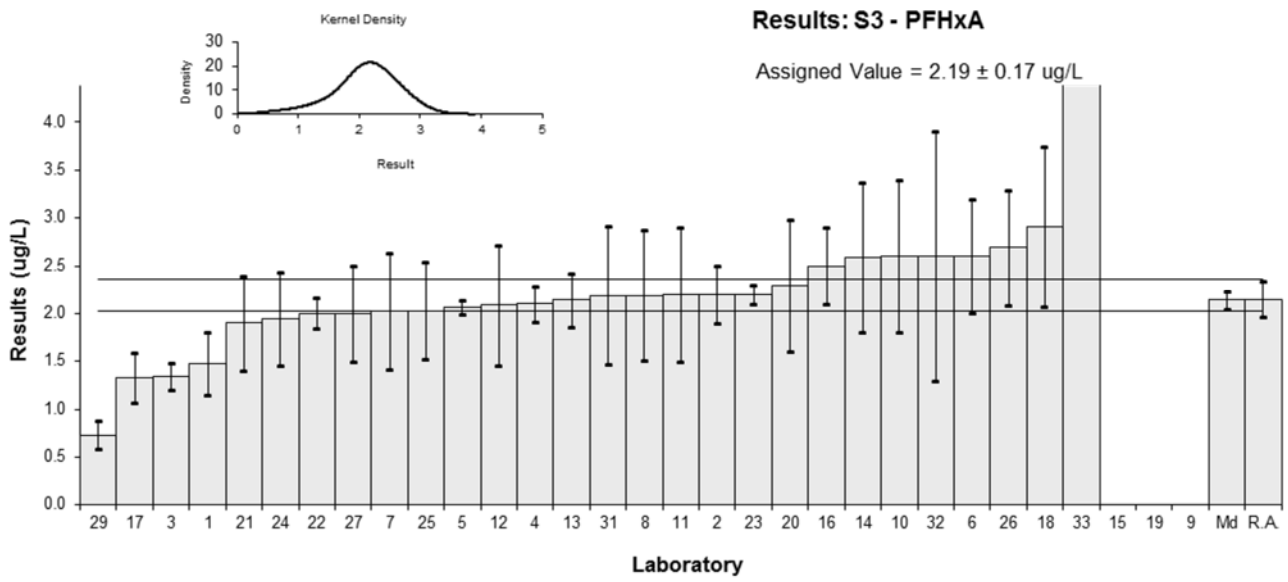
Participant Results

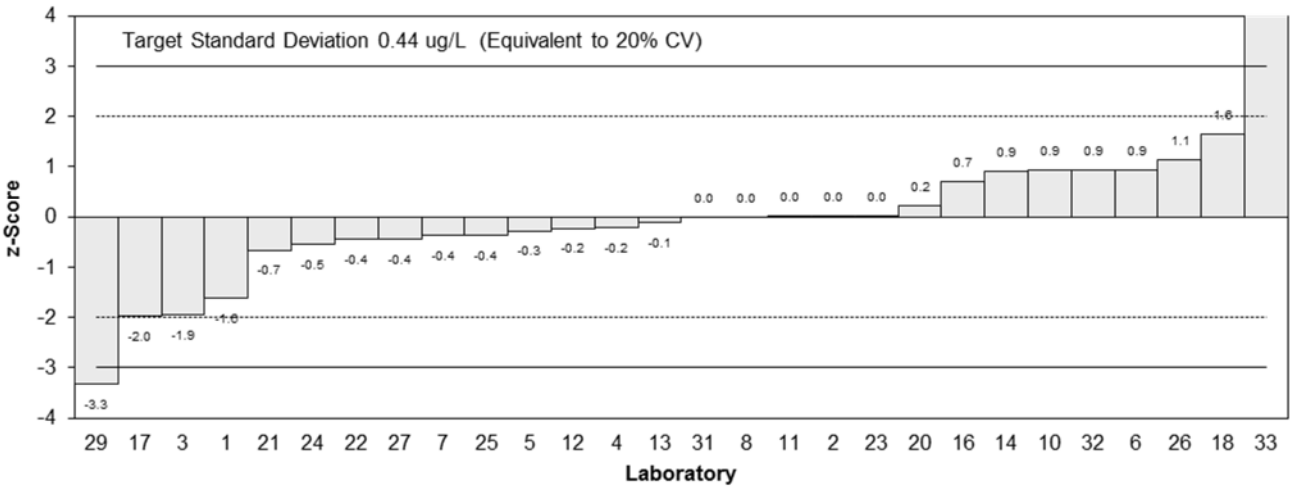
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	1.48	0.33	NR	-1.62	-1.91
2	2.2	0.3	NR	0.02	0.03
3	1.339	0.139	NR	-1.94	-3.88
4	2.1	0.1887	89	-0.21	-0.35
5	2.068	0.070	97.1	-0.28	-0.66
6	2.6	0.6	75	0.94	0.66
7	2.029	0.609	100	-0.37	-0.25
8	2.19	0.68	100.1	0.00	0.00
9	NT	NT	NT		
10	2.6	0.8	NR	0.94	0.50
11	2.2	0.7	82	0.02	0.01
12	2.09	0.628	99	-0.23	-0.15
13	2.14	0.282	108	-0.11	-0.15
14	2.59	0.78	68	0.91	0.50
15	NT	NT	NT		
16	2.5	0.4	56	0.71	0.71
17	1.329	0.266	NR	-1.97	-2.73
18	2.91	0.84	97	1.64	0.84
19	NT	NT	NT		
20	2.29	0.686	106	0.23	0.14
21	1.9	0.50	103	-0.66	-0.55
22	2.000	0.160	NR	-0.43	-0.81
23	2.2	0.1	108	0.02	0.05
24	1.95	0.49	94.81	-0.55	-0.46
25	2.03	0.508	72	-0.37	-0.30
26	2.69	0.599	86	1.14	0.80
27	2.0	0.5	98	-0.43	-0.36
29	0.73	0.15	NR	-3.33	-6.44
31	2.19	0.72	100	0.00	0.00
32	2.6	1.3	56	0.94	0.31
33	2337.8074	584.4519	73.2	5332.46	4.00

Statistics

Assigned Value	2.19	0.17
Spike	Not Spiked	
Robust Average*	2.15	0.19
Median*	2.14	0.09
Mean*	2.11	
N	28	
Max.	2337.8074	
Min.	0.73	
Robust SD*	0.40	
Robust CV*	19%	

* Results from laboratory 33 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 29 and 33.


Kernel Density
Density
Result
Results: S3 - PFHxA
Assigned Value = 2.19 ± 0.17 ug/L
Results (ug/L)
Laboratory
29 17 3 1 21 24 22 27 7 25 5 12 4 13 31 8 11 2 23 20 16 14 10 32 6 26 18 33 15 19 9 Md R.A


z-Scores: S3 - PFHxA
Target Standard Deviation 0.44 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
29 17 3 1 21 24 22 27 7 25 5 12 4 13 31 8 11 2 23 20 16 14 10 32 6 26 18 33

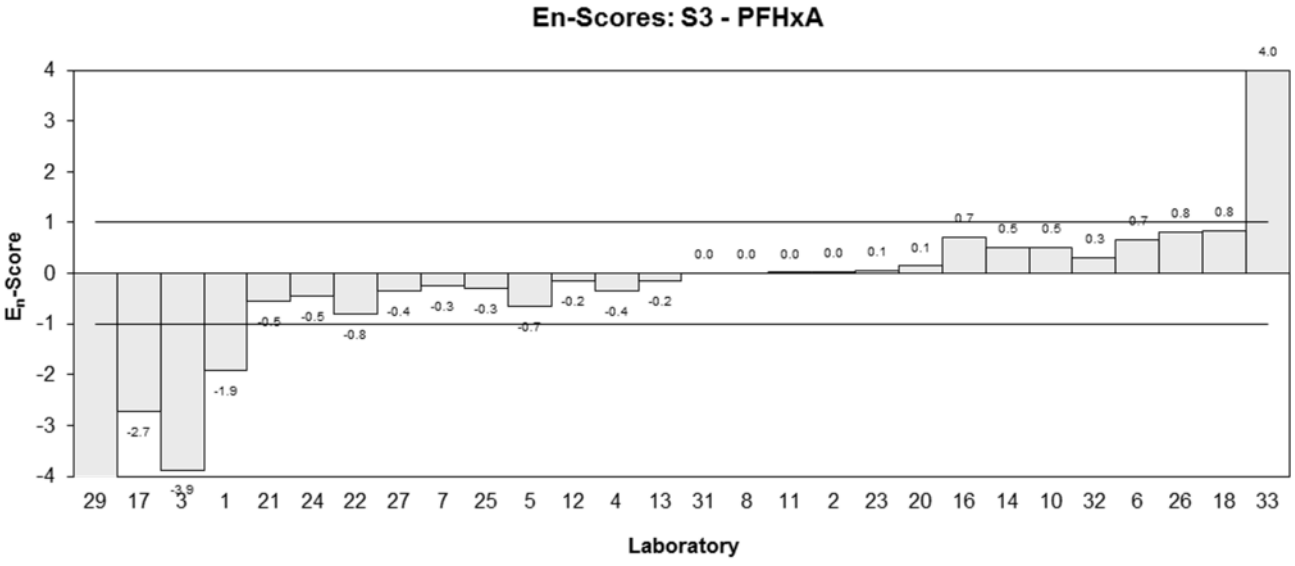

En-Scores: S3 - PFHxA
En-Score
Laboratory
29 17 3 1 21 24 22 27 7 25 5 12 4 13 31 8 11 2 23 20 16 14 10 32 6 26 18 33

Figure 41

Table 51

Sample Details

Sample No.	S3
Matrix.	water
Analyte.	PFHxS
Units	µg/L

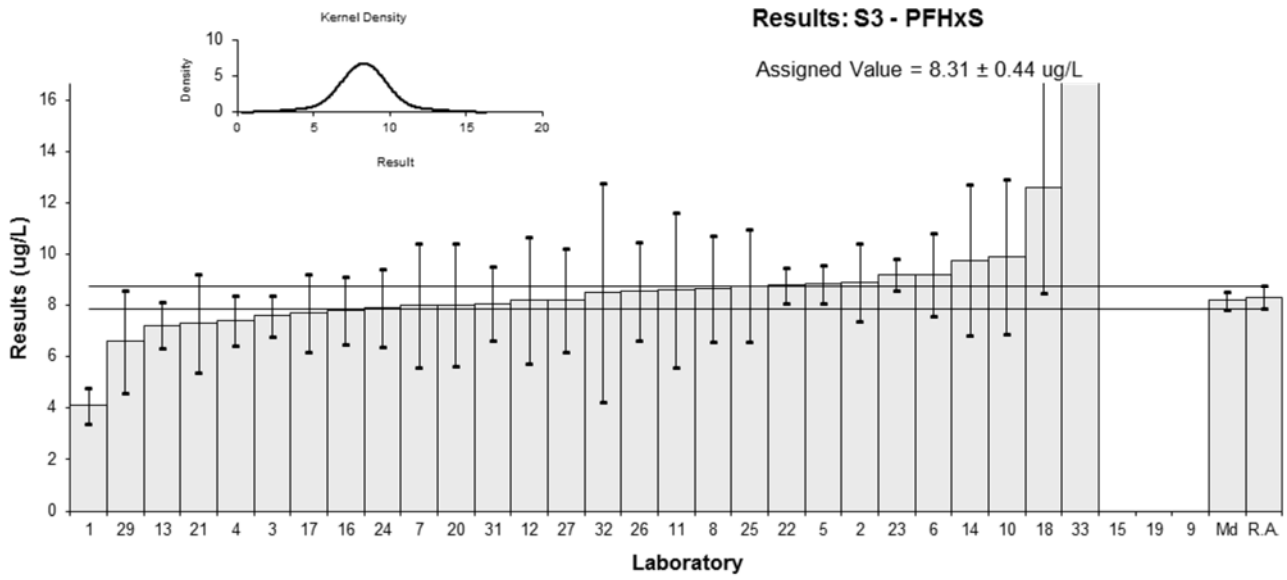
Participant Results

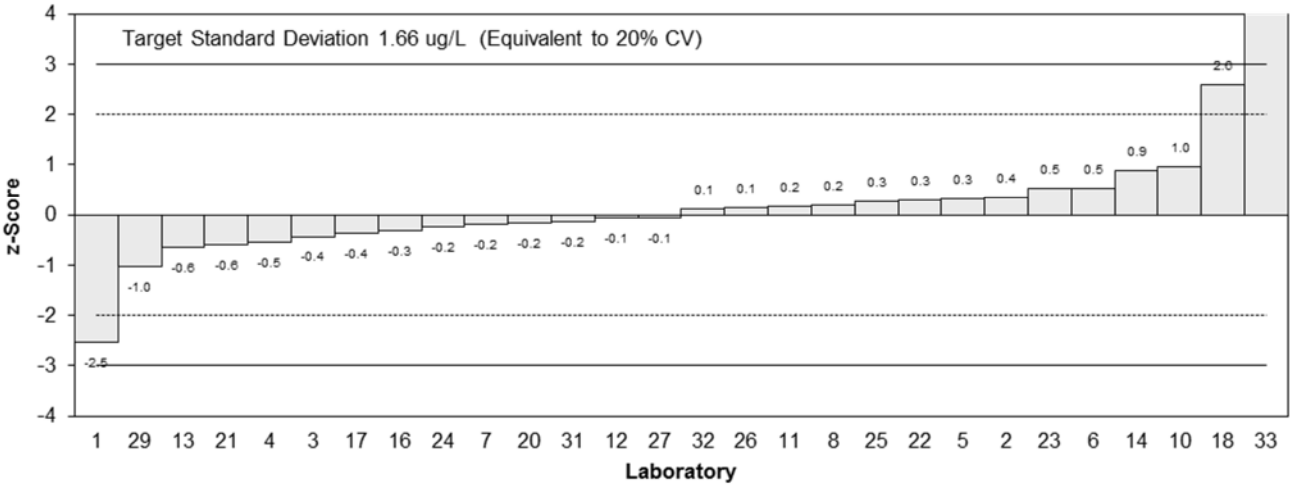
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	4.11	0.70	NR	-2.53	-5.08
2	8.9	1.5	NR	0.35	0.38
3	7.593	0.788	NR	-0.43	-0.79
4	7.4	0.956	86	-0.55	-0.86
5	8.84	0.74	95.9	0.32	0.62
6	9.2	1.6	61	0.54	0.54
7	8.007	2.402	102	-0.18	-0.12
8	8.64	2.07	101.0	0.20	0.16
9	NT	NT	NT		
10	9.9	3.0	NR	0.96	0.52
11	8.6	3	84	0.17	0.10
12	8.19	2.46	94	-0.07	-0.05
13	7.23	0.889	105	-0.65	-1.09
14	9.77	2.93	81	0.88	0.49
15	NT	NT	NT		
16	7.8	1.3	100	-0.31	-0.37
17	7.70	1.539	NR	-0.37	-0.38
18	12.6	4.1	68	2.58	1.04
19	NT	NT	NT		
20	8.02	2.41	104	-0.17	-0.12
21	7.3	1.9	87	-0.61	-0.52
22	8.790	0.703	NR	0.29	0.58
23	9.2	0.6	107	0.54	1.20
24	7.9	1.5	90.48	-0.25	-0.26
25	8.77	2.19	46	0.28	0.21
26	8.54	1.92	95	0.14	0.12
27	8.2	2.0	92	-0.07	-0.05
29	6.6	2.0	NR	-1.03	-0.84
31	8.06	1.45	95	-0.15	-0.16
32	8.51	4.255	46	0.12	0.05
33	7024.7426	1756.1857	112.5	4221.68	4.00

Statistics

Assigned Value	8.31	0.44
Spike	Not Spiked	
Robust Average*	8.31	0.44
Median*	8.20	0.35
Mean*	8.31	
N	28	
Max.	7024.7426	
Min.	4.11	
Robust SD*	0.92	
Robust CV*	11%	

* Results from laboratory 33 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S3 - PFHxS
Assigned Value = 8.31 ± 0.44 ug/L
Results (ug/L)
Laboratory
1 29 13 21 4 3 17 16 24 7 20 31 12 27 32 26 11 8 25 22 5 2 23 6 14 10 18 33 15 19 9 Md R.A.


z-Scores: S3 - PFHxS
Target Standard Deviation 1.66 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
1 29 13 21 4 3 17 16 24 7 20 31 12 27 32 26 11 8 25 22 5 2 23 6 14 10 18 33

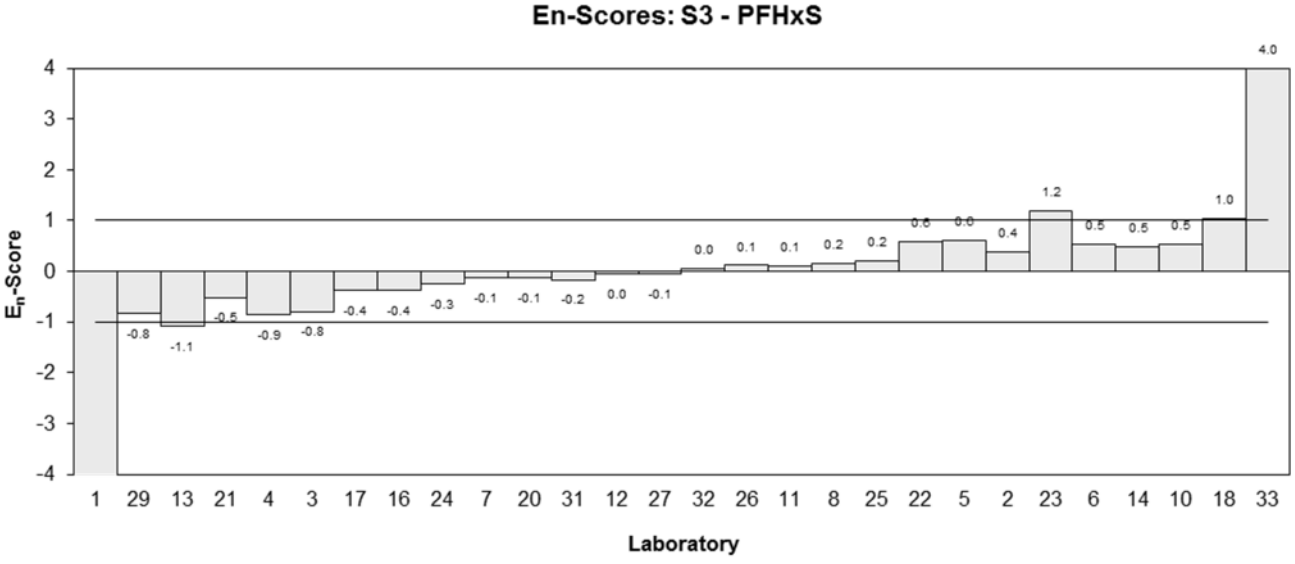

En-Scores: S3 - PFHxS
En-Score
Laboratory
1 29 13 21 4 3 17 16 24 7 20 31 12 27 32 26 11 8 25 22 5 2 23 6 14 10 18 33

Figure 42

Table 52

Sample Details

Sample No.	S3
Matrix.	water
Analyte.	PFNA
Units	µg/L

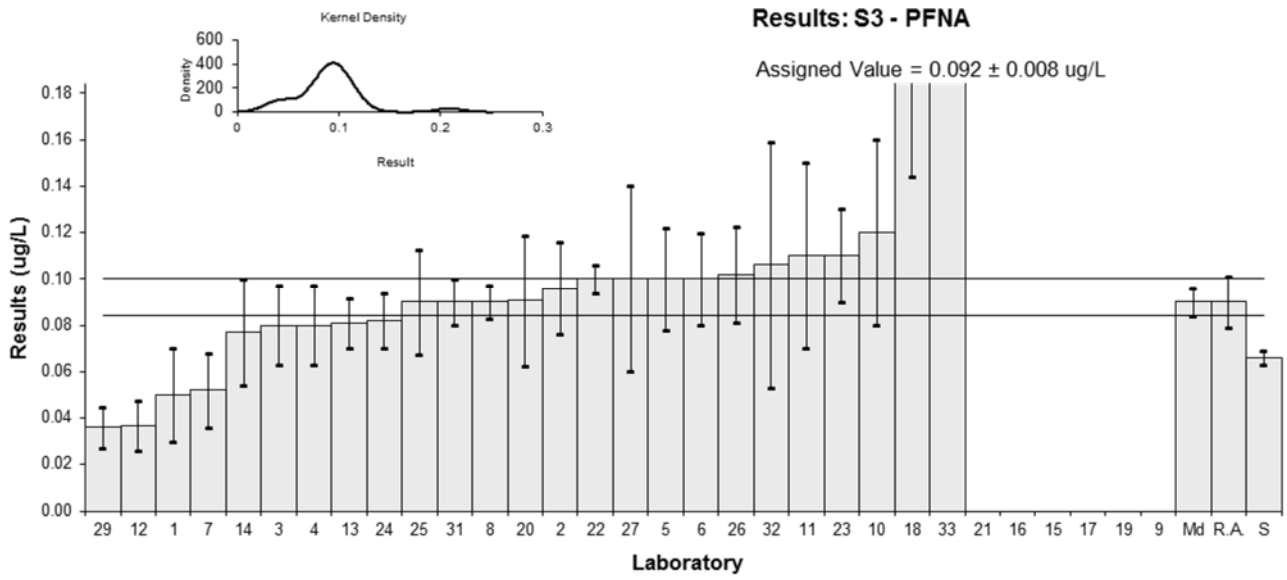
Participant Results

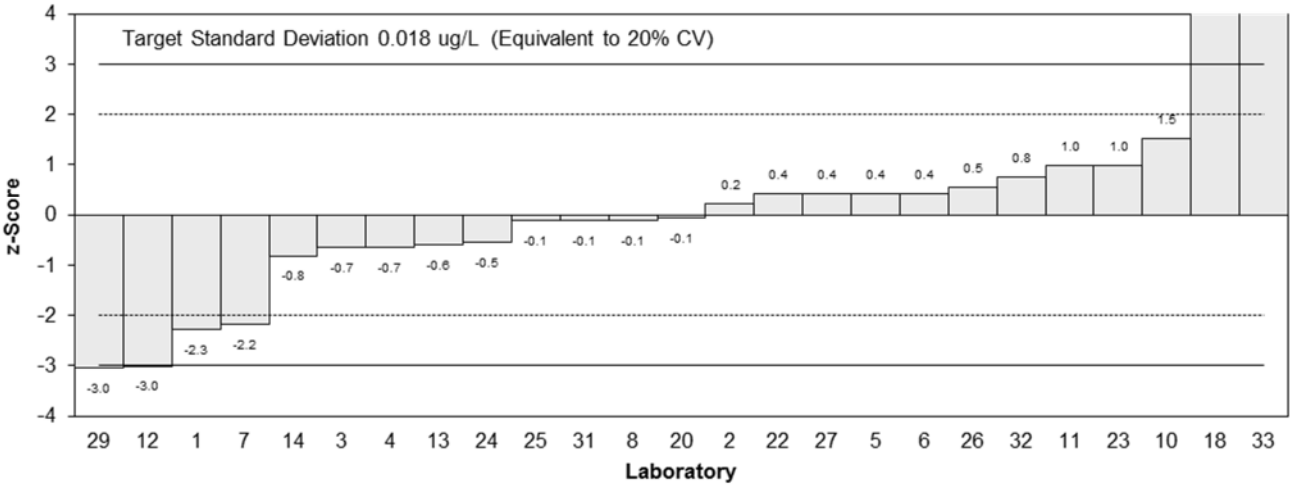
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.05	0.02	NR	-2.28	-1.95
2	0.096	0.020	NR	0.22	0.19
3	0.080	0.017	NR	-0.65	-0.64
4	0.08	0.0170	79	-0.65	-0.64
5	0.100	0.022	50.5	0.43	0.34
6	0.10	0.02	71	0.43	0.37
7	0.052	0.016	88	-2.17	-2.24
8	0.09	0.007	91.5	-0.11	-0.19
9	NT	NT	NT		
10	0.12	0.04	NR	1.52	0.69
11	0.11	0.04	85	0.98	0.44
12	0.0367	0.0110	91	-3.01	-4.07
13	0.0809	0.0109	51	-0.60	-0.82
14	0.077	0.023	61	-0.82	-0.62
15	NT	NT	NT		
16	<0.2	NR	54		
17	NT	NT	NT		
18	0.209	0.065	57	6.36	1.79
19	NT	NT	NT		
20	0.0907	0.0281	112	-0.07	-0.04
21	< 0.07	0.03	NR		
22	0.100	0.006	NR	0.43	0.80
23	0.11	0.02	94	0.98	0.84
24	0.082	0.012	72.25	-0.54	-0.69
25	0.09	0.0225	59	-0.11	-0.08
26	0.102	0.0206	27	0.54	0.45
27	0.1	0.04	68	0.43	0.20
29	0.036	0.0087	NR	-3.04	-4.74
31	0.09	0.01	72	-0.11	-0.16
32	0.106	0.053	23	0.76	0.26
33	96.4215	24.1054	82.1	5235.30	4.00

Statistics

Assigned Value**	0.092	0.008
Spike	0.066	0.003
Robust Average*	0.090	0.011
Median*	0.090	0.006
Mean*	0.091	
N	25	
Max.	96.4215	
Min.	0.036	
Robust SD*	0.021	
Robust CV*	23%	

* Results from laboratory 33 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 12, 18, 29 and 33.


Kernel Density
Density
Result
Results: S3 - PFNA
Assigned Value = 0.092 ± 0.008 ug/L
Results (ug/L)
Laboratory
29 12 1 7 14 3 4 13 24 25 31 8 20 2 22 27 5 6 26 32 11 23 10 18 33 21 16 15 17 19 9 Md R.A. S


z-Scores: S3 - PFNA
Target Standard Deviation 0.018 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
29 12 1 7 14 3 4 13 24 25 31 8 20 2 22 27 5 6 26 32 11 23 10 18 33

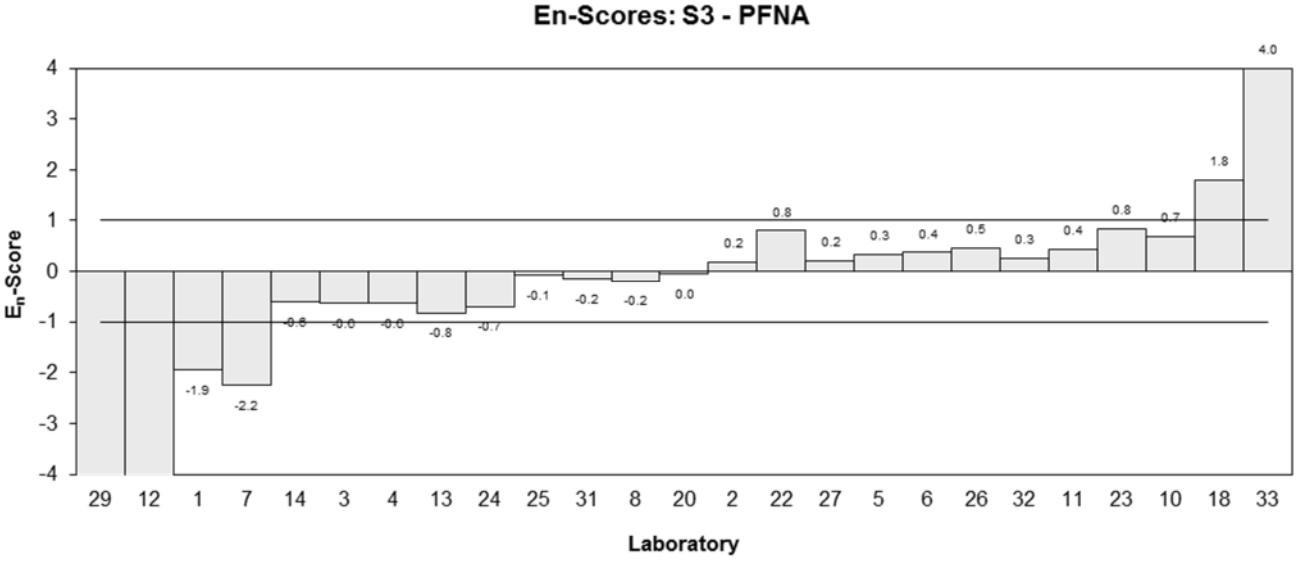

En-Scores: S3 - PFNA
En-Score
Laboratory
29 12 1 7 14 3 4 13 24 25 31 8 20 2 22 27 5 6 26 32 11 23 10 18 33

Figure 43

Table 53

Sample Details

Sample No.	S3
Matrix.	water
Analyte.	PFOA
Units	µg/L

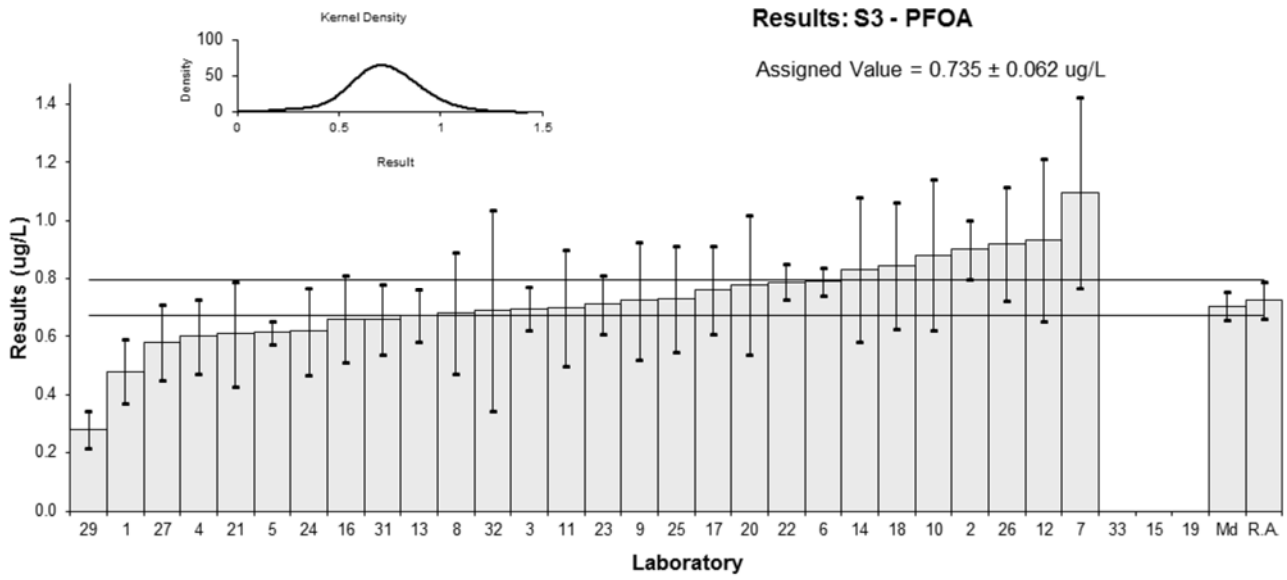
Participant Results

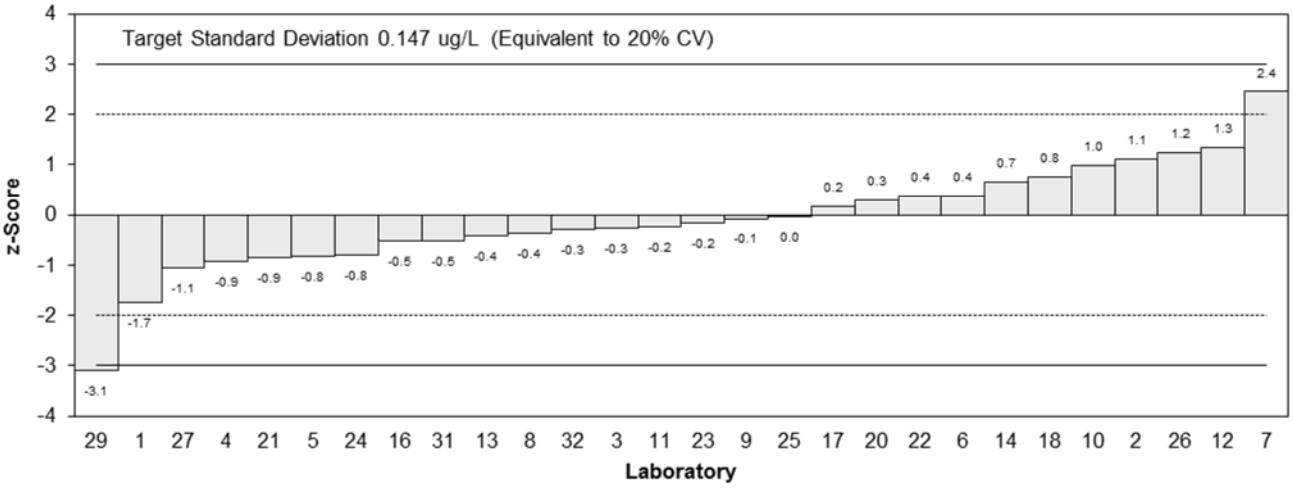
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.48	0.11	NR	-1.73	-2.02
2	0.90	0.10	NR	1.12	1.40
3	0.696	0.074	79.40	-0.27	-0.40
4	0.6	0.1290	95	-0.92	-0.94
5	0.613	0.038	107.4	-0.83	-1.68
6	0.79	0.05	66	0.37	0.69
7	1.095	0.328	110	2.45	1.08
8	0.68	0.21	99.6	-0.37	-0.25
9	0.724	0.203	96.7	-0.07	-0.05
10	0.88	0.26	108	0.99	0.54
11	0.70	0.2	101	-0.24	-0.17
12	0.933	0.280	95	1.35	0.69
13	0.673	0.0909	98	-0.42	-0.56
14	0.832	0.25	95	0.66	0.38
15	NT	NT	NT		
16	0.66	0.15	91	-0.51	-0.46
17	0.760	0.152	NR	0.17	0.15
18	0.846	0.218	105	0.76	0.49
19	NT	NT	NT		
20	0.778	0.241	112	0.29	0.17
21	0.61	0.18	106	-0.85	-0.66
22	0.789	0.063	NR	0.37	0.61
23	0.71	0.1	105	-0.17	-0.21
24	0.618	0.15	5.44	-0.80	-0.72
25	0.729	0.182	77	-0.04	-0.03
26	0.918	0.196	62	1.24	0.89
27	0.58	0.13	80	-1.05	-1.08
29	0.28	0.065	NR	-3.10	-5.07
31	0.66	0.12	100	-0.51	-0.56
32	0.692	0.346	100	-0.29	-0.12
33	NR	25	71.2		

Statistics

Assigned Value*	0.735	0.062
Spike	Not Spiked	
Robust Average	0.727	0.064
Median	0.705	0.049
Mean	0.722	
N	28	
Max.	1.095	
Min.	0.28	
Robust SD	0.140	
Robust CV	19%	

* Assigned value is the robust average excluding laboratory 29.


Kernel Density
Density
Result
Results: S3 - PFOA
Assigned Value = 0.735 ± 0.062 ug/L
Results (ug/L)
Laboratory
29 1 27 4 21 5 24 16 31 13 8 32 3 11 23 9 25 17 20 22 6 14 18 10 2 26 12 7 33 15 19 Md R.A


z-Scores: S3 - PFOA
Target Standard Deviation 0.147 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
29 1 27 4 21 5 24 16 31 13 8 32 3 11 23 9 25 17 20 22 6 14 18 10 2 26 12 7

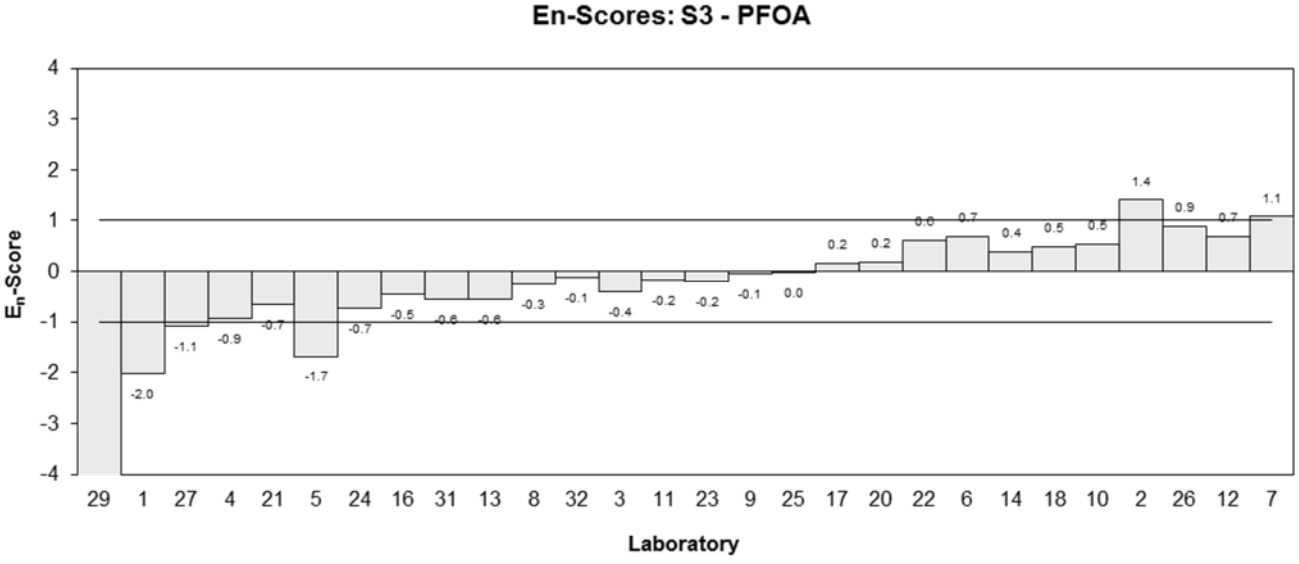

En-Scores: S3 - PFOA
En-Score
Laboratory
29 1 27 4 21 5 24 16 31 13 8 32 3 11 23 9 25 17 20 22 6 14 18 10 2 26 12 7

Figure 44

Table 54

Sample Details

Sample No.	S3
Matrix.	water
Analyte.	PFOS
Units	µg/L

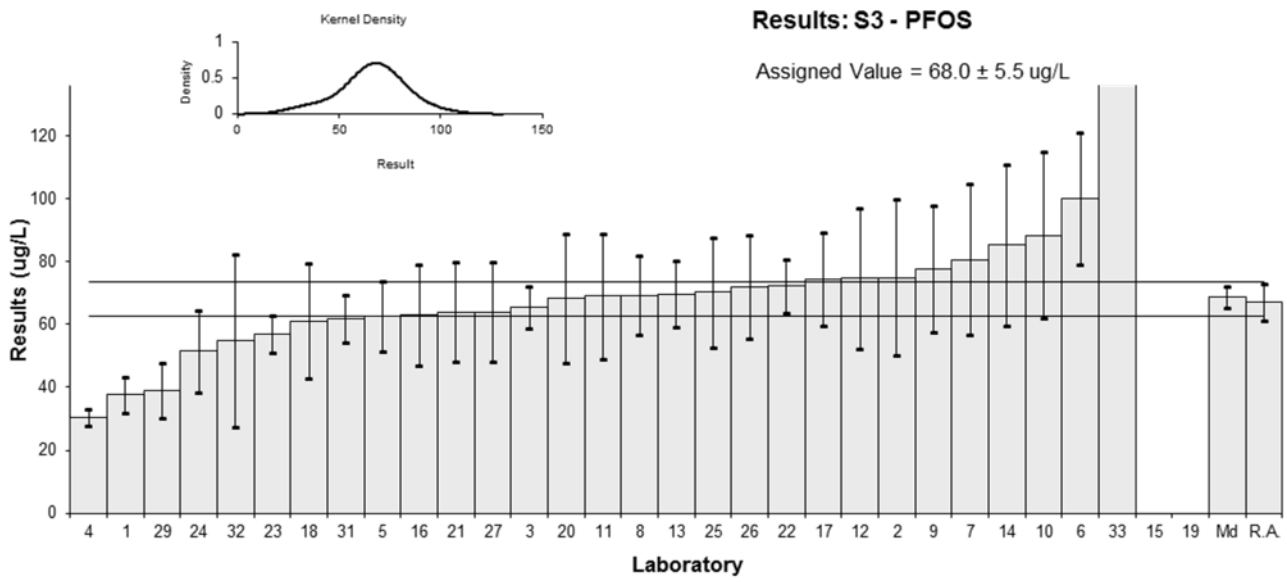
Participant Results

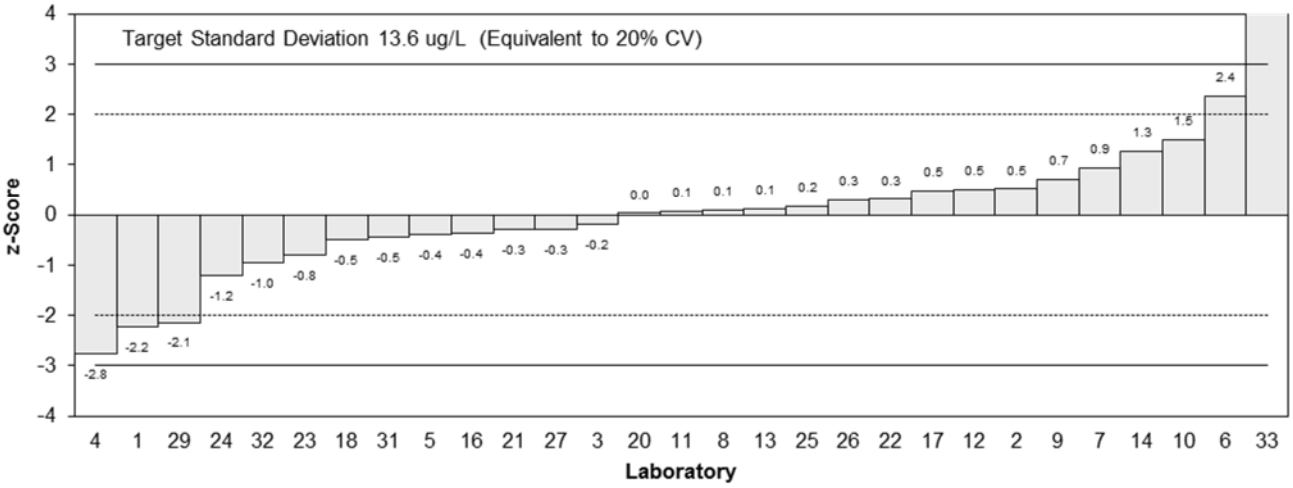
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	37.7	5.7	NR	-2.23	-3.83
2	75	25	NR	0.51	0.27
3	65.553	6.834	96.66	-0.18	-0.28
4	30.41	2.75	102	-2.76	-6.11
5	62.7	11.2	119.2	-0.39	-0.42
6	100	21	84	2.35	1.47
7	80.738	24.221	84	0.94	0.51
8	69.3	12.5	92.5	0.10	0.10
9	77.6	20.2	102.6	0.71	0.46
10	88.4	26.5	106	1.50	0.75
11	69	20	91	0.07	0.05
12	74.8	22.4	90	0.50	0.29
13	69.6	10.6	95	0.12	0.13
14	85.3	25.6	50	1.27	0.66
15	NT	NT	NT		
16	63	16	87	-0.37	-0.30
17	74.4	14.9	NR	0.47	0.40
18	61.2	18.4	89	-0.50	-0.35
19	NT	NT	NT		
20	68.4	20.5	96.3	0.03	0.02
21	64	16	75	-0.29	-0.24
22	72.224	8.667	NR	0.31	0.41
23	57	6.0	97	-0.81	-1.35
24	51.56	13	94.48	-1.21	-1.16
25	70.3	17.6	108	0.17	0.12
26	72.1	16.5	73	0.30	0.24
27	64	16	106	-0.29	-0.24
29	38.9	8.8	NR	-2.14	-2.80
31	61.8	7.4	105	-0.46	-0.67
32	55	27.5	17	-0.96	-0.46
33	39234.8160	9808.704	145.5	2879.91	3.99

Statistics

Assigned Value**	68.0	5.5
Spike	Not Spiked	
Robust Average*	67.2	5.8
Median*	68.7	3.6
Mean*	66.4	
N	29	
Max.	39234.816	
Min.	30.41	
Robust SD*	12.3	
Robust CV*	18%	

* Results from laboratory 33 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 4 and 33.


Kernel Density
Density
Result
Results: S3 - PFOS
Assigned Value = 68.0 ± 5.5 ug/L
Results (ug/L)
Laboratory
4 1 29 24 32 23 18 31 5 16 21 27 3 20 11 8 13 25 26 22 17 12 2 9 7 14 10 6 33 15 19 Md R.A.


z-Scores: S3 - PFOS
Target Standard Deviation 13.6 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
4 1 29 24 32 23 18 31 5 16 21 27 3 20 11 8 13 25 26 22 17 12 2 9 7 14 10 6 33

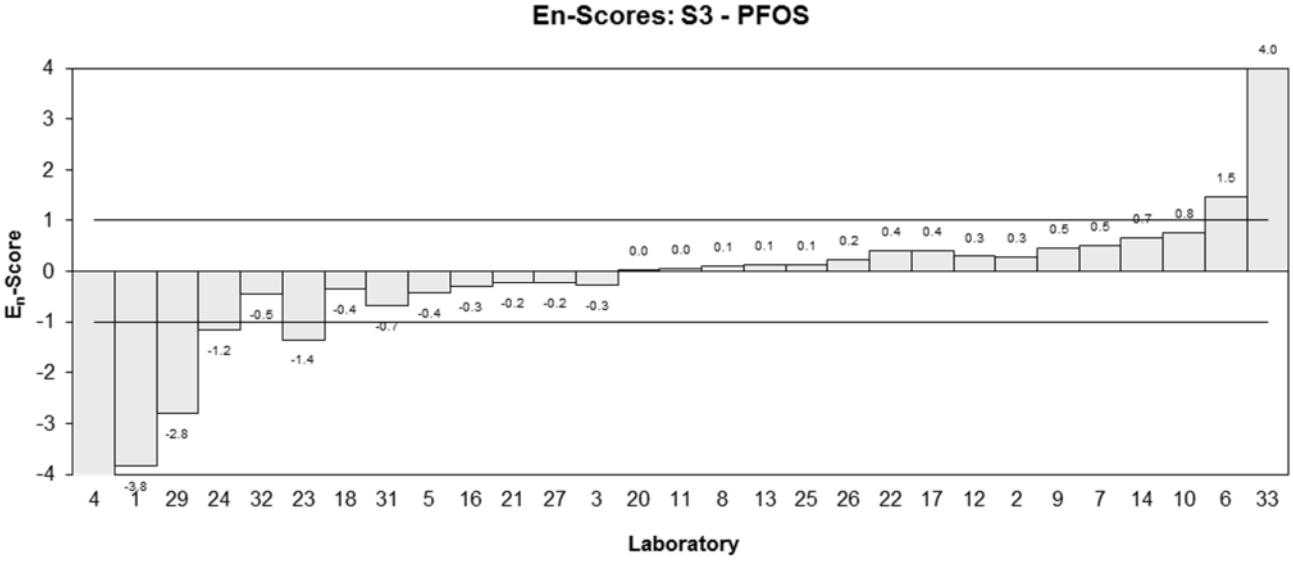

En-Scores: S3 - PFOS
En-Score
Laboratory
4 1 29 24 32 23 18 31 5 16 21 27 3 20 11 8 13 25 26 22 17 12 2 9 7 14 10 6 33

Figure 45

Table 55

Sample Details

Sample No.	S3
Matrix.	water
Analyte.	PFOSA
Units	µg/L

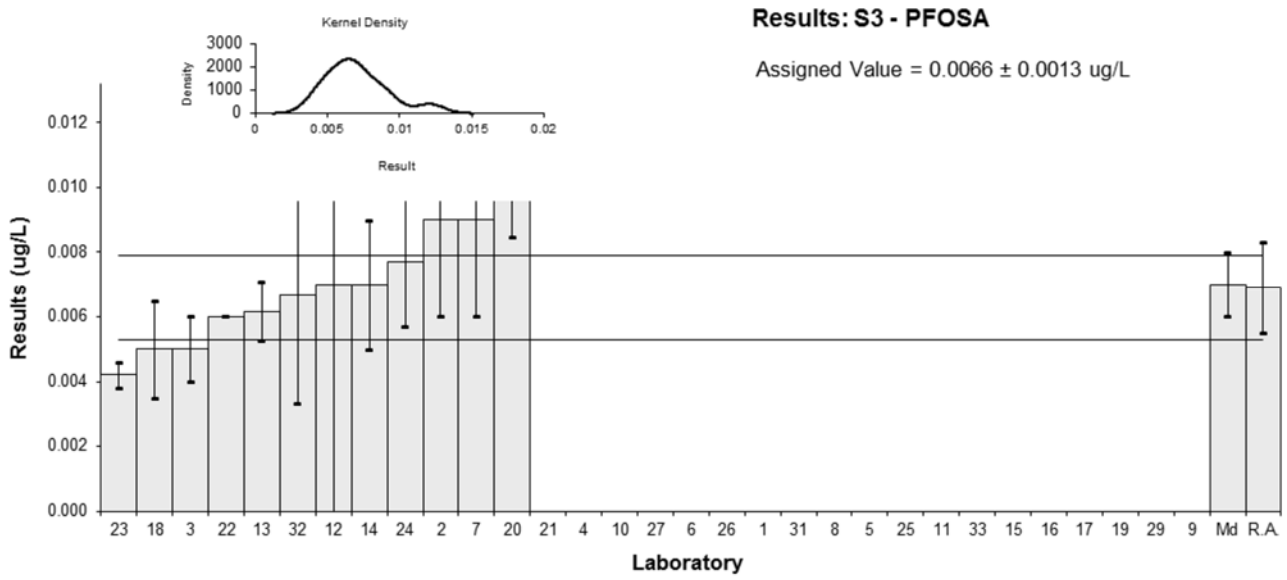
Participant Results

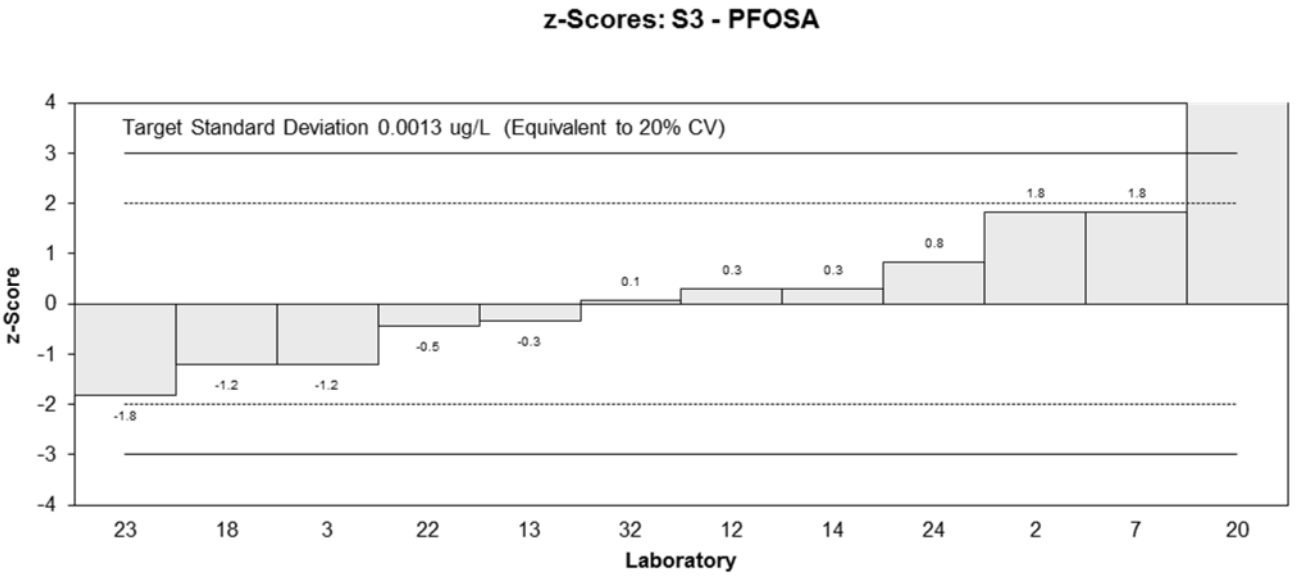
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	<0.02	NR	NR		
2	0.009	0.003	NR	1.82	0.73
3	0.005	0.001	NR	-1.21	-0.98
4	<0.002	0.0008	88		
5	<0.020	0.003	72.9		
6	<0.01	0.002	58		
7	0.009	0.003	94	1.82	0.73
8	<0.02	0.003	104.9		
9	NT	NT	NT		
10	<0.01	NR	NR		
11	<0.1	NR	93		
12	0.00699	0.010	85	0.30	0.04
13	0.00616	0.00091	115	-0.33	-0.28
14	0.007	0.002	19	0.30	0.17
15	NT	NT	NT		
16	NT	NT	NT		
17	NT	NT	NT		
18	0.005	0.0015	121	-1.21	-0.81
19	NT	NT	NT		
20	0.0121	0.00362	78.3	4.17	1.43
21	< 0.14	0.10	NR		
22	0.006	0	NR	-0.45	-0.46
23	0.0042	0.0004	101	-1.82	-1.76
24	0.0077	0.002	66.95	0.83	0.46
25	<0.0200	NR	50		
26	<0.0198	NR	60		
27	<0.01	NR	88		
29	NT	NT	NT		
31	<0.02	0.01	105		
32	0.00668	0.00334	47	0.06	0.02
33	NR	25	53.9		

Statistics

Assigned Value*	0.0066	0.0013
Spike	Not Spiked	
Robust Average	0.0069	0.0014
Median	0.0068	0.0013
Mean	0.0071	
N	12	
Max.	0.0121	
Min.	0.0042	
Robust SD	0.0020	
Robust CV	29%	

** Assigned value is the robust average excluding laboratory 20.


Results: S3 - PFOSA
Assigned Value = 0.0066 ± 0.0013 ug/L
Kernel Density
Density
Result
Results (ug/L)
Laboratory
23 18 3 22 13 32 12 14 24 2 7 20 21 4 10 27 6 26 1 31 8 5 25 11 33 15 16 17 19 29 9 Md R.A.


z-Scores: S3 - PFOSA
Target Standard Deviation 0.0013 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
23 18 3 22 13 32 12 14 24 2 7 20

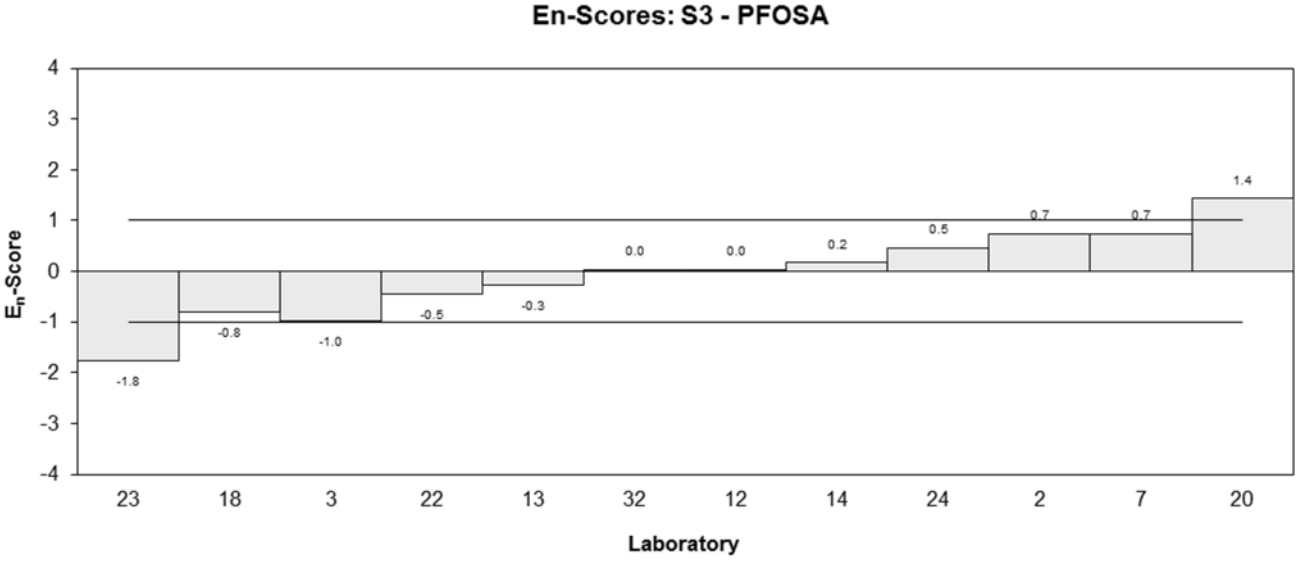

En-Scores: S3 - PFOSA
En-Score
Laboratory
23 18 3 22 13 32 12 14 24 2 7 20

Figure 46

Table 56

Sample Details

Sample No.	S3
Matrix.	water
Analyte.	PFPeA
Units	µg/L

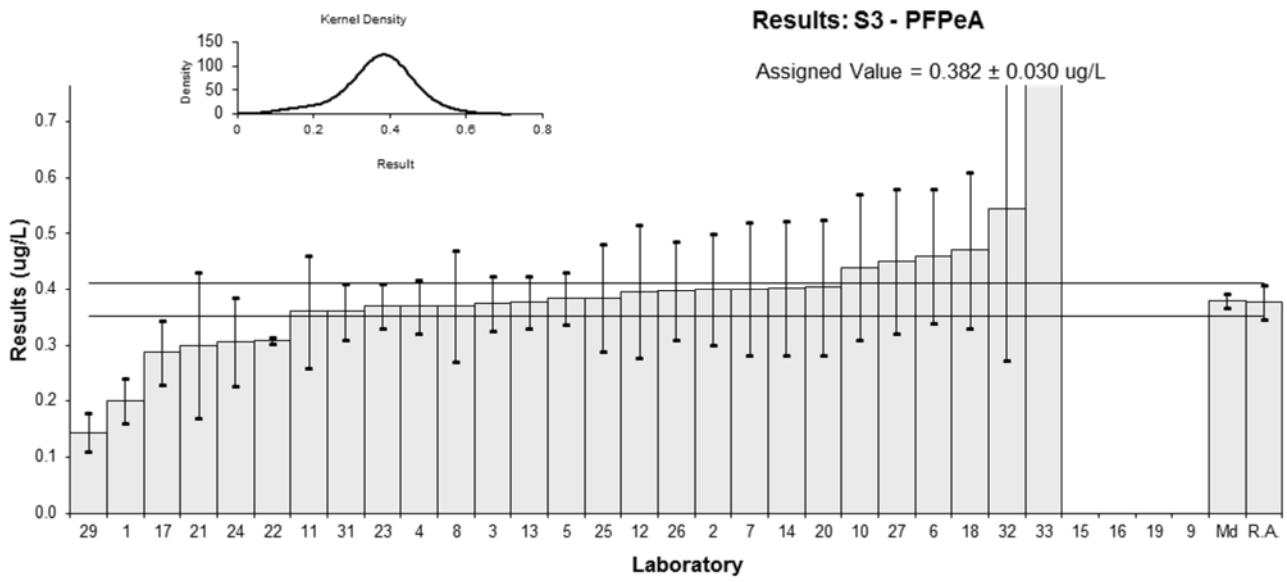
Participant Results

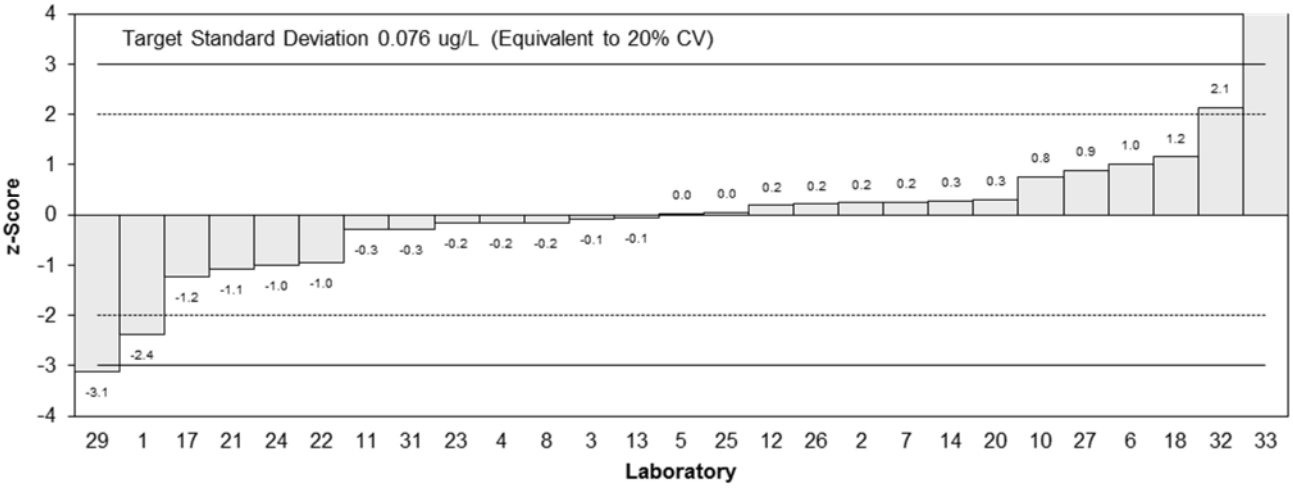
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.20	0.04	NR	-2.38	-3.64
2	0.40	0.10	NR	0.24	0.17
3	0.375	0.05	NR	-0.09	-0.12
4	0.37	0.0482	94	-0.16	-0.21
5	0.384	0.047	97.1	0.03	0.04
6	0.46	0.12	70	1.02	0.63
7	0.401	0.120	88	0.25	0.15
8	0.37	0.10	101.0	-0.16	-0.11
9	NT	NT	NT		
10	0.44	0.13	NR	0.76	0.43
11	0.36	0.1	113	-0.29	-0.21
12	0.396	0.119	105	0.18	0.11
13	0.377	0.0475	120	-0.07	-0.09
14	0.402	0.121	80	0.26	0.16
15	NT	NT	NT		
16	NT	NT	NT		
17	0.287	0.057	NR	-1.24	-1.47
18	0.470	0.14	110	1.15	0.61
19	NT	NT	NT		
20	0.404	0.121	117	0.29	0.18
21	0.3	0.13	115	-1.07	-0.61
22	0.309	0.006	NR	-0.96	-2.39
23	0.37	0.04	91	-0.16	-0.24
24	0.306	0.08	100.61	-0.99	-0.89
25	0.385	0.0963	88	0.04	0.03
26	0.398	0.0879	76	0.21	0.17
27	0.45	0.13	94	0.89	0.51
29	0.144	0.034	NR	-3.12	-5.25
31	0.36	0.05	103	-0.29	-0.38
32	0.545	0.2725	69	2.13	0.59
33	411.6154	102.9039	75.8	5382.64	4.00

Statistics

Assigned Value	0.382	0.030
Spike	Not Spiked	
Robust Average*	0.377	0.032
Median*	0.381	0.013
Mean*	0.372	
N	27	
Max.	411.6154	
Min.	0.144	
Robust SD*	0.064	
Robust CV*	17%	

* Results from laboratory 33 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 29 and 33.


Kernel Density
Density
Result
Results: S3 - PFPeA
Assigned Value = 0.382 ± 0.030 ug/L
Results (ug/L)
Laboratory
29 1 17 21 24 22 11 31 23 4 8 3 13 5 25 12 26 2 7 14 20 10 27 6 18 32 33 15 16 19 9 Md R.A.


z-Scores: S3 - PFPeA
Target Standard Deviation 0.076 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
29 1 17 21 24 22 11 31 23 4 8 3 13 5 25 12 26 2 7 14 20 10 27 6 18 32 33

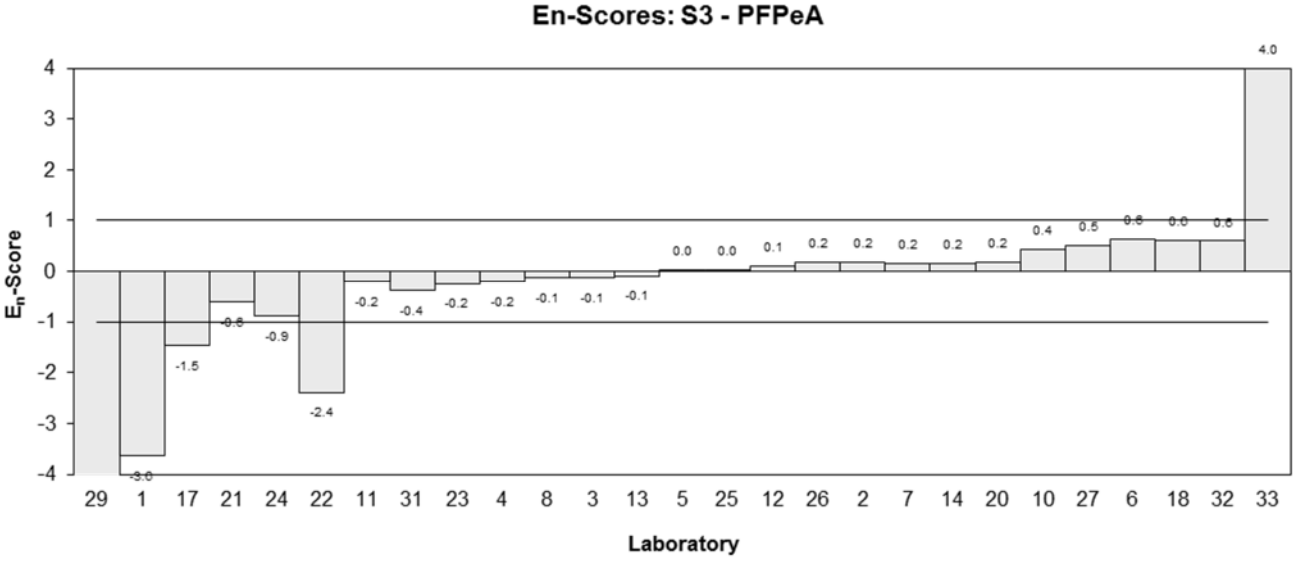

En-Scores: S3 - PFPeA
En-Score
Laboratory
29 1 17 21 24 22 11 31 23 4 8 3 13 5 25 12 26 2 7 14 20 10 27 6 18 32 33

Figure 47

Table 57

Sample Details

Sample No.	S3
Matrix.	water
Analyte.	PFTeDA
Units	µg/L

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	<0.03	NR	NR
2	0.050	0.010	NR
3	0.036	0.093	NR
4	<0.002	0.0007	92
5	NT	NT	NT
6	<0.05	0.01	51
7	0.049	0.015	56
8	<0.05	0.009	98.8
9	NT	NT	NT
10	0.054	0.016	NR
11	<0.5	NR	72
12	0.0484	0.0145	82
13	0.0453	0.00747	127
14	0.012	0.004	30
15	NT	NT	NT
16	NT	NT	NT
17	NT	NT	NT
18	<0.005	0.002	54
19	NT	NT	NT
20	0.0496	0.0174	113
21	< 0.07	0.02	NR
22	0.009	0.001	NR
23	<0.1	NR	133
24	0.082	0.0048	76.74
25	NT	NT	NT
26	0.0643	0.0134	63
27	0.053	0.02	96
29	NT	NT	NT
31	<0.05	0.01	108
32	0.0383	0.01915	67
33	NR	NR	91.4

Statistics

Assigned Value	Not Set	
Spike	0.078	0.004
Robust Average	0.046	0.011
Median	0.049	0.004
Mean	0.045	
N	13	
Max.	0.082	
Min.	0.009	
Robust SD	0.015	
Robust CV	32%	

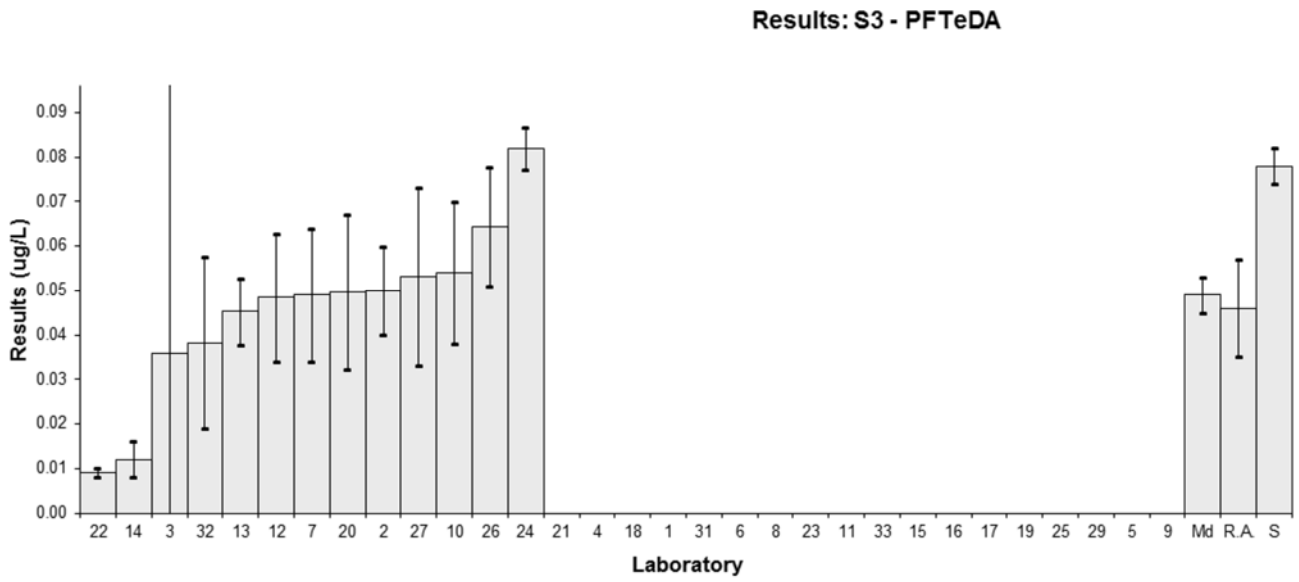

Results: S3 - PFTeDA
Results (ug/L)
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
22 14 3 32 13 12 7 20 2 27 10 26 24 21 4 18 1 31 6 8 23 11 33 15 16 17 19 25 29 5 9 Md R.A. S
Laboratory

Figure 48

Table 58

Sample Details

Sample No.	S4
Matrix.	water
Analyte.	EtFOSE
Units	µg/L

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	<0.02	NR	NR
2	<0.008	NR	NR
3	NT	NT	NT
4	<0.01	0.0059	85
5	NT	NT	NT
6	<0.05	0.01	30
7	0.010	0.003	76
8	<0.05	0.001	118.9
9	NT	NT	NT
10	NT	NT	NT
11	<0.5	NR	74
12	0.0120	0.010	58
13	NT	NT	NT
14	NT	NT	NT
15	NT	NT	NT
16	NT	NT	NT
17	NT	NT	NT
18	<0.005	0.002	117
19	NT	NT	NT
20	< 0.04	NR	49.6
21	< 0.07	0.06	NR
22	0.004	0	NR
23	0.0062	0.002	111
24	0.0029	0.0017	31.87
25	NT	NT	NT
26	0.0202	0.00414	69
27	<0.05	NR	78
29	NT	NT	NT
31	<0.05	0.01	105
32	NT	NT	NT
33	NR	NR	45.1

Statistics

Assigned Value	Not Set	
Spike	0.029	0.001
Robust Average	0.0092	0.0073
Median	0.0081	0.0062
Mean	0.0092	
N	6	
Max.	0.0202	
Min.	0.0029	
Robust SD	0.0071	
Robust CV	77%	

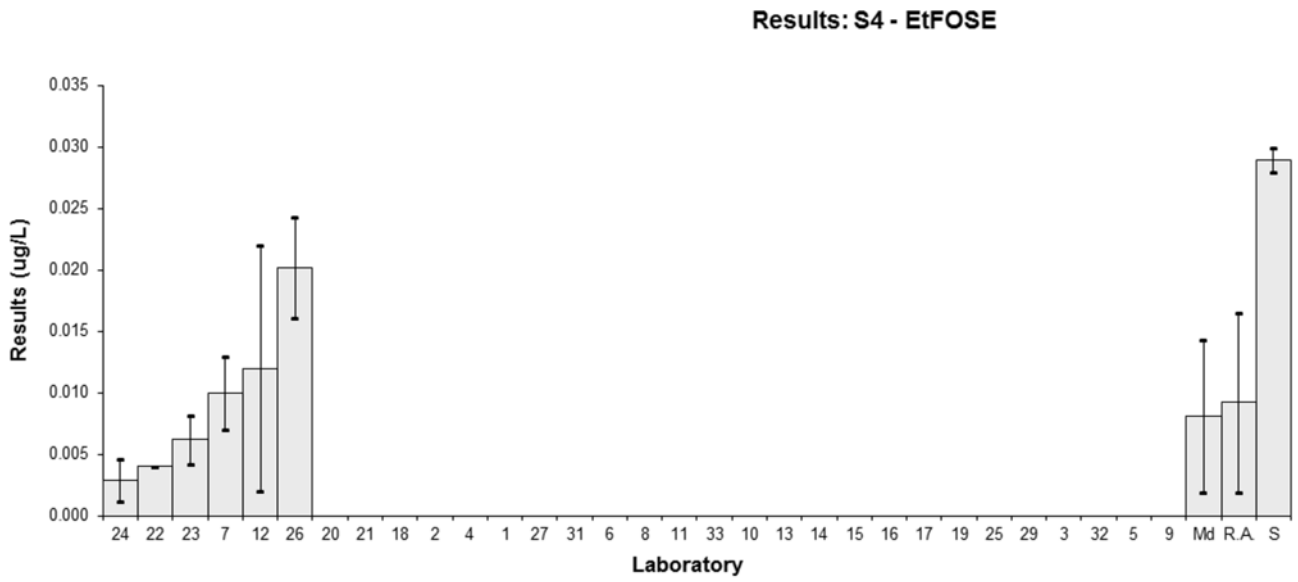

Results: S4 - EtFOSE
Results (ug/L)
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
24 22 23 7 12 26 20 21 18 2 4 1 27 31 6 8 11 33 10 13 14 15 16 17 19 25 29 3 32 5 9 Md R.A. S
Laboratory

Figure 49

Table 59

Sample Details

Sample No.	S4
Matrix.	water
Analyte.	6:2 FTS
Units	µg/L

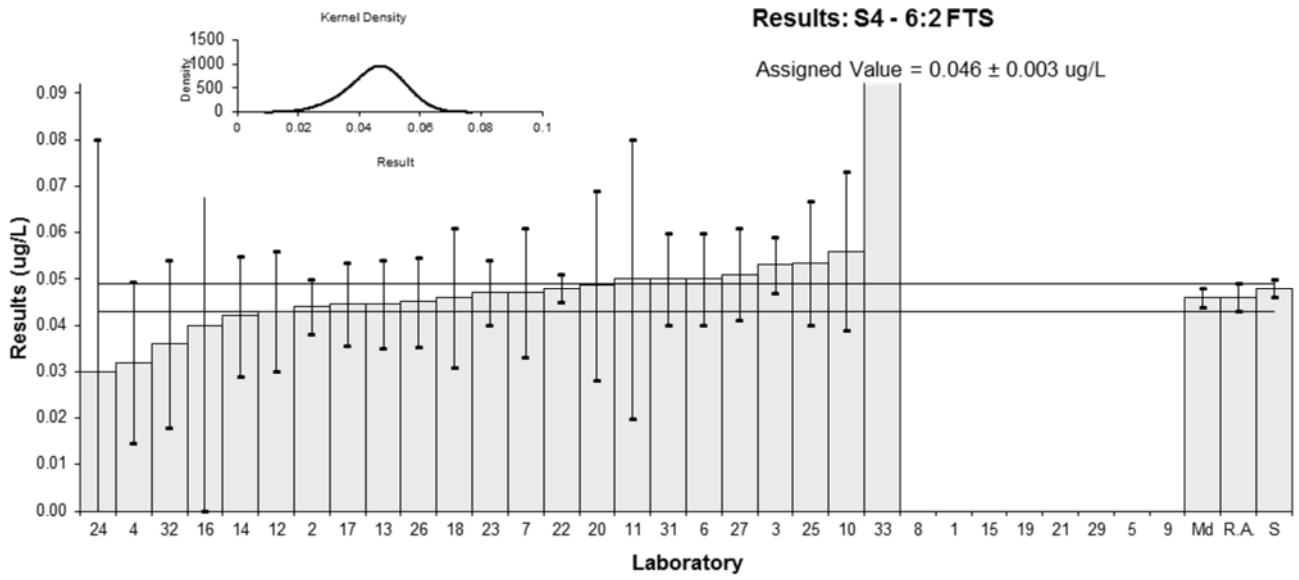
Participant Results

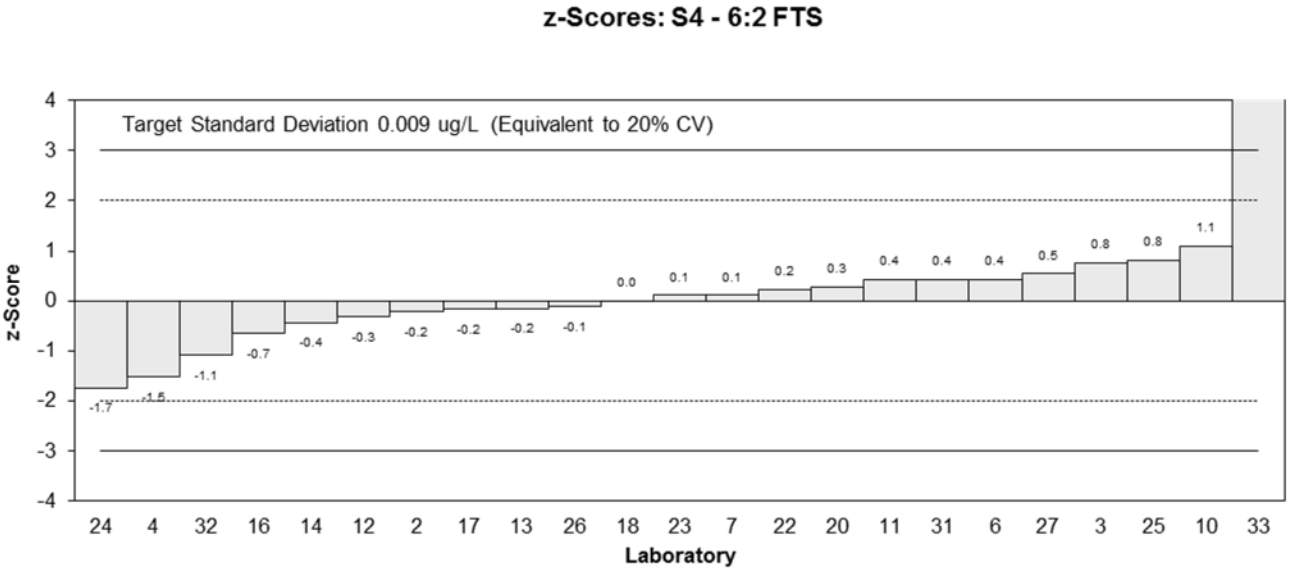
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	0.044	0.006	NR	-0.22	-0.30
3	0.053	0.006	NR	0.76	1.04
4	0.032	0.0173	88	-1.52	-0.80
5	NT	NT	NT		
6	0.05	0.01	68	0.43	0.38
7	0.047	0.014	88	0.11	0.07
8	<0.05	0.02	101.1		
9	NT	NT	NT		
10	0.056	0.017	NR	1.09	0.58
11	0.05	0.03	120	0.43	0.13
12	0.0430	0.0129	94	-0.33	-0.23
13	0.0446	0.00950	97	-0.15	-0.14
14	0.042	0.013	120	-0.43	-0.30
15	NT	NT	NT		
16	0.04	0.04	217	-0.65	-0.15
17	0.0445	0.009	NR	-0.16	-0.16
18	0.046	0.015	102	0.00	0.00
19	NT	NT	NT		
20	0.0486	0.0204	131	0.28	0.13
21	NT	NT	NT		
22	0.048	0.003	NR	0.22	0.47
23	0.047	0.007	93	0.11	0.13
24	0.03	0.05	115.63	-1.74	-0.32
25	0.0535	0.0134	87	0.82	0.55
26	0.0450	0.00963	70	-0.11	-0.10
27	0.051	0.01	80	0.54	0.48
29	NT	NT	NT		
31	0.05	0.01	111	0.43	0.38
32	0.0361	0.01805	127	-1.08	-0.54
33	45.2644	11.3161	82.0	4915.04	4.00

Statistics

Assigned Value	0.046	0.003
Spike	0.048	0.002
Robust Average*	0.046	0.003
Median*	0.046	0.002
Mean*	0.046	
N	23	
Max.	45.2644	
Min.	0.03	
Robust SD*	0.006	
Robust CV*	13%	

* Results from laboratory 33 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S4 - 6:2 FTS
Assigned Value = 0.046 ± 0.003 ug/L
Results (ug/L)
Laboratory
24 4 32 16 14 12 2 17 13 26 18 23 7 22 20 11 31 6 27 3 25 10 33 8 1 15 19 21 29 5 9 Md R.A. S


z-Scores: S4 - 6:2 FTS
Target Standard Deviation 0.009 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
24 4 32 16 14 12 2 17 13 26 18 23 7 22 20 11 31 6 27 3 25 10 33

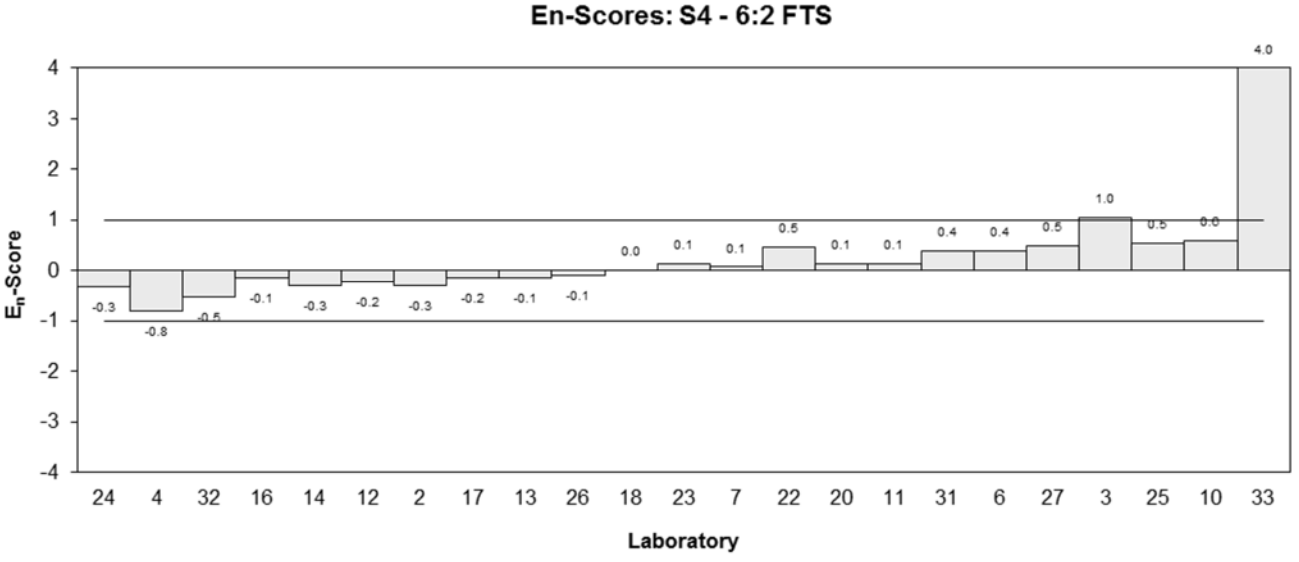

En-Scores: S4 - 6:2 FTS
En-Score
Laboratory
24 4 32 16 14 12 2 17 13 26 18 23 7 22 20 11 31 6 27 3 25 10 33

Figure 50

Table 60

Sample Details

Sample No.	S4
Matrix.	water
Analyte.	8:2 FTS
Units	µg/L

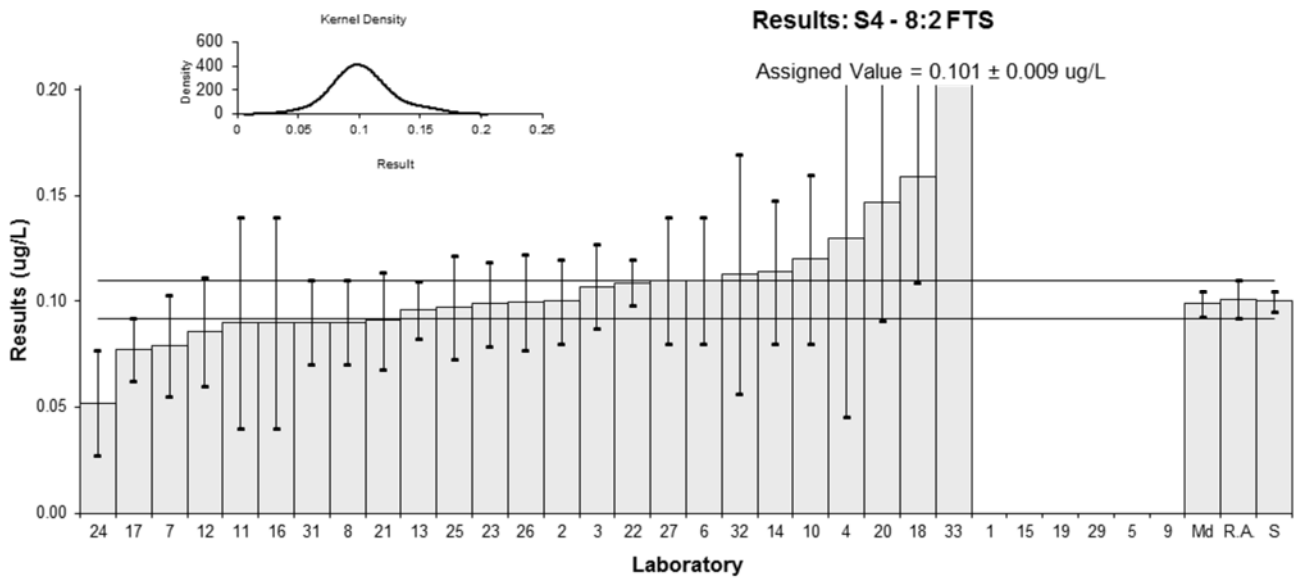
Participant Results

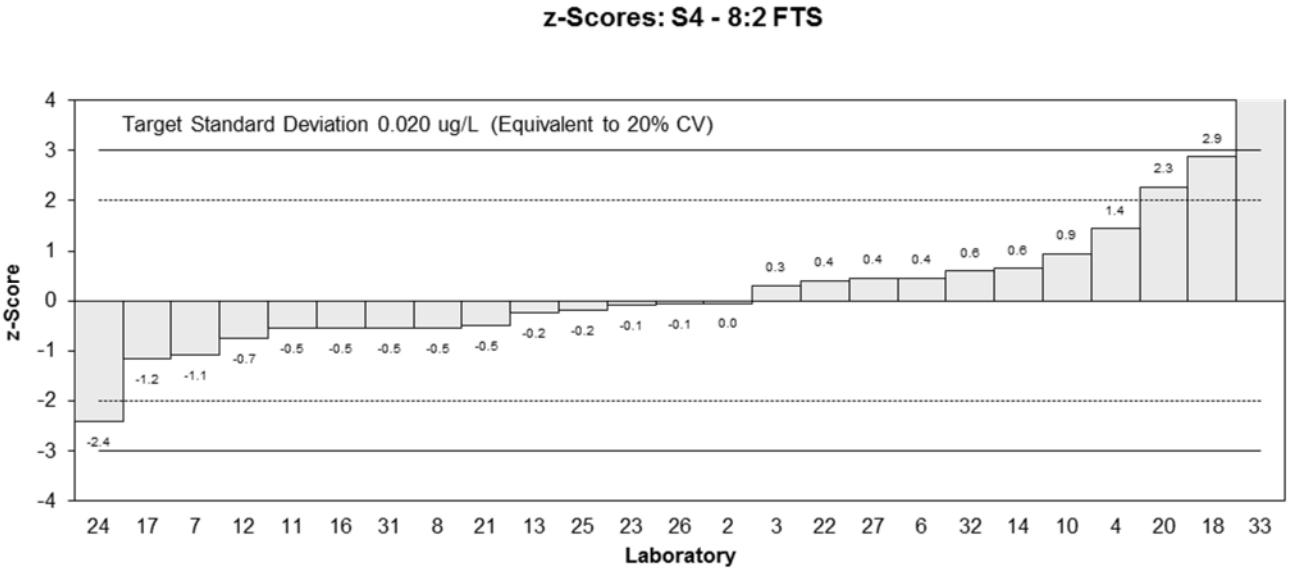
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	0.10	0.02	NR	-0.05	-0.05
3	0.107	0.020	NR	0.30	0.27
4	0.13	0.0846	96	1.44	0.34
5	NT	NT	NT		
6	0.11	0.03	62	0.45	0.29
7	0.079	0.024	66	-1.09	-0.86
8	0.09	0.02	100.1	-0.54	-0.50
9	NT	NT	NT		
10	0.12	0.04	NR	0.94	0.46
11	0.09	0.05	95	-0.54	-0.22
12	0.0859	0.0258	77	-0.75	-0.55
13	0.0960	0.0138	82	-0.25	-0.30
14	0.114	0.034	88	0.64	0.37
15	NT	NT	NT		
16	0.09	0.05	212	-0.54	-0.22
17	0.0773	0.015	NR	-1.17	-1.35
18	0.159	0.050	79	2.87	1.14
19	NT	NT	NT		
20	0.147	0.0560	113	2.28	0.81
21	0.091	0.023	NR	-0.50	-0.40
22	0.109	0.011	NR	0.40	0.56
23	0.099	0.02	200	-0.10	-0.09
24	0.052	0.025	37.64	-2.43	-1.84
25	0.0973	0.0243	87	-0.18	-0.14
26	0.0996	0.0225	59	-0.07	-0.06
27	0.11	0.03	80	0.45	0.29
29	NT	NT	NT		
31	0.09	0.02	105	-0.54	-0.50
32	0.113	0.0565	77	0.59	0.21
33	115.6689	28.9172	69.2	5721.18	4.00

Statistics

Assigned Value	0.101	0.009
Spike	0.100	0.005
Robust Average*	0.101	0.009
Median*	0.099	0.006
Mean*	0.102	
N	25	
Max.	115.6689	
Min.	0.052	
Robust SD*	0.018	
Robust CV*	18%	

* Results from laboratory 33 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S4 - 8:2 FTS
Assigned Value = 0.101 ± 0.009 ug/L
Results (ug/L)
Laboratory
24 17 7 12 11 16 31 8 21 13 25 23 26 2 3 22 27 6 32 14 10 4 20 18 33 1 15 19 29 5 9 Md R.A. S


z-Scores: S4 - 8:2 FTS
Target Standard Deviation 0.020 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
24 17 7 12 11 16 31 8 21 13 25 23 26 2 3 22 27 6 32 14 10 4 20 18 33

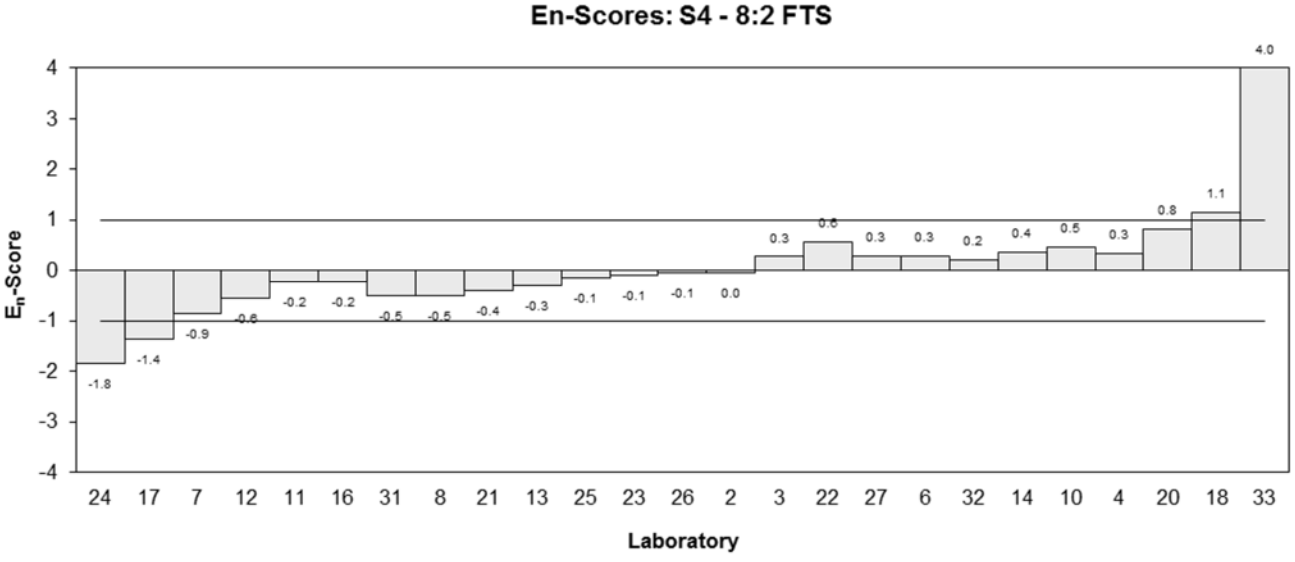

En-Scores: S4 - 8:2 FTS
En-Score
Laboratory
24 17 7 12 11 16 31 8 21 13 25 23 26 2 3 22 27 6 32 14 10 4 20 18 33

Figure 51

Table 61

Sample Details

Sample No.	S4
Matrix.	water
Analyte.	MeFOSA
Units	µg/L

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	<0.03	NR	NR
2	<0.008	NR	NR
3	NT	NT	NT
4	<0.005	0.0023	88
5	NT	NT	NT
6	<0.05	0.01	43
7	<0.01	NR	92
8	<0.05	0.005	95.2
9	NT	NT	NT
10	<0.01	NR	NR
11	<0.05	NR	78
12	0.00535	0.010	72
13	NT	NT	NT
14	NT	NT	NT
15	NT	NT	NT
16	NT	NT	NT
17	NT	NT	NT
18	<0.005	0.002	102
19	NT	NT	NT
20	< 0.005	NR	48.6
21	< 0.02	0.017	NR
22	0.002	0.001	NR
23	< 0.005	NR	113
24	<0.005	NR	13.05
25	NT	NT	NT
26	<0.0198	NR	71
27	<0.02	NR	66
29	NT	NT	NT
31	<0.05	0.01	103
32	NT	NT	NT
33	NR	NR	22.0

Statistics

Assigned Value	Not Set	
Spike	0.031	0.002
N	2	

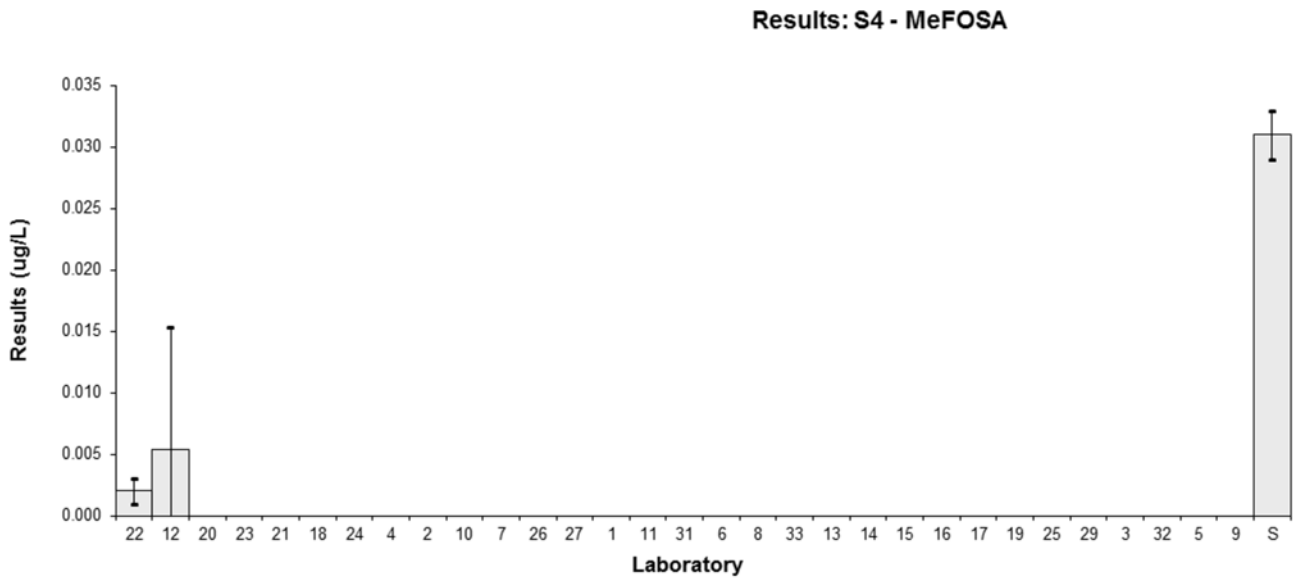

Results: S4 - MeFOSA
Results (ug/L)
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
22 12 20 23 21 18 24 4 2 10 7 26 27 1 11 31 6 8 33 13 14 15 16 17 19 25 29 3 32 5 9 S
Laboratory

Figure 52

Table 62

Sample Details

Sample No.	S4
Matrix.	water
Analyte.	PFBA
Units	µg/L

Participant Results

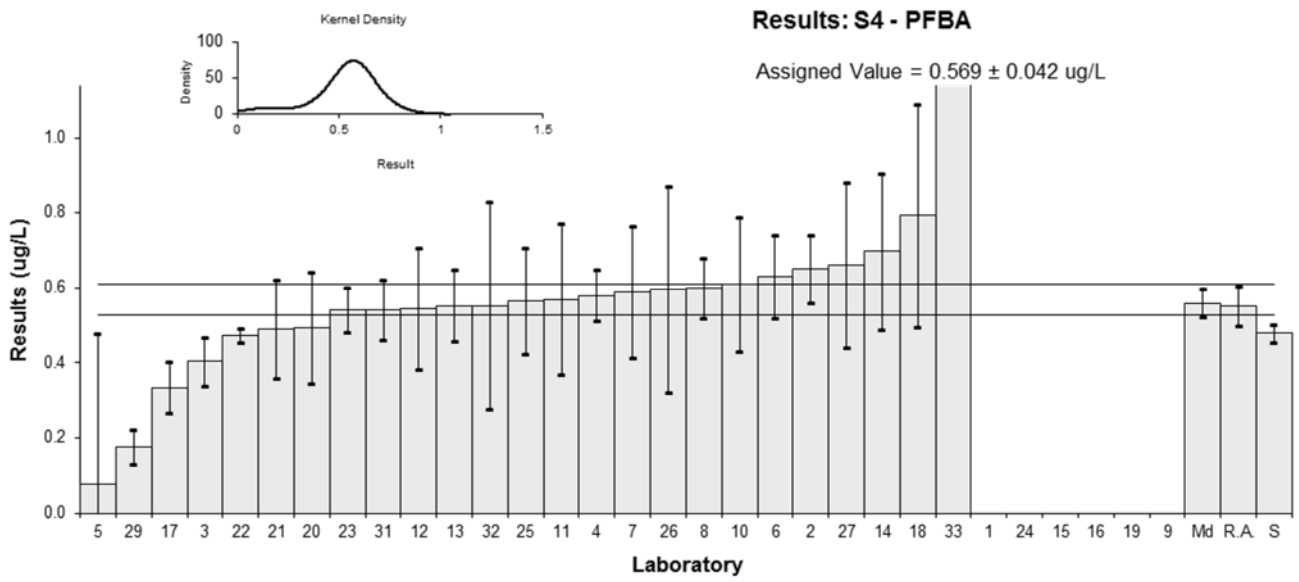
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	<0.05	NR	NR		
2	0.65	0.09	NR	0.71	0.82
3	0.403	0.065	91.37	-1.46	-2.15
4	0.58	0.0692	105	0.10	0.14
5	0.0773	0.401	229.3	-4.32	-1.22
6	0.63	0.11	52	0.54	0.52
7	0.589	0.177	90	0.18	0.11
8	0.6	0.08	101.0	0.27	0.34
9	NT	NT	NT		
10	0.61	0.18	NR	0.36	0.22
11	0.57	0.2	112	0.01	0.00
12	0.544	0.163	92	-0.22	-0.15
13	0.553	0.0962	103	-0.14	-0.15
14	0.697	0.209	53	1.12	0.60
15	NT	NT	NT		
16	NT	NT	NT		
17	0.3344	0.067	NR	-2.06	-2.97
18	0.792	0.296	96	1.96	0.75
19	NT	NT	NT		
20	0.493	0.148	102	-0.67	-0.49
21	0.49	0.13	108	-0.69	-0.58
22	0.473	0.019	NR	-0.84	-2.08
23	0.54	0.06	117	-0.25	-0.40
24	<2.0	NR	116.21		
25	0.564	0.141	86	-0.04	-0.03
26	0.597	0.275	66	0.25	0.10
27	0.66	0.22	92	0.80	0.41
29	0.175	0.046	NR	-3.46	-6.33
31	0.54	0.08	97	-0.25	-0.32
32	0.553	0.2765	95	-0.14	-0.06
33	663.0160	165.7540	89.3	5821.15	4.00

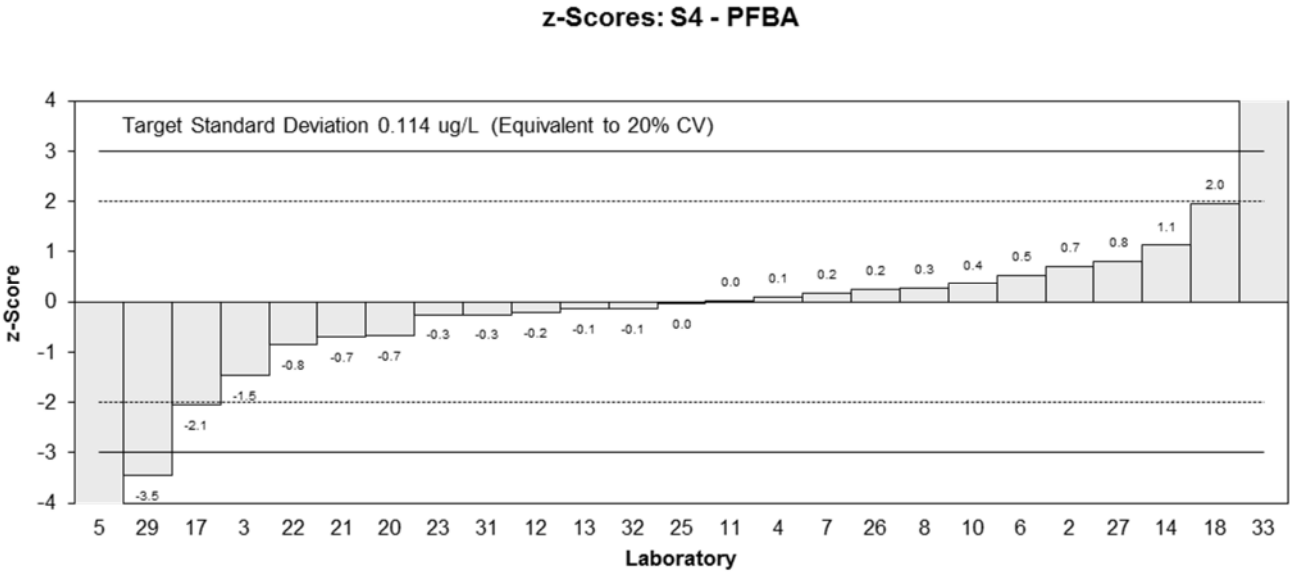
Statistics

Assigned Value**	0.569	0.042
Spike	0.478	0.024
Robust Average*	0.551	0.053
Median*	0.559	0.037
Mean*	0.530	
N	25	
Max.	663.016	
Min.	0.0773	
Robust SD*	0.103	
Robust CV*	19%	

* Results from laboratory 33 were omitted from the statistical calculations.

** Assigned value is the robust average excluding laboratories 5, 29 and 33.


Kernel Density
Density
Result
Results: S4 - PFBA
Assigned Value = 0.569 ± 0.042 ug/L
Results (ug/L)
Laboratory
5 29 17 3 22 21 20 23 31 12 13 32 25 11 4 7 26 8 10 6 2 27 14 18 33 1 24 15 16 19 9 Md R.A. S


z-Scores: S4 - PFBA
Target Standard Deviation 0.114 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
5 29 17 3 22 21 20 23 31 12 13 32 25 11 4 7 26 8 10 6 2 27 14 18 33

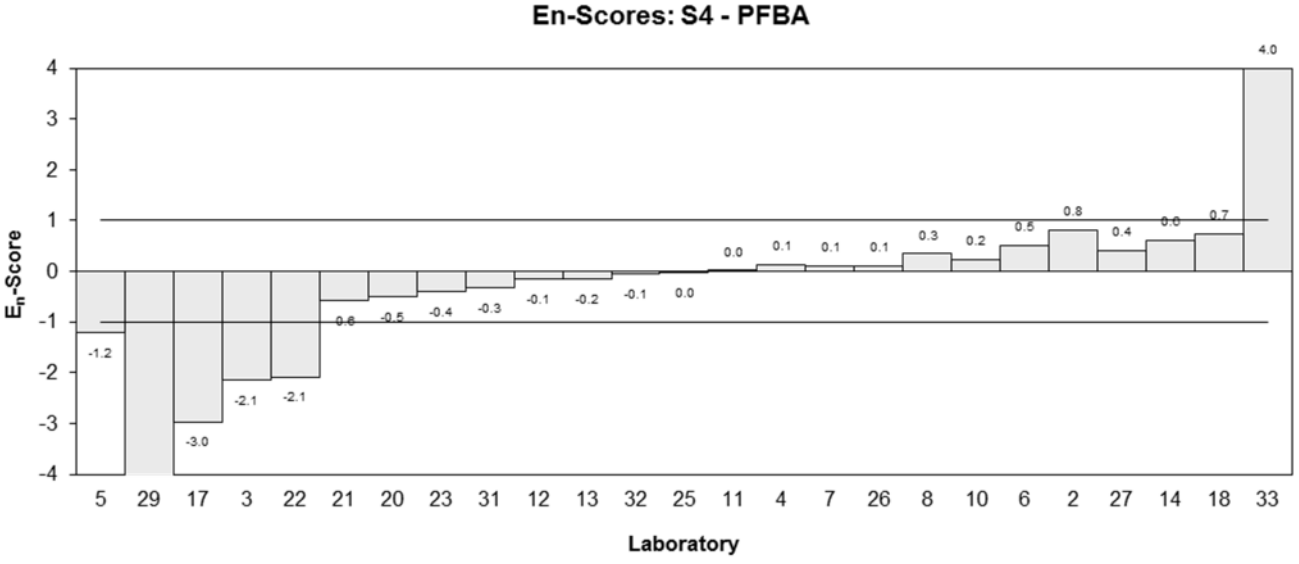

En-Scores: S4 - PFBA
En-Score
Laboratory
5 29 17 3 22 21 20 23 31 12 13 32 25 11 4 7 26 8 10 6 2 27 14 18 33

Figure 53

Table 63

Sample Details

Sample No.	S4
Matrix.	water
Analyte.	PFBS
Units	µg/L

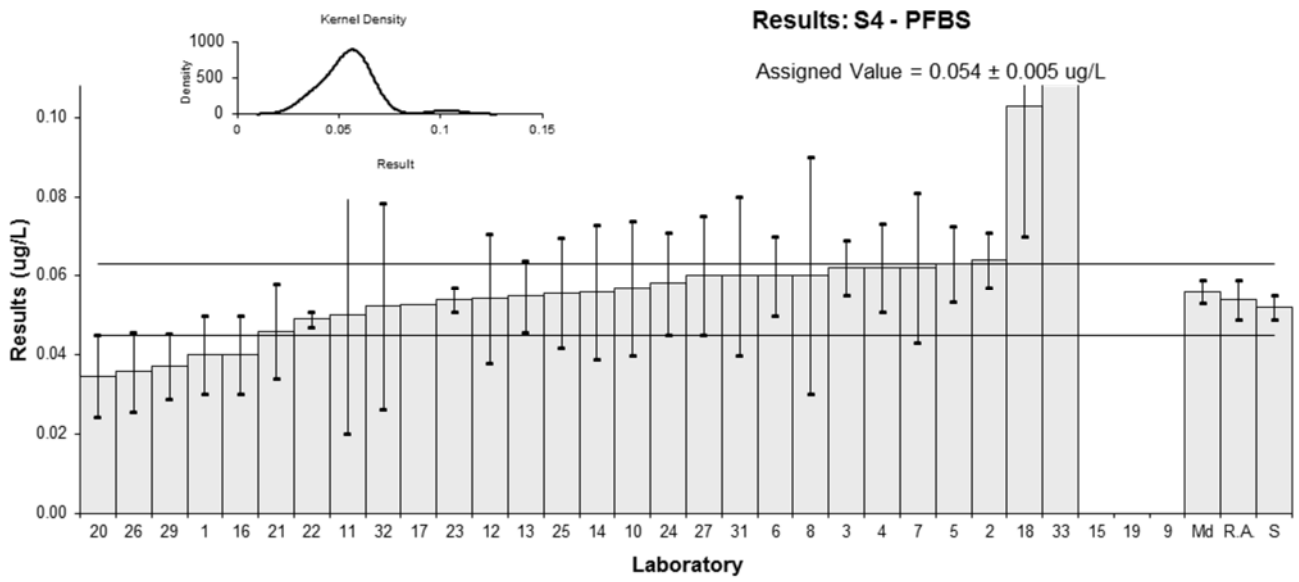
Participant Results

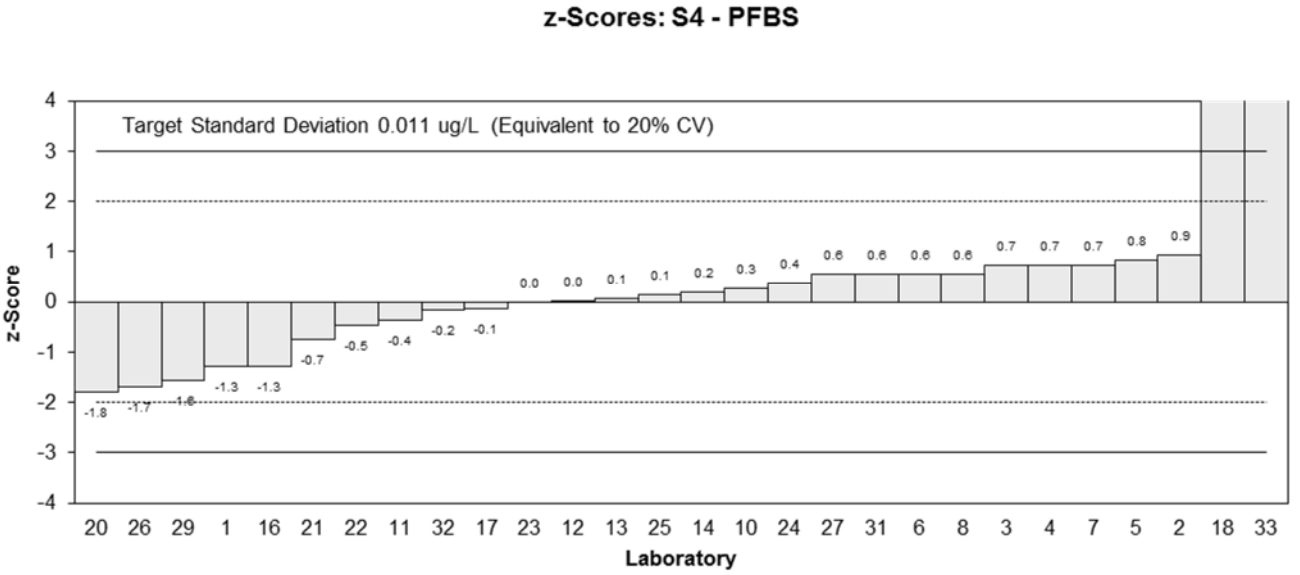
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.04	0.01	NR	-1.30	-1.25
2	0.064	0.007	NR	0.93	1.16
3	0.062	0.007	NR	0.74	0.93
4	0.062	0.0111	101	0.74	0.66
5	0.0631	0.0095	104.3	0.84	0.85
6	0.06	0.01	93	0.56	0.54
7	0.062	0.019	98	0.74	0.41
8	0.06	0.03	98.7	0.56	0.20
9	NT	NT	NT		
10	0.057	0.017	NR	0.28	0.17
11	0.05	0.03	96	-0.37	-0.13
12	0.0542	0.0163	97	0.02	0.01
13	0.0548	0.00904	95	0.07	0.08
14	0.056	0.017	89	0.19	0.11
15	NT	NT	NT		
16	0.04	0.01	95	-1.30	-1.25
17	0.0525	NR	NR	-0.14	-0.30
18	0.103	0.033	54	4.54	1.47
19	NT	NT	NT		
20	0.0346	0.0104	111	-1.80	-1.68
21	0.046	0.012	109	-0.74	-0.62
22	0.049	0.002	NR	-0.46	-0.93
23	0.054	0.003	109	0.00	0.00
24	0.058	0.013	93.24	0.37	0.29
25	0.0556	0.0139	87	0.15	0.11
26	0.0357	0.0100	67	-1.69	-1.64
27	0.060	0.015	94	0.56	0.38
29	0.037	0.0083	NR	-1.57	-1.75
31	0.06	0.02	107	0.56	0.29
32	0.0523	0.02615	95	-0.16	-0.06
33	53.1350	13.2838	90.6	4914.91	4.00

Statistics

Assigned Value**	0.054	0.005
Spike	0.052	0.003
Robust Average*	0.054	0.005
Median*	0.056	0.003
Mean*	0.055	
N	28	
Max.	53.135	
Min.	0.0346	
Robust SD*	0.010	
Robust CV*	18%	

* Results from laboratory 33 were omitted from the statistical calculations.
** Assigned value is the robust average excluding laboratories 18 and 33.


Kernel Density
Density
Result
Results: S4 - PFBS
Assigned Value = 0.054 ± 0.005 ug/L
Results (ug/L)
Laboratory
20 26 29 1 16 21 22 11 32 17 23 12 13 25 14 10 24 27 31 6 8 3 4 7 5 2 18 33 15 19 9 Md R.A. S


z-Scores: S4 - PFBS
Target Standard Deviation 0.011 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
20 26 29 1 16 21 22 11 32 17 23 12 13 25 14 10 24 27 31 6 8 3 4 7 5 2 18 33

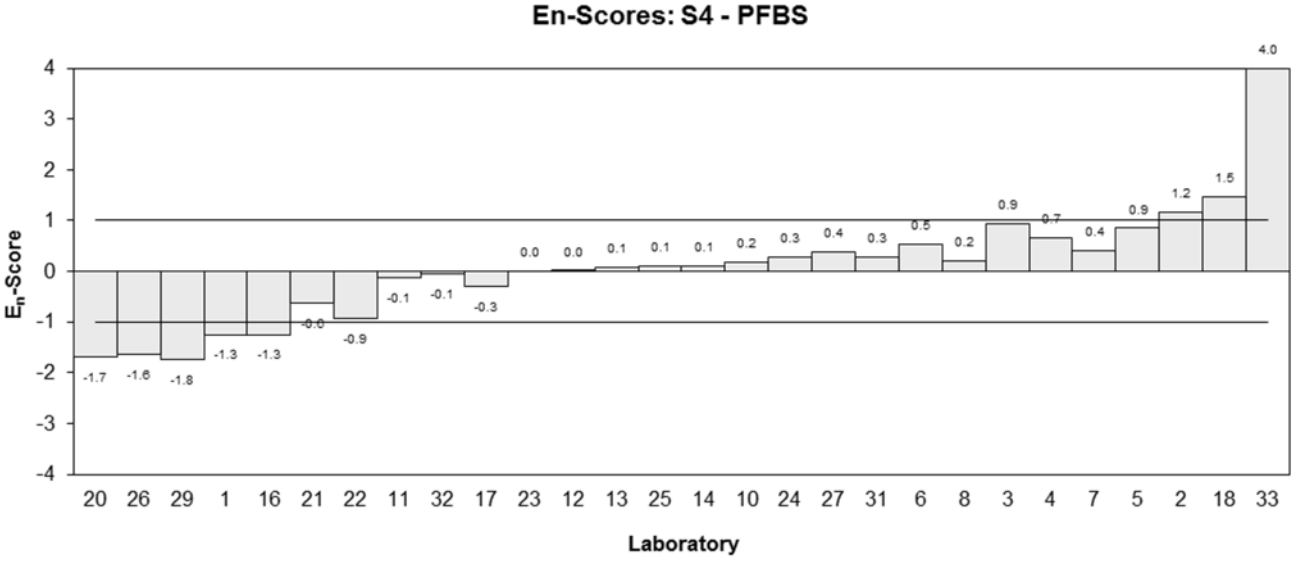

En-Scores: S4 - PFBS
En-Score
Laboratory
20 26 29 1 16 21 22 11 32 17 23 12 13 25 14 10 24 27 31 6 8 3 4 7 5 2 18 33

Figure 54

Table 64

Sample Details

Sample No.	S4
Matrix.	water
Analyte.	PFDA
Units	µg/L

Participant Results

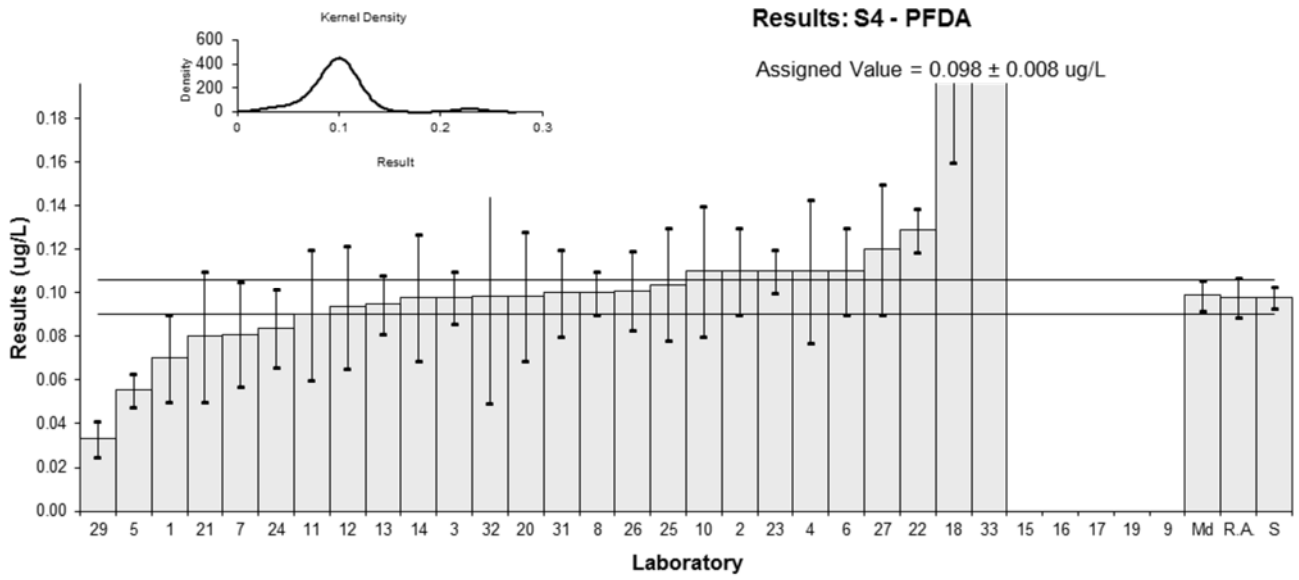
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.07	0.02	NR	-1.43	-1.30
2	0.11	0.02	NR	0.61	0.56
3	0.098	0.012	52.94	0.00	0.00
4	0.11	0.0330	104	0.61	0.35
5	0.0553	0.0075	114.3	-2.18	-3.89
6	0.11	0.02	74	0.61	0.56
7	0.081	0.024	108	-0.87	-0.67
8	0.10	0.01	101.3	0.10	0.16
9	NT	NT	NT		
10	0.11	0.03	NR	0.61	0.39
11	0.09	0.03	94	-0.41	-0.26
12	0.0936	0.0281	102	-0.22	-0.15
13	0.0948	0.0134	102	-0.16	-0.21
14	0.098	0.029	88	0.00	0.00
15	NT	NT	NT		
16	NT	NT	NT		
17	NT	NT	NT		
18	0.229	0.069	55	6.68	1.89
19	NT	NT	NT		
20	0.0985	0.0296	118	0.03	0.02
21	0.08	0.03	96	-0.92	-0.58
22	0.129	0.010	NR	1.58	2.42
23	0.11	0.01	173	0.61	0.94
24	0.084	0.018	12.91	-0.71	-0.71
25	0.104	0.0260	91	0.31	0.22
26	0.101	0.0183	64	0.15	0.15
27	0.12	0.03	86	1.12	0.71
29	0.033	0.0083	NR	-3.32	-5.64
31	0.10	0.02	106	0.10	0.09
32	0.0983	0.04915	83	0.02	0.01
33	109.8510	27.4628	63.8	5599.64	4.00

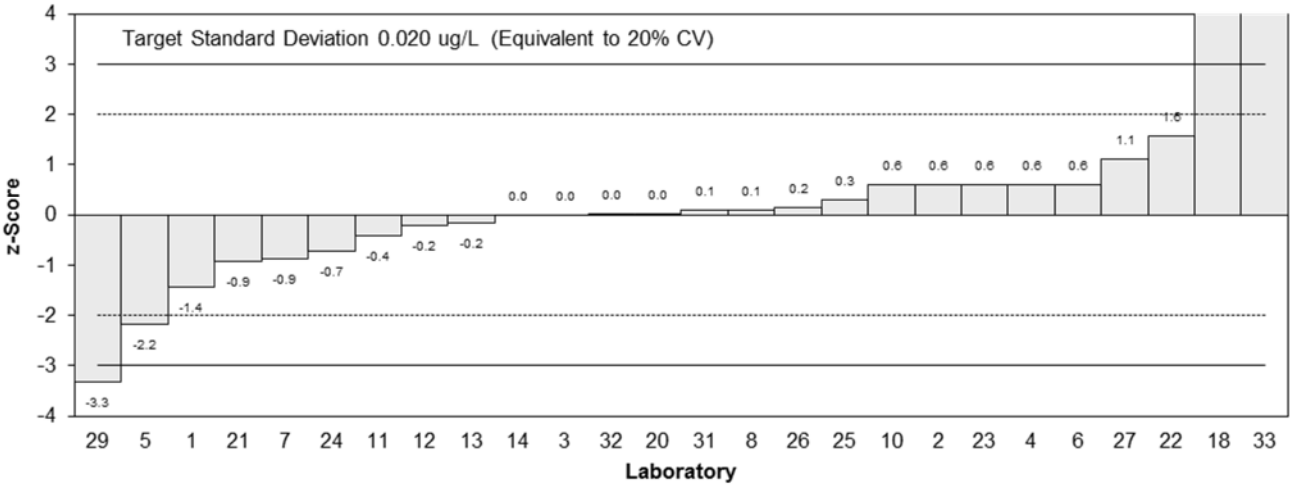
Statistics

Assigned Value**	0.098	0.008
Spike	0.098	0.005
Robust Average*	0.098	0.009
Median*	0.099	0.007
Mean*	0.100	
N	26	
Max.	109.851	
Min.	0.033	
Robust SD*	0.017	
Robust CV*	14%	

* Results from laboratory 33 were omitted from the statistical calculations.

** Assigned value is the robust average excluding laboratories 18, 29 and 33.


Kernel Density
Density
Result
Results: S4 - PFDA
Assigned Value = 0.098 ± 0.008 ug/L
Results (ug/L)
Laboratory
29 5 1 21 7 24 11 12 13 14 3 32 20 31 8 26 25 10 2 23 4 6 27 22 18 33 15 16 17 19 9 Md R.A. S


z-Scores: S4 - PFDA
Target Standard Deviation 0.020 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
29 5 1 21 7 24 11 12 13 14 3 32 20 31 8 26 25 10 2 23 4 6 27 22 18 33

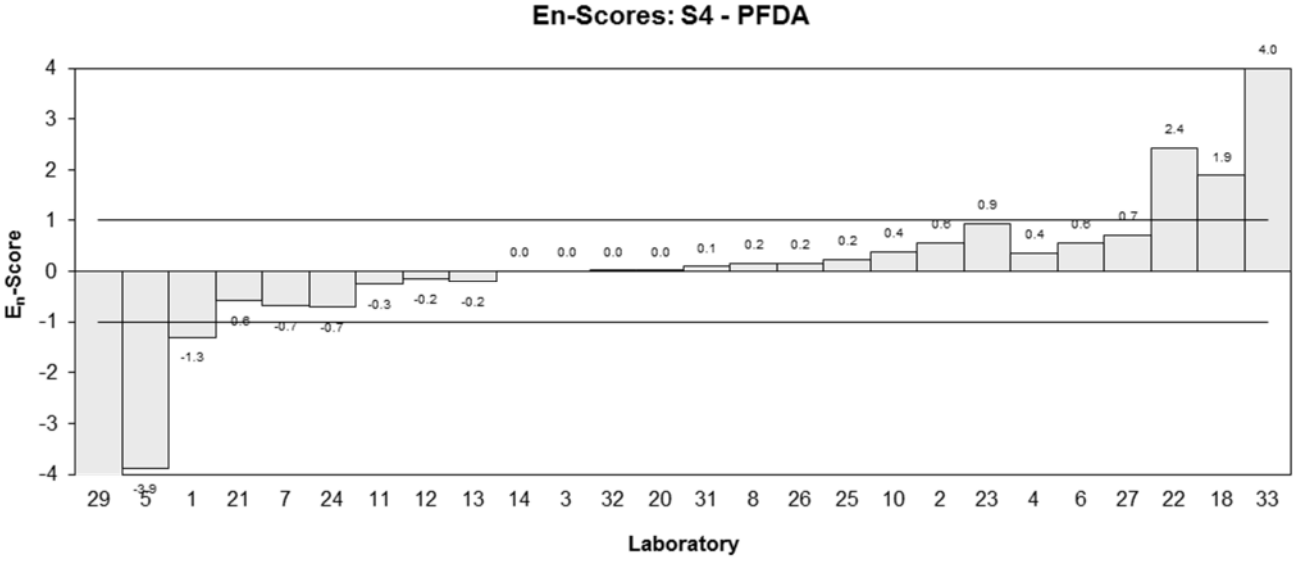

En-Scores: S4 - PFDA
En-Score
Laboratory
29 5 1 21 7 24 11 12 13 14 3 32 20 31 8 26 25 10 2 23 4 6 27 22 18 33

Figure 55

Table 65

Sample Details

Sample No.	S4
Matrix.	water
Analyte.	PFHpA
Units	µg/L

Participant Results

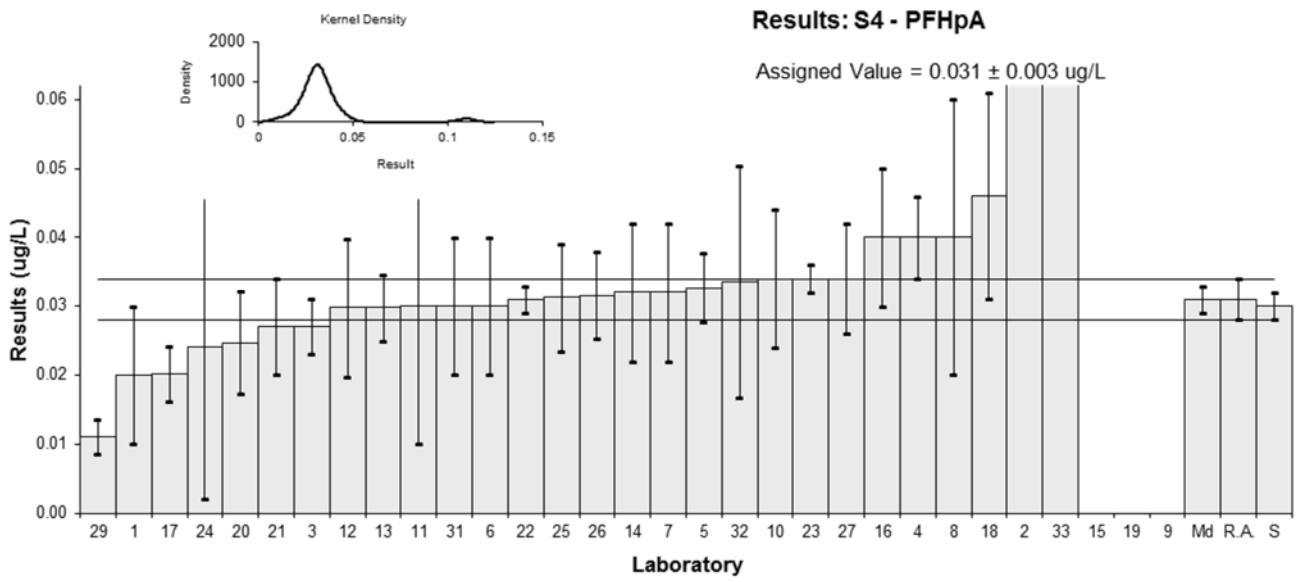
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.02	0.01	NR	-1.77	-1.05
2	0.11	0.03	NR	12.74	2.62
3	0.027	0.004	NR	-0.65	-0.80
4	0.04	0.0059	92	1.45	1.36
5	0.0327	0.005	109.1	0.27	0.29
6	0.03	0.01	66	-0.16	-0.10
7	0.032	0.010	94	0.16	0.10
8	0.04	0.02	95.4	1.45	0.45
9	NT	NT	NT		
10	0.034	0.010	NR	0.48	0.29
11	0.03	0.02	84	-0.16	-0.05
12	0.0298	0.010	104	-0.19	-0.11
13	0.0298	0.00483	101	-0.19	-0.21
14	0.032	0.01	97	0.16	0.10
15	NT	NT	NT		
16	0.04	0.01	58	1.45	0.86
17	0.0201	0.004	NR	-1.76	-2.18
18	0.046	0.015	99	2.42	0.98
19	NT	NT	NT		
20	0.0247	0.00740	115	-1.02	-0.79
21	0.027	0.007	104	-0.65	-0.53
22	0.031	0.002	NR	0.00	0.00
23	0.034	0.002	101	0.48	0.83
24	0.024	0.022	112.15	-1.13	-0.32
25	0.0313	0.00783	101	0.05	0.04
26	0.0316	0.00626	61	0.10	0.09
27	0.034	0.008	90	0.48	0.35
29	0.011	0.0025	NR	-3.23	-5.12
31	0.03	0.01	106	-0.16	-0.10
32	0.0336	0.0168	85	0.42	0.15
33	35.1487	8.7872	85.0	5664.15	4.00

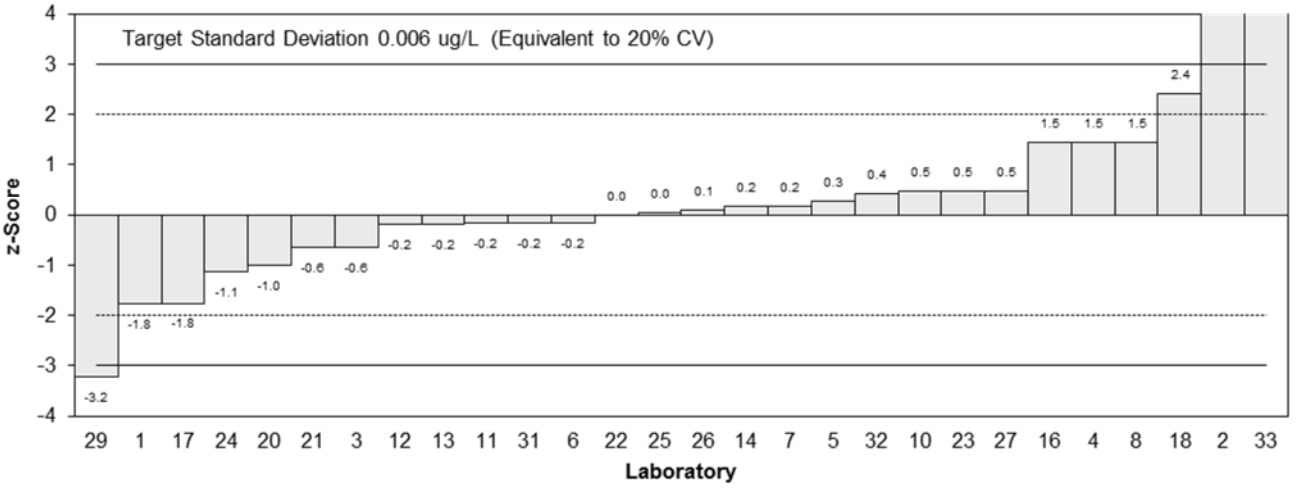
`Statistics

Assigned Value**	0.031	0.003
Spike	0.030	0.002
Robust Average*	0.031	0.003
Median*	0.031	0.002
Mean*	0.034	
N	28	
Max.	35.1487	
Min.	0.011	
Robust SD*	0.007	
Robust CV*	22%	

* Results from laboratory 33 were omitted from the statistical calculations.

** Assigned value is the robust average excluding laboratories 18 and 33.


Kernel Density
Density
Result
Results: S4 - PFHpA
Assigned Value = 0.031 ± 0.003 ug/L
Results (ug/L)
Laboratory
29 1 17 24 20 21 3 12 13 11 31 6 22 25 26 14 7 5 32 10 23 27 16 4 8 18 2 33 15 19 9 Md R.A. S


z-Scores: S4 - PFHpA
Target Standard Deviation 0.006 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
29 1 17 24 20 21 3 12 13 11 31 6 22 25 26 14 7 5 32 10 23 27 16 4 8 18 2 33

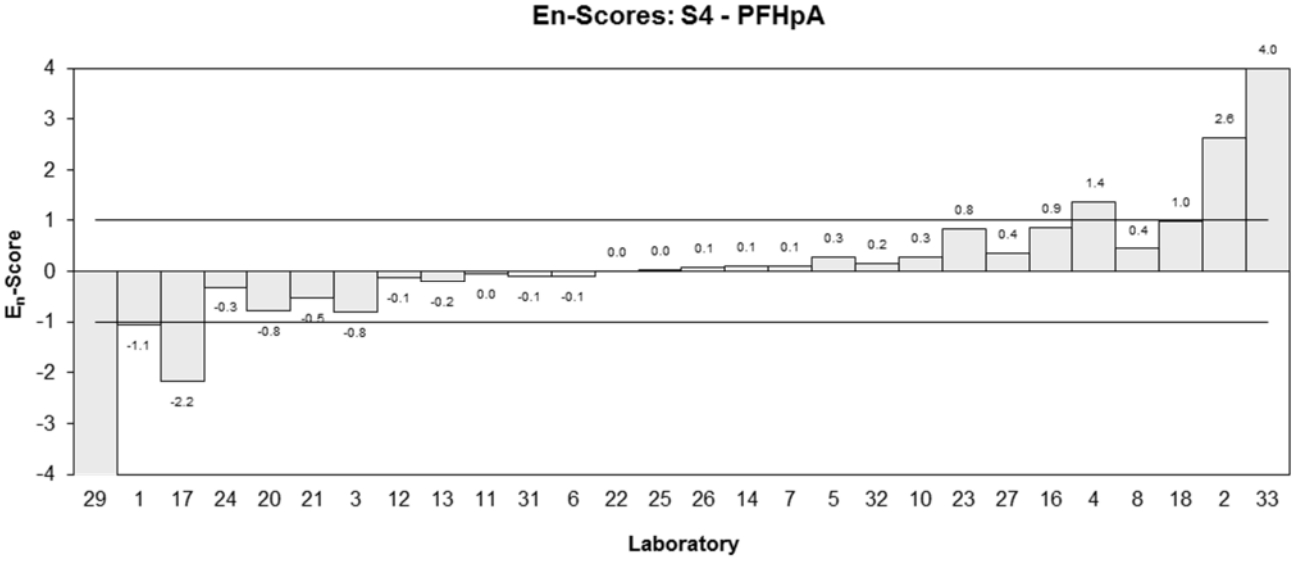

En-Scores: S4 - PFHpA
En-Score
Laboratory
29 1 17 24 20 21 3 12 13 11 31 6 22 25 26 14 7 5 32 10 23 27 16 4 8 18 2 33

Figure 56

Table 66

Sample Details

Sample No.	S4
Matrix.	water
Analyte.	PFHxA
Units	µg/L

Participant Results

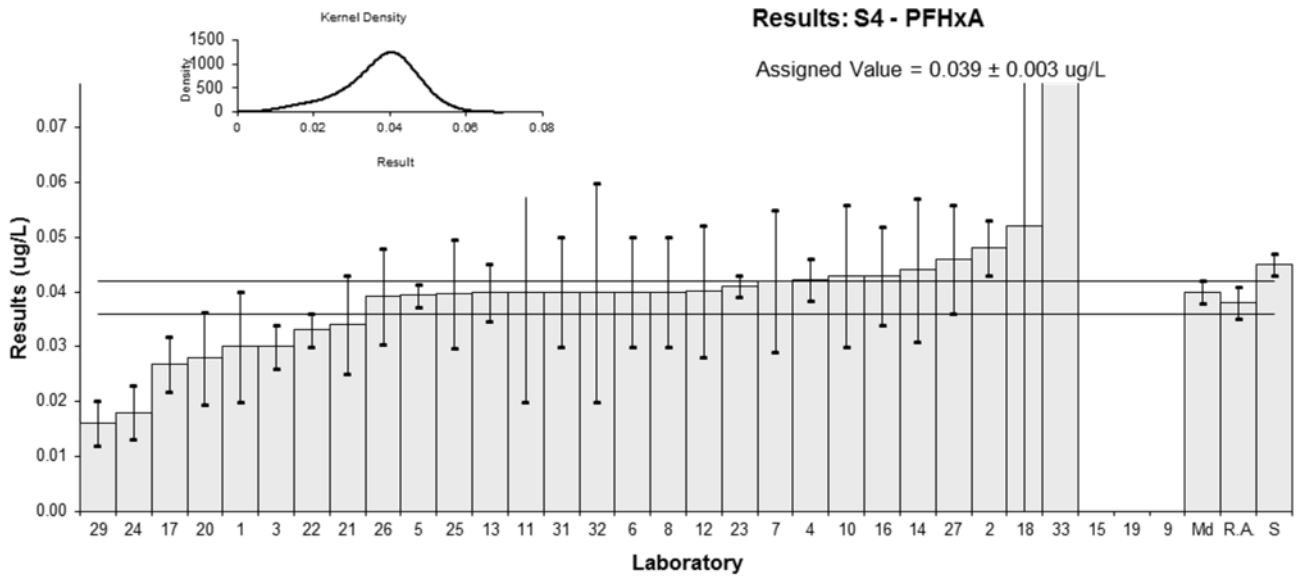
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.03	0.01	NR	-1.15	-0.86
2	0.048	0.005	NR	1.15	1.54
3	0.030	0.004	NR	-1.15	-1.80
4	0.0422	0.0038	95	0.41	0.66
5	0.0394	0.0021	110.5	0.05	0.11
6	0.04	0.01	72	0.13	0.10
7	0.042	0.013	100	0.38	0.22
8	0.04	0.01	96.6	0.13	0.10
9	NT	NT	NT		
10	0.043	0.013	NR	0.51	0.30
11	0.04	0.02	81	0.13	0.05
12	0.0401	0.0120	107	0.14	0.09
13	0.0398	0.00525	103	0.10	0.13
14	0.044	0.013	92	0.64	0.37
15	NT	NT	NT		
16	0.043	0.009	58	0.51	0.42
17	0.0268	0.005	NR	-1.56	-2.09
18	0.052	0.151	82	1.67	0.09
19	NT	NT	NT		
20	0.0279	0.00838	112	-1.42	-1.25
21	0.034	0.009	103	-0.64	-0.53
22	0.033	0.003	NR	-0.77	-1.41
23	0.041	0.002	101	0.26	0.55
24	0.018	0.005	100.08	-2.69	-3.60
25	0.0397	0.00993	101	0.09	0.07
26	0.0392	0.00873	69	0.03	0.02
27	0.046	0.01	98	0.90	0.67
29	0.016	0.0041	NR	-2.95	-4.53
31	0.04	0.01	106	0.13	0.10
32	0.0400	0.02	95	0.13	0.05
33	40.7415	10.1854	87.7	5218.27	4.00

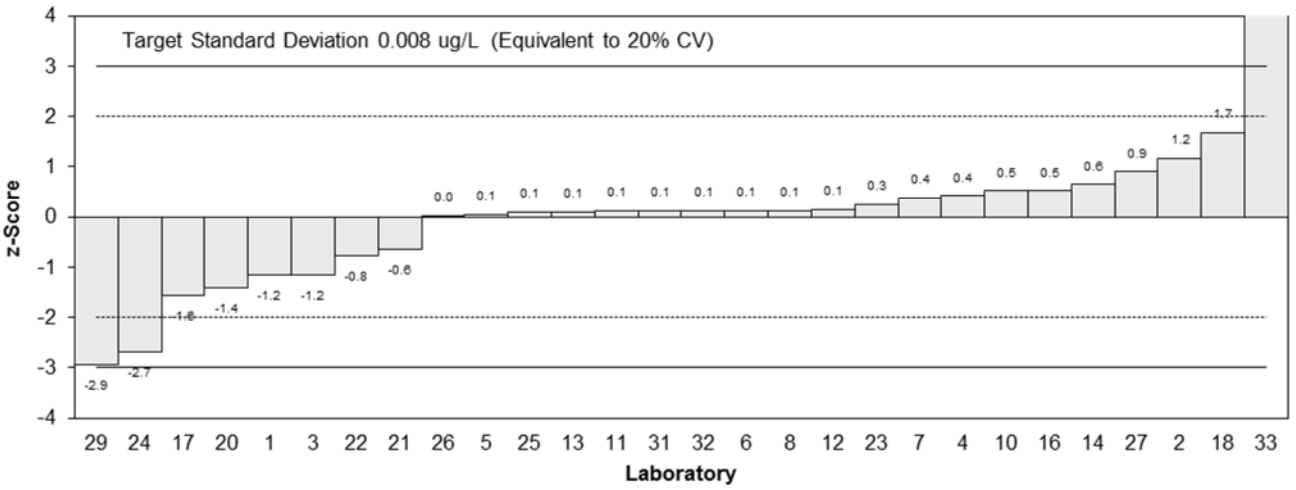
Statistics

Assigned Value**	0.039	0.003
Spike	0.045	0.002
Robust Average*	0.038	0.004
Median*	0.040	0.002
Mean*	0.038	
N	28	
Max.	40.7415	
Min.	0.016	
Robust SD*	0.007	
Robust CV*	18%	

* Results from laboratory 33 were omitted from the statistical calculations.

** Assigned value is the robust average excluding laboratories 24, 29 and 33.


Kernel Density
Density
Result
Results: S4 - PFHxA
Assigned Value = 0.039 ± 0.003 ug/L
Results (ug/L)
Laboratory
29 24 17 20 1 3 22 21 26 5 25 13 11 31 32 6 8 12 23 7 4 10 16 14 27 2 18 33 15 19 9 Md R.A. S


z-Scores: S4 - PFHxA
Target Standard Deviation 0.008 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
29 24 17 20 1 3 22 21 26 5 25 13 11 31 32 6 8 12 23 7 4 10 16 14 27 2 18 33

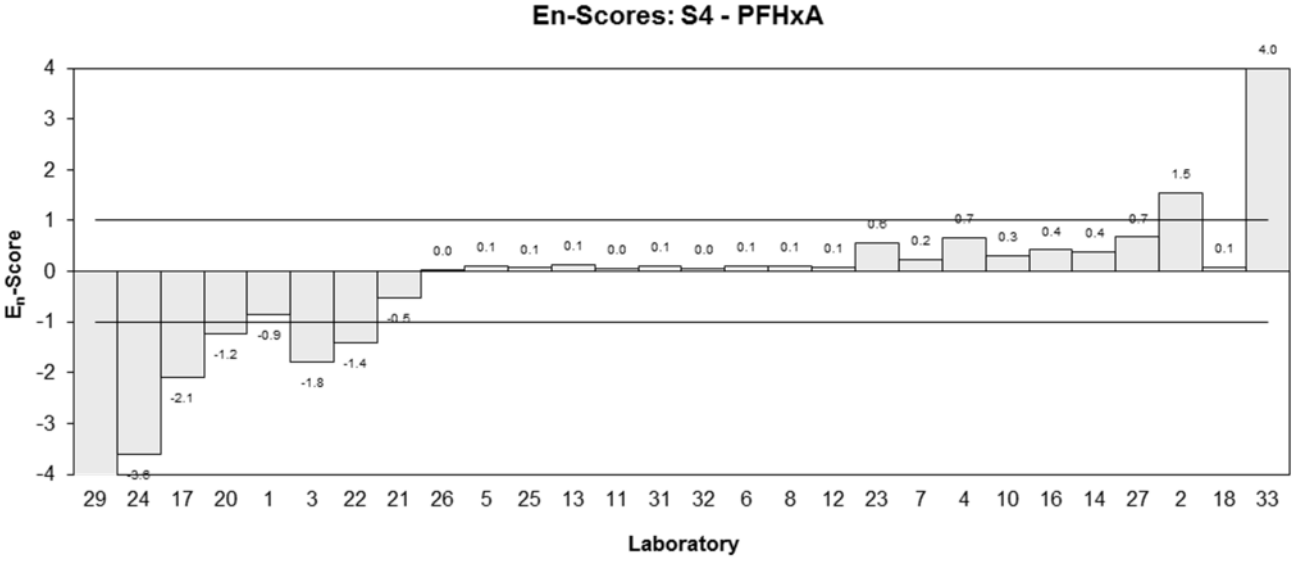

En-Scores: S4 - PFHxA
En-Score
Laboratory
29 24 17 20 1 3 22 21 26 5 25 13 11 31 32 6 8 12 23 7 4 10 16 14 27 2 18 33

Figure 57

Table 67

Sample Details

Sample No.	S4
Matrix.	water
Analyte.	PFHxS
Units	µg/L

Participant Results

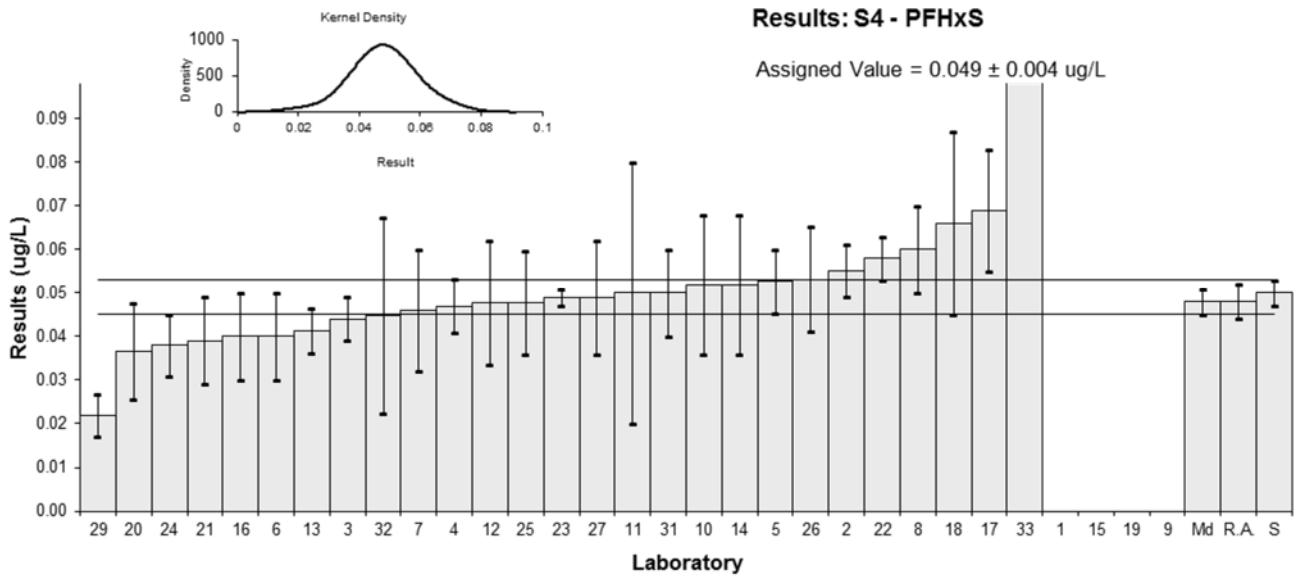
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	<0.02	NR	NR		
2	0.055	0.006	NR	0.61	0.83
3	0.044	0.005	NR	-0.51	-0.78
4	0.047	0.0061	103	-0.20	-0.27
5	0.0527	0.0073	104.3	0.38	0.44
6	0.04	0.01	86	-0.92	-0.84
7	0.046	0.014	102	-0.31	-0.21
8	0.06	0.01	91.4	1.12	1.02
9	NT	NT	NT		
10	0.052	0.016	NR	0.31	0.18
11	0.05	0.03	82	0.10	0.03
12	0.0477	0.0143	95	-0.13	-0.09
13	0.0413	0.00508	105	-0.79	-1.19
14	0.052	0.016	88	0.31	0.18
15	NT	NT	NT		
16	0.04	0.01	95	-0.92	-0.84
17	0.069	0.014	NR	2.04	1.37
18	0.066	0.021	63	1.73	0.80
19	NT	NT	NT		
20	0.0366	0.0110	114	-1.27	-1.06
21	0.039	0.010	103	-1.02	-0.93
22	0.058	0.005	NR	0.92	1.41
23	0.049	0.002	97	0.00	0.00
24	0.038	0.007	93.24	-1.12	-1.36
25	0.0477	0.0119	87	-0.13	-0.10
26	0.0532	0.0120	67	0.43	0.33
27	0.049	0.013	88	0.00	0.00
29	0.022	0.0048	NR	-2.76	-4.32
31	0.05	0.01	108	0.10	0.09
32	0.0449	0.02245	89	-0.42	-0.18
33	52	13	93.7	5301.12	4.00

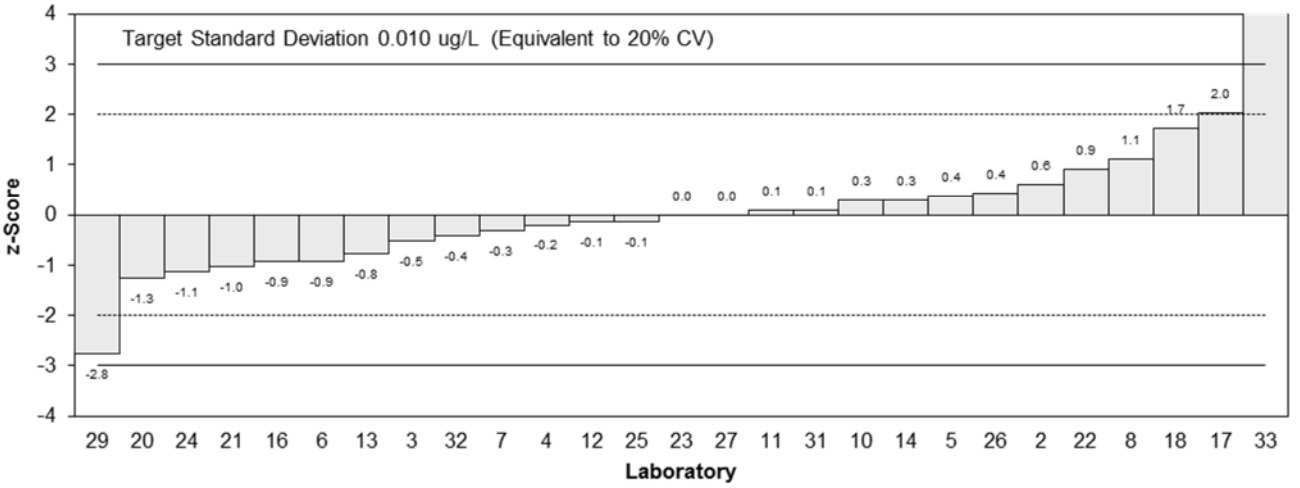
Statistics

Assigned Value**	0.049	0.004
Spike	0.050	0.003
Robust Average*	0.048	0.004
Median*	0.048	0.003
Mean*	0.048	
N	27	
Max.	52	
Min.	0.022	
Robust SD*	0.008	
Robust CV*	17%	

* Results from laboratory 33 were omitted from the statistical calculations.

** Assigned value is the robust average excluding laboratories 29 and 33.


Kernel Density
Density
Result
Results: S4 - PFHxS
Assigned Value = 0.049 ± 0.004 ug/L
Results (ug/L)
Laboratory
29 20 24 21 16 6 13 3 32 7 4 12 25 23 27 11 31 10 14 5 26 2 22 8 18 17 33 1 15 19 9 Md R.A. S


z-Scores: S4 - PFHxS
Target Standard Deviation 0.010 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
29 20 24 21 16 6 13 3 32 7 4 12 25 23 27 11 31 10 14 5 26 2 22 8 18 17 33

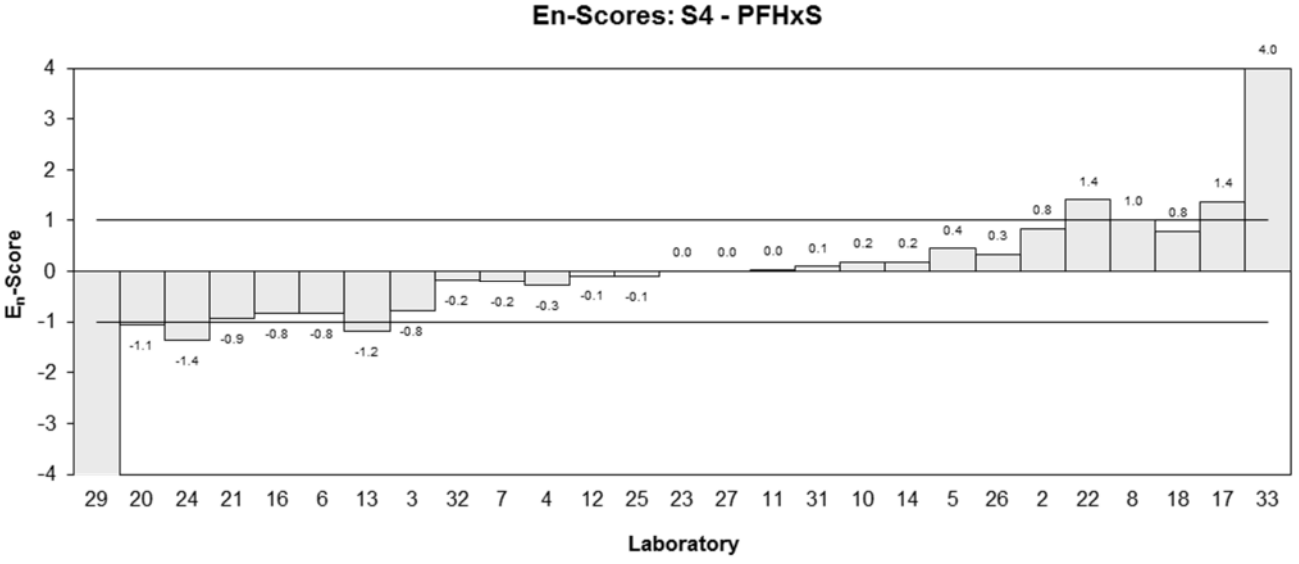

En-Scores: S4 - PFHxS
En-Score
Laboratory
29 20 24 21 16 6 13 3 32 7 4 12 25 23 27 11 31 10 14 5 26 2 22 8 18 17 33

Figure 58

Table 68

Sample Details

Sample No.	S4
Matrix.	water
Analyte.	PFNA
Units	µg/L

Participant Results

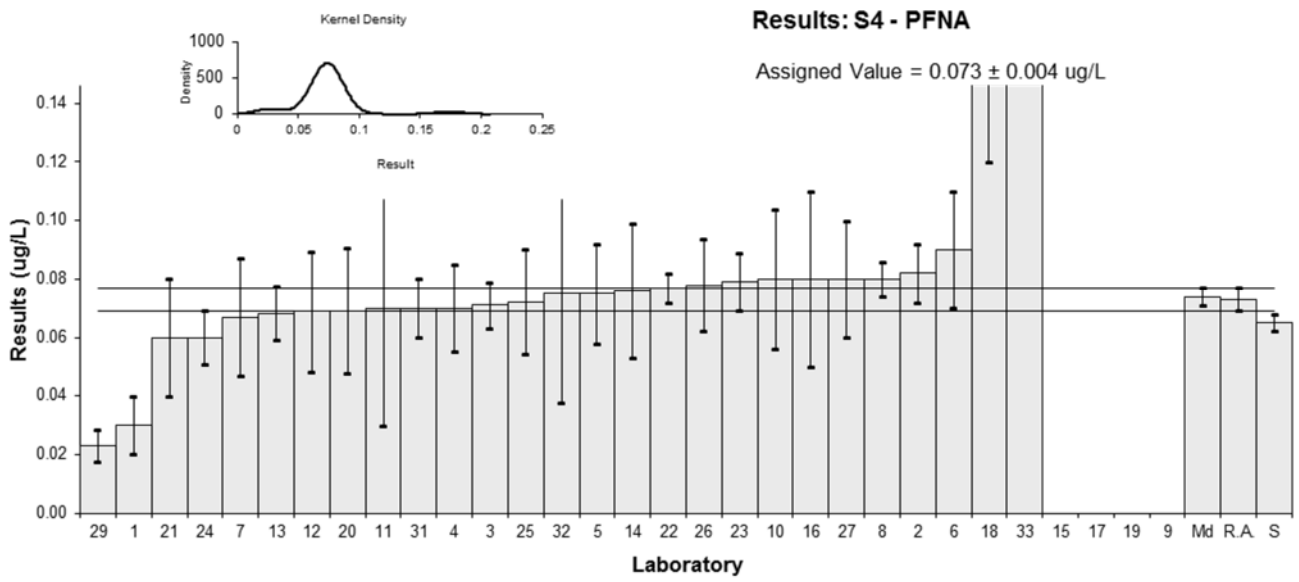
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.03	0.01	NR	-2.95	-3.99
2	0.082	0.010	NR	0.62	0.84
3	0.071	0.008	NR	-0.14	-0.22
4	0.07	0.0149	111	-0.21	-0.19
5	0.0750	0.017	107.8	0.14	0.11
6	0.09	0.02	56	1.16	0.83
7	0.067	0.020	88	-0.41	-0.29
8	0.08	0.006	96.5	0.48	0.97
9	NT	NT	NT		
10	0.080	0.024	NR	0.48	0.29
11	0.07	0.04	99	-0.21	-0.07
12	0.0688	0.0206	97	-0.29	-0.20
13	0.0682	0.00921	97	-0.33	-0.48
14	0.076	0.023	96	0.21	0.13
15	NT	NT	NT		
16	0.08	0.03	95	0.48	0.23
17	NT	NT	NT		
18	0.174	0.054	56	6.92	1.87
19	NT	NT	NT		
20	0.0692	0.0215	113	-0.26	-0.17
21	0.06	0.02	NR	-0.89	-0.64
22	0.077	0.005	NR	0.27	0.62
23	0.079	0.01	120	0.41	0.56
24	0.06	0.009	118.21	-0.89	-1.32
25	0.0721	0.0180	96	-0.06	-0.05
26	0.0779	0.0157	70	0.34	0.30
27	0.080	0.02	90	0.48	0.34
29	0.023	0.0055	NR	-3.42	-7.35
31	0.07	0.01	108	-0.21	-0.28
32	0.0750	0.0375	87	0.14	0.05
33	74.6106	18.6527	72	5105.32	4.00

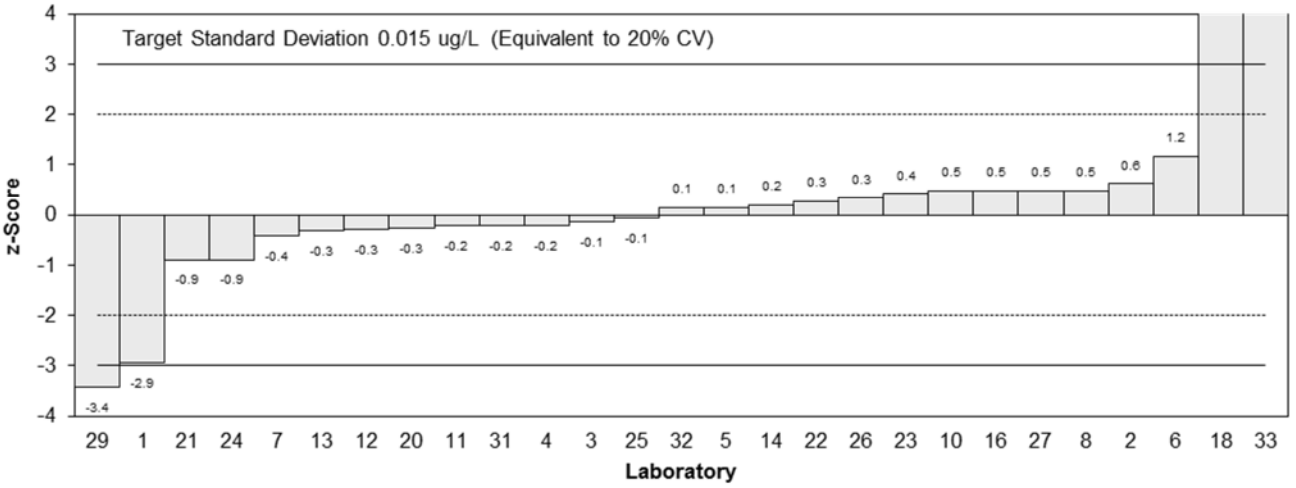
Statistics

Assigned Value**	0.073	0.004
Spike	0.065	0.003
Robust Average*	0.073	0.004
Median*	0.074	0.003
Mean*	0.074	
N	27	
Max.	74.6106	
Min.	0.023	
Robust SD*	0.009	
Robust CV*	12%	

* Results from laboratory 33 were omitted from the statistical calculations.

** Assigned value is the robust average excluding laboratories 18, 29 and 33.


Kernel Density
Density
Result
Results: S4 - PFNA
Assigned Value = 0.073 ± 0.004 ug/L
Results (ug/L)
Laboratory
29 1 21 24 7 13 12 20 11 31 4 3 25 32 5 14 22 26 23 10 16 27 8 2 6 18 33 15 17 19 9 Md R.A. S


z-Scores: S4 - PFNA
Target Standard Deviation 0.015 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
29 1 21 24 7 13 12 20 11 31 4 3 25 32 5 14 22 26 23 10 16 27 8 2 6 18 33

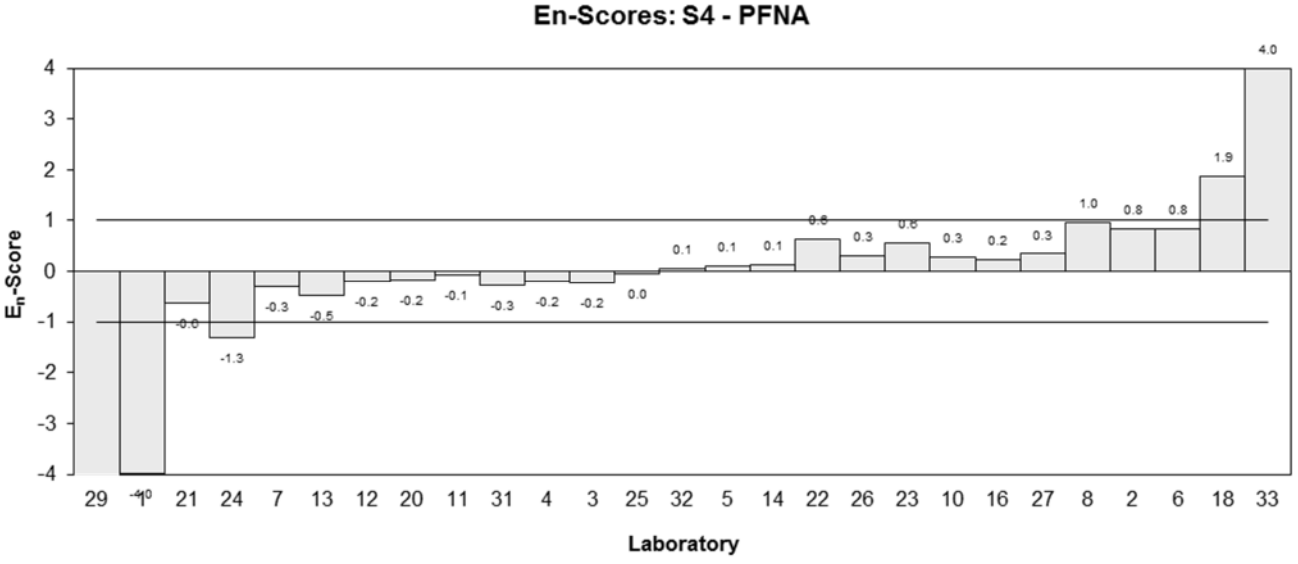

En-Scores: S4 - PFNA
En-Score
Laboratory
29 1 21 24 7 13 12 20 11 31 4 3 25 32 5 14 22 26 23 10 16 27 8 2 6 18 33

Figure 59

Table 69

Sample Details

Sample No.	S4
Matrix.	water
Analyte.	PFOA
Units	µg/L

Participant Results

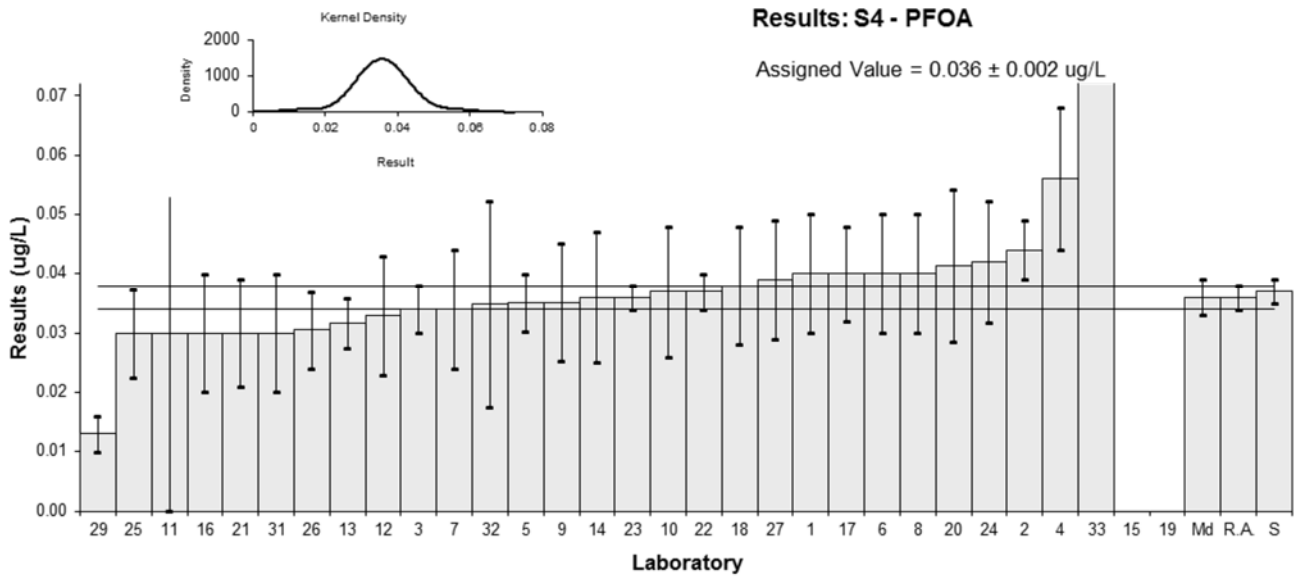
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.04	0.01	NR	0.56	0.39
2	0.044	0.005	NR	1.11	1.49
3	0.034	0.004	97.04	-0.28	-0.45
4	0.056	0.0120	101	2.78	1.64
5	0.0351	0.0049	109.1	-0.12	-0.17
6	0.04	0.01	63	0.56	0.39
7	0.034	0.010	110	-0.28	-0.20
8	0.04	0.01	99.6	0.56	0.39
9	0.0352	0.0099	105.4	-0.11	-0.08
10	0.037	0.011	95	0.14	0.09
11	0.03	0.03	103	-0.83	-0.20
12	0.0330	0.010	95	-0.42	-0.29
13	0.0316	0.00427	103	-0.61	-0.93
14	0.036	0.011	94	0.00	0.00
15	NT	NT	NT		
16	0.03	0.01	100	-0.83	-0.59
17	0.040	0.008	NR	0.56	0.49
18	0.038	0.010	98	0.28	0.20
19	NT	NT	NT		
20	0.0414	0.0128	115	0.75	0.42
21	0.03	0.009	103	-0.83	-0.65
22	0.037	0.003	NR	0.14	0.28
23	0.036	0.002	103	0.00	0.00
24	0.042	0.0102	11.95	0.83	0.58
25	0.0299	0.00748	105	-0.85	-0.79
26	0.0305	0.00651	66	-0.76	-0.81
27	0.039	0.010	94	0.42	0.29
29	0.013	0.0030	NR	-3.19	-6.38
31	0.03	0.01	102	-0.83	-0.59
32	0.0348	0.0174	98	-0.17	-0.07
33	39.7640	9.9410	159.5774	5517.78	4.00

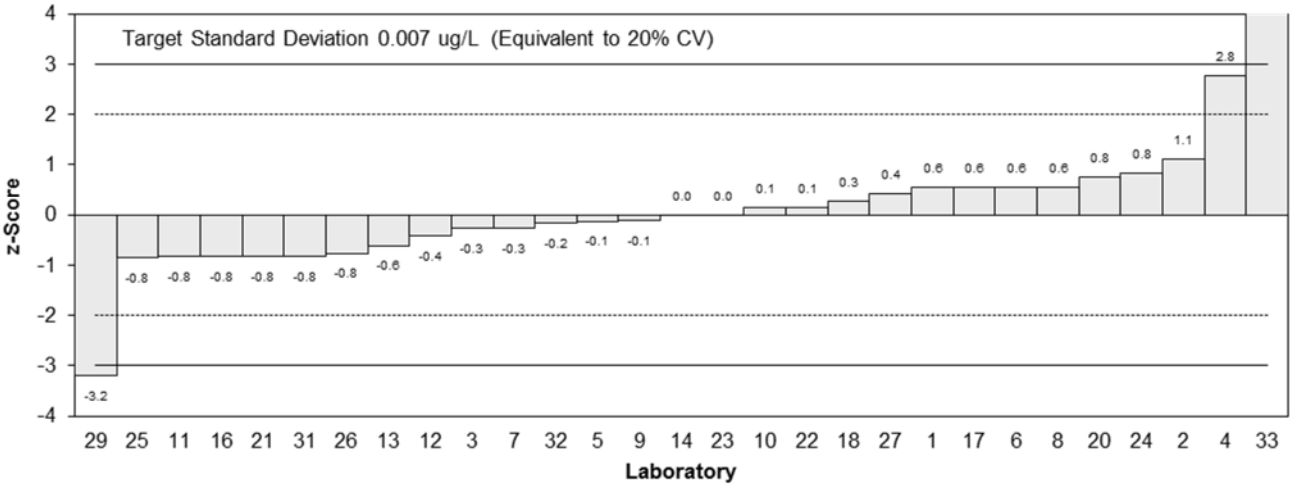
Statistics

Assigned Value**	0.036	0.002
Spike	0.037	0.002
Robust Average*	0.036	0.003
Median*	0.036	0.003
Mean*	0.036	
N	29	
Max.	39.764	
Min.	0.013	
Robust SD*	0.005	
Robust CV*	14%	

* Results from laboratory 33 were omitted from the statistical calculations.

** Assigned value is the robust average excluding laboratories 29 and 33.


Kernel Density
Density
Result
Results: S4 - PFOA
Assigned Value = 0.036 ± 0.002 ug/L
Results (ug/L)
Laboratory
29 25 11 16 21 31 26 13 12 3 7 32 5 9 14 23 10 22 18 27 1 17 6 8 20 24 2 4 33 15 19 Md R.A. S


z-Scores: S4 - PFOA
Target Standard Deviation 0.007 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
29 25 11 16 21 31 26 13 12 3 7 32 5 9 14 23 10 22 18 27 1 17 6 8 20 24 2 4 33

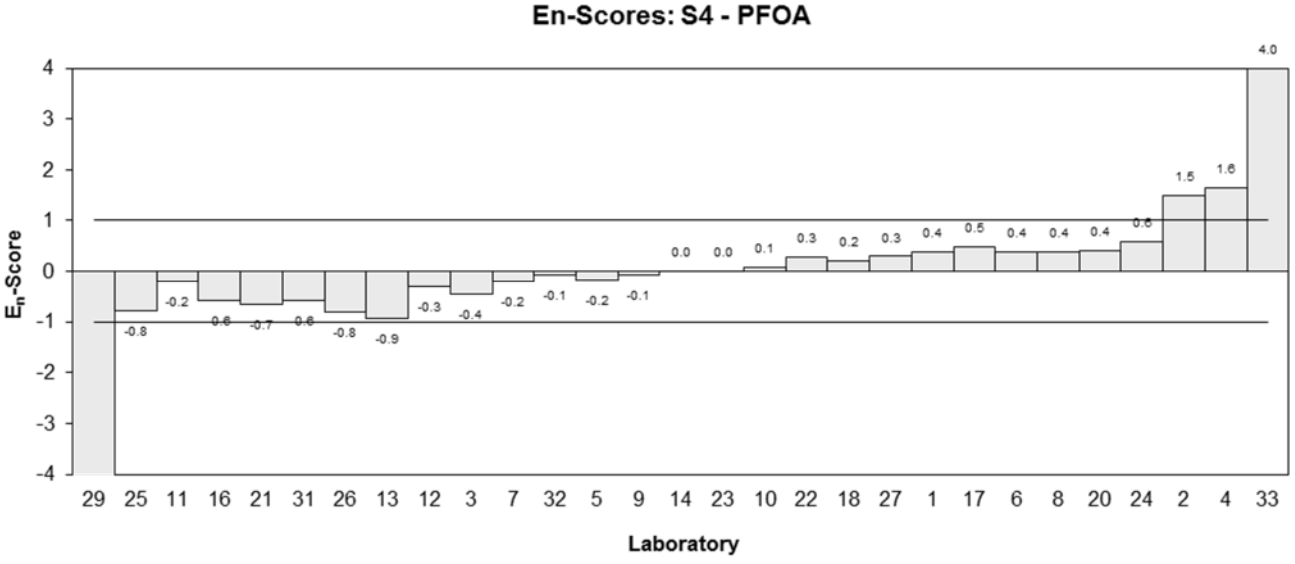

En-Scores: S4 - PFOA
En-Score
Laboratory
29 25 11 16 21 31 26 13 12 3 7 32 5 9 14 23 10 22 18 27 1 17 6 8 20 24 2 4 33

Figure 60

Table 70

Sample Details

Sample No.	S4
Matrix.	water
Analyte.	PFOS
Units	µg/L

Participant Results

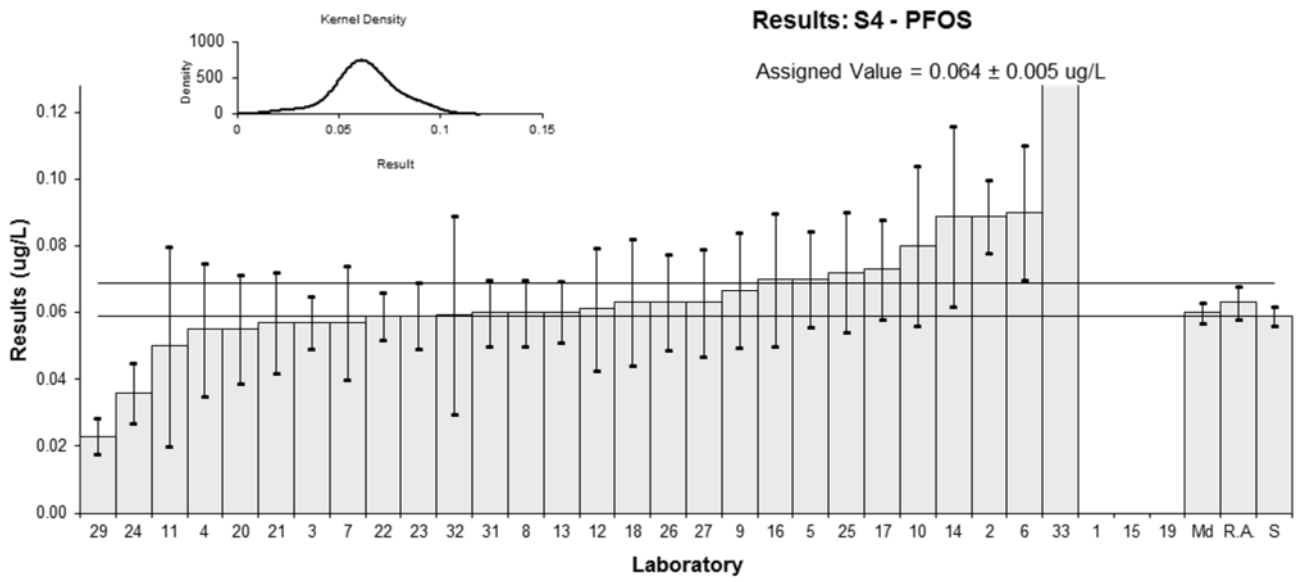
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	<0.02	NR	NR		
2	0.089	0.011	NR	1.95	2.07
3	0.057	0.008	60.97	-0.55	-0.74
4	0.055	0.0200	109	-0.70	-0.44
5	0.0702	0.0144	98.6	0.48	0.41
6	0.09	0.02	75	2.03	1.26
7	0.057	0.017	84	-0.55	-0.40
8	0.06	0.01	96.2	-0.31	-0.36
9	0.0668	0.0174	96.6	0.22	0.15
10	0.080	0.024	102	1.25	0.65
11	0.05	0.03	110	-1.09	-0.46
12	0.0611	0.0183	92	-0.23	-0.15
13	0.0602	0.00921	98	-0.30	-0.36
14	0.089	0.027	90	1.95	0.91
15	NT	NT	NT		
16	0.07	0.02	86	0.47	0.29
17	0.073	0.015	NR	0.70	0.57
18	0.063	0.019	93	-0.08	-0.05
19	NT	NT	NT		
20	0.0551	0.0165	113	-0.70	-0.52
21	0.057	0.015	95	-0.55	-0.44
22	0.059	0.007	NR	-0.39	-0.58
23	0.059	0.01	143	-0.39	-0.45
24	0.036	0.009	105.68	-2.19	-2.72
25	0.0721	0.0180	72	0.63	0.43
26	0.0630	0.0144	75	-0.08	-0.07
27	0.063	0.016	100	-0.08	-0.06
29	0.023	0.0053	NR	-3.20	-5.63
31	0.06	0.01	105	-0.31	-0.36
32	0.0593	0.02965	80	-0.37	-0.16
33	59.7731	14.9433	89.6	4664.77	4.00

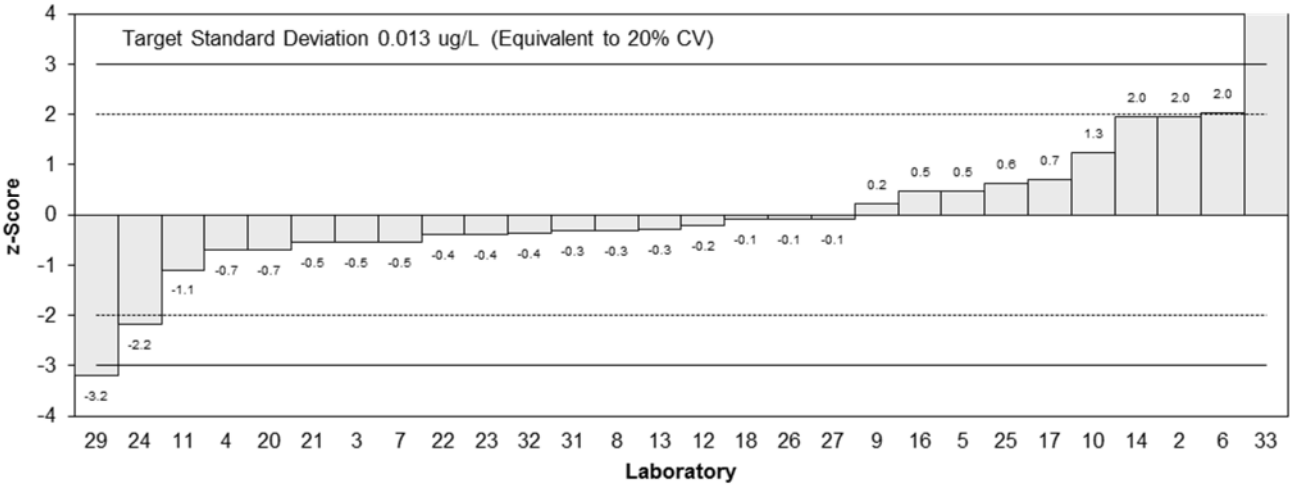
Statistics

Assigned Value**	0.064	0.005
Spike	0.059	0.003
Robust Average*	0.063	0.005
Median*	0.060	0.003
Mean*	0.063	
N	28	
Max.	59.7731	
Min.	0.023	
Robust SD*	0.011	
Robust CV*	17%	

* Results from laboratory 33 were omitted from the statistical calculations.

** Assigned value is the robust average excluding laboratories 29 and 33.


Kernel Density
Density
Result
Results: S4 - PFOS
Assigned Value = 0.064 ± 0.005 ug/L
Results (ug/L)
Laboratory
29 24 11 4 20 21 3 7 22 23 32 31 8 13 12 18 26 27 9 16 5 25 17 10 14 2 6 33 1 15 19 Md R.A. S


z-Scores: S4 - PFOS
Target Standard Deviation 0.013 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
29 24 11 4 20 21 3 7 22 23 32 31 8 13 12 18 26 27 9 16 5 25 17 10 14 2 6 33

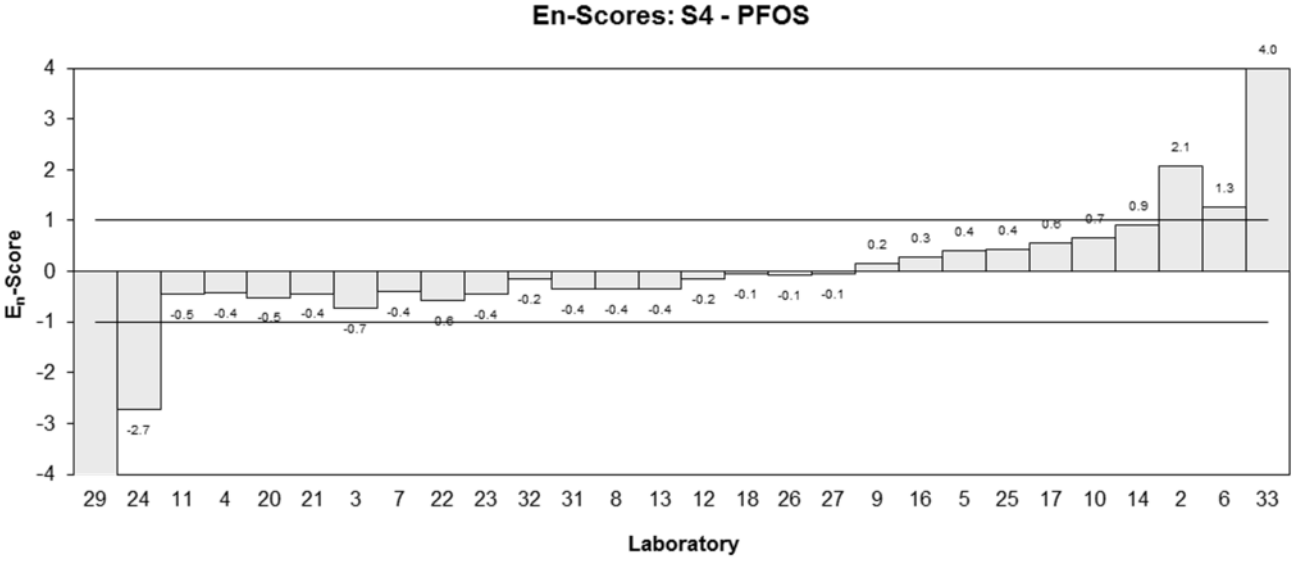

En-Scores: S4 - PFOS
En-Score
Laboratory
29 24 11 4 20 21 3 7 22 23 32 31 8 13 12 18 26 27 9 16 5 25 17 10 14 2 6 33

Figure 61

Table 71

Sample Details

Sample No.	S4
Matrix.	water
Analyte.	PFOSA
Units	µg/L

Participant Results

Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.19	0.04	NR	11.96	3.31
2	0.049	0.006	NR	-0.62	-0.82
3	0.038	0.008	NR	-1.61	-1.80
4	0.068	0.0265	93	1.07	0.44
5	0.0629	0.0139	53.3	0.62	0.46
6	0.07	0.02	60	1.25	0.67
7	0.052	0.016	94	-0.36	-0.23
8	0.05	0.008	95.9	-0.54	-0.60
9	NT	NT	NT		
10	0.060	0.018	NR	0.36	0.21
11	<0.1	NR	95		
12	0.0591	0.0177	90	0.28	0.17
13	0.0598	0.00879	91	0.34	0.36
14	0.051	0.015	36	-0.45	-0.31
15	NT	NT	NT		
16	NT	NT	NT		
17	NT	NT	NT		
18	0.058	0.016	81	0.18	0.12
19	NT	NT	NT		
20* **	0.0861	0.0258	78.5	2.00	1.00
21	< 0.14	0.04	NR		
22	0.037	0.002	NR	-1.70	-3.00
23	0.055	0.005	79	-0.09	-0.13
24	0.034	0.009	8.91	-1.96	-2.03
25	0.0548	0.0318	32	-0.11	-0.04
26	0.0643	0.0160	58	0.74	0.49
27	0.060	0.015	92	0.36	0.25
29	NT	NT	NT		
31	0.05	0.01	106	-0.54	-0.51
32	0.0629	0.03145	43	0.62	0.22
33	66.2816	16.5704	55.5	5913.00	4.00

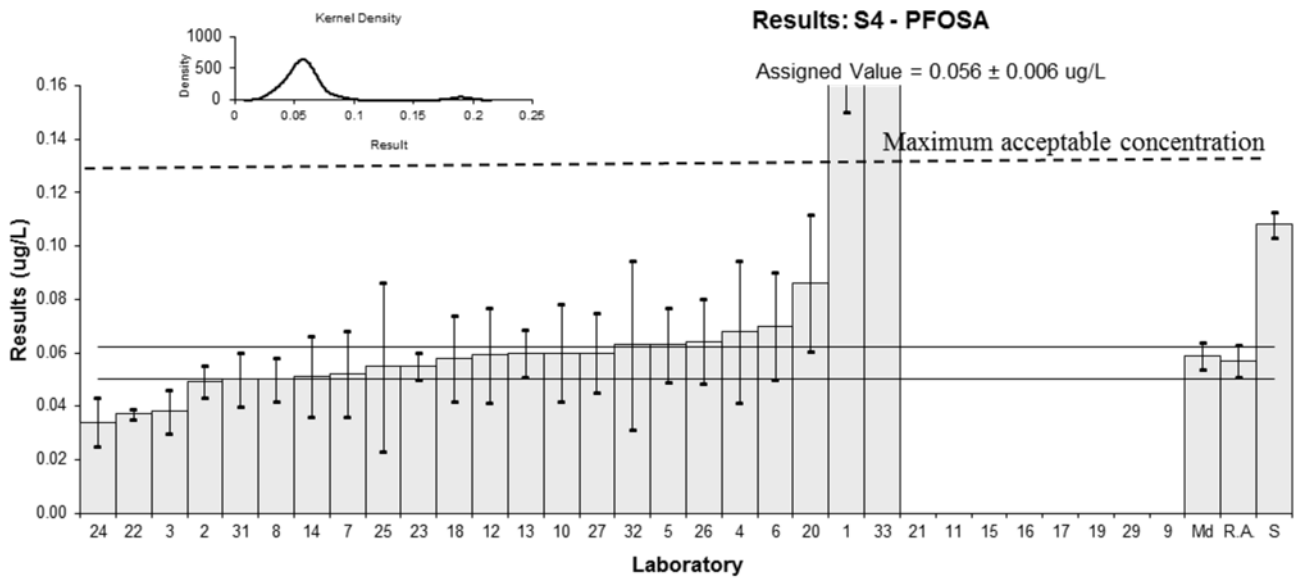
Statistics

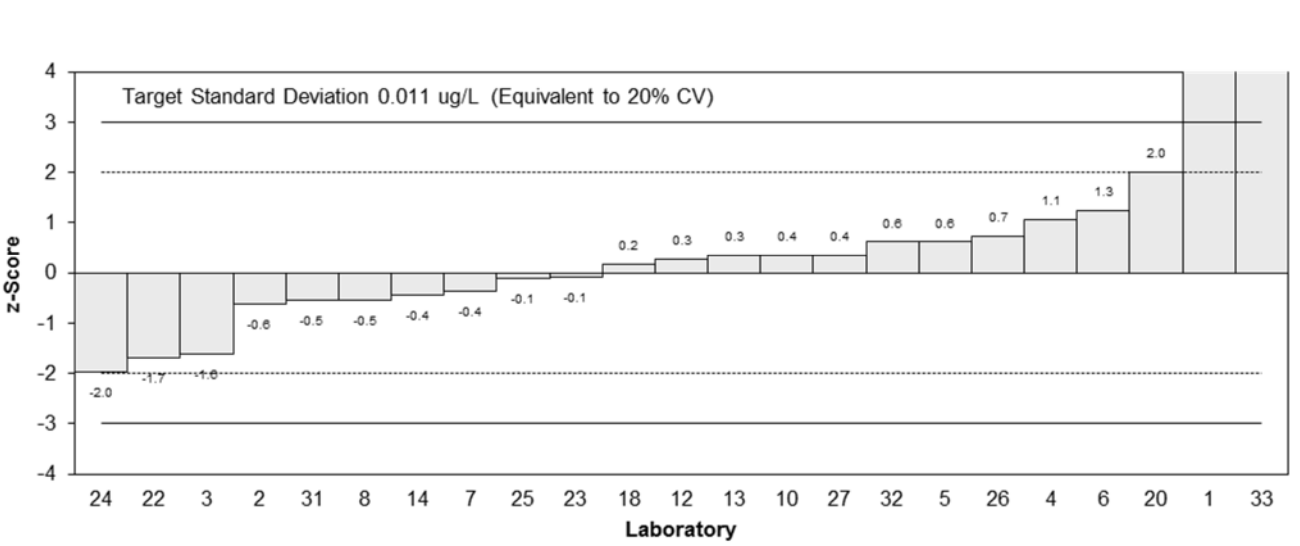
Assigned Value**	0.056	0.006
Spike	0.108	0.005
Maximum acceptable conc.	0.13	
Robust Average*	0.057	0.006
Median*	0.059	0.005
Mean*	0.062	
N	23	
Max.	66.2816	
Min.	0.034	
Robust SD*	0.011	
Robust CV*	19%	

* Results from laboratory 33 were omitted from the statistical calculations.

** Assigned value is the robust average excluding laboratories 1 and 33.

***z-score adjusted to 2 (see Section 6.3).


Kernel Density
Density
Result
Results: S4 - PFOSA
Assigned Value = 0.056 ± 0.006 ug/L
Maximum acceptable concentration
Results (ug/L)
Laboratory
24 22 3 2 31 8 14 7 25 23 18 12 13 10 27 32 5 26 4 6 20 1 33 21 11 15 16 17 19 29 9 Md R.A. S


z-Scores: S4 - PFOSA
Target Standard Deviation 0.011 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
24 22 3 2 31 8 14 7 25 23 18 12 13 10 27 32 5 26 4 6 20 1 33

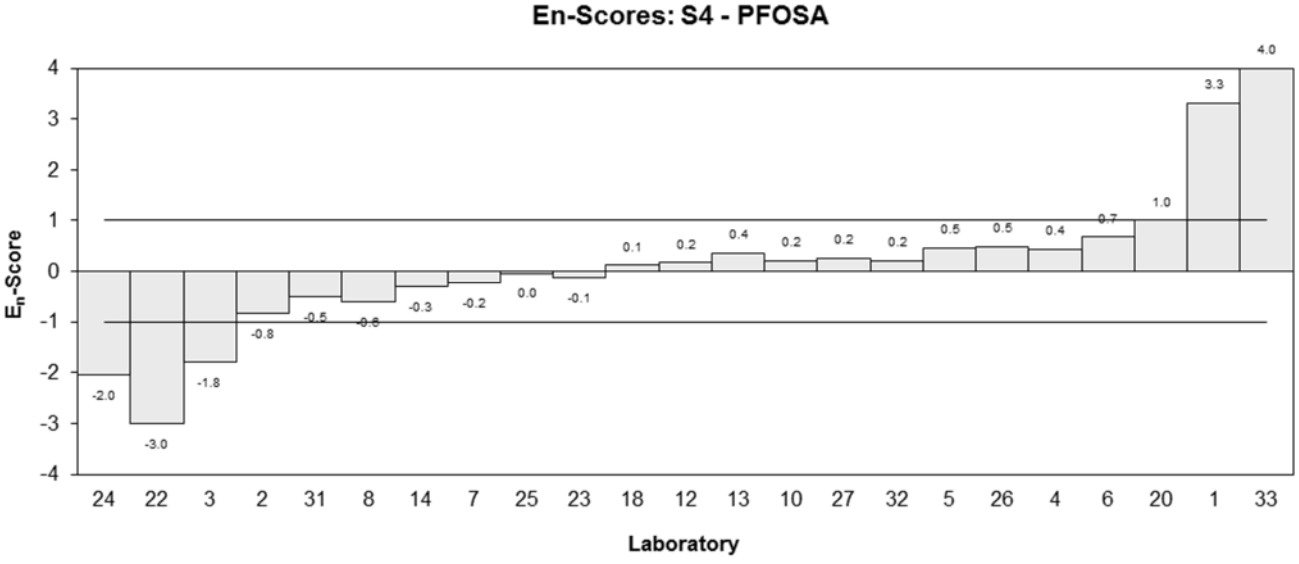

En-Scores: S4 - PFOSA
En-Score
Laboratory
24 22 3 2 31 8 14 7 25 23 18 12 13 10 27 32 5 26 4 6 20 1 33

Figure 62

Table 72

Sample Details

Sample No.	S4
Matrix.	water
Analyte.	PFPeA
Units	µg/L

Participant Results

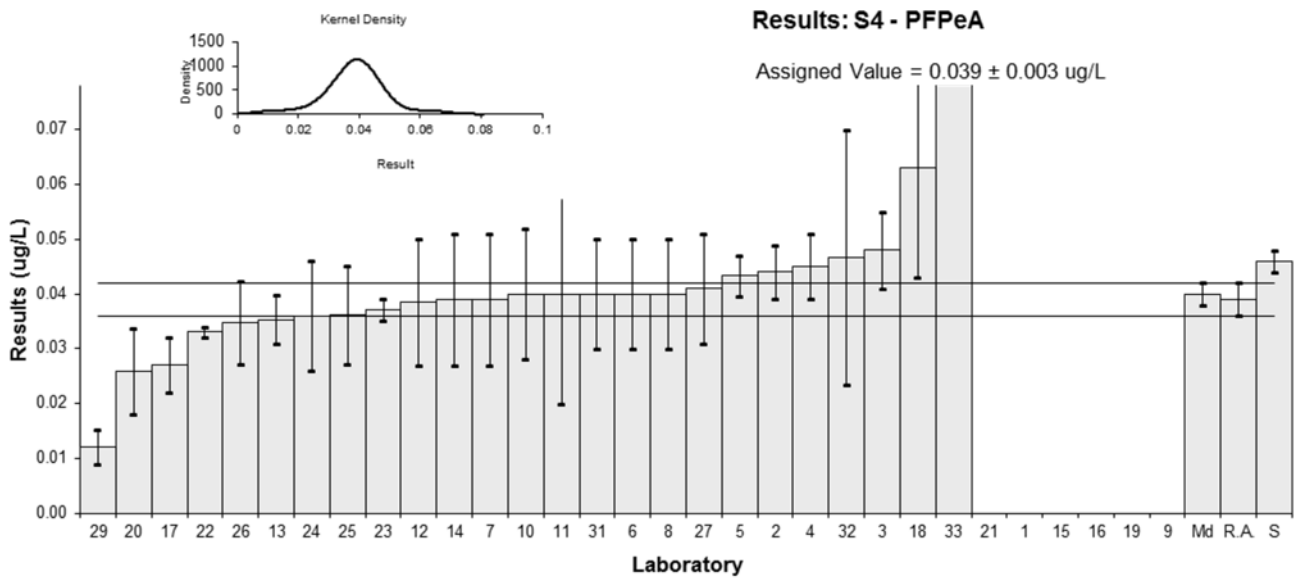
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	<0.02	NR	NR		
2	0.044	0.005	NR	0.64	0.86
3	0.048	0.007	NR	1.15	1.18
4	0.045	0.0059	104	0.77	0.91
5	0.0433	0.0038	110.5	0.55	0.89
6	0.04	0.01	65	0.13	0.10
7	0.039	0.012	88	0.00	0.00
8	0.04	0.01	100.2	0.13	0.10
9	NT	NT	NT		
10	0.040	0.012	NR	0.13	0.08
11	0.04	0.02	112	0.13	0.05
12	0.0385	0.0115	113	-0.06	-0.04
13	0.0353	0.00445	99	-0.47	-0.69
14	0.039	0.012	64	0.00	0.00
15	NT	NT	NT		
16	NT	NT	NT		
17	0.0270	0.005	NR	-1.54	-2.06
18	0.063	0.020	103	3.08	1.19
19	NT	NT	NT		
20	0.0259	0.00778	117	-1.68	-1.57
21	< 0.02	0.009	109		
22	0.033	0.001	NR	-0.77	-1.90
23	0.037	0.002	103	-0.26	-0.55
24	0.036	0.010	112.15	-0.38	-0.29
25	0.0361	0.00903	102	-0.37	-0.30
26	0.0347	0.00767	78	-0.55	-0.52
27	0.041	0.01	96	0.26	0.19
29	0.012	0.0032	NR	-3.46	-6.16
31	0.04	0.01	103	0.13	0.10
32	0.0466	0.0233	98	0.97	0.32
33	41.5870	10.3968	87.5	5326.67	4.00

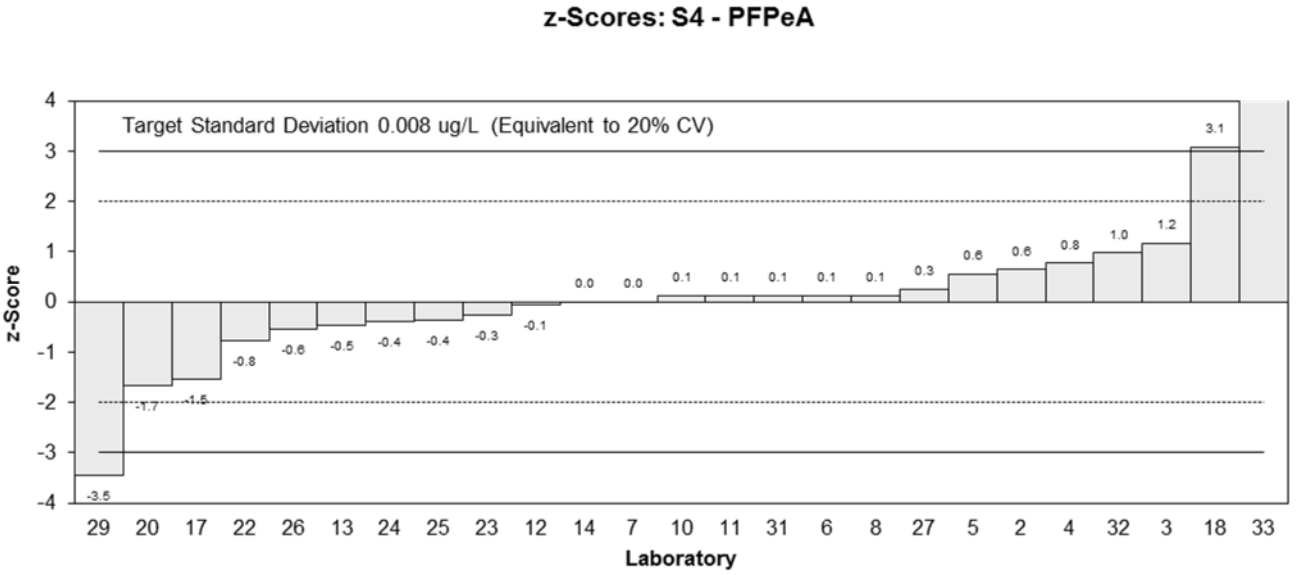
Statistics

Assigned Value**	0.039	0.003
Spike	0.046	0.002
Robust Average*	0.039	0.003
Median*	0.040	0.002
Mean*	0.039	
N	25	
Max.	41.587	
Min.	0.012	
Robust SD*	0.006	
Robust CV*	15%	

* Results from laboratory 33 were omitted from the statistical calculations.

** Assigned value is the robust average excluding laboratories 18, 29 and 33.


Kernel Density
Density
Result
Results: S4 - PFPeA
Assigned Value = 0.039 ± 0.003 ug/L
Results (ug/L)
Laboratory
29 20 17 22 26 13 24 25 23 12 14 7 10 11 31 6 8 27 5 2 4 32 3 18 33 21 1 15 16 19 9 Md R.A. S


z-Scores: S4 - PFPeA
Target Standard Deviation 0.008 ug/L (Equivalent to 20% CV)
z-Score
Laboratory
29 20 17 22 26 13 24 25 23 12 14 7 10 11 31 6 8 27 5 2 4 32 3 18 33

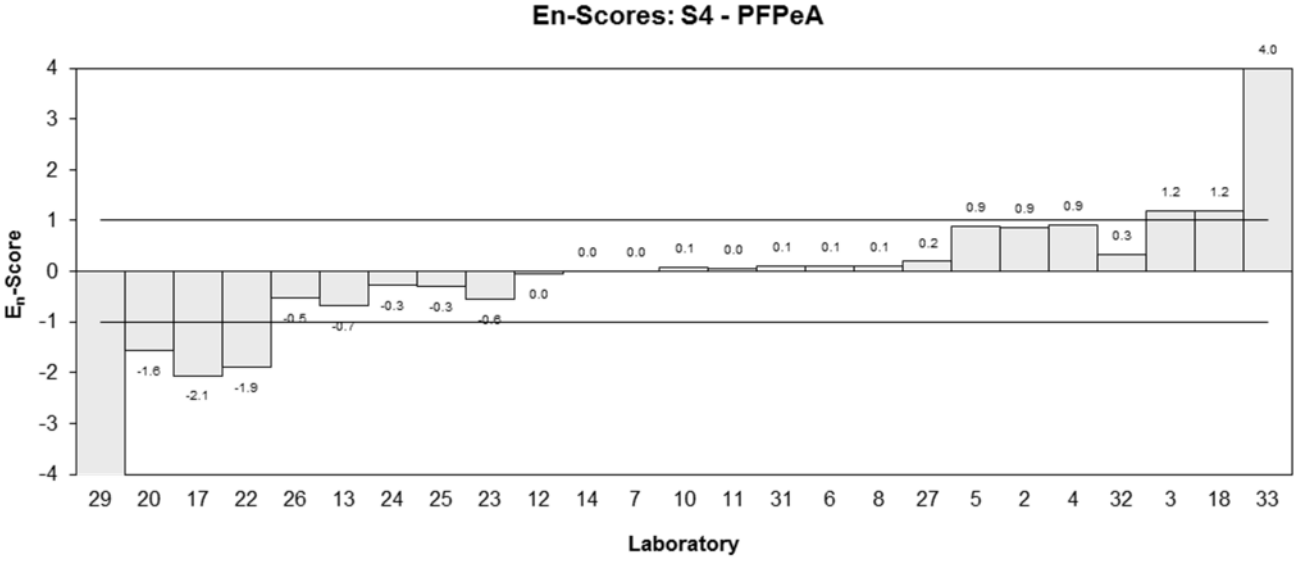

En-Scores: S4 - PFPeA
En-Score
Laboratory
29 20 17 22 26 13 24 25 23 12 14 7 10 11 31 6 8 27 5 2 4 32 3 18 33

Figure 63

Table 73

Sample Details

Sample No.	S4
Matrix.	water
Analyte.	PFTeDA
Units	µg/L

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	<0.03	NR	NR
2	0.054	0.006	NR
3	0.019	0.008	NR
4	<0.04	0.0145	93
5	NT	NT	NT
6	<0.05	0.01	45
7	0.026	0.008	56
8	<0.05	0.009	110.0
9	NT	NT	NT
10	0.031	0.009	NR
11	<0.5	NR	84
12	0.0330	0.010	81
13	0.0279	0.00460	99
14	0.023	0.007	60
15	NT	NT	NT
16	NT	NT	NT
17	NT	NT	NT
18	<0.005	0.002	54
19	NT	NT	NT
20	0.0396	0.0139	104
21	< 0.07	0.04	NR
22	0.013	0.001	NR
23	<0.1	NR	153
24	0.084	0.048	99.8
25	NT	NT	NT
26	0.0499	0.0104	59
27	0.038	0.01	82
29	NT	NT	NT
31	<0.05	0.01	108
32	0.0184	0.0092	60
33	46.8838	11.7210	72.0

Statistics

Assigned Value	Not Set	
Spike	0.079	0.004
Robust Average*	0.033	0.011
Median*	0.031	0.008
Mean*	0.035	
N	14	
Max.	46.8838	
Min.	0.013	
Robust SD	0.016	
Robust CV	49%	

* Results from laboratory 33 were omitted from the statistical calculations.

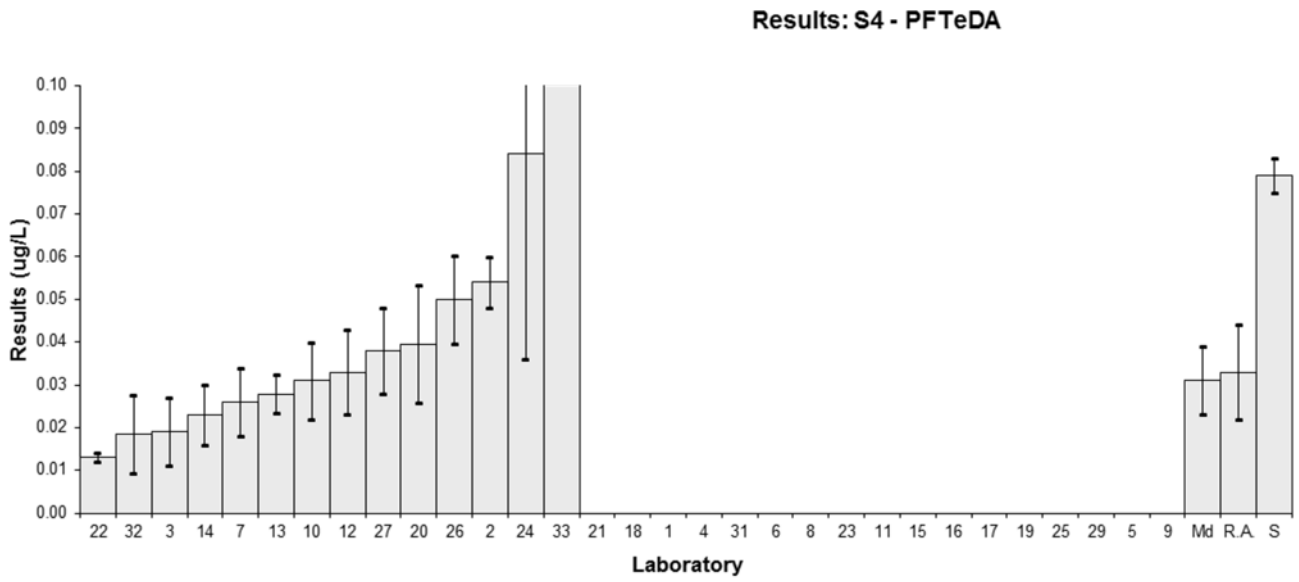

Results: S4 - PFTeDA
Results (ug/L)
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
22 32 3 14 7 13 10 12 27 20 26 2 24 33 21 18 1 4 31 6 8 23 11 15 16 17 19 25 29 5 9 Md R.A. S
Laboratory

Figure 64

Table 74

Sample Details

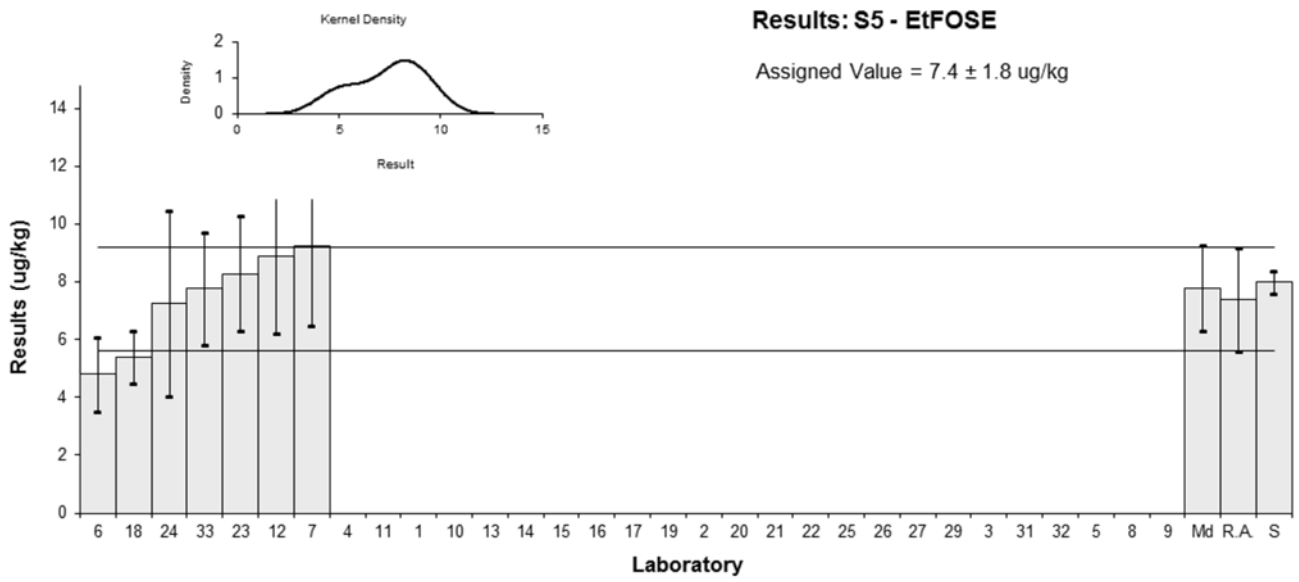
Sample No.	S5
Matrix.	Fish
Analyte.	EtFOSE
Units	µg/kg

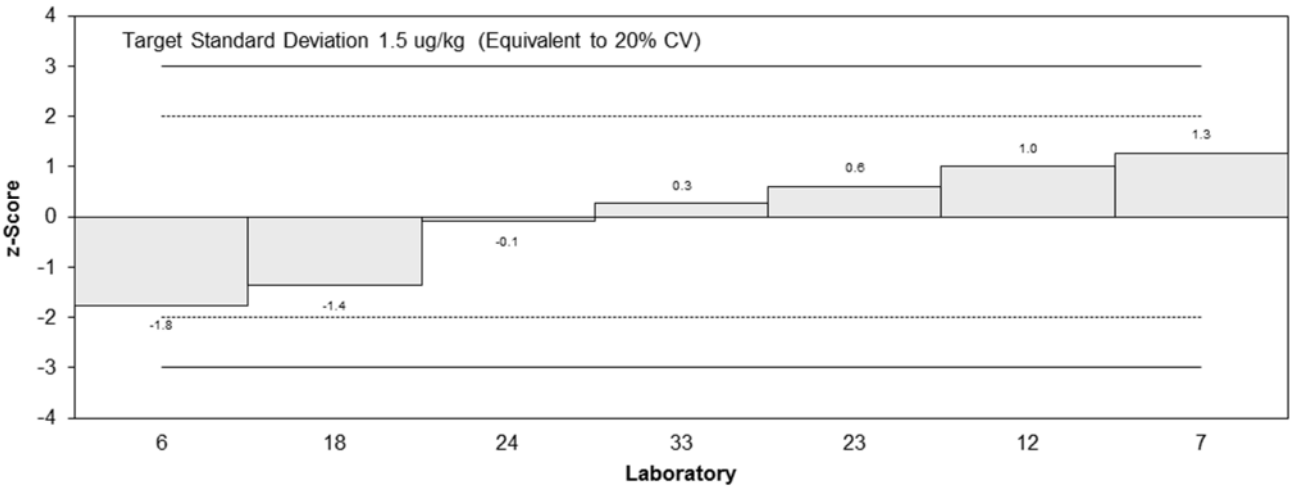
Participant Results

Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	NT	NT	NT		
4	<5	3.34	99		
5	NT	NT	NT		
6	4.8	1.3	36	-1.76	-1.17
7	9.26	2.78	90	1.26	0.56
8	NT	NT	NT		
9	NT	NT	NT		
10	NT	NT	NT		
11	<50	NR	133		
12	8.88	2.66	72	1.00	0.46
13	NT	NT	NT		
14	NT	NT	NT		
15	NT	NT	NT		
16	NT	NT	NT		
17	NT	NT	NT		
18	5.4	0.91	177	-1.35	-0.99
19	NT	NT	NT		
20	NT	NT	NT		
21	NT	NT	NT		
22	NT	NT	NT		
23	8.3	2.0	119	0.61	0.33
24	7.26	3.2	5.03	-0.09	-0.04
25	NT	NT	NT		
26	NT	NT	NT		
27	NT	NT	NT		
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	7.7838	1.9460	55.1	0.26	0.14

Statistics

Assigned Value	7.4	1.8
Spike	8.01	0.40
Robust Average	7.4	1.8
Median	7.8	1.5
Mean	7.4	
N	7	
Max.	9.26	
Min.	4.8	
Robust SD	1.93	
Robust CV	26%	


Kernel Density
Density
Result
Results: S5 - EtFOSE
Assigned Value = 7.4 ± 1.8 ug/kg
Results (ug/kg)
Laboratory
6 18 24 33 23 12 7 4 11 1 10 13 14 15 16 17 19 2 20 21 22 25 26 27 29 3 31 32 5 8 9 Md R.A. S


z-Scores: S5 - EtFOSE
Target Standard Deviation 1.5 ug/kg (Equivalent to 20% CV)
z-Score
-1.8
-1.4
-0.1
0.3
0.6
1.0
1.3
Laboratory
6 18 24 33 23 12 7

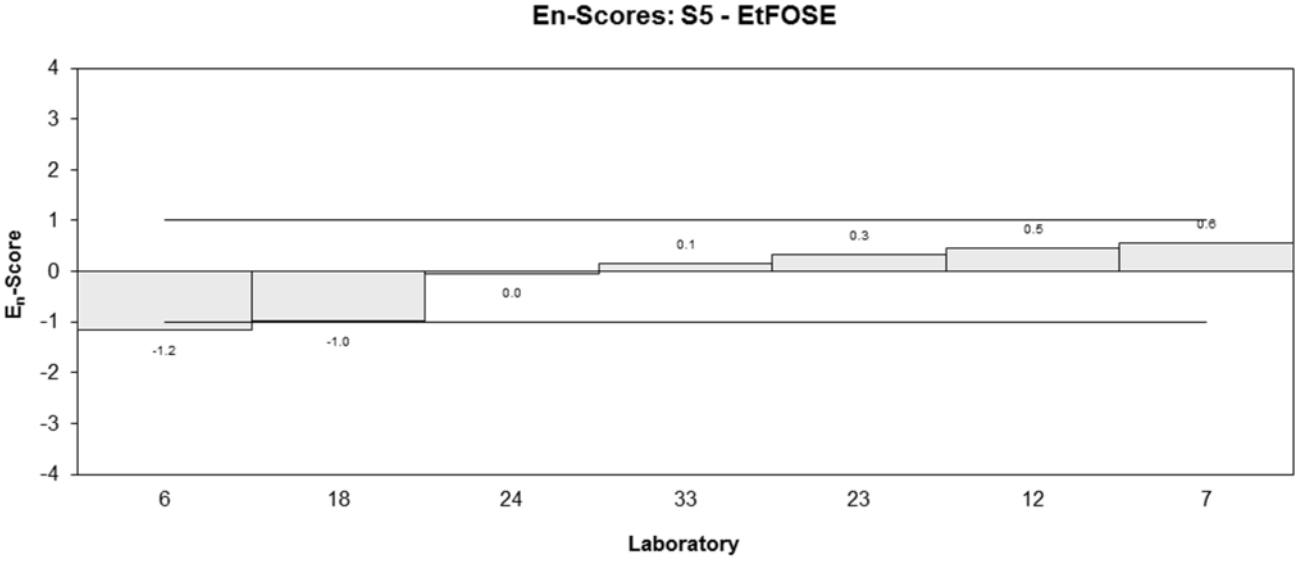

En-Scores: S5 - EtFOSE
En-Score
-1.2
-1.0
0.0
0.1
0.3
0.5
0.6
Laboratory
6 18 24 33 23 12 7

Figure 65

Table 75

Sample Details

Sample No.	S5
Matrix.	Fish
Analyte.	6:2 FTS
Units	µg/kg

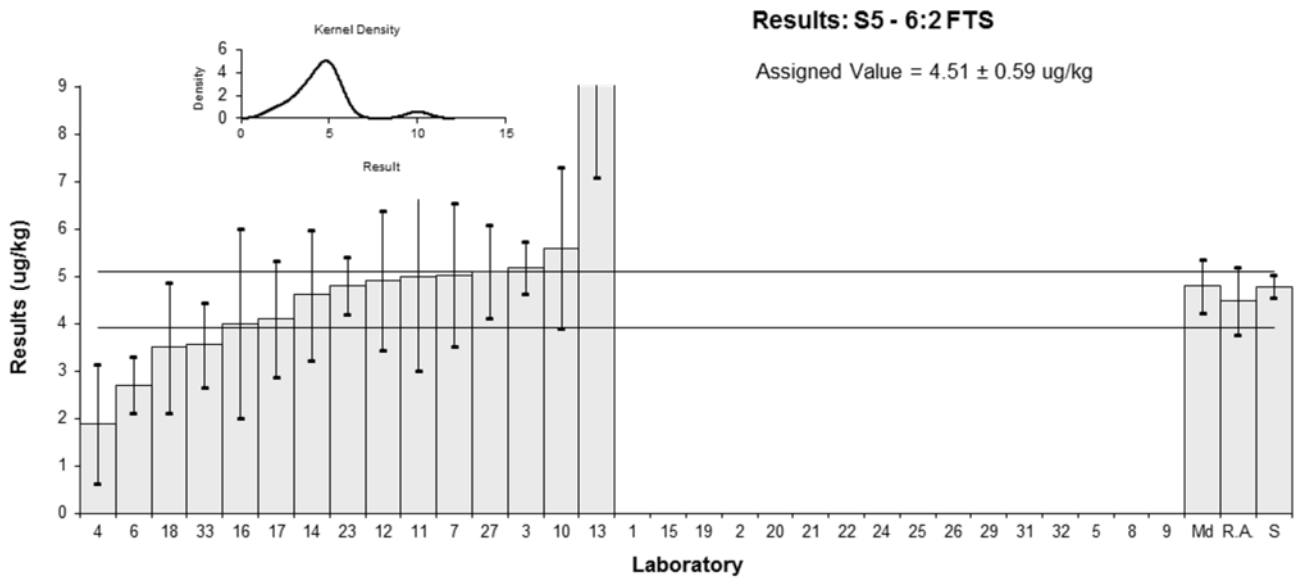
Participant Results

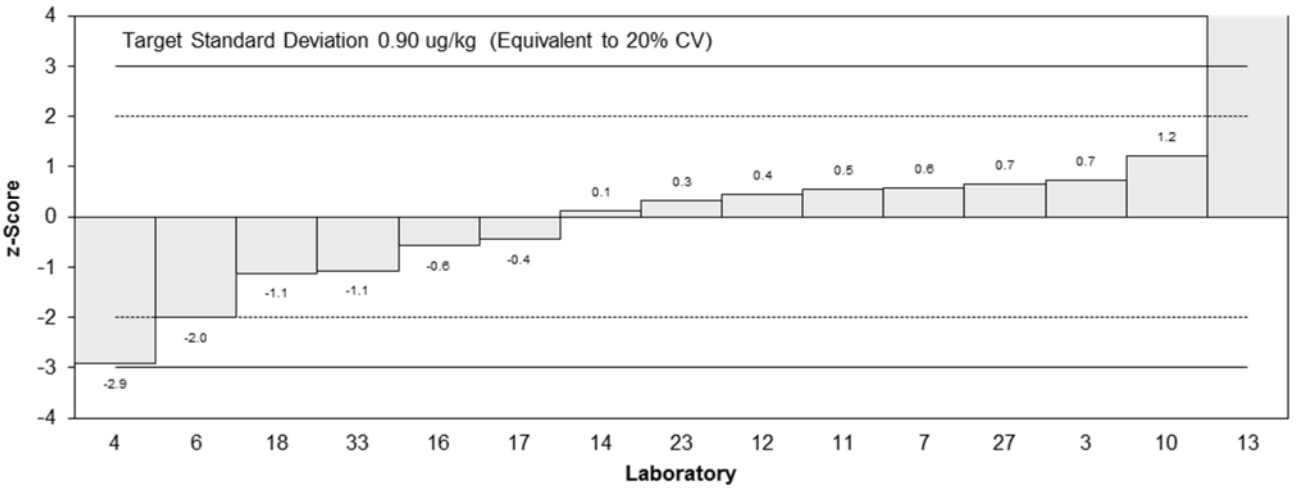
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	5.178	0.550	NR	0.74	0.83
4	1.88	1.26	120	-2.92	-1.89
5	NT	NT	NT		
6	2.7	0.6	66	-2.01	-2.15
7	5.03	1.51	80	0.58	0.32
8	NT	NT	NT		
9	NT	NT	NT		
10	5.6	1.7	NR	1.21	0.61
11	5	2	111	0.54	0.23
12	4.91	1.47	83	0.44	0.25
13	10.0	2.91	167	6.09	1.85
14	4.61	1.38	70	0.11	0.07
15	NT	NT	NT		
16	4	2	359	-0.57	-0.24
17	4.11	1.23	NR	-0.44	-0.29
18	3.5	1.38	128	-1.12	-0.67
19	NT	NT	NT		
20	NT	NT	NT		
21	NT	NT	NT		
22	NT	NT	NT		
23	4.8	0.6	85	0.32	0.34
24	NT	NT	NT		
25	NT	NT	NT		
26	NT	NT	NT		
27	5.1	1	100	0.65	0.51
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	3.5452	0.8863	75.6	-1.07	-0.91

Statistics

Assigned Value*	4.51	0.59
Spike	4.78	0.24
Robust Average	4.48	0.72
Median	4.80	0.57
Mean	4.66	
N	15	
Max.	10	
Min.	1.88	
Robust SD	1.12	
Robust CV	25%	

* Assigned value is the robust average excluding laboratories 4 and 13.


Results: S5 - 6:2 FTS
Assigned Value = 4.51 ± 0.59 ug/kg
Kernel Density
Density
Result
Results (ug/kg)
Laboratory
4 6 18 33 16 17 14 23 12 11 7 27 3 10 13 1 15 19 2 20 21 22 24 25 26 29 31 32 5 8 9 Md R.A. S


z-Scores: S5 - 6:2 FTS
Target Standard Deviation 0.90 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
4 6 18 33 16 17 14 23 12 11 7 27 3 10 13
-2.9 -2.0 -1.1 -1.1 -0.6 -0.4 0.1 0.3 0.4 0.5 0.6 0.7 0.7 1.2

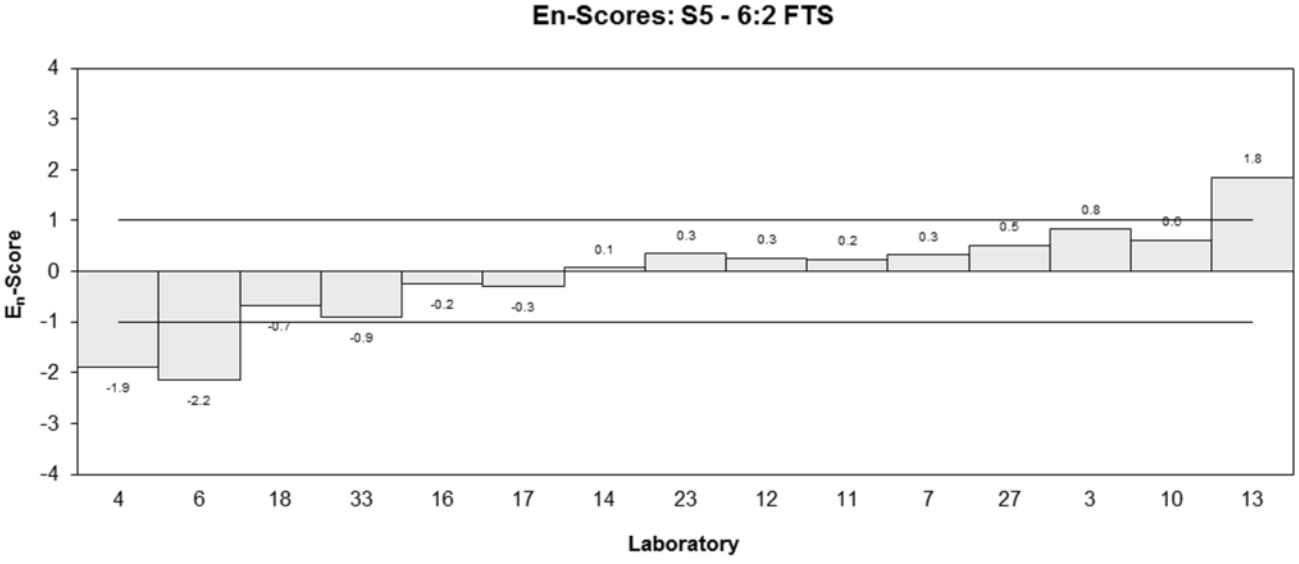

En-Scores: S5 - 6:2 FTS
En-Score
Laboratory
4 6 18 33 16 17 14 23 12 11 7 27 3 10 13
-1.9 -2.2 -0.7 -0.9 -0.2 -0.3 0.1 0.3 0.3 0.2 0.3 0.5 0.8 0.6 1.8

Figure 66

Table 76

Sample Details

Sample No.	S5
Matrix.	Fish
Analyte.	8:2 FTS
Units	µg/kg

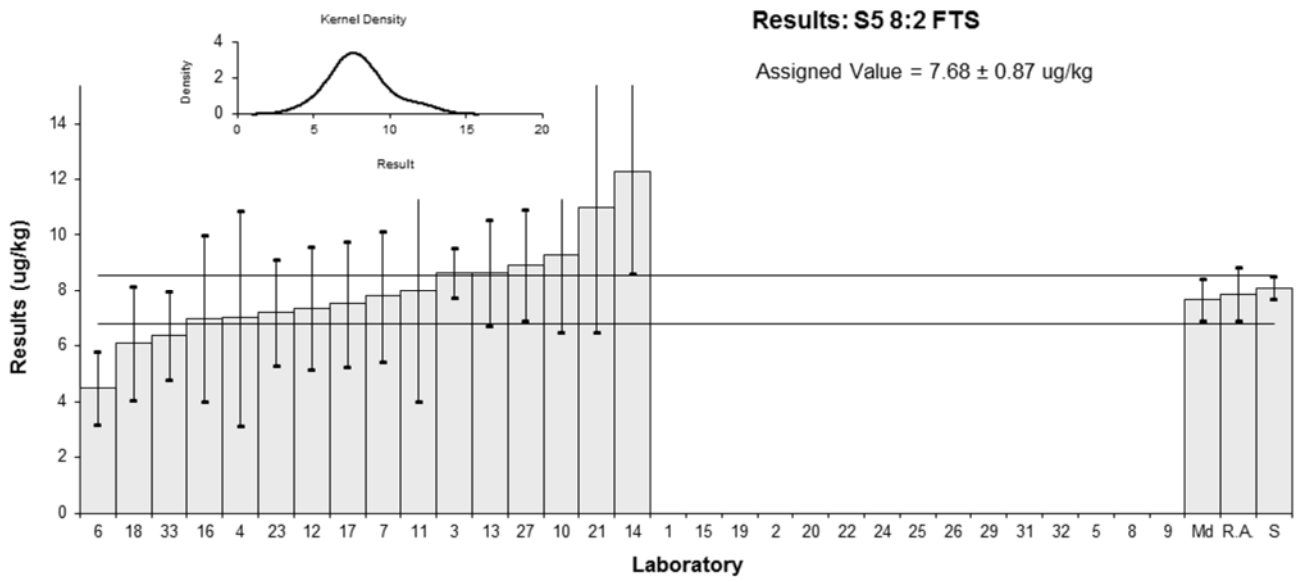
Participant Results

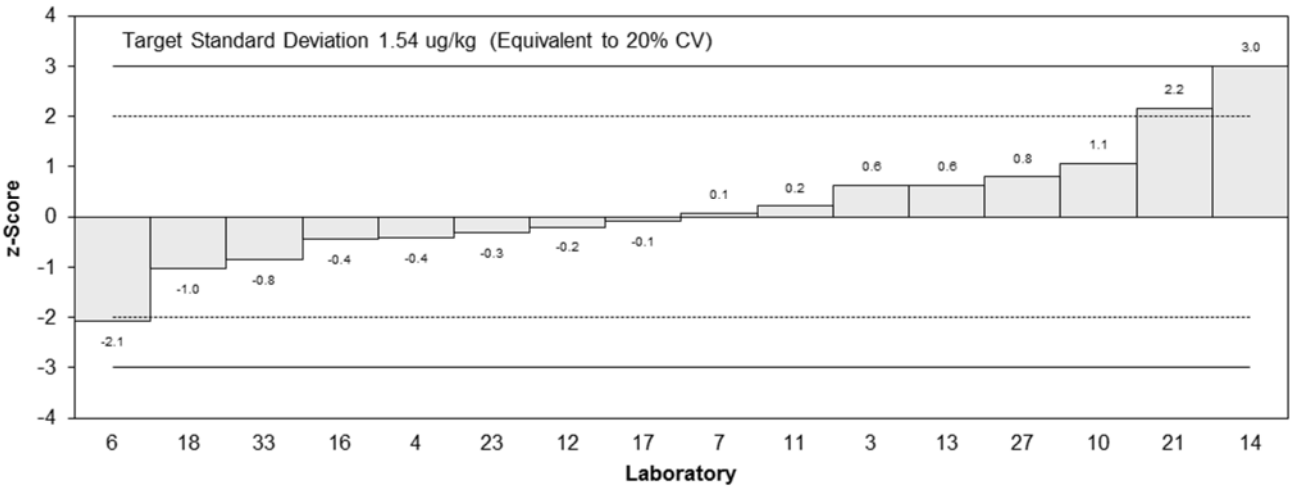
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	8.630	0.910	NR	0.62	0.75
4	7.02	3.87	95	-0.43	-0.17
5	NT	NT	NT		
6	4.5	1.3	87	-2.07	-2.03
7	7.79	2.34	96	0.07	0.04
8	NT	NT	NT		
9	NT	NT	NT		
10	9.3	2.8	NR	1.05	0.55
11	8	4	130	0.21	0.08
12	7.37	2.21	81	-0.20	-0.13
13	8.64	1.92	169	0.63	0.46
14	12.3	3.7	72	3.01	1.22
15	NT	NT	NT		
16	7	3	352	-0.44	-0.22
17	7.53	2.26	NR	-0.10	-0.06
18	6.1	2.05	155	-1.03	-0.71
19	NT	NT	NT		
20	NT	NT	NT		
21	11	4.5	NR	2.16	0.72
22	NT	NT	NT		
23	7.2	1.9	60	-0.31	-0.23
24	NT	NT	NT		
25	NT	NT	NT		
26	NT	NT	NT		
27	8.9	2	116	0.79	0.56
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	6.3774	1.5944	67.1	-0.85	-0.72

Statistics

Assigned Value*	7.68	0.87
Spike	8.10	0.41
Robust Average	7.86	0.97
Median	7.66	0.77
Mean	7.98	
N	16	
Max.	12.3	
Min.	4.5	
Robust SD	1.55	
Robust CV	20%	

* Assigned value is the robust average excluding laboratory 14.


Results: S5 8:2 FTS
Assigned Value = 7.68 ± 0.87 ug/kg
Kernel Density
Density
Result
Results (ug/kg)
Laboratory
6 18 33 16 4 23 12 17 7 11 3 13 27 10 21 14 1 15 19 2 20 22 24 25 26 29 31 32 5 8 9 Md R.A. S


z-Scores: S5 - 8:2 FTS
Target Standard Deviation 1.54 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
6 18 33 16 4 23 12 17 7 11 3 13 27 10 21 14
-2.1 -1.0 -0.8 -0.4 -0.4 -0.3 -0.2 -0.1 0.1 0.2 0.6 0.6 0.8 1.1 2.2 3.0

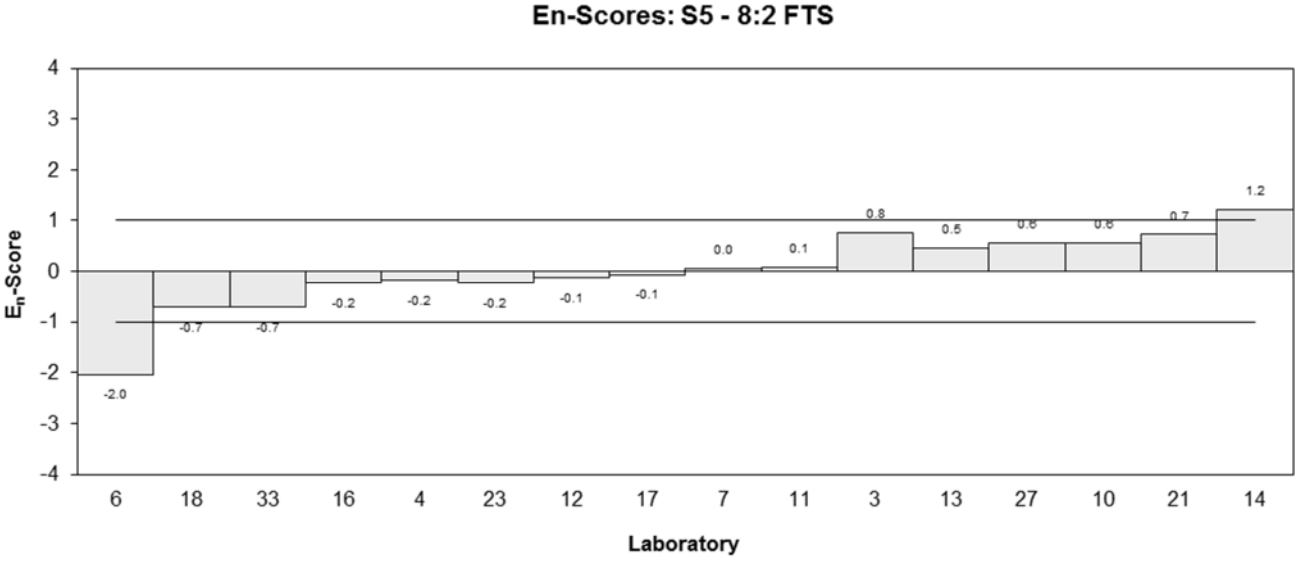

En-Scores: S5 - 8:2 FTS
En-Score
Laboratory
6 18 33 16 4 23 12 17 7 11 3 13 27 10 21 14
-2.0 -0.7 -0.7 -0.2 -0.2 -0.2 -0.1 -0.1 0.0 0.1 0.8 0.5 0.6 0.6 0.7 1.2

Figure 67

Table 77

Sample Details

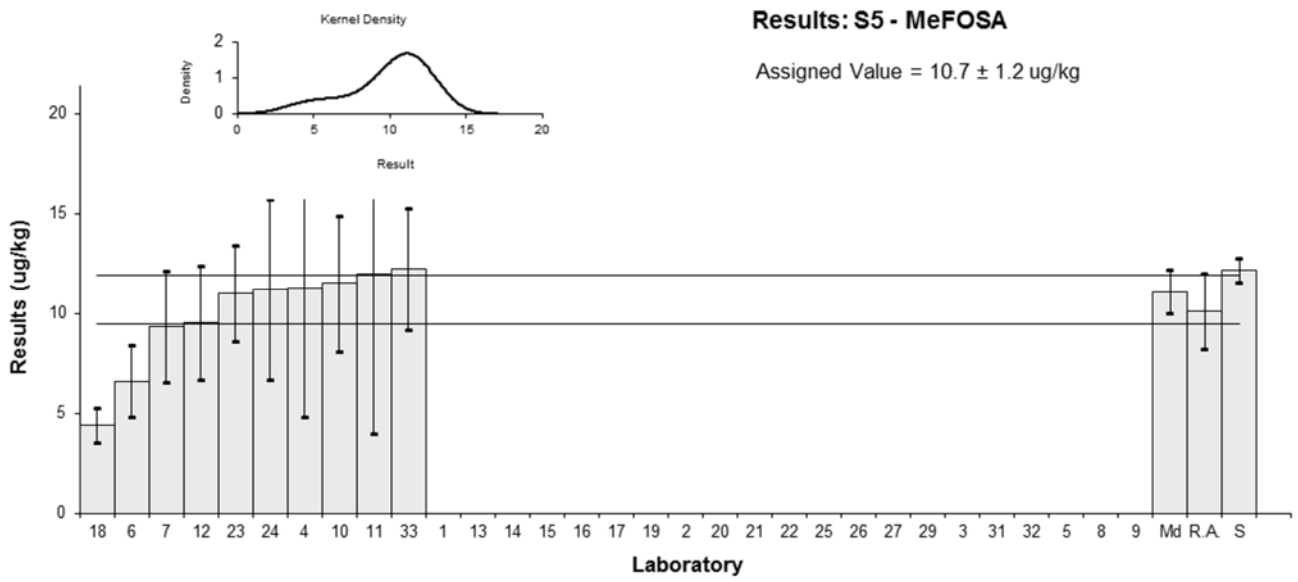
Sample No.	S5
Matrix.	Fish
Analyte.	MeFOSA
Units	µg/kg

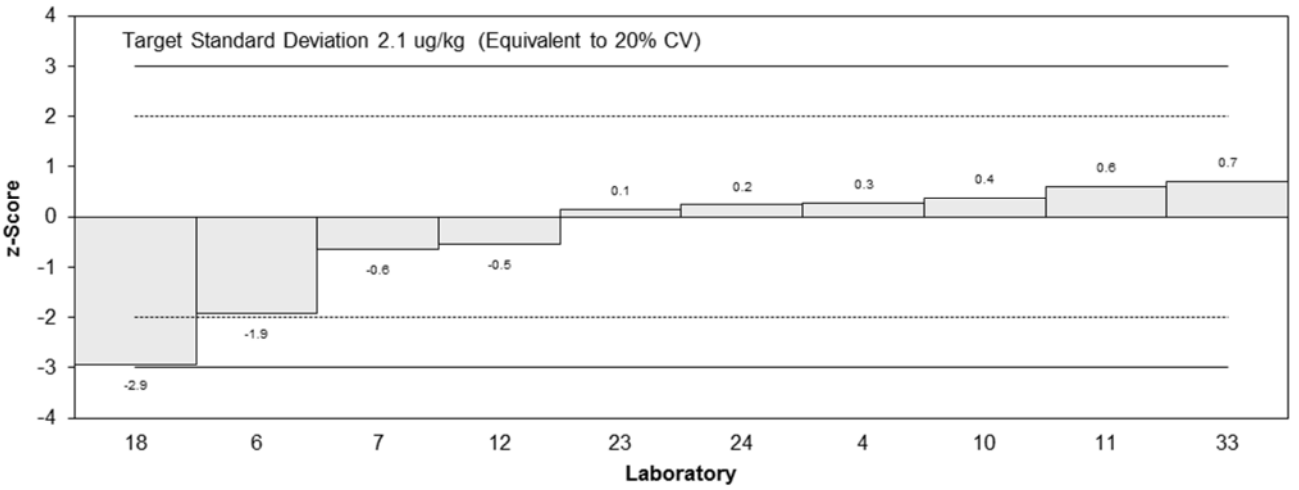
Participant Results

Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	NT	NT	NT		
4	11.29	6.45	104	0.28	0.09
5	NT	NT	NT		
6	6.6	1.8	59	-1.92	-1.90
7	9.33	2.80	83	-0.64	-0.45
8	NT	NT	NT		
9	NT	NT	NT		
10	11.5	3.4	NR	0.37	0.22
11	12	8	94	0.61	0.16
12	9.54	2.86	79	-0.54	-0.37
13	NT	NT	NT		
14	NT	NT	NT		
15	NT	NT	NT		
16	NT	NT	NT		
17	NT	NT	NT		
18	4.4	0.89	161	-2.94	-4.22
19	NT	NT	NT		
20	NT	NT	NT		
21	NT	NT	NT		
22	NT	NT	NT		
23	11	2.4	102	0.14	0.11
24	11.2	4.5	2.88	0.23	0.11
25	NT	NT	NT		
26	NT	NT	NT		
27	NT	NT	NT		
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	12.2018	3.0505	27	0.70	0.46

Statistics

Assigned Value	10.7	1.2
Spike	12.18	0.61
Robust Average	10.1	1.9
Median	11.1	1.1
Mean	9.9	
N	10	
Max.	12.2018	
Min.	4.4	
Robust SD	2.35	
Robust CV	23%	


Kernel Density
Density
Result
Results: S5 - MeFOSA
Assigned Value = 10.7 ± 1.2 ug/kg
Results (ug/kg)
Laboratory
18 6 7 12 23 24 4 10 11 33 1 13 14 15 16 17 19 2 20 21 22 25 26 27 29 3 31 32 5 8 9 Md R.A. S


z-Scores: S5 - MeFOSA
Target Standard Deviation 2.1 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
-2.9
-1.9
-0.6
-0.5
0.1
0.2
0.3
0.4
0.6
0.7
18 6 7 12 23 24 4 10 11 33

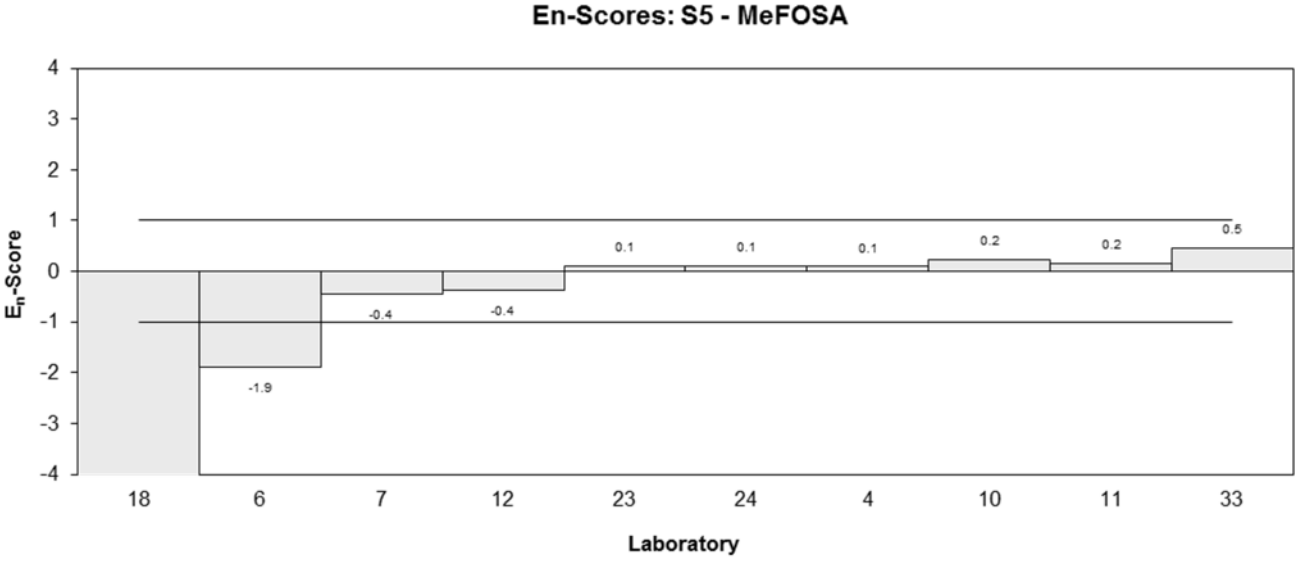

En-Scores: S5 - MeFOSA
En-Score
Laboratory
-1.9
-0.4
-0.4
0.1
0.1
0.1
0.2
0.2
0.5
18 6 7 12 23 24 4 10 11 33

Figure 68

Table 78

Sample Details

Sample No.	S5
Matrix.	Fish
Analyte.	PFBA
Units	µg/kg

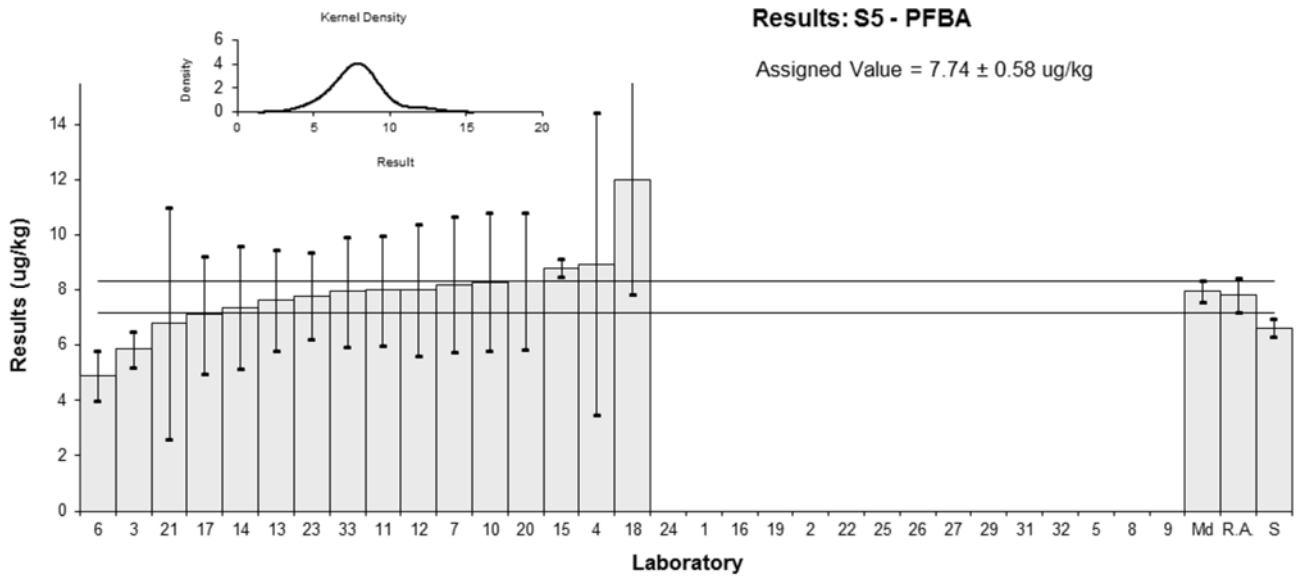
Participant Results

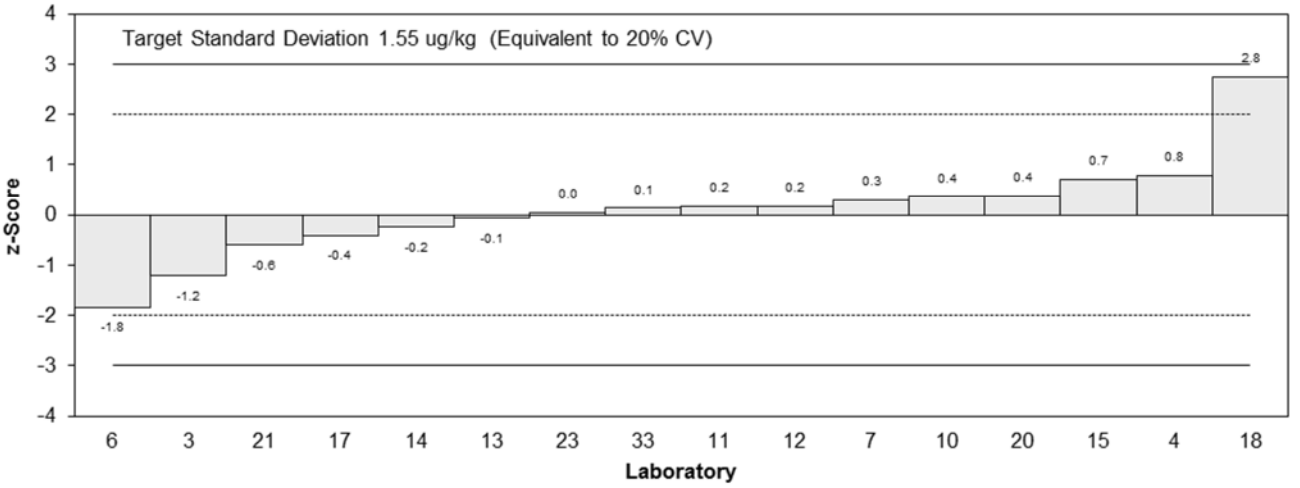
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	5.861	0.647	90.68	-1.21	-2.16
4	8.96	5.47	108	0.79	0.22
5	NT	NT	NT		
6	4.9	0.9	80	-1.83	-2.65
7	8.20	2.46	82	0.30	0.18
8	NT	NT	NT		
9	NT	NT	NT		
10	8.3	2.5	NR	0.36	0.22
11	8	2	99	0.17	0.12
12	8.01	2.40	86	0.17	0.11
13	7.65	1.84	77	-0.06	-0.05
14	7.38	2.21	14	-0.23	-0.16
15	8.817	0.321	65.8	0.70	1.62
16	NT	NT	NT		
17	7.11	2.13	NR	-0.41	-0.29
18	12.0	4.14	144	2.75	1.02
19	NT	NT	NT		
20	8.33	2.50	111	0.38	0.23
21	6.8	4.2	120	-0.61	-0.22
22	NT	NT	NT		
23	7.8	1.6	108	0.04	0.04
24	<300	NR	48.96		
25	NT	NT	NT		
26	NT	NT	NT		
27	NT	NT	NT		
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	7.9449	1.9862	61.6	0.13	0.10

Statistics

Assigned Value*	7.74	0.58
Spike	6.64	0.33
Robust Average	7.83	0.61
Median	7.97	0.38
Mean	7.88	
N	16	
Max.	12	
Min.	4.9	
Robust SD	0.98	
Robust CV	13%	

* Assigned value is the robust average excluding laboratory 18.


Kernel Density
Density
Result
Results: S5 - PFBA
Assigned Value = 7.74 ± 0.58 ug/kg
Results (ug/kg)
Laboratory
6 3 21 17 14 13 23 33 11 12 7 10 20 15 4 18 24 1 16 19 2 22 25 26 27 29 31 32 5 8 9 Md R.A. S


z-Scores: S5 - PFBA
Target Standard Deviation 1.55 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
6 3 21 17 14 13 23 33 11 12 7 10 20 15 4 18
-1.8 -1.2 -0.6 -0.4 -0.2 -0.1 0.0 0.1 0.2 0.2 0.3 0.4 0.4 0.7 0.8 2.8

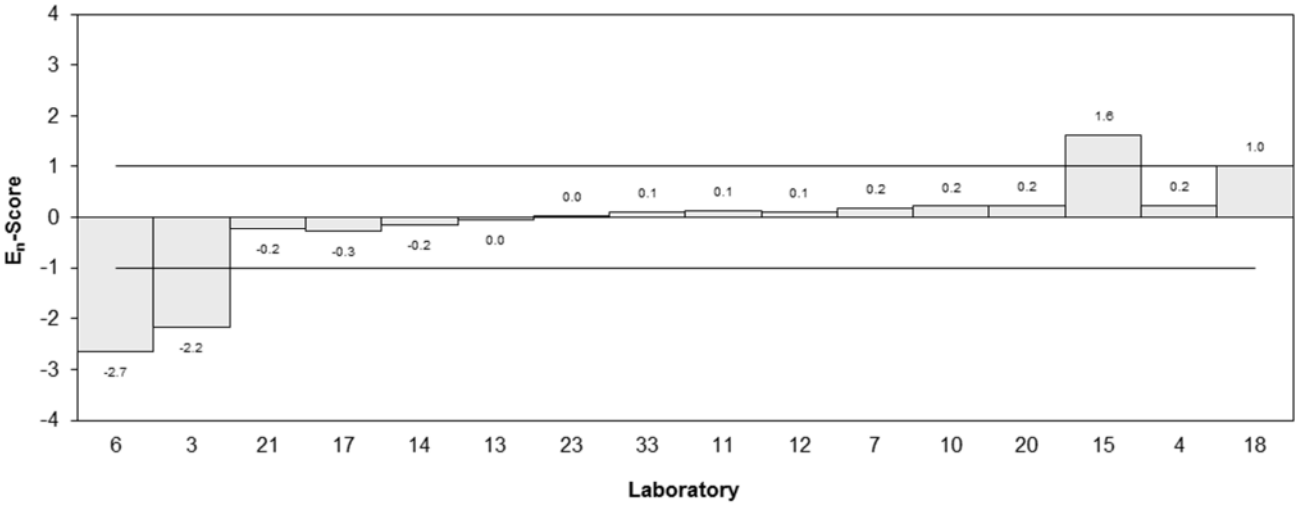

En-Scores: S5 - PFBA
En-Score
Laboratory
6 3 21 17 14 13 23 33 11 12 7 10 20 15 4 18
-2.7 -2.2 -0.2 -0.3 -0.2 0.0 0.0 0.1 0.1 0.1 0.2 0.2 0.2 1.6 0.2 1.0

Figure 69

Table 79

Sample Details

Sample No.	S5
Matrix.	Fish
Analyte.	PFBS
Units	µg/kg

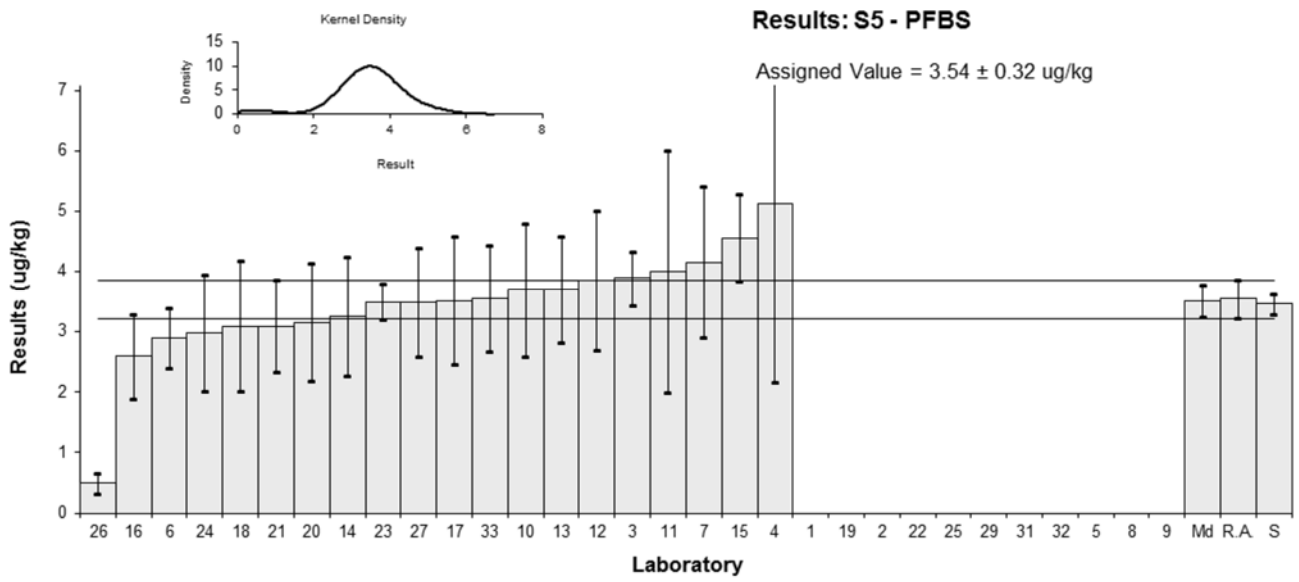
Participant Results

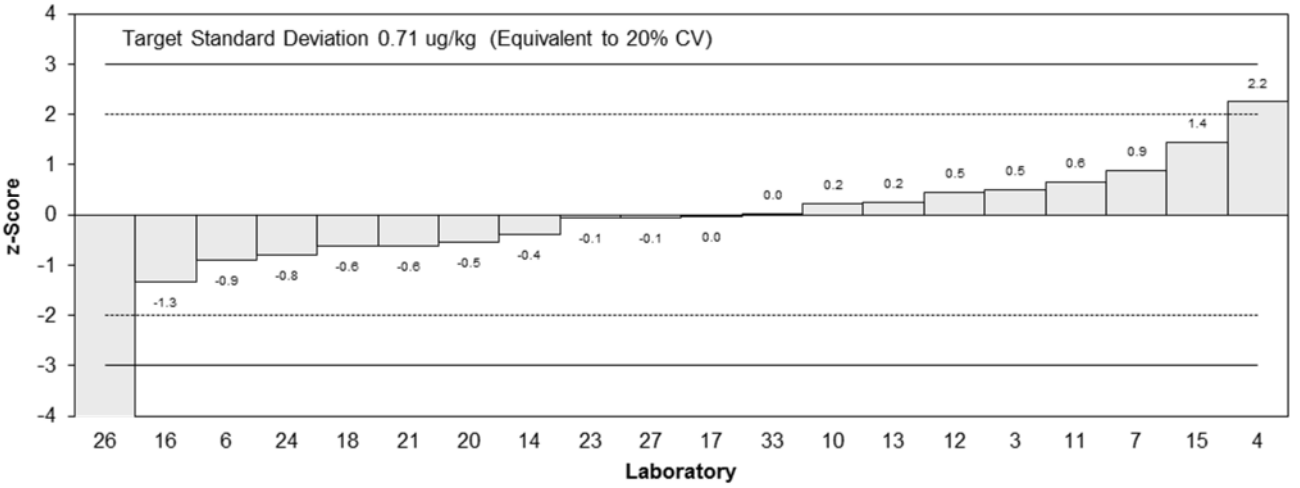
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	3.889	0.440	NR	0.49	0.64
4	5.13	2.97	105	2.25	0.53
5	NT	NT	NT		
6	2.9	0.5	69	-0.90	-1.08
7	4.16	1.25	117	0.88	0.48
8	NT	NT	NT		
9	NT	NT	NT		
10	3.7	1.1	NR	0.23	0.14
11	4	2	101	0.65	0.23
12	3.86	1.16	90	0.45	0.27
13	3.71	0.879	79	0.24	0.18
14	3.26	0.98	57	-0.40	-0.27
15	4.566	0.712	65.7	1.45	1.31
16	2.6	0.7	75	-1.33	-1.22
17	3.52	1.06	NR	-0.03	-0.02
18	3.1	1.08	143	-0.62	-0.39
19	NT	NT	NT		
20	3.16	0.98	111	-0.54	-0.37
21	3.1	0.77	115	-0.62	-0.53
22	NT	NT	NT		
23	3.5	0.3	104	-0.06	-0.09
24	2.98	0.96	6.36	-0.79	-0.55
25	NT	NT	NT		
26	0.493	0.169	71	-4.30	-8.42
27	3.5	0.9	91	-0.06	-0.04
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	3.5583	0.8896	75.2	0.03	0.02

Statistics

Assigned Value	3.54	0.32
Spike	3.47	0.17
Robust Average*	3.54	0.32
Median*	3.52	0.26
Mean*	3.59	
N	20	
Max.	5.13	
Min.	0.493	
Robust SD*	0.55	
Robust CV*	16%	

* Results from laboratory 26 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S5 - PFBS
Assigned Value = 3.54 ± 0.32 ug/kg
Results (ug/kg)
Laboratory
26 16 6 24 18 21 20 14 23 27 17 33 10 13 12 3 11 7 15 4 1 19 2 22 25 29 31 32 5 8 9 Md R.A. S


z-Scores: S5 - PFBS
Target Standard Deviation 0.71 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
26 16 6 24 18 21 20 14 23 27 17 33 10 13 12 3 11 7 15 4
-1.3 -0.9 -0.8 -0.6 -0.6 -0.5 -0.4 -0.1 -0.1 0.0 0.0 0.2 0.2 0.5 0.5 0.6 0.9 1.4 2.2

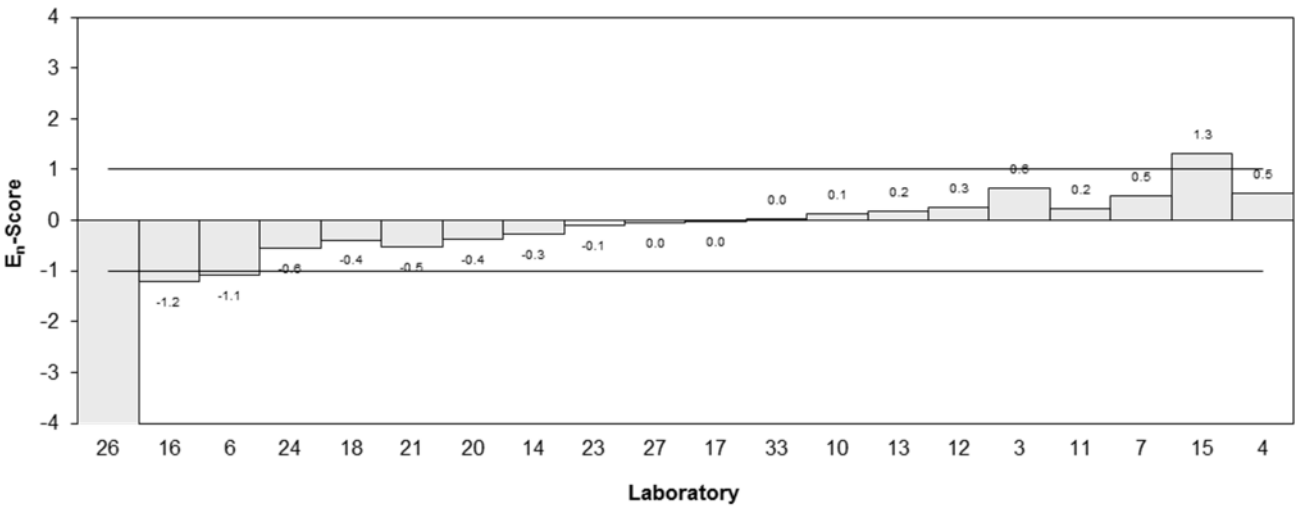

En-Scores: S5 - PFBS
En-Score
Laboratory
26 16 6 24 18 21 20 14 23 27 17 33 10 13 12 3 11 7 15 4
-1.2 -1.1 -0.6 -0.4 -0.5 -0.4 -0.3 -0.1 0.0 0.0 0.0 0.1 0.2 0.3 0.6 0.2 0.5 1.3 0.5

Figure 70

Table 80

Sample Details

Sample No.	S5
Matrix.	Fish
Analyte.	PFDA
Units	µg/kg

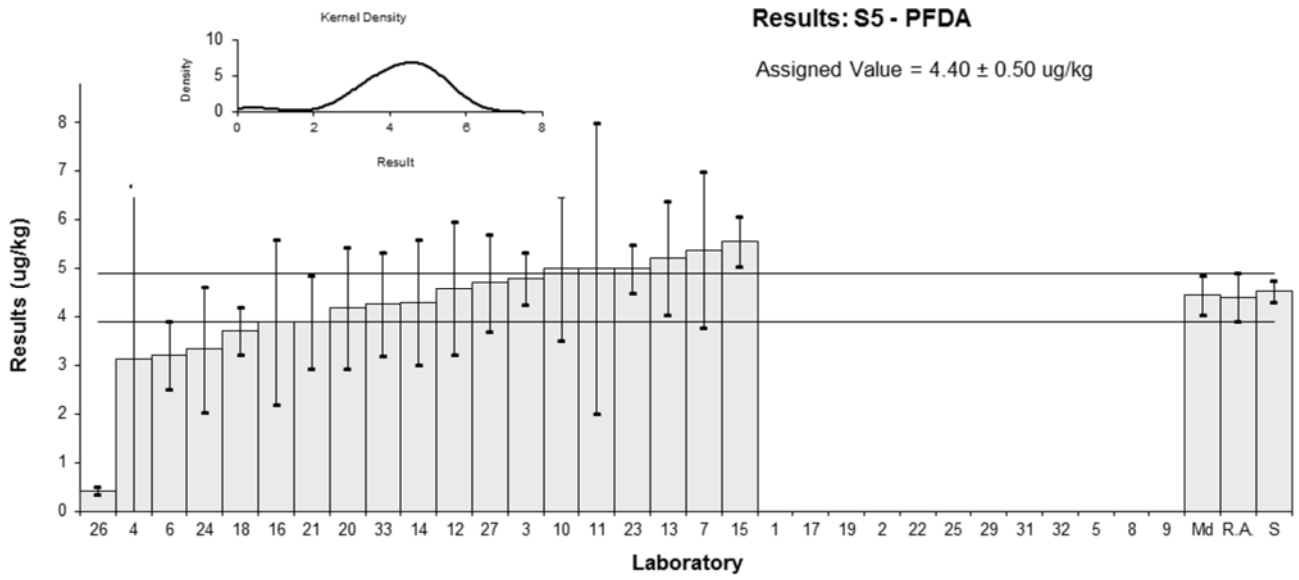
Participant Results

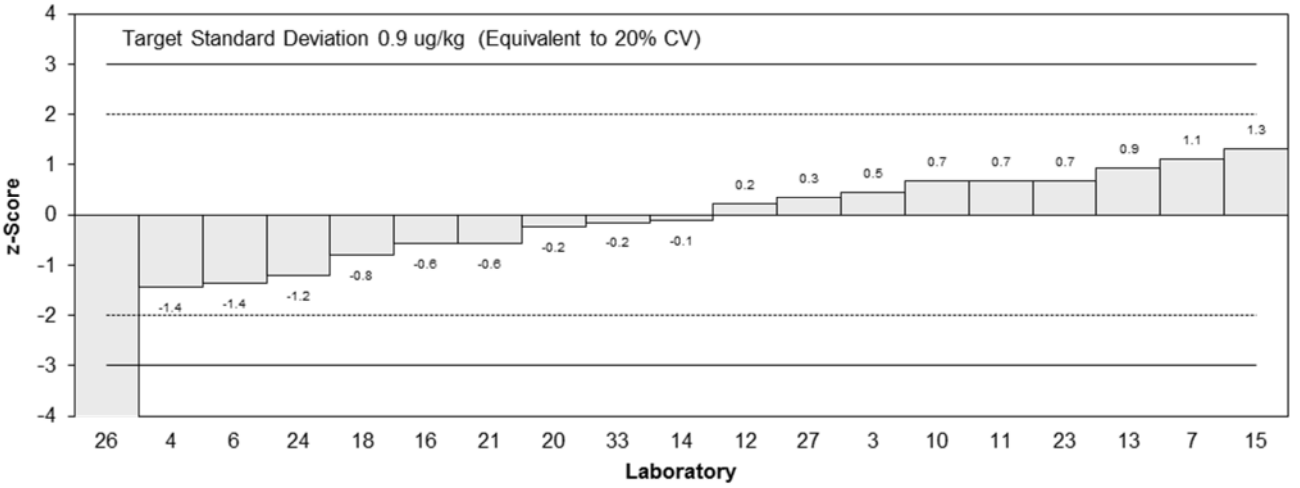
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	4.803	0.542	89.63	0.46	0.55
4	3.13	3.58	103	-1.44	-0.35
5	NT	NT	NT		
6	3.2	0.7	118	-1.36	-1.39
7	5.38	1.61	101	1.11	0.58
8	NT	NT	NT		
9	NT	NT	NT		
10	5.0	1.5	NR	0.68	0.38
11	5	3	99	0.68	0.20
12	4.59	1.38	92	0.22	0.13
13	5.22	1.17	91	0.93	0.64
14	4.3	1.29	72	-0.11	-0.07
15	5.554	0.508	54.7	1.31	1.62
16	3.9	1.7	92	-0.57	-0.28
17	NT	NT	NT		
18	3.7	0.49	136	-0.80	-1.00
19	NT	NT	NT		
20	4.19	1.26	113	-0.24	-0.15
21	3.9	0.96	121	-0.57	-0.46
22	NT	NT	NT		
23	5.0	0.5	88	0.68	0.85
24	3.33	1.3	6.44	-1.22	-0.77
25	NT	NT	NT		
26	0.419	0.0773	81	-4.52	-7.87
27	4.7	1	108	0.34	0.27
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	4.2653	1.0663	64.9	-0.15	-0.11

Statistics

Assigned Value	4.40	0.50
Spike	4.52	0.23
Robust Average*	4.40	0.50
Median*	4.45	0.41
Mean*	4.40	
N	19	
Max.	5.554	
Min.	0.419	
Robust SD*	0.85	
Robust CV*	19%	

* Results from laboratory 26 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S5 - PFDA
Assigned Value = 4.40 ± 0.50 ug/kg
Results (ug/kg)
Laboratory
26 4 6 24 18 16 21 20 33 14 12 27 3 10 11 23 13 7 15 1 17 19 2 22 25 29 31 32 5 8 9 Md R.A. S


z-Scores: S5 - PFDA
Target Standard Deviation 0.9 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
26 4 6 24 18 16 21 20 33 14 12 27 3 10 11 23 13 7 15
-1.4 -1.4 -1.2 -0.8 -0.6 -0.6 -0.2 -0.2 -0.1 0.2 0.3 0.5 0.7 0.7 0.7 0.9 1.1 1.3

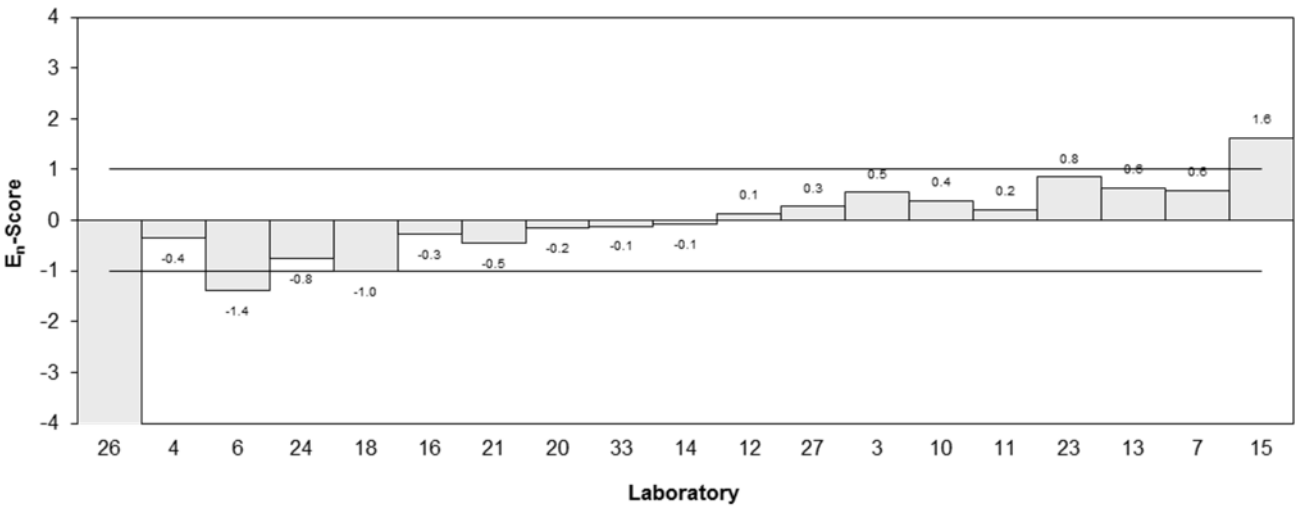

En-Scores: S5 - PFDA
En-Score
Laboratory
26 4 6 24 18 16 21 20 33 14 12 27 3 10 11 23 13 7 15
-0.4 -1.4 -0.8 -1.0 -0.3 -0.5 -0.2 -0.1 -0.1 0.1 0.3 0.5 0.4 0.2 0.8 0.6 0.6 1.6

Figure 71

Table 81

Sample Details

Sample No.	S5
Matrix.	Fish
Analyte.	PFHpA
Units	µg/kg

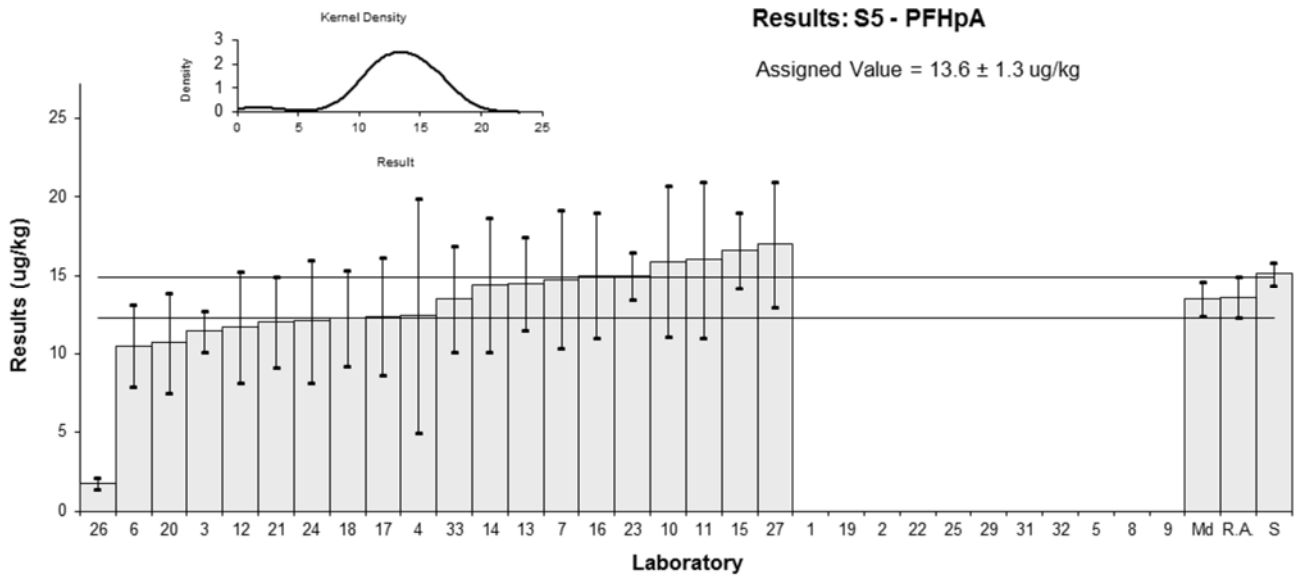
Participant Results

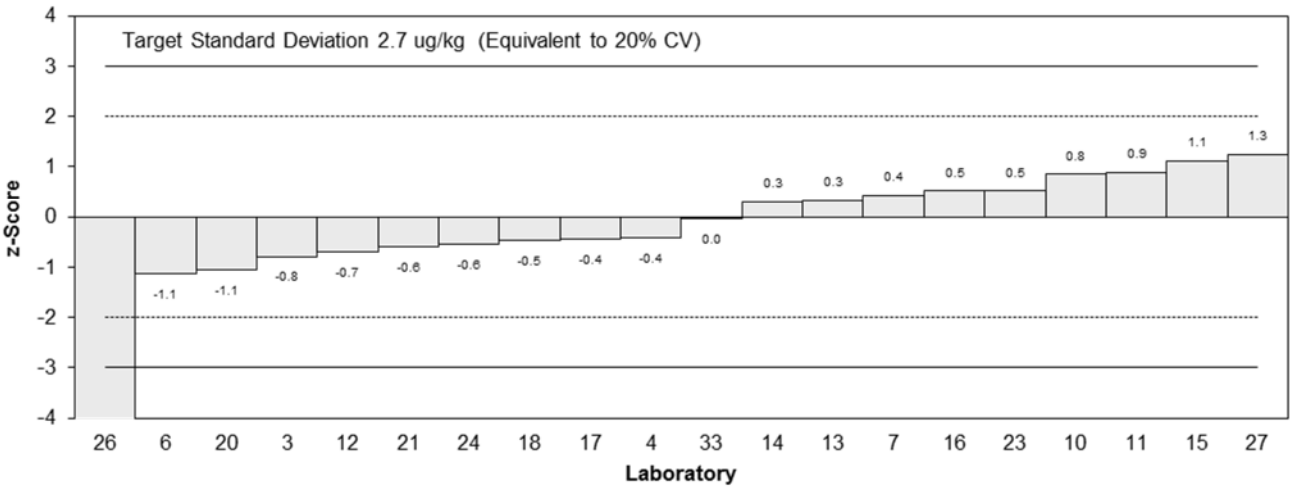
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	11.451	1.311	NR	-0.79	-1.16
4	12.44	7.48	90	-0.43	-0.15
5	NT	NT	NT		
6	10.5	2.6	110	-1.14	-1.07
7	14.76	4.43	88	0.43	0.25
8	NT	NT	NT		
9	NT	NT	NT		
10	15.9	4.8	NR	0.85	0.46
11	16	5	79	0.88	0.46
12	11.7	3.52	101	-0.70	-0.51
13	14.5	3.00	90	0.33	0.28
14	14.4	4.3	61	0.29	0.18
15	16.601	2.444	70.7	1.10	1.08
16	15	4	45	0.51	0.33
17	12.4	3.73	NR	-0.44	-0.30
18	12.3	3.08	133	-0.48	-0.39
19	NT	NT	NT		
20	10.7	3.21	123	-1.07	-0.84
21	12	2.9	112	-0.59	-0.50
22	NT	NT	NT		
23	15	1.5	96	0.51	0.71
24	12.1	3.9	9.02	-0.55	-0.36
25	NT	NT	NT		
26	1.75	0.379	60	-4.36	-8.75
27	17	4	115	1.25	0.81
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	13.4881	3.3720	83.1	-0.04	-0.03

Statistics

Assigned Value	13.6	1.3
Spike	15.10	0.76
Robust Average*	13.6	1.3
Median*	13.5	1.1
Mean*	13.6	
N	20	
Max.	17	
Min.	1.75	
Robust SD*	2.3	
Robust CV*	17%	

* Results from laboratory 26 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S5 - PFHpA
Assigned Value = 13.6 ± 1.3 ug/kg
Results (ug/kg)
Laboratory
26 6 20 3 12 21 24 18 17 4 33 14 13 7 16 23 10 11 15 27 1 19 2 22 25 29 31 32 5 8 9 Md R.A. S


z-Scores: S5 - PFHpA
Target Standard Deviation 2.7 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
26 6 20 3 12 21 24 18 17 4 33 14 13 7 16 23 10 11 15 27
-1.1 -1.1 -0.8 -0.7 -0.6 -0.6 -0.5 -0.4 -0.4 0.0 0.3 0.3 0.4 0.5 0.5 0.8 0.9 1.1 1.3

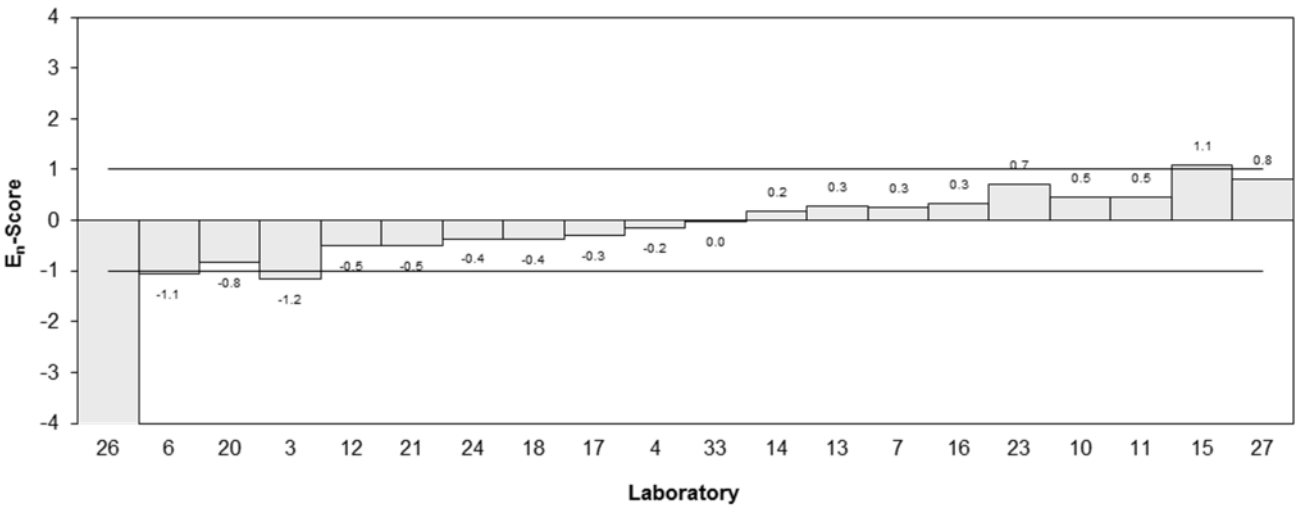

En-Scores: S5 - PFHpA
En-Score
Laboratory
26 6 20 3 12 21 24 18 17 4 33 14 13 7 16 23 10 11 15 27
-1.1 -0.8 -1.2 -0.5 -0.5 -0.4 -0.4 -0.3 -0.2 0.0 0.2 0.3 0.3 0.3 0.7 0.5 0.5 1.1 0.8

Figure 72

Table 82

Sample Details

Sample No.	S5
Matrix.	Fish
Analyte.	PFHxA
Units	µg/kg

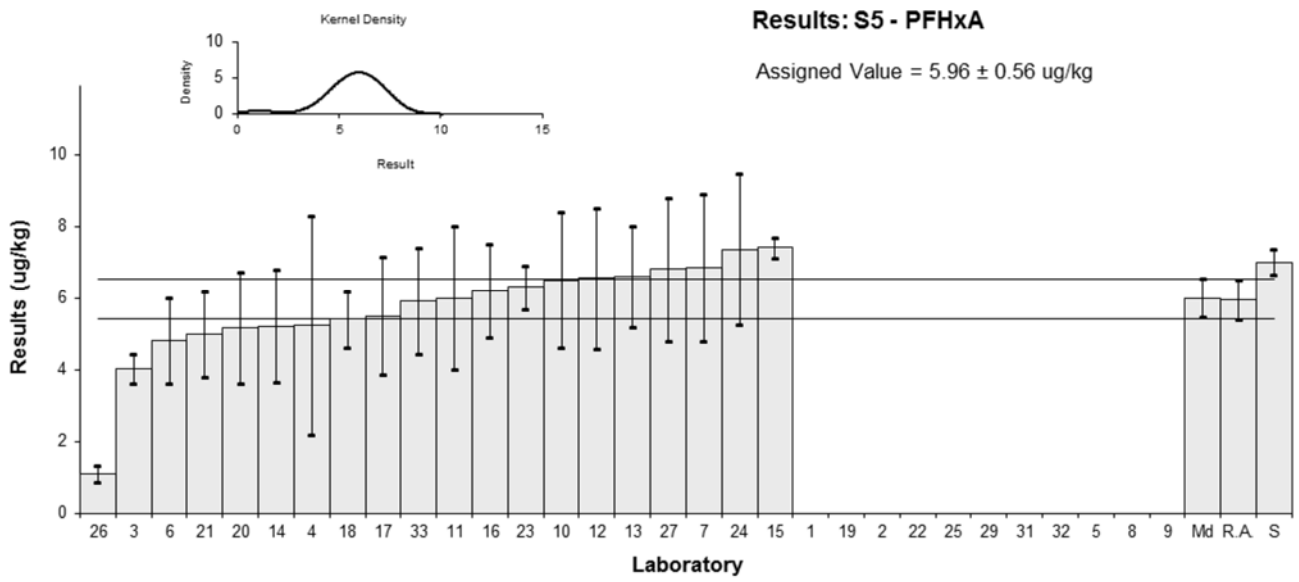
Participant Results

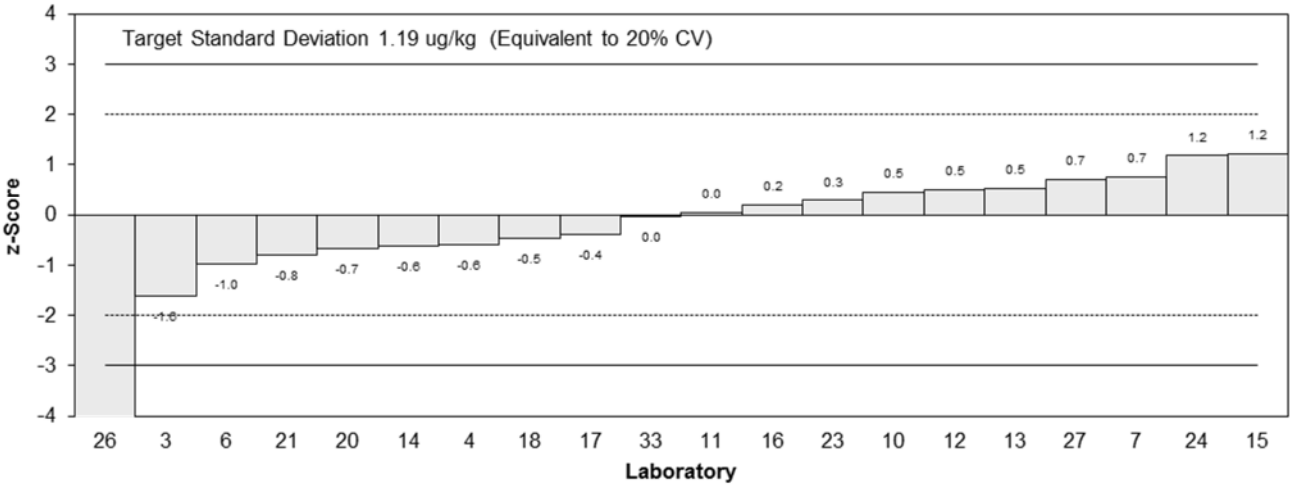
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	4.025	0.407	NR	-1.62	-2.80
4	5.24	3.06	102	-0.60	-0.23
5	NT	NT	NT		
6	4.8	1.2	78	-0.97	-0.88
7	6.85	2.06	86	0.75	0.42
8	NT	NT	NT		
9	NT	NT	NT		
10	6.5	1.9	NR	0.45	0.27
11	6	2	96	0.03	0.02
12	6.55	1.96	77	0.49	0.29
13	6.59	1.42	87	0.53	0.41
14	5.22	1.57	51	-0.62	-0.44
15	7.406	0.285	71.6	1.21	2.30
16	6.2	1.3	45	0.20	0.17
17	5.50	1.65	NR	-0.39	-0.26
18	5.4	0.79	135	-0.47	-0.58
19	NT	NT	NT		
20	5.16	1.55	123	-0.67	-0.49
21	5.0	1.2	114	-0.81	-0.72
22	NT	NT	NT		
23	6.3	0.6	99	0.29	0.41
24	7.36	2.1	4.46	1.17	0.64
25	NT	NT	NT		
26	1.08	0.227	48	-4.09	-8.08
27	6.8	2	110	0.70	0.40
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	5.9069	1.4767	76.8	-0.04	-0.03

Statistics

Assigned Value	5.96	0.56
Spike	7.00	0.35
Robust Average*	5.96	0.56
Median*	6.00	0.54
Mean*	5.94	
N	20	
Max.	7.406	
Min.	1.08	
Robust SD*	0.97	
Robust CV*	16%	

* Results from laboratory 26 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S5 - PFHxA
Assigned Value = 5.96 ± 0.56 ug/kg
Results (ug/kg)
Laboratory
26 3 6 21 20 14 4 18 17 33 11 16 23 10 12 13 27 7 24 15 1 19 2 22 25 29 31 32 5 8 9 Md R.A. S


z-Scores: S5 - PFHxA
Target Standard Deviation 1.19 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
26 3 6 21 20 14 4 18 17 33 11 16 23 10 12 13 27 7 24 15

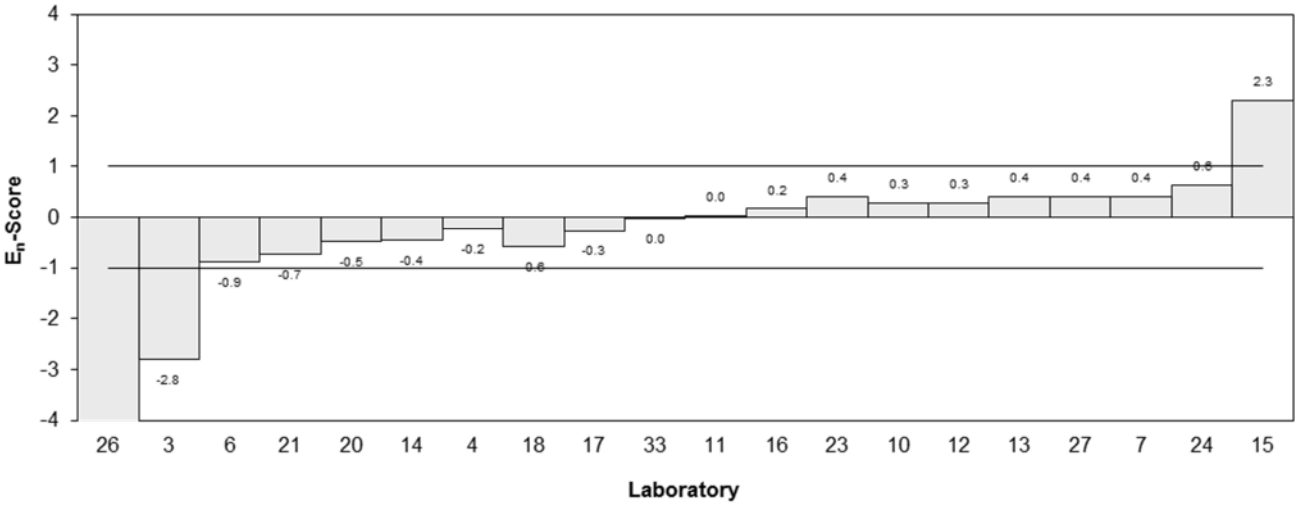

En-Scores: S5 - PFHxA
En-Score
Laboratory
26 3 6 21 20 14 4 18 17 33 11 16 23 10 12 13 27 7 24 15

Figure 73

Table 83

Sample Details

Sample No.	S5
Matrix.	Fish
Analyte.	PFHxS
Units	µg/kg

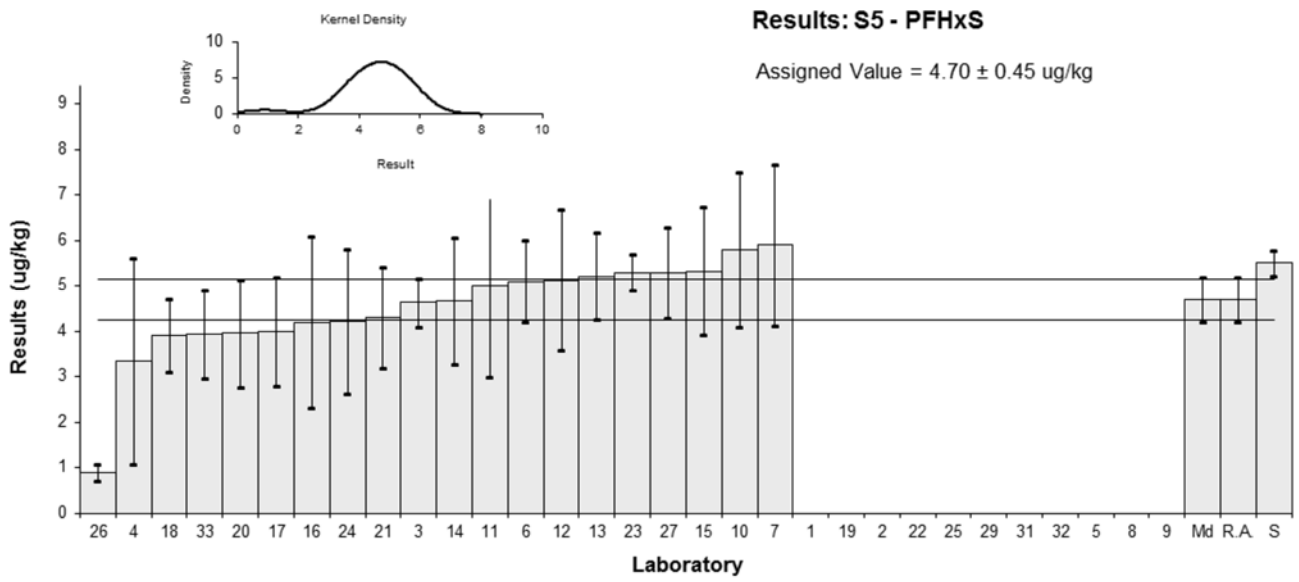
Participant Results

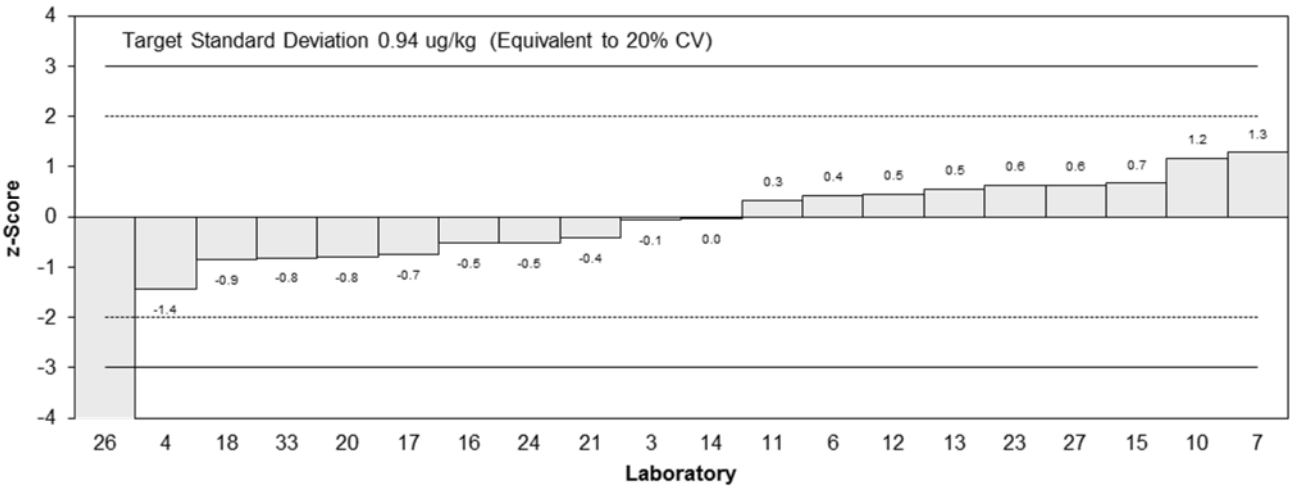
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	4.631	0.534	NR	-0.07	-0.10
4	3.35	2.27	99	-1.44	-0.58
5	NT	NT	NT		
6	5.1	0.9	102	0.43	0.40
7	5.90	1.77	85	1.28	0.66
8	NT	NT	NT		
9	NT	NT	NT		
10	5.8	1.7	NR	1.17	0.63
11	5	2	103	0.32	0.15
12	5.13	1.54	93	0.46	0.27
13	5.21	0.953	82	0.54	0.48
14	4.66	1.4	72	-0.04	-0.03
15	5.325	1.409	65.7	0.66	0.42
16	4.2	1.9	75	-0.53	-0.26
17	4.0	1.20	NR	-0.74	-0.55
18	3.9	0.80	138	-0.85	-0.87
19	NT	NT	NT		
20	3.95	1.18	111	-0.80	-0.59
21	4.3	1.1	105	-0.43	-0.34
22	NT	NT	NT		
23	5.3	0.4	102	0.64	1.00
24	4.21	1.6	6.36	-0.52	-0.29
25	NT	NT	NT		
26	0.893	0.180	48	-4.05	-7.85
27	5.3	1	91	0.64	0.55
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	3.9341	0.9835	70.2	-0.81	-0.71

Statistics

Assigned Value	4.70	0.45
Spike	5.50	0.28
Robust Average*	4.70	0.45
Median*	4.70	0.50
Mean*	4.69	
N	20	
Max.	5.9	
Min.	0.893	
Robust SD*	0.79	
Robust CV*	17%	

* Results from laboratory 26 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S5 - PFHxS
Assigned Value = 4.70 ± 0.45 ug/kg
Results (ug/kg)
Laboratory
26 4 18 33 20 17 16 24 21 3 14 11 6 12 13 23 27 15 10 7 1 19 2 22 25 29 31 32 5 8 9 Md R.A. S


z-Scores: S5 - PFHxS
Target Standard Deviation 0.94 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
26 4 18 33 20 17 16 24 21 3 14 11 6 12 13 23 27 15 10 7
-1.4 -0.9 -0.8 -0.8 -0.7 -0.5 -0.5 -0.4 -0.1 0.0 0.3 0.4 0.5 0.5 0.6 0.6 0.7 1.2 1.3

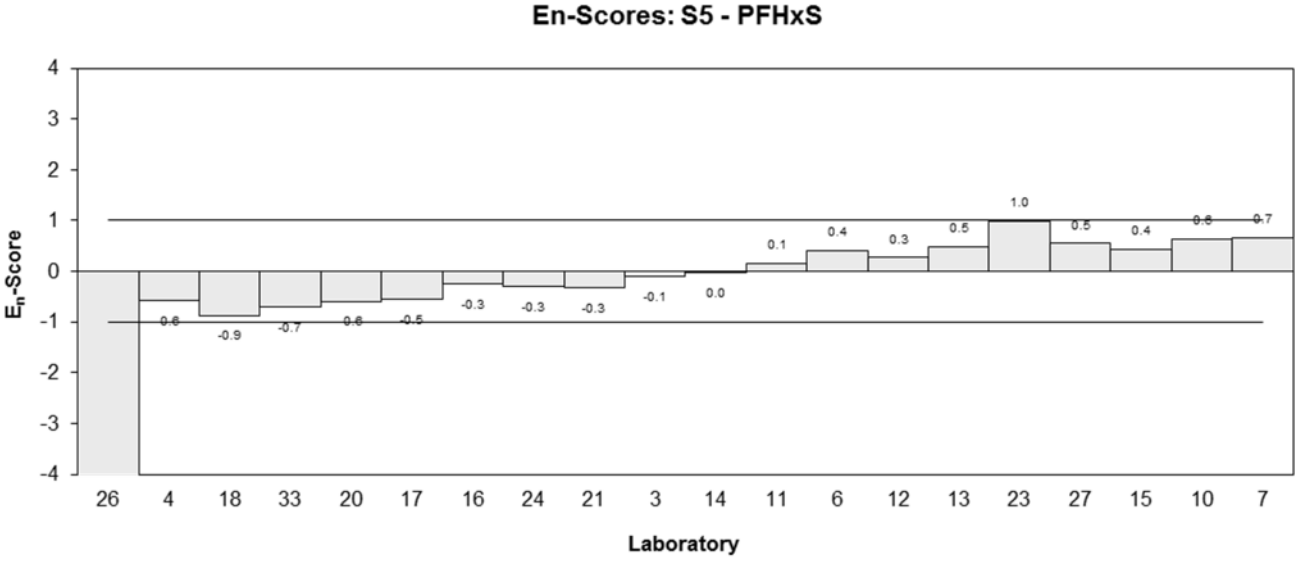

En-Scores: S5 - PFHxS
En-Score
Laboratory
26 4 18 33 20 17 16 24 21 3 14 11 6 12 13 23 27 15 10 7
-0.6 -0.9 -0.7 -0.6 -0.5 -0.3 -0.3 -0.3 -0.1 0.0 0.1 0.4 0.3 0.5 1.0 0.5 0.4 0.6 0.7

Figure 74

Table 84

Sample Details

Sample No.	S5
Matrix.	Fish
Analyte.	PFNA
Units	µg/kg

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	NT	NT	NT
2	NT	NT	NT
3	0.045	0.089	NR
4	<1	1.83	98
5	NT	NT	NT
6	<0.5	0.01	122
7	<0.5	NR	90
8	NT	NT	NT
9	NT	NT	NT
10	<1	NR	NR
11	NR	NR	105
12	<0.5	0.5	98
13	< 10.0	NR	95
14	< 0.222	0.066	71
15	NR	NR	63.9
16	<0.3	NR	92
17	NT	NT	NT
18	<1.0	0.07	155
19	NT	NT	NT
20	<0.7	NR	120
21	< 1	0.25	NR
22	NT	NT	NT
23	< 0.25	NR	89
24	<0.10	NR	64.19
25	NT	NT	NT
26	<0.236	NR	65
27	<0.5	NR	99
29	NT	NT	NT
31	NT	NT	NT
32	NT	NT	NT
33	NR	25	73.8

Statistics

Assigned Value	Not Set	
Spike	Not Spiked	

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Table 85

Sample Details

Sample No.	S5
Matrix.	Fish
Analyte.	PFOA
Units	µg/kg

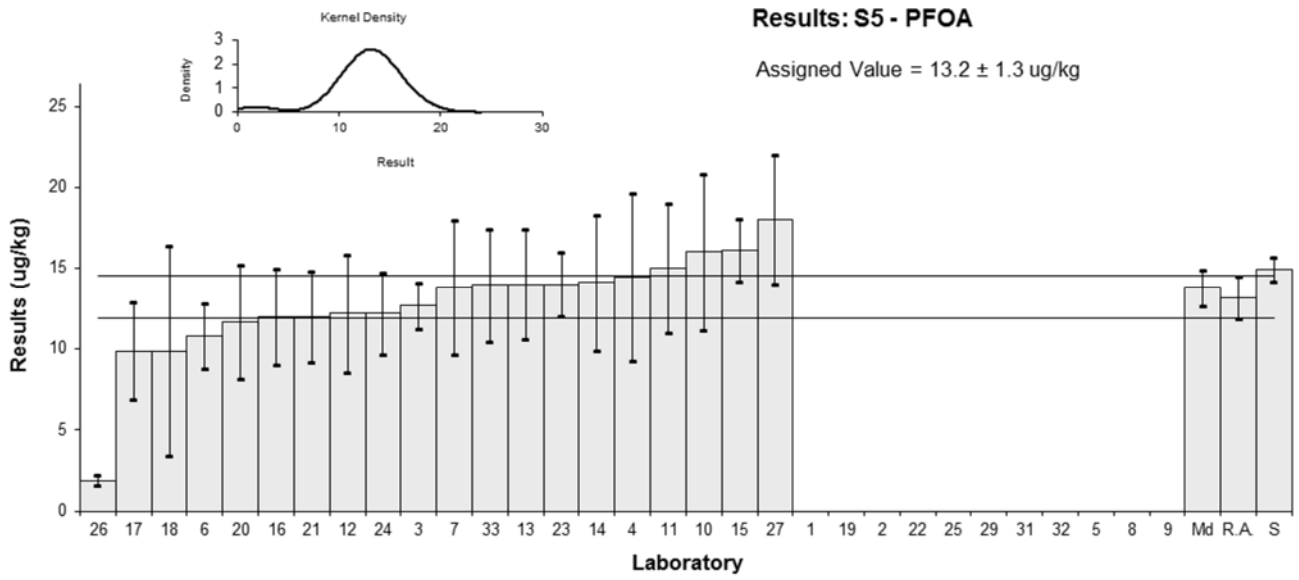
Participant Results

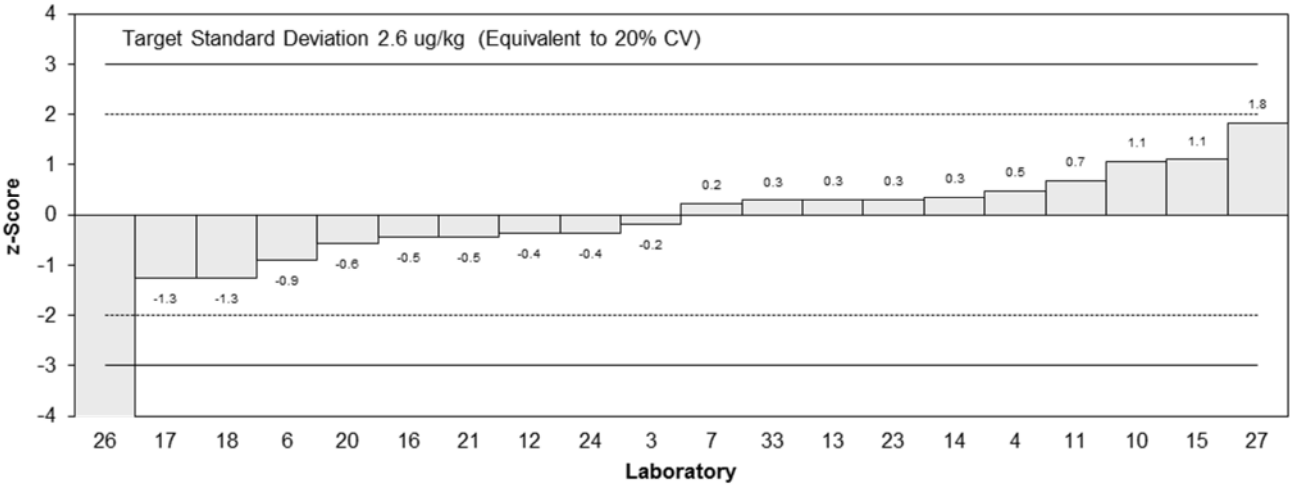
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	12.683	1.405	75.26	-0.20	-0.27
4	14.44	5.21	106	0.47	0.23
5	NT	NT	NT		
6	10.8	2.0	93	-0.91	-1.01
7	13.80	4.14	86	0.23	0.14
8	NT	NT	NT		
9	NT	NT	NT		
10	16.0	4.8	95	1.06	0.56
11	15	4	98	0.68	0.43
12	12.2	3.67	93	-0.38	-0.26
13	14.0	3.40	89	0.30	0.22
14	14.1	4.2	66	0.34	0.20
15	16.107	1.910	71.0	1.10	1.26
16	12	3	81	-0.45	-0.37
17	9.90	3.00	NR	-1.25	-1.01
18	9.9	6.48	135	-1.25	-0.50
19	NT	NT	NT		
20	11.7	3.51	114	-0.57	-0.40
21	12	2.8	115	-0.45	-0.39
22	NT	NT	NT		
23	14	2.0	90	0.30	0.34
24	12.2	2.5	9.02	-0.38	-0.35
25	NT	NT	NT		
26	1.89	0.342	50	-4.28	-8.41
27	18	4	98	1.82	1.14
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	13.9557	3.4889	71.8	0.29	0.20

Statistics

Assigned Value	13.2	1.3
Spike	14.95	0.75
Robust Average*	13.2	1.3
Median*	13.8	1.3
Mean*	13.3	
N	20	
Max.	18	
Min.	1.89	
Robust SD*	2.24	
Robust CV*	17%	

* Results from laboratory 26 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S5 - PFOA
Assigned Value = 13.2 ± 1.3 ug/kg
Results (ug/kg)
Laboratory
26 17 18 6 20 16 21 12 24 3 7 33 13 23 14 4 11 10 15 27 1 19 2 22 25 29 31 32 5 8 9 Md R.A. S


z-Scores: S5 - PFOA
Target Standard Deviation 2.6 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
26 17 18 6 20 16 21 12 24 3 7 33 13 23 14 4 11 10 15 27
-1.3 -1.3 -0.9 -0.6 -0.5 -0.5 -0.4 -0.4 -0.2 0.2 0.3 0.3 0.3 0.3 0.5 0.7 1.1 1.1 1.8

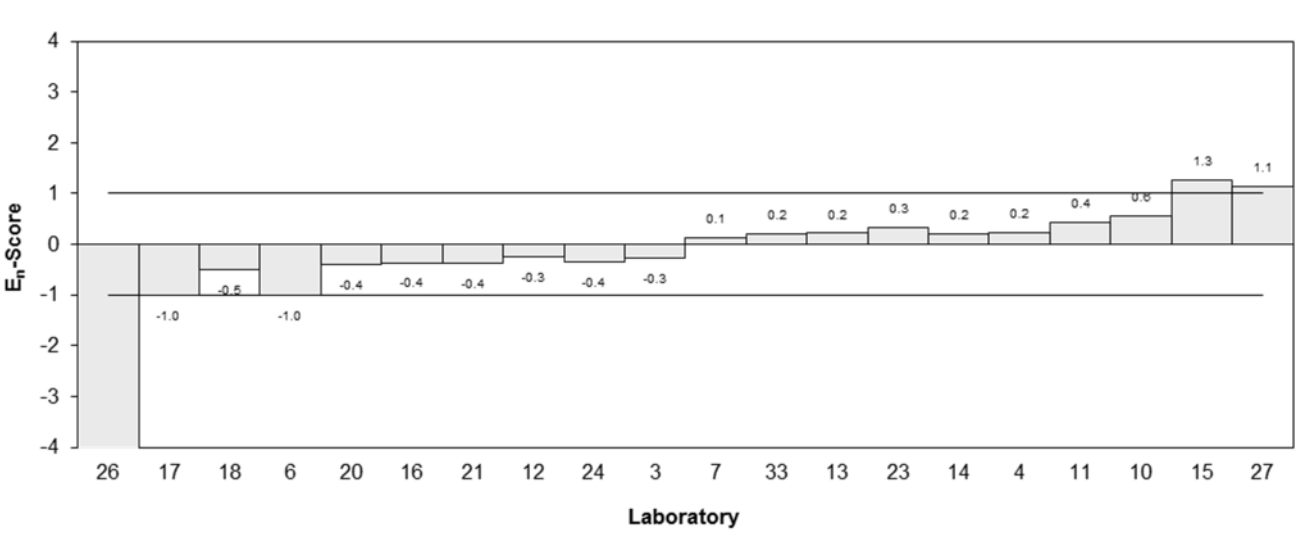

En-Scores: S5 - PFOA
En-Score
Laboratory
26 17 18 6 20 16 21 12 24 3 7 33 13 23 14 4 11 10 15 27
-1.0 -0.5 -1.0 -0.4 -0.4 -0.4 -0.3 -0.4 -0.3 0.1 0.2 0.2 0.3 0.2 0.2 0.4 0.6 1.3 1.1

Figure 75

Table 86

Sample Details

Sample No.	S5
Matrix.	Fish
Analyte.	PFOS
Units	µg/kg

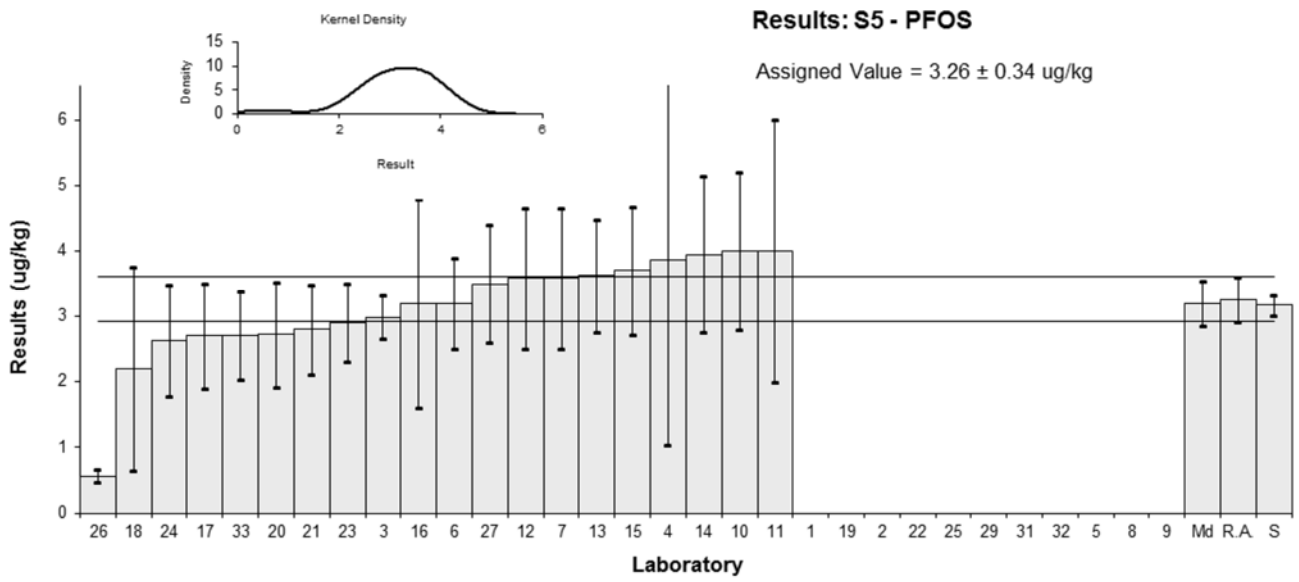
Participant Results

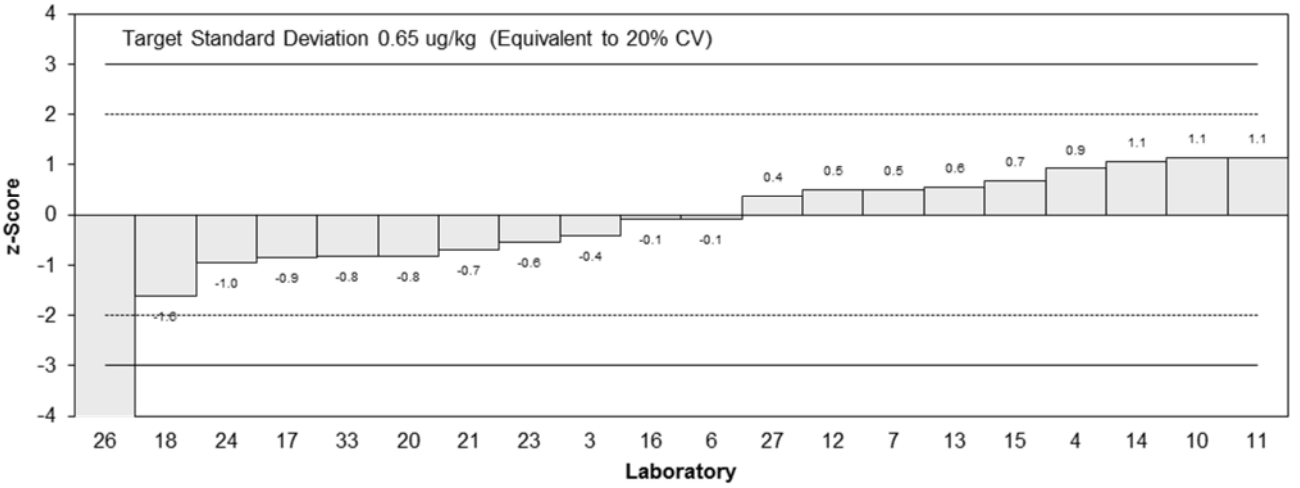
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	2.991	0.330	85.62	-0.41	-0.57
4	3.86	2.82	91	0.92	0.21
5	NT	NT	NT		
6	3.2	0.7	101	-0.09	-0.08
7	3.58	1.08	90	0.49	0.28
8	NT	NT	NT		
9	NT	NT	NT		
10	4.0	1.2	90	1.13	0.59
11	4	2	102	1.13	0.36
12	3.58	1.07	92	0.49	0.29
13	3.62	0.858	79	0.55	0.39
14	3.95	1.19	79	1.06	0.56
15	3.697	0.979	55.2	0.67	0.42
16	3.2	1.6	79	-0.09	-0.04
17	2.7	0.81	NR	-0.86	-0.64
18	2.2	1.55	148	-1.63	-0.67
19	NT	NT	NT		
20	2.72	0.81	110	-0.83	-0.61
21	2.8	0.69	106	-0.71	-0.60
22	NT	NT	NT		
23	2.9	0.6	94	-0.55	-0.52
24	2.64	0.85	6.46	-0.95	-0.68
25	NT	NT	NT		
26	0.566	0.100	54	-4.13	-7.60
27	3.5	0.9	86	0.37	0.25
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	2.7134	0.6784	66.9	-0.84	-0.72

Statistics

Assigned Value	3.26	0.34
Spike	3.17	0.16
Robust Average*	3.26	0.34
Median*	3.20	0.34
Mean*	3.26	
N	20	
Max.	4	
Min.	0.566	
Robust SD*	0.60	
Robust CV*	18%	

* Results from laboratory 26 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S5 - PFOS
Assigned Value = 3.26 ± 0.34 ug/kg
Results (ug/kg)
Laboratory
26 18 24 17 33 20 21 23 3 16 6 27 12 7 13 15 4 14 10 11 1 19 2 22 25 29 31 32 5 8 9 Md R.A. S


z-Scores: S5 - PFOS
Target Standard Deviation 0.65 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
26 18 24 17 33 20 21 23 3 16 6 27 12 7 13 15 4 14 10 11

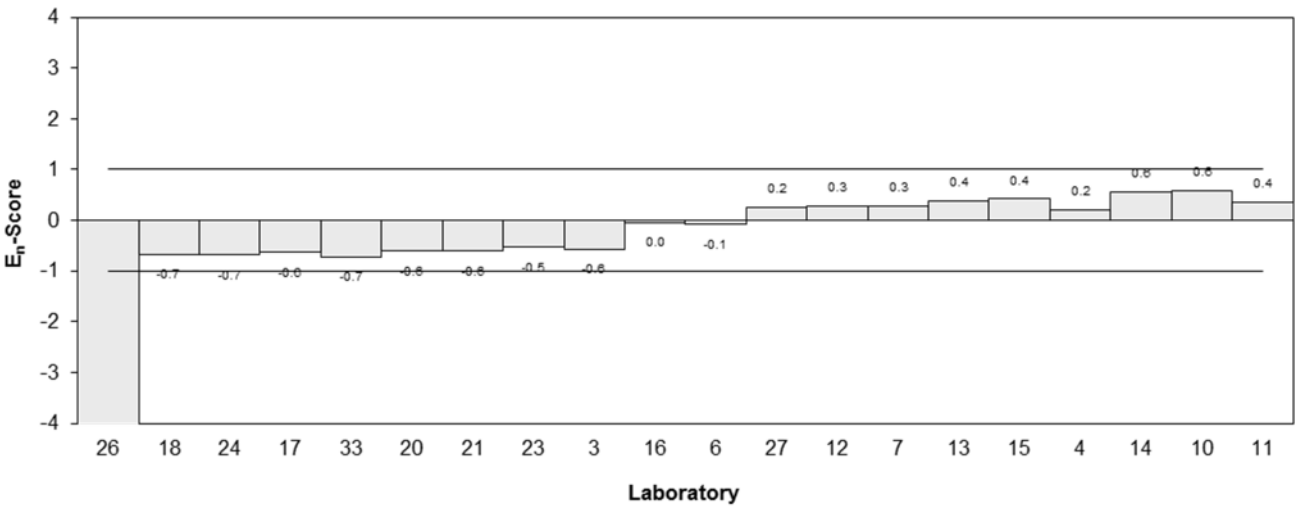

En-Scores: S5 - PFOS
En-Score
Laboratory
26 18 24 17 33 20 21 23 3 16 6 27 12 7 13 15 4 14 10 11

Figure 76

Table 87

Sample Details

Sample No.	S5
Matrix.	Fish
Analyte.	PFOSA
Units	µg/kg

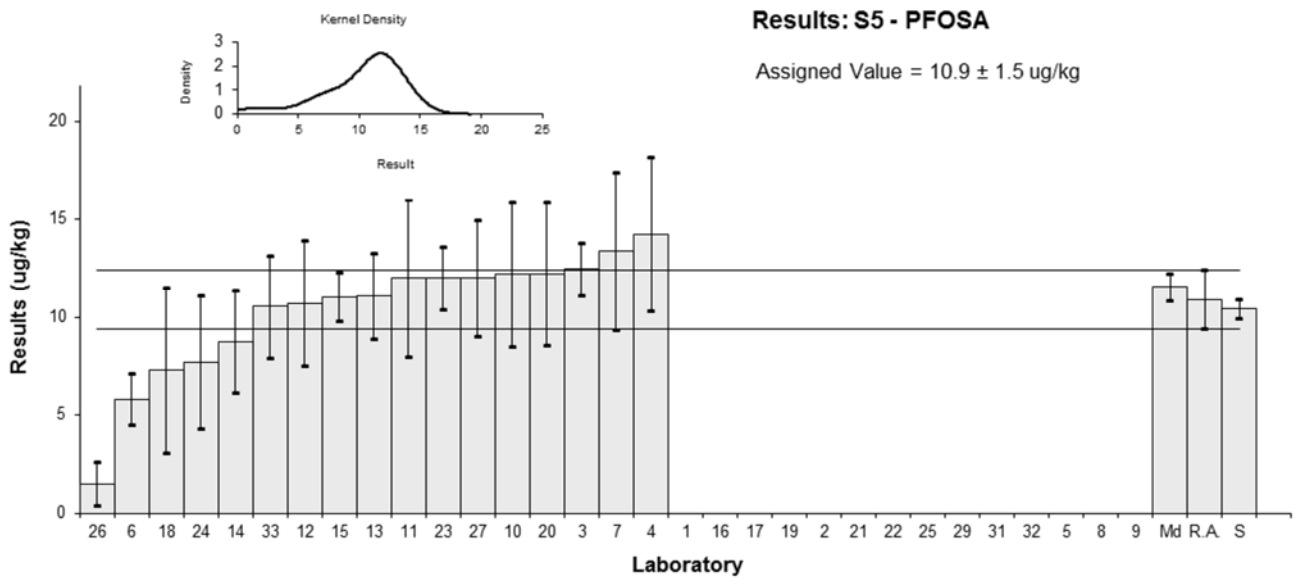
Participant Results

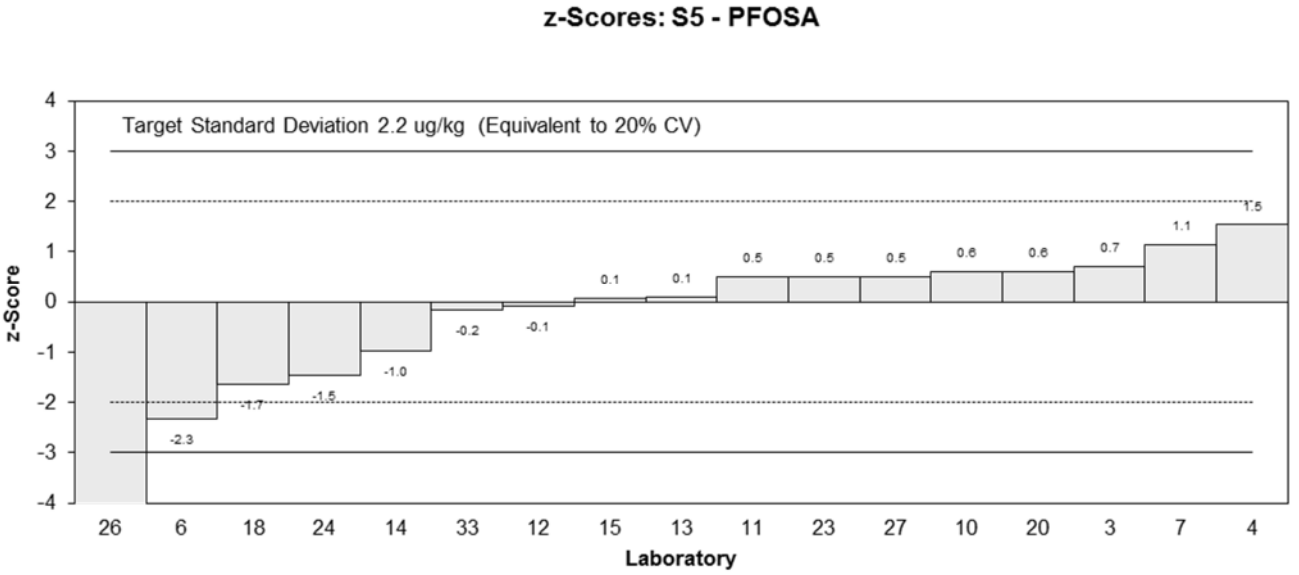
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	12.437	1.346	NR	0.71	0.76
4	14.24	3.91	67	1.53	0.80
5	NT	NT	NT		
6	5.8	1.3	68	-2.34	-2.57
7	13.37	4.01	85	1.13	0.58
8	NT	NT	NT		
9	NT	NT	NT		
10	12.2	3.7	NR	0.60	0.33
11	12	4	105	0.50	0.26
12	10.7	3.21	85	-0.09	-0.06
13	11.1	2.20	69	0.09	0.08
14	8.74	2.62	31	-0.99	-0.72
15	11.029	1.240	18.1	0.06	0.07
16	NT	NT	NT		
17	NT	NT	NT		
18	7.3	4.22	146	-1.65	-0.80
19	NT	NT	NT		
20	12.2	3.66	118	0.60	0.33
21	NT	NT	NT		
22	NT	NT	NT		
23	12	1.6	101	0.50	0.50
24	7.70	3.4	3.35	-1.47	-0.86
25	NT	NT	NT		
26	1.49	1.10	13	-4.32	-5.06
27	12	3	98	0.50	0.33
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	10.5335	2.6334	58.0	-0.17	-0.12

Statistics

Assigned Value	10.9	1.5
Spike	10.43	0.52
Robust Average*	10.9	1.5
Median*	11.6	0.7
Mean*	10.8	
N	17	
Max.	14.24	
Min.	1.49	
Robust SD*	2.4	
Robust CV*	22%	

* Results from laboratory 26 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S5 - PFOSA
Assigned Value = 10.9 ± 1.5 ug/kg
Results (ug/kg)
Laboratory
26 6 18 24 14 33 12 15 13 11 23 27 10 20 3 7 4 1 16 17 19 2 21 22 25 29 31 32 5 8 9 Md R.A. S


z-Scores: S5 - PFOSA
Target Standard Deviation 2.2 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
26 6 18 24 14 33 12 15 13 11 23 27 10 20 3 7 4
-2.3 -1.7 -1.5 -1.0 -0.2 -0.1 0.1 0.1 0.5 0.5 0.5 0.6 0.6 0.7 1.1 1.5

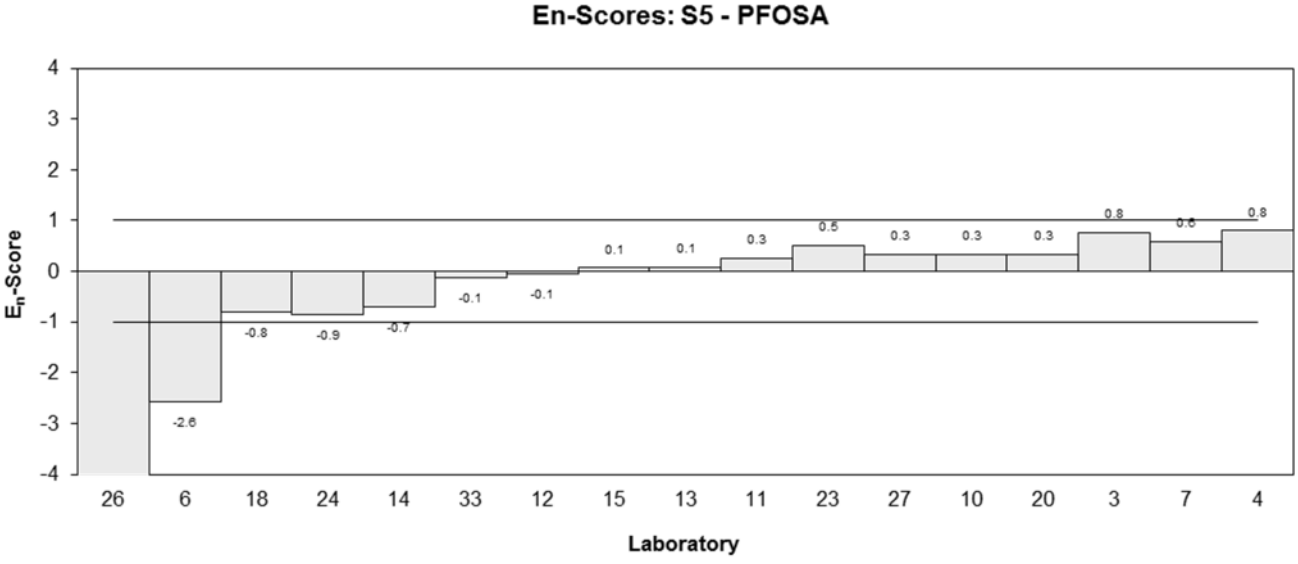

En-Scores: S5 - PFOSA
En-Score
Laboratory
26 6 18 24 14 33 12 15 13 11 23 27 10 20 3 7 4
-2.6 -0.8 -0.9 -0.7 -0.1 -0.1 0.1 0.1 0.3 0.5 0.3 0.3 0.3 0.8 0.6 0.8

Figure 77

Table 88

Sample Details

Sample No.	S5
Matrix.	Fish
Analyte.	PFPeA
Units	µg/kg

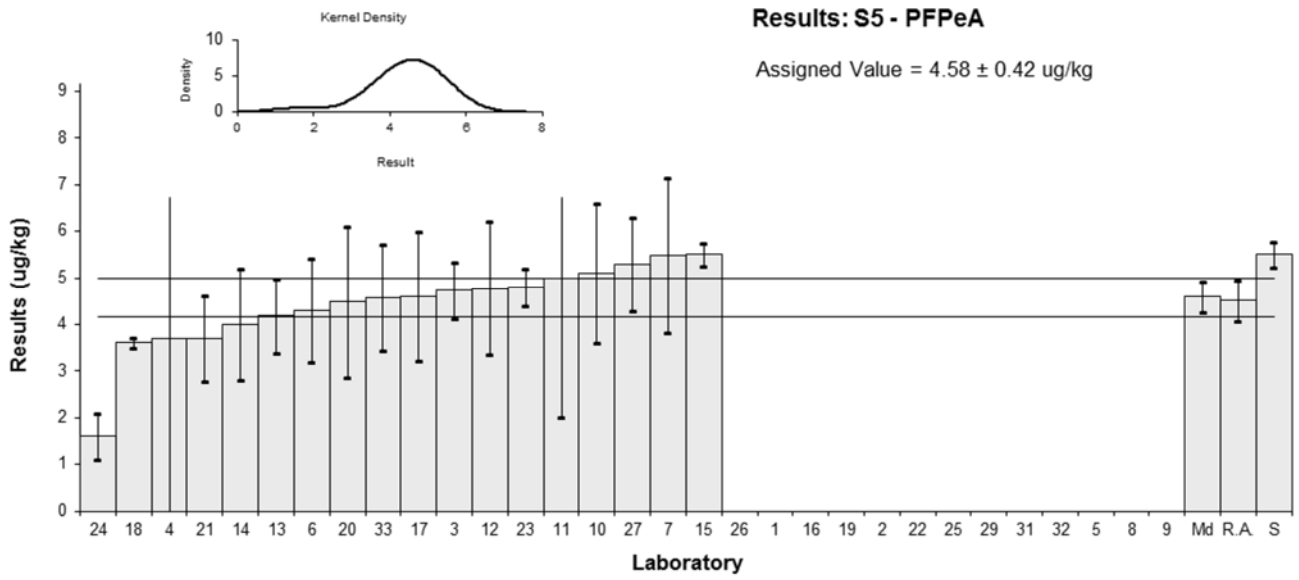
Participant Results

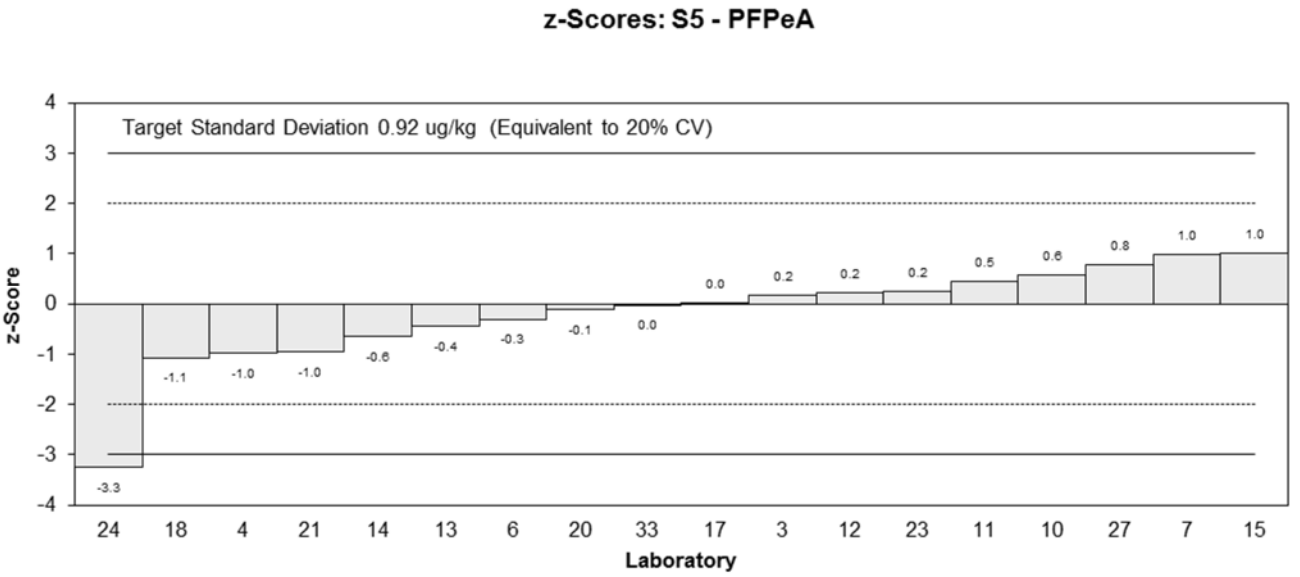
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	4.727	0.614	NR	0.16	0.20
4	3.69	3.84	106	-0.97	-0.23
5	NT	NT	NT		
6	4.3	1.1	63	-0.31	-0.24
7	5.48	1.65	72	0.98	0.53
8	NT	NT	NT		
9	NT	NT	NT		
10	5.1	1.5	NR	0.57	0.33
11	5	3	97	0.46	0.14
12	4.78	1.43	84	0.22	0.13
13	4.18	0.79	78	-0.44	-0.45
14	3.99	1.2	31	-0.64	-0.46
15	5.497	0.242	69.9	1.00	1.89
16	NT	NT	NT		
17	4.60	1.38	NR	0.02	0.01
18	3.6	0.11	132	-1.07	-2.26
19	NT	NT	NT		
20	4.48	1.61	123	-0.11	-0.06
21	3.7	0.92	116	-0.96	-0.87
22	NT	NT	NT		
23	4.8	0.4	100	0.24	0.38
24	1.60	0.5	9.02	-3.25	-4.56
25	NT	NT	NT		
26	<1.89	NR	68		
27	5.3	1	112	0.79	0.66
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	4.5772	1.1443	69.7	0.00	0.00

Statistics

Assigned Value*	4.58	0.42
Spike	5.50	0.28
Robust Average	4.51	0.43
Median	4.59	0.34
Mean	4.41	
N	18	
Max.	5.497	
Min.	1.6	
Robust SD	0.73	
Robust CV	16%	

* Assigned value is the robust average excluding laboratory 24.


Results: S5 - PFPeA
Assigned Value = 4.58 ± 0.42 ug/kg
Kernel Density
Density
Result
Results (ug/kg)
24 18 4 21 14 13 6 20 33 17 3 12 23 11 10 27 7 15 26 1 16 19 2 22 25 29 31 32 5 8 9 Md R.A. S
Laboratory


z-Scores: S5 - PFPeA
Target Standard Deviation 0.92 ug/kg (Equivalent to 20% CV)
z-Score
-3.3 -1.1 -1.0 -1.0 -0.6 -0.4 -0.3 -0.1 0.0 0.0 0.2 0.2 0.2 0.5 0.6 0.8 1.0 1.0
24 18 4 21 14 13 6 20 33 17 3 12 23 11 10 27 7 15
Laboratory

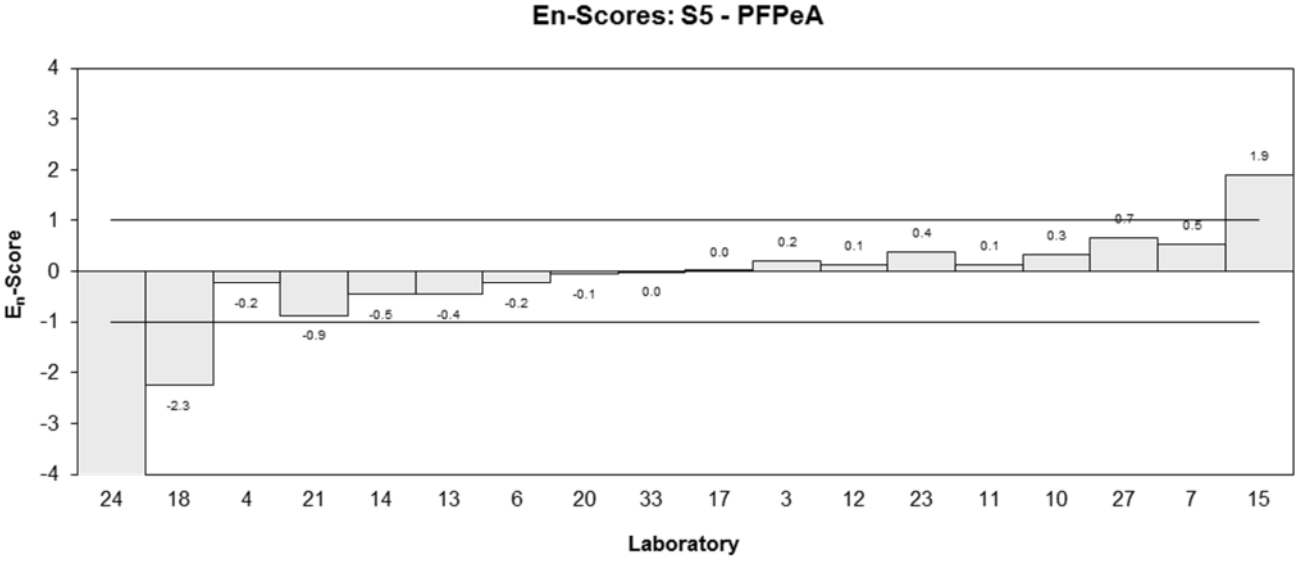

En-Scores: S5 - PFPeA
En-Score
-2.3 -0.2 -0.9 -0.5 -0.4 -0.2 -0.1 0.0 0.0 0.2 0.1 0.4 0.1 0.3 0.7 0.5 1.9
24 18 4 21 14 13 6 20 33 17 3 12 23 11 10 27 7 15
Laboratory

Figure 78

Table 89

Sample Details

Sample No.	S5
Matrix.	Fish
Analyte.	PFTeDA
Units	µg/kg

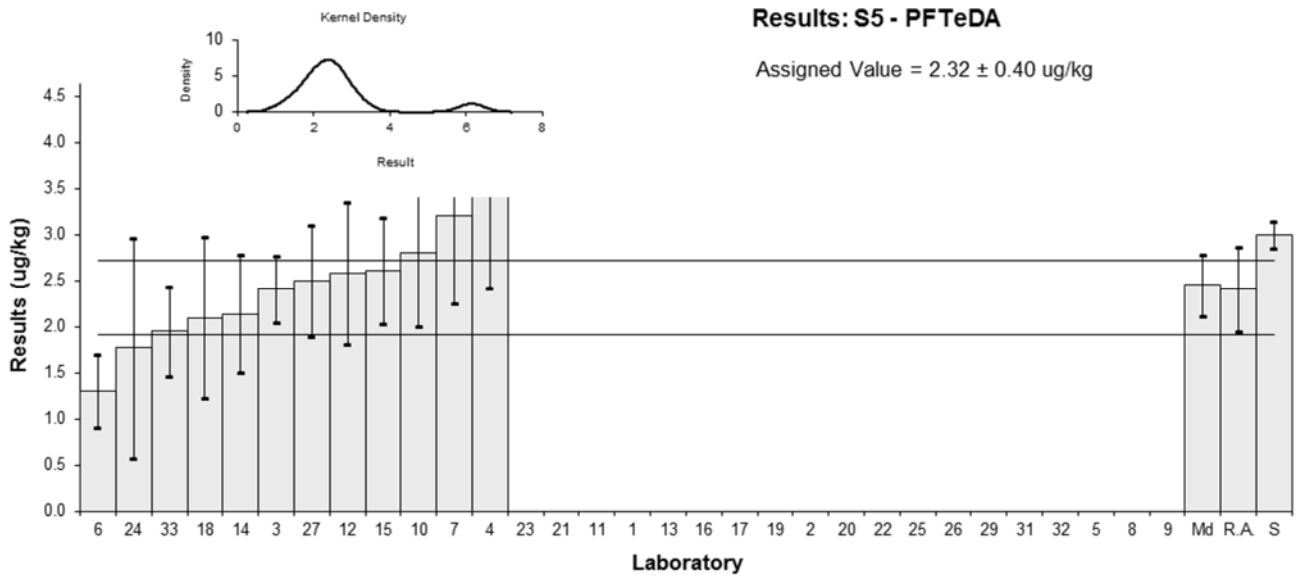
Participant Results

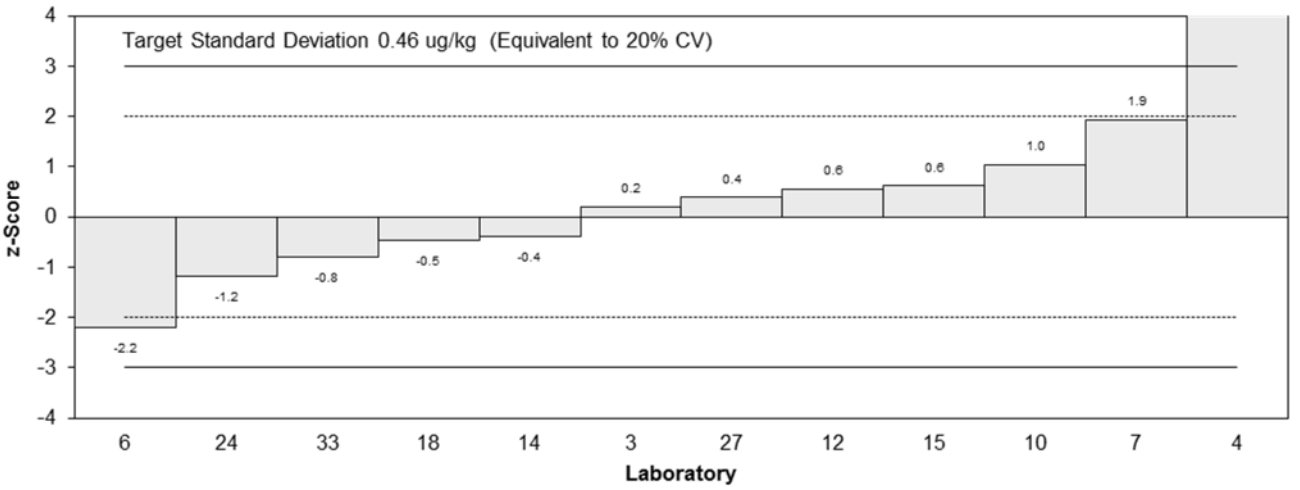
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	2.408	0.359	NR	0.19	0.16
4	6.15	3.73	8	8.25	1.02
5	NT	NT	NT		
6	1.3	0.4	40	-2.20	-1.80
7	3.21	0.96	65	1.92	0.86
8	NT	NT	NT		
9	NT	NT	NT		
10	2.8	0.8	NR	1.03	0.54
11	<5	NR	101		
12	2.58	0.773	82	0.56	0.30
13	NT	NT	NT		
14	2.14	0.64	107	-0.39	-0.24
15	2.606	0.576	71.0	0.62	0.41
16	NT	NT	NT		
17	NT	NT	NT		
18	2.1	0.88	143	-0.47	-0.23
19	NT	NT	NT		
20	NT	NT	NT		
21	< 5	0	NR		
22	NT	NT	NT		
23	< 12.5	NR	81		
24	1.77	1.2	4.51	-1.19	-0.43
25	NT	NT	NT		
26	NT	NT	NT		
27	2.5	0.6	86	0.39	0.25
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	1.9526	0.4882	42.6	-0.79	-0.58

Statistics

Assigned Value*	2.32	0.40
Spike	3.00	0.15
Robust Average	2.41	0.46
Median	2.45	0.33
Mean	2.63	
N	12	
Max.	6.15	
Min.	1.3	
Robust SD	0.64	
Robust CV	27%	

* Assigned value is the robust average excluding laboratory 4.


Kernel Density
Density
Result
Results: S5 - PFTeDA
Assigned Value = 2.32 ± 0.40 ug/kg
Results (ug/kg)
Laboratory
6 24 33 18 14 3 27 12 15 10 7 4 23 21 11 1 13 16 17 19 2 20 22 25 26 29 31 32 5 8 9 Md R.A. S


z-Scores: S5 - PFTeDA
Target Standard Deviation 0.46 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
6 24 33 18 14 3 27 12 15 10 7 4
-2.2 -1.2 -0.8 -0.5 -0.4 0.2 0.4 0.6 0.6 1.0 1.9

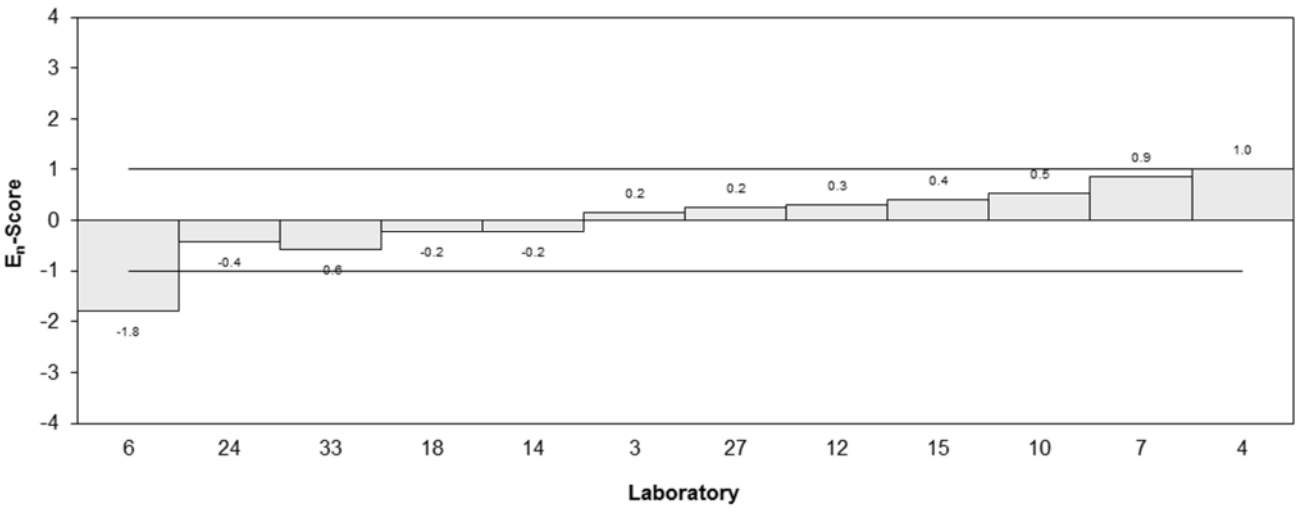

En-Scores: S5 - PFTeDA
En-Score
Laboratory
6 24 33 18 14 3 27 12 15 10 7 4
-1.8 -0.4 -0.6 -0.2 -0.2 0.2 0.2 0.3 0.4 0.5 0.9 1.0

Figure 79

Table 90

Sample Details

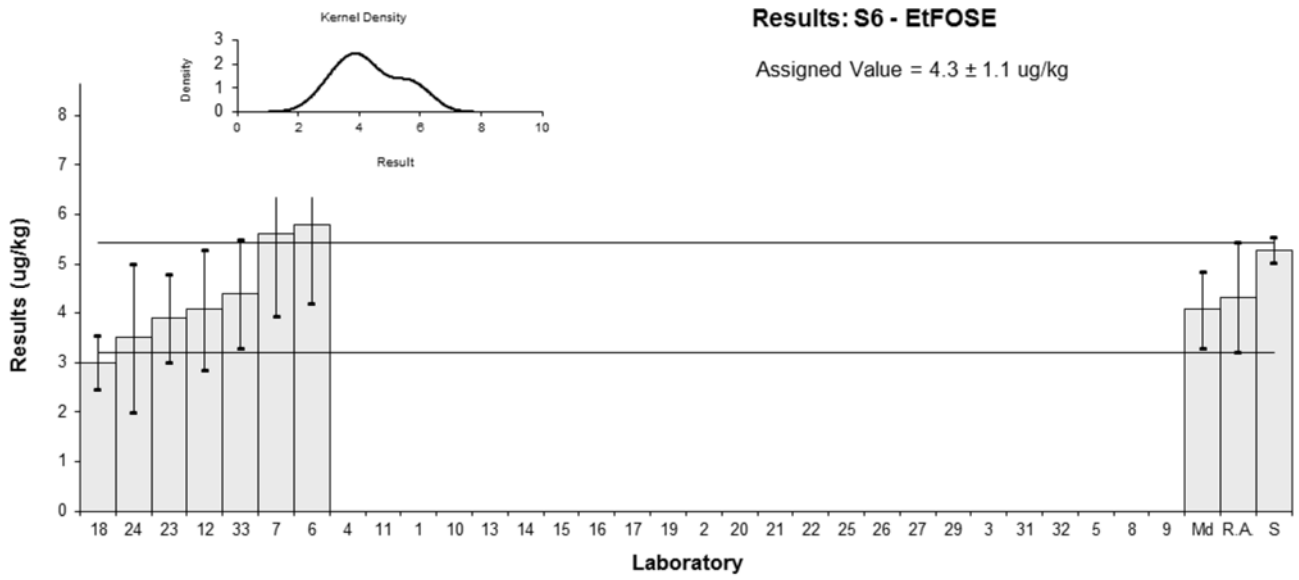
Sample No.	S6
Matrix.	Prawn
Analyte.	EtFOSE
Units	µg/kg

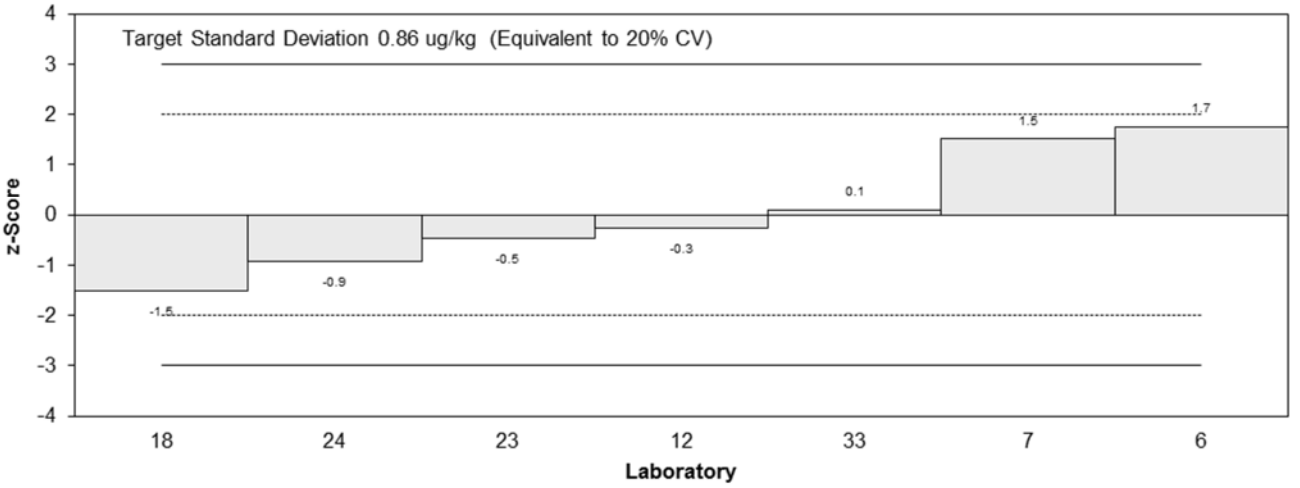
Participant Results

Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	NT	NT	NT		
4	<5	3.34	59		
5	NT	NT	NT		
6	5.8	1.6	73	1.74	0.77
7	5.6	1.67	60.1	1.51	0.65
8	NT	NT	NT		
9	NT	NT	NT		
10	NT	NT	NT		
11	<50	NR	123		
12	4.07	1.22	79	-0.27	-0.14
13	NT	NT	NT		
14	NT	NT	NT		
15	NT	NT	NT		
16	NT	NT	NT		
17	NT	NT	NT		
18	3.0	0.55	113	-1.51	-1.06
19	NT	NT	NT		
20	NT	NT	NT		
21	NT	NT	NT		
22	NT	NT	NT		
23	3.9	0.9	99	-0.47	-0.28
24	3.50	1.5	3.81	-0.93	-0.43
25	NT	NT	NT		
26	NT	NT	NT		
27	NT	NT	NT		
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	4.3852	1.0963	61.0	0.10	0.06

Statistics

Assigned Value	4.3	1.1
Spike	5.28	0.26
Robust Average	4.3	1.1
Median	4.1	0.8
Mean	4.3	
N	7	
Max.	5.8	
Min.	3	
Robust SD	1.2	
Robust CV	27%	


Kernel Density
Density
Result
Results: S6 - EtFOSE
Assigned Value = 4.3 ± 1.1 ug/kg
Results (ug/kg)
Laboratory
18 24 23 12 33 7 6 4 11 1 10 13 14 15 16 17 19 2 20 21 22 25 26 27 29 3 31 32 5 8 9 Md R.A. S


z-Scores: S6 - EtFOSE
Target Standard Deviation 0.86 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
18 24 23 12 33 7 6
-1.5
-0.9
-0.5
-0.3
0.1
1.5
1.7

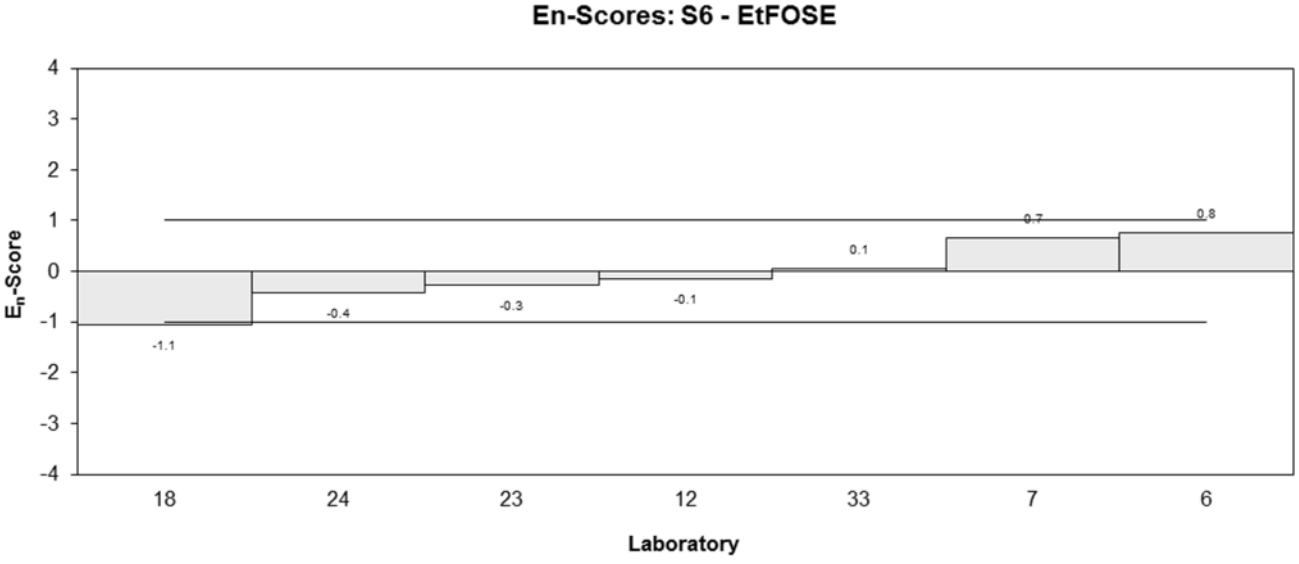

En-Scores: S6 - EtFOSE
En-Score
Laboratory
18 24 23 12 33 7 6
-1.1
-0.4
-0.3
-0.1
0.1
0.7
0.8

Figure 80

Table 91

Sample Details

Sample No.	S6
Matrix.	Prawn
Analyte.	6:2 FTS
Units	µg/kg

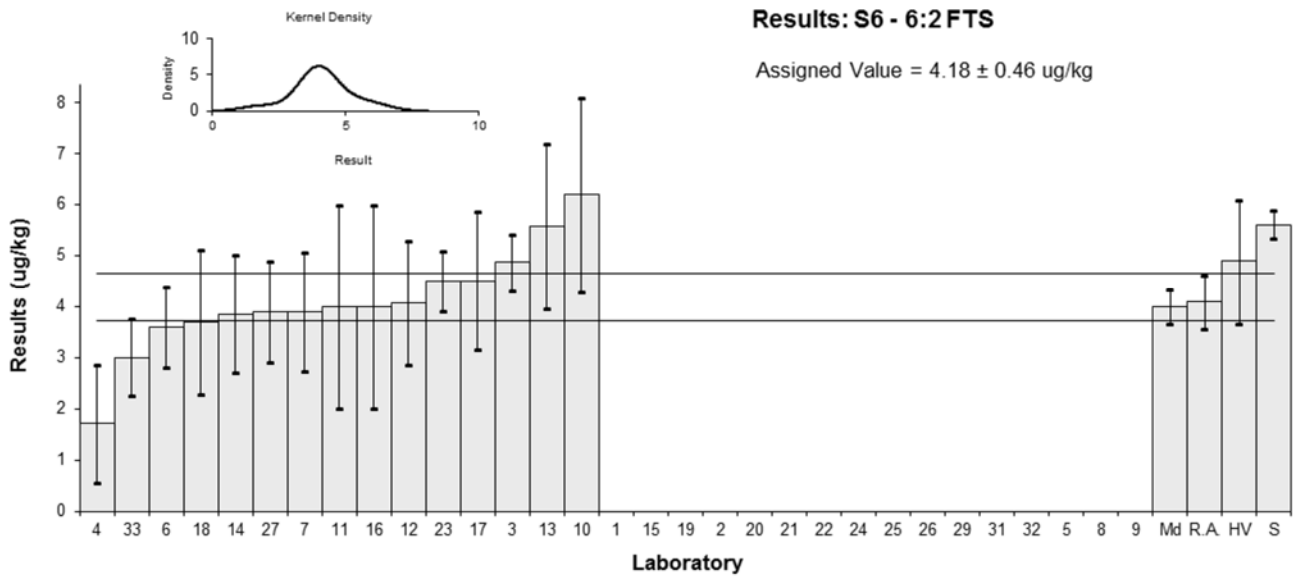
Participant Results

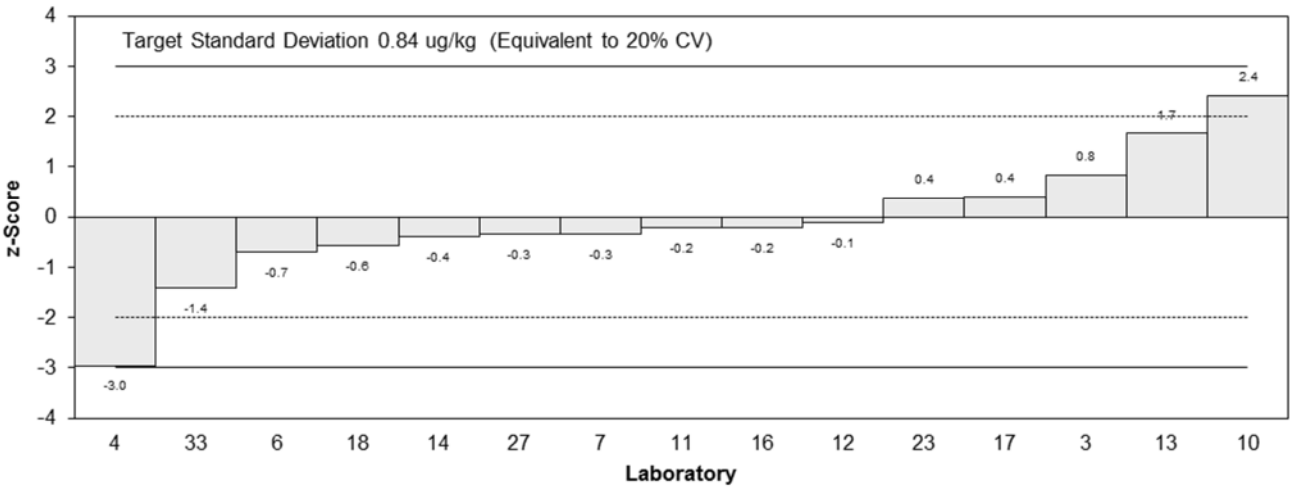
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	4.869	0.557	NR	0.82	0.95
4	1.71	1.15	116	-2.95	-1.99
5	NT	NT	NT		
6	3.6	0.8	74	-0.69	-0.63
7	3.9	1.17	89.0	-0.33	-0.22
8	NT	NT	NT		
9	NT	NT	NT		
10	6.2	1.9	NR	2.42	1.03
11	4	2	106	-0.22	-0.09
12	4.08	1.22	87	-0.12	-0.08
13	5.57	1.62	215	1.66	0.83
14	3.86	1.16	53	-0.38	-0.26
15	NT	NT	NT		
16	4	2	293	-0.22	-0.09
17	4.51	1.35	NR	0.39	0.23
18	3.7	1.41	122	-0.57	-0.32
19	NT	NT	NT		
20	NT	NT	NT		
21	NT	NT	NT		
22	NT	NT	NT		
23	4.5	0.6	89	0.38	0.42
24	NT	NT	NT		
25	NT	NT	NT		
26	NT	NT	NT		
27	3.9	1	119	-0.33	-0.25
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	3.0005	0.7501	29.9	-1.41	-1.34

Statistics

Assigned Value*	4.18	0.46
Spike	5.61	0.28
NMI Homog. Value	4.9	1.2
Robust Average	4.09	0.52
Median	4.00	0.33
Mean	4.093	
N	15	
Max.	6.2	
Min.	1.71	
Robust SD	0.80	
Robust CV	20%	

* Assigned value is the robust average excluding laboratory 4.


Results: S6 - 6:2 FTS
Assigned Value = 4.18 ± 0.46 ug/kg
Kernel Density
Density
Result
Results (ug/kg)
4 33 6 18 14 27 7 11 16 12 23 17 3 13 10 1 15 19 2 20 21 22 24 25 26 29 31 32 5 8 9 Md R.A. HV S
Laboratory


z-Scores: S6 - 6:2 FTS
Target Standard Deviation 0.84 ug/kg (Equivalent to 20% CV)
z-Score
-3.0 -1.4 -0.7 -0.6 -0.4 -0.3 -0.3 -0.2 -0.2 -0.1 0.4 0.4 0.8 1.7 2.4
4 33 6 18 14 27 7 11 16 12 23 17 3 13 10
Laboratory

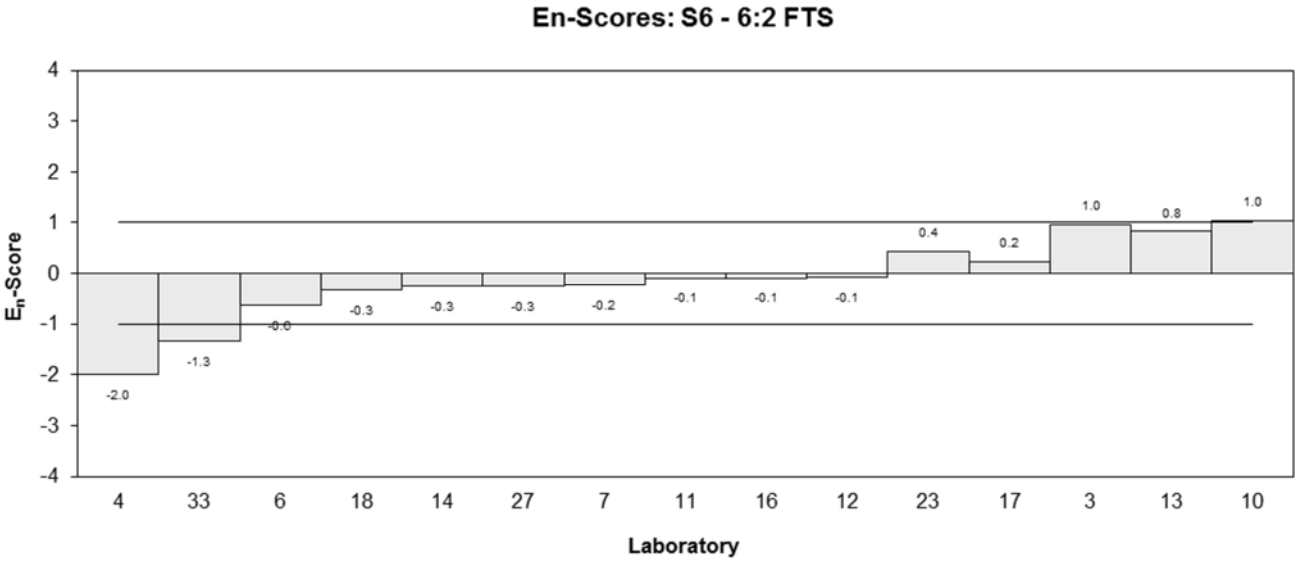

En-Scores: S6 - 6:2 FTS
En-Score
-2.0 -1.3 -0.6 -0.3 -0.3 -0.3 -0.2 -0.1 -0.1 -0.1 0.4 0.2 1.0 0.8 1.0
4 33 6 18 14 27 7 11 16 12 23 17 3 13 10
Laboratory

Figure 81

Table 92

Sample Details

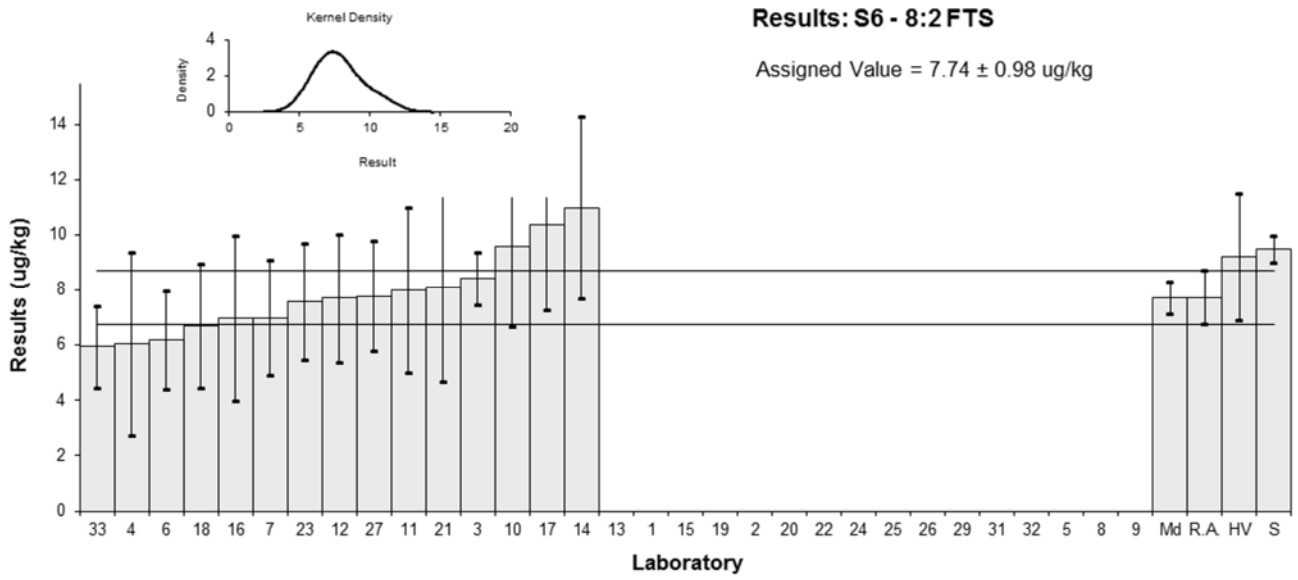
Sample No.	S6
Matrix.	Prawn
Analyte.	8:2 FTS
Units	µg/kg

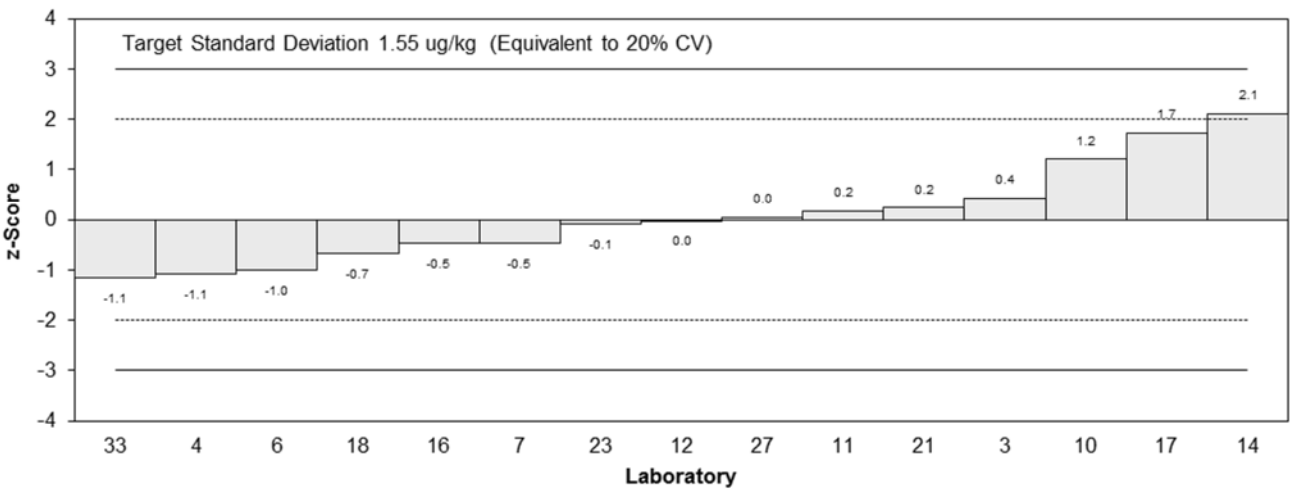
Participant Results

Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	8.411	0.953	NR	0.43	0.49
4	6.06	3.34	85	-1.09	-0.48
5	NT	NT	NT		
6	6.2	1.8	133	-0.99	-0.75
7	7.0	2.10	88.7	-0.48	-0.32
8	NT	NT	NT		
9	NT	NT	NT		
10	9.6	2.9	NR	1.20	0.61
11	8	3	106	0.17	0.08
12	7.72	2.31	86	-0.01	-0.01
13	<103	NT	201		
14	11.0	3.3	59	2.11	0.95
15	NT	NT	NT		
16	7	3	293	-0.48	-0.23
17	10.4	3.11	NR	1.72	0.82
18	6.7	2.25	144	-0.67	-0.42
19	NT	NT	NT		
20	NT	NT	NT		
21	8.1	3.4	NR	0.23	0.10
22	NT	NT	NT		
23	7.6	2.1	55	-0.09	-0.06
24	NT	NT	NT		
25	NT	NT	NT		
26	NT	NT	NT		
27	7.8	2	144	0.04	0.03
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	5.9611	1.4903	31.2	-1.15	-1.00

Statistics

Assigned Value	7.74	0.98
Spike	9.50	0.48
NMI Homog.Value	9.2	2.3
Robust Average	7.74	0.98
Median	7.72	0.59
Mean	7.84	
N	15	
Max.	11	
Min.	5.9611	
Robust SD	1.5	
Robust CV	20%	


Kernel Density
Density
Result
Results: S6 - 8:2 FTS
Assigned Value = 7.74 ± 0.98 ug/kg
Results (ug/kg)
Laboratory
33 4 6 18 16 7 23 12 27 11 21 3 10 17 14 13 1 15 19 2 20 22 24 25 26 29 31 32 5 8 9 Md R.A. HV S


z-Scores: S6 - 8:2 FTS
Target Standard Deviation 1.55 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
33 4 6 18 16 7 23 12 27 11 21 3 10 17 14
-1.1 -1.1 -1.0 -0.7 -0.5 -0.5 -0.1 0.0 0.0 0.2 0.2 0.4 1.2 1.7 2.1

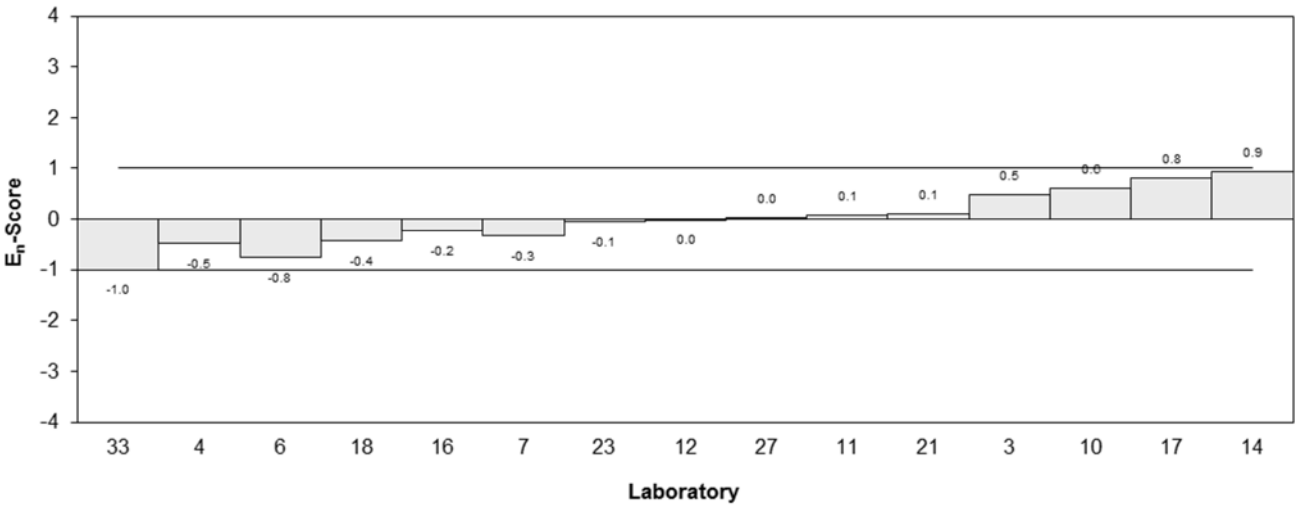

En-Scores: S6 - 8:2 FTS
En-Score
Laboratory
33 4 6 18 16 7 23 12 27 11 21 3 10 17 14
-1.0 -0.5 -0.8 -0.4 -0.2 -0.3 -0.1 0.0 0.0 0.1 0.1 0.5 0.8 0.9

Figure 82

Table 93

Sample Details

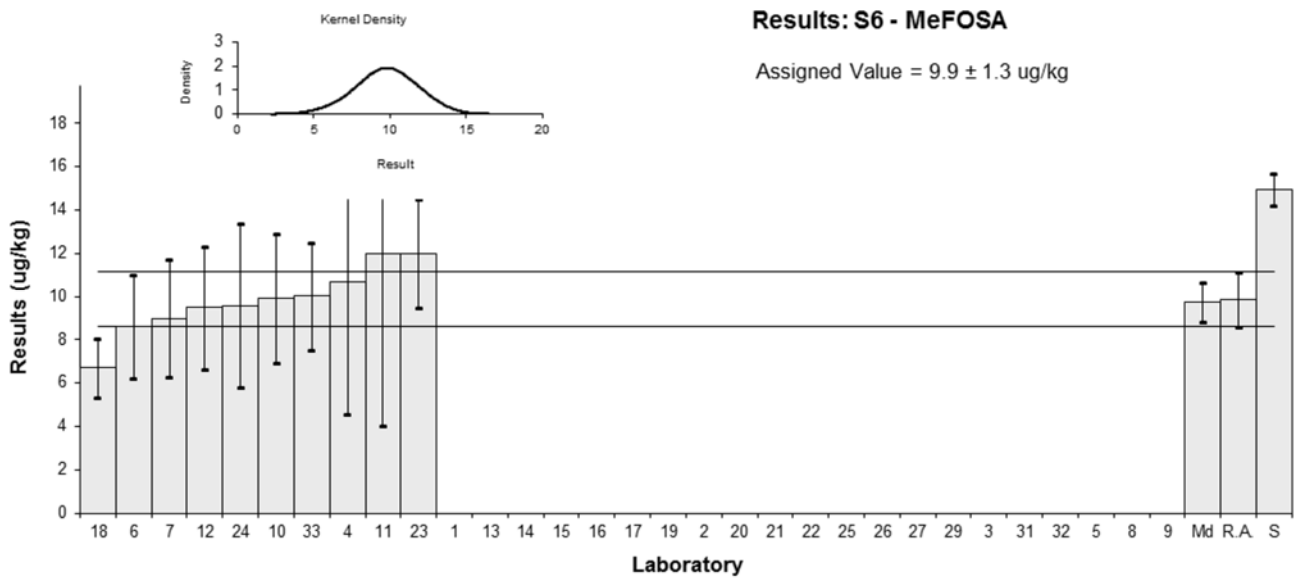
Sample No.	S6
Matrix.	Prawn
Analyte.	MeFOSA
Units	µg/kg

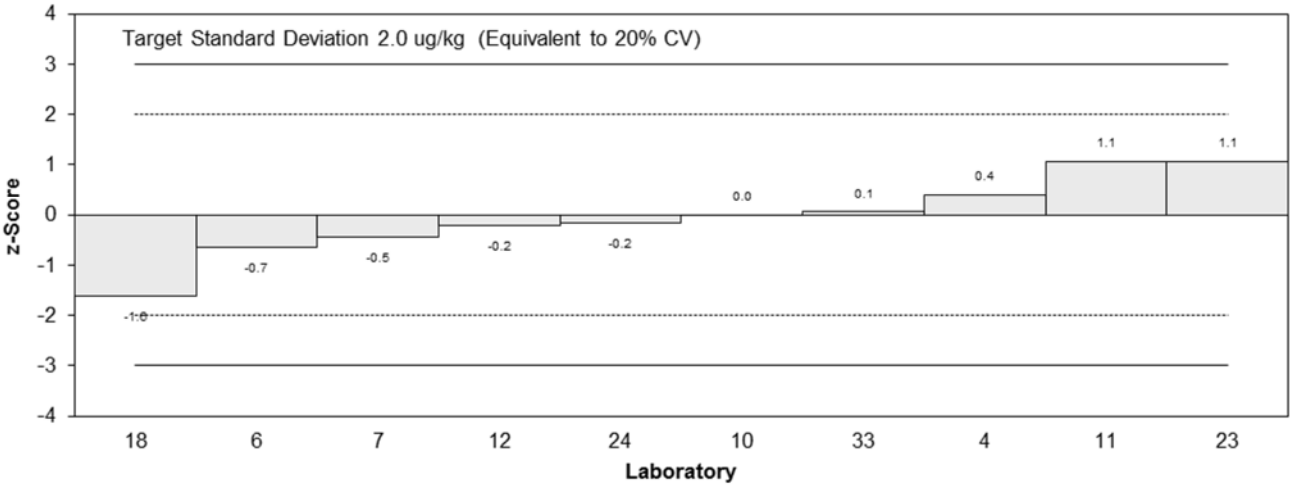
Participant Results

Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	NT	NT	NT		
4	10.67	6.10	62	0.39	0.12
5	NT	NT	NT		
6	8.6	2.4	70	-0.66	-0.48
7	9.0	2.71	91.3	-0.45	-0.30
8	NT	NT	NT		
9	NT	NT	NT		
10	9.9	3.0	NR	0.00	0.00
11	12	8	87	1.06	0.26
12	9.49	2.85	83	-0.21	-0.13
13	NT	NT	NT		
14	NT	NT	NT		
15	NT	NT	NT		
16	NT	NT	NT		
17	NT	NT	NT		
18	6.7	1.36	147	-1.62	-1.70
19	NT	NT	NT		
20	NT	NT	NT		
21	NT	NT	NT		
22	NT	NT	NT		
23	12	2.5	95	1.06	0.75
24	9.58	3.8	2.62	-0.16	-0.08
25	NT	NT	NT		
26	NT	NT	NT		
27	NT	NT	NT		
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	10.0089	2.5022	41.6	0.06	0.04

Statistics

Assigned Value	9.9	1.3
Spike	14.94	0.75
Robust Average	9.9	1.3
Median	9.7	0.9
Mean	9.8	
N	10	
Max.	12	
Min.	6.7	
Robust SD	1.6	
Robust CV	16%	


Kernel Density
Density
Result
Results: S6 - MeFOSA
Assigned Value = 9.9 ± 1.3 ug/kg
Results (ug/kg)
Laboratory
18 6 7 12 24 10 33 4 11 23 1 13 14 15 16 17 19 2 20 21 22 25 26 27 29 3 31 32 5 8 9 Md R.A. S


z-Scores: S6 - MeFOSA
Target Standard Deviation 2.0 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
18 6 7 12 24 10 33 4 11 23
-1.6 -0.7 -0.5 -0.2 -0.2 0.0 0.1 0.4 1.1 1.1

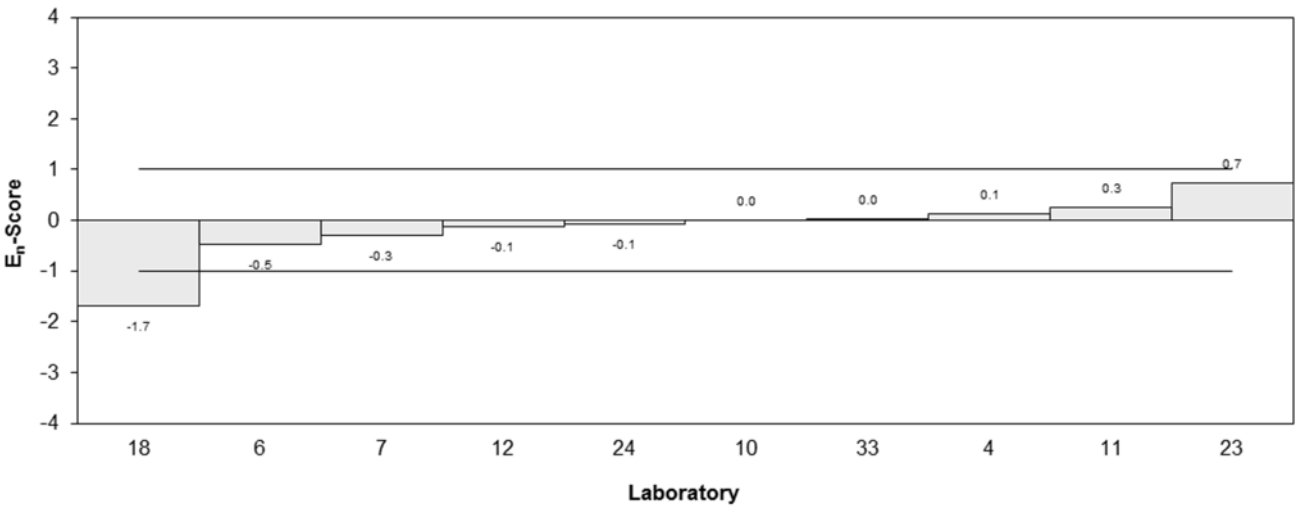

En-Scores: S6 - MeFOSA
En-Score
Laboratory
18 6 7 12 24 10 33 4 11 23
-1.7 -0.5 -0.3 -0.1 -0.1 0.0 0.0 0.1 0.3 0.7

Figure 83

Table 94

Sample Details

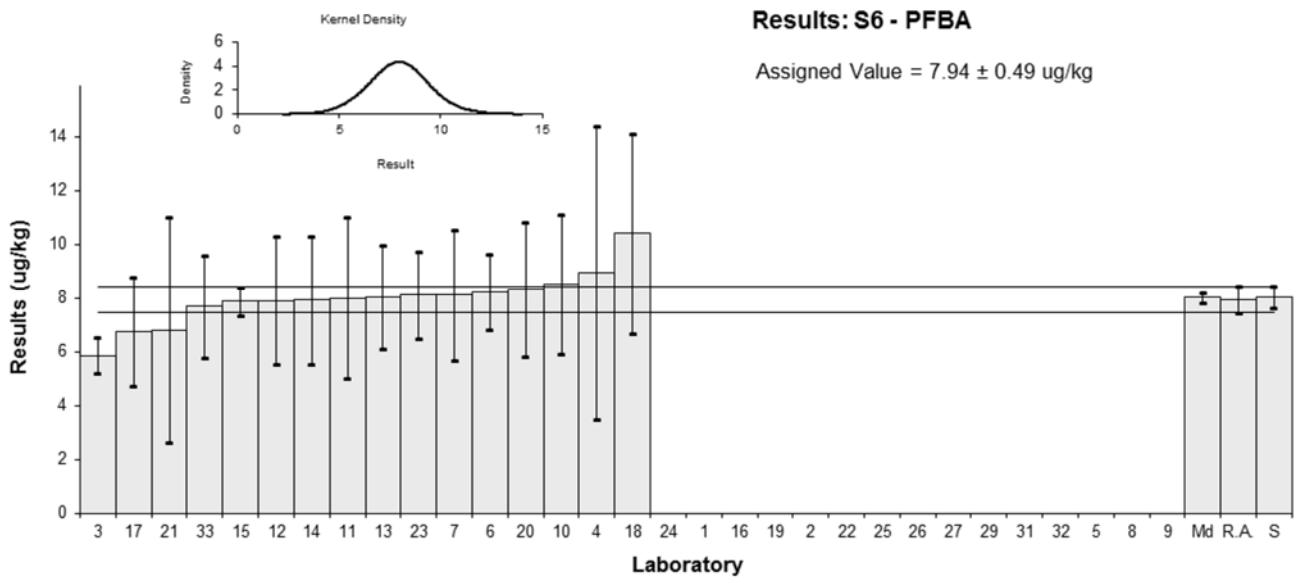
Sample No.	S6
Matrix.	Prawn
Analyte.	PFBA
Units	µg/kg

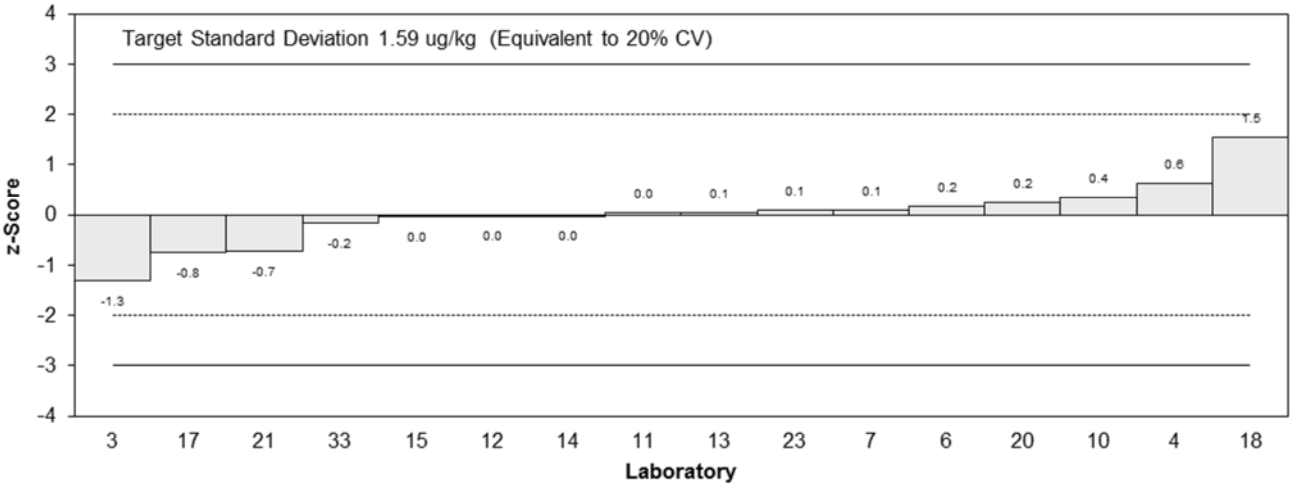
Participant Results

Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	5.857	0.672	90.79	-1.31	-2.50
4	8.94	5.46	98	0.63	0.18
5	NT	NT	NT		
6	8.2	1.4	78	0.16	0.18
7	8.1	2.42	87.9	0.10	0.06
8	NT	NT	NT		
9	NT	NT	NT		
10	8.5	2.6	NR	0.35	0.21
11	8	3	98	0.04	0.02
12	7.90	2.37	83	-0.03	-0.02
13	8.02	1.92	47	0.05	0.04
14	7.92	2.38	32	-0.01	-0.01
15	7.869	0.521	66.2	-0.04	-0.10
16	NT	NT	NT		
17	6.73	2.02	NR	-0.76	-0.58
18	10.4	3.71	136	1.55	0.66
19	NT	NT	NT		
20	8.33	2.50	77.8	0.25	0.15
21	6.8	4.2	119	-0.72	-0.27
22	NT	NT	NT		
23	8.1	1.6	114	0.10	0.10
24	<300	NR	61.67		
25	NT	NT	NT		
26	NT	NT	NT		
27	NT	NT	NT		
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	7.6720	1.9180	31.0	-0.17	-0.14

Statistics

Assigned Value	7.94	0.49
Spike	8.03	0.40
Robust Average	7.94	0.49
Median	8.01	0.20
Mean	7.96	
N	16	
Max.	10.4	
Min.	5.857	
Robust SD	0.78	
Robust CV	9.8%	


Kernel Density
Density
Result
Results: S6 - PFBA
Assigned Value = 7.94 ± 0.49 ug/kg
Results (ug/kg)
Laboratory
3 17 21 33 15 12 14 11 13 23 7 6 20 10 4 18 24 1 16 19 2 22 25 26 27 29 31 32 5 8 9 Md R.A. S


z-Scores: S6 - PFBA
Target Standard Deviation 1.59 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
3 17 21 33 15 12 14 11 13 23 7 6 20 10 4 18
-1.3 -0.8 -0.7 -0.2 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.2 0.2 0.4 0.6 T.5

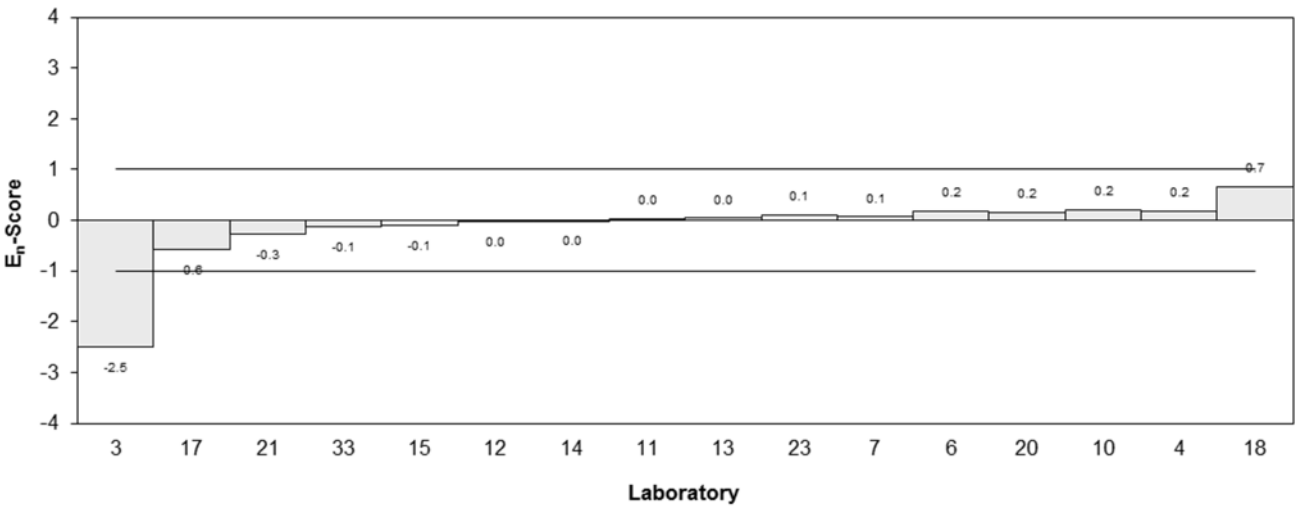

En-Scores: S6 - PFBA
En-Score
Laboratory
3 17 21 33 15 12 14 11 13 23 7 6 20 10 4 18
-2.5 -0.6 -0.3 -0.1 -0.1 0.0 0.0 0.0 0.0 0.1 0.1 0.2 0.2 0.2 0.2 0.7

Figure 84

Table 95

Sample Details

Sample No.	S6
Matrix.	Prawn
Analyte.	PFBS
Units	µg/kg

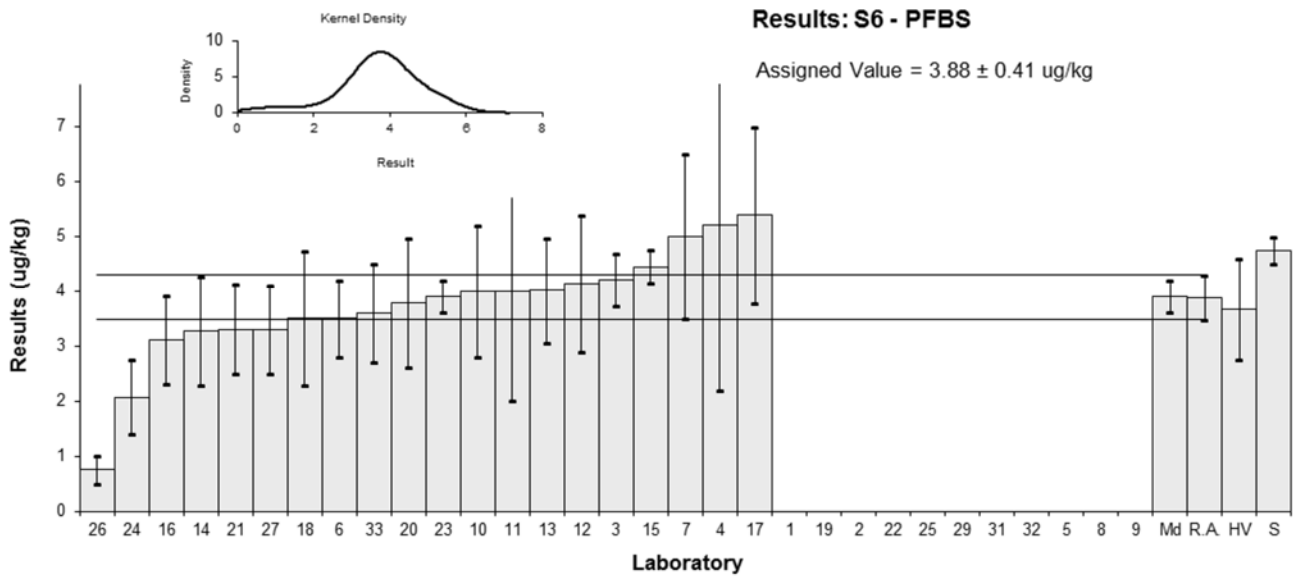
Participant Results

Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	4.196	0.474	NR	0.41	0.50
4	5.2	3.01	104	1.70	0.43
5	NT	NT	NT		
6	3.5	0.7	65	-0.49	-0.47
7	5.0	1.50	85.0	1.44	0.72
8	NT	NT	NT		
9	NT	NT	NT		
10	4.0	1.2	NR	0.15	0.09
11	4	2	93	0.15	0.06
12	4.13	1.24	95	0.32	0.19
13	4.01	0.950	62	0.17	0.13
14	3.27	0.98	62	-0.79	-0.57
15	4.441	0.298	70.2	0.72	1.11
16	3.1	0.8	76	-1.01	-0.87
17	5.38	1.61	NR	1.93	0.90
18	3.5	1.22	143	-0.49	-0.30
19	NT	NT	NT		
20	3.78	1.17	103	-0.13	-0.08
21	3.3	0.82	118	-0.75	-0.63
22	NT	NT	NT		
23	3.9	0.3	105	0.03	0.04
24	2.07	0.67	10.32	-2.33	-2.30
25	NT	NT	NT		
26	0.747	0.256	66	-4.04	-6.48
27	3.3	0.8	95	-0.75	-0.65
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	3.5897	0.8974	34.8	-0.37	-0.29

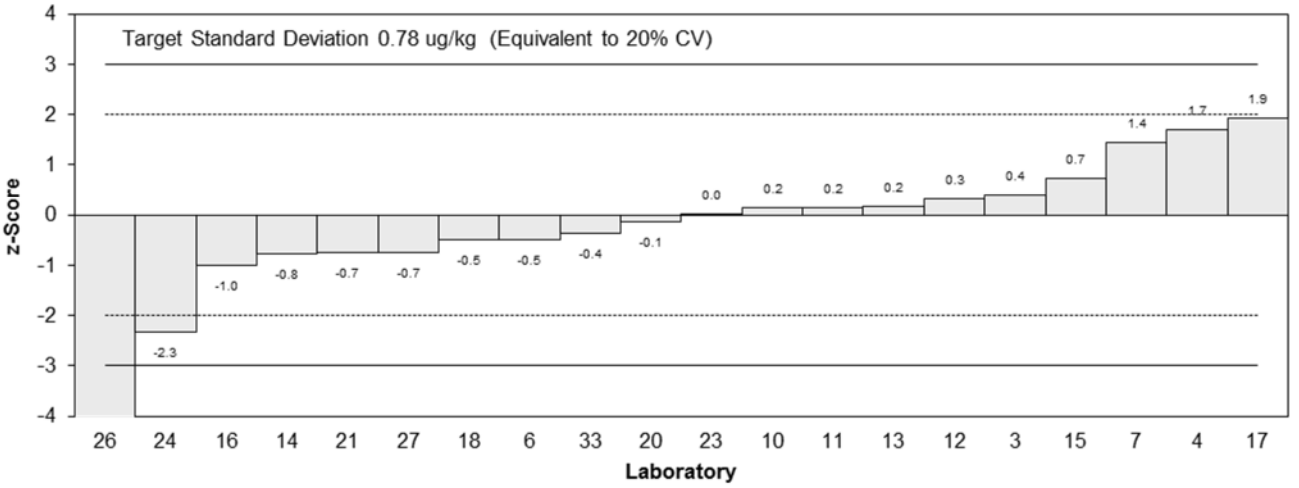
Statistics

Assigned Value	3.88	0.41
Spike	4.73	0.24
NMI Homog. Value	3.66	0.92
Robust Average*	3.88	0.41
Median*	3.90	0.29
Mean*	3.88	
N	20	
Max.	5.38	
Min.	0.747	
Robust SD*	0.71	
Robust CV*	18%	

* Results from laboratory 26 were omitted from the statistical calculations.



z-Scores: S6 - PFBS



En-Scores: S6 - PFBS

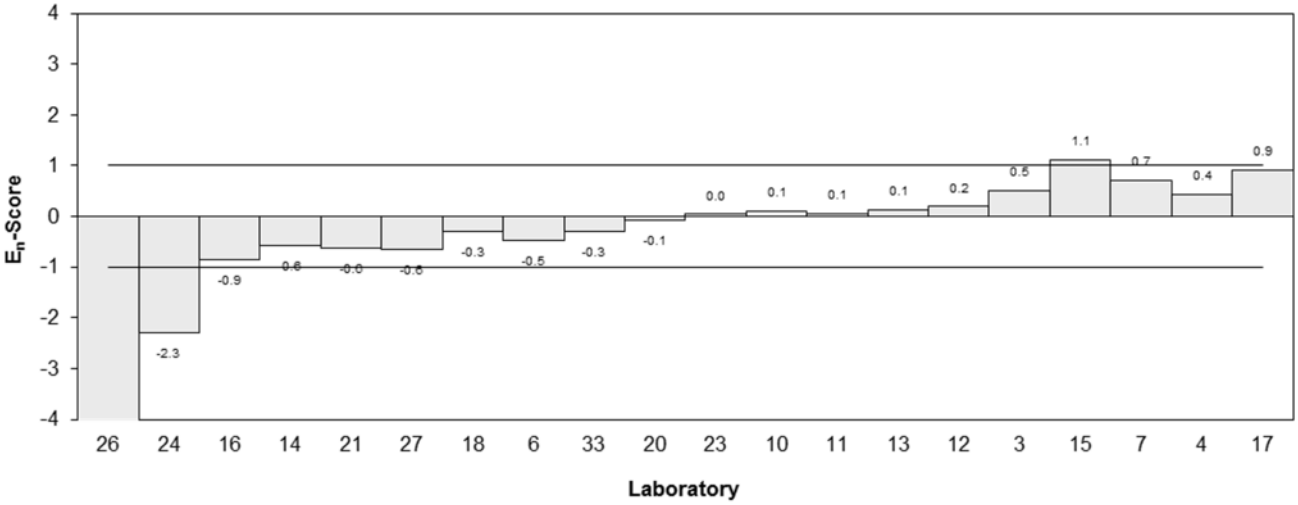


Figure 85

Table 96

Sample Details

Sample No.	S6
Matrix.	Prawn
Analyte.	PFDA
Units	µg/kg

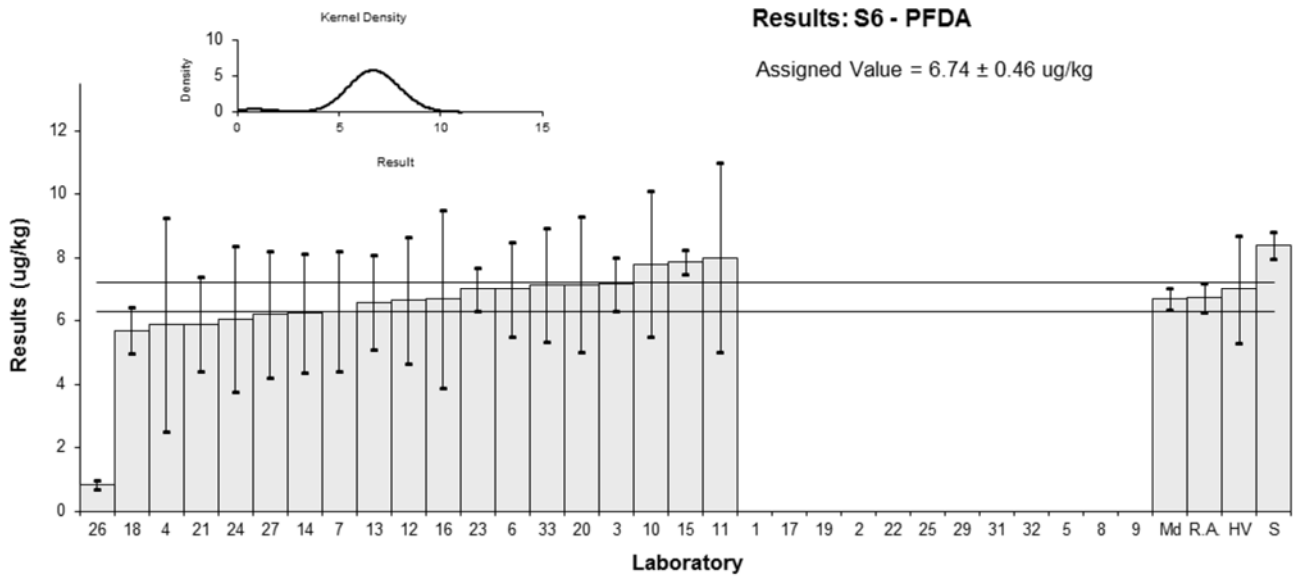
Participant Results

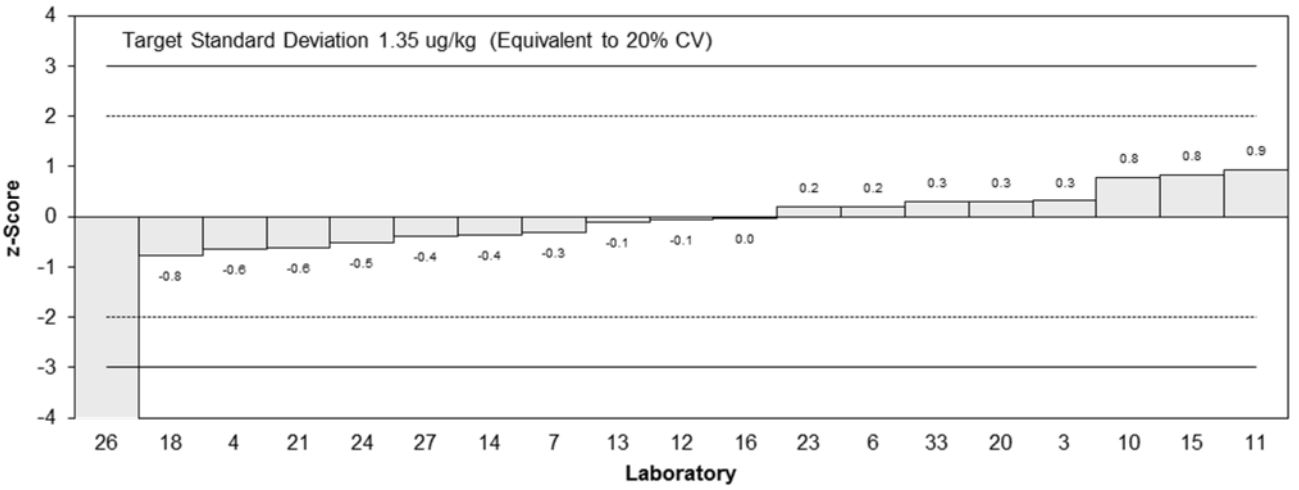
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	7.158	0.863	96.00	0.31	0.43
4	5.88	3.36	89	-0.64	-0.25
5	NT	NT	NT		
6	7.0	1.5	134	0.19	0.17
7	6.3	1.89	108.1	-0.33	-0.23
8	NT	NT	NT		
9	NT	NT	NT		
10	7.8	2.3	NR	0.79	0.45
11	8	3	99	0.93	0.42
12	6.66	2.00	95	-0.06	-0.04
13	6.59	1.48	93	-0.11	-0.10
14	6.25	1.87	59	-0.36	-0.25
15	7.858	0.379	61.5	0.83	1.88
16	6.7	2.8	93	-0.03	-0.01
17	NT	NT	NT		
18	5.7	0.73	147	-0.77	-1.21
19	NT	NT	NT		
20	7.14	2.14	101	0.30	0.18
21	5.9	1.5	107	-0.62	-0.54
22	NT	NT	NT		
23	7.0	0.7	92	0.19	0.31
24	6.05	2.3	8.18	-0.51	-0.29
25	NT	NT	NT		
26	0.829	0.153	85	-4.39	-12.19
27	6.2	2	105	-0.40	-0.26
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	7.1384	1.7846	34.5	0.30	0.22

Statistics

Assigned Value	6.74	0.46
Spike	8.39	0.42
NMI Homog Value	7.0	1.7
Robust Average*	6.74	0.46
Median*	6.68	0.35
Mean*	6.74	
N	19	
Max.	8	
Min.	0.829	
Robust SD*	0.78	
Robust CV*	12%	

* Results from laboratory 26 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S6 - PFDA
Assigned Value = 6.74 ± 0.46 ug/kg
Results (ug/kg)
26 18 4 21 24 27 14 7 13 12 16 23 6 33 20 3 10 15 11 1 17 19 2 22 25 29 31 32 5 8 9 Md R.A. HV S
Laboratory


z-Scores: S6 - PFDA
Target Standard Deviation 1.35 ug/kg (Equivalent to 20% CV)
z-Score
-0.8 -0.6 -0.6 -0.5 -0.4 -0.4 -0.3 -0.1 -0.1 0.0 0.2 0.2 0.3 0.3 0.3 0.8 0.8 0.9
26 18 4 21 24 27 14 7 13 12 16 23 6 33 20 3 10 15 11
Laboratory

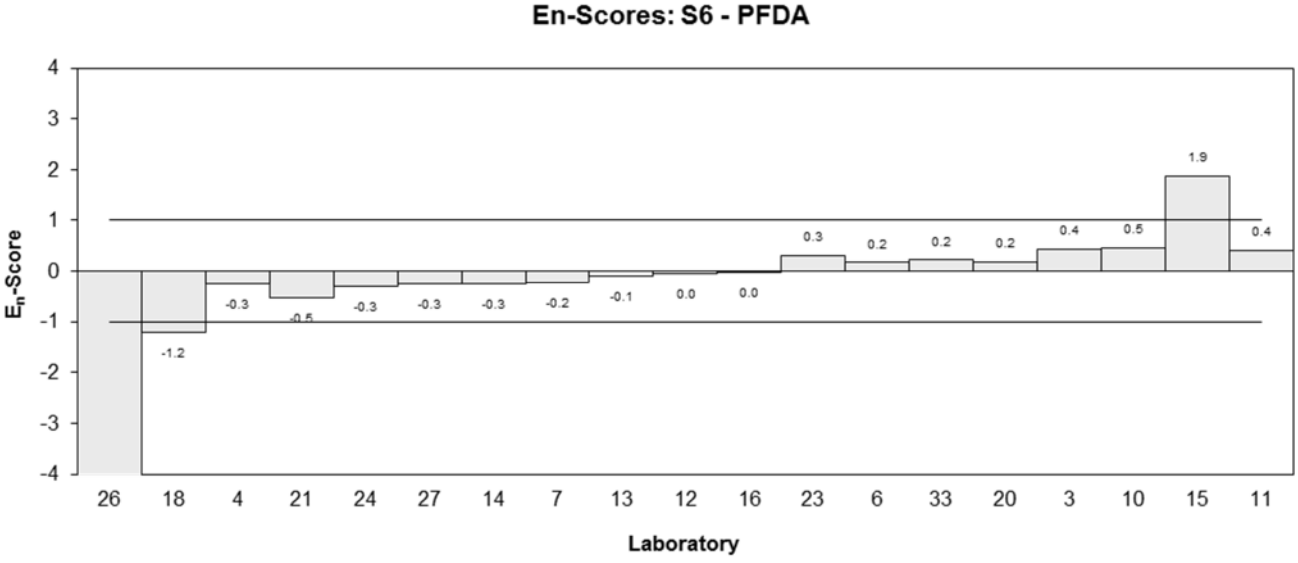

En-Scores: S6 - PFDA
En-Score
-1.2 -0.3 -0.5 -0.3 -0.3 -0.3 -0.2 -0.1 0.0 0.0 0.3 0.2 0.2 0.2 0.4 0.5 1.9 0.4
26 18 4 21 24 27 14 7 13 12 16 23 6 33 20 3 10 15 11
Laboratory

Figure 86

Table 97

Sample Details

Sample No.	S6
Matrix.	Prawn
Analyte.	PFHpA
Units	µg/kg

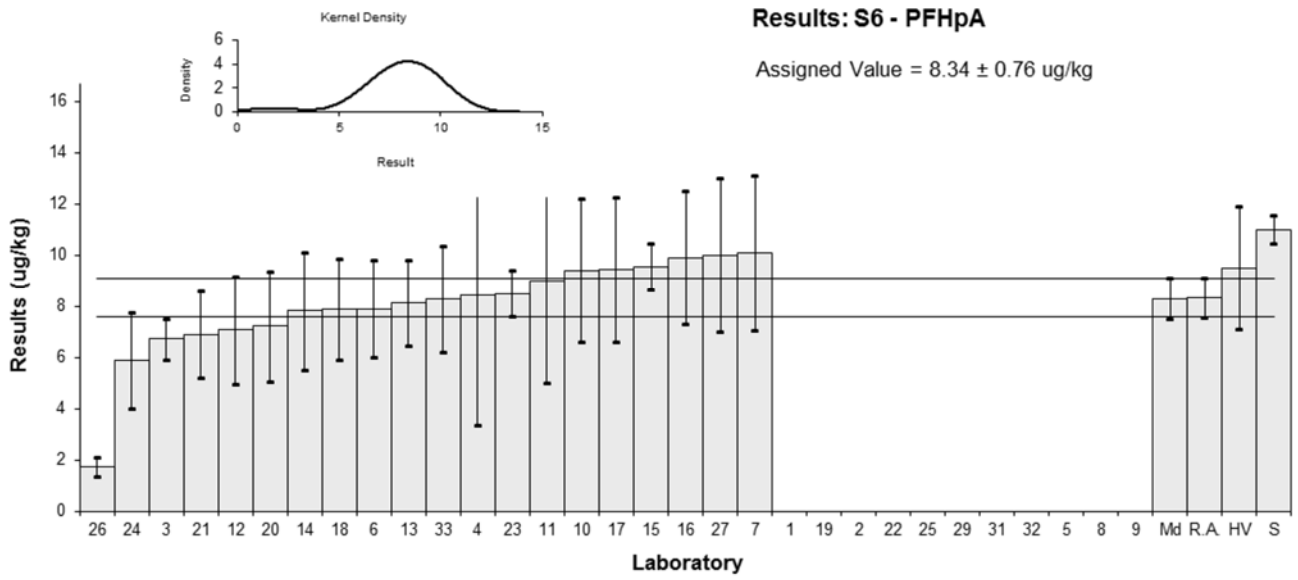
Participant Results

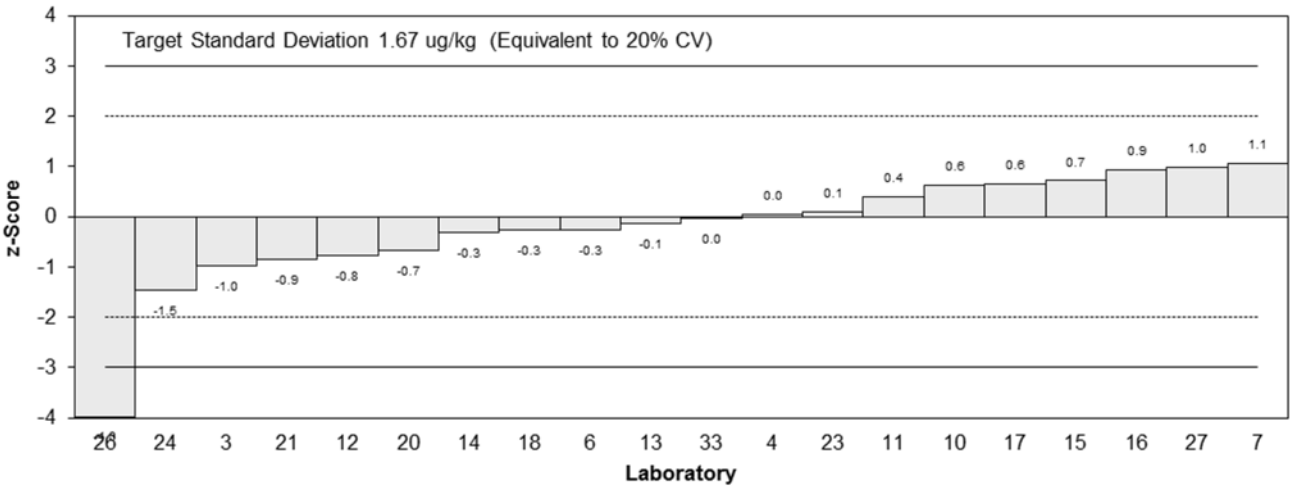
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	6.713	0.795	NR	-0.98	-1.48
4	8.41	5.06	74	0.04	0.01
5	NT	NT	NT		
6	7.9	1.9	125	-0.26	-0.22
7	10.1	3.03	62.0	1.06	0.56
8	NT	NT	NT		
9	NT	NT	NT		
10	9.4	2.8	NR	0.64	0.37
11	9	4	93	0.40	0.16
12	7.06	2.12	95	-0.77	-0.57
13	8.12	1.68	85	-0.13	-0.12
14	7.82	2.3	62	-0.31	-0.21
15	9.539	0.904	70.4	0.72	1.02
16	9.9	2.6	42	0.94	0.58
17	9.42	2.83	NR	0.65	0.37
18	7.9	1.98	130	-0.26	-0.21
19	NT	NT	NT		
20	7.21	2.16	113	-0.68	-0.49
21	6.9	1.7	112	-0.86	-0.77
22	NT	NT	NT		
23	8.5	0.9	101	0.10	0.14
24	5.88	1.9	11.63	-1.47	-1.20
25	NT	NT	NT		
26	1.71	0.370	56	-3.97	-7.84
27	10	3	105	1.00	0.54
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	8.2952	2.0738	37.8	-0.03	-0.02

Statistics

Assigned Value	8.34	0.76
Spike	11.00	0.55
NMI Homog. Value	9.5	2.4
Robust Average*	8.34	0.76
Median*	8.30	0.79
Mean*	8.32	
N	20	
Max.	10.1	
Min.	1.71	
Robust SD*	1.3	
Robust CV*	16%	

* Results from laboratory 26 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S6 - PFHpA
Assigned Value = 8.34 ± 0.76 ug/kg
Results (ug/kg)
Laboratory
26 24 3 21 12 20 14 18 6 13 33 4 23 11 10 17 15 16 27 7 1 19 2 22 25 29 31 32 5 8 9 Md R.A. HV S


z-Scores: S6 - PFHpA
Target Standard Deviation 1.67 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
26 24 3 21 12 20 14 18 6 13 33 4 23 11 10 17 15 16 27 7
-1.5 -1.0 -0.9 -0.8 -0.7 -0.3 -0.3 -0.3 -0.1 0.0 0.0 0.1 0.4 0.6 0.6 0.7 0.9 1.0 1.1

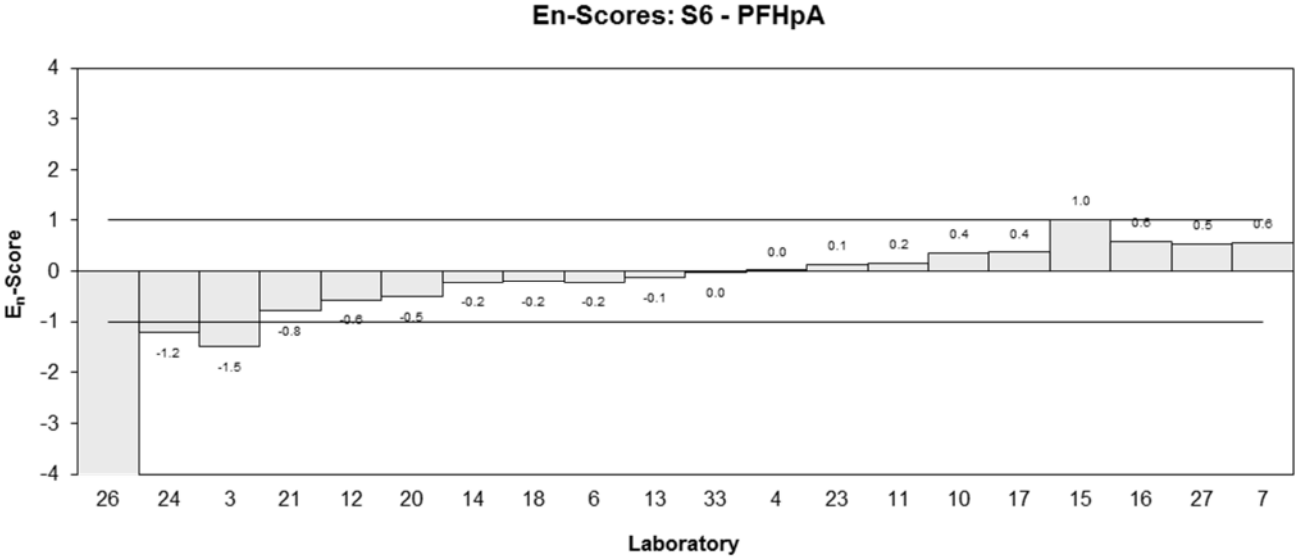

En-Scores: S6 - PFHpA
En-Score
Laboratory
26 24 3 21 12 20 14 18 6 13 33 4 23 11 10 17 15 16 27 7
-1.2 -1.5 -0.8 -0.6 -0.5 -0.2 -0.2 -0.2 -0.1 0.0 0.0 0.1 0.2 0.4 0.4 1.0 0.6 0.5 0.6

Figure 87

Table 98

Sample Details

Sample No.	S6
Matrix.	Prawn
Analyte.	PFHxA
Units	µg/kg

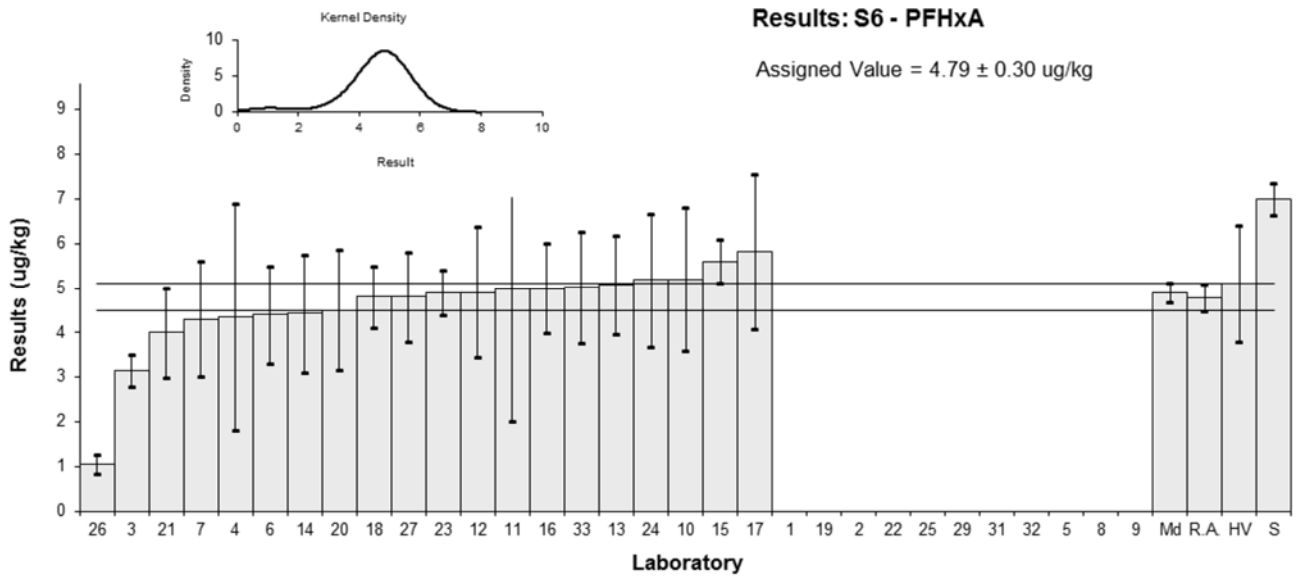
Participant Results

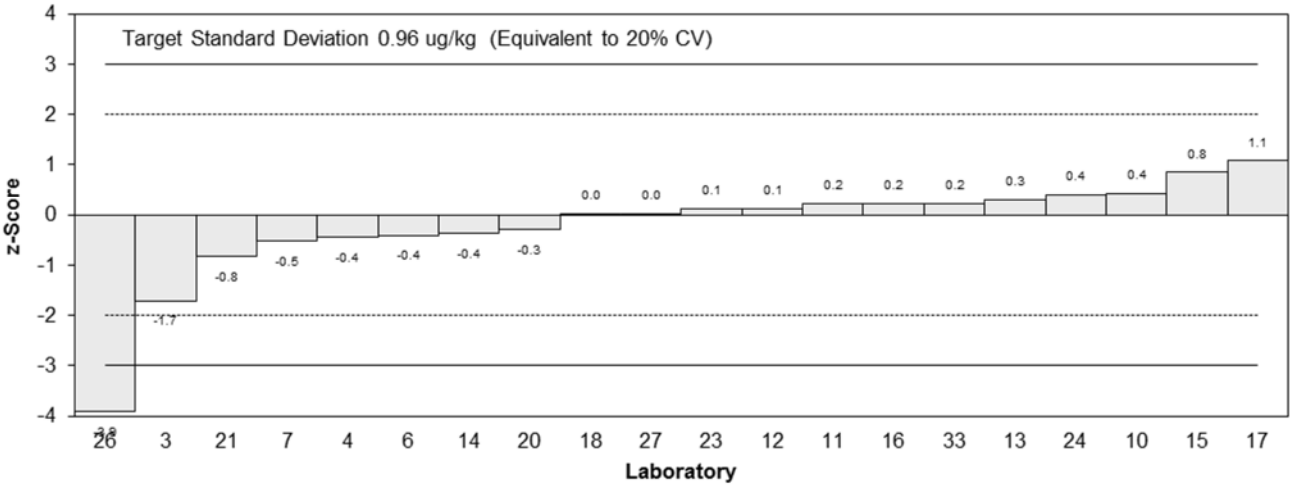
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	3.156	0.363	NR	-1.71	-3.47
4	4.36	2.55	81	-0.45	-0.17
5	NT	NT	NT		
6	4.4	1.1	78	-0.41	-0.34
7	4.3	1.29	117.3	-0.51	-0.37
8	NT	NT	NT		
9	NT	NT	NT		
10	5.2	1.6	NR	0.43	0.25
11	5	3	100	0.22	0.07
12	4.91	1.47	96	0.13	0.08
13	5.08	1.10	72	0.30	0.25
14	4.43	1.33	59	-0.38	-0.26
15	5.600	0.478	71.6	0.85	1.44
16	5.0	1.0	42	0.22	0.20
17	5.82	1.75	NR	1.08	0.58
18	4.8	0.70	137	0.01	0.01
19	NT	NT	NT		
20	4.50	1.35	113	-0.30	-0.21
21	4.0	1.0	112	-0.82	-0.76
22	NT	NT	NT		
23	4.9	0.5	102	0.11	0.19
24	5.18	1.5	6.00	0.41	0.25
25	NT	NT	NT		
26	1.05	0.221	64	-3.90	-10.04
27	4.8	1	106	0.01	0.01
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	5.0103	1.2526	33.4	0.23	0.17

Statistics

Assigned Value	4.79	0.30
Spike	7.00	0.35
NMI Homog Value	5.1	1.3
Robust Average*	4.79	0.30
Median*	4.90	0.21
Mean*	4.76	
N	20	
Max.	5.82	
Min.	1.05	
Robust SD*	0.52	
Robust CV*	11%	

* Results from laboratory 26 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S6 - PFHxA
Assigned Value = 4.79 ± 0.30 ug/kg
Results (ug/kg)
Laboratory
26 3 21 7 4 6 14 20 18 27 23 12 11 16 33 13 24 10 15 17 1 19 2 22 25 29 31 32 5 8 9 Md R.A. HV S


z-Scores: S6 - PFHxA
Target Standard Deviation 0.96 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
26 3 21 7 4 6 14 20 18 27 23 12 11 16 33 13 24 10 15 17
-3.8 -1.7 -0.8 -0.5 -0.4 -0.4 -0.4 -0.3 0.0 0.0 0.1 0.1 0.2 0.2 0.2 0.3 0.4 0.4 0.8 1.1

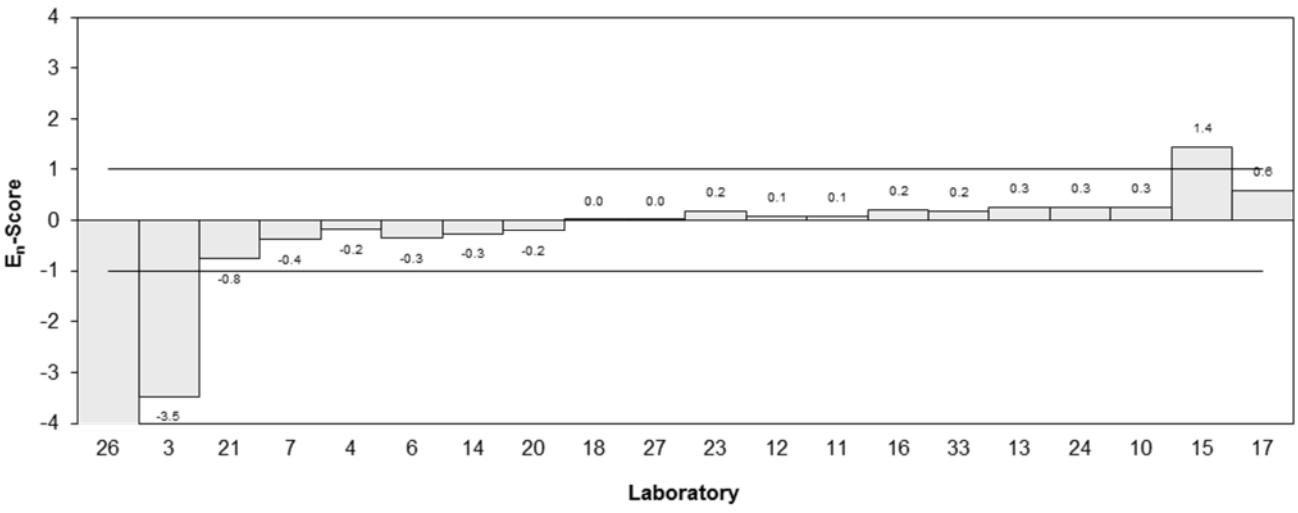

En-Scores: S6 - PFHxA
En-Score
Laboratory
26 3 21 7 4 6 14 20 18 27 23 12 11 16 33 13 24 10 15 17
-3.5 -0.8 -0.4 -0.2 -0.3 -0.3 -0.2 0.0 0.0 0.2 0.1 0.1 0.2 0.2 0.3 0.3 0.3 1.4 0.6

Figure 88

Table 99

Sample Details

Sample No.	S6
Matrix.	Prawn
Analyte.	PFHxS
Units	µg/kg

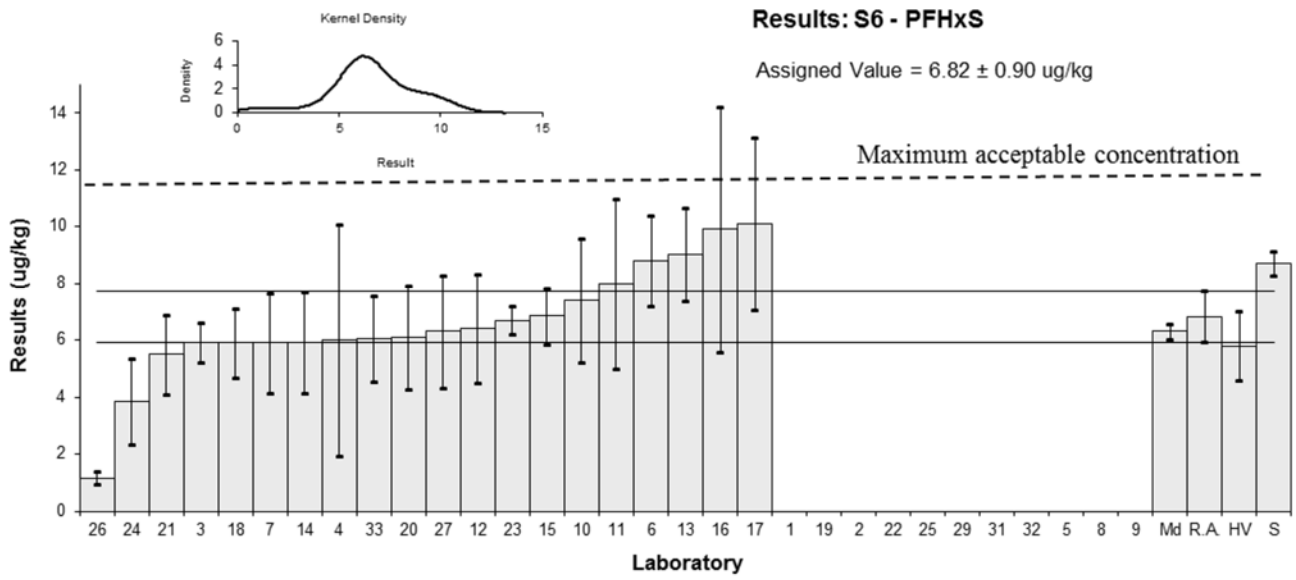
Participant Results

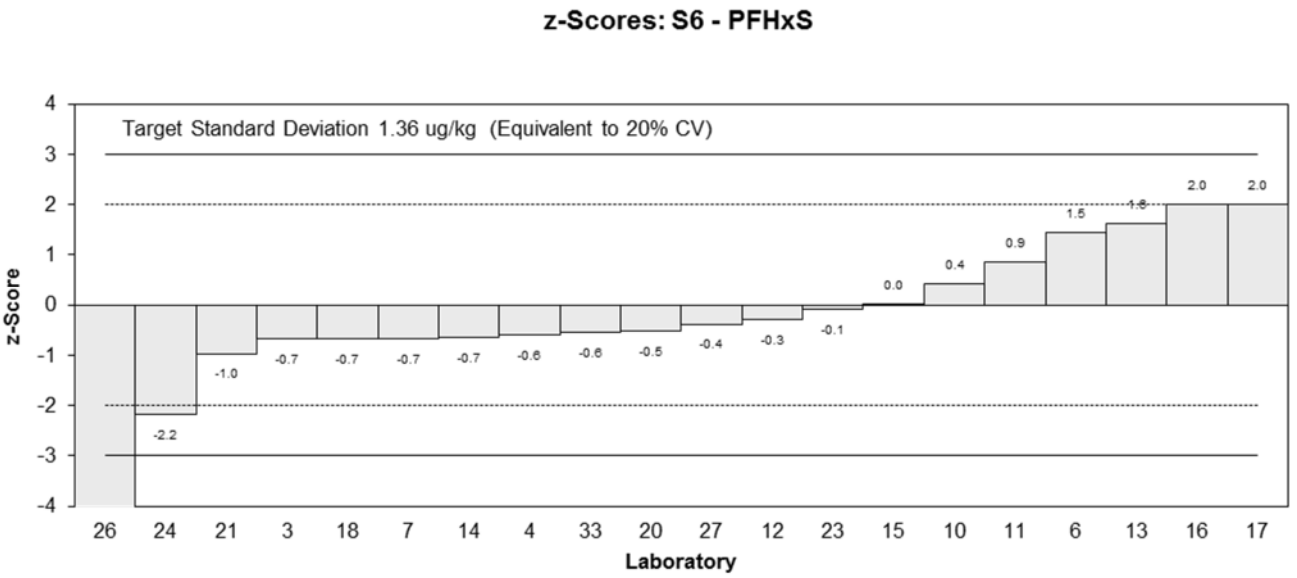
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	5.897	0.698	NR	-0.68	-0.81
4	6.02	4.08	96	-0.59	-0.19
5	NT	NT	NT		
6	8.8	1.6	104	1.45	1.08
7	5.9	1.76	105.5	-0.67	-0.47
8	NT	NT	NT		
9	NT	NT	NT		
10	7.4	2.2	NR	0.43	0.24
11	8	3	96	0.87	0.38
12	6.41	1.92	93	-0.30	-0.19
13	9.03	1.65	76	1.62	1.18
14	5.93	1.78	73	-0.65	-0.45
15	6.853	0.981	70.2	0.02	0.02
16**	9.9	4.3	76	2.00	0.70
17**	10.1	3.03	NR	2.00	1.00
18	5.9	1.21	134	-0.67	-0.61
19	NT	NT	NT		
20	6.10	1.83	103	-0.53	-0.35
21	5.5	1.4	106	-0.97	-0.79
22	NT	NT	NT		
23	6.7	0.5	107	-0.09	-0.12
24	3.84	1.5	10.32	-2.18	-1.70
25	NT	NT	NT		
26	1.17	0.236	65	-4.14	-6.07
27	6.3	2	98	-0.38	-0.24
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	6.0614	1.5154	34.2	-0.56	-0.43

Statistics

Assigned Value	6.82	0.90
Spike	8.70	0.44
Maximum acceptable conc.**	11.4	
NMI Homog Value	5.8	1.2
Robust Average*	6.82	0.90
Median*	6.30	0.29
Mean*	6.88	
N	20	
Max.	10.1	
Min.	1.17	
Robust SD*	1.6	
Robust CV*	23%	

* Results from laboratory 26 were omitted from the statistical calculations.
**z-score adjusted to 2 (see Section 6.3)


Kernel Density
Density
Result
Results: S6 - PFHxS
Assigned Value = 6.82 ± 0.90 ug/kg
Maximum acceptable concentration
Results (ug/kg)
26 24 21 3 18 7 14 4 33 20 27 12 23 15 10 11 6 13 16 17 1 19 2 22 25 29 31 32 5 8 9 Md R.A. HV S
Laboratory


z-Scores: S6 - PFHxS
Target Standard Deviation 1.36 ug/kg (Equivalent to 20% CV)
z-Score
-2.2 -1.0 -0.7 -0.7 -0.7 -0.7 -0.6 -0.6 -0.5 -0.4 -0.3 -0.1 0.0 0.4 0.9 1.5 1.8 2.0 2.0
26 24 21 3 18 7 14 4 33 20 27 12 23 15 10 11 6 13 16 17
Laboratory

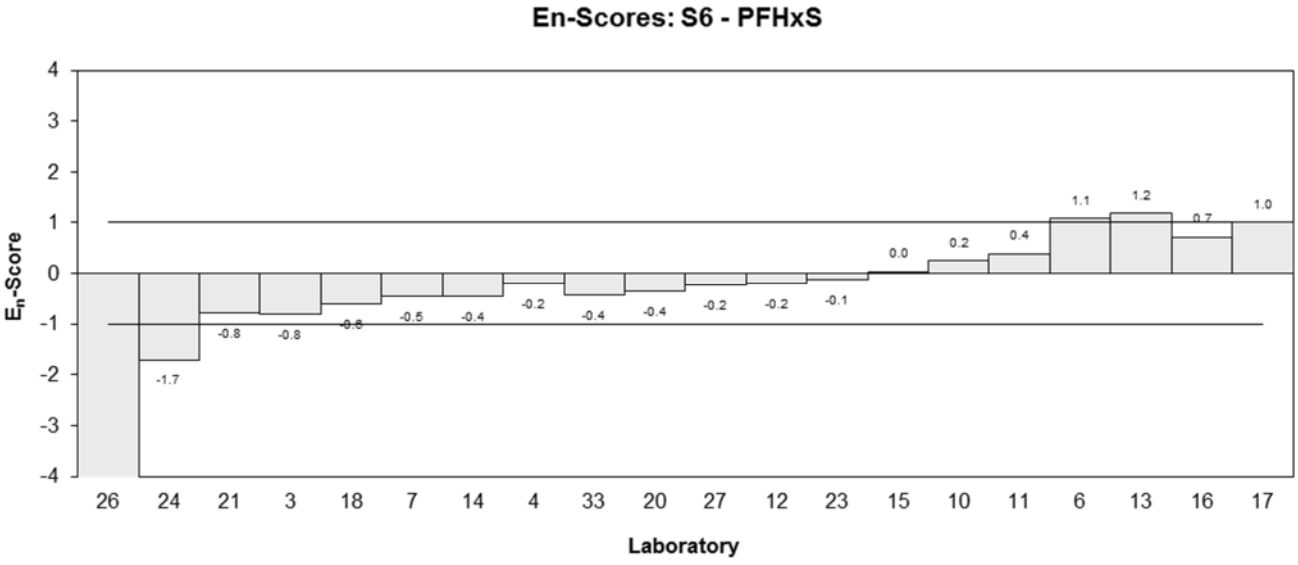

En-Scores: S6 - PFHxS
En-Score
-1.7 -0.8 -0.8 -0.6 -0.5 -0.4 -0.2 -0.4 -0.4 -0.2 -0.2 -0.1 0.0 0.2 0.4 1.1 1.2 0.7 1.0
26 24 21 3 18 7 14 4 33 20 27 12 23 15 10 11 6 13 16 17
Laboratory

Figure 89

Table 100

Sample Details

Sample No.	S6
Matrix.	Prawn
Analyte.	PFNA
Units	µg/kg

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	NT	NT	NT
2	NT	NT	NT
3	0.069	0.090	NR
4	<1	1.83	89
5	NT	NT	NT
6	<0.5	0.1	135
7	<0.5	NR	120.6
8	NT	NT	NT
9	NT	NT	NT
10	<1	NR	NR
11	<1	NR	96
12	<0.5	NR	86
13	<10.3	NR	95
14	< 0.234	0.07	60
15	NR	NR	66.3
16	<0.3	NR	92
17	NT	NT	NT
18	<1.0	0.07	139
19	NT	NT	NT
20	<0.5	NR	113
21	< 1	0.25	NR
22	NT	NT	NT
23	< 0.25	NR	87
24	<0.10	NR	74.76
25	NT	NT	NT
26	<0.184	NR	64
27	<0.5	NR	96
29	NT	NT	NT
31	NT	NT	NT
32	NT	NT	NT
33	0.0779	0.0195	31.2

Statistics

Assigned Value	Not Set	
Spike	Not Spiked	

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Table 101

Sample Details

Sample No.	S6
Matrix.	Prawn
Analyte.	PFOA
Units	µg/kg

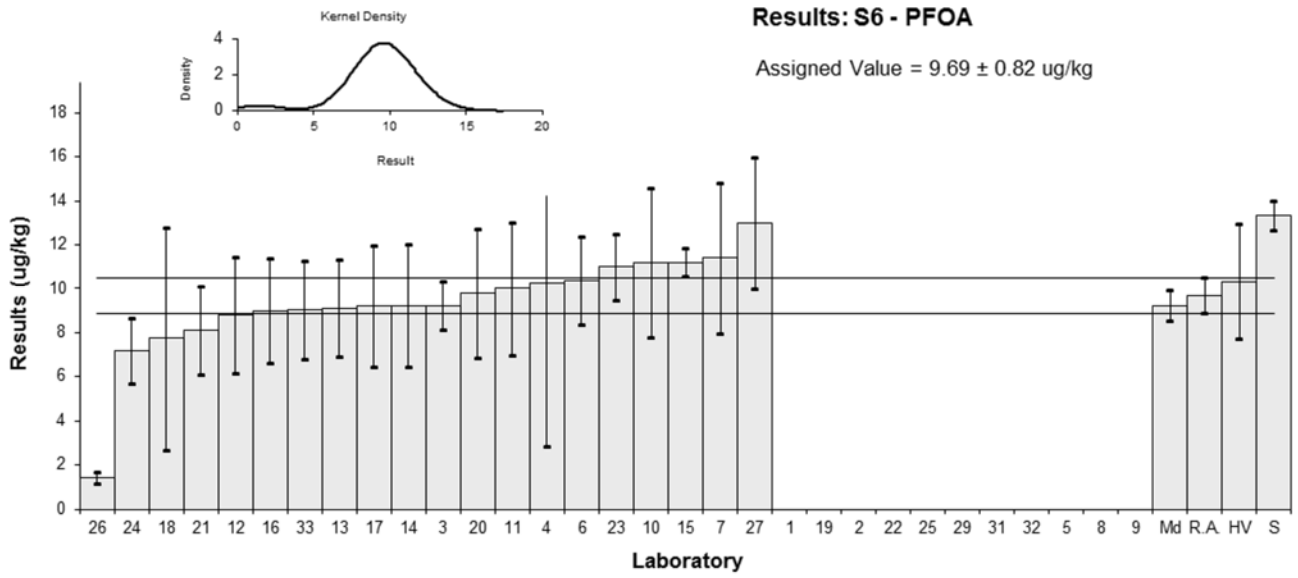
Participant Results

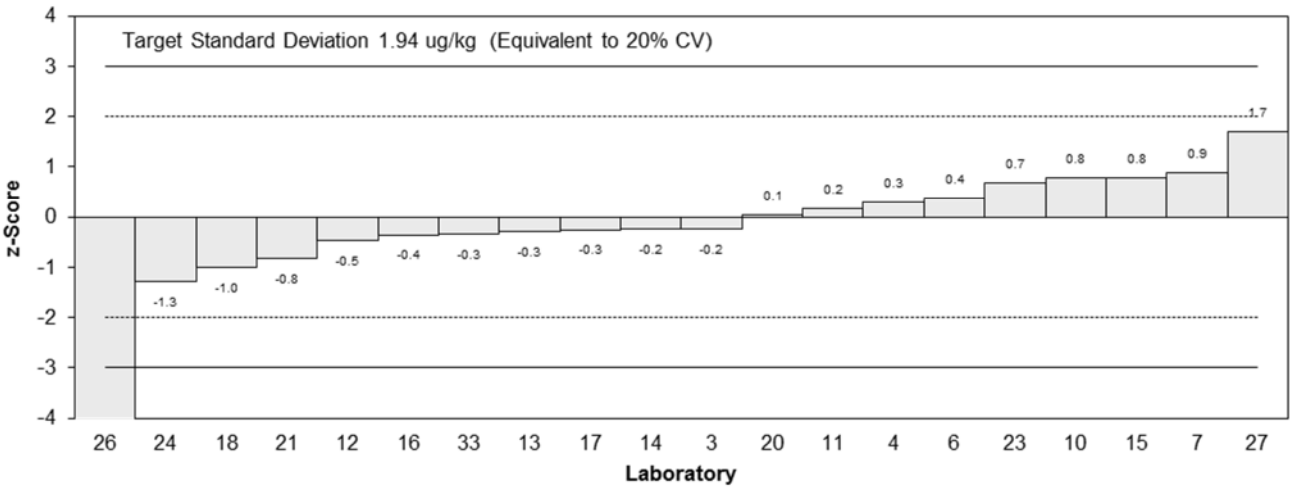
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	9.242	1.109	75.70	-0.23	-0.32
4	10.25	7.40	88	0.29	0.08
5	NT	NT	NT		
6	10.4	2.0	104	0.37	0.33
7	11.4	3.43	73.5	0.88	0.48
8	NT	NT	NT		
9	NT	NT	NT		
10	11.2	3.4	108	0.78	0.43
11	10	3	100	0.16	0.10
12	8.79	2.64	92	-0.46	-0.33
13	9.12	2.19	90	-0.29	-0.24
14	9.24	2.8	68	-0.23	-0.15
15	11.216	0.643	70.9	0.79	1.46
16	9.0	2.4	91	-0.36	-0.27
17	9.2	2.75	NR	-0.25	-0.17
18	7.74	5.07	145	-1.01	-0.38
19	NT	NT	NT		
20	9.79	2.94	101	0.05	0.03
21	8.1	2.0	110	-0.82	-0.74
22	NT	NT	NT		
23	11	1.5	91	0.68	0.77
24	7.19	1.5	11.63	-1.29	-1.46
25	NT	NT	NT		
26	1.45	0.262	61	-4.25	-9.57
27	13	3	88	1.71	1.06
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	9.0370	2.2593	34.8	-0.34	-0.27

Statistics

Assigned Value	9.69	0.82
Spike	13.32	0.67
NMI Homog Value	10.3	2.6
Robust Average*	9.69	0.82
Median*	9.24	0.72
Mean*	9.73	
N	20	
Max.	13	
Min.	1.45	
Robust SD*	1.4	
Robust CV*	15%	

* Results from laboratory 26 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S6 - PFOA
Assigned Value = 9.69 ± 0.82 ug/kg
Results (ug/kg)
26 24 18 21 12 16 33 13 17 14 3 20 11 4 6 23 10 15 7 27 1 19 2 22 25 29 31 32 5 8 9 Md R.A. HV S
Laboratory


z-Scores: S6 - PFOA
Target Standard Deviation 1.94 ug/kg (Equivalent to 20% CV)
z-Score
-1.3 -1.0 -0.8 -0.5 -0.4 -0.3 -0.3 -0.3 -0.2 -0.2 0.1 0.2 0.3 0.4 0.7 0.8 0.8 0.9 1.7
26 24 18 21 12 16 33 13 17 14 3 20 11 4 6 23 10 15 7 27
Laboratory

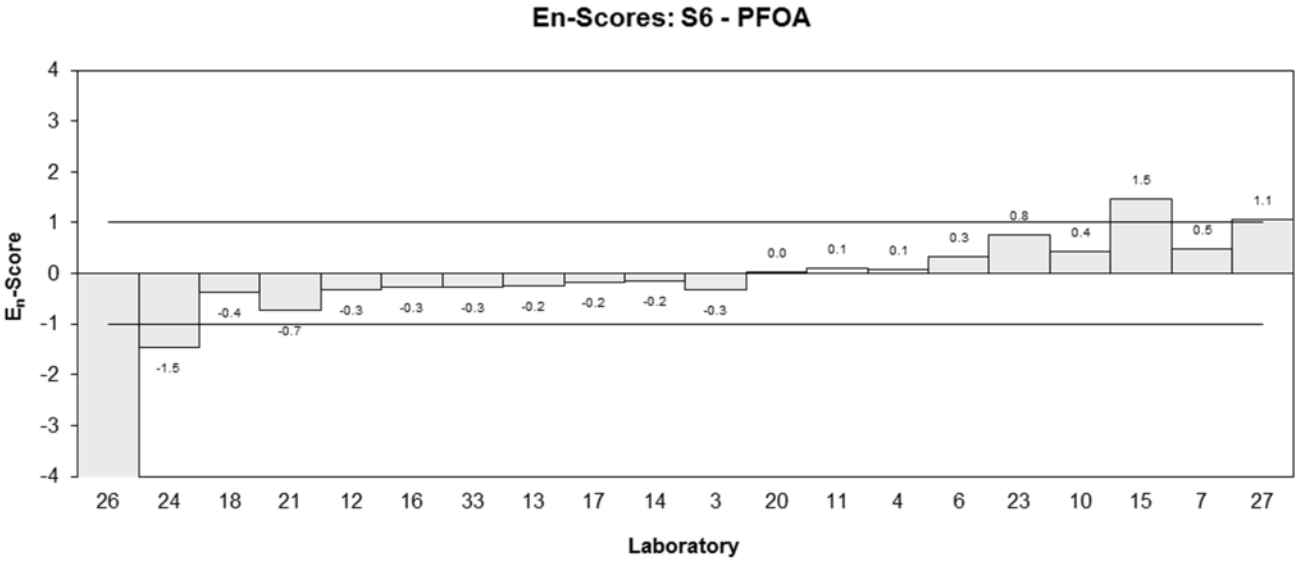

En-Scores: S6 - PFOA
En-Score
-1.5 -0.4 -0.7 -0.3 -0.3 -0.3 -0.2 -0.2 -0.2 -0.3 0.0 0.1 0.1 0.3 0.8 0.4 1.5 0.5 1.1
26 24 18 21 12 16 33 13 17 14 3 20 11 4 6 23 10 15 7 27
Laboratory

Figure 90

Table 102

Sample Details

Sample No.	S6
Matrix.	Prawn
Analyte.	PFOS
Units	µg/kg

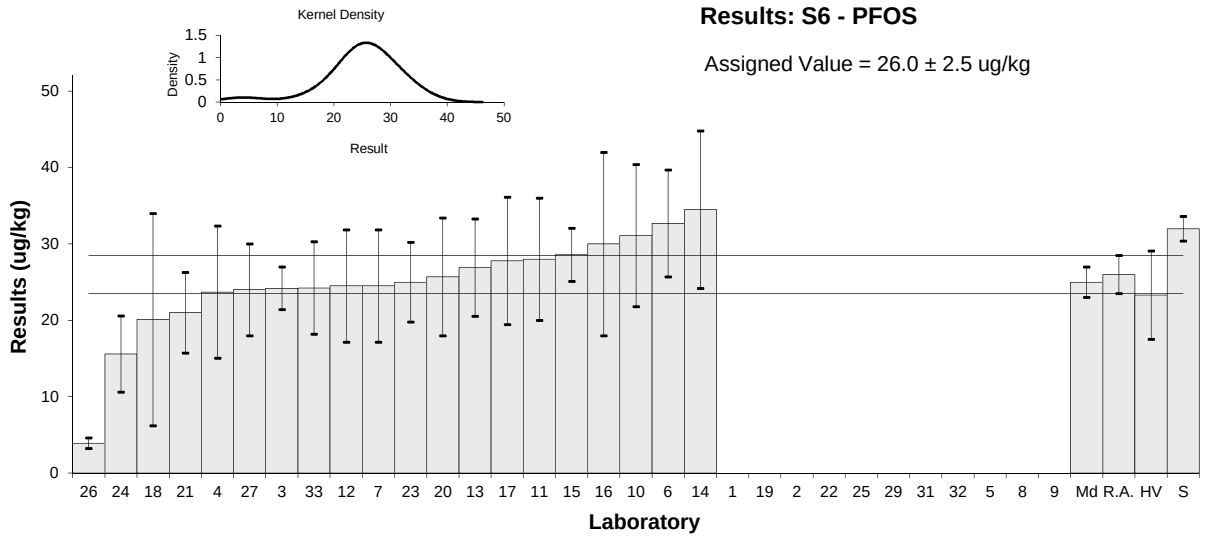
Participant Results

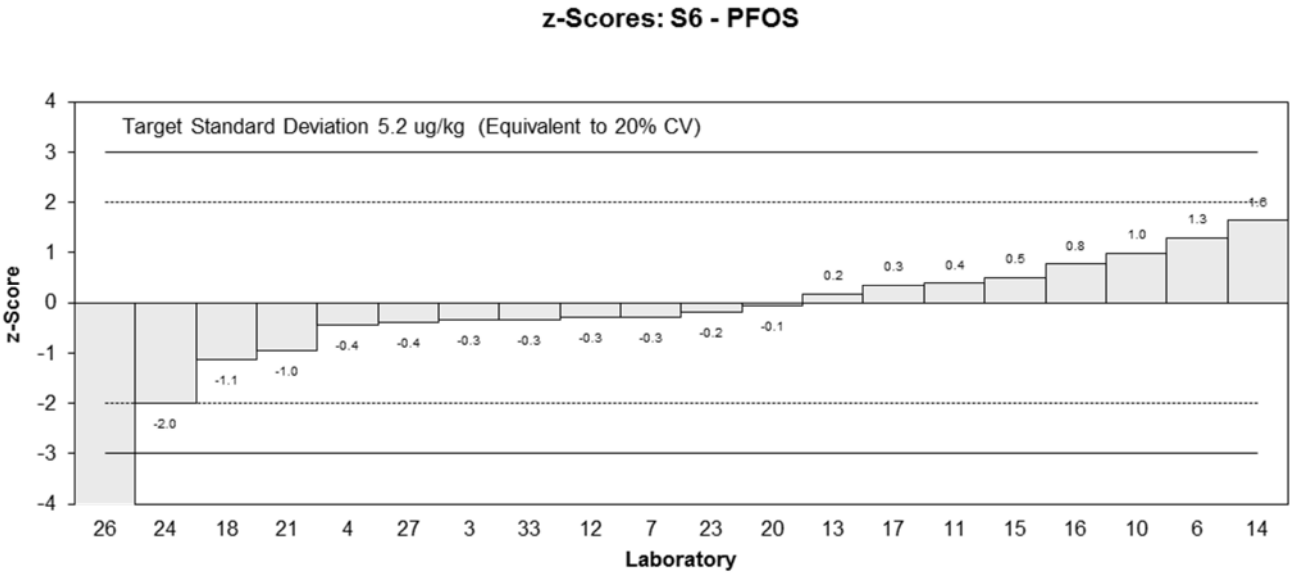
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	24.197	2.782	89.36	-0.35	-0.48
4	23.69	8.66	79	-0.44	-0.26
5	NT	NT	NT		
6	32.7	7.0	113	1.29	0.90
7	24.5	7.34	97.0	-0.29	-0.19
8	NT	NT	NT		
9	NT	NT	NT		
10	31.1	9.3	103	0.98	0.53
11	28	8	106	0.38	0.24
12	24.5	7.34	94	-0.29	-0.19
13	26.9	6.38	77	0.17	0.13
14	34.5	10.3	66	1.63	0.80
15	28.588	3.493	64.2	0.50	0.60
16	30	12	81	0.77	0.33
17	27.8	8.34	NR	0.35	0.21
18	20.1	13.9	136	-1.13	-0.42
19	NT	NT	NT		
20	25.7	7.71	103	-0.06	-0.04
21	21	5.3	100	-0.96	-0.85
22	NT	NT	NT		
23	25	5.2	94	-0.19	-0.17
24	15.6	5	8.76	-2.00	-1.86
25	NT	NT	NT		
26	3.91	0.692	70	-4.25	-8.52
27	24	6	108	-0.38	-0.31
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	24.2299	6.0575	2.4316	-0.34	-0.27

Statistics

Assigned Value	26.0	2.5
Spike	32.0	1.6
NMI Homog Value	23.3	5.8
Robust Average*	26.0	2.5
Median*	25.0	2.0
Mean*	24.8	
N	20	
Max.	34.5	
Min.	3.91	
Robust SD*	4.4	
Robust CV*	17%	

* Results from laboratory 26 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S6 - PFOS
Assigned Value = 26.0 ± 2.5 ug/kg
Results (ug/kg)
Laboratory
26 24 18 21 4 27 3 33 12 7 23 20 13 17 11 15 16 10 6 14 1 19 2 22 25 29 31 32 5 8 9 Md R.A. HV S


z-Scores: S6 - PFOS
Target Standard Deviation 5.2 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
26 24 18 21 4 27 3 33 12 7 23 20 13 17 11 15 16 10 6 14

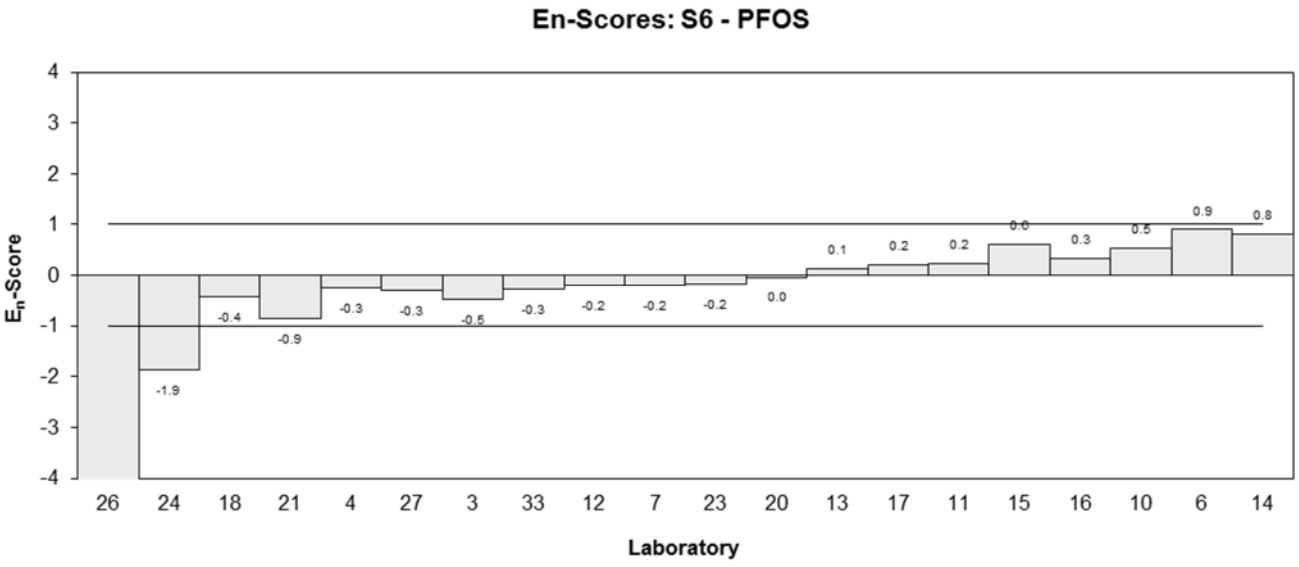

En-Scores: S6 - PFOS
En-Score
Laboratory
26 24 18 21 4 27 3 33 12 7 23 20 13 17 11 15 16 10 6 14

Figure 91

Table 103

Sample Details

Sample No.	S6
Matrix.	Prawn
Analyte.	PFOSA
Units	µg/kg

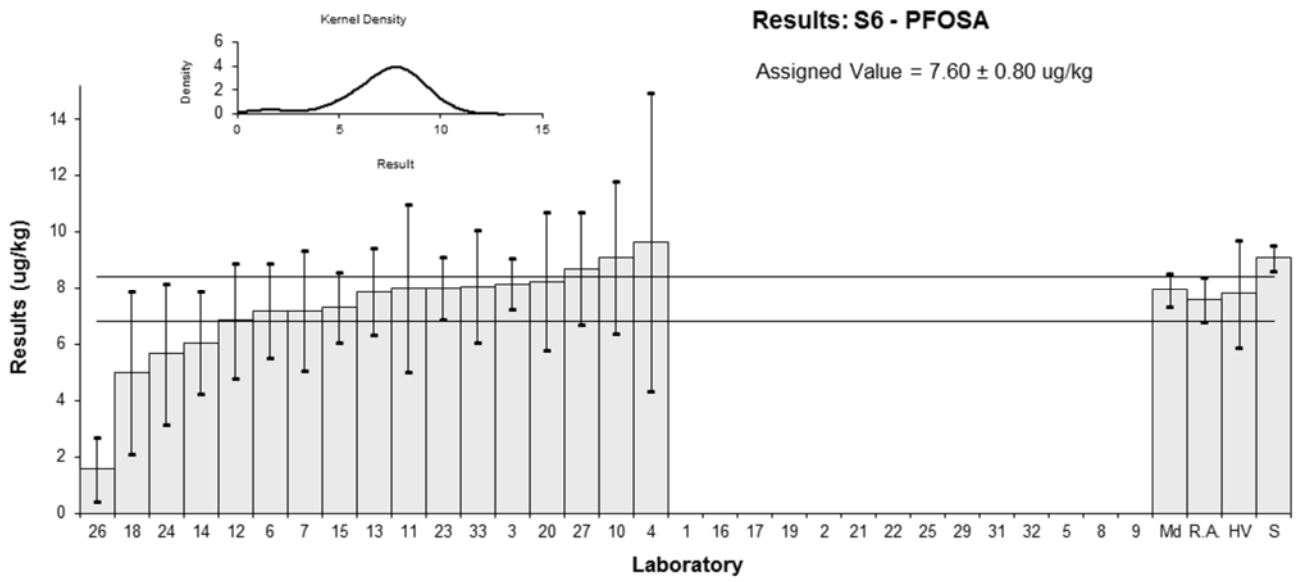
Participant Results

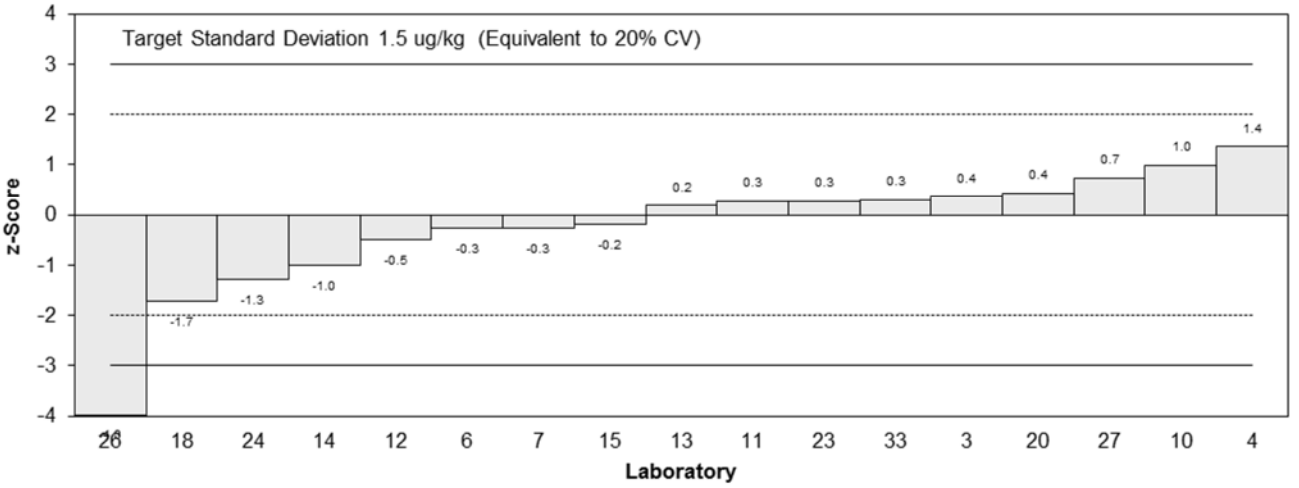
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	8.151	0.912	NR	0.36	0.45
4	9.66	5.31	57	1.36	0.38
5	NT	NT	NT		
6	7.2	1.7	80	-0.26	-0.21
7	7.2	2.15	93.5	-0.26	-0.17
8	NT	NT	NT		
9	NT	NT	NT		
10	9.1	2.7	NR	0.99	0.53
11	8	3	100	0.26	0.13
12	6.85	2.05	88	-0.49	-0.34
13	7.88	1.56	71	0.18	0.16
14	6.06	1.82	63	-1.01	-0.77
15	7.303	1.251	17.7	-0.20	-0.20
16	NT	NT	NT		
17	NT	NT	NT		
18	5.0	2.89	143	-1.71	-0.87
19	NT	NT	NT		
20	8.25	2.48	113	0.43	0.25
21	NT	NT	NT		
22	NT	NT	NT		
23	8.0	1.1	102	0.26	0.29
24	5.66	2.5	2.98	-1.28	-0.74
25	NT	NT	NT		
26	1.56	1.15	7	-3.97	-4.31
27	8.7	2	104	0.72	0.51
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	8.0633	2.0158	63.7	0.30	0.21

Statistics

Assigned Value	7.60	0.80
Spike	9.08	0.45
NMI Homog Value	7.8	1.9
Robust Average	7.60	0.89
Median	7.94	0.58
Mean	7.57	
N	17	
Max.	9.66	
Min.	1.56	
Robust SD	1.3	
Robust CV	17%	

* Results from laboratory 26 were omitted from the statistical calculations.


Kernel Density
Density
Result
Results: S6 - PFOSA
Assigned Value = 7.60 ± 0.80 ug/kg
Results (ug/kg)
26 18 24 14 12 6 7 15 13 11 23 33 3 20 27 10 4 1 16 17 19 2 21 22 25 29 31 32 5 8 9 Md R.A. HV S
Laboratory


z-Scores: S6 - PFOSA
Target Standard Deviation 1.5 ug/kg (Equivalent to 20% CV)
z-Score
-1.7 -1.3 -1.0 -0.5 -0.3 -0.3 -0.2 0.2 0.3 0.3 0.3 0.4 0.4 0.7 1.0 1.4
26 18 24 14 12 6 7 15 13 11 23 33 3 20 27 10 4
Laboratory

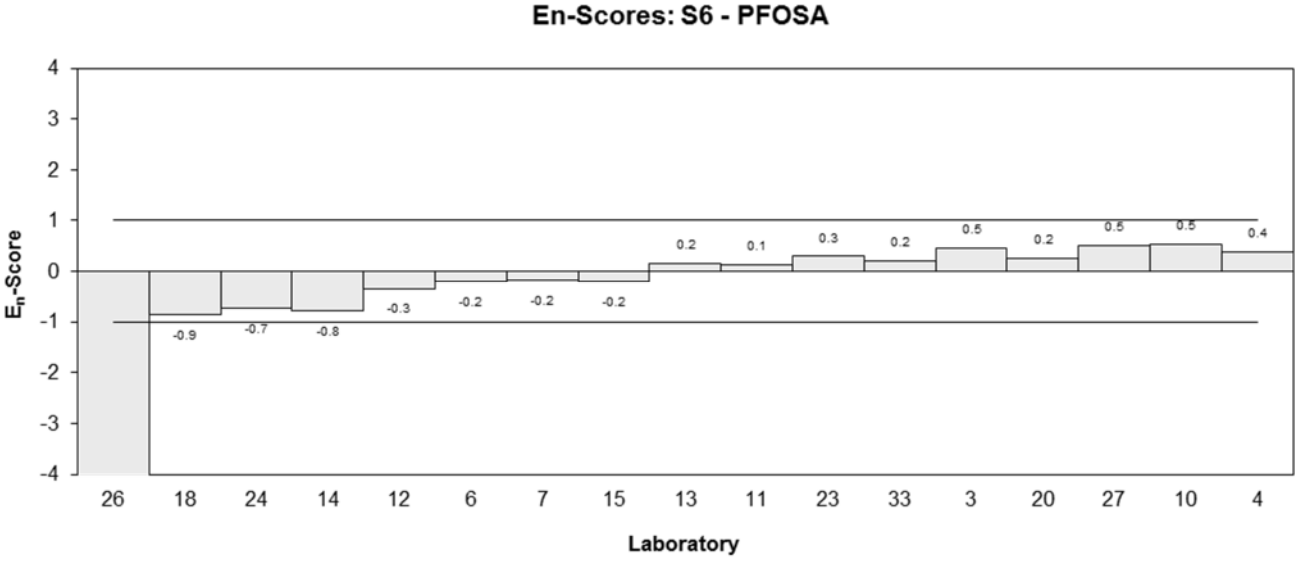

En-Scores: S6 - PFOSA
En-Score
-0.9 -0.7 -0.8 -0.3 -0.2 -0.2 -0.2 0.2 0.1 0.3 0.2 0.5 0.2 0.5 0.5 0.4
26 18 24 14 12 6 7 15 13 11 23 33 3 20 27 10 4
Laboratory

Figure 92

Table 104

Sample Details

Sample No.	S6
Matrix.	Prawn
Analyte.	PFPeA
Units	µg/kg

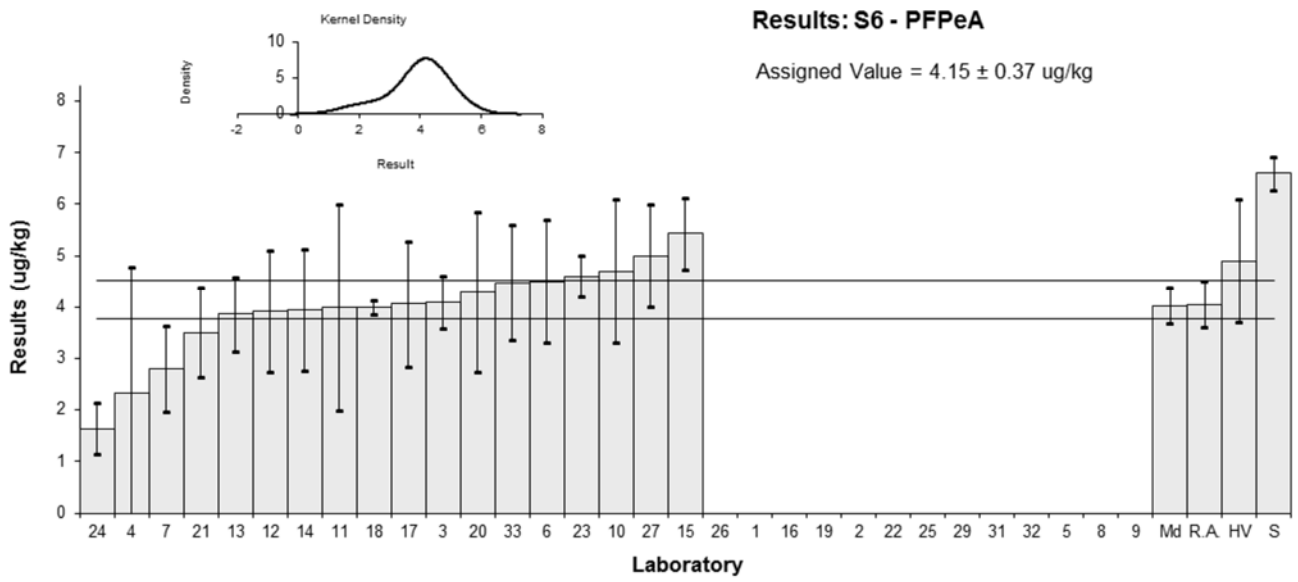
Participant Results

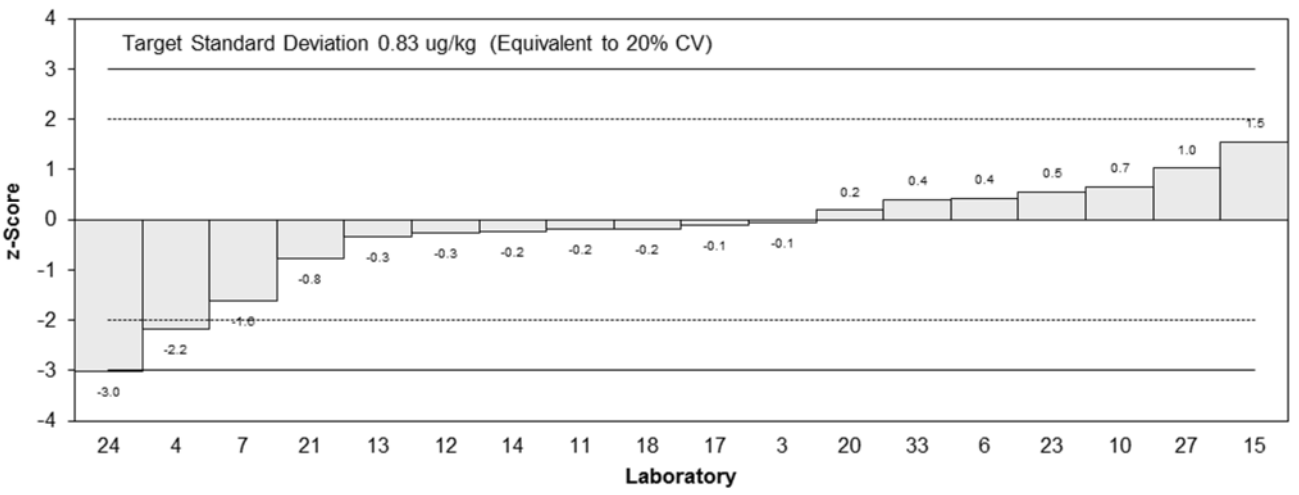
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	4.090	0.513	NR	-0.07	-0.09
4	2.34	2.43	114	-2.18	-0.74
5	NT	NT	NT		
6	4.5	1.2	66	0.42	0.28
7	2.8	0.84	129.0	-1.63	-1.47
8	NT	NT	NT		
9	NT	NT	NT		
10	4.7	1.4	NR	0.66	0.38
11	4	2	95	-0.18	-0.07
12	3.92	1.18	99	-0.28	-0.19
13	3.86	0.730	57	-0.35	-0.35
14	3.95	1.19	52	-0.24	-0.16
15	5.431	0.690	69.7	1.54	1.64
16	NT	NT	NT		
17	4.06	1.22	NR	-0.11	-0.07
18	4.0	0.13	132	-0.18	-0.38
19	NT	NT	NT		
20	4.30	1.55	113	0.18	0.09
21	3.5	0.87	117	-0.78	-0.69
22	NT	NT	NT		
23	4.6	0.4	100	0.54	0.83
24	1.64	0.49	11.63	-3.02	-4.09
25	NT	NT	NT		
26	<1.47	NR	62		
27	5.0	1	107	1.02	0.80
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	4.4807	1.1202	31.7	0.40	0.28

Statistics

Assigned Value*	4.15	0.37
Spike	6.60	0.33
NMI Homog Value	4.9	1.2
Robust Average	4.05	0.45
Median	4.03	0.34
Mean	3.95	
N	18	
Max.	5.431	
Min.	1.64	
Robust SD	0.76	
Robust CV	19%	

* Assigned value is the robust average excluding laboratory 24.


Results: S6 - PFPeA
Assigned Value = 4.15 ± 0.37 ug/kg
Kernel Density
Density
Result
Results (ug/kg)
Laboratory
24 4 7 21 13 12 14 11 18 17 3 20 33 6 23 10 27 15 26 1 16 19 2 22 25 29 31 32 5 8 9 Md R.A. HV S


z-Scores: S6 - PFPeA
Target Standard Deviation 0.83 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
24 4 7 21 13 12 14 11 18 17 3 20 33 6 23 10 27 15
-3.0 -2.2 -1.6 -0.8 -0.3 -0.3 -0.2 -0.2 -0.2 -0.1 -0.1 0.2 0.4 0.4 0.5 0.7 1.0 1.5

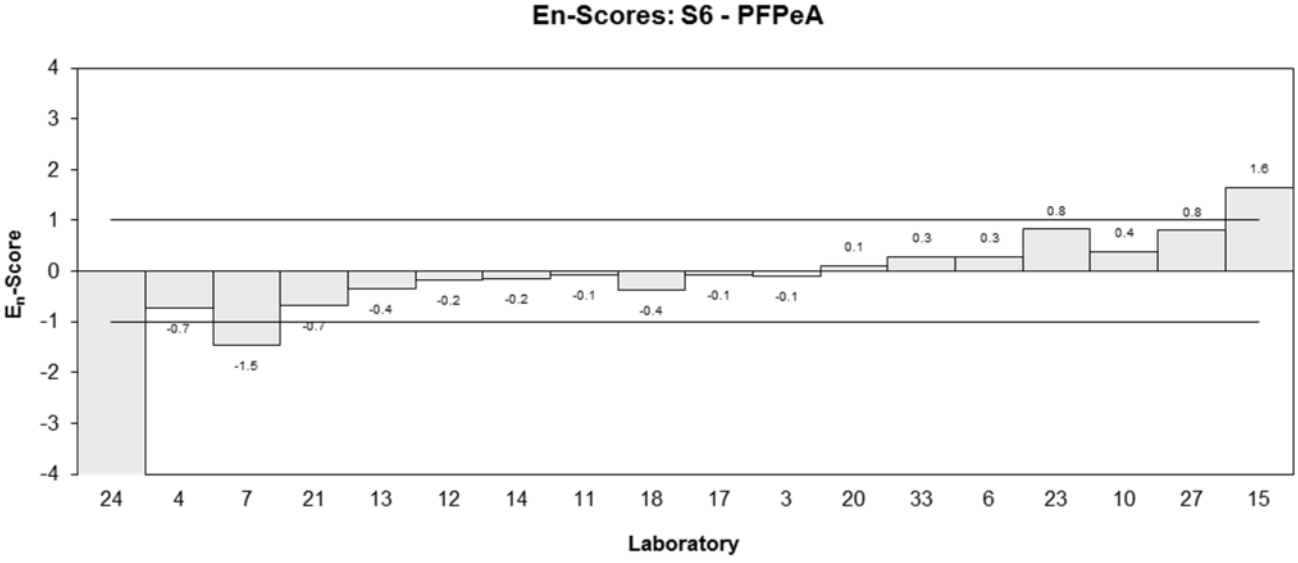

En-Scores: S6 - PFPeA
En-Score
Laboratory
24 4 7 21 13 12 14 11 18 17 3 20 33 6 23 10 27 15
-0.7 -1.5 -0.7 -0.4 -0.2 -0.2 -0.1 -0.4 -0.1 -0.1 0.1 0.3 0.3 0.8 0.4 0.8 1.6

Figure 93

Table 105

Sample Details

Sample No.	S6
Matrix.	Prawn
Analyte.	PFTeDA
Units	µg/kg

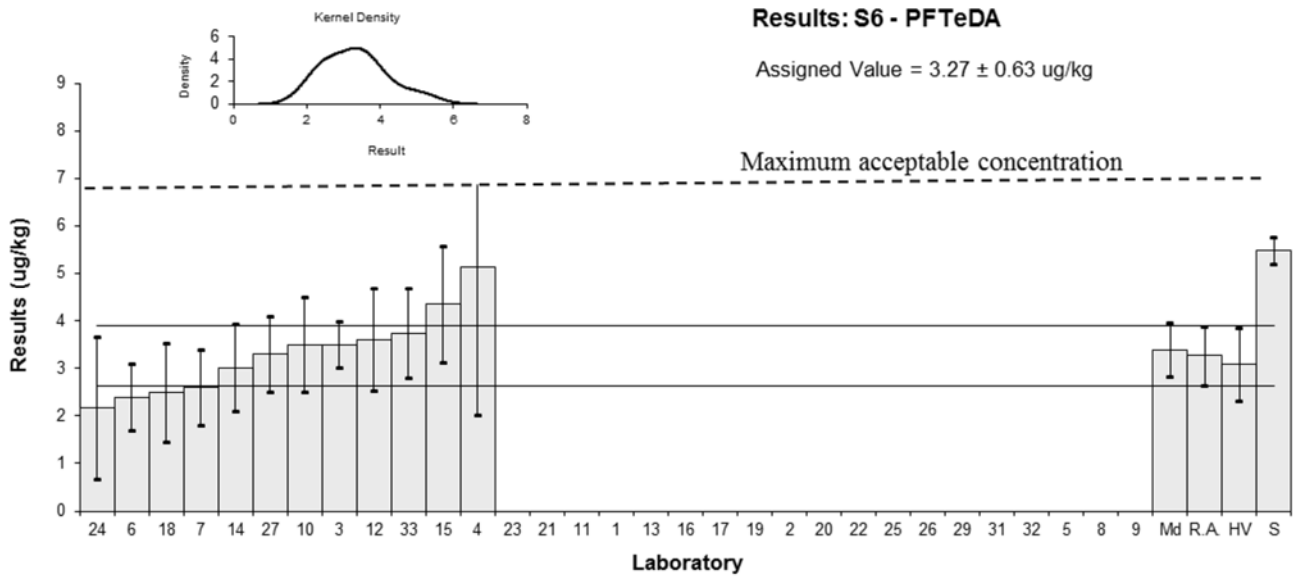
Participant Results

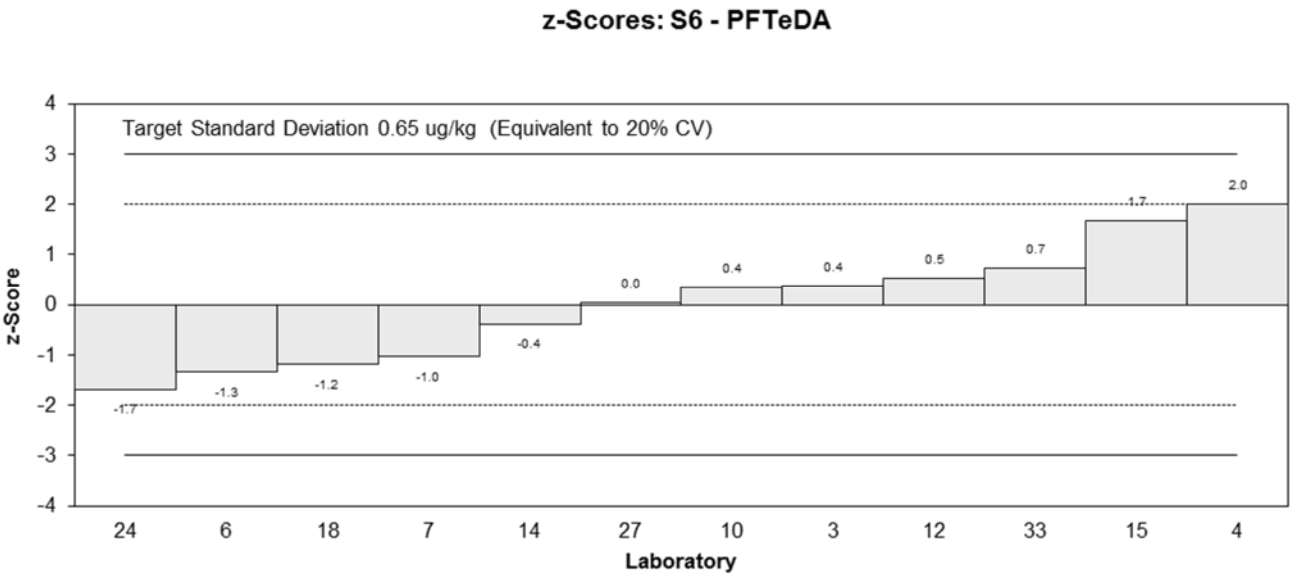
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	3.509	0.490	NR	0.37	0.30
4*	5.14	3.12	12	2.00	0.59
5	NT	NT	NT		
6	2.4	0.7	119	-1.33	-0.92
7	2.6	0.79	86.0	-1.02	-0.66
8	NT	NT	NT		
9	NT	NT	NT		
10	3.5	1.0	NR	0.35	0.19
11	<5	NR	98		
12	3.61	1.08	79	0.52	0.27
13	NT	NT	NT		
14	3.02	0.91	81	-0.38	-0.23
15	4.363	1.234	44.9	1.67	0.79
16	NT	NT	NT		
17	NT	NT	NT		
18	2.5	1.04	141	-1.18	-0.63
19	NT	NT	NT		
20	NT	NT	NT		
21	< 5	0	NR		
22	NT	NT	NT		
23	< 12.5	NR	84		
24	2.17	1.5	6.70	-1.68	-0.68
25	NT	NT	NT		
26	NT	NT	NT		
27	3.3	0.8	75	0.05	0.03
29	NT	NT	NT		
31	NT	NT	NT		
32	NT	NT	NT		
33	3.7483	0.9371	14.2	0.73	0.42

Statistics

Assigned Value	3.27	0.63
Spike	5.50	0.28
Maximum acceptable conc. *	6.80	
NMI Homog Value	3.09	0.77
Robust Average	3.27	0.63
Median	3.40	0.56
Mean	3.32	
N	12	
Max.	5.14	
Min.	2.17	
Robust SD	0.87	
Robust CV	27%	

*z-score adjusted to 2 (see Section 6.3)


Kernel Density
Density
Result
Results: S6 - PFTeDA
Assigned Value = 3.27 ± 0.63 ug/kg
Maximum acceptable concentration
Results (ug/kg)
24 6 18 7 14 27 10 3 12 33 15 4 23 21 11 1 13 16 17 19 2 20 22 25 26 29 31 32 5 8 9 Md R.A. HV S
Laboratory


z-Scores: S6 - PFTeDA
Target Standard Deviation 0.65 ug/kg (Equivalent to 20% CV)
z-Score
-1.7 -1.3 -1.2 -1.0 -0.4 0.0 0.4 0.4 0.5 0.7 1.7 2.0
24 6 18 7 14 27 10 3 12 33 15 4
Laboratory

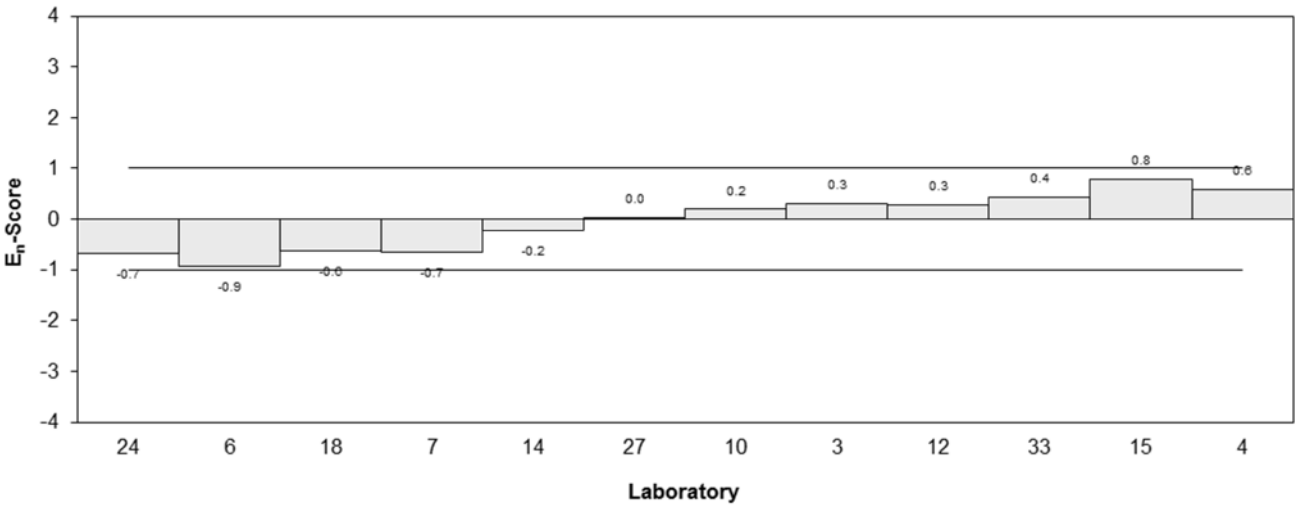

En-Scores: S6 - PFTeDA
En-Score
-0.7 -0.9 -0.6 -0.7 -0.2 0.0 0.2 0.3 0.3 0.4 0.8 0.6
24 6 18 7 14 27 10 3 12 33 15 4
Laboratory

Figure 94

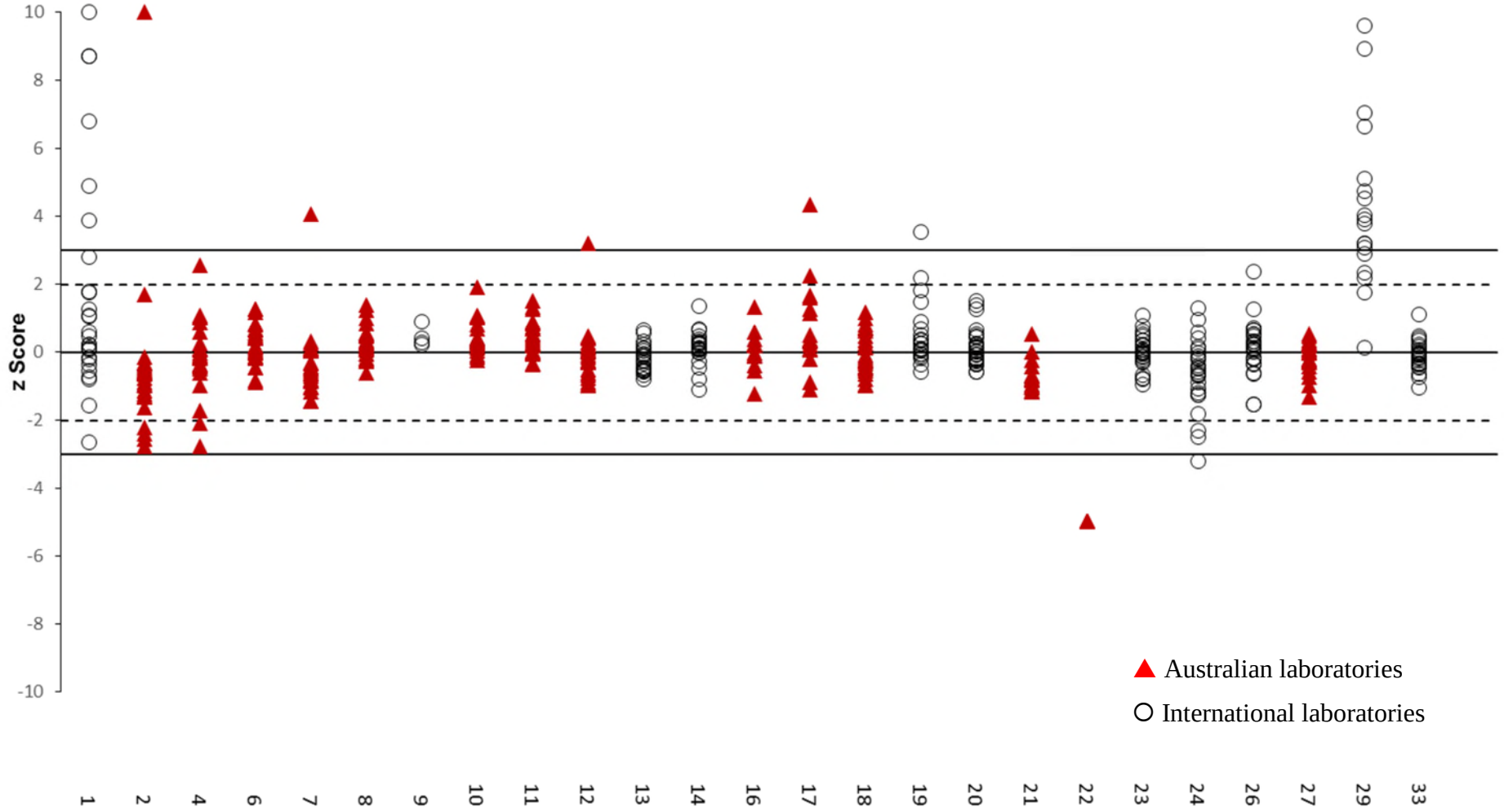


Figure 95 z-Score Dispersal by Laboratory Soil Samples S1 and S2

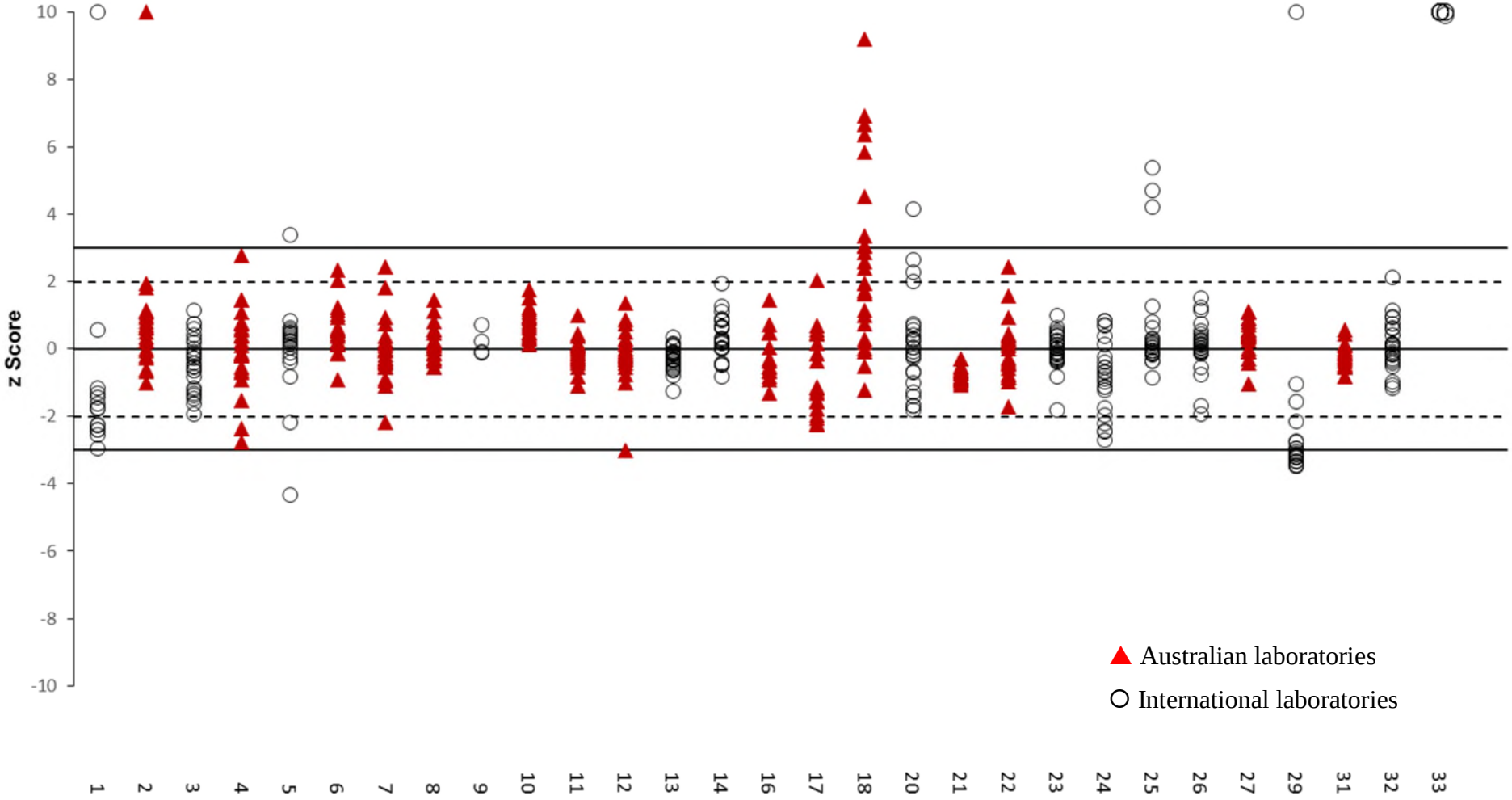


Figure 96 z-Score Dispersal by Laboratory Water Samples S3 and S4

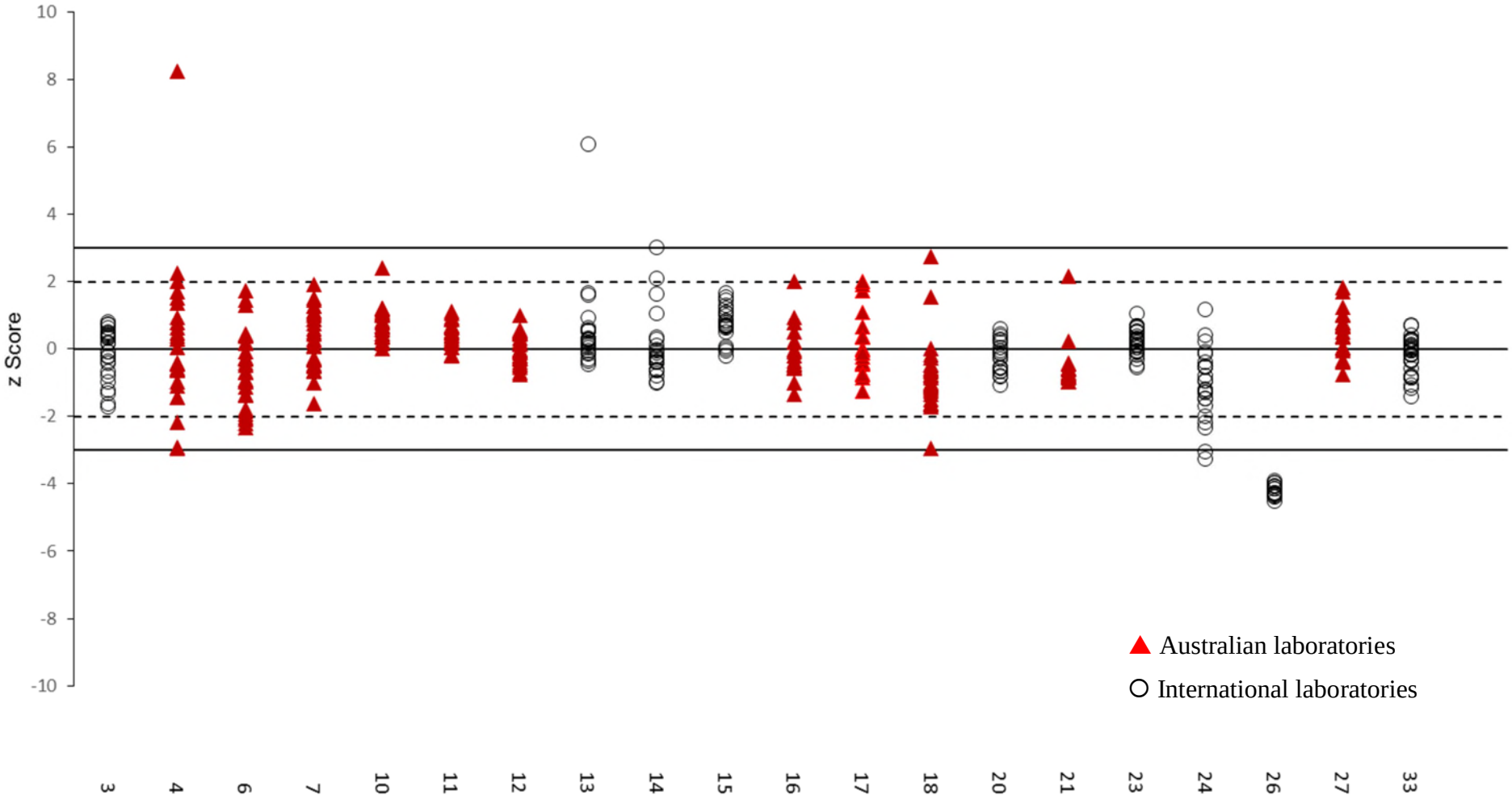


Figure 97 z-Score Dispersal by Laboratory Biota Samples S5 and S6

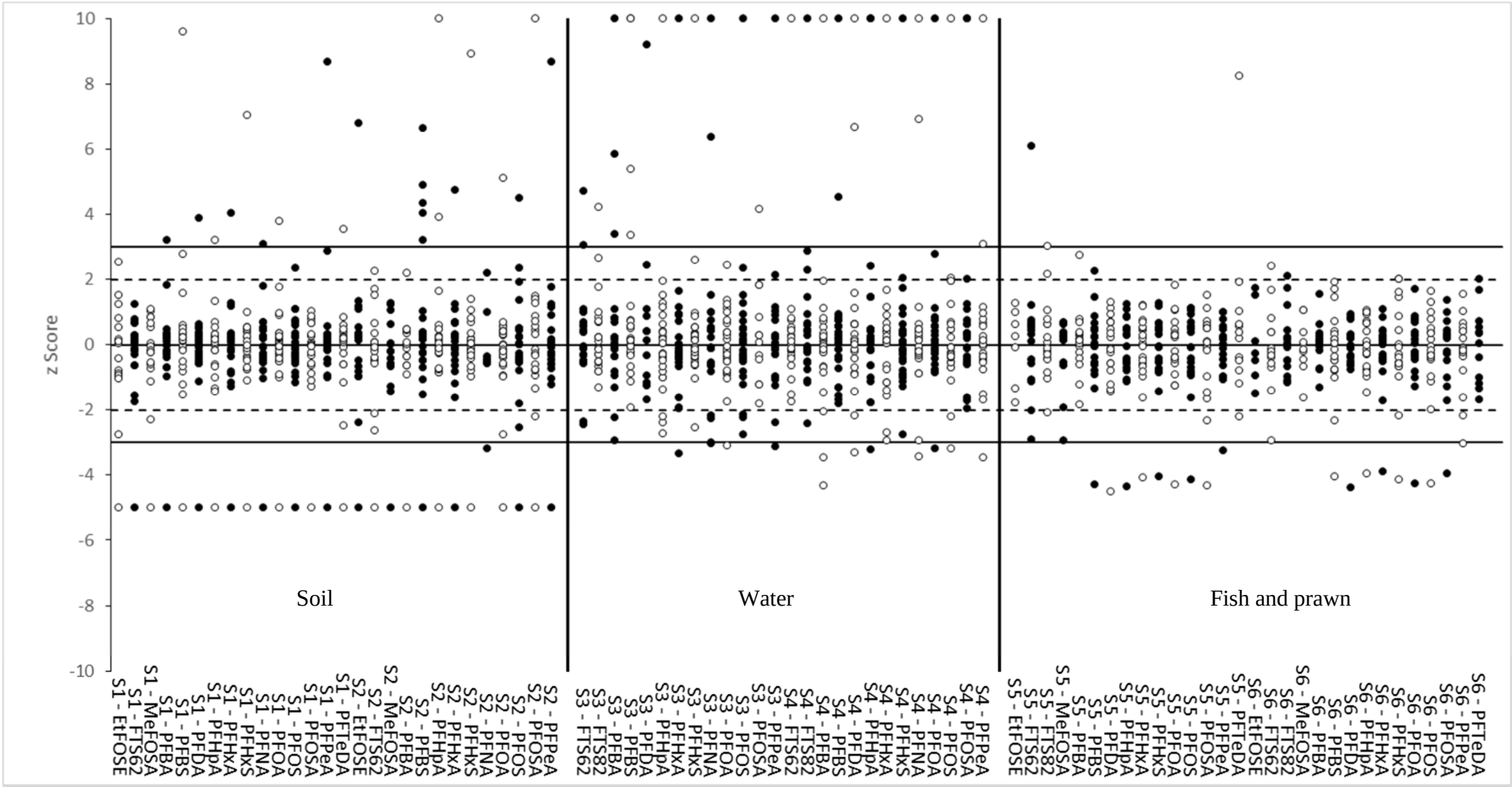


Figure 98 z-Score Dispersal by Analyte

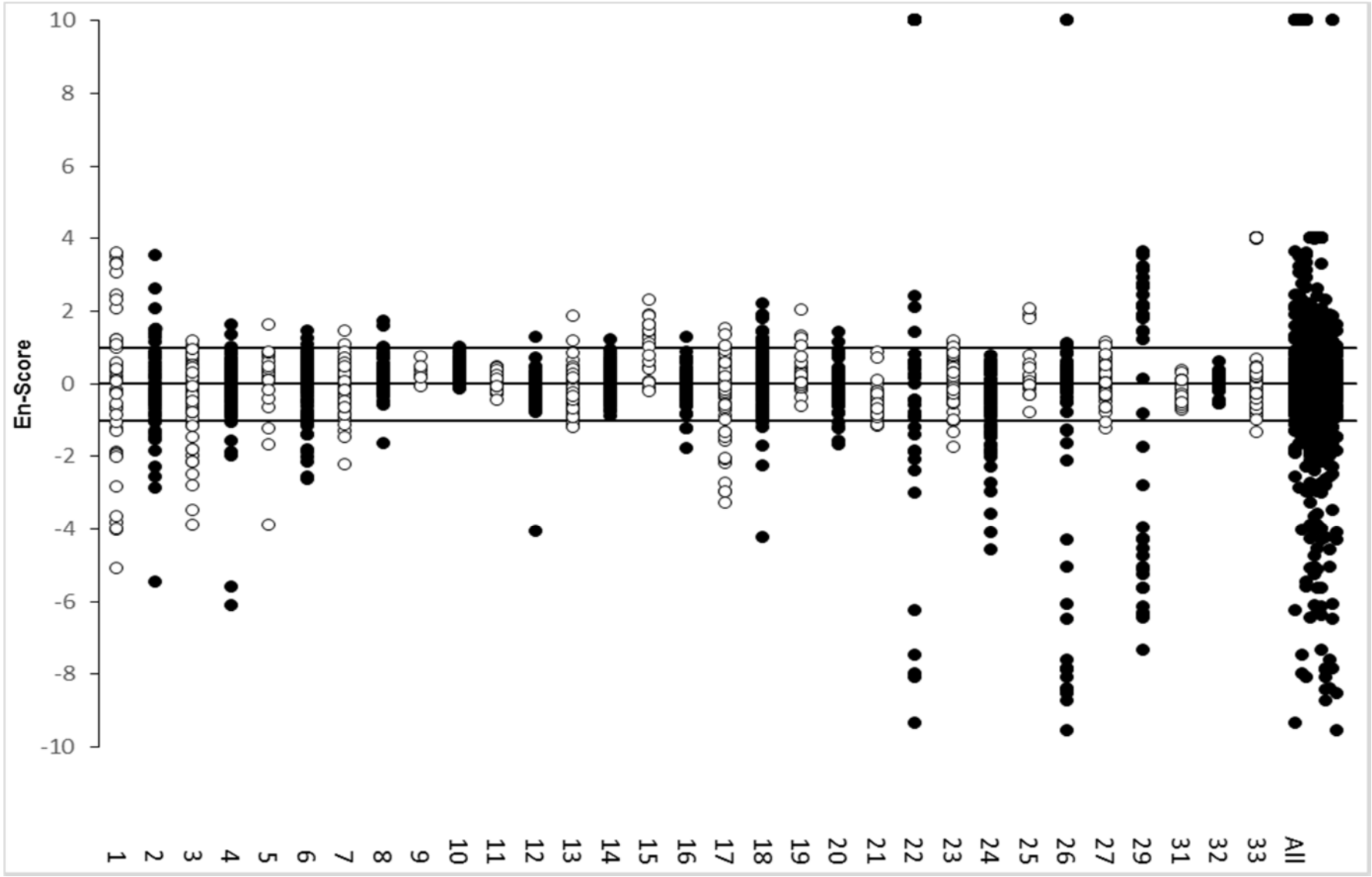


Figure 99 E_n-Score Dispersal by Laboratory

6 DISCUSSION OF RESULTS

6.1 Assigned Value

The robust average of participants' results was used as the assigned value for all samples. The robust averages and associated expanded uncertainties were calculated using the procedure described in 'ISO13528:2015(E), Statistical methods for use in proficiency testing by interlaboratory comparisons'.[7] The calculation of the expanded uncertainty for the robust average of PFOA in Sample S3 is presented in Appendix 4.

Results less than 50% and greater than 150% of the robust average were removed before calculation of the assigned value.[3,4]

Assigned values for spiked analytes in Samples S1, S2, S3, S4, S5 and S6 were within the range 52 – 139% of the spiked concentration for that analyte (Table 106).

No assigned values were calculated for 8:2 FTS in Samples S1 and S2, PFDA in Sample S2, PFTeDA in Samples S2, S3 and S4 and EtFOSE and MeFOSA in Samples S3 and S4. The reason was few laboratories reported numeric results and these results were too variable.

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 106 Comparison of Assigned Value and Spiked Concentration.

Sample	Matrix	Analyte	Units	Spiked Concentration	Assigned Value	Assigned/ Spike (%)
S1	Soil	EtFOSE	µg/kg	5.46	6.9	126
S1	Soil	6:2 FTS	µg/kg	5.49	5.2	95
S1	Soil	MeFOSA	µg/kg	5.04	5.15	102
S1	Soil	PFBA	µg/kg	7.74	9.32	120
S1	Soil	PFBS	µg/kg	9.39	9.56	102
S1	Soil	PFDA	µg/kg	16.51	18.06	109
S1	Soil	PFHpA	µg/kg	14.90	15	101
S1	Soil	PFHxA	µg/kg	11.80	10.45	89
S1	Soil	PFHxS	µg/kg	16.10	15.33	95
S1	Soil	PFNA	µg/kg	18.27	20.2	111
S1	Soil	PFOA	µg/kg	6.96	6.55	94
S1	Soil	PFOS	µg/kg	6.97	7.83	112
S1	Soil	PFOSA	µg/kg	10.28	11.06	108
S1	Soil	PFPeA	µg/kg	7.20	6.28	87
S1	Soil	PFTeDA	µg/kg	8.90	7.61	86
S2	Soil	EtFOSE	µg/kg	5.24	6.32	121
S2	Soil	6:2 FTS	µg/kg	5.55	5.52	99
S2	Soil	MeFOSA	µg/kg	2.40	2.4	100
S2	Soil	PFOA	µg/kg	85.6	80.5	94
S3	Water	6:2 FTS	µg/L	0.047	0.051	109

Sample	Matrix	Analyte	Units	Spiked Concentration	Assigned Value	Assigned/ Spike (%)
S3	Water	8:2 FTS	µg/L	0.102	0.096	94
S3	Water	PFNA	µg/L	0.066	0.092	139
S4	Water	6:2 FTS	µg/L	0.048	0.046	96
S4	Water	8:2 FTS	µg/L	0.100	0.101	101
S4	Water	PFBA	µg/L	0.478	0.569	119
S4	Water	PFBS	µg/L	0.052	0.054	104
S4	Water	PFDA	µg/L	0.098	0.098	100
S4	Water	PFHpA	µg/L	0.030	0.031	103
S4	Water	PFHxA	µg/L	0.045	0.039	87
S4	Water	PFHxS	µg/L	0.050	0.049	98
S4	Water	PFNA	µg/L	0.065	0.073	112
S4	Water	PFOA	µg/L	0.037	0.036	97
S4	Water	PFOS	µg/L	0.059	0.064	108
S4	Water	PFOSA	µg/L	0.108	0.056	52
S4	Water	PFPeA	µg/L	0.046	0.039	85
S5	Fish	EtFOSE	µg/kg	8.01	7.4	92
S5	Fish	6:2 FTS	µg/kg	4.78	4.51	94
S5	Fish	8:2 FTS	µg/kg	8.10	7.68	95
S5	Fish	MeFOSA	µg/kg	12.18	10.7	88
S5	Fish	PFBA	µg/kg	6.64	7.74	117
S5	Fish	PFBS	µg/kg	3.47	3.54	102
S5	Fish	PFDA	µg/kg	4.52	4.4	97
S5	Fish	PFHpA	µg/kg	15.1	13.6	90
S5	Fish	PFHxA	µg/kg	7.00	5.96	85
S5	Fish	PFHxS	µg/kg	5.50	4.7	85
S5	Fish	PFOA	µg/kg	14.95	13.2	88
S5	Fish	PFOS	µg/kg	3.17	3.26	103
S5	Fish	PFOSA	µg/kg	10.43	10.9	105
S5	Fish	PFPeA	µg/kg	5.50	4.58	83
S5	Fish	PFTeDA	µg/kg	3.00	2.32	77
S6	Prawn	EtFOSE	µg/kg	5.28	4.3	81
S6	Prawn	6:2 FTS	µg/kg	5.61	4.18	75
S6	Prawn	8:2 FTS	µg/kg	9.50	7.74	81
S6	Prawn	MeFOSA	µg/kg	14.94	9.9	66
S6	Prawn	PFBA	µg/kg	8.03	7.94	99
S6	Prawn	PFBS	µg/kg	4.73	3.88	82

Sample	Matrix	Analyte	Units	Spiked Concentration	Assigned Value	Assigned/ Spike (%)
S6	Prawn	PFDA	µg/kg	8.39	6.74	80
S6	Prawn	PFHpA	µg/kg	11.00	8.34	76
S6	Prawn	PFHxA	µg/kg	7.00	4.79	68
S6	Prawn	PFHxS	µg/kg	8.70	6.82	78
S6	Prawn	PFOA	µg/kg	13.32	9.69	73
S6	Prawn	PFOS	µg/kg	32.0	26	81
S6	Prawn	PFOSA	µg/kg	9.08	7.6	84
S6	Prawn	PFPeA	µg/kg	6.60	4.15	63
S6	Prawn	PFTeDA	µg/kg	5.50	3.27	59

6.2 Measurement Uncertainty Reported by Participants

Participants were asked to report an estimate of the expanded uncertainty associated with their results and the basis of this uncertainty estimate (Table 7).

It is a requirement of the ISO Standard 17025 that laboratories have procedures to estimate the uncertainty of chemical measurements and to report this uncertainty in specific circumstances, including: 'when the client's instruction so requires.'

All 1813 numeric results were reported with an associated estimate of expanded measurement uncertainty.

The magnitude of the reported expanded uncertainties was within the range 0% to 518% of the reported value. Eighty-seven (5%) were less than 10% relative, which the study coordinator believes are unrealistically small for a routine PFAS measurement and one hundred and seventeen (6.5%) were larger than 50% relative.

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

Some participants attached an estimate of the expanded measurement uncertainty to a result reported as less than their limit of reporting.

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 instead of 0.0383 ± 0.01915 µg/L better report 0.038 ± 0.019 µg/kg)[6].

6.3 z-Score

A target standard deviation equivalent to 20% coefficient of variation (CV) was used to calculate z-scores. The between-laboratory coefficient of variation predicted by the modified Horwitz equation[8] and the between laboratories CV are presented for comparison in Table 107.

Table 107 Performance Target standard deviation, modified Horwitz values and between laboratories CV

Sample	Analyte	Assigned value	Unit	Target SD (as PCV, %)	Modified Horwitz CV (%)	Between laboratories' CV (%)
S1	EtFOSE	6.9	µg/kg	20	22	24
S1	6:2 FTS	5.2	µg/kg	20	22	12
S1	MeFOSA	5.15	µg/kg	20	22	17
S1	PFBA	9.32	µg/kg	20	22	10
S1	PFBS	9.56	µg/kg	20	22	13
S1	PFDA	18.06	µg/kg	20	22	9.1
S1	PFHpA	15	µg/kg	20	22	12
S1	PFHxA	10.45	µg/kg	20	16	12
S1	PFHxS	15.33	µg/kg	20	22	12
S1	PFNA	20.2	µg/kg	20	22	13
S1	PFOA	6.55	µg/kg	20	22	11
S1	PFOS	7.83	µg/kg	20	22	14
S1	PFOSA	11.06	µg/kg	20	22	15
S1	PFPeA	6.28	µg/kg	20	22	8.4
S1	PFTeDA	7.61	µg/kg	20	22	12
S2	EtFOSE	6.32	µg/kg	20	22	21
S2	6:2 FTS	5.52	µg/kg	20	22	15
S2	MeFOSA	2.4	µg/kg	20	22	20
S2	PFBA	1.83	µg/kg	20	22	11
S2	PFBS	2.32	µg/kg	20	22	33
S2	PFHpA	4.21	µg/kg	20	22	12
S2	PFHxA	19.2	µg/kg	20	22	14
S2	PFHxS	68.3	µg/kg	20	22	12
S2	PFNA	0.334	µg/kg	20	22	28
S2	PFOA	80.5	µg/kg	20	22	13
S2	PFOS	1100	µg/kg	20	16	17
S2	PFOSA	3.41	µg/kg	20	22	22
S2	PFPeA	5.04	µg/kg	20	22	16
S3	6:2 FTS	0.051	µg/L	20	22	17
S3	8:2 FTS	0.096	µg/L	20	22	17
S3	PFBA	0.172	µg/L	20	22	18
S3	PFBS	0.243	µg/L	20	22	15
S3	PFDA	0.0074	µg/L	20	22	30

Sample	Analyte	Assigned value	Unit	Target SD (as PCV, %)	Modified Horwitz CV (%)	Between laboratories' CV (%)
S3	PFHpA	0.288	µg/L	20	22	22
S3	PFHxA	2.19	µg/L	20	22	19
S3	PFHxS	8.31	µg/L	20	22	11
S3	PFNA	0.092	µg/L	20	22	23
S3	PFOA	0.735	µg/L	20	22	19
S3	PFOSA	0.0066	µg/L	20	22	29
S3	PFPeA	0.382	µg/L	20	22	17
S4	6:2 FTS	0.046	µg/L	20	22	13
S4	8:2 FTS	0.101	µg/L	20	22	18
S4	PFBS	0.054	µg/L	20	22	18
S4	PFDA	0.098	µg/L	20	22	14
S4	PFHpA	0.031	µg/L	20	22	22
S4	PFHxA	0.039	µg/L	20	22	18
S4	PFHxS	0.049	µg/L	20	22	17
S4	PFNA	0.073	µg/L	20	22	12
S4	PFOA	0.036	µg/L	20	22	14
S4	PFOS	0.064	µg/L	20	22	17
S4	PFOSA	0.056	µg/L	20	22	19
S4	PFPeA	0.039	µg/L	20	22	15
S5	EtFOSE	7.4	µg/kg	20	22	26
S5	6:2 FTS	4.51	µg/kg	20	22	25
S5	8:2 FTS	7.68	µg/kg	20	22	20
S5	MeFOSA	10.7	µg/kg	20	22	23
S5	PFBA	7.74	µg/kg	20	22	13
S5	PFBS	3.54	µg/kg	20	22	16
S5	PFDA	4.4	µg/kg	20	22	19
S5	PFHpA	13.6	µg/kg	20	22	17
S5	PFHxA	5.96	µg/kg	20	22	16
S5	PFHxS	4.7	µg/kg	20	22	17
S5	PFOA	13.2	µg/kg	20	22	17
S5	PFOS	3.26	µg/kg	20	22	18
S5	PFOSA	10.9	µg/kg	20	22	22
S5	PFPeA	4.58	µg/kg	20	22	16
S5	PFTeDA	2.32	µg/kg	20	22	27
S6	EtFOSE	4.3	µg/kg	20	22	27

Sample	Analyte	Assigned value	Unit	Target SD (as PCV, %)	Modified Horwitz CV (%)	Between laboratories' CV (%)
S6	6:2 FTS	4.18	µg/kg	20	22	20
S6	8:2 FTS	7.74	µg/kg	20	22	20
S6	MeFOSA	9.9	µg/kg	20	22	16
S6	PFBA	7.94	µg/kg	20	22	9.8
S6	PFBS	3.88	µg/kg	20	22	18
S6	PFDA	6.74	µg/kg	20	22	12
S6	PFHpA	8.34	µg/kg	20	22	26
S6	PFHxA	4.79	µg/kg	20	22	11
S6	PFHxS	6.82	µg/kg	20	22	23
S6	PFOA	9.69	µg/kg	20	22	15
S6	PFOS	26	µg/kg	20	22	17
S6	PFOSA	7.6	µg/kg	20	22	17
S6	PFPeA	4.15	µg/kg	20	22	19
S6	PFTeDA	3.27	µg/kg	20	22	27

Note: Shaded cells are between participant laboratories' CV which were higher than the target SD established by the study coordinator and the coefficient of variation from predictive mathematical model (modified Horwitz equation).

To account for possible bias in the consensus values due to laboratories using inefficient analytical/extraction techniques, z-scores were adjusted for PFOSA in Sample S4 and PFHxS and PFTeDA in Sample S6. For these analytes z-scores greater than 2 were set at 2.
A maximum acceptable concentration was set to two target standard deviations more than the spiked level. For results higher than the maximum acceptable concentration z-scores were not adjusted. This ensured that laboratories reporting results close to the spiked concentration were not penalised. z-Scores of less than 2 were left unaltered.

The dispersal of participants' z-scores is graphically presented in Figures 95-97 and by analyte in Figure 98.

Of the 1744 results for which z-scores were calculated, 1554 (89%) returned a satisfactory z-score of $|z| \leq 2$.

Eighteen laboratories analysed all three matrices. The total number of results for which z-scors were calculated and the number of satisfactory z and E_n-scores reported by each of these laboratories are presented in Figure 100. Laboratories **12** and **18** reported the highest number of results for which z-scores were calculated (83 out of 84). Laboratory **12** had the highest number of satisfactory z-scores 81 out of 83. All the results reported by laboratories **23** (80), **11** (76), **27** (72) and **16** (46) returned satisfactory z-scores.

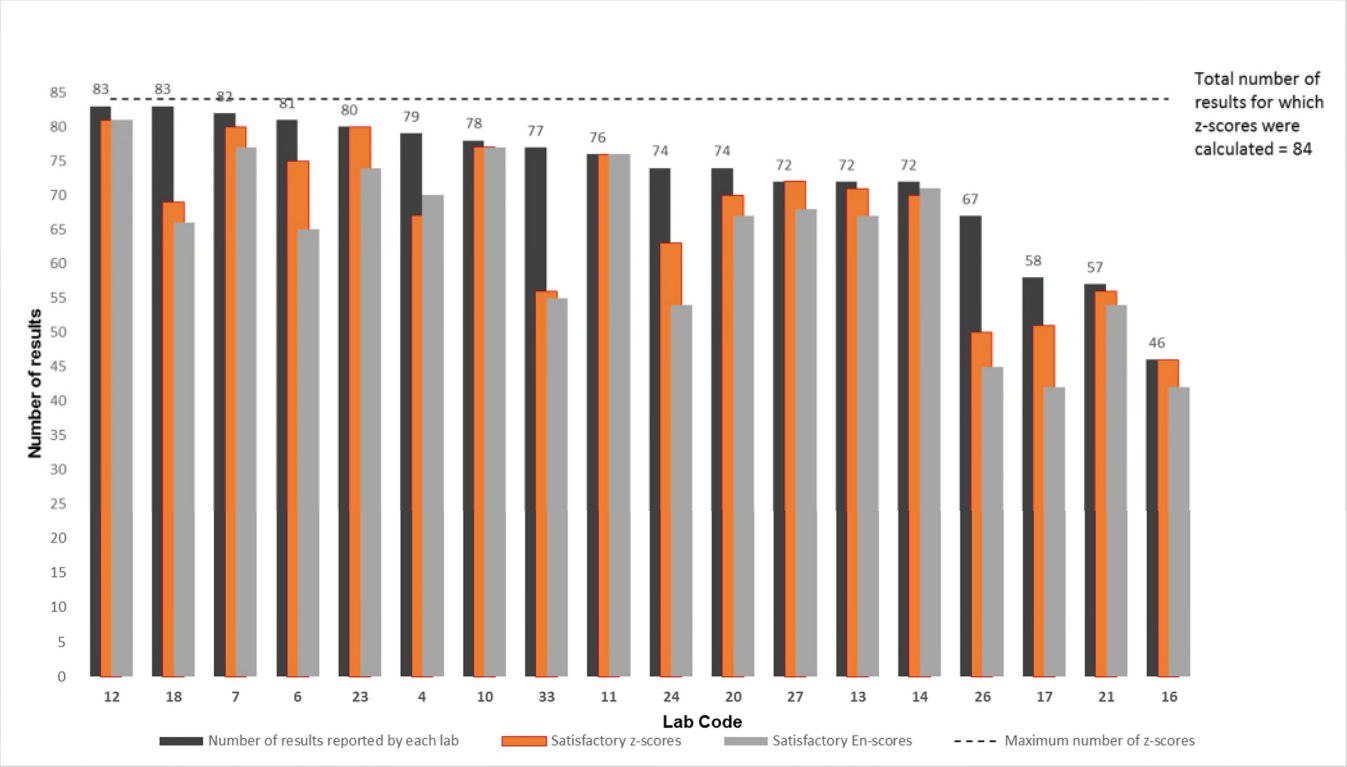


Figure 100 Total number of results for which z-scores were calculated and the numbers of satisfactory z and En-scores for laboratories that analysed all three matrices

Seven laboratories analysed two matrices, six laboratories reported results for soil and water and one laboratory for water and biota (Figure 101). Laboratories **3** (52) and **8** (50) returned satisfactory z-scores for all analytes tested for which z-scores were calculated. Laboratory **9** reported only two analytes (PFOS and PFOA) for each sample and returned satisfactory z-scores for all results (8).

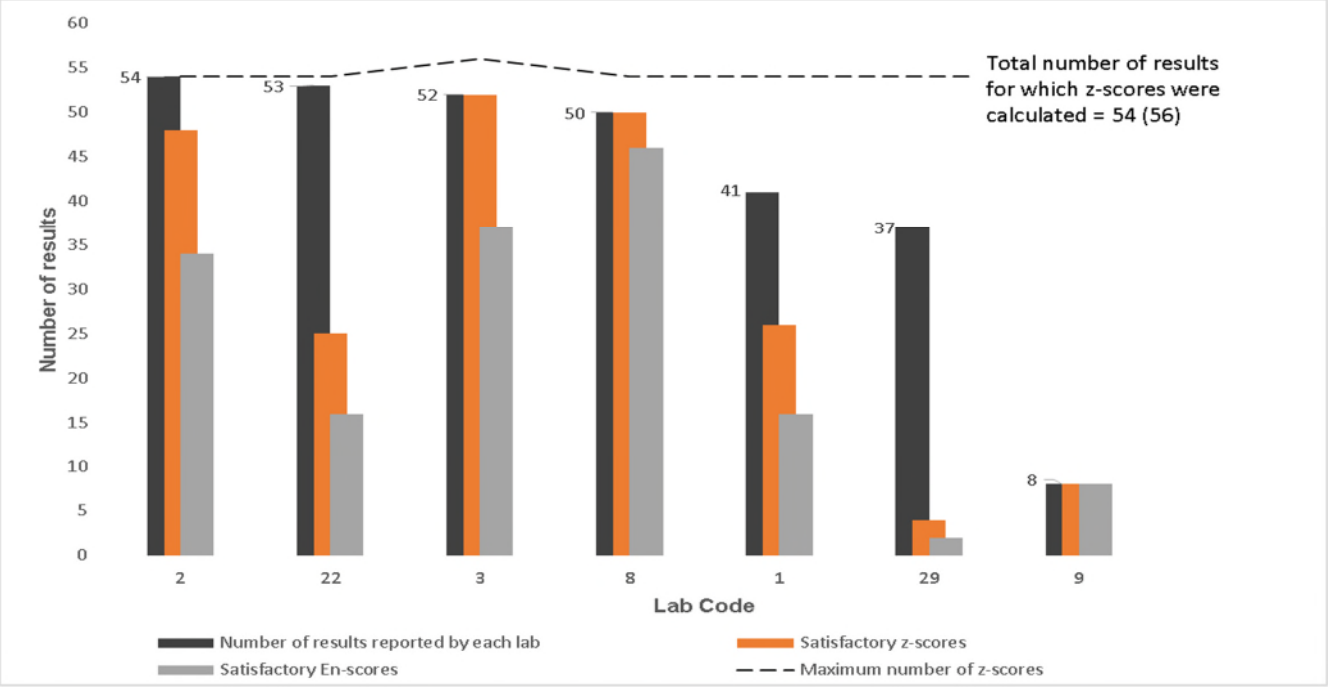


Figure 101 Total number of results for which z-scores were calculated and the numbers of satisfactory z and E_n-scores for laboratories that analysed two matrices

Six laboratories analysed one matrix only, four laboratories reported results for water samples one for soil and one for biota (Figure 102). Laboratories **31** (24) and **15** (22) returned satisfactory z-scores for all analytes tested and for which z-scores were calculated.

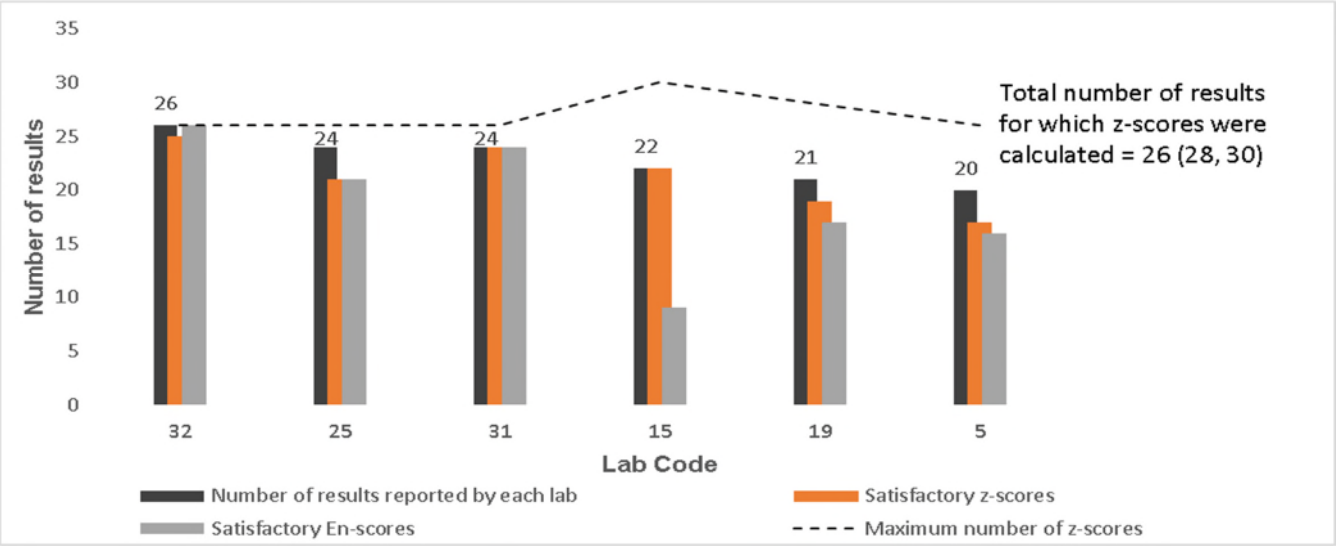
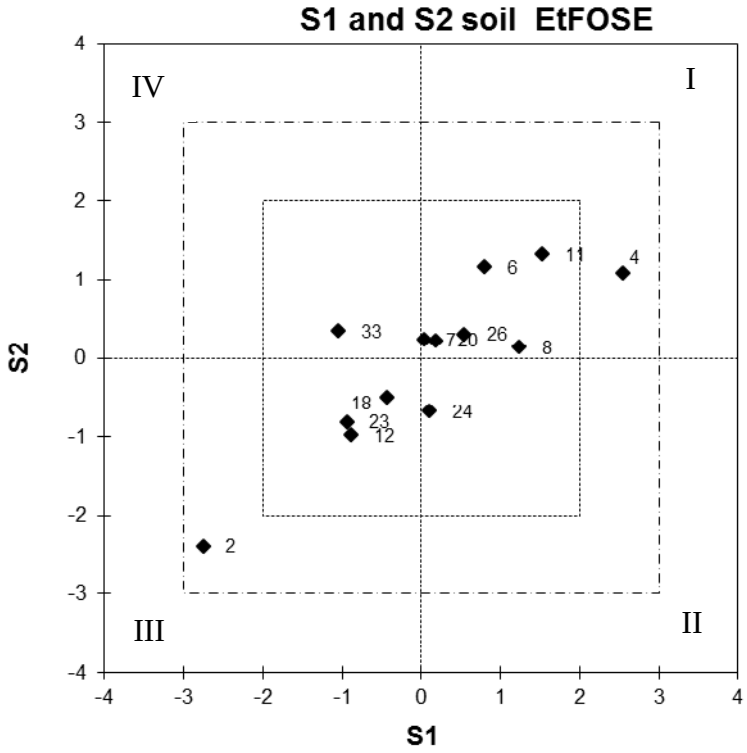


Figure 102 Total number of results for which z-scores were calculated and the numbers of satisfactory z and E_n-scores for laboratories that analysed one matrix

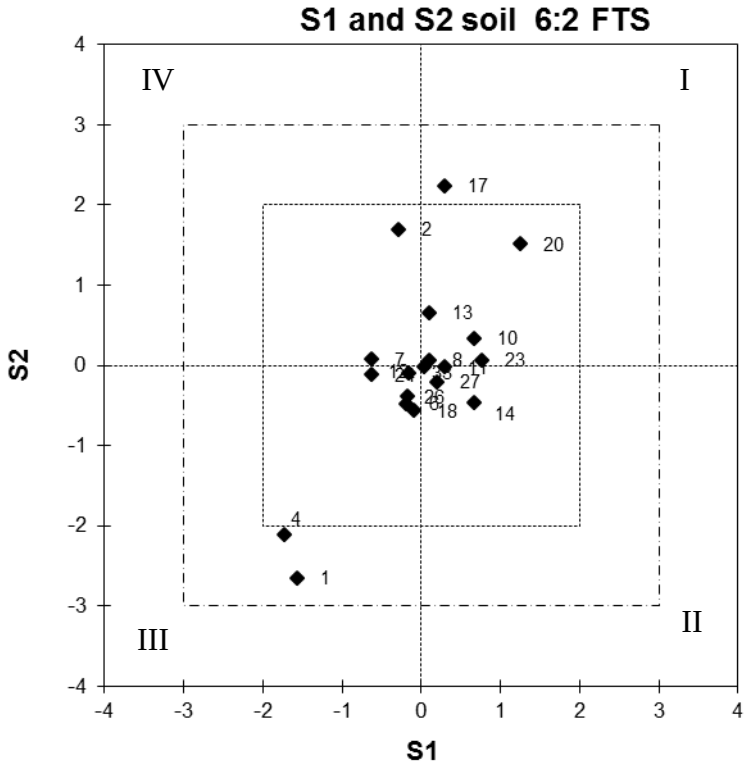
6.4 z-Score Scatter Plots

Scatter plots of z-scores for all analytes are presented in Figures 103-139. Scores are predominantly plotted in quadrants I and III, indicating laboratory bias is the major contributor to the variability of results.



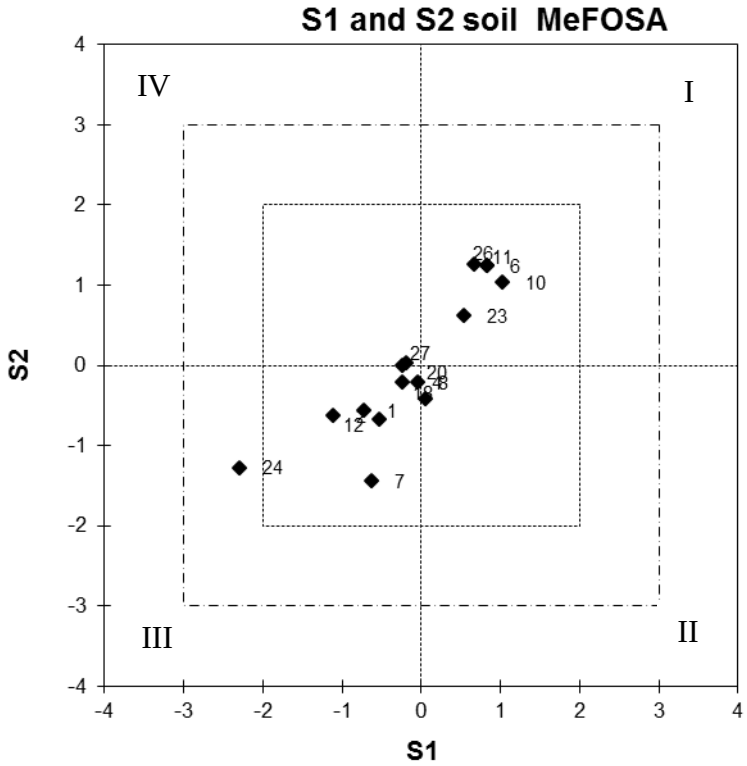
Laboratories 1, 22 are offscale.

Figure 103 Soil z-score scatter plot EtFOSE



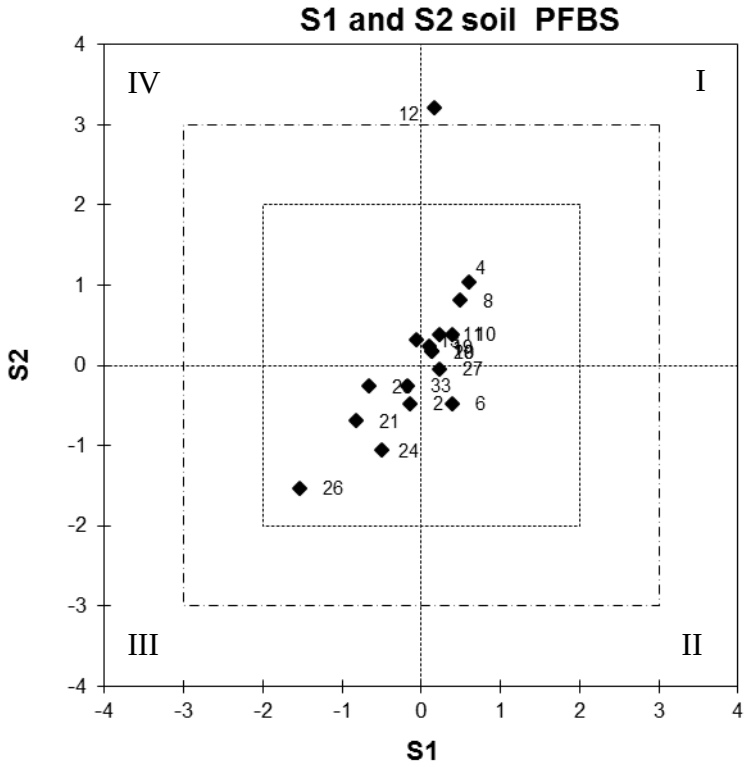
Laboratory 22 is offscale.

Figure 104 Soil z-score scatter plot 6:2 FTS



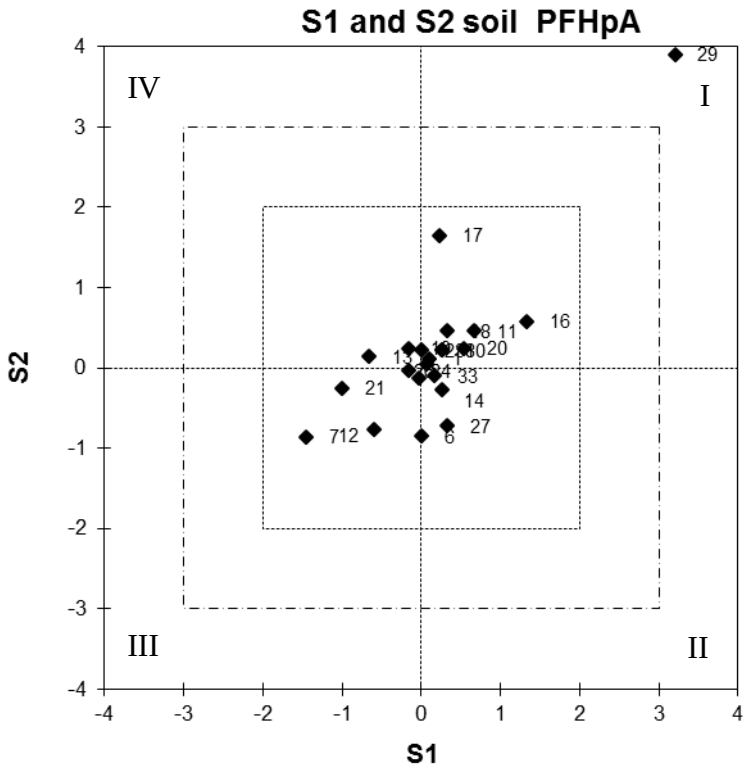
Laboratory 22 is offscale.

Figure 105 Soil z-score scatter plot MeFOSA



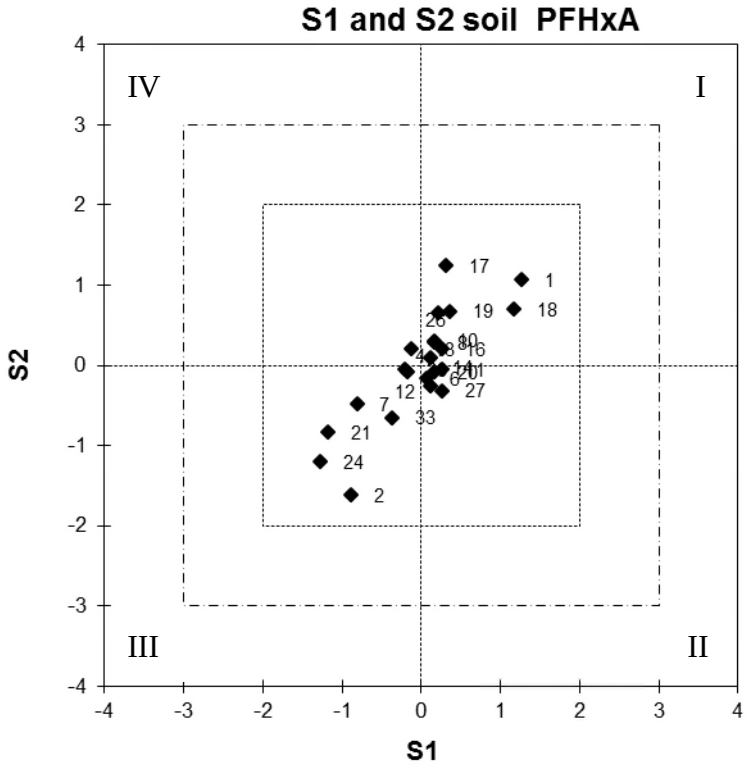
Laboratories 1, 7, 17, 22 and 29 are offscale.

Figure 106 Soil z-score scatter plot PFBS



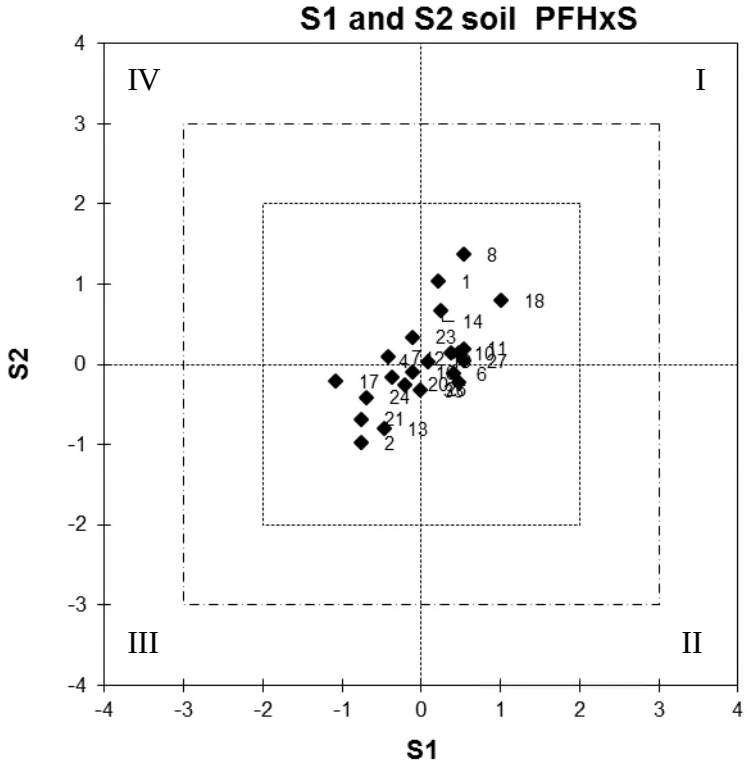
Laboratories 2 and 22 are offscale.

Figure 107 Soil z-score scatter plot PFHpA



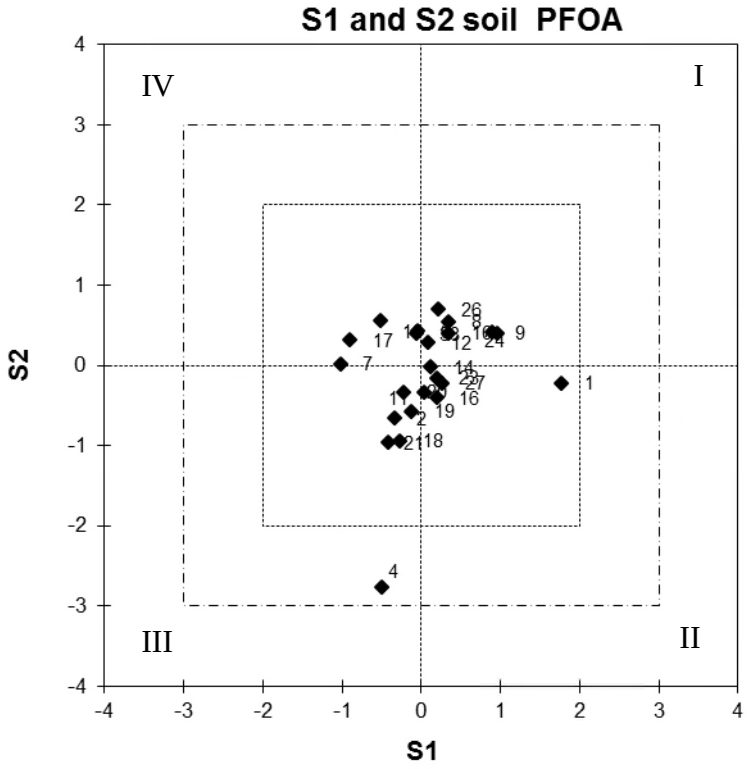
Laboratories 22 and 29 are offscale.

Figure 108 Soil z-score scatter plot PFHxA



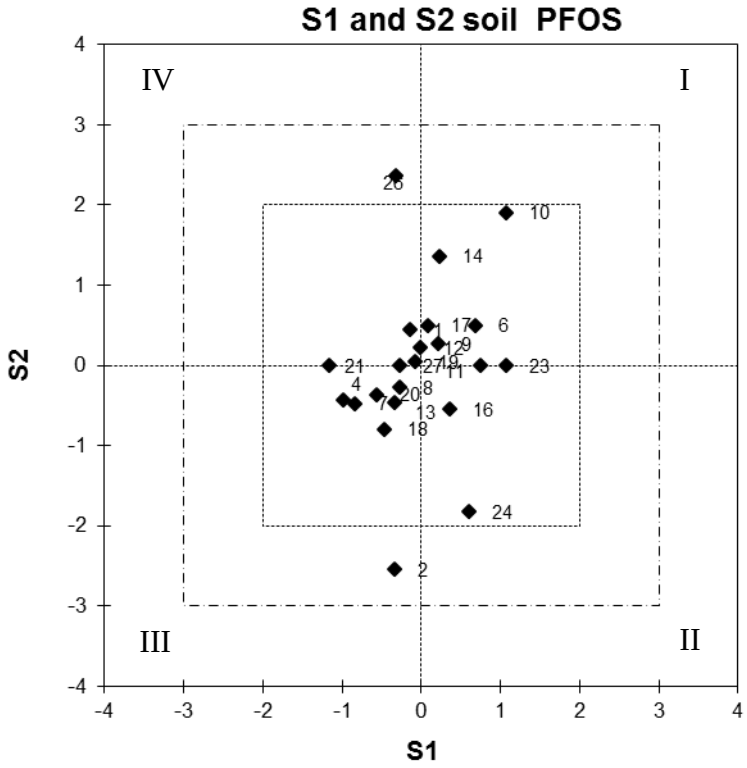
Laboratories 22 and 29 are offscale.

Figure 109 Soil z-score scatter plot PFHxS



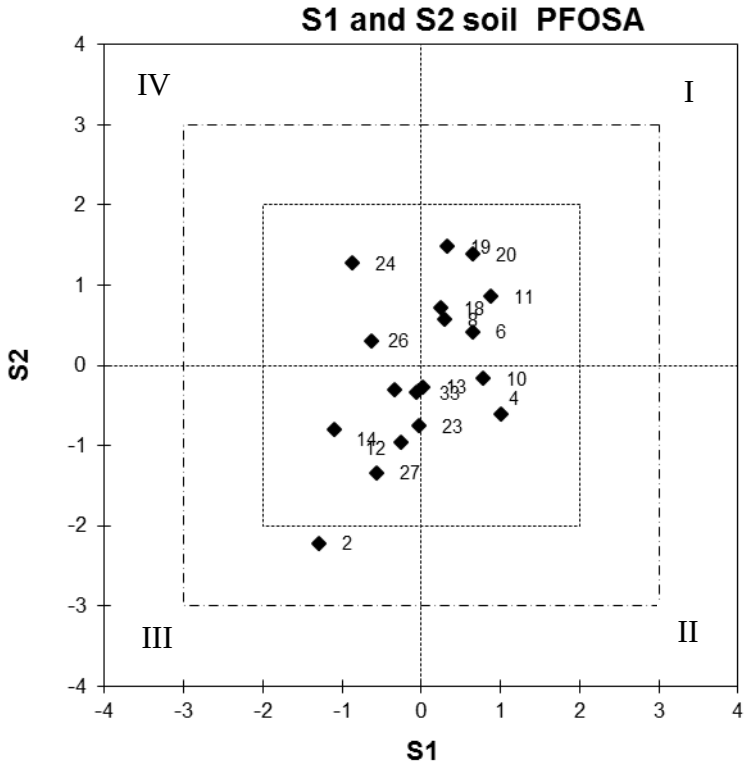
Laboratories 22 and 29 are offscale.

Figure 110 Soil z-score scatter plot PFOA



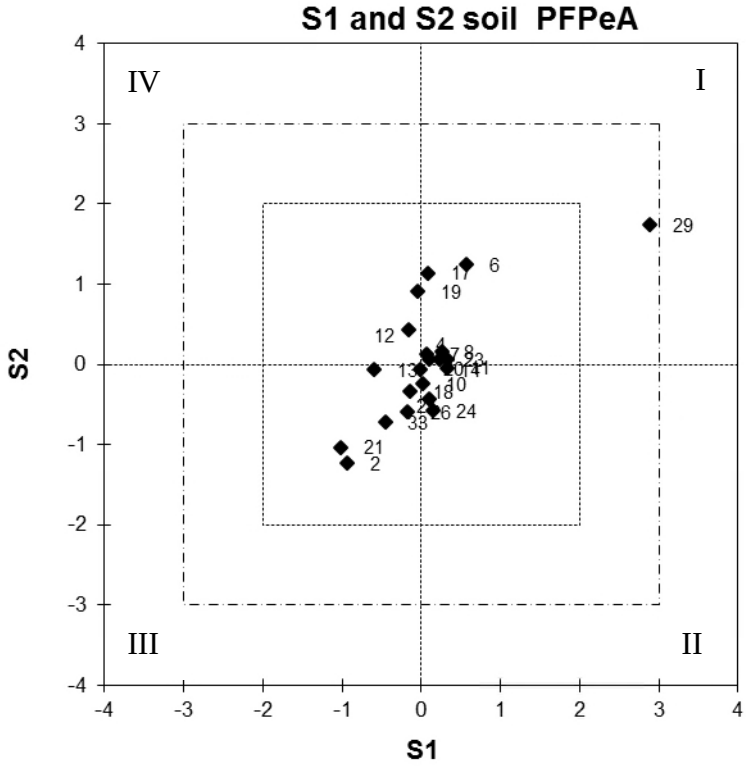
Laboratory 29 are offscale.

Figure 111 Soil z-score scatter plot PFOS



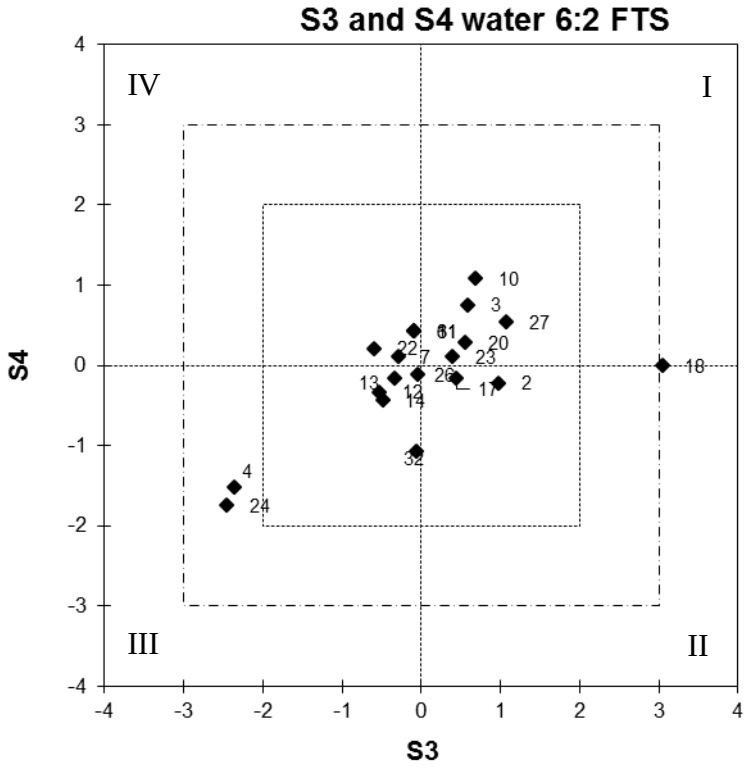
Laboratories 1 and 22 are offscale.

Figure 112 Soil z-score scatter plot PFOSA



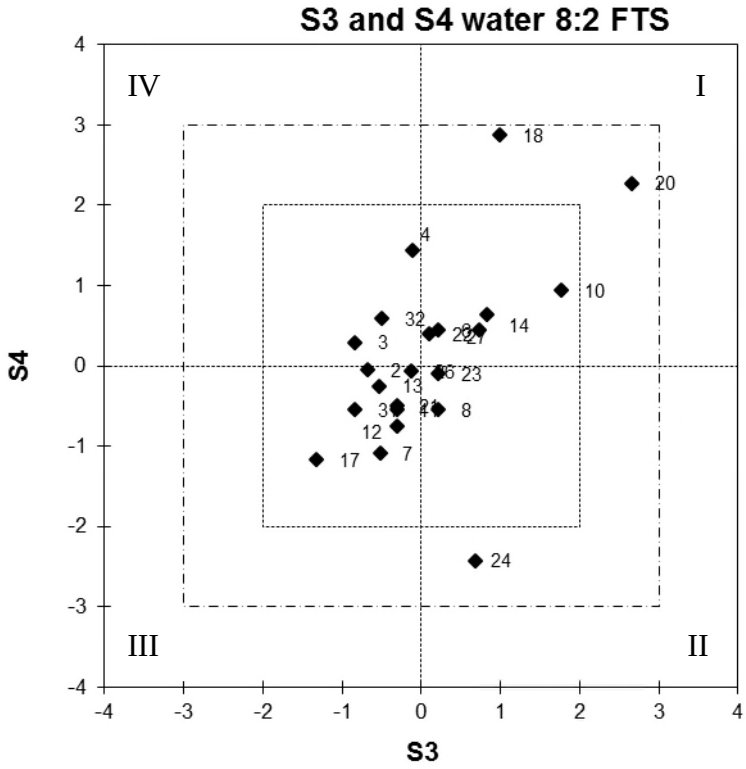
Laboratories 1 and 22 are offscale.

Figure 113 Soil z-score scatter plot PFPeA



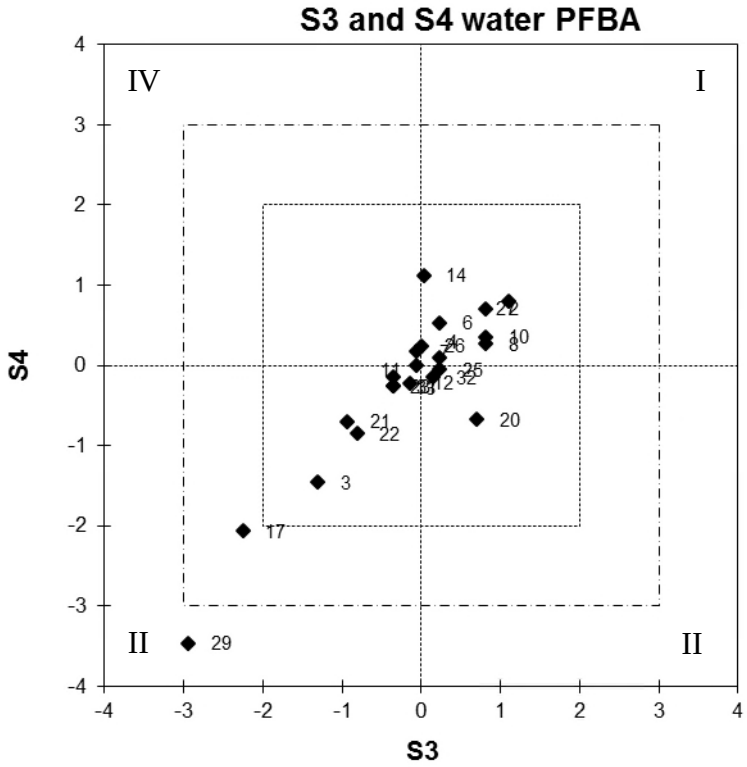
Laboratory 25 is offscale.

Figure 114 Water z-score scatter plot 6:2 FTS



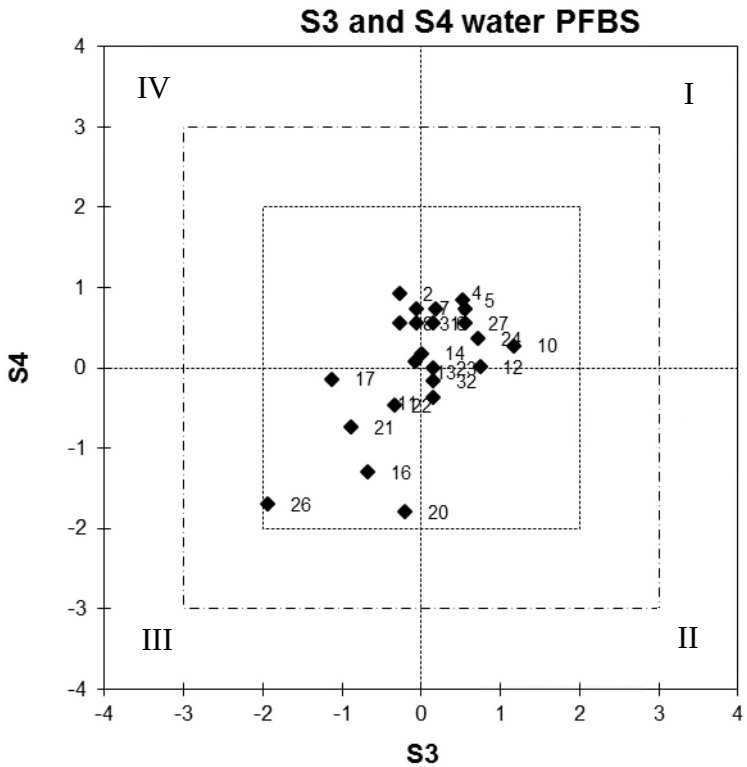
Laboratory 25 is offscale.

Figure 115 Water z-score scatter plot 8:2 FTS



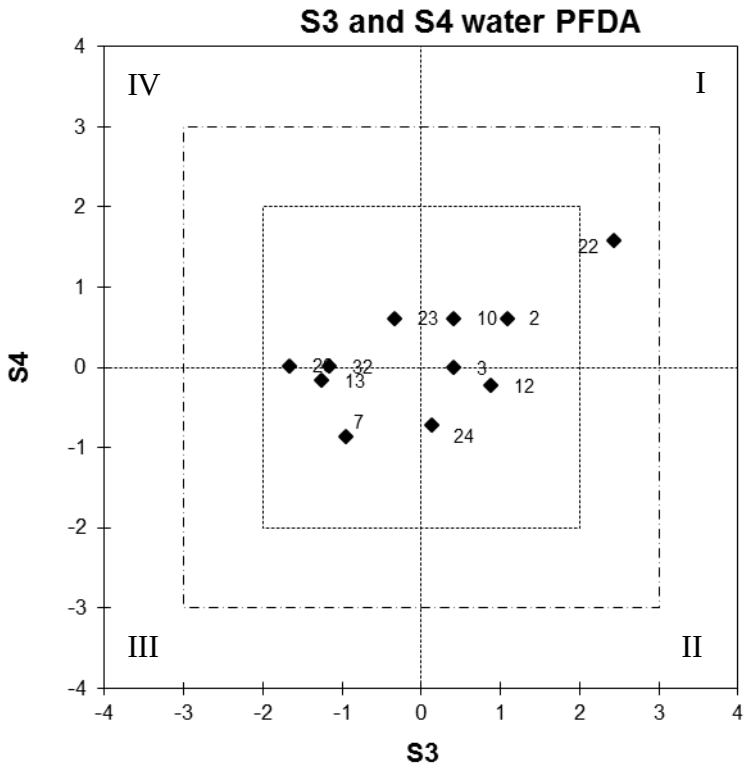
Laboratories 5, 18 and 33 are offscale.

Figure 116 Water z-score scatter plot PFBA



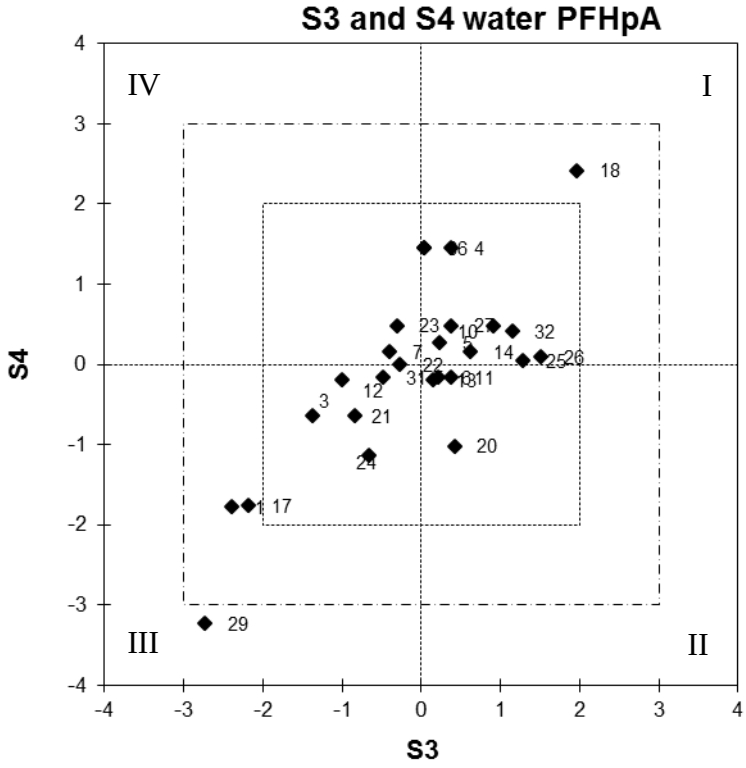
Laboratories 18, 25, 29 and 33 are offscale.

Figure 117 Water z-score scatter plot PFBS



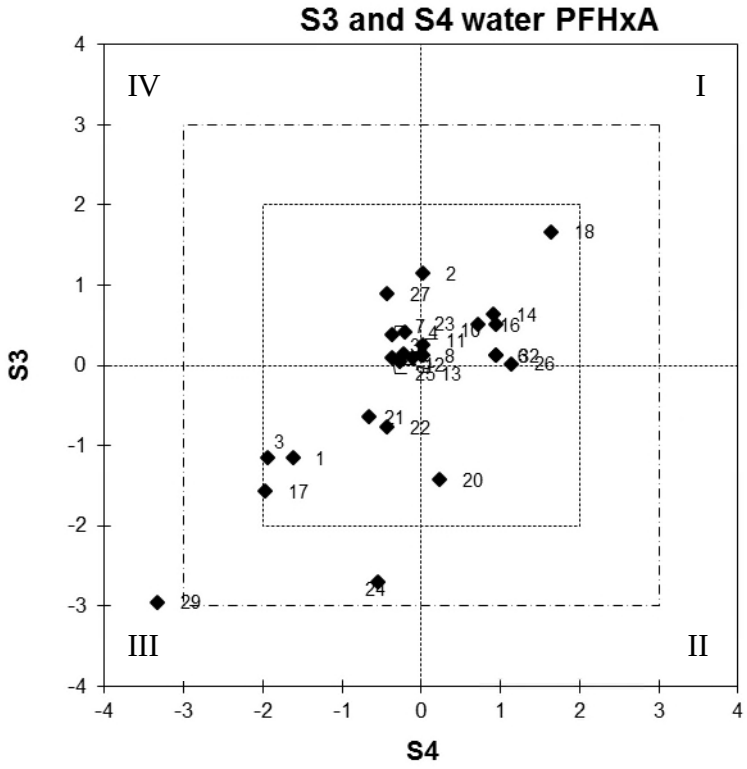
Laboratory 18 is offscale.

Figure 118 Water z-score scatter plot PFDA



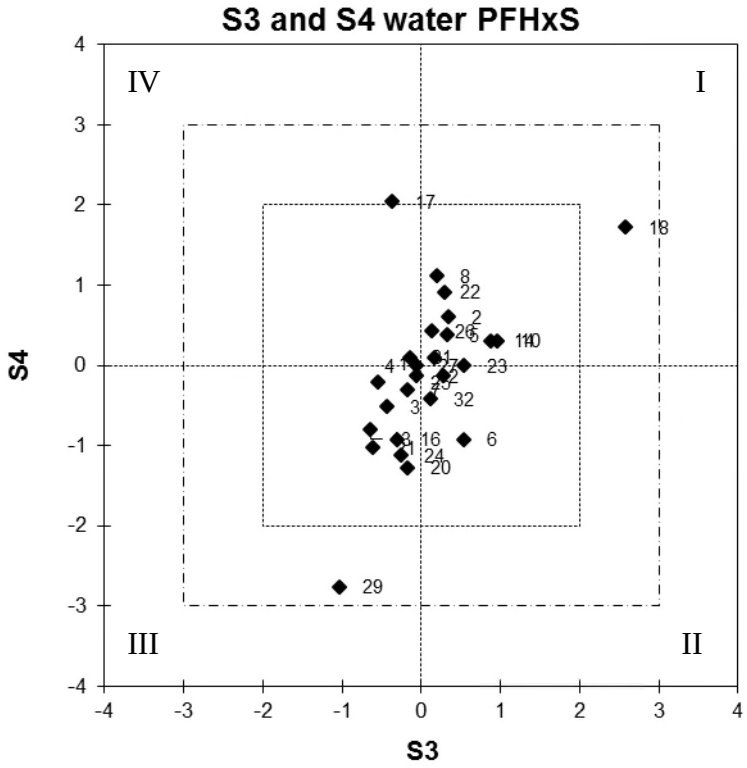
Laboratories 2 and 33 are offscale.

Figure 119 Water z-score scatter plot PFHpA



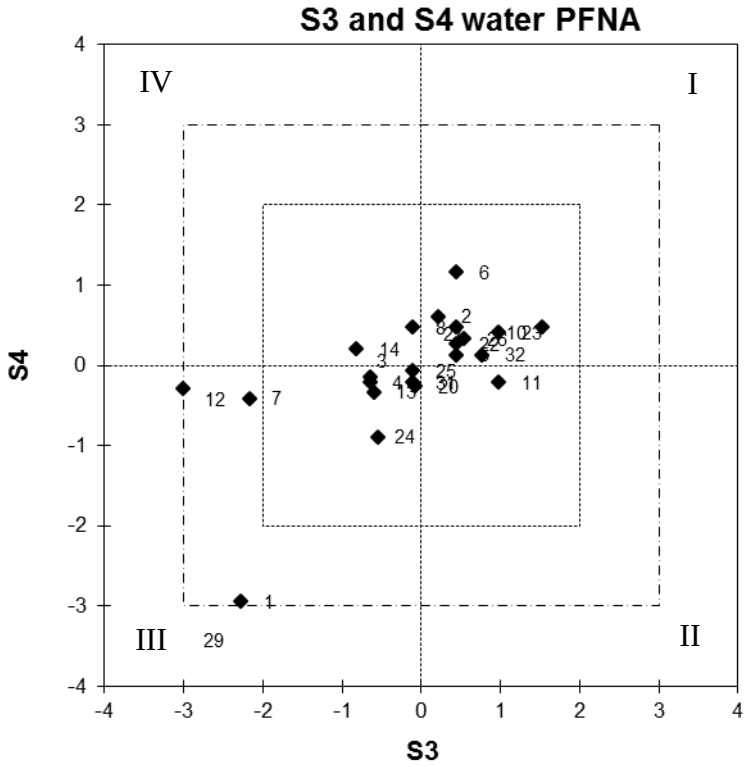
Laboratory 33 is offscale.

Figure 120 Water z-score scatter plot PFHxA



Laboratory 33 is offscale.

Figure 121 Water z-score scatter plot PFHxS



Laboratories 18 and 33 are offscale.

Figure 122 Water z-score scatter plot PFNA

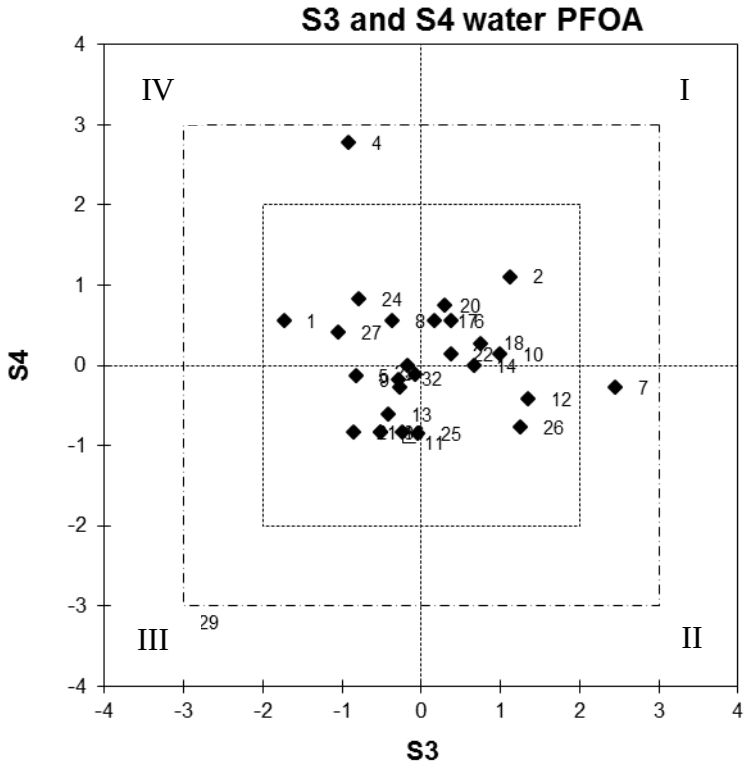
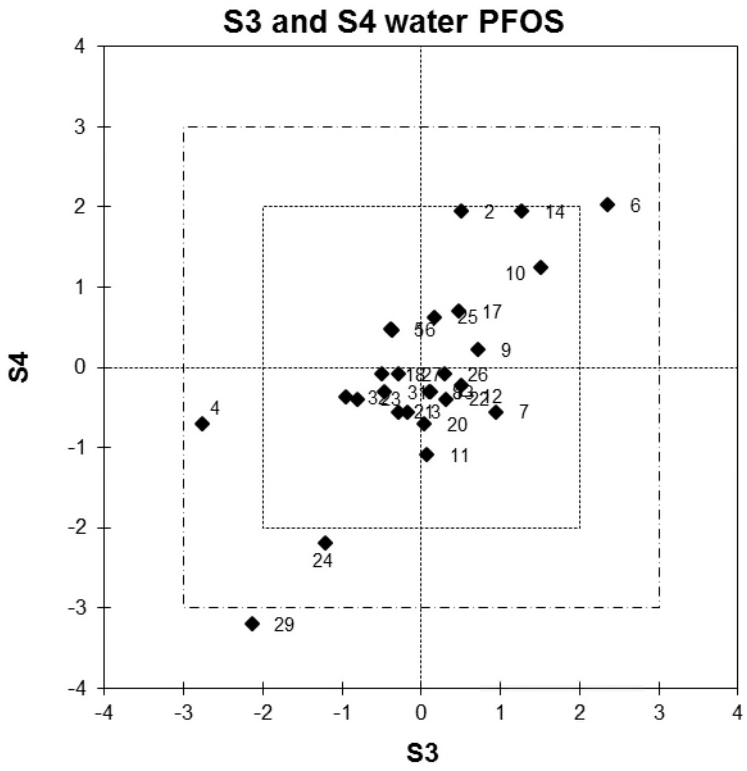
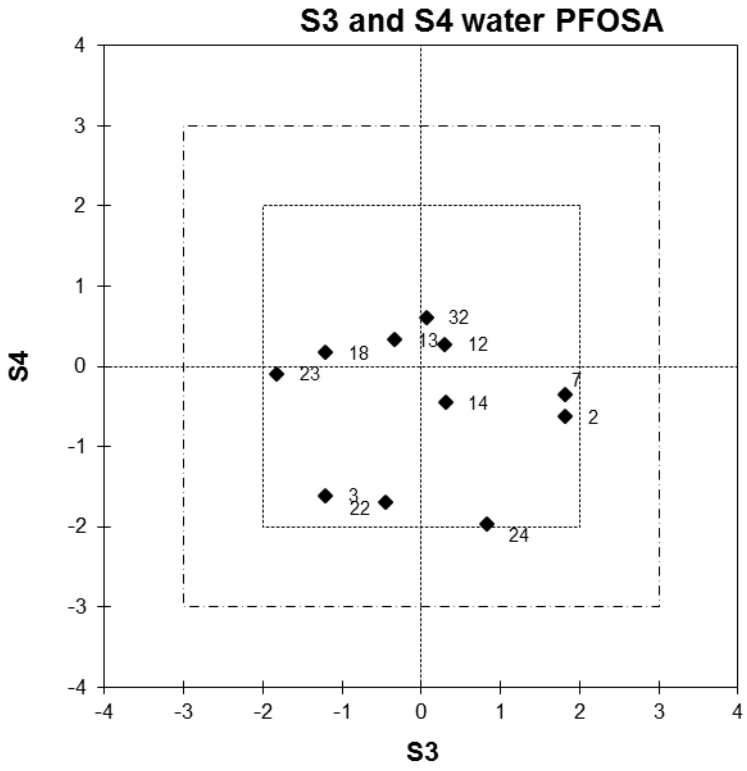


Figure 123 Water z-score scatter plot PFOA



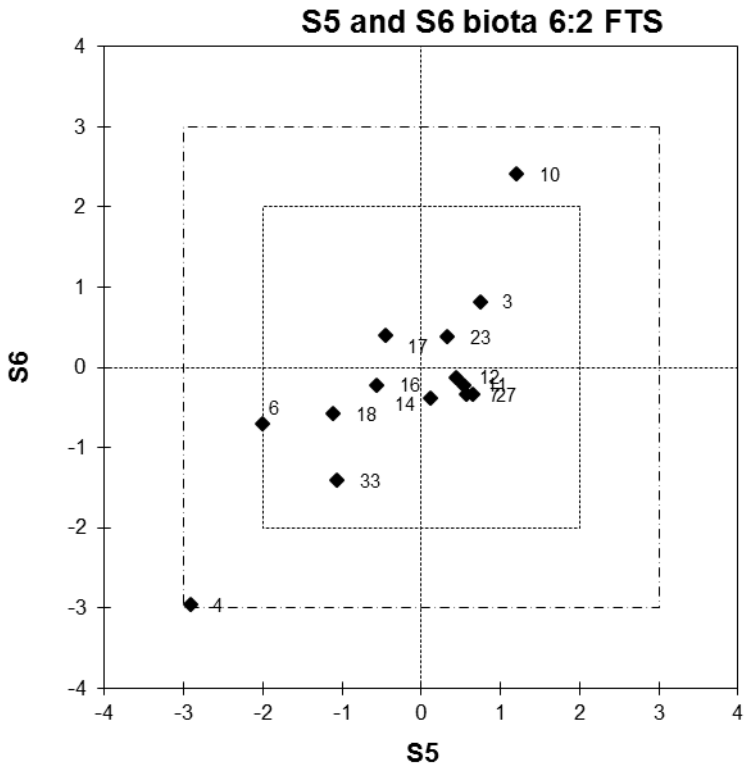
Laboratory 33 is offscale.

Figure 124 Water z-score scatter plot PFOS



Laboratory 20 is offscale.

Figure 125 Water z-score scatter plot PFOSA



Laboratory 13 is offscale.

Figure 126 Biota z-score scatter plot 6:2 FTS

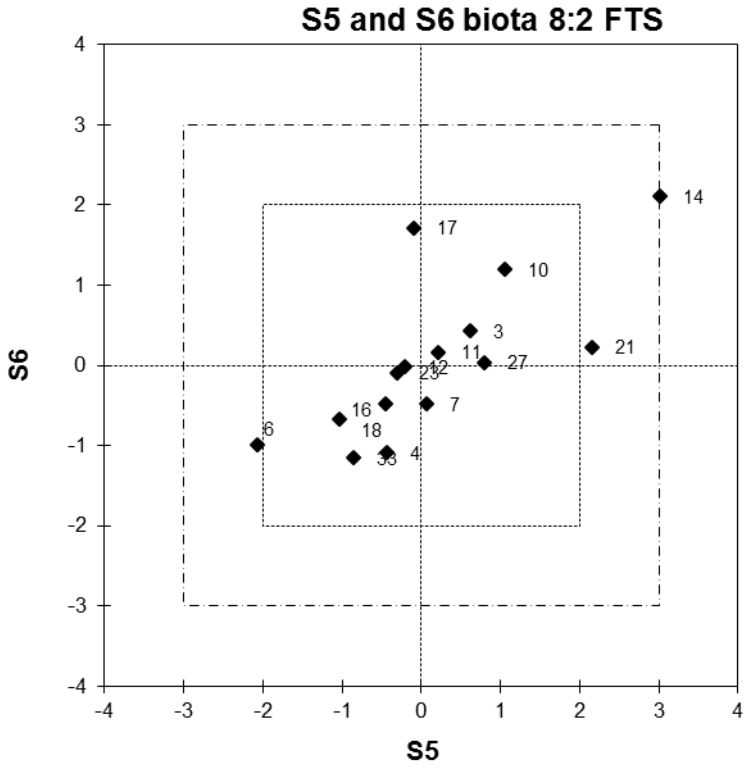


Figure 127 Biota z-score scatter plot 8:2 FTS

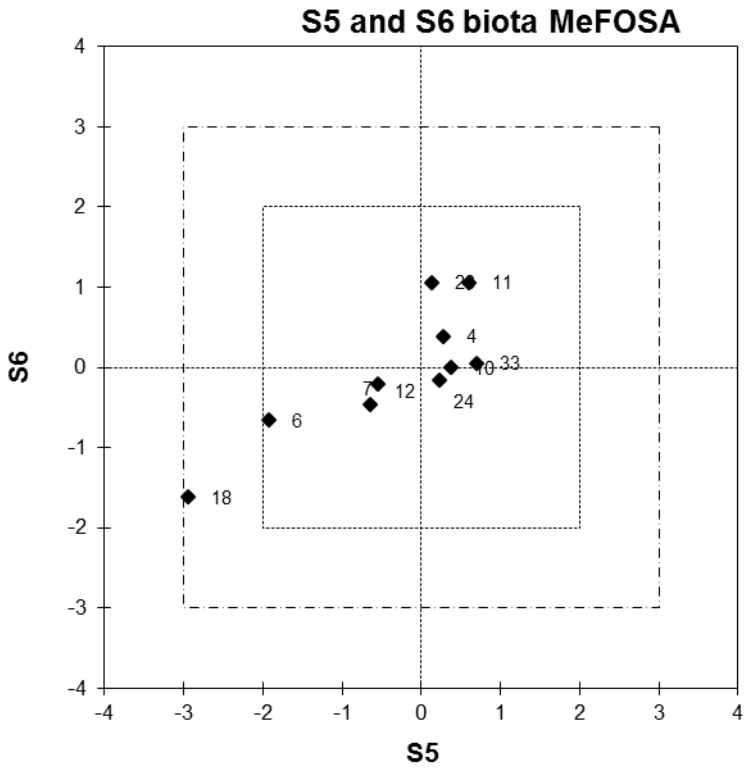


Figure 128 Biota z-score scatter plot MeFOSA

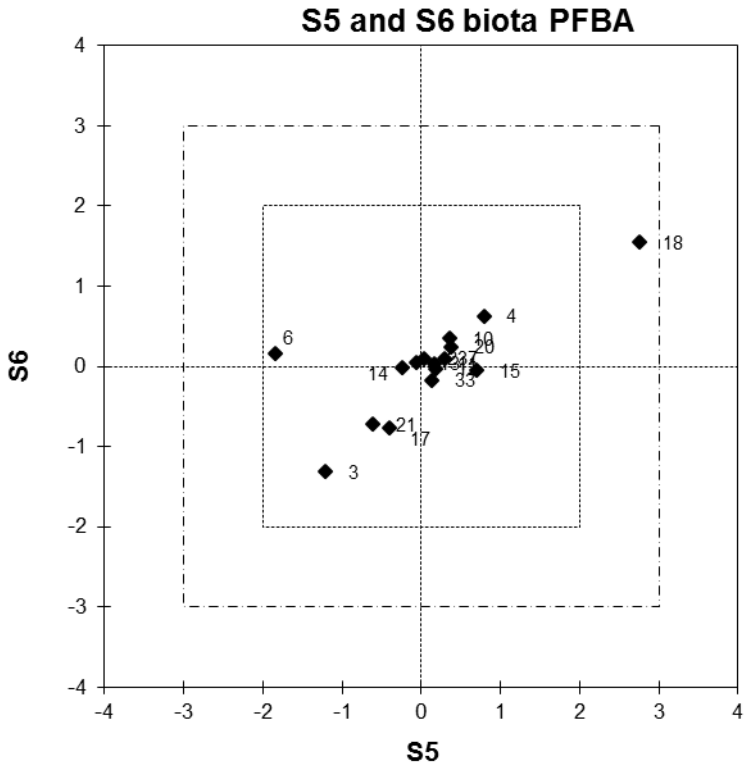
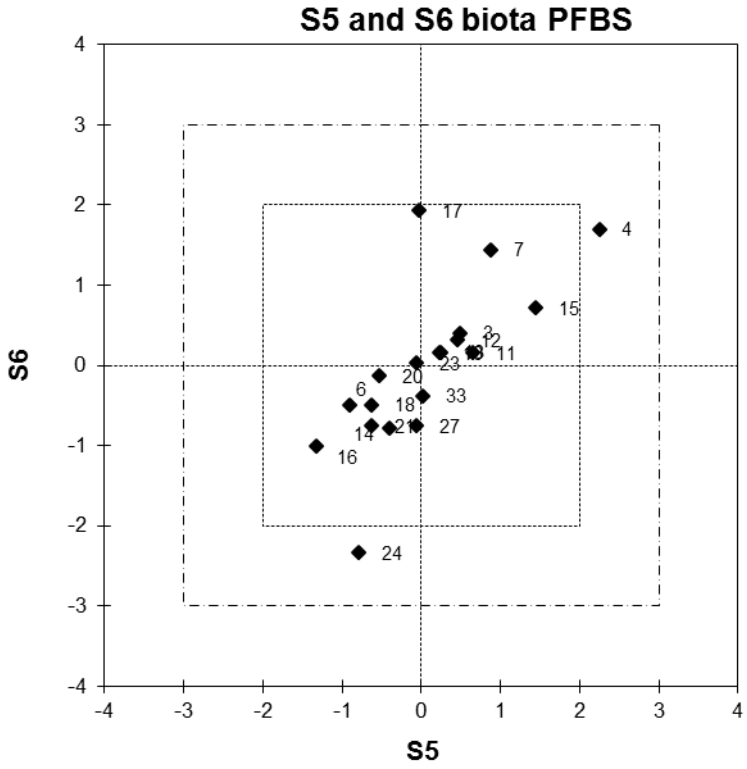
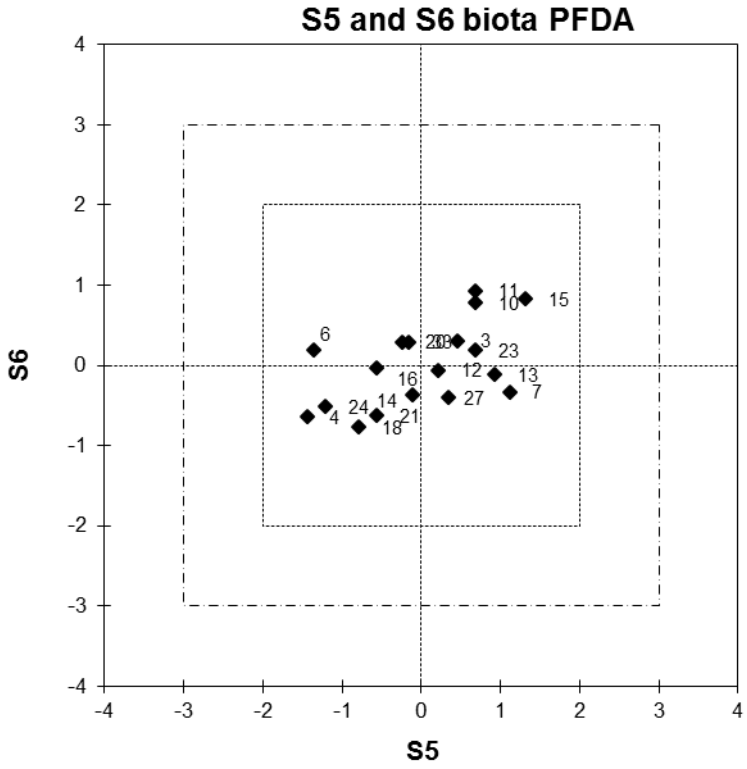


Figure 129 Biota z-score scatter plot PFBA



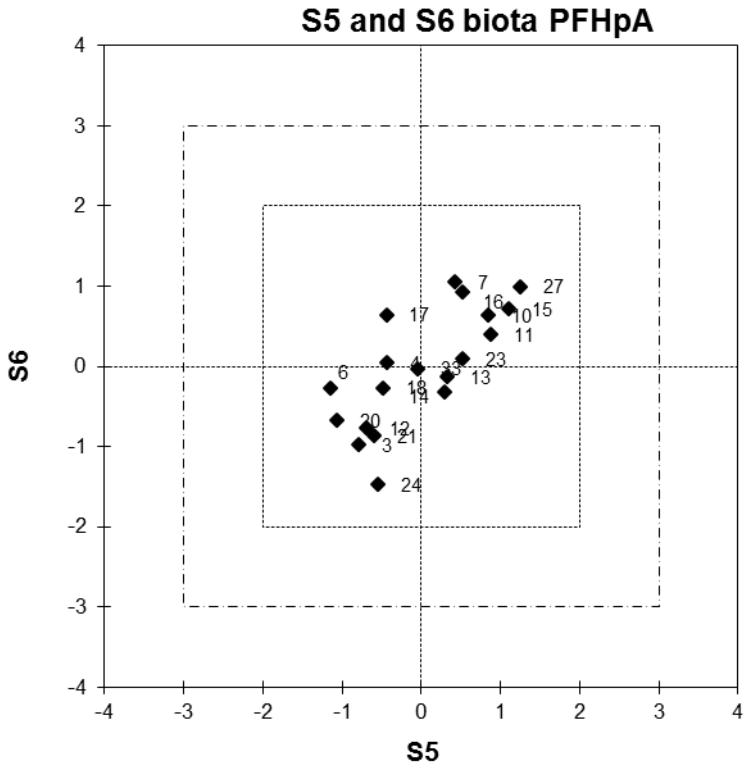
Laboratory 26 is offscale.

Figure 130 Biota z-score scatter plot PFBS



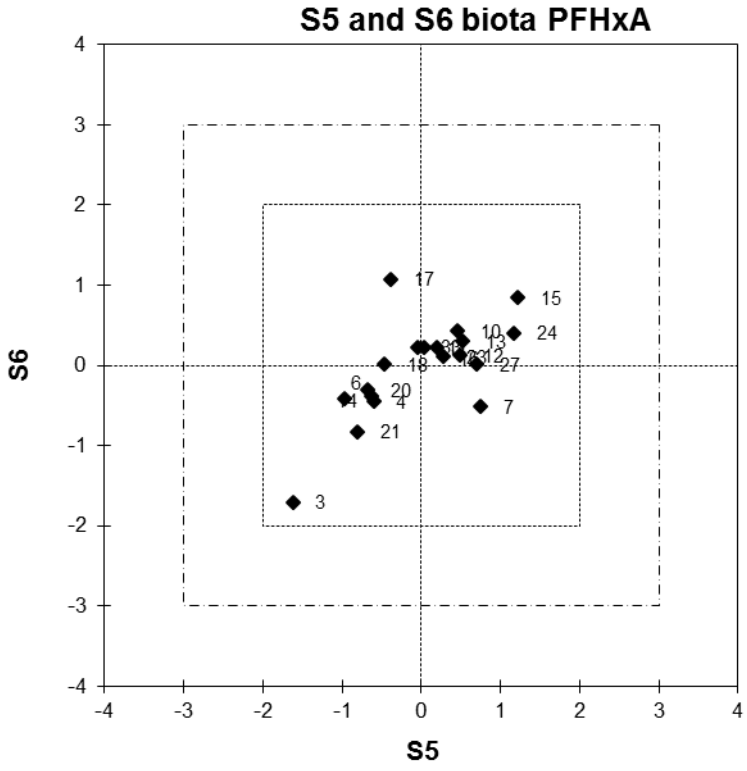
Laboratory 26 is offscale.

Figure 131 Biota z-score scatter plot PFDA



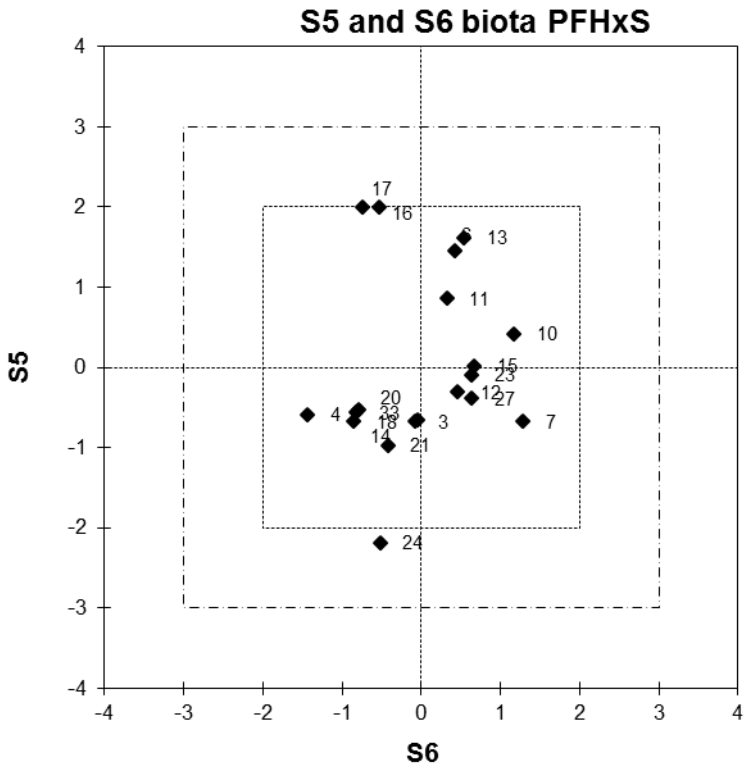
Laboratory 26 is offscale.

Figure 132 Biota z-score scatter plot PFHpA



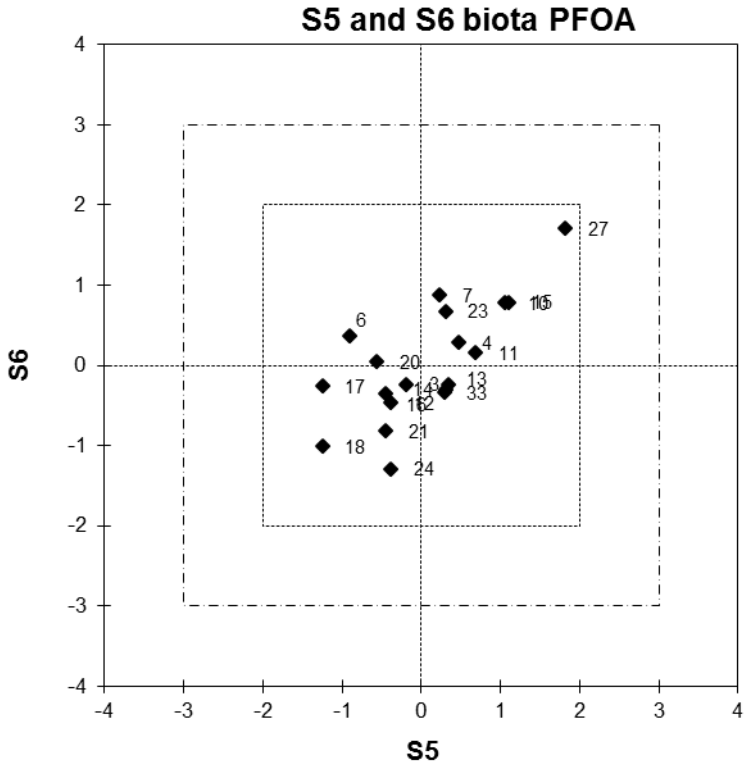
Laboratory 26 is offscale.

Figure 133 Biota z-score scatter plot PFHxA



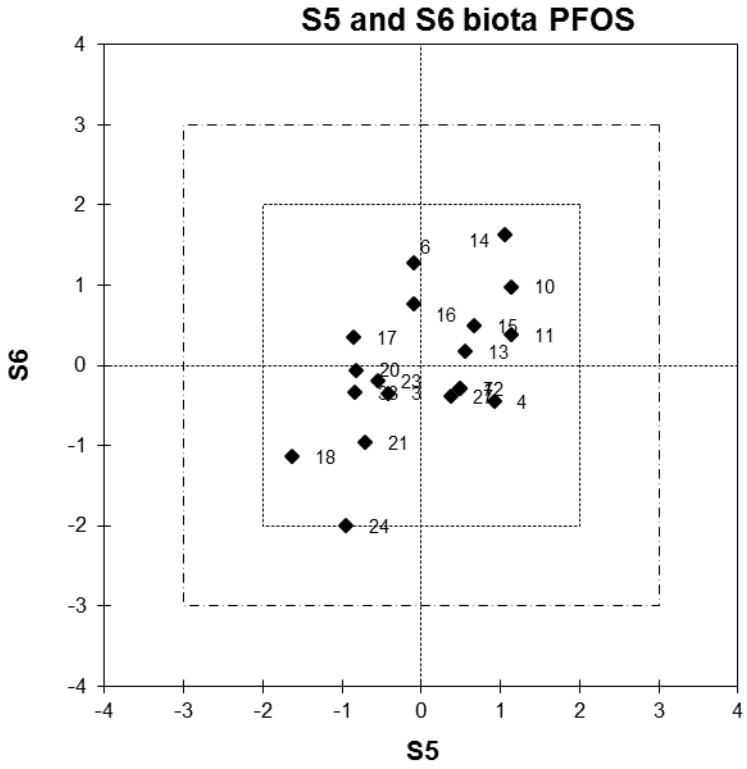
Laboratory 26 is offscale.

Figure 134 Biota z-score scatter plot PFHxS



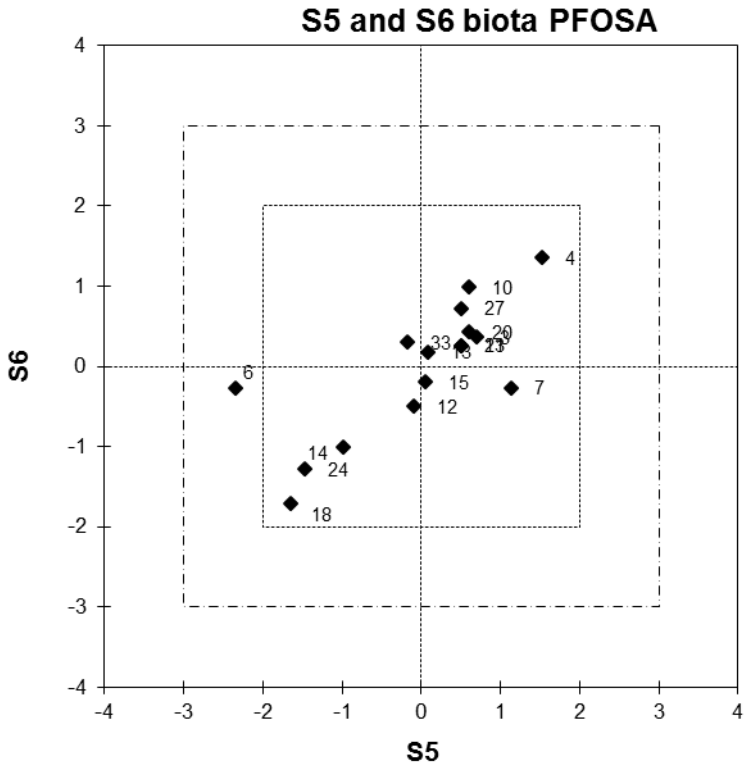
Laboratory 26 is offscale.

Figure 135 Biota z-score scatter plot PFOA



Laboratory 26 is offscale.

Figure 136 Biota z-score scatter plot PFOS



Laboratory 26 is offscale.

Figure 137 Biota z-score scatter plot PFOSA

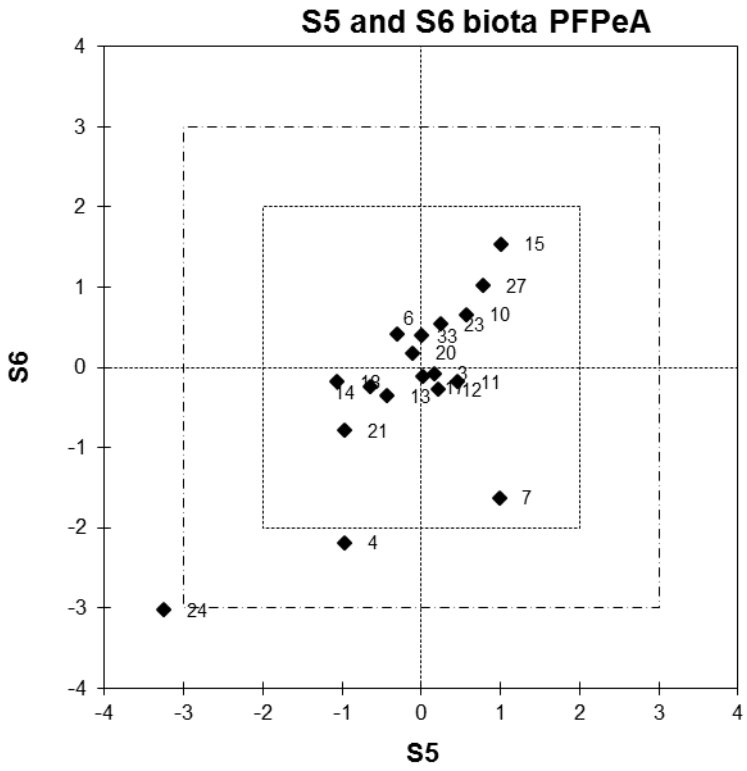
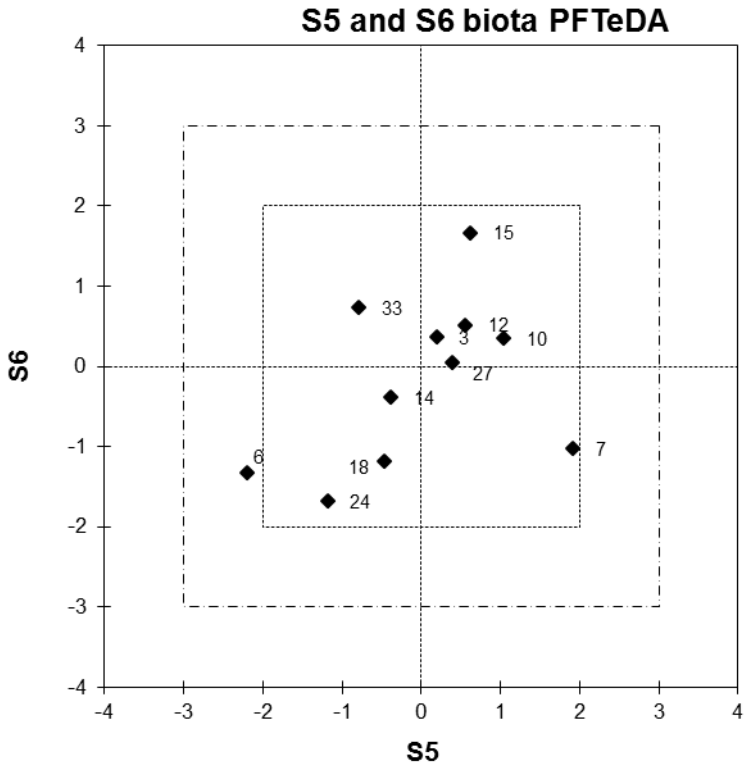


Figure 138 Biota z-score scatter plot PFPeA



Laboratory 4 is offscale.

Figure 139 Biota z-score scatter plot PFTeDA

6.5 E_n-Score

Where a laboratory did not report an uncertainty estimate, an uncertainty of zero (0) was used to calculate the E_n-score.

Of one thousand seven hundred and forty-four E_n-scores, 1425 (82%) were satisfactory with $|E_n| \leq 1$. The dispersal of participants' E_n-scores is presented in Figure 99.

Laboratory 12 had the highest number of satisfactory En-scores (81 out of 83).

From the laboratories that analysed all three matrices, only laboratory **11** (76) returned satisfactory E_n-scores for all results reported (Figure 100).

Laboratories 9, 31 and 32 returned satisfactory E_n-score for all analytes for which they tested and for which E_n-scores were calculated (Figures 101-103).

6.6 Participants' Methods

Participants were requested to analyse the samples using their normal test method and to report a single result as they would normally report to a client. Results reported in this way reflect the true variability of results reported to clients. The method descriptions provided by participants are presented in Tables 2 to 7. The study coordinator thanks all laboratories that completed the method questionnaire. A summary is presented below.

Soil samples

Pre-treatment: cooling (1), homogenization (3) and acidification (2).
Extraction technique: sonication (4), solvent extraction (6) liquid-liquid extraction with ion pairing (2), solid phase extraction (4), solid-liquid extraction (3), mechanical agitation (1), soxhlet (1) and alkaline extraction/digestion (3).
Clean-up: SPE (9), carbon (5), centrifugation (3) and filtration (1).
Extraction solvent: methanol/base eg. KOH, NH_4OH, NH_3, NaOH (9), methanol/other e.g. acetic acid, water (2), methanol (6), acetonitrile/other e.g. methanol, water (2), acetonitrile only (1) and MTBE (2).

Water samples

Pre-treatment: pH adjustment (7), sonication (2) and dilution (1).
Extraction technique: direct injection (9), filtration (1) and SPE (19), sonication (1).
Extraction solvents: methanol (10) and methanol/base e.g. NH_3, NH_4OH (6).

Fish/Prawn samples

Pre-treatment: freezing (2), alkalinisation/pH adjustment (2) and homogenisation (3).
Extraction: sonication (2), liquid-liquid (2), SPE (2), SLE (2), QuEChERS (3), alkaline digestion/extraction (4) and mechanical agitation (1).
Clean-up: SPE (11), filtration (2), centrifugation (3), QuEChERS (1) and activated carbon (5).
Extraction solvent: acetonitrile (5), acetonitrile/other (5), methanol (2) and methanol/other including methanol/ACN (6).

For all matrices the analytical detection method of choice was LC-MS. Three laboratories used LC Orbitrap and all the other participants used LC-MSMS (QQQ).

Eleven participants used corresponding mass-labelled internal standards (added before extraction) for every analyte. The other participants used an internal standard of one PFAS for the quantification of another PFAS. Two participants did not provide information. From the total number of 194 unsatisfactory z-scores, 70 (36%) were from participants that did not use the corresponding labelled internal standard. The highest number of unsatisfactory scores were for PFBS (11, 79% of unsatisfactory z-scores), and PFPeA (9, 82% of unsatisfactory z-scores).

Due to the limited amount of data and the variety of analytical methods used no significant trend with extraction and sample preparation was identified.

6.7 Effects of Sample Matrix

Samples S1 and S2 were soil, Samples S3 and S4 were water, Sample S5 was fish and Sample S6 was prawn. Incurred soil Sample S2 and both water Samples S3 and S4 had the largest number of analytes where z-scores could not be calculated due to the low level of some analytes (below the LOR of most participants). Incurred water and soil samples received the least number of percent satisfactory z-scores (Table 108).

Table 108 Satisfactory z-scores for each matrix

Sample		Expected number of z-scores	Actual number of z-scores (% of expected no of z-scores)	Satisfactory	% satisfactory
S1 Soil	Spiked	400	326 (82%)	294	90
S2 Soil	Incurred + 4 spiked analytes	375	264 (70%)	227	86
S3 Water	Incurred + 6 spiked analytes	464	313 (67%)	269	86
S4 Water	Spiked	464	342 (74%)	300	88
S5 Fish	Spiked	300	250 (83%)	229	92
S6 Prawn	Spiked	300	249 (83%)	230	92

Water was more challenging matrix for a number of analytes than soil and biota.

For **EtFOSE** and **MeFOSA** the spiked level in water Samples S3 and S4 was below 0.050 µg/L. Only 38% of the expected results have been reported compared to 92% in soil and 85% in biota. This could be due to the lower concentration levels which were close to the limit of reporting for many participants. Due to the small number of results reported, the performance of participants was not assessed. Normalised results against the spiked concentration showed a lower recovery for these analytes in water compared with soil and biota (see Figure 140).

PFOSA was spiked in soil sample S1, water S3, fish S5 and prawn S6. Normalised results against spiked concentration indicate a bias towards low results for PFOSA in water sample (see Figure 140). A possible reason was the adsorption of this analyte onto the walls of the container.[9, 10] In order to avoid adsorption, participants were instructed to **use** the entire contents of the bottle for analysis, but only 63% followed the instruction, with the remaining participants taking a sub-sample.

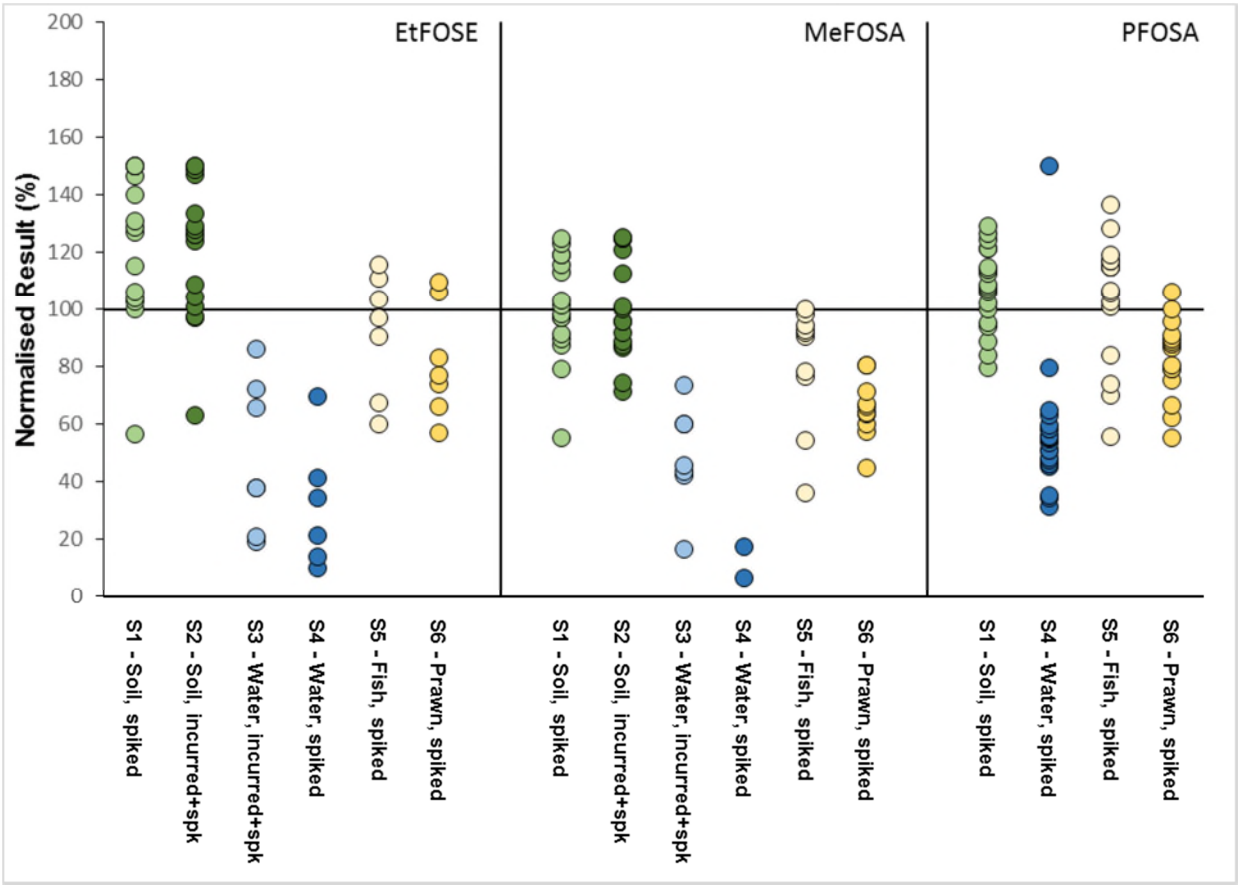
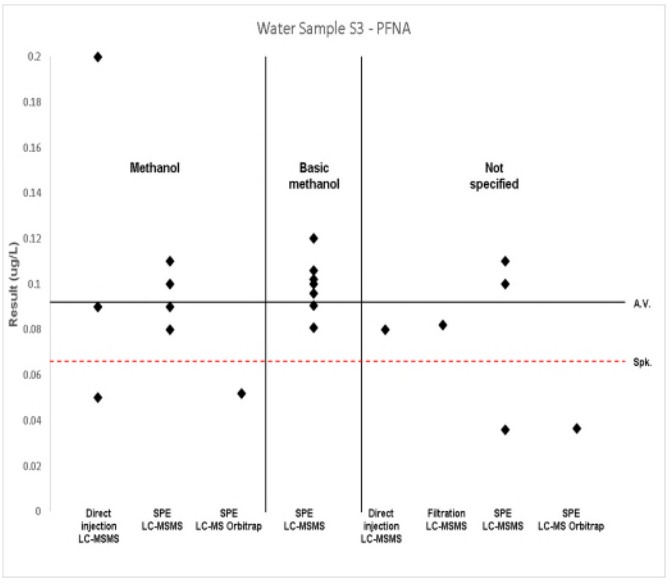


Figure 140 Normalised results vs spike level for EtFOSE, MeFOSA and PFOSA

PFNA was spiked at 0.065 µg/L in water Samples S3 and S4. The assigned value for Sample S3 was 0.092 µg/L, higher than the assigned value in Sample S4 (0.073 µg/L) – Figure 141. Higher content of PFOS (68 µg/L vs 0.065 µg/L) may be the reason for the enhancement of PFNA in Sample S3.



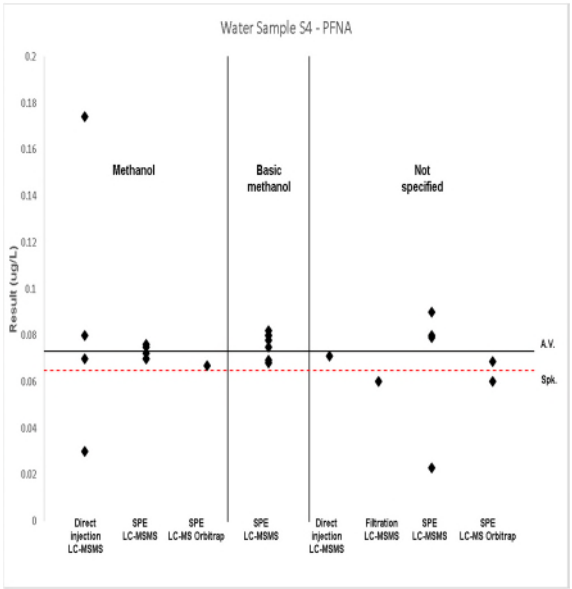


Figure 141 PFNA results vs solvent/technique used

PFTeDA recoveries in different matrices ranged from 42-86%, with the lowest recovery in water Sample S4. The recovery in prawn are also much lower (59%) than in the fish sample (77%). The losses may have occurred due to inefficient extraction and/or suppression of signal due to matrix effects during LC-MSMS analysis[9, 10] (Figure 142).

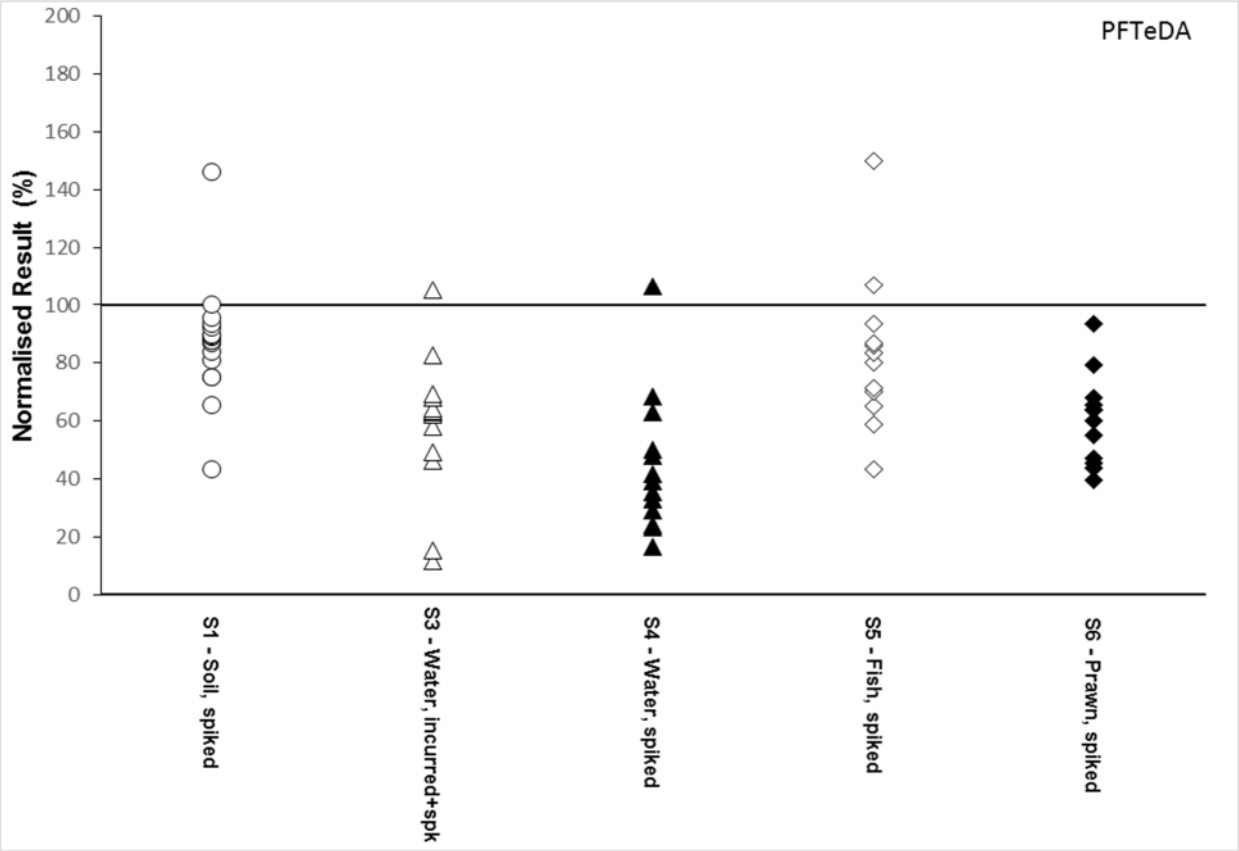


Figure 142 Normalised results vs spike level for PFTeDA

Prawn matrix was introduced for the first time in this PT study. A plot of results, expressed as a percentage of the spiked concentration, for Samples S5 fish and S6 prawn is presented in Figure 143. Both matrices were spiked with analytes of similar concentration except PFOS which was ten times higher in prawn samples. Fish samples had better agreement between the assigned value and the spiked concentration for all analytes except PFBA. This analyte was enhanced in fish, possibly due to matrix interference.

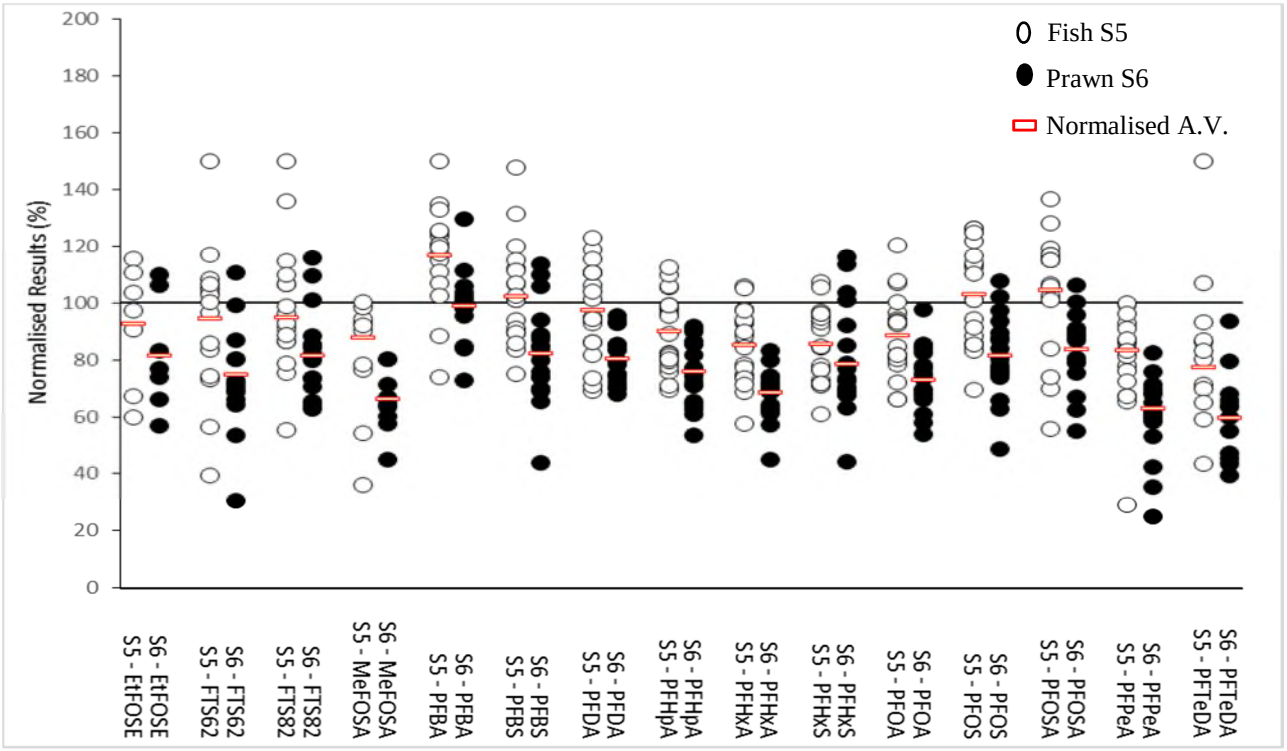


Figure 143 Normalised results for fish Sample S5 and prawn Sample S6 as % of spike

6.8 False negatives

Table 109 lists false negative results – an analyte for which a laboratory tested but did not report a result (eg. laboratories reporting as '<' result when the assigned value (or spiked value) was significantly higher than the participants' reporting limit).

Table 109 False Negatives

Lab Code	Sample	Analyte
1	S2	PFBA
1	S3	PFBS, PFBA, PFTeDa
1	S4	PFBA, PFHxS, PFOS, PFPeA, PFTeDA
2	S3	EtFOSE
2	S4	MeFOSA
4	S3	PFOSA, PFTeDA, EtFOSE, MeFOSA
4	S4	PFTeDA, EtFOSE, MeFOSA
4	S5	EtFOSE
6	S3	PFTeDA
6	S4	PFTeDA
7	S4	MeFOSA
8	S3	PFTeDA
8	S4	PFTeDA
10	S4	MeFOSA
11	S2	PFNA
14	S3	PFDA

Lab Code	Sample	Analyte
18	S3	PFTeDA, MeFOSA
18	S4	PFTeDA, MeFOSA
20	S4	MeFOSA
21	S1	EtFOSE, PFOSA,
21	S3	PFNA
21	S4	PFPeA, MeFOSA
23	S3	MeFOSA
23	S4	MeFOSA
24	S3	MeFOSA
24	S4	MeFOSA
26	S3	MeFOSA
26	S4	MeFOSA
26	S5	PFPeA
26	S6	PFPeA
27	S1	EtFOSE
27	S4	MeFOSA
31	S3	PFTeDA
31	S4	PFTeDA

7 REFERENCES

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APPENDIX 1 - PARTICIPATING LABORATORIES

Agilent Technologies Australia VIC	ALS Environmental WA, USA
ALS Laboratory Group Ontario, CANADA	ALS Leochimica S.r.l., ITALY
ALS Scoresby VIC	Analytical Reference Laboratory (WA) Pty Ltd WA
Analytical Services Tasmania EPA Division, TAS	AsureQuality Limited Wellington Laboratory, NEW ZEALAND
ALS Laboratory Group-Brisbane, QLD	ALS Laboratory Group-Sydney, NSW
AXYS Analytical Services Ltd, CANADA	CHEMCENTRE WA
China National Centre Food Safety Risk Assessment, CHINA	Envirolab Services NSW
Eurofins mgt, QLD	Eurofins GFA Lab Service GmbH GERMANY
Health Canada, Ottawa ON, CANADA	Government Laboratory, HONG KONG
JenaBios GmbH, GERMANY	National Measurement Institute NSW
Office of Environment and Heritage, Department of Premier and Cabinet Environmental Protection Science, NSW	Provinciaal Instituut voor Hygiene, BELGIUM
Queensland Health Forensic and Scientific Services QLD	Scientific Analytical Services Queensland UrbanUtilities, QLD
SGS Leeder Consulting VIC	Sydney Water Corporation NSW
Symbio Alliance QLD	Symbio Laboratories Sydney, NSW
TestAmerica Burlington Vermont, USA	TestAmerica Sacramento California, USA
Vista Analytical Laboratory CA, USA	VITO, BELGIUM
Watercare Services Limited, NEW ZEALAND	

APPENDIX 2 - SAMPLE PREPARATION

Sixteen analytical standards used for spiking samples in AQA 18-09 were purchased from HPC Standards GmbH, Toronto Research Chemicals, Sigma-Aldrich and Wellington Laboratories Canada. On the analytical reports provided with the standards, all analytes have a stated purity of >95%.

Sample S1: 704.8 g of dried uncontaminated soil sieved through a 850 µm sieve and collected on a 355 µm sieve was placed in a 3 L round bottom flask. A slurry was produced by adding acetone. The slurry was spiked with analyte solutions prepared in methanol (13 analytes) and isopropanol (3 analytes). The slurry was stirred using an overhead IKA stirrer, left to evaporate overnight and purged with nitrogen for further drying. The soil was then mixed with more uncontaminated dried and sieved soil to a total amount of 1112.4 g, dispensed into 20 g portions and packed into labelled 50 mL Greiner tubes.

Sample S2: 735.7 g of dried and sieved uncontaminated soil was spiked with 4 analytes using a similar procedure as described for Sample S1.

364.3 g of contaminated soil dried and sieved through a 850 µm sieve and collected on a 355 µm sieve and 735.7 g of uncontaminated spiked soil were mixed for 120 min using a V-mixer. The soil was divided into 20 g portions and packed into labelled 50 mL Greiner tubes.

Sample S3: Contaminated water was filtered through an Advantec Toyo GB 140 glass fibre filter. 846 g of filtered contaminated water was diluted with autoclaved Milli-Q water to a final volume of 5749 g. The water was placed in a stainless steel pot, spiked with 6 analytes, mixed with an IKA stirrer and dispensed into labelled 65 mL HDPE containers.

Sample S4: 6510 g of autoclaved Milli-Q water was spiked with 16 standard solutions (one for each analyte) prepared in methanol (13 analytes) and isopropanol (3 analytes). The spiked water was stirred using an IKA stirrer and dispensed into labelled 65 mL HDPE containers.

Sample S5: Yellowfin bream fish (Acanthopagrus australis) from an uncontaminated control site were composited. A portion of the composited fish was sub-sampled and placed in a -80ºC freezer for use as Sample S5 unspiked. Approximately 366 g of fish composite was placed on a tray and sprayed with a mist of the spiking solution using a commercial pump. This was repeated until all spiking solution was used. The fish was thoroughly mixed. Sample S5 was placed on stainless steel trays as patties of no more than six centimeters square and frozen overnight in a -80ºC freezer. The patties of fish were embrittled by immersion in liquid nitrogen and then ground using a Retsch SM2000 mill that was cooled with liquid nitrogen and dry ice. After grinding, samples were placed in a refrigerator in a covered Pyrex dish. The next day after all the carbon dioxide sublimed, 5 g portions of fish were packed into labelled 50 mL Greiner tubes.

Sample S6: Peeled prawns bought from a Sydney retailer and were blended using a food processor. A portion of the blended prawns was sub-sampled and placed in a -80ºC freezer for use as Sample S6 unspiked. Approximately 365 g of blended prawns were placed on a tray and sprayed with a mist of the spiking solution using a commercial pump. This was repeated until all spiking solution was used. The prawn puree was thoroughly mixed. Sample S6 was placed on stainless steel trays as patties of no more than six centimeters square and frozen overnight in a -80ºC freezer. The patties of prawns were embrittled by immersion in liquid nitrogen and then ground using a Retsch SM2000 mill that was cooled with liquid nitrogen and dry ice. After grinding, samples were placed in a refrigerator in a covered Pyrex dish. The next day after all the carbon dioxide had sublimed, 5 g portions of prawn were packed into labelled 50 mL Greiner tubes.

Soil and the water samples were stored at 4^0C and the fish and prawn samples were stored at -80ºC prior to dispatch to participants.

APPENDIX 3 - SAMPLE S6 PRAWN HOMOGENEITY TESTING AND STABILITY CHECK

A3.1 Homogeneity Testing

Homogeneity testing was based on that described in the International Protocol.[4]

Prawn samples were prepared as described in Section A2.1 and analysed at NMI North Ryde. A brief description of analysis method is presented below. The measurements were made under repeatability conditions in random order.

Samples were prepared in duplicate by accurately weighing 1 g of the sample then spiking with 30 µL of labelled internal standard in methanol. The samples were extracted by overnight tumbling in alkaline methanol (0.01 N potassium hydroxide), then centrifuged and eluent removed then passed through an activated carbon cartridge (Supelco Envi-Carb, 500 mg, 120-400 mesh) under vacuum and rinsed with methanol. After evaporation under nitrogen, the extract was reconstituted to 600 µL in mobile phase and spiked with 10 µL labelled recovery standard in methanol. All chemicals were analytical reagents or LCMS grade solvents. Instrument analysis was performed using an Agilent 1100 High Performance Liquid Chromatography (HPLC) coupled with an ABSciex 4000 Qtrap Mass spectrometer, operating in multiple reaction monitoring mode. 5 µL of extract was injected onto a Waters XBridge BEH column (1 mm x 150 mm x 3.5 µm, 130 Å) with a mobile phase gradient consisting of water:methanol (Triethyl amine used as modifier). Two mass transitions were monitored for each target analyte and labelled internal standard, and abundance ratios checked. The instrument mass accuracy is calibrated annually during preventative maintenance, and a six point calibration curve established for each analytical batch. A solvent batch blank was extracted and analysed with each batch, and sample results were at least three times the level of any analyte detected in the batch blank where reported. Quantification is based on the use of the labelled internal standards using relative retention factors from the multipoint calibration, and is corrected for internal standard recoveries. The analysis used calibration, internal standards and recovery standards supplied by Wellington Laboratories, Canada.

Results of the prawn homogeneity testing are presented in Tables 110-121. For each sample, the mean of the 14 measurements were used as the homogeneity value. All samples were found to be sufficiently homogeneous for use in this PT study.

Table 110 Sample **S6**, 6:2 FTS homogeneity testing results

Bottle Fill Number	6:2 FTS µg/kg	
	Replicate 1	Replicate 2
5	5.13	4.92
14	4.43	4.33
18	5.18	4.79
21	5.01	4.84
30	4.62	4.59
37	5.33	4.90
44	5.36	4.88
Mean	4.88	
CV	6.4%	

Thompson and Fearn Homogeneity Tests[11]

Test	Value	Critical	Result
Cochran	0.35	0.73	Pass
San/σ	0.22	0.5	Pass
s^2_{sam}	0.055	0.25	Pass

Table 111 Sample **S6**, 8:2 FTS homogeneity testing results

Bottle Fill Number	8:2 FTS µg/kg	
	Replicate 1	Replicate 2
5	9.05	8.63
14	9.18	9.43
18	9.26	9.05
21	8.85	9.54
30	9.11	9.82
37	9.31	9.22
44	9.33	9.64
Mean	9.24	
CV	3.4%	

Thompson and Fearn Homogeneity Tests[11]

Test	Value	Critical	Result
Cochran	0.37	0.73	Pass
San/σ	0.17	0.5	Pass
s^2_{sam}	0.000	0.79	Pass

Table 112 Sample **S6**, PFBS homogeneity testing results

Bottle Fill Number	PFBS µg/kg	
	Replicate 1	Replicate 2
5	3.71	3.39
14	3.75	3.41
18	3.81	3.67
21	3.68	3.59
30	3.56	3.58
37	3.95	3.91
44	3.59	3.62
Mean	3.66	
CV	4.4%	

Thompson and Fearn Homogeneity Tests[11]

Test	Value	Critical	Result
Cochran	0.47	0.73	Pass
San/σ	0.18	0.5	Pass
s^2_{sam}	0.009	0.13	Pass

Table 113 Sample **S6**, PFDA homogeneity testing results

Bottle Fill Number	PFDA µg/kg	
	Replicate 1	Replicate 2
5	6.90	7.86
14	6.34	7.41
18	7.11	5.89
21	7.39	6.67
30	6.80	7.04
37	7.40	6.56
44	6.92	7.32
Mean	6.97	
CV	7.3%	

Thompson and Fearn Homogeneity Tests[11]

Test	Value	Critical	Result
Cochran	0.30	0.73	Pass
San/σ	0.43	0.5	Pass
s^2_{sam}	0.000	0.88	Pass

Table 114 Sample **S6**, PFHpA homogeneity testing results

Bottle Fill Number	PFHpA µg/kg	
	Replicate 1	Replicate 2
5	9.34	9.18
14	9.57	9.09
18	9.95	9.83
21	9.80	8.67
30	9.71	9.35
37	10.15	9.59
44	9.08	9.91
Mean	9.52	
CV	4.4%	

Thompson and Fearn Homogeneity Tests[11]

Test	Value	Critical	Result
Cochran	0.48	0.73	Pass
San/σ	0.23	0.5	Pass
s^2_{sam}	0.000	0.96	Pass

Table 115 Sample **S6**, PFHxA homogeneity testing results

Bottle Fill Number	PFHxA µg/kg	
	Replicate 1	Replicate 2
5	5.08	5.13
14	4.86	5.01
18	5.28	5.12
21	5.04	5.05
30	4.89	5.09
37	5.39	4.92
44	5.06	4.87
Mean	5.06	
CV	3.0%	

Thompson and Fearn Homogeneity Tests[11]

Test	Value	Critical	Result
Cochran	0.64	0.73	Pass
San/σ	0.16	0.5	Pass
s^2_{sam}	0.000	0.23	Pass

Table 116 Sample **S6**, PFHxS homogeneity testing results

Bottle Fill Number	PFHxS µg/kg	
	Replicate 1	Replicate 2
5	5.80	5.78
14	5.72	5.75
18	5.73	6.23
21	6.13	5.77
30	5.40	5.94
37	6.03	5.88
44	5.47	5.59
Mean	5.80	
CV	4.0%	

Thompson and Fearn Homogeneity Tests[11]

Test	Value	Critical	Result
Cochran	0.41	0.73	Pass
San/σ	0.19	0.5	Pass
s^2_{sam}	0.004	0.33	Pass

Table 117 Sample **S6**, PFOA homogeneity testing results

Bottle Fill Number	PFOA µg/kg	
	Replicate 1	Replicate 2
5	10.82	10.07
14	8.85	9.89
18	11.44	10.25
21	10.37	10.00
30	9.65	10.55
37	11.07	10.41
44	10.63	10.70
Mean	10.3	
CV	6.2%	

Thompson and Fearn Homogeneity Tests[11]

Test	Value	Critical	Result
Cochran	0.32	0.73	Pass
San/σ	0.27	0.5	Pass
s^2_{sam}	0.100	1.26	Pass

Table 118 Sample **S6**, PFOS homogeneity testing results

Bottle Fill Number	PFOS µg/kg	
	Replicate 1	Replicate 2
5	22.37	24.63
14	23.78	27.37
18*	25.92	18.69
21	23.13	24.37
30	22.27	21.50
37	22.00	24.18
44	22.41	21.54
Mean	23.3	
CV	7.2%	

*Results on bottle fill 18 were not included in the test for homogeneity being identified as an analytical outliers (test Sa/σ) due to the difference between replicates.[11]

Thompson and Fearn Homogeneity Tests[11]

Test	Value	Critical	Result
Cochran	0.50	0.78	Pass
S_{an}/σ	0.31	0.5	Pass
s^2_{sam}	0.776	7.94	Pass

Table 119 Sample **S6**, PFOSA homogeneity testing results

Bottle Fill Number	PFOSA µg/kg	
	Replicate 1	Replicate 2
5	8.03	7.45
14	7.78	7.65
18	7.26	7.39
21	7.48	7.77
30	7.88	8.39
37	8.24	8.07
44	7.47	7.88
Mean	7.77	
CV	4.3%	

Thompson and Fearn Homogeneity Tests[11]

Test	Value	Critical	Result
Cochran	0.37	0.73	Pass
S_{an}/σ	0.16	0.5	Pass
s^2_{sam}	0.053	0.55	Pass

Table 120 Sample **S6**, PFPeA homogeneity testing results

Bottle Fill Number	PFPeA µg/kg	
	Replicate 1	Replicate 2
5	4.89	4.90
14	4.66	4.69
18	5.19	5.06
21	4.70	5.10
30	4.92	4.99
37	5.01	4.91
44	4.78	4.98
Mean	4.91	
CV	3.2%	

Thompson and Fearn Homogeneity Tests[11]

Test	Value	Critical	Result
Cochran	0.69	0.73	Pass
S_{an}/σ	0.13	0.5	**Pass**
s^2_{sam}	0.010	0.21	**Pass**

Table 121 Sample **S6**, PFTeDA homogeneity testing results

Bottle Fill Number	PFTeDA µg/kg	
	Replicate 1	Replicate 2
5	3.14	3.05
14	3.01	3.00
18	3.17	3.13
21	2.99	3.12
30	3.01	3.15
37	3.27	3.15
44	3.05	3.02
Mean	3.09	
CV	2.7%	

Thompson and Fearn Homogeneity Tests[11]

Test	Value	Critical	Result
Cochran	0.32	0.73	**Pass**
S_{an}/σ	0.11	0.5	**Pass**
s^2_{sam}	0.003	0.08	**Pass**

A3.2 Stability Check

A stability study was conducted for the prawn matrix. Sample analysis was performed as described in A3.1. Short term stability and stability during transportation was assessed by comparing the average of duplicate measurements performed on each sample, kept at room temperature, starting June (sample dispatch) and ending August 2018 (after results deadline). Results were in good agreement with each other and the assigned value (Figure 144).

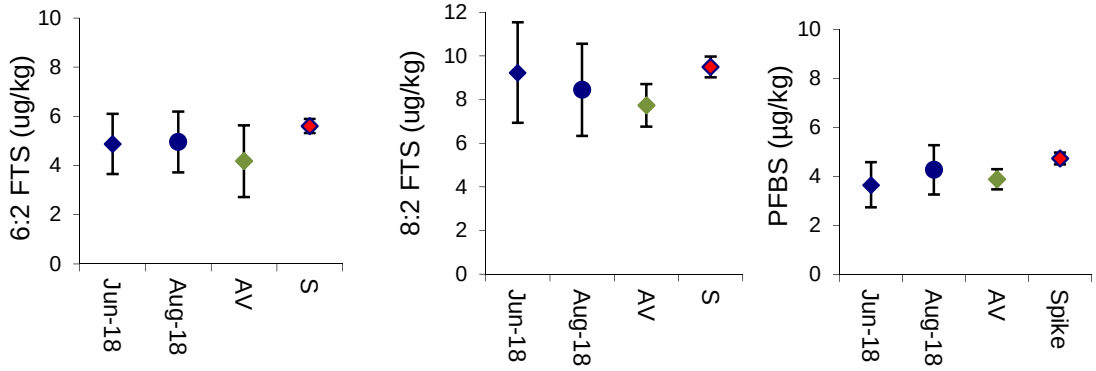


Figure 144 Stability results, assigned value (AV) and spiked value (S) in spiked prawn Sample S6 (room temperature)

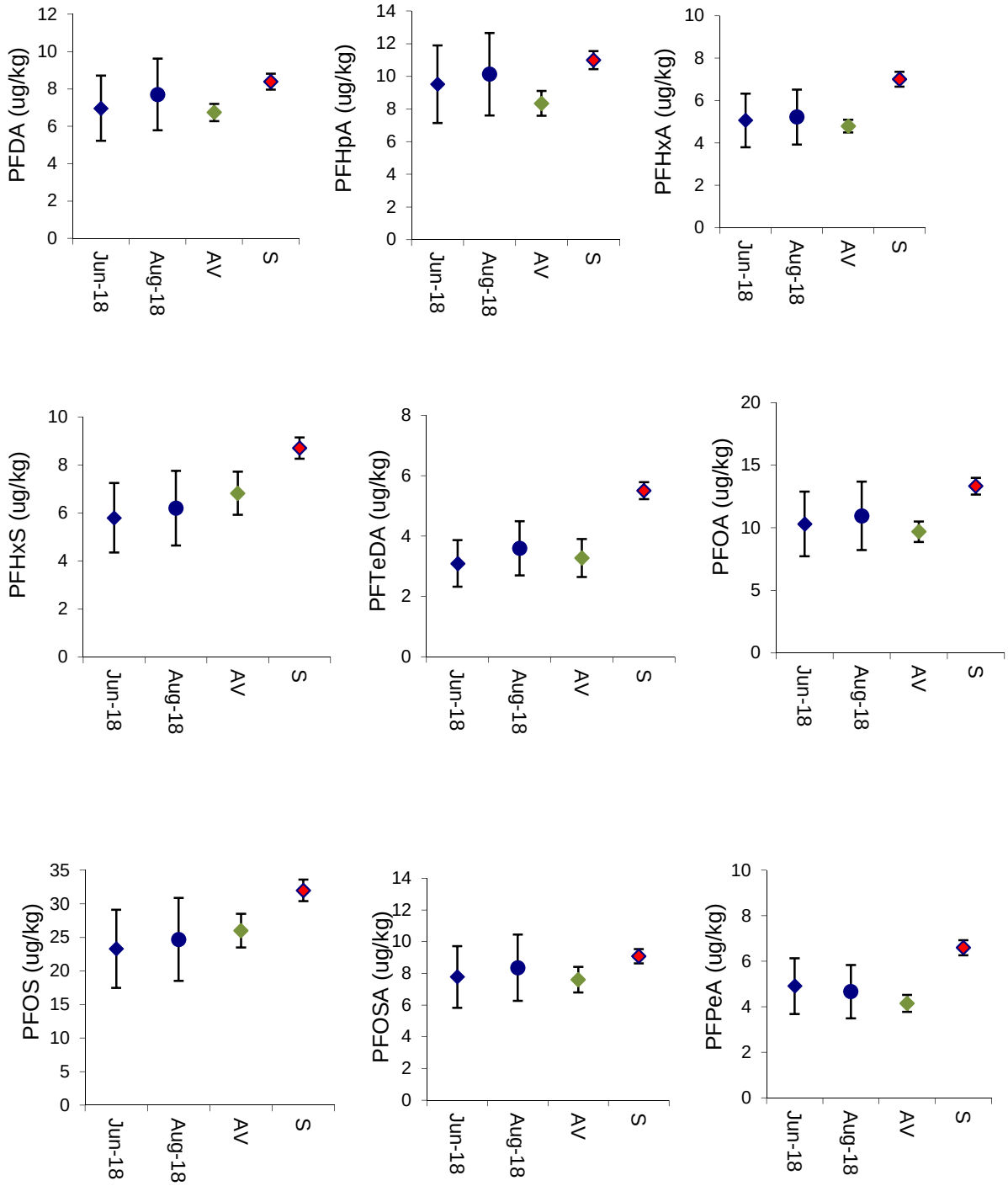
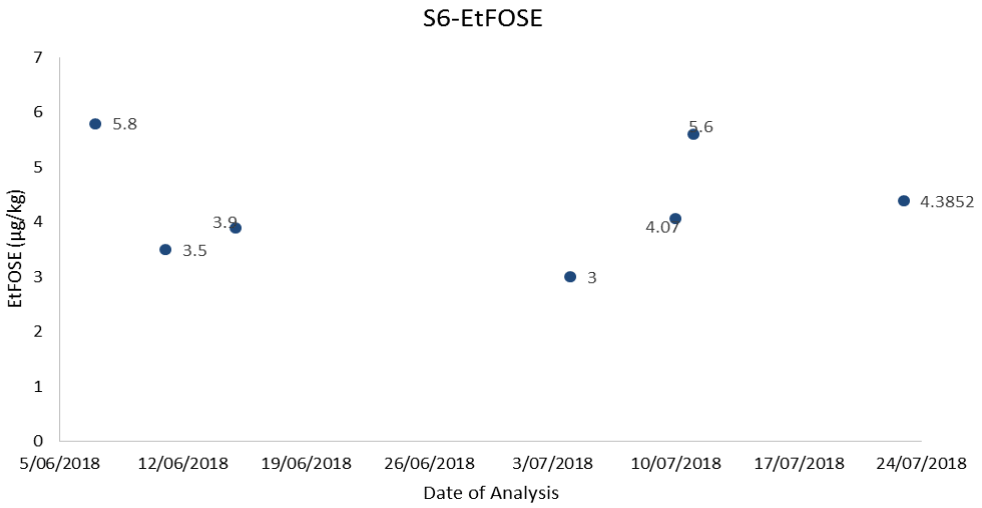
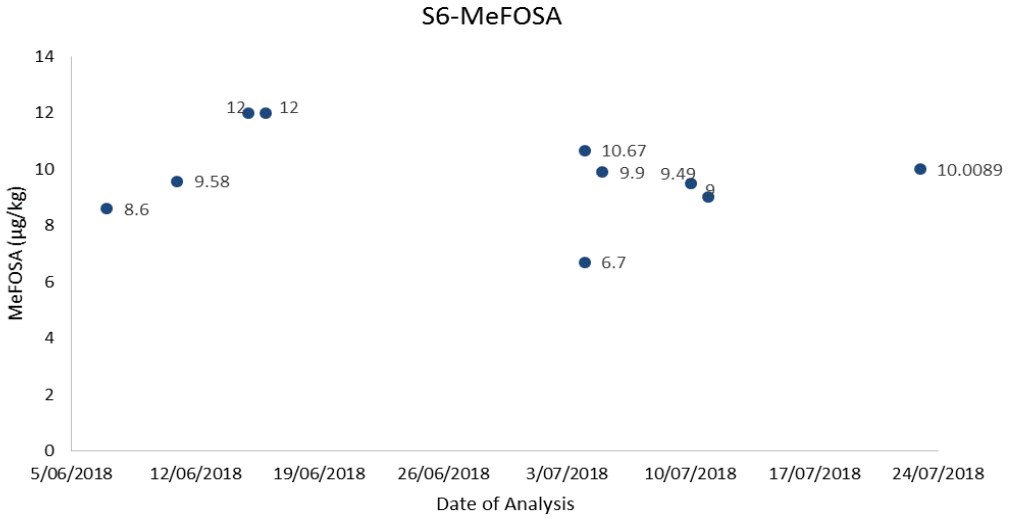


Figure 145 cont'd Stability results, assigned value (AV) and spiked value (S) in spiked prawn Sample S6 (room temperature)

To confirm the stability during transportation and over time, results returned by participants were combined with the reported participant date of analysis (where no date of analysis was provided the date of receipt was used) and subjected to a trend analysis (Figures 145 to 149). No trend was evident providing further evidence of sample stability.





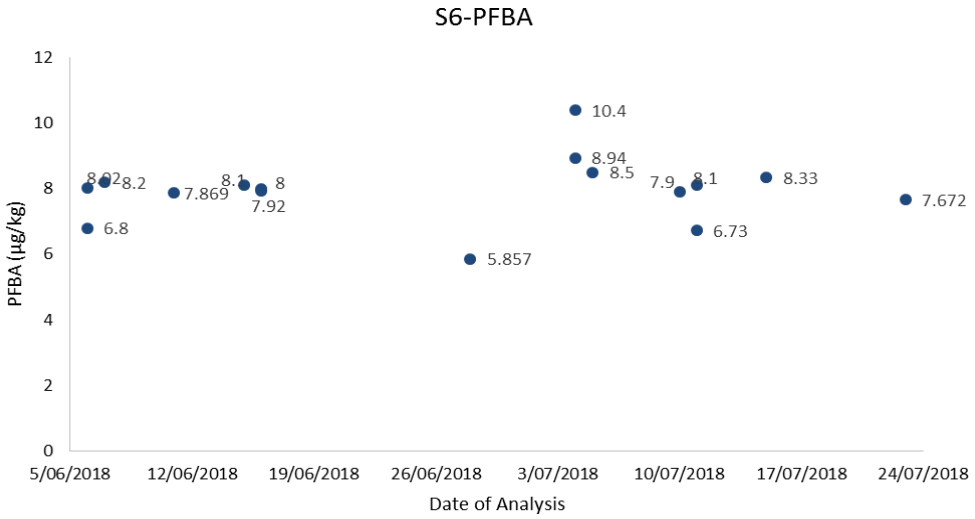
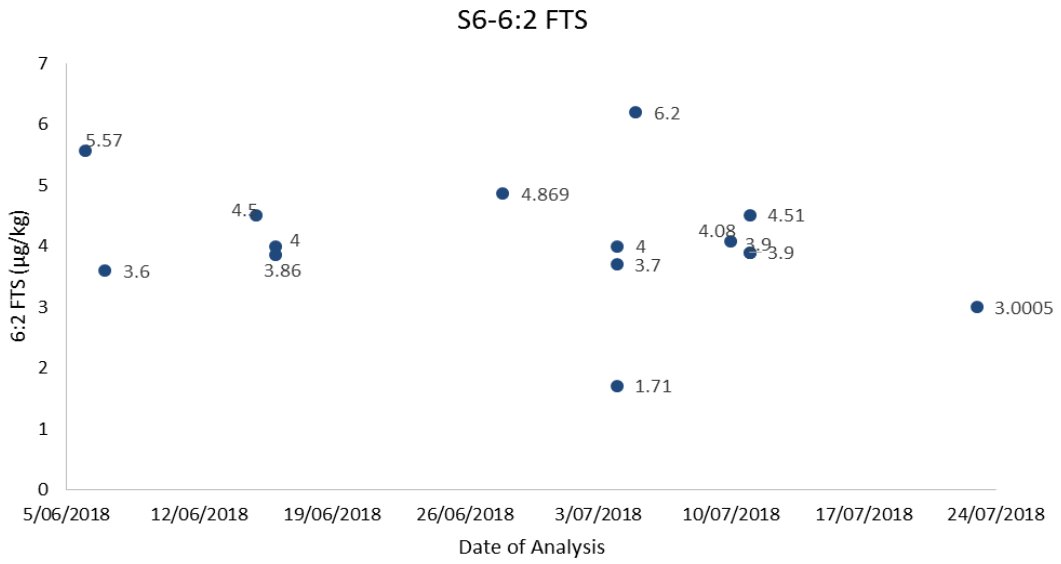
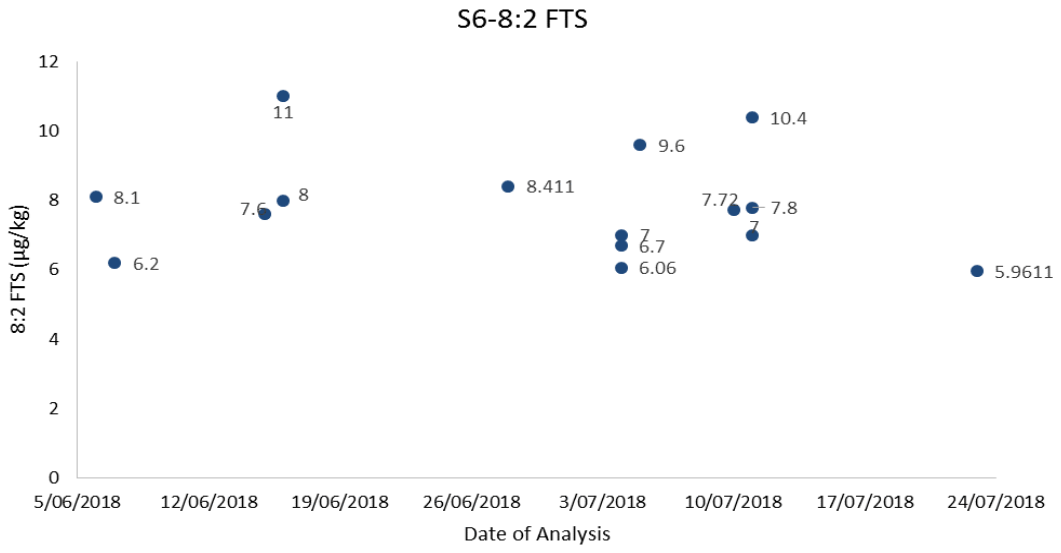


Figure 146 Participant results and date of sample analysis trend for EtFOSE, MeFOSA and PFBA in prawn Sample S6





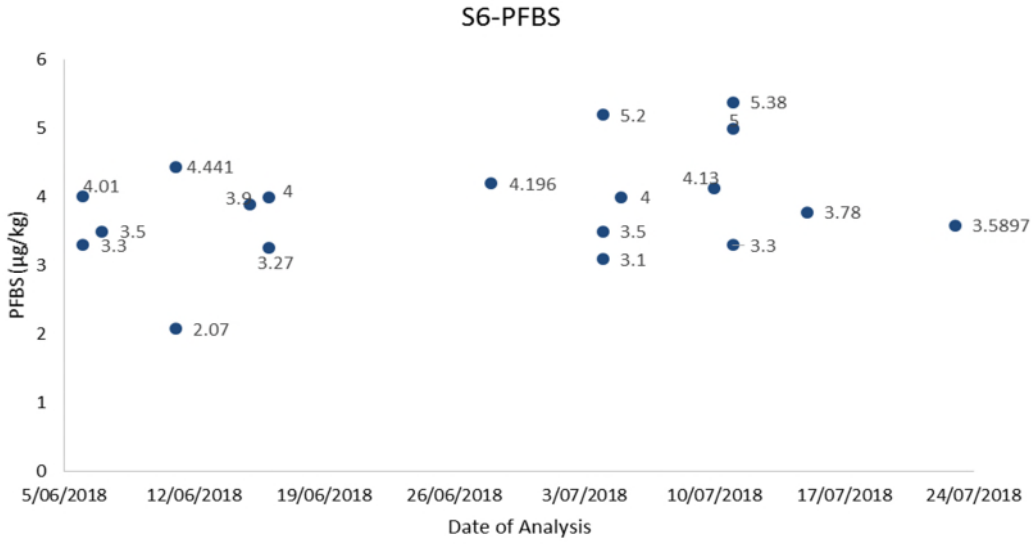
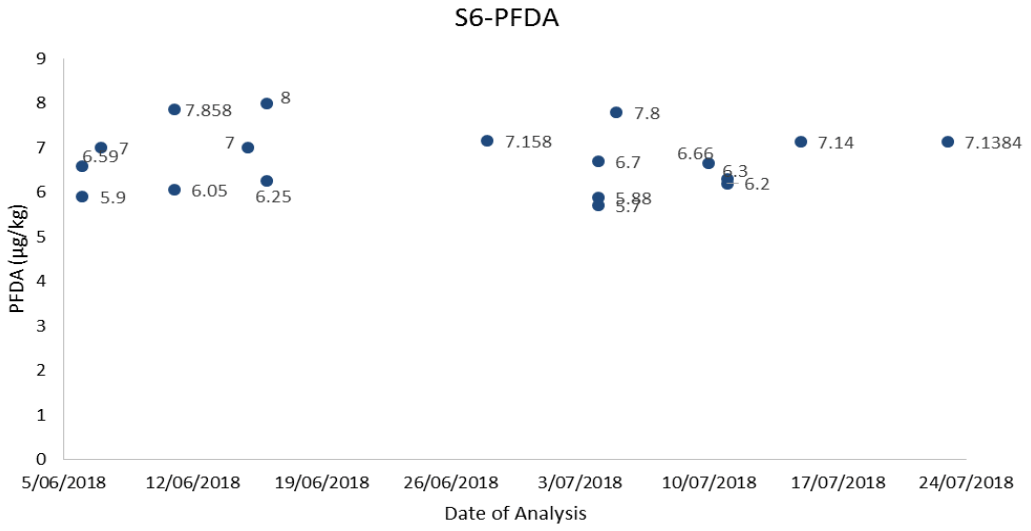
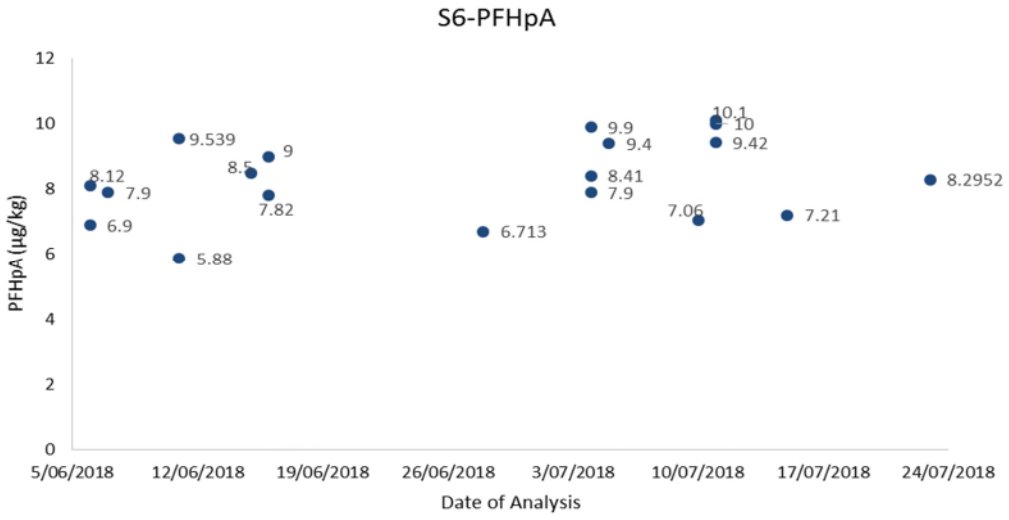


Figure 147 Participant results and date of sample analysis trend for 6:2 FTS, 8:2 FTS and PFBS in prawn Sample S6





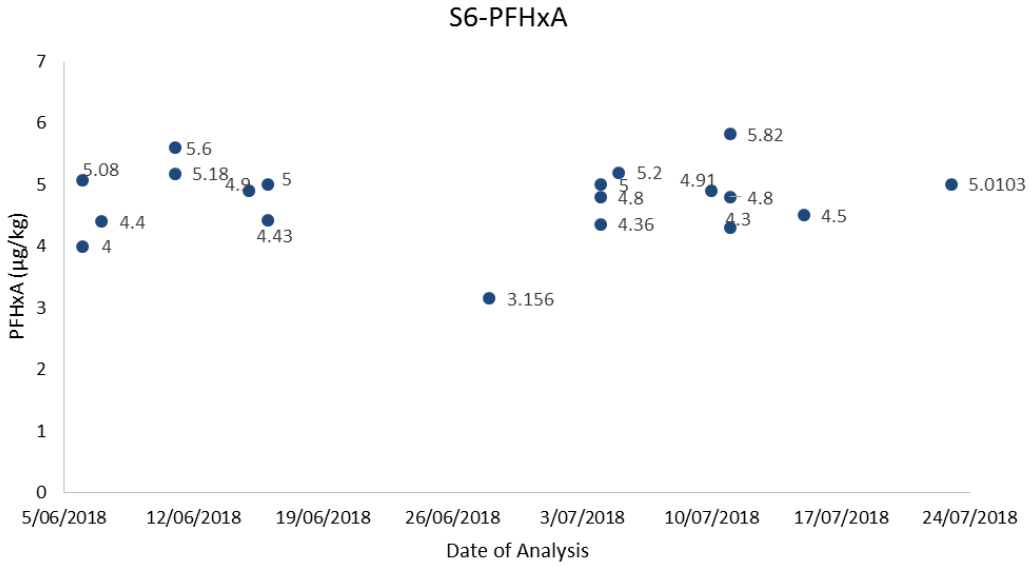


Figure 148 Participant results and date of sample analysis trend for PFDA, PFHpA and PFHxA in prawn Sample S6

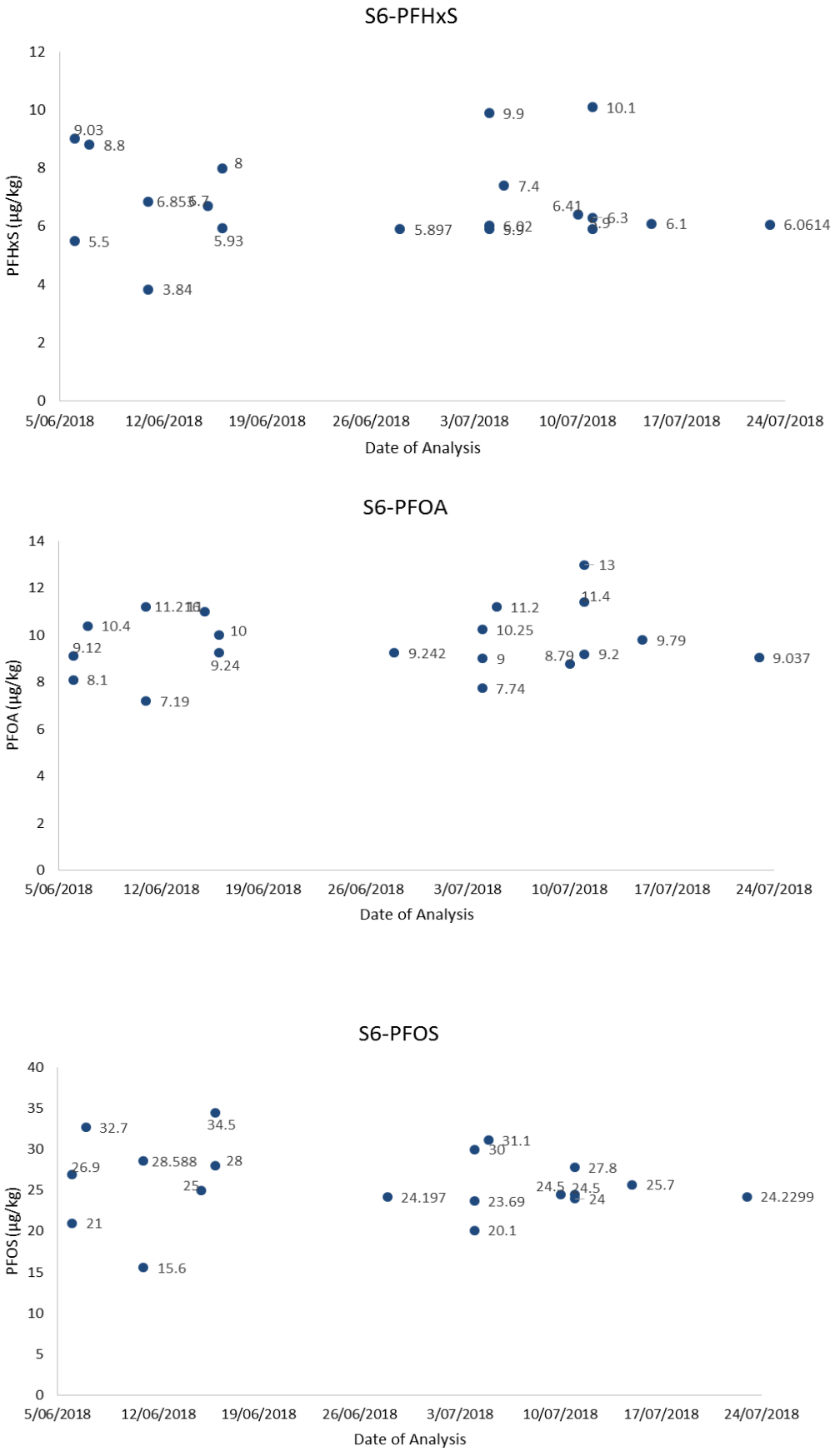
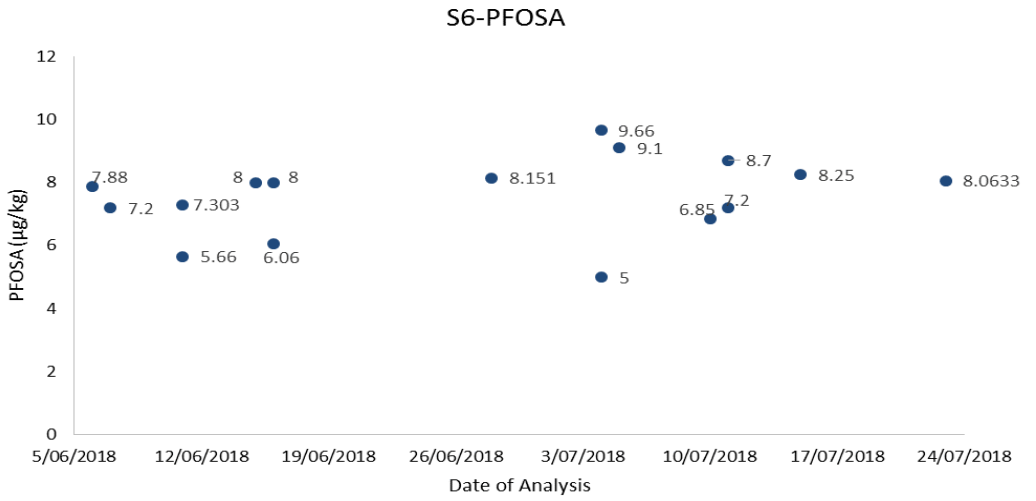
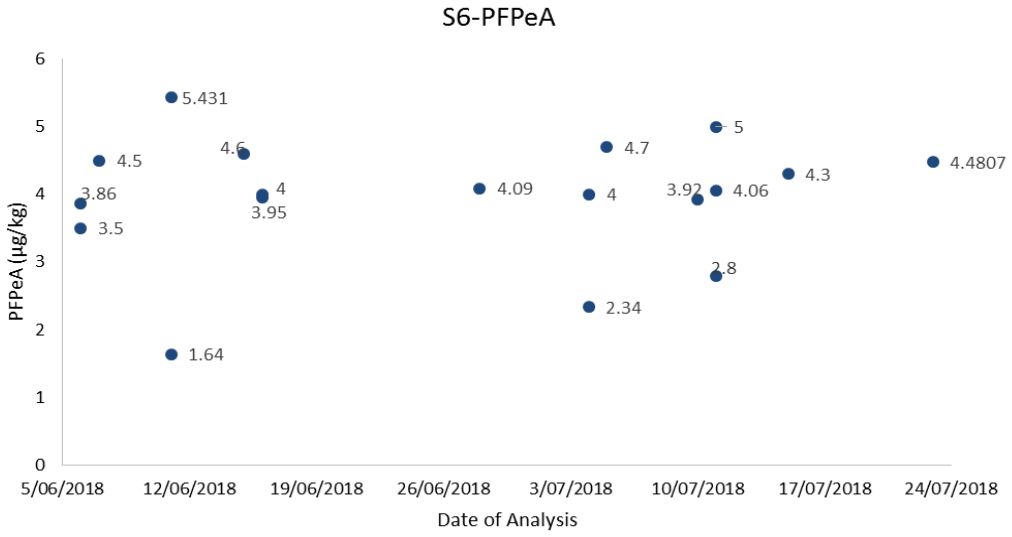


Figure 149 Participant results and date of sample analysis trend for PFHxS, PFOA and PFOS in prawn Sample S6





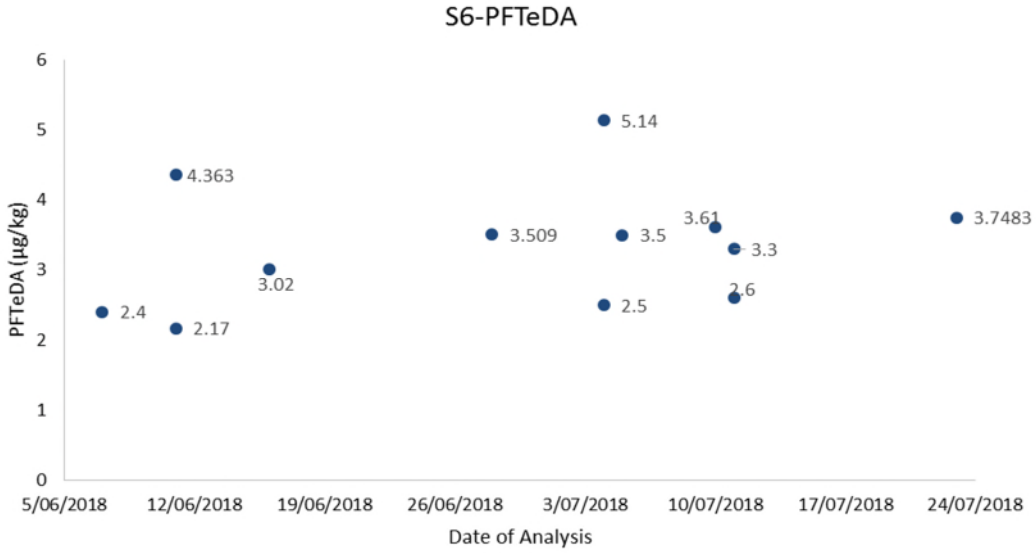


Figure 150 Participant results and date of sample analysis trend for PFOSA, PFPeA and PFTeDA in prawn Sample S6.

APPENDIX 4 - ROBUST AVERAGE AND ASSOCIATED UNCERTAINTY

The robust average was calculated using the procedure described in 'ISO13458:4015(E), Statistical methods for use in proficiency testing by interlaboratory comparisons – Annex C'.[7]

The uncertainty was estimated as:

$$u_{rob\ av} = 1.25 * S_{rob\ av} / \sqrt{p} \qquad \text{Equation 4}$$

where:

$u_{rob\ av}$	robust average standard uncertainty
$S_{rob\ av}$	robust average standard deviation
p	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 122.

Table 122 Uncertainty Estimate for PFOA in Sample S3

No. results (p)	28
Robust Average	0.7266 µg/L
$S_{rob\ av}$	0.1351 µg/L
$u_{rob\ av}$	0.0319 µg/L
k	2
$U_{rob\ av}$	0.0638 µg/L

The robust average for PFOA in Sample S3 is 0.727 ± 0.064 µg/L.

APPENDIX 5 - ACRONYMS AND ABBREVIATIONS

6:2 FTS	1H, 1H, 2H, 2H-perfluorooctane sulfonate
8:2 FTS	1H, 1H, 2H, 2H-perfluorodecane sulfonate
AV	Assigned Value
CV	Coefficient of Variation
CRM	Certified Reference Material
EPA	Environment Protection Authority
FOSA	Perfluoro-1-octanesulfonamide
GUM	Guide for Uncertainty Measurement
ISO	International Standards Organisation
LC	Liquid Chromatography
Max	Maximum value in a set of results
Md	Median
Min	Minimum value in a set of results
MS	Mass Spectrometry
NMI	National Measurement Institute (of Australia)
NR	Not Reported
NT	Not Tested
PFAS	Per- and poly fluorinated alkyl substances
PFBA	Perfluoro-n-butanoic acid
PFBS	Potassium perfluoro-1-butanesulfonate
PFDA	Perfluoro-n-decanoic acid
PFHxS	Potassium perfluorohexanesulfonate
PFHxA	Perfluoro-n-hexanoic acid
PFHpA	Perfluoro-n-heptanoic acid
PFNA	Perfluoro-n-nonanoic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PFOSA	Perfluoro-1-octanesulfonamide
PFPeA	Perfluoro-n-pentanoic acid
PFTeDa	Perfluorotetradecanoic acid
MeFOSA	Methylperfluorooctanesulfonamide
EtFOSE	Ethyl-N-(2-hydroxyethyl)perfluorooctylsulphonamide
PT	Proficiency Test
Q	Quadrupole mass analyser

QQQ	Triple Quadrupole (mass spectrometry)
QuEChERS	Quick, Easy, Cheap, Effective, Rugged and Safe extraction method
Robust CV	Robust Coefficient of Variation
Robust SD	Robust Standard Deviation
S	Spiked or formulated concentration of a PT sample
SPE	Solid Phase Extraction
Target SD	Target standard deviation
σ	Target standard deviation

End of Report