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National Measurement Institute

Proficiency Test Final Report
AQA 20-10
PFAS in Soil and Water

March 2021

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

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Raluca Iavetz

Manager, Chemical Reference Values

105 Delhi Road, North Ryde, NSW 2113, Australia

Phone: +61 2 9449 0178

Email: raluca.iavetz@measurement.gov.au

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TABLE OF CONTENTS

SUMMARY

This report presents the results of the proficiency test AQA 20-10 PFAS in Soil and Water. This study focused on the measurement of thirty-four per- and polyfluorinated alkyl substances (PFAS): PFBS, PFPeS, PFHpS, PFNS, PFDS, PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFNA, PFDA, PFUdA, PFDoA, PFTrDA, PFTeDA, Gen X, ADONA and 9Cl-PF3ONS, PFOSA, MeFOSA, EtFOSA, MeFOSAA, EtFOSAA, MeFOSE, EtFOSE, 4:2 FTS, 6:2 FTS, 8:2 FTS, 10:2 FTS in soil and water in soil and water. Measurement of PFOS total and PFOS linear (PFOS_L) and of PFHxS total and PFHxS linear (PFHxS_L) were also included in the program.

Thirty-five laboratories participated and thirty-four submitted results.

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

- two soil samples: Sample S1 with incurred PFAS contaminants, and Sample S2 spiked with 26 individual PFAS components; and
- two water samples: Sample S3 with incurred PFAS contaminants, and Sample S4 spiked with 24 individual PFAS components.

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

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

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

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

Of 2238 z-scores, 1855 (83%) returned $|z| \leq 2.0$, indicating a satisfactory performance.

Of 2238 E_n-scores, 1555 (69%) returned $|E_n| \leq 1.0$, indicating agreement of the participant's result with the assigned value within their respective expanded uncertainties.

No laboratory received satisfactory z-scores for all analytes for which z-scores were calculated (87). Laboratories **15** and **16** returned the highest number of satisfactory z-scores (86). All results reported by laboratories **29** (83), **13** (67), **21** (66), **32** (7) and **23** (4) returned satisfactory z-scores.

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

PFOS presented analytical difficulty to participanting laboratories in both matrices.

A limited number of laboratories reported results for Gen X, ADONA and 9Cl-PF3ONS in soil and water.

Although PFAS results were generally compatible, discrepancies were found between the results produced by methods which involved methanol or base modified methanol as extraction solvent and those produced by the other extraction solvents.

There was a correlation between the results of participants who used the entire or almost entire sample container, and high recoveries of long chain carboxylic acids from the spiked water sample.

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

Over the last 6 years, laboratories have developed methods for the analysis of a wide spectrum of PFAS contaminants and in general the results reported were compatible with each other. Over this period, the average proportion of satisfactory scores was 89% for z-scores and 77% for E_n-scores.

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

Of 2363 results, 2321 were reported with an associated estimate of expanded measurement uncertainty. The magnitude of the reported expanded uncertainties was within the range 0% to 1155% of the reported value

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

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

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

1 INTRODUCTION

1.1 NMI Proficiency Testing Program

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

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

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

1.2 Study Aims

The aims of the study were to:

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

1.3 Study Conduct

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

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

2 STUDY INFORMATION

2.1 Study Timetable

The timetable of the study was:

Invitation issued	4 September 2020
Samples dispatched	28 September 2020
Results due	09 November 2020
Interim report issued	20 November 2020

2.2 Participation

Thirty-five laboratories registered to participate in this study, and thirty-four participants submitted results by the due date.

2.3 Test Material Preparation

Four test samples were provided for analysis.

- Two soil samples S1 and S2 each containing 20 g:
    - Sample S1 containing incurred PFAS contaminants; and
    - Sample S2 spiked with 26 individual PFAS components.
- Two water samples S3 and S4 each containing 2 x 50 mL:
    - Sample S3 containing incurred PFAS contaminants; and
    - Sample S4 autoclaved tap water spiked with 24 individual PFAS components.

Twenty-two analytes were added into the bulk water sample S4 that was dispensed in 65 mL HDPE bottles. Each bottle was then further spiked with a composite solution containing PFTeDA and PFOSA, with the aim of minimising the loss of these analytes during preparation (see details in Appendix 1).

Four PFAS analytes: PFHxS_L, 9Cl-PF3ONS and 4:2 FTS, 10:2 FTS were introduced for the first time in this PT study.

The analytical standards used for spiking these samples 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 and sample preparation details in Appendix 1.

Table 1 Formulated concentrations of test samples

PFAS	S2 Soil (Spiked) µg/kg	S4 Water (Spiked) µg/L
6:2 FTS	14.2	0.0284
8:2 FTS	4.79	0.0957
9Cl-PF3ONS	74.6	0.14
ADONA	75.4	0.0753
EtFOSE	10.1	Not Spiked
GenX	80	0.0999
PFBA	25.1	0.0892
PFBS	10	0.0612
PFDA	100	0.0404
PFDoA	15	Not Spiked
PFDS	29.1	0.0773
PFHpA	Not Spiked	0.0295
PFHpS	20.1	0.100
PFHxA	11.56	0.015
PFHxS	5.41	0.0551
PFHxS_L	5.33	0.0542
PFNA	46.9	0.152
PFNS	3.31	0.00483
PFOA	7.51	0.0503
PFOS	4.20	0.0326
PFOS_L	2.34	0.0182

PFAS	S2 Soil (Spiked) µg/kg	S4 Water (Spiked) µg/L
PFOSA	10.1	0.106
PFPeA	20.1	0.04
PFPeS	56.6	0.0472
PFTeDA	30.1	0.085
PFTrDA	50	Not Spiked
PFUdDA	80	0.111

2.4 Test Material Homogeneity and Stability Testing

The preparation of the study samples is described in Appendix 1. No homogeneity or stability testing was conducted on soil and water samples. These samples were prepared and packaged using a process that has been demonstrated to produce homogeneous and stable samples in previous NMI PFAS PTs. Participants' results gave no reason to question the homogeneity and stability of the previously used analytes. However, there were stability issues in this study with regards to GenX in S2 and PFDS and PFUdA in S4. Possible reasons for the instability of these analytes are presented in sections 6.7 and 6.8. A reasonable consensus was found between participants' results and consequently an assigned value was set for these tests.

2.5 Sample Storage, Dispatch and Receipt

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

Participants were sent 20 g soil in Greiner tubes for each of Samples S1 and S2, and two 50 mL water in HDPE bottles for each of Samples S3 and S4. The samples were packed in a foam box with a cooler brick and sent by courier on 28 September 2020.

The following items were packaged with the samples:

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

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

2.6 Instructions to Participants

Participants were instructed as follows:

- Quantitatively analyse the samples using your normal test method. For water samples use the entire content of the bottle for analysis.
- Report results in units of µg/kg on an as received basis for soil 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 (i.e. corrected for recovery or not, according to your standard procedure – but state if results are corrected on the result sheet). This figure will be used in all statistical analysis in the study report.
- For each analyte in each sample report the associated expanded measurement uncertainty (e.g. 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 (e.g. uncertainty budget, repeatability precision, long term result variability).
- If determined, report your internal standard percentage recovery. This will be presented in the report for information only.
- Please complete the method details as required in the Methodology sheet.
- Return the completed results sheet by e-mail to proficiency@measurement.gov.au
- Please return completed result sheet by 26 October 2020. Late results may not be included in the study report.

Due to the exceptional international circumstances occurring over the course of this study, the results due date was extended to 09 November 2020 for all participants.

2.7 Interim Report

An interim report was emailed to all participants on 20 November 2020.

3 PARTICIPANT LABORATORY INFORMATION

3.1 Test Methods Reported by Participants

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

3.2 Basis of Participants' Measurement Uncertainty Estimates

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

Table 2 Basis of Participants' Uncertainty Estimate

Lab. Code	Approach to Estimating MU	Information Sources for MU Estimation*		Guide Document for Estimating MU
		Precision	Method Bias	
1	Standard deviation of replicate analyses multiplied by 2 or 3	Control samples Duplicate analysis Instrument calibration	Instrument calibration Recoveries of SS Standard purity	NATA GAG Estimating and Reporting MU (replaced Technical Note 33)
2	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS		NATA GAG Estimating and Reporting MU (replaced Technical Note 33)
3[a]	Standard deviation of replicate analyses multiplied by 2 or 3	Control samples - SS	Recoveries of SS	Procedure as set out in Statistics and Chemometrics for Analytical Chemistry, Miller and Miller, 5th Edition
4[a]	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS Duplicate analysis	Recoveries of SS	Eurachem/CITAC Guide
5	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS Duplicate analysis Instrument calibration	Instrument calibration Recoveries of SS Standard purity	NATA GAG Estimating and Reporting MU (replaced Technical Note 33)
6	Standard deviation of replicate analyses multiplied by 2 or 3	Control samples - SS	Instrument calibration	NATA GAG Estimating and Reporting MU (replaced Technical Note 33)
7	Standard deviation of replicate analyses multiplied by 2 or 3	Duplicate analysis Instrument calibration	Recoveries of SS	Eurolab Technical Report No1/2007
8[a]	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS Duplicate analysis	Recoveries of SS	Eurachem/CITAC Guide
9[a]	Standard deviation of replicate analyses multiplied by 2 or 3	Control samples - SS	Recoveries of SS	USEPA SW-846
10	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS Instrument calibration	Instrument calibration Recoveries of SS Standard purity	Eurachem/CITAC Guide
11	Top Down - reproducibility (standard deviation) from PT studies used directly	Standard deviation from PT studies only		ISO/GUM
			CRM Instrument calibration Recoveries of SS	

Lab. Code	Approach to Estimating MU	Information Sources for MU Estimation*		Guide Document for Estimating MU
		Precision	Method Bias	
12	Bottom Up (ISO/GUM, fish bone/cause and effect diagram)	Duplicate analysis	CRM Recoveries of SS	ISO/GUM
13	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS	Recoveries of SS	Eurachem/CITAC Guide
14	Top Down - precision and estimates of the method and laboratory bias	Control samples - CRM Duplicate analysis Instrument calibration	CRM Instrument calibration Recoveries of SS	NATA GAG Estimating and Reporting MU (replaced Technical Note 33)
15	Standard deviation of replicate analyses multiplied by 2 or 3	Control samples Duplicate analysis Instrument calibration	CRM Instrument calibration Laboratory bias from PT studies Recoveries of SS Standard purity	NATA GAG Estimating and Reporting MU (replaced Technical Note 33)
16	Standard deviation of replicate analyses multiplied by 2 or 3	Control samples - SS Duplicate analysis Instrument calibration	Instrument calibration Recoveries of SS Standard purity	NATA GAG Estimating and Reporting MU (replaced Technical Note 33)
17	Standard deviation of replicate analyses multiplied by 2 or 3	Duplicate analysis	Recoveries of SS	ISO/GUM
18	Bottom Up (ISO/GUM, fish bone/cause and effect diagram)	Duplicate analysis Instrument calibration	Instrument calibration	ISO/GUM
19[a]	Top Down - precision and estimates of the method and laboratory bias	Instrument calibration	Instrument calibration Recoveries of SS	In-house document
20	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS Duplicate analysis	CRM	NATA GAG Estimating and Reporting MU (replaced Technical Note 33)
21[a]	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS Duplicate analysis	Recoveries of SS	Eurachem/CITAC Guide
22	Top Down - precision and estimates of the method and laboratory bias	Control samples - CRM Duplicate analysis Instrument calibration	CRM Instrument calibration Recoveries of SS	ISO/GUM
23	Top Down - precision and estimates of the method and laboratory bias	Control samples - Spare samples of AQA 19-11 Duplicate analysis	Recoveries of SS Standard purity	Eurachem/CITAC Guide
24	Standard deviation of replicate analyses multiplied by 2 or 3	Control samples - SS Duplicate analysis Instrument calibration	Recoveries of SS	NATA GAG Estimating and Reporting MU (replaced Technical Note 33)
25	Standard deviation of replicate analyses multiplied by 2 or 3	Control samples	Recoveries of SS	NATA GAG Estimating and Reporting MU (replaced Technical Note 33)
26	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS	Recoveries of SS	NATA - Estimating and reporting MU of chemical test results.
27[a]	Standard deviation of replicate analyses multiplied by 2 or 3	Control samples - RM Duplicate analysis Instrument calibration	CRM Instrument calibration Recoveries of SS	Eurachem/CITAC Guide

Lab. Code	Approach to Estimating MU	Information Sources for MU Estimation*		Guide Document for Estimating MU
		Precision	Method Bias	
28[a]	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS Duplicate analysis		Eurachem/CITAC Guide
29[a]	Standard deviation of replicate analyses multiplied by 2 or 3	Control samples - Spiked blank (LCS)	Recoveries of SS	SW846
30	Top Down - precision and estimates of the method and laboratory bias	Duplicate analysis	Recoveries of SS	
32	Top Down - precision and estimates of the method and laboratory bias	Control samples - SS Duplicate analysis	CRM Instrument calibration Recoveries of SS Standard purity	ISO/GUM
33		Control samples - RM Duplicate analysis	Instrument calibration Laboratory bias from PT studies Recoveries of SS	
34	2 times within laboratory reproducibility and bias of the method	Control samples - SS	Recoveries of SS	
35	Professional judgment	Duplicate analysis Instrument calibration	Instrument calibration Laboratory bias from PT studies Recoveries of SS Standard purity	Eurachem/CITAC Guide

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

Table 3 Uncertainty Estimate Comments

Lab Code	Approach to Estimating MU
3	Measurement Uncertainty (U) estimated from the standard deviation (u) of replicate recovery samples using the expression U = 2 x u. Procedure as set out in Statistics and Chemometrics for Analytical Chemistry, Miller and Miller, 5th Edition.
4	MU is calculated based on historic QC data.
8	MU is calculated based on historic QC data. For S4: MU includes bias.
9	Standard practice for laboratories utilizing US EPA's SW-846 document.
19	In-house document; In-house uncertainty was 99% confidence (3 stdev), but we used 2 stdev for uncertainty here.
21	MU is calculated based on historic QC data.
27	Uncertainty calculated as 3 x SD of replicate analysis. Soil samples were extracted alongside both spiked soil and reference soil.
28	MU is calculated based on historic QC data.
29	Standard practice for laboratories utilizing US EPA's SW-846 document.

3.3 Participants' Comments

Participants were invited to make comments for this PT study. Such feedback allows for the improvement of future studies. Participants' comments are presented in Table 4, along with the study coordinator's response where appropriate.

Table 4 Participants' Comments

Lab Code	Participants' Comments	Study manager's response
4	Suggest considering proficiency trial for leachable PFAS (ASLP/TCLP).	Thank you for your suggestions. The other participants are also invited to comment.

4 PRESENTATION OF RESULTS AND STATISTICAL ANALYSIS

4.1 Results Summary

Participant results are listed in Tables 5 to 101 with the summary statistics: robust average, median, mean, number of numeric results (N), maximum (Max.), minimum (Min.), robust standard deviation (Robust SD) and robust coefficient of variation (Robust CV).

Bar charts of results and performance scores are presented in Figures 2 to 98. An example chart with interpretation guide is shown in Figure 1.

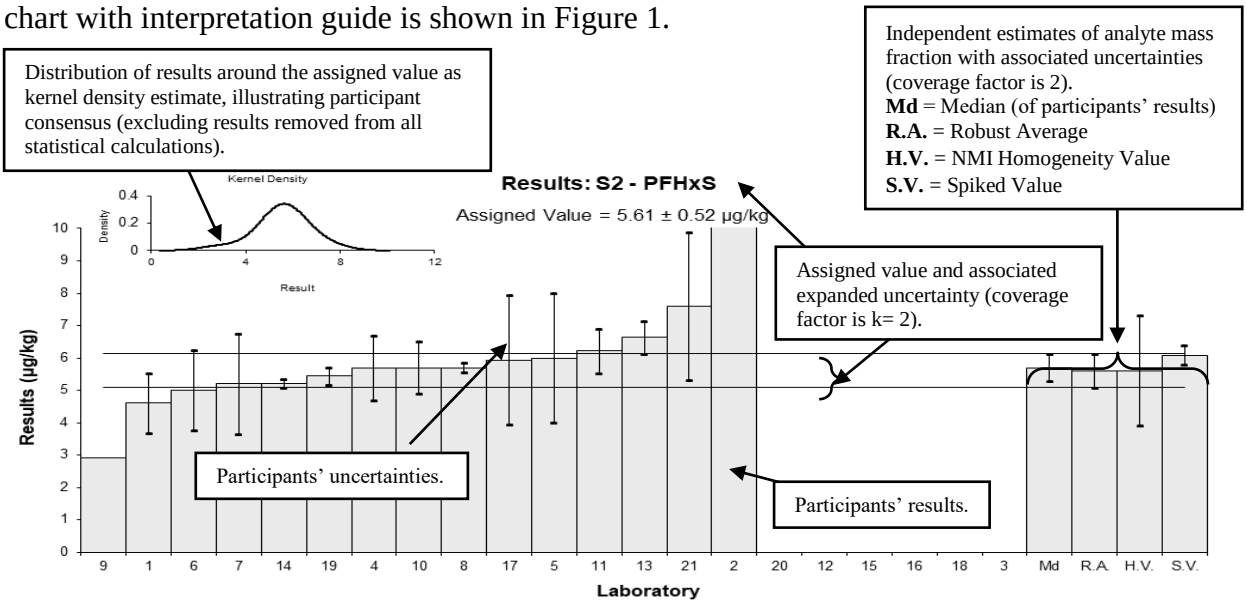


Figure 1 Guide to Presentation of Results

4.2 Assigned Value

An example of an assigned value calculation using data from the present study is given in Appendix 2. The assigned value is defined as: 'the value attributed to a particular property of a proficiency test item.'[1] In this study the property is the mass fraction of analyte. Assigned values were the robust average of participants' results; the expanded uncertainties were estimated from the associated robust standard deviations (results less than 50% and greater than 150% of the robust average were removed before the calculation of the assigned value).[3,4]

4.3 Robust Average and Robust Between Laboratory Coefficient of Variation

The robust averages and associated expanded MUs, and robust CVs (a measure of the variability of participants' results) were calculated using the procedure described in ISO 13528:2015.[5]

4.4 Performance Coefficient of Variation (PCV)

The performance coefficient of variation (PCV) is a fixed measure of the between laboratory variation that in the judgement of the study coordinator would be expected from participants given the levels of analytes present. It is important to note that this is a performance measure set by the study coordinator; it is not the CV of participant results. The PCV is based on the mass fraction of the analytes and experience from previous studies, and is supported by mathematical models such as the Thompson-Horwitz equation.[6] By setting a fixed and realistic value for the PCV, a participant's performance does not depend on the other participants' performance and can be compared from study to study.

4.5 Target Standard Deviation

The target standard deviation (σ) is the product of the assigned value (X) and the PCV, as presented in Equation 1. This value is used for calculation of each participant z-score.

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

4.6 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 a participant's result
X is the assigned value
σ is the target standard deviation from Equation 1

For a z-score with absolute value (|z|):

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

To account for potential low bias in the consensus value due to inefficient methodologies, a number of scores were adjusted for a 'maximum acceptable concentration'. Results lower than the maximum acceptable concentration but with a z-score greater than 2.0 had their z-score adjusted to 2.0. Additional information is given in Section 6.3.

4.7 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.

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

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

For an E_n-score with absolute value ($|E_n|$):

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

4.8 Traceability and Measurement Uncertainty

Laboratories accredited to ISO/IEC 17025:2017 must establish and demonstrate the traceability and measurement uncertainty associated with their test results.[7]

Guidelines for quantifying uncertainty in analytical measurement are described in the Eurachem/CITAC Guide.[8]

5 TABLES AND FIGURES

Table 5

Sample Details

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

Participant Results

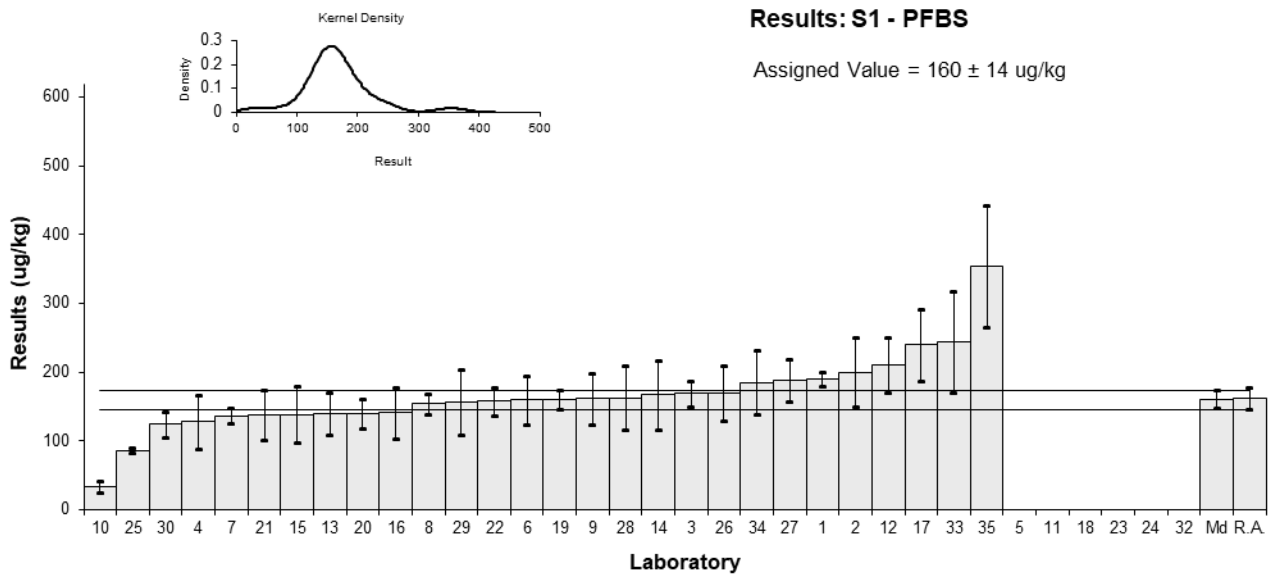
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	189.73	10.48	NR	0.93	1.70
2	200	50	NR	1.25	0.77
3	169	19	96	0.28	0.38
4	128	39.3	118	-1.00	-0.77
5	NR	NR	NR		
6	160	35	NR	0.00	0.00
7	136.69	10.75	NR	-0.73	-1.32
8	154	15	NR	-0.19	-0.29
9	162	37	59	0.06	0.05
10	33.2	8.6	104	-3.96	-7.72
11	NT	NT	NT		
12	210	40	125	1.56	1.18
13	140.0	30.8	NR	-0.62	-0.59
14	167	50	67	0.22	0.13
15	139	41.7	88	-0.66	-0.48
16	141	38	94	-0.59	-0.47
17	240	52	NR	2.50	1.49
18	NT	NT	NT		
19	161	14.0	118	0.03	0.05
20	140	21	107	-0.62	-0.79
21	138	36	92	-0.69	-0.57
22	158	20	69	-0.06	-0.08
23	NT	NT	NT		
24	NT	NT	NT		
25	86.9	3.0	95.4	-2.28	-5.11
26	170	40	NR	0.31	0.24
27	188.4	30.44	168.3	0.89	0.85
28	163	47	93	0.09	0.06
29	157	47.1	92	-0.09	-0.06
30	124.31	18.77081	78.6	-1.12	-1.52
32	NT	NT	NT		
33	245	73.5	105	2.66	1.14
34	185	46.25	98	0.78	0.52
35	354	88	40	6.06	2.18

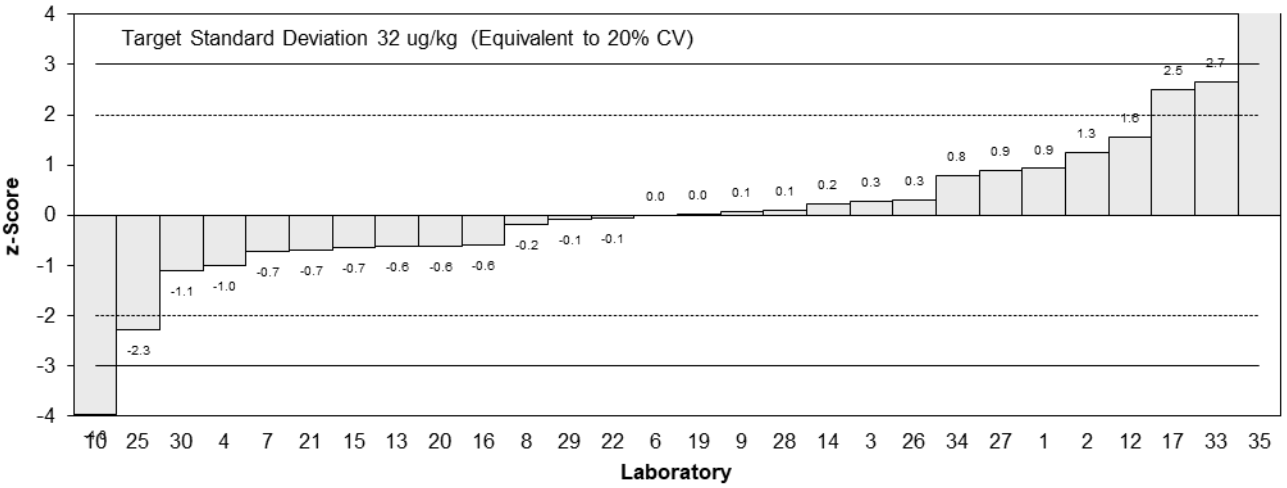
Statistics

Assigned Value*	160	14
Spike	Not Spiked	
Robust Average	162	16
Median	161	13
Mean	166	
N	28	
Max.	354	
Min.	33.2	

Robust SD	35	
Robust CV	21%	

*Robust Average excluding Laboratories 10, 33 and 35.


Kernel Density
Density
Result
Results: S1 - PFBS
Assigned Value = 160 ± 14 ug/kg
Results (ug/kg)
Laboratory
10 25 30 4 7 21 15 13 20 16 8 29 22 6 19 9 28 14 3 26 34 27 1 2 12 17 33 35 5 11 18 23 24 32 Md R.A.


z-Scores: S1 - PFBS
Target Standard Deviation 32 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 30 4 7 21 15 13 20 16 8 29 22 6 19 9 28 14 3 26 34 27 1 2 12 17 33 35

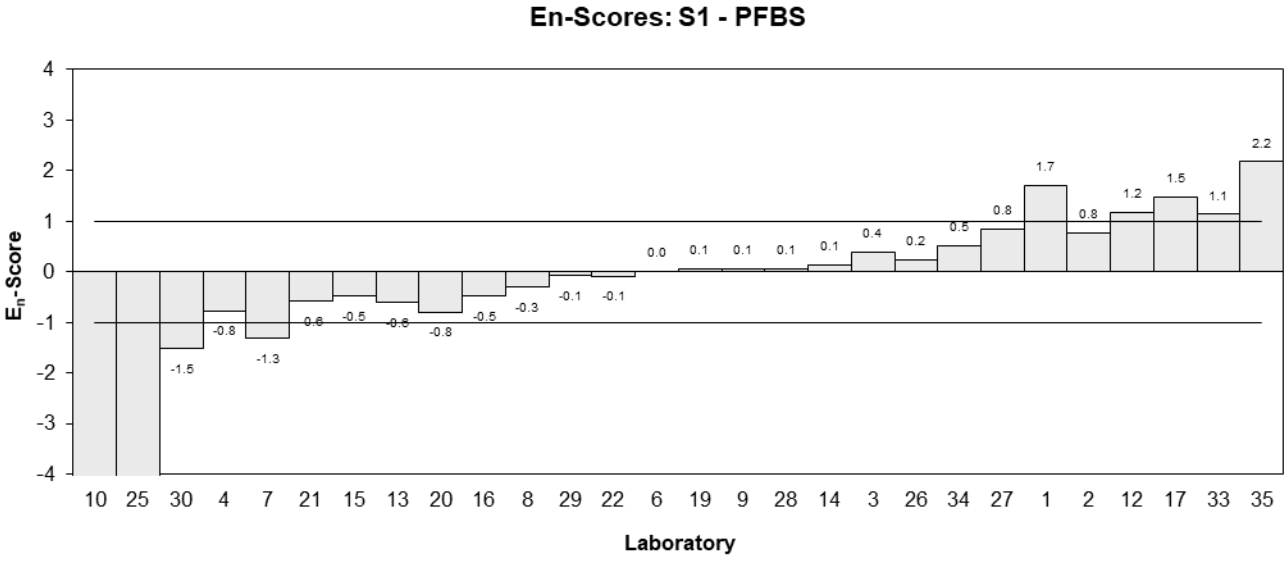

En-Scores: S1 - PFBS
En-Score
Laboratory
10 25 30 4 7 21 15 13 20 16 8 29 22 6 19 9 28 14 3 26 34 27 1 2 12 17 33 35

Figure 2

Table 6

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	PFPeS
Units	ug/kg

Participant Results

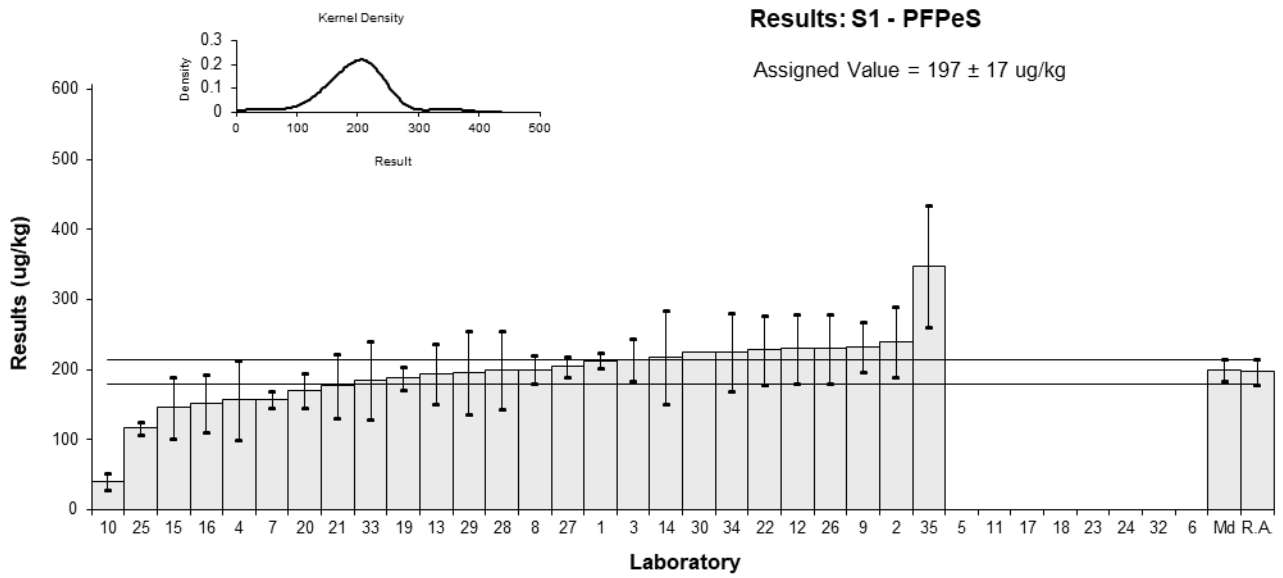
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	213.18	11.61	NR	0.41	0.79
2	240	50	NR	1.09	0.81
3	214	30	87	0.43	0.49
4	157	57.1	96.7	-1.02	-0.67
5	NR	NR	NR		
6	NT	NT	NT		
7	157.86	12.10	NR	-0.99	-1.88
8	200	20	NR	0.08	0.11
9	232	36	59	0.89	0.88
10	41.0	11.9	NR	-3.96	-7.52
11	NT	NT	NT		
12	230	50	110	0.84	0.62
13	194.7	42.8	NR	-0.06	-0.05
14	218	66	NR	0.53	0.31
15	146	43.8	76	-1.29	-1.09
16	152	41	94	-1.14	-1.01
17	NT	NT	NT		
18	NT	NT	NT		
19	188	16.3	118	-0.23	-0.38
20	170	25	107	-0.69	-0.89
21	177	46	98	-0.51	-0.41
22	228	50	NR	0.79	0.59
23	NT	NT	NT		
24	NT	NT	NT		
25	116.6	9.1	NR	-2.04	-4.17
26	230	50	NR	0.84	0.62
27	204.5	14.40	92.1	0.19	0.34
28	200	56	108	0.08	0.05
29	196	58.8	83	-0.03	-0.02
30	224.45	NR	78.6	0.70	1.61
32	NT	NT	NT		
33	185	55.5	105	-0.30	-0.21
34	225	56.25	98	0.71	0.48
35	347	87	40	3.81	1.69

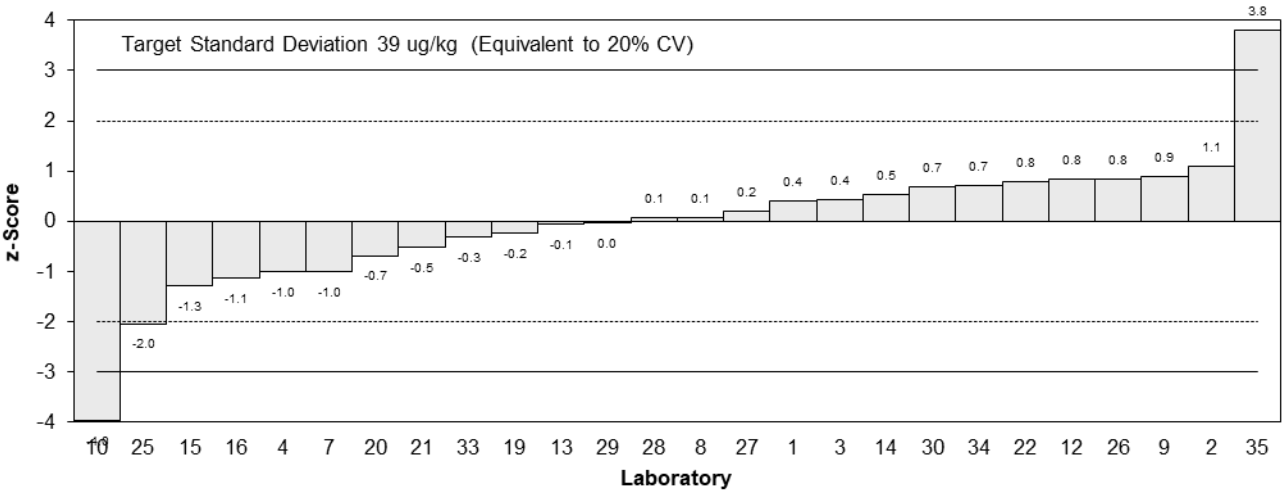
Statistics

Assigned Value*	197	17
Spike	Not Spiked	
Robust Average	197	18
Median	200	16
Mean	196	
N	26	
Max.	347	
Min.	41	

Robust SD	38	
Robust CV	19%	

*Robust Average excluding Laboratories 10 and 35.


Kernel Density
Density
Result
Results: S1 - PFPeS
Assigned Value = 197 ± 17 ug/kg
Results (ug/kg)
Laboratory
10 25 15 16 4 7 20 21 33 19 13 29 28 8 27 1 3 14 30 34 22 12 26 9 2 35 5 11 17 18 23 24 32 6 Md R.A.


z-Scores: S1 - PFPeS
Target Standard Deviation 39 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 15 16 4 7 20 21 33 19 13 29 28 8 27 1 3 14 30 34 22 12 26 9 2 35

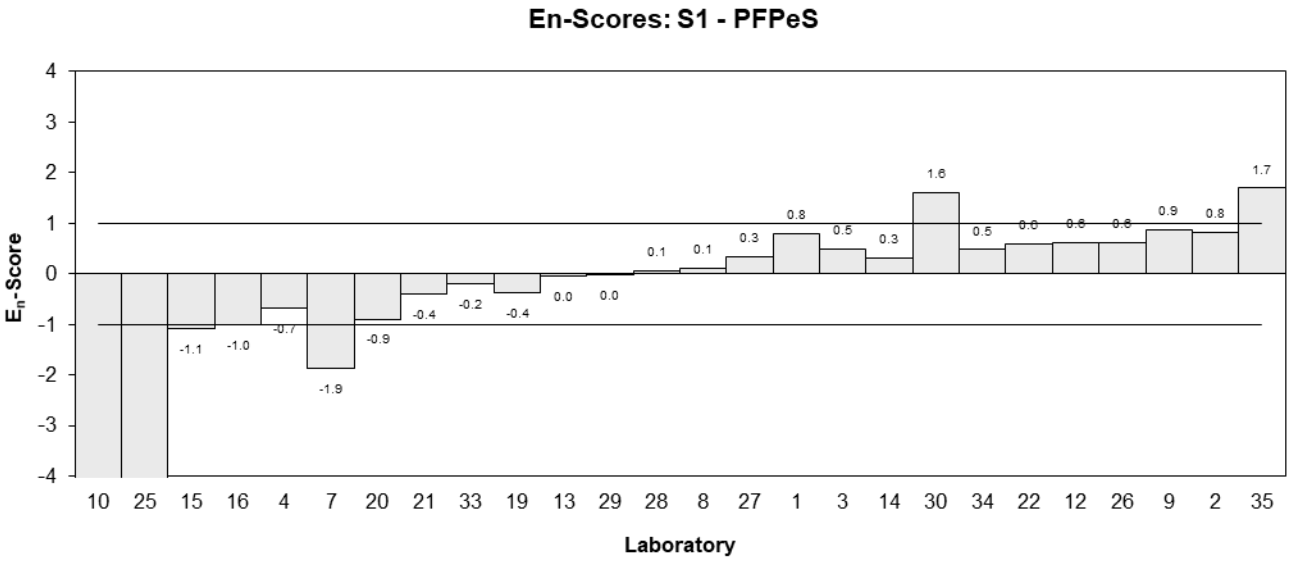

En-Scores: S1 - PFPeS
En-Score
Laboratory
10 25 15 16 4 7 20 21 33 19 13 29 28 8 27 1 3 14 30 34 22 12 26 9 2 35

Figure 3

Table 7

Sample Details

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

Participant Results

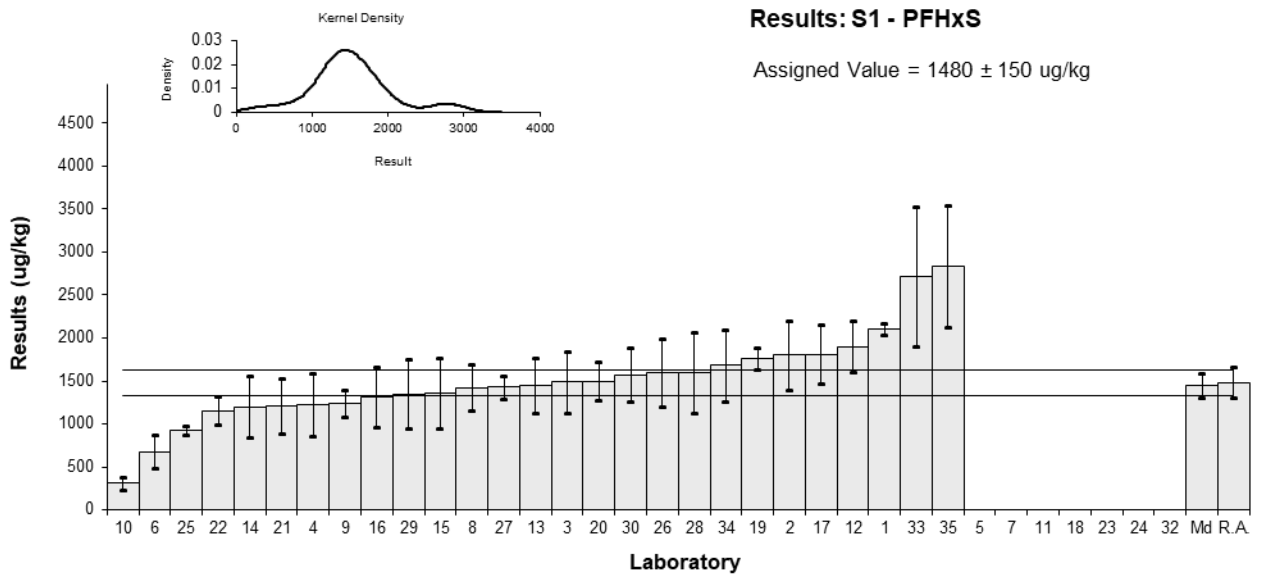
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	2110.91	66.52	NR	2.13	3.84
2	1800	400	NR	1.08	0.75
3	1490	358	114	0.03	0.03
4	1220	364	96.7	-0.88	-0.66
5	NR	NR	NR		
6	680	200	NR	-2.70	-3.20
7	NR	NR	NR		
8	1425	271	NR	-0.19	-0.18
9	1240	160	74	-0.81	-1.09
10	314.0	75.4	96	-3.94	-6.95
11	NT	NT	NT		
12	1900	300	110	1.42	1.25
13	1452.6	319.6	NR	-0.09	-0.08
14	1200	360	87	-0.95	-0.72
15	1360	408	76	-0.41	-0.28
16	1314	355	94	-0.56	-0.43
17	1810	340	64	1.11	0.89
18	NT	NT	NT		
19	1760	129	137	0.95	1.42
20	1500	220	99	0.07	0.08
21	1210	322	98	-0.91	-0.76
22	1156	165	128	-1.09	-1.45
23	NT	NT	NT		
24	NT	NT	NT		
25	931	52	98.6	-1.85	-3.46
26	1600	400	NR	0.41	0.28
27	1432.9	133.85	92.1	-0.16	-0.23
28	1600	474	108	0.41	0.24
29	1350	405	83	-0.44	-0.30
30	1572.02	311.25996	78.6	0.31	0.27
32	NT	NT	NT		
33	2720	816	72.4	4.19	1.49
34	1680	420	98	0.68	0.45
35	2830	709	40	4.56	1.86

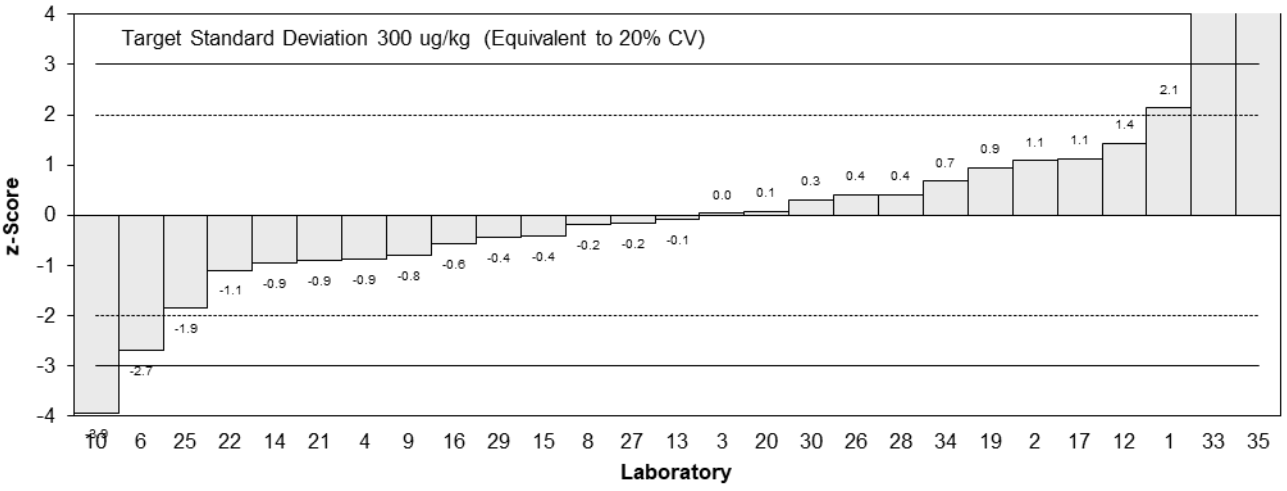
Statistics

Assigned Value*	1480	150
Spike	Not Spiked	
Robust Average	1480	180
Median	1450	140
Mean	1510	
N	27	
Max.	2830	
Min.	314	

Robust SD	380	
Robust CV	26%	

*Robust Average excluding Laboratories 6, 10, 33 and 35.


Kernel Density
Density
Result
Results: S1 - PFHxS
Assigned Value = 1480 ± 150 ug/kg
Results (ug/kg)
Laboratory
10 6 25 22 14 21 4 9 16 29 15 8 27 13 3 20 30 26 28 34 19 2 17 12 1 33 35 5 7 11 18 23 24 32 Md R.A.


z-Scores: S1 - PFHxS
Target Standard Deviation 300 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 6 25 22 14 21 4 9 16 29 15 8 27 13 3 20 30 26 28 34 19 2 17 12 1 33 35

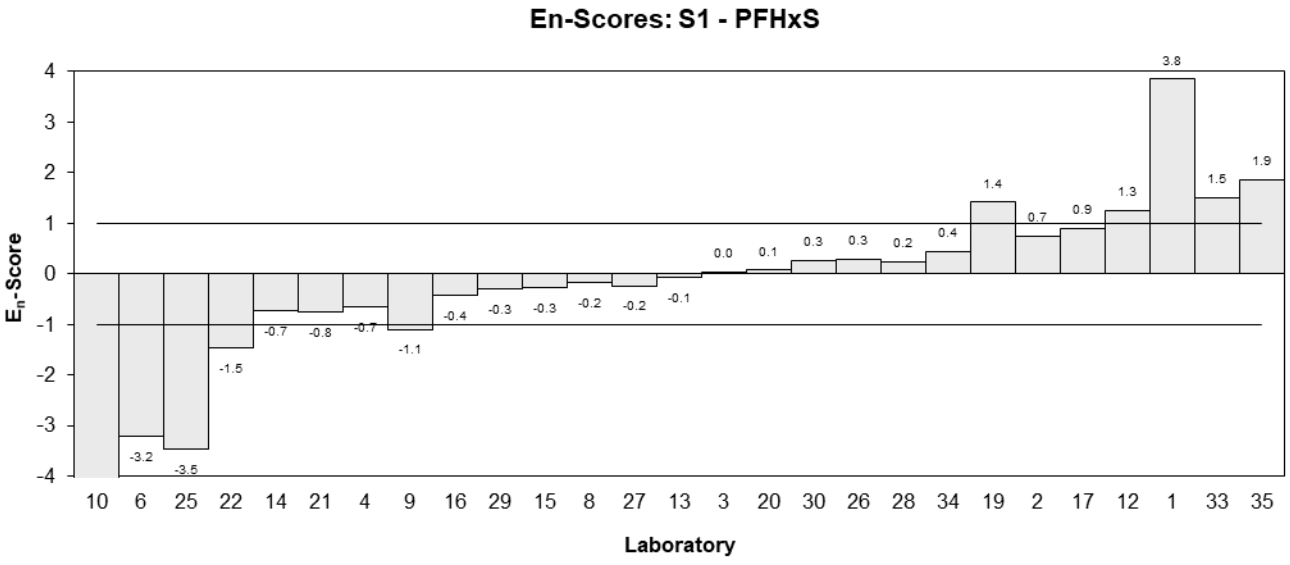

En-Scores: S1 - PFHxS
En-Score
Laboratory
10 6 25 22 14 21 4 9 16 29 15 8 27 13 3 20 30 26 28 34 19 2 17 12 1 33 35

Figure 4

Table 8

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	PFHxS_L
Units	ug/kg

Participant Results

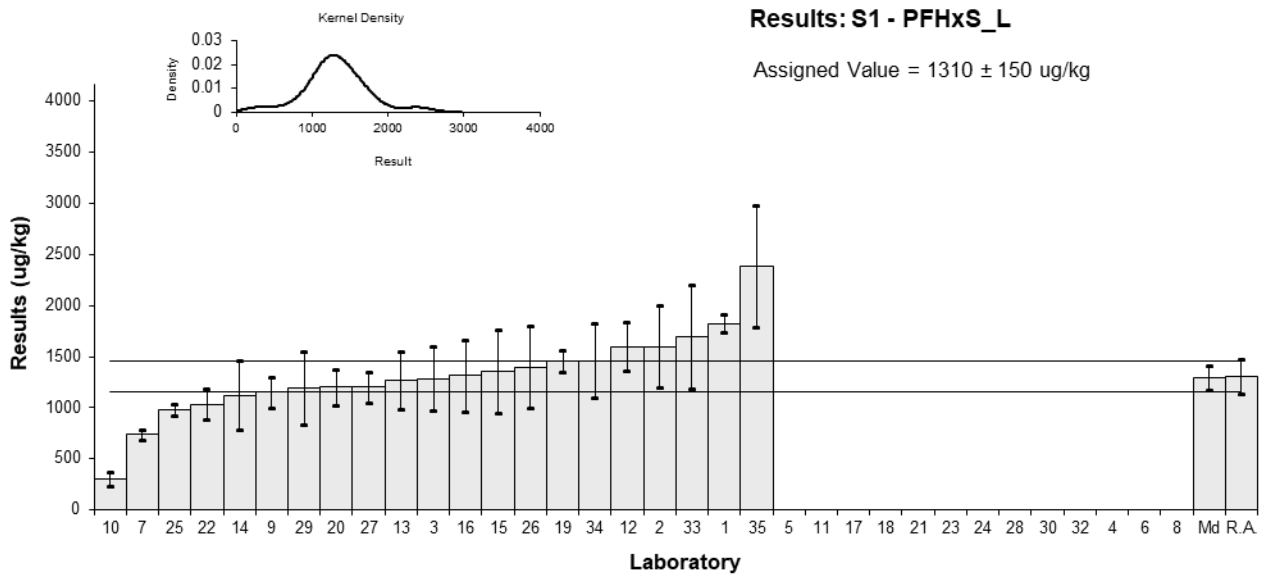
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	1826.16	88.08	85	1.97	2.97
2	1600	400	NR	1.11	0.68
3	1286	309	114	-0.09	-0.07
4	NT	NT	NT		
5	NR	NR	NR		
6	NT	NT	NT		
7	735.95	50.94	NR	-2.19	-3.62
8	NT	NT	NT		
9	1150	150	74	-0.61	-0.75
10	302.6	72.6	NR	-3.85	-6.05
11	NT	NT	NT		
12	1600	240	110	1.11	1.02
13	1270.2	279.4	NR	-0.15	-0.13
14	1123	337	87	-0.71	-0.51
15	1358	407	76	0.18	0.11
16	1314	355	94	0.02	0.01
17	NT	NT	NT		
18	NT	NT	NT		
19	1460	107	137	0.57	0.81
20	1200	180	99	-0.42	-0.47
21	NT	NT	NT		
22	1035	148	128	-1.05	-1.31
23	NT	NT	NT		
24	NT	NT	NT		
25	979	55	98.6	-1.26	-2.07
26	1400	400	NR	0.34	0.21
27	1203.3	152.94	92.1	-0.41	-0.50
28	NT	NT	NT		
29	1190	357	83	-0.46	-0.31
30	NT	NT	NT		
32	NT	NT	NT		
33	1690	507	72.4	1.45	0.72
34	1460	365	98	0.57	0.38
35	2380	596	40	4.08	1.74

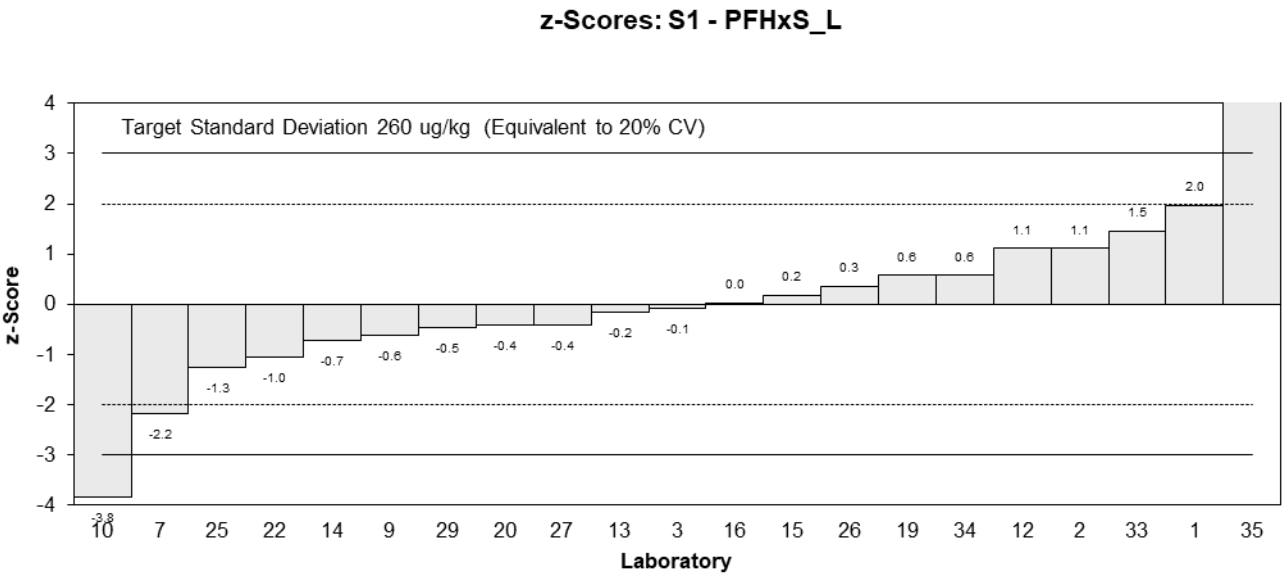
Statistics

Assigned Value*	1310	150
Spike	Not Spiked	
Robust Average	1310	170
Median	1290	120
Mean	1310	
N	21	
Max.	2380	
Min.	302.6	

Robust SD	320	
Robust CV	24%	

*Robust Average excluding Laboratories 10 and 35.


Kernel Density
Density
Result
Results: S1 - PFHxS_L
Assigned Value = 1310 ± 150 ug/kg
Results (ug/kg)
Laboratory
10 7 25 22 14 9 29 20 27 13 3 16 15 26 19 34 12 2 33 1 35 5 11 17 18 21 23 24 28 30 32 4 6 8 Md R.A.


z-Scores: S1 - PFHxS_L
Target Standard Deviation 260 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 7 25 22 14 9 29 20 27 13 3 16 15 26 19 34 12 2 33 1 35

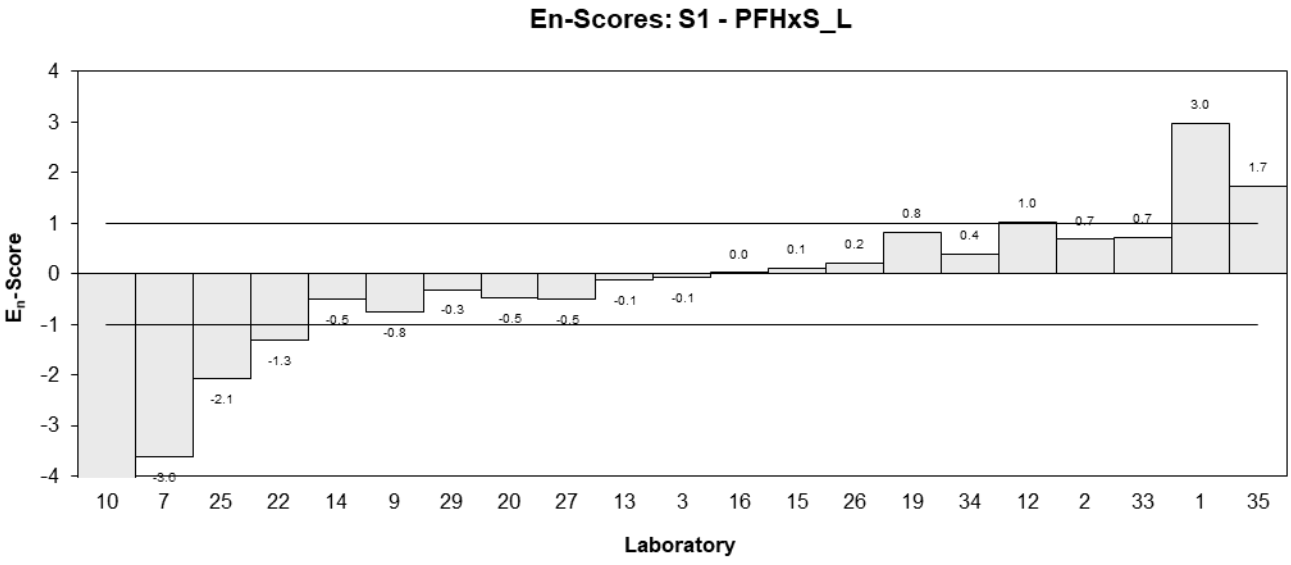

En-Scores: S1 - PFHxS_L
En-Score
Laboratory
10 7 25 22 14 9 29 20 27 13 3 16 15 26 19 34 12 2 33 1 35

Figure 5

Table 9

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	PFHpS
Units	ug/kg

Participant Results

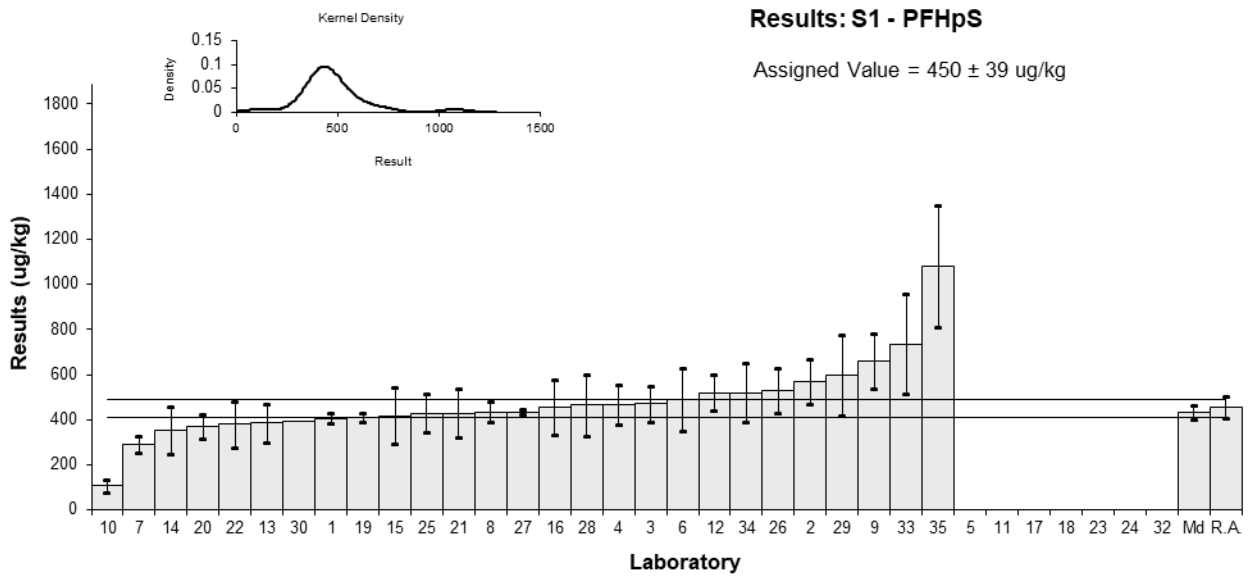
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	406.59	23.92	NR	-0.48	-0.95
2	570	100	NR	1.33	1.12
3	471	80	114	0.23	0.24
4	467	86.4	101	0.19	0.18
5	NR	NR	NR		
6	490	140	NR	0.44	0.28
7	291.12	38.47	NR	-1.77	-2.90
8	435	44	NR	-0.17	-0.26
9	660	123	74	2.33	1.63
10	106.9	29.9	NR	-3.81	-6.98
11	NT	NT	NT		
12	520	80	110	0.78	0.79
13	386.1	84.9	NR	-0.71	-0.68
14	354	106	NR	-1.07	-0.85
15	416	125	55	-0.38	-0.26
16	456	123	94	0.07	0.05
17	NT	NT	NT		
18	NT	NT	NT		
19	411	21.9	137	-0.43	-0.87
20	370	56	99	-0.89	-1.17
21	430	108	98	-0.22	-0.17
22	380	104	NR	-0.78	-0.63
23	NT	NT	NT		
24	NT	NT	NT		
25	428.4	85	NR	-0.24	-0.23
26	530	100	NR	0.89	0.75
27	435.2	9.67	92.1	-0.16	-0.37
28	465	135	120	0.17	0.11
29	597	179.1	55	1.63	0.80
30	395.58	NR	78.6	-0.60	-1.40
32	NT	NT	NT		
33	735	221	72.4	3.17	1.27
34	520	130	98	0.78	0.52
35	1080	269	40	7.00	2.32

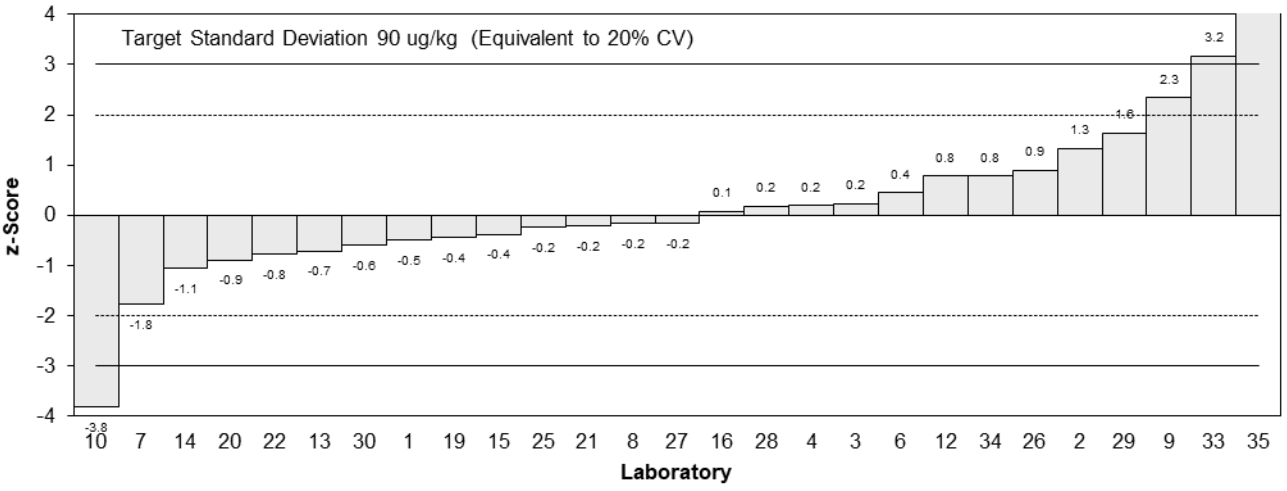
Statistics

Assigned Value*	450	39
Spike	Not Spiked	
Robust Average	458	48
Median	435	32
Mean	474	
N	27	
Max.	1080	
Min.	106.9	

Robust SD	100	
Robust CV	22%	

*Robust Average excluding Laboratories 10, 33 and 35.


Kernel Density
Density
Result
Results: S1 - PFHpS
Assigned Value = 450 ± 39 ug/kg
Results (ug/kg)
Laboratory
10 7 14 20 22 13 30 1 19 15 25 21 8 27 16 28 4 3 6 12 34 26 2 29 9 33 35 5 11 17 18 23 24 32 Md R.A.


z-Scores: S1 - PFHpS
Target Standard Deviation 90 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 7 14 20 22 13 30 1 19 15 25 21 8 27 16 28 4 3 6 12 34 26 2 29 9 33 35

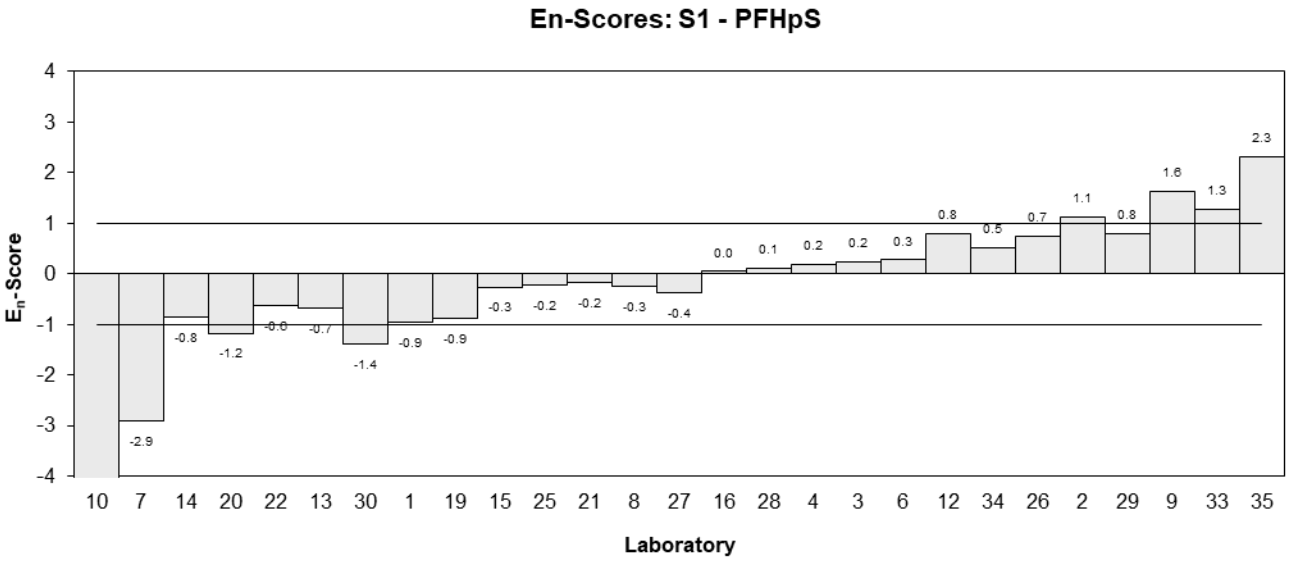

En-Scores: S1 - PFHpS
En-Score
Laboratory
10 7 14 20 22 13 30 1 19 15 25 21 8 27 16 28 4 3 6 12 34 26 2 29 9 33 35

Figure 6

Table 10

Sample Details

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

Participant Results

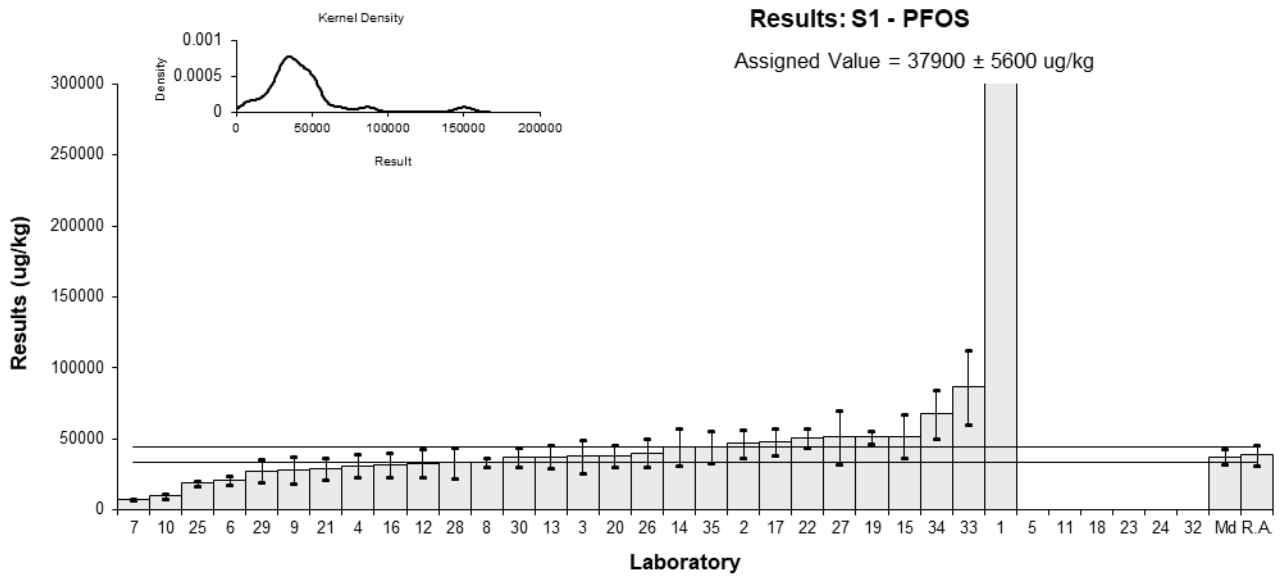
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	471293.56	6204	NR	57.18	51.86
2	47000	10000	NR	1.2	0.79
3	37685	12059	107	-0.03	-0.02
4	31200	8140	101	-0.88	-0.68
5	NR	NR	NR		
6	21000	3000	NR	-2.23	-2.66
7	7446.53	271.28	NR	-4.02	-5.43
8	33695	3370	NR	-0.55	-0.64
9	28000	9240	96	-1.31	-0.92
10	9653.0	2220	49	-3.73	-4.69
11	NT	NT	NT		
12	33000	10000	100	-0.65	-0.43
13	37368.0	8221.0	NR	-0.07	-0.05
14	44153	13246	93	0.82	0.43
15	52000	15600	55	1.86	0.85
16	32000	8640	94	-0.78	-0.57
17	48000	9600	22	1.33	0.91
18	NT	NT	NT		
19	51300	4450	119	1.77	1.87
20	38000	7700	108	0.01	0.01
21	29000	7770	107	-1.17	-0.93
22	51082	6784	73	1.74	1.5
23	NT	NT	NT		
24	NT	NT	NT		
25	18960	1800	82.2	-2.5	-3.22
26	40000	10000	NR	0.28	0.18
27	51219	18865	22.0	1.76	0.68
28	33200	10558	120	-0.62	-0.39
29	27400	8220	87	-1.39	-1.06
30	37279.26	6971.22	77.1	-0.08	-0.07
32	NT	NT	NT		
33	86435	25930	132	6.4	1.83
34	67500	16875	99	3.91	1.66
35	44400	11104	40	0.86	0.52

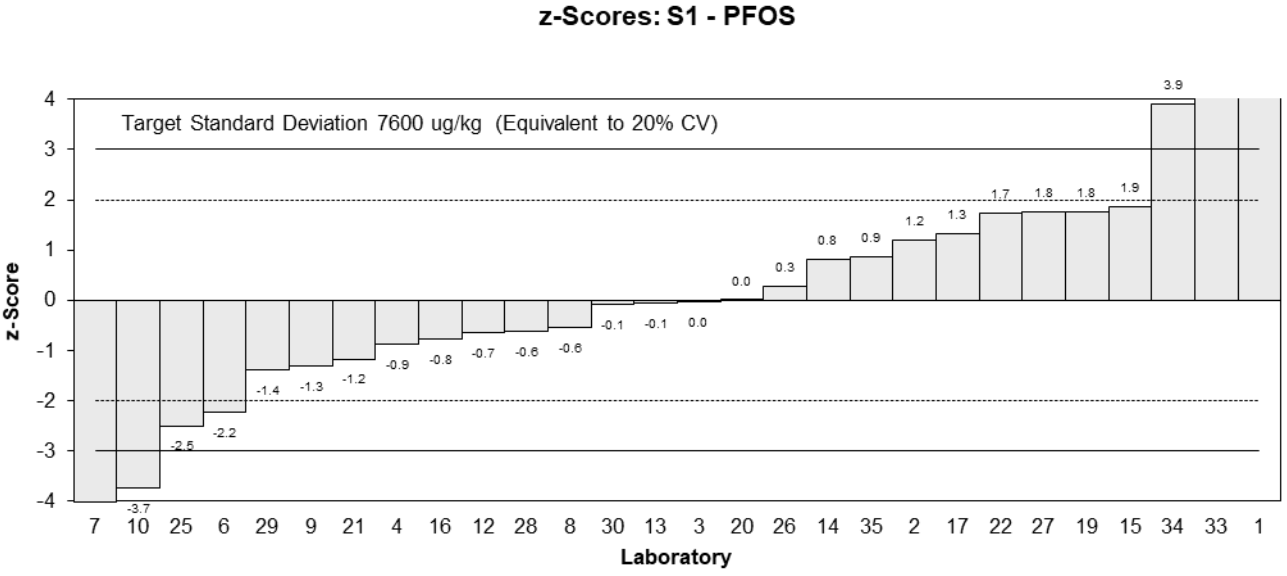
Statistics*

Assigned Value**	37900	5600
Spike	Not Spiked	
Robust Average	37700	6500
Median	37400	5500
Mean	38400	
N	27	
Max.	86435	
Min.	7446.53	

Robust SD	14000	
Robust CV	36%	

*Laboratory 1 removed from statistical calculation.
**Robust Average excluding Laboratories 7, 10,PF 33 and 34.


Kernel Density
Density
0.001
0.0005
0
0
50000
100000
150000
200000
Result
Results: S1 - PFOS
Assigned Value = 37900 ± 5600 ug/kg
Results (ug/kg)
300000
250000
200000
150000
100000
50000
0
7 10 25 6 29 9 21 4 16 12 28 8 30 13 3 20 26 14 35 2 17 22 27 19 15 34 33 1 5 11 18 23 24 32 Md R.A.
Laboratory


z-Scores: S1 - PFOS
Target Standard Deviation 7600 ug/kg (Equivalent to 20% CV)
z-Score
4
3
2
1
0
-1
-2
-3
-4
-3.7 -2.5 -2.2 -1.4 -1.3 -1.2 -0.9 -0.8 -0.7 -0.6 -0.6 -0.1 -0.1 0.0 0.0 0.3 0.8 0.9 1.2 1.3 1.7 1.8 1.8 1.9 3.9
7 10 25 6 29 9 21 4 16 12 28 8 30 13 3 20 26 14 35 2 17 22 27 19 15 34 33 1
Laboratory

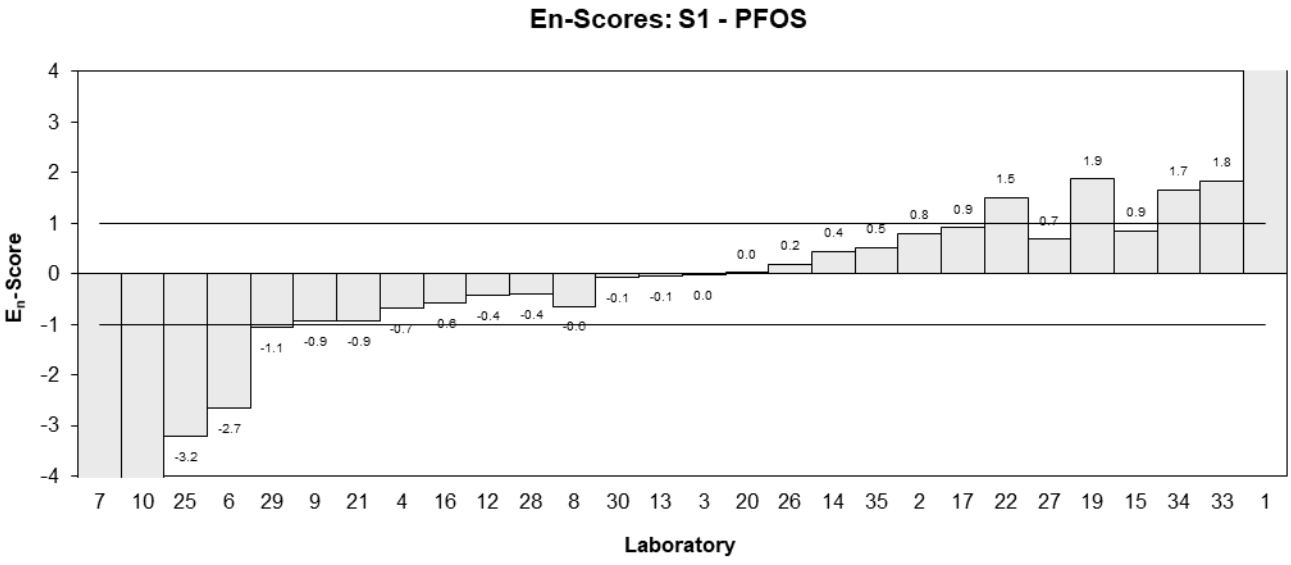

En-Scores: S1 - PFOS
En-Score
4
3
2
1
0
-1
-2
-3
-4
-3.2 -2.7 -1.1 -0.9 -0.9 -0.7 -0.6 -0.4 -0.4 -0.6 -0.1 -0.1 0.0 0.0 0.2 0.4 0.5 0.8 0.9 1.5 0.7 1.9 0.9 1.7 1.8
7 10 25 6 29 9 21 4 16 12 28 8 30 13 3 20 26 14 35 2 17 22 27 19 15 34 33 1
Laboratory

Figure 7

Table 11

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	PFOS_L
Units	ug/kg

Participant Results

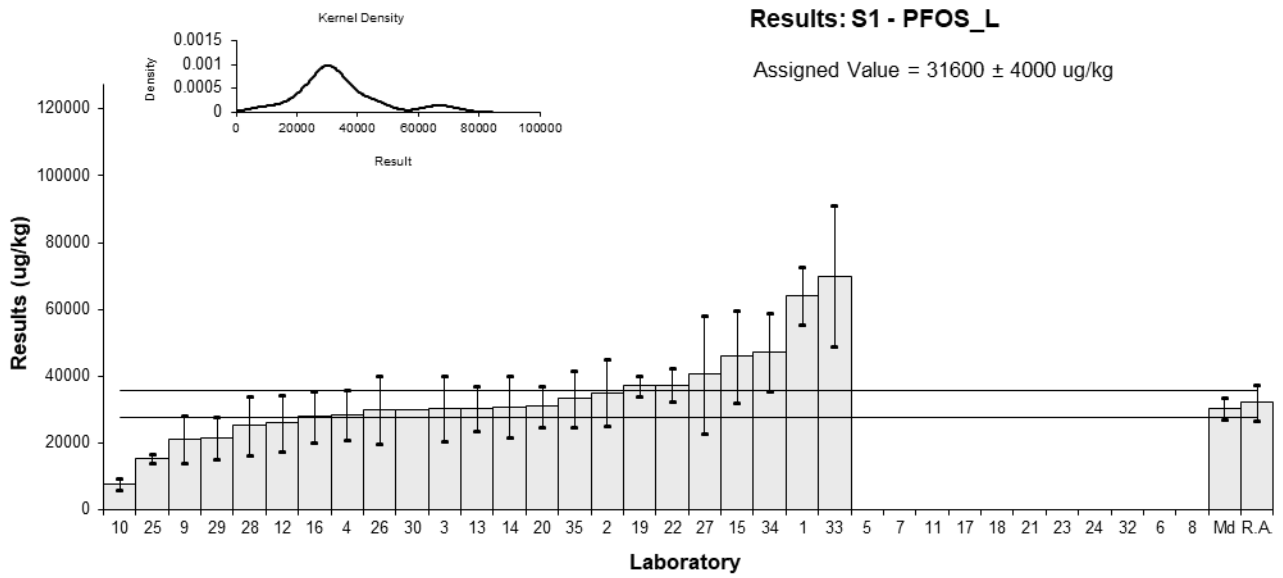
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	64098.17	8595	53	5.14	3.43
2	35000	10000	NR	0.54	0.32
3	30375	9720	107	-0.19	-0.12
4	28610	7460	101	-0.47	-0.35
5	NR	NR	NR		
6	NT	NT	NT		
7	NR	NR	NR		
8	NT	NT	NT		
9	21200	7000	96	-1.65	-1.29
10	7785.0	1791	NR	-3.77	-5.43
11	NT	NT	NT		
12	26000	8500	100	-0.89	-0.60
13	30386.2	6685.0	101	-0.19	-0.16
14	30854	9256	93	-0.12	-0.07
15	46000	13800	55	2.28	1.00
16	28000	7688	94	-0.57	-0.42
17	NT	NT	NT		
18	NT	NT	NT		
19	37100	3210	119	0.87	1.07
20	31000	6100	108	-0.09	-0.08
21	NT	NT	NT		
22	37396	4966	73	0.92	0.91
23	NT	NT	NT		
24	NT	NT	NT		
25	15479	1450	82.2	-2.55	-3.79
26	30000	10000	NR	-0.25	-0.15
27	40563	17624	22.0	1.42	0.50
28	25200	8917	120	-1.01	-0.65
29	21500	6450	87	-1.60	-1.33
30	30097.35	NR	NR	-0.24	-0.38
32	NT	NT	NT		
33	70017	21005	132	6.08	1.80
34	47200	11800	99	2.47	1.25
35	33300	8328	40	0.27	0.18

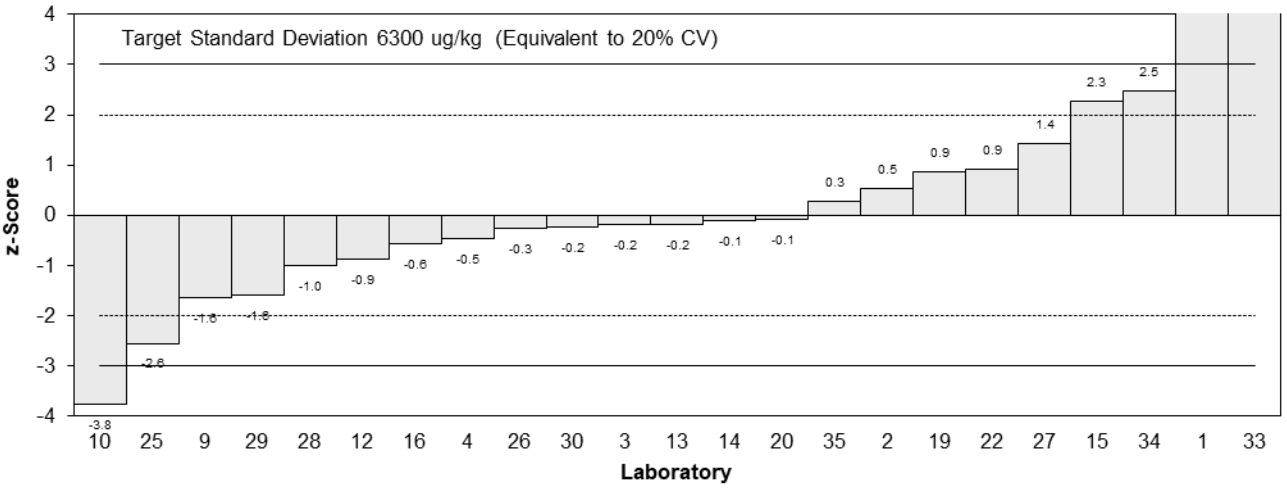
Statistics

Assigned Value*	31600	4000
Spike	Not Spiked	
Robust Average	32100	5500
Median	30400	3300
Mean	33400	
N	23	
Max.	70017	
Min.	7785	

Robust SD	11000	
Robust CV	33%	

*Robust Average excluding Laboratories 1, 10, 25 and 33.


Kernel Density
Density
0.0015
0.001
0.0005
0
0
20000
40000
60000
80000
100000
Result
Results: S1 - PFOS_L
Assigned Value = 31600 ± 4000 ug/kg
Results (ug/kg)
120000
100000
80000
60000
40000
20000
0
10 25 9 29 28 12 16 4 26 30 3 13 14 20 35 2 19 22 27 15 34 1 33 5 7 11 17 18 21 23 24 32 6 8 Md R.A.
Laboratory


z-Scores: S1 - PFOS_L
Target Standard Deviation 6300 ug/kg (Equivalent to 20% CV)
z-Score
4
3
2
1
0
-1
-2
-3
-4
-3.8
-2.6
-1.6
-1.6
-1.0
-0.9
-0.6
-0.5
-0.3
-0.2
-0.2
-0.2
-0.1
-0.1
0.3
0.5
0.9
0.9
1.4
2.3
2.5
10 25 9 29 28 12 16 4 26 30 3 13 14 20 35 2 19 22 27 15 34 1 33
Laboratory

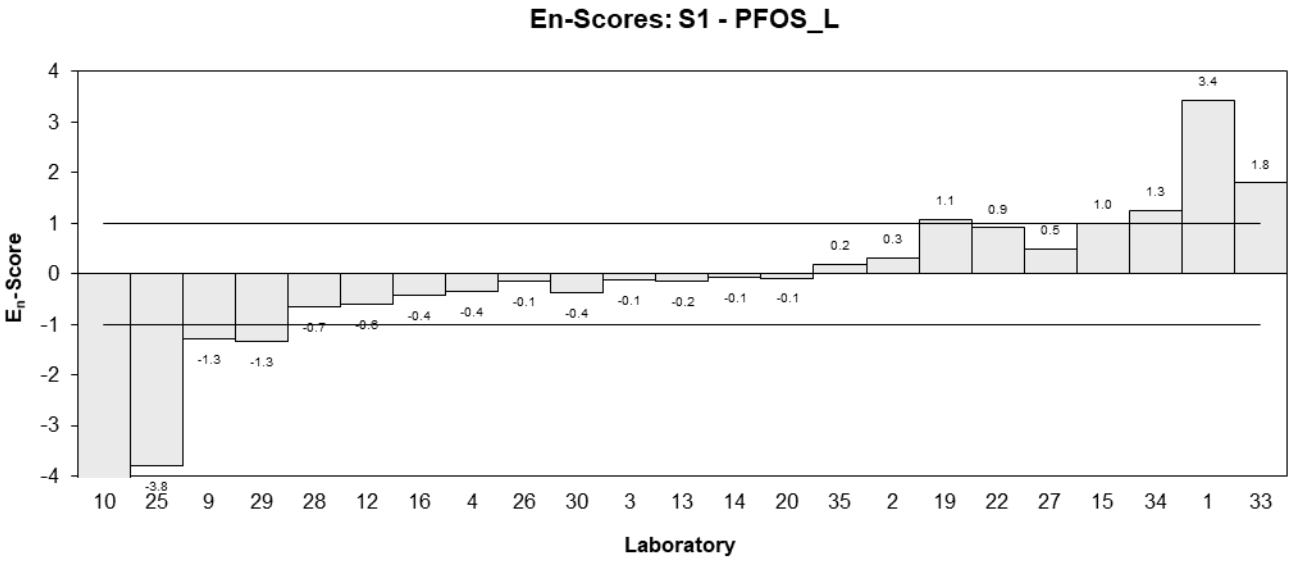

En-Scores: S1 - PFOS_L
En-Score
4
3
2
1
0
-1
-2
-3
-4
-3.8
-1.3
-1.3
-0.7
-0.6
-0.4
-0.4
-0.1
-0.4
-0.1
-0.2
-0.1
-0.1
0.2
0.3
1.1
0.9
0.5
1.0
1.3
3.4
1.8
10 25 9 29 28 12 16 4 26 30 3 13 14 20 35 2 19 22 27 15 34 1 33
Laboratory

Figure 8

Table 12

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	PFNS
Units	ug/kg

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	277.22	18.56	NR
2	NT	NT	NT
3	56	8.9	107
4	202	54.9	65.2
5	NR	NR	NR
6	690	99	NR
7	NT	NT	NT
8	NT	NT	NT
9	155	30	43
10	78.5	22	NR
11	NT	NT	NT
12	NT	NT	NT
13	65.6	14.4	NR
14	258	77	NR
15	221	66.3	55
16	223	60	94
17	NT	NT	NT
18	NT	NT	NT
19	554	40.6	119
20	83	12	108
21	NT	NT	NT
22	279	83	NR
23	NT	NT	NT
24	NT	NT	NT
25	92.7	8.5	NR
26	NT	NT	NT
27	59.95	6.956	22.0
28	NT	NT	NT
29	73.7	22.11	55
30	NT	NT	NT
32	NT	NT	NT
33	NT	NT	NT
34	247	61.75	99
35	NT	NT	NT

Statistics

Assigned Value	Not Set		**Robust SD**	120
Spike	Not Spiked		**Robust CV**	67%
Robust Average	182	74		
Median	202	83		
Mean	213			
N	17			
Max.	690			
Min.	56			

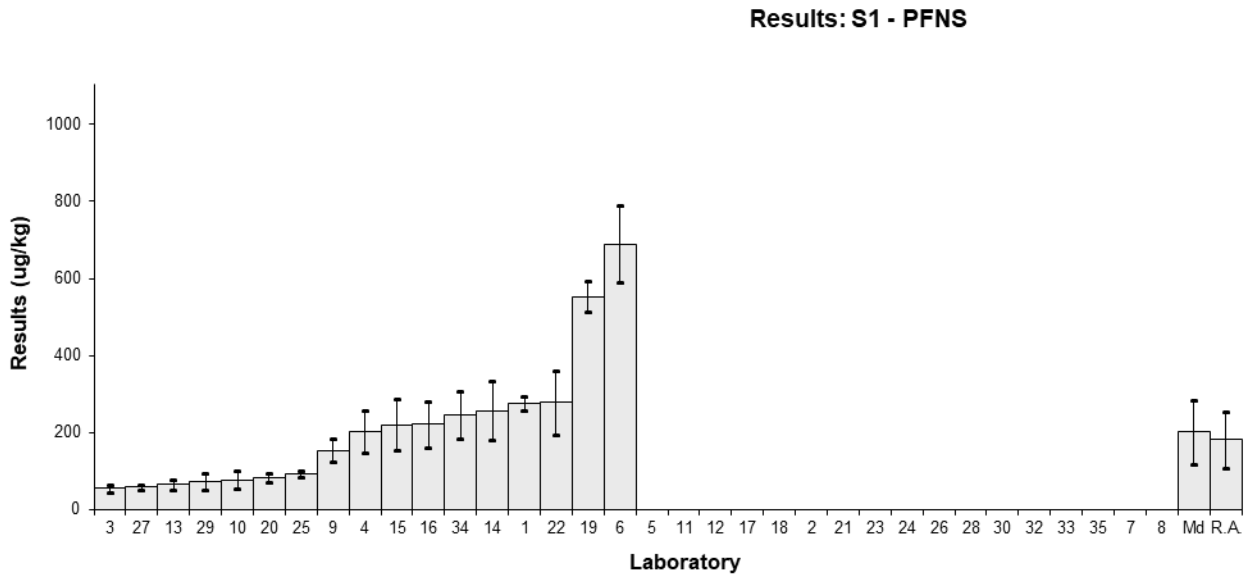

Results: S1 - PFNS
Results (ug/kg)
1000
800
600
400
200
0
3 27 13 29 10 20 25 9 4 15 16 34 14 1 22 19 6 5 11 12 17 18 2 21 23 24 26 28 30 32 33 35 7 8 Md R.A.
Laboratory

Figure 9

Table 13

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	PFDS
Units	ug/kg

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	146.02	18.98	NR
2	260	50	NR
3	64	15	107
4	158	43.0	57.5
5	NR	NR	NR
6	NT	NT	NT
7	58.95	54.77	NR
8	255	41	NR
9	117	20	43
10	88.1	27.3	NR
11	NT	NT	NT
12	110	30	140
13	73.3	16.1	NR
14	202	61	NR
15	136	40.8	79
16	143	39	94
17	280	56	NR
18	NT	NT	NT
19	340	24.9	119
20	93	14	108
21	130	37	107
22	198	70	NR
23	NT	NT	NT
24	NT	NT	NT
25	42.9	6.6	NR
26	220	50	NR
27	28.37	10.131	22.0
28	230	75	88
29	71.5	21.45	55
30	152.19	NR	33.4
32	NT	NT	NT
33	112	33.6	103
34	272	68	99
35	272	68	40

Statistics

Assigned Value	Not Set	
Spike	Not Spiked	
Robust Average	156	44
Median	143	41
Mean	158	
N	27	
Max.	340	
Min.	28.37	

Robust SD	92
Robust CV	59%

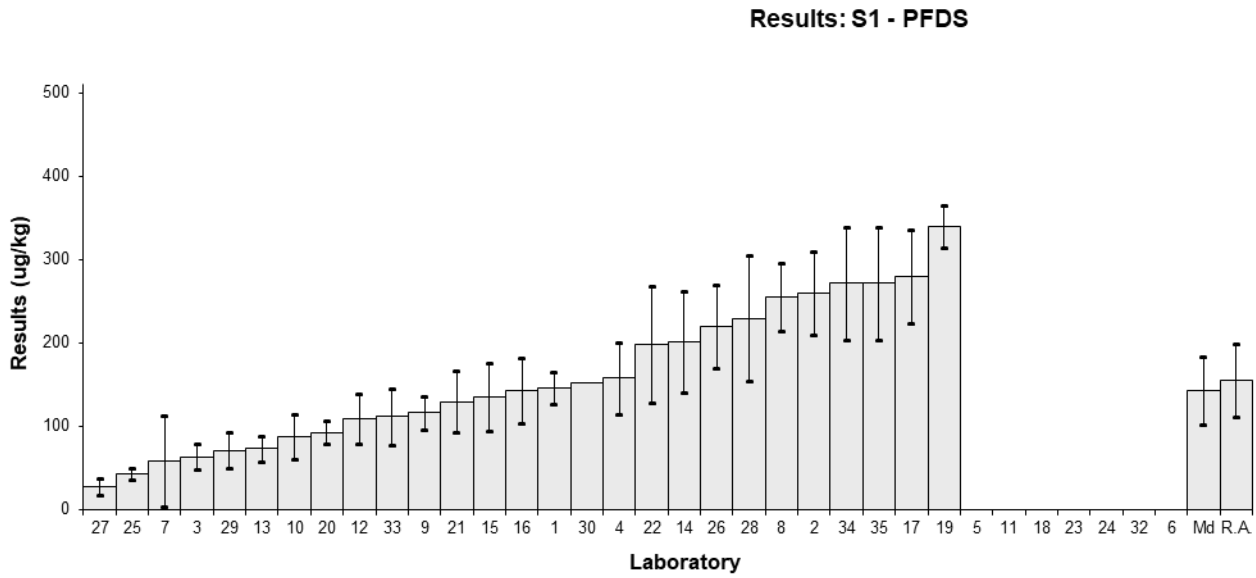

Results: S1 - PFDS
Results (ug/kg)
500
400
300
200
100
0
27 25 7 3 29 13 10 20 12 33 9 21 15 16 1 30 4 22 14 26 28 8 2 34 35 17 19 5 11 18 23 24 32 6 Md R.A.
Laboratory

Figure 10

Table 14

Sample Details

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

Participant Results

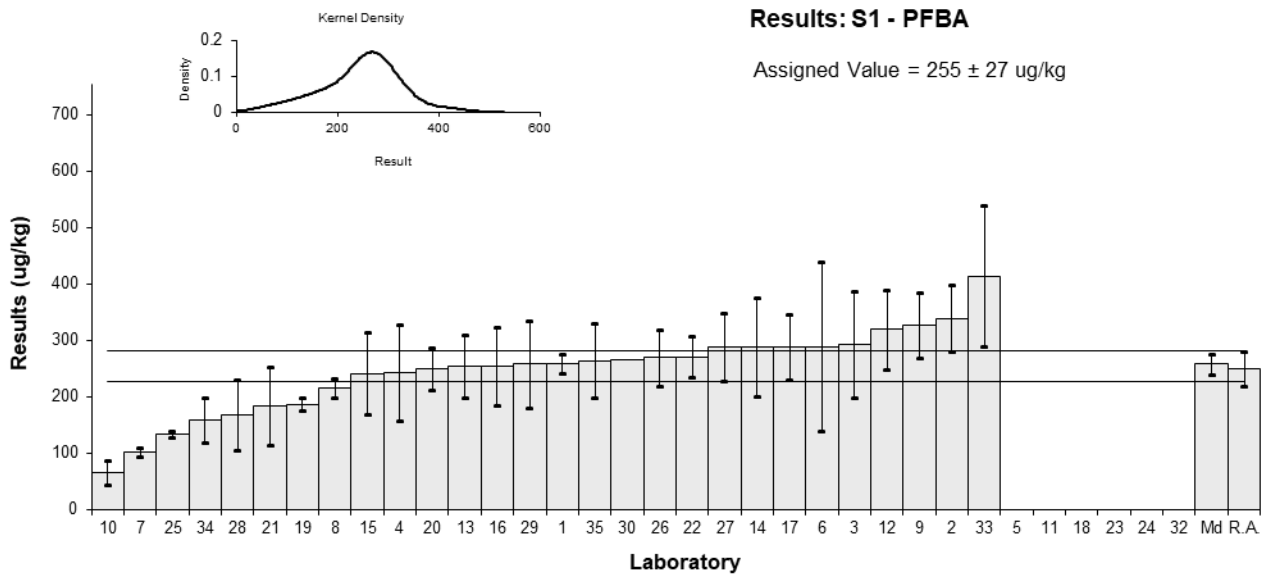
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	259.54	16.28	74	0.09	0.14
2	340	60	NR	1.67	1.29
3	293	94	96	0.75	0.39
4	244	85.4	127	-0.22	-0.12
5	NR	NR	NR		
6	290	150	NR	0.69	0.23
7	103.29	8.26	NR	-2.97	-5.37
8	216	17	NR	-0.76	-1.22
9	327	58	61	1.41	1.13
10	66.0	21.8	88	-3.71	-5.45
11	NT	NT	NT		
12	320	70	150	1.27	0.87
13	254.9	56.1	NR	0.00	0.00
14	289	87	69	0.67	0.37
15	242	72.6	86	-0.25	-0.17
16	255	69	94	0.00	0.00
17	290	58	94	0.69	0.55
18	NT	NT	NT		
19	187	11.2	107	-1.33	-2.33
20	250	37	100	-0.10	-0.11
21	185	69	110	-1.37	-0.94
22	272	37	81	0.33	0.37
23	NT	NT	NT		
24	NT	NT	NT		
25	134	6.3	94.6	-2.37	-4.36
26	270	50	NR	0.29	0.26
27	288.5	60.239	92.0	0.66	0.51
28	169	63	83	-1.69	-1.25
29	259	77.7	84	0.08	0.05
30	266.44	NR	78.6	0.22	0.42
32	NT	NT	NT		
33	415	124.5	59.6	3.14	1.26
34	159	39.75	95	-1.88	-2.00
35	265	66	70	0.20	0.14

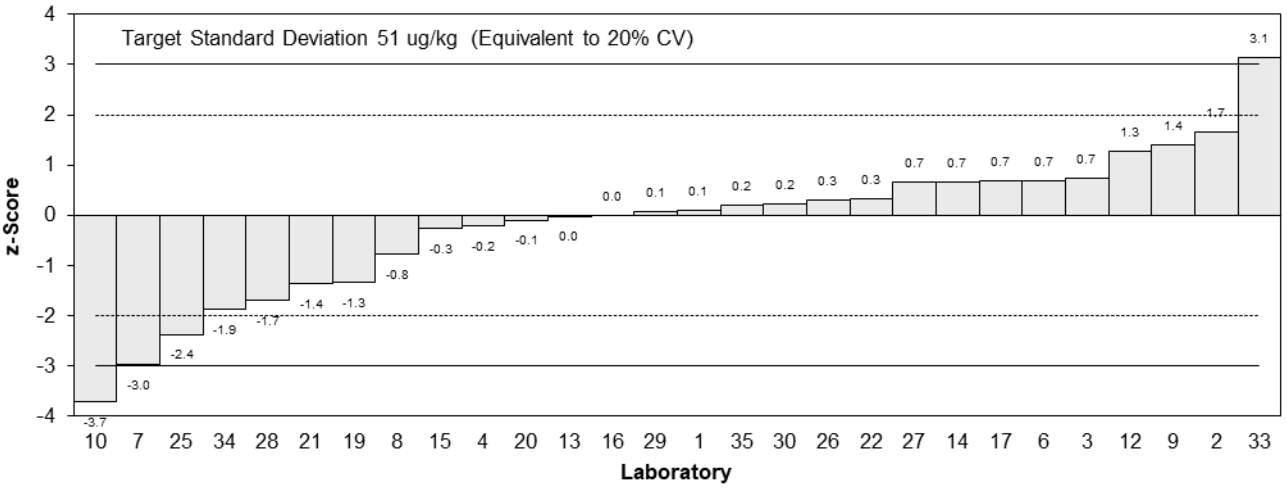
Statistics

Assigned Value*	255	27
Spike	Not Spiked	
Robust Average	250	31
Median	259	18
Mean	247	
N	28	
Max.	415	
Min.	66	

Robust SD	66	
Robust CV	27%	

*Robust Average excluding Laboratories 7, 10 and 33.


Kernel Density
Density
Result
Results: S1 - PFBA
Assigned Value = 255 ± 27 ug/kg
Results (ug/kg)
Laboratory
10 7 25 34 28 21 19 8 15 4 20 13 16 29 1 35 30 26 22 27 14 17 6 3 12 9 2 33 5 11 18 23 24 32 Md R.A.


z-Scores: S1 - PFBA
Target Standard Deviation 51 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 7 25 34 28 21 19 8 15 4 20 13 16 29 1 35 30 26 22 27 14 17 6 3 12 9 2 33

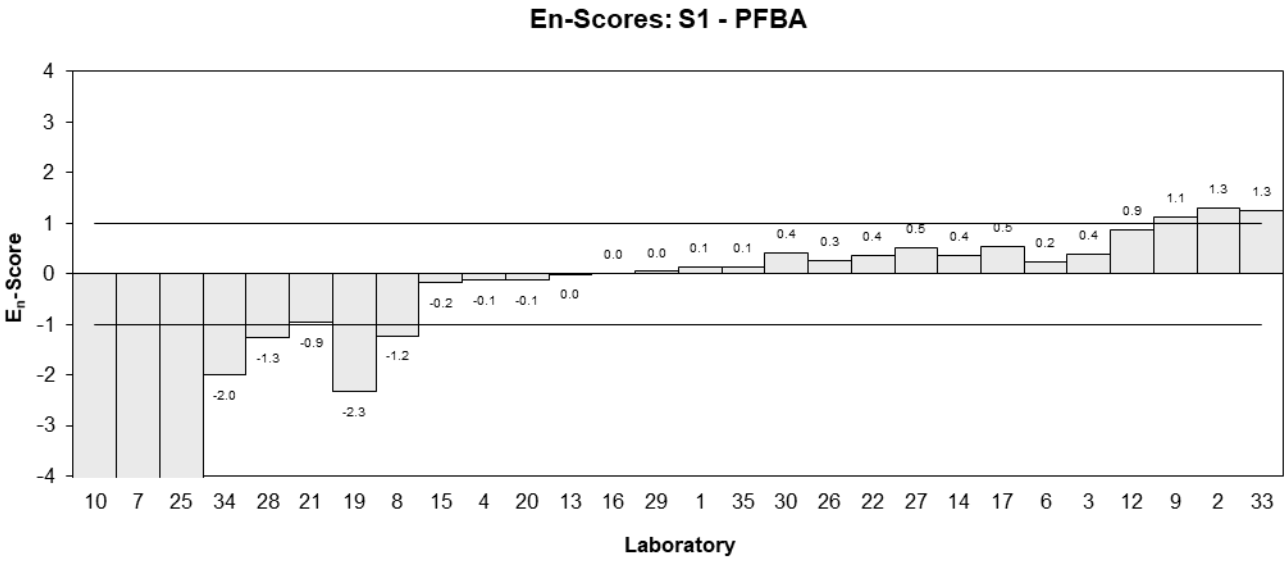

En-Scores: S1 - PFBA
En-Score
Laboratory
10 7 25 34 28 21 19 8 15 4 20 13 16 29 1 35 30 26 22 27 14 17 6 3 12 9 2 33

Figure 11

Table 15

Sample Details

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

Participant Results

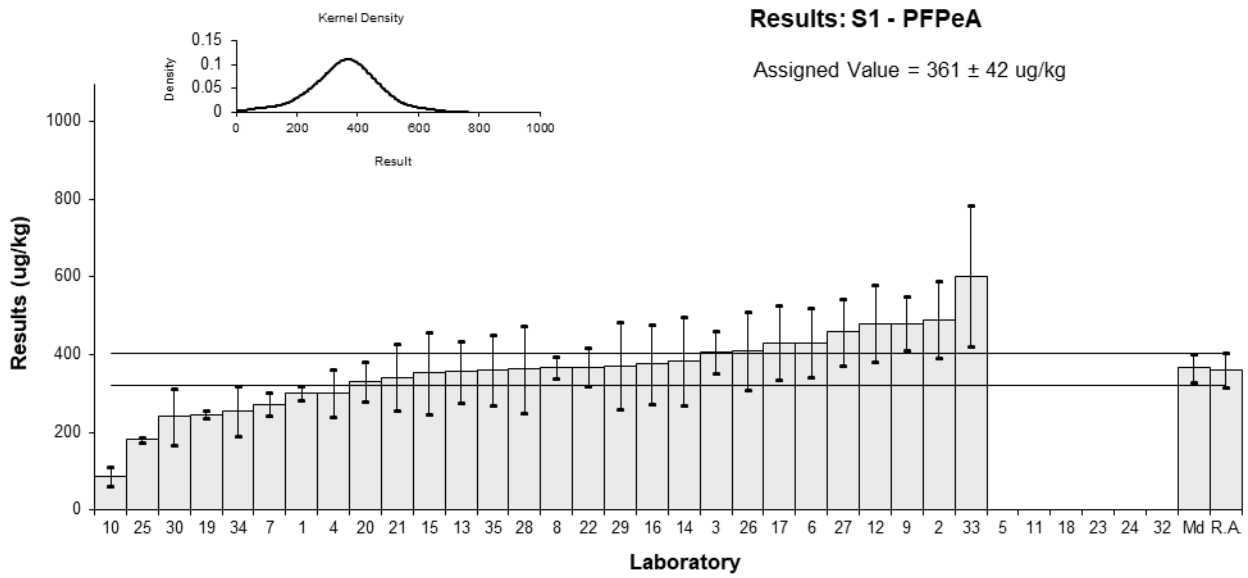
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	301.60	18.62	50	-0.82	-1.29
2	490	100	NR	1.79	1.19
3	406	53	95	0.62	0.67
4	302	61.0	115	-0.82	-0.80
5	NR	NR	NR		
6	430	89	NR	0.96	0.70
7	272.25	30.76	NR	-1.23	-1.70
8	367	29	NR	0.08	0.12
9	480	69	58	1.65	1.47
10	87.0	25.2	78	-3.80	-5.59
11	NT	NT	NT		
12	480	100	132	1.65	1.10
13	355.2	78.2	NR	-0.08	-0.07
14	383	115	129	0.30	0.18
15	352	106	75	-0.12	-0.08
16	376	102	94	0.21	0.14
17	430	95	NR	0.96	0.66
18	NT	NT	NT		
19	246	9.83	136	-1.59	-2.67
20	330	50	114	-0.43	-0.47
21	341	85	90	-0.28	-0.21
22	368	50	96	0.10	0.11
23	NT	NT	NT		
24	NT	NT	NT		
25	180.6	7.8	102.3	-2.50	-4.22
26	410	100	NR	0.68	0.45
27	458	85.662	93.8	1.34	1.02
28	363	112	95	0.03	0.02
29	371	111.3	86	0.14	0.08
30	239.95	71.985	78.6	-1.68	-1.45
32	NT	NT	NT		
33	602	180.6	92.4	3.34	1.30
34	254	63.5	98	-1.48	-1.41
35	359	90	70	-0.03	-0.02

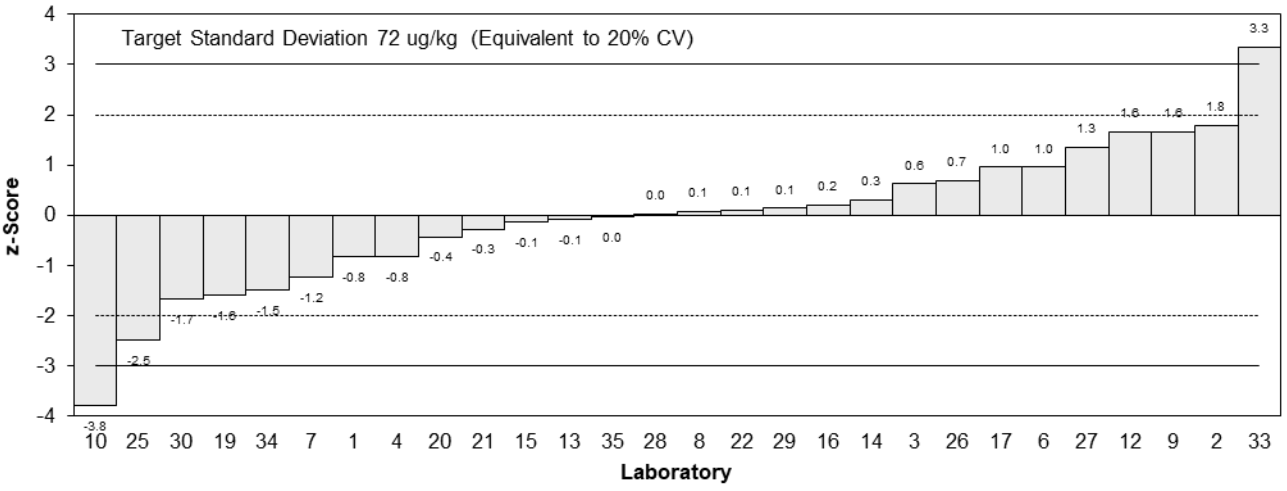
Statistics

Assigned Value*	361	42
Spike	Not Spiked	
Robust Average	361	44
Median	365	36
Mean	358	
N	28	
Max.	602	
Min.	87	

Robust SD	94	
Robust CV	26%	

*Robust Average excluding Laboratories 10 and 33.


Kernel Density
Density
Result
Results: S1 - PFPeA
Assigned Value = 361 ± 42 ug/kg
Results (ug/kg)
Laboratory
10 25 30 19 34 7 1 4 20 21 15 13 35 28 8 22 29 16 14 3 26 17 6 27 12 9 2 33 5 11 18 23 24 32 Md R.A.


z-Scores: S1 - PFPeA
Target Standard Deviation 72 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 30 19 34 7 1 4 20 21 15 13 35 28 8 22 29 16 14 3 26 17 6 27 12 9 2 33

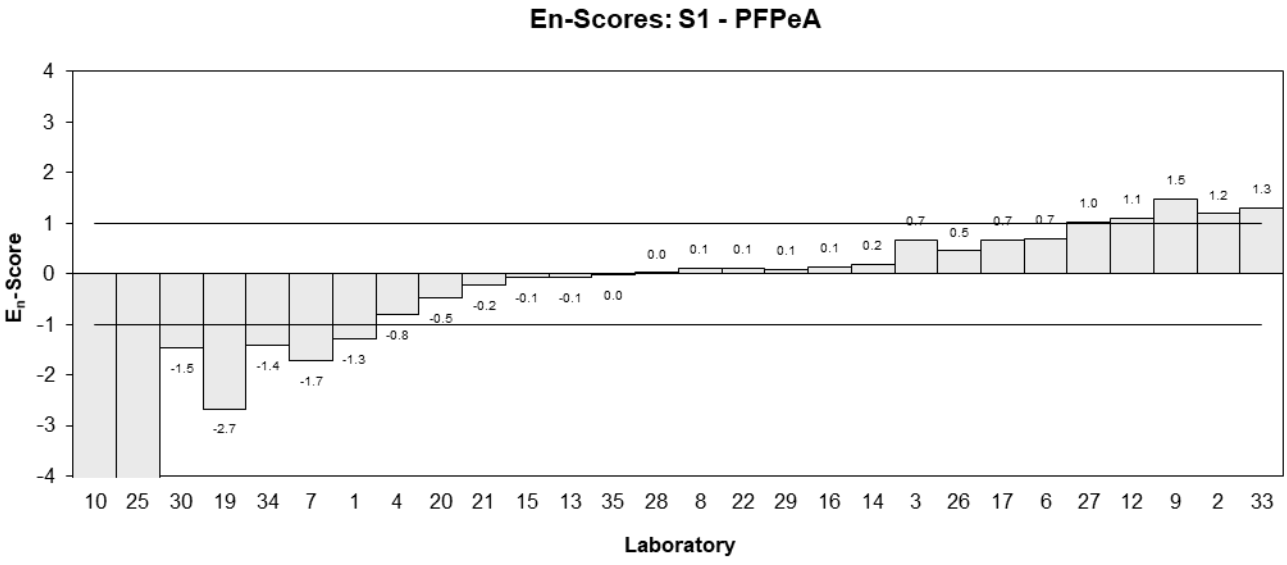

En-Scores: S1 - PFPeA
En-Score
Laboratory
10 25 30 19 34 7 1 4 20 21 15 13 35 28 8 22 29 16 14 3 26 17 6 27 12 9 2 33

Figure 12

Table 16

Sample Details

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

Participant Results

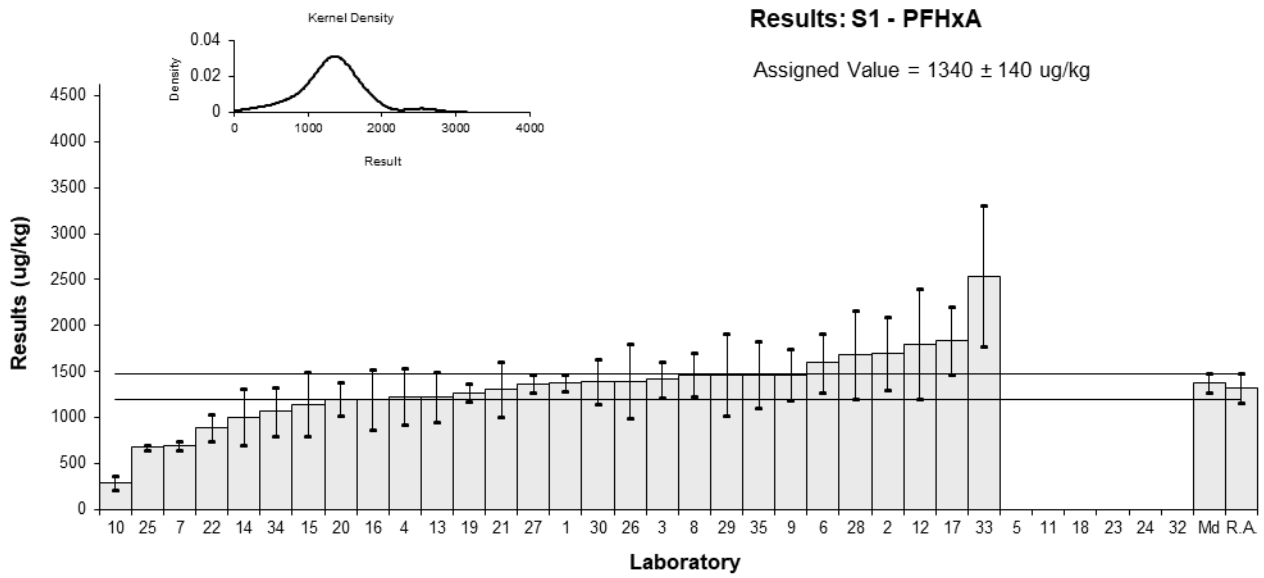
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	1381.62	87.36	53	0.16	0.25
2	1700	400	NR	1.34	0.85
3	1418	198	87	0.29	0.32
4	1230	306	97.4	-0.41	-0.33
5	NR	NR	NR		
6	1600	320	NR	0.97	0.74
7	696.12	50.33	NR	-2.40	-4.33
8	1467	235	NR	0.47	0.46
9	1470	280	75	0.49	0.42
10	297.0	80.2	94	-3.89	-6.46
11	NT	NT	NT		
12	1800	600	146	1.72	0.75
13	1233.4	271.3	NR	-0.40	-0.35
14	1010	303	109	-1.23	-0.99
15	1150	345	71	-0.71	-0.51
16	1203	325	94	-0.51	-0.39
17	1840	370	90	1.87	1.26
18	NT	NT	NT		
19	1274	93.4	112	-0.25	-0.39
20	1200	180	104	-0.52	-0.61
21	1310	299	90	-0.11	-0.09
22	892	140	119	-1.67	-2.26
23	NT	NT	NT		
24	NT	NT	NT		
25	680.1	24	94.4	-2.46	-4.65
26	1400	400	NR	0.22	0.14
27	1371.2	94.345	78.9	0.12	0.18
28	1685	485	95	1.29	0.68
29	1470	441	85	0.49	0.28
30	1397.22	243.11628	78.6	0.21	0.20
32	NT	NT	NT		
33	2540	762	89.7	4.48	1.55
34	1070	267.5	105	-1.01	-0.89
35	1470	367	70	0.49	0.33

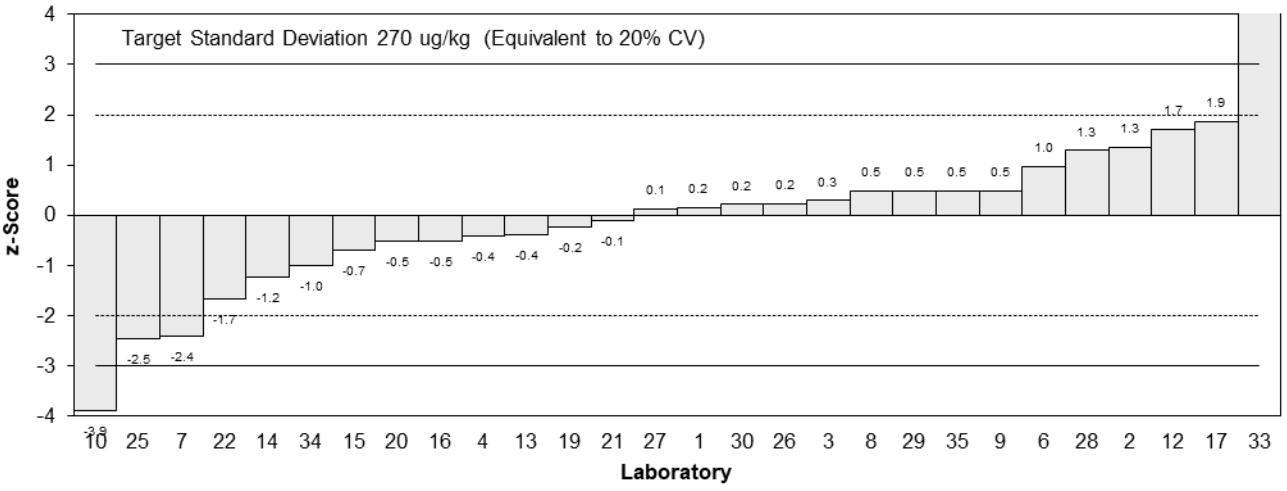
Statistics

Assigned Value*	1340	140
Spike	Not Spiked	
Robust Average	1330	160
Median	1380	100
Mean	1330	
N	28	
Max.	2540	
Min.	297	

Robust SD	340	
Robust CV	25%	

*Robust Average excluding Laboratories 10 and 33.


Kernel Density
Density
Result
Results: S1 - PFHxA
Assigned Value = 1340 ± 140 ug/kg
Results (ug/kg)
Laboratory
10 25 7 22 14 34 15 20 16 4 13 19 21 27 1 30 26 3 8 29 35 9 6 28 2 12 17 33 5 11 18 23 24 32 Md R.A.


z-Scores: S1 - PFHxA
Target Standard Deviation 270 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 7 22 14 34 15 20 16 4 13 19 21 27 1 30 26 3 8 29 35 9 6 28 2 12 17 33

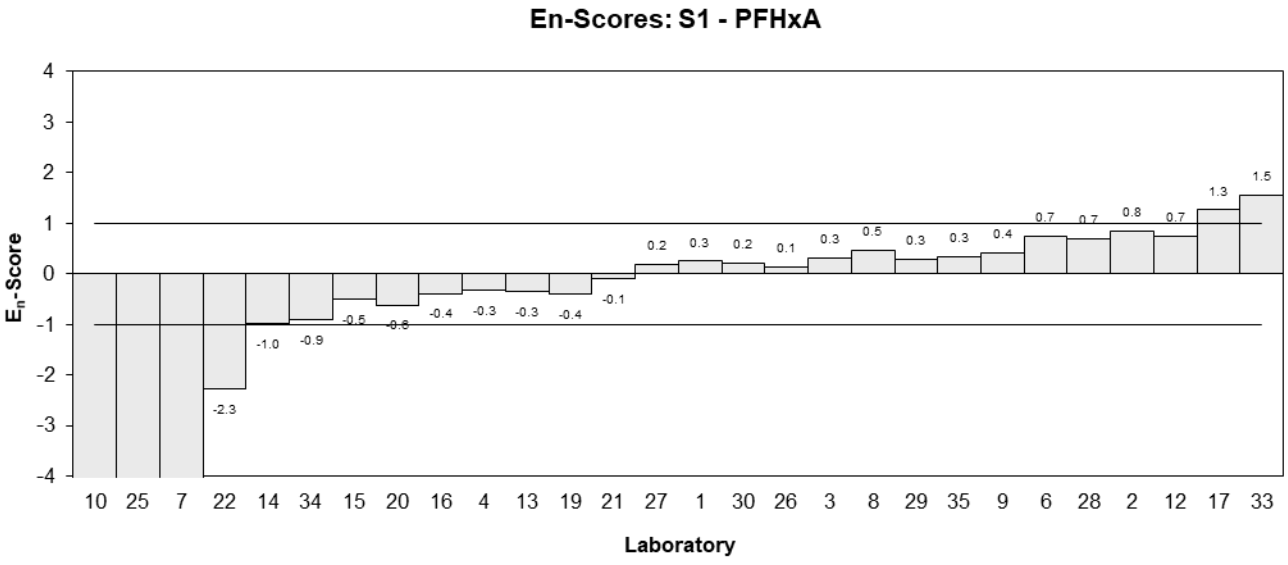

En-Scores: S1 - PFHxA
En-Score
Laboratory
10 25 7 22 14 34 15 20 16 4 13 19 21 27 1 30 26 3 8 29 35 9 6 28 2 12 17 33

Figure 13

Table 17

Sample Details

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

Participant Results

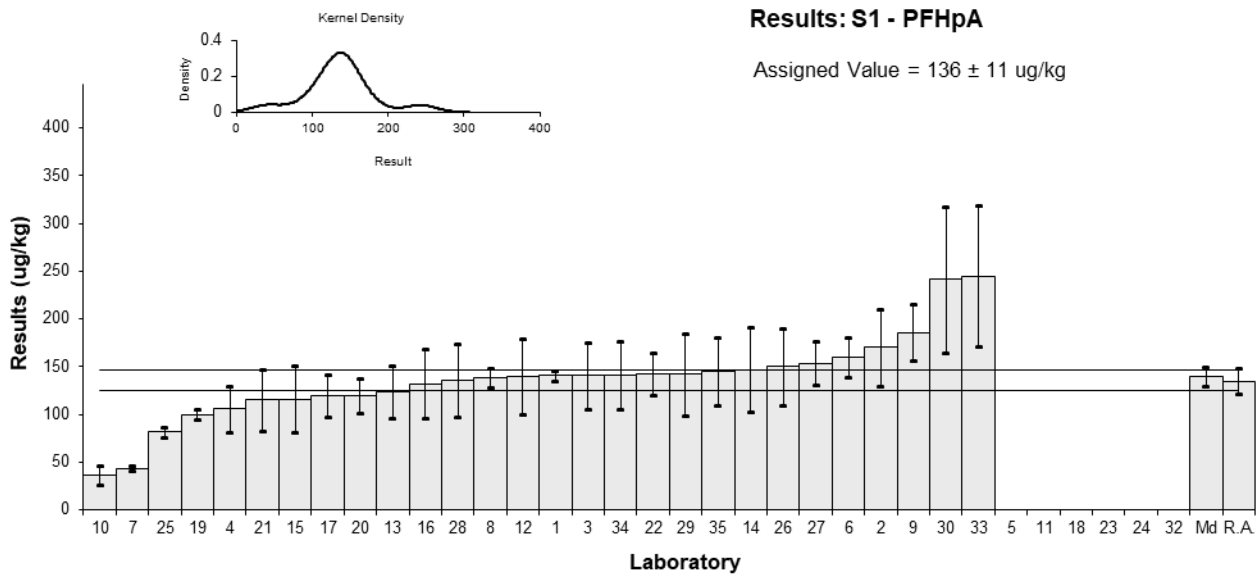
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	140.81	5.45	52	0.18	0.39
2	170	40	NR	1.25	0.82
3	141	35	99	0.18	0.14
4	106	24	104	-1.10	-1.14
5	NR	NR	NR		
6	160	21	NR	0.88	1.01
7	43.67	2.47	NR	-3.39	-8.19
8	139	10	NR	0.11	0.20
9	186	30	59	1.84	1.56
10	36.1	10.1	96	-3.67	-6.69
11	NT	NT	NT		
12	140	40	137	0.15	0.10
13	124.1	27.3	NR	-0.44	-0.40
14	147	44	72	0.40	0.24
15	116	34.8	79	-0.74	-0.55
16	132	36	94	-0.15	-0.11
17	120	22	NR	-0.59	-0.65
18	NT	NT	NT		
19	100	5.36	114	-1.32	-2.94
20	120	18	99	-0.59	-0.76
21	115	32	95	-0.77	-0.62
22	142	22	75	0.22	0.24
23	NT	NT	NT		
24	NT	NT	NT		
25	81.5	5.8	86.7	-2.00	-4.38
26	150	40	NR	0.51	0.34
27	153.8	23.258	101.4	0.65	0.69
28	136	38	76	0.00	0.00
29	142	42.6	73	0.22	0.14
30	241.26	76.72068	33.4	3.87	1.36
32	NT	NT	NT		
33	245	73.5	119	4.01	1.47
34	141	35.25	105	0.18	0.14
35	145	36	70	0.33	0.24

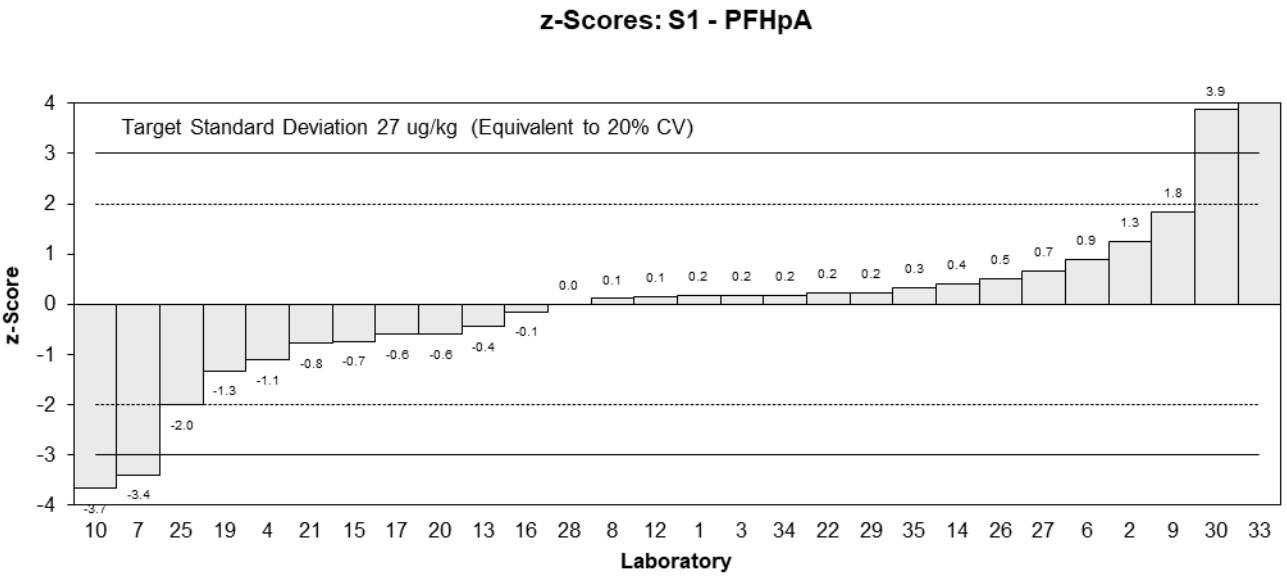
Statistics

Assigned Value*	136	11
Spike	Not Spiked	
Robust Average	135	14
Median	140	10
Mean	136	
N	28	
Max.	245	
Min.	36.1	

Robust SD	29	
Robust CV	21%	

*Robust Average excluding Laboratories 7, 10, 30 and 33.


Kernel Density
Density
Result
Results: S1 - PFHpA
Assigned Value = 136 ± 11 ug/kg
Results (ug/kg)
Laboratory
10 7 25 19 4 21 15 17 20 13 16 28 8 12 1 3 34 22 29 35 14 26 27 6 2 9 30 33 5 11 18 23 24 32 Md R.A.


z-Scores: S1 - PFHpA
Target Standard Deviation 27 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 7 25 19 4 21 15 17 20 13 16 28 8 12 1 3 34 22 29 35 14 26 27 6 2 9 30 33

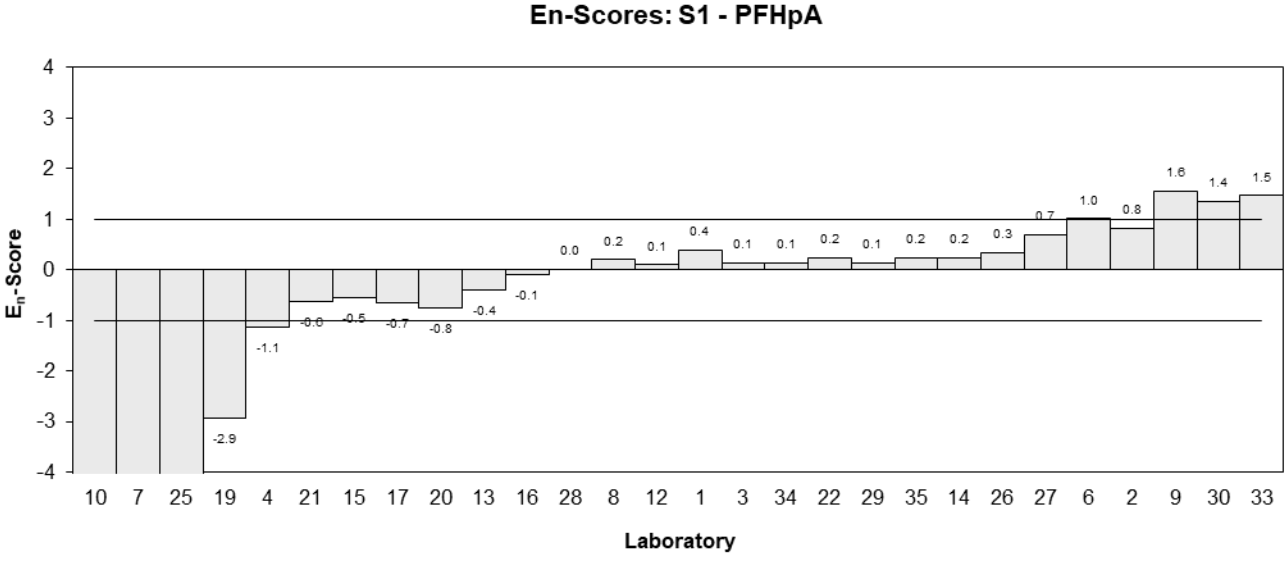

En-Scores: S1 - PFHpA
En-Score
Laboratory
10 7 25 19 4 21 15 17 20 13 16 28 8 12 1 3 34 22 29 35 14 26 27 6 2 9 30 33

Figure 14

Table 18

Sample Details

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

Participant Results

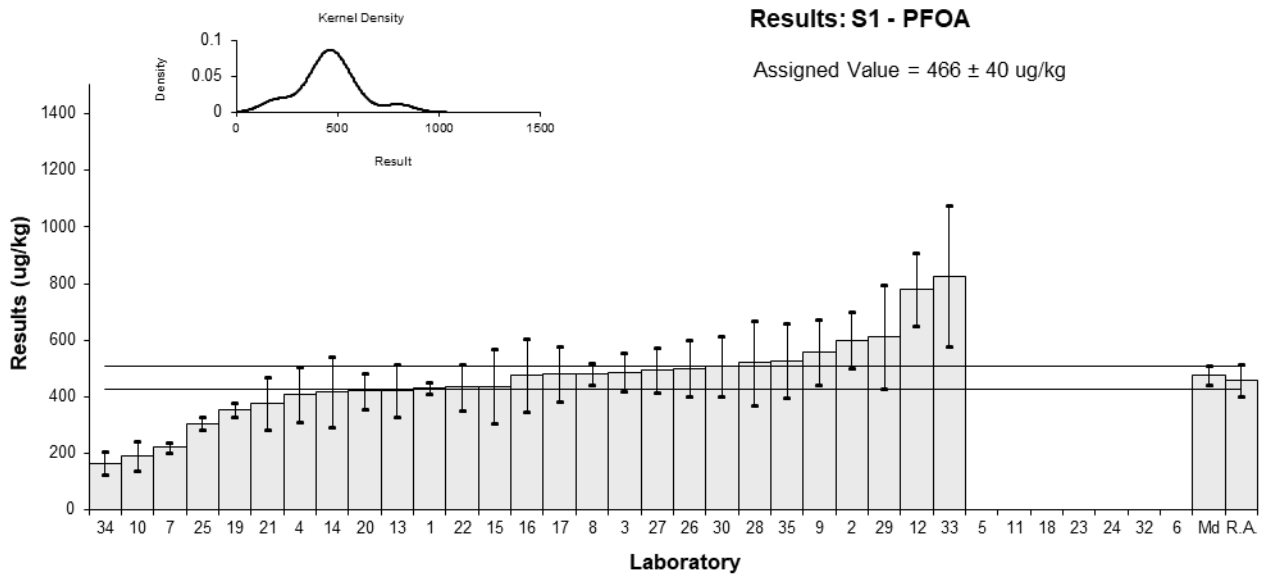
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	430.83	19.37	40	-0.38	-0.79
2	600	100	NR	1.44	1.24
3	487	68	91	0.23	0.27
4	410	97.2	105	-0.60	-0.53
5	NR	NR	NR		
6	NT	NT	NT		
7	220.75	18.04	NR	-2.63	-5.59
8	482	39	NR	0.17	0.29
9	559	116	76	1.00	0.76
10	193.1	52.1	96	-2.93	-4.15
11	NT	NT	NT		
12	780	130	140	3.37	2.31
13	420.7	92.5	94	-0.49	-0.45
14	417	125	81	-0.53	-0.37
15	436	131	83	-0.32	-0.22
16	476	129	94	0.11	0.07
17	480	96	133	0.15	0.13
18	NT	NT	NT		
19	355	23.7	119	-1.19	-2.39
20	420	63	96	-0.49	-0.62
21	376	93	94	-0.97	-0.89
22	434	80	88	-0.34	-0.36
23	NT	NT	NT		
24	NT	NT	NT		
25	306.4	22.7	97.3	-1.71	-3.47
26	500	100	NR	0.36	0.32
27	495.4	78.576	105.9	0.32	0.33
28	520	148	86	0.58	0.35
29	612	183.6	76	1.57	0.78
30	508.76	106.8396	78.6	0.46	0.37
32	NT	NT	NT		
33	827	248	98.9	3.87	1.44
34	165	41.25	103	-3.23	-5.24
35	527	132	70	0.65	0.44

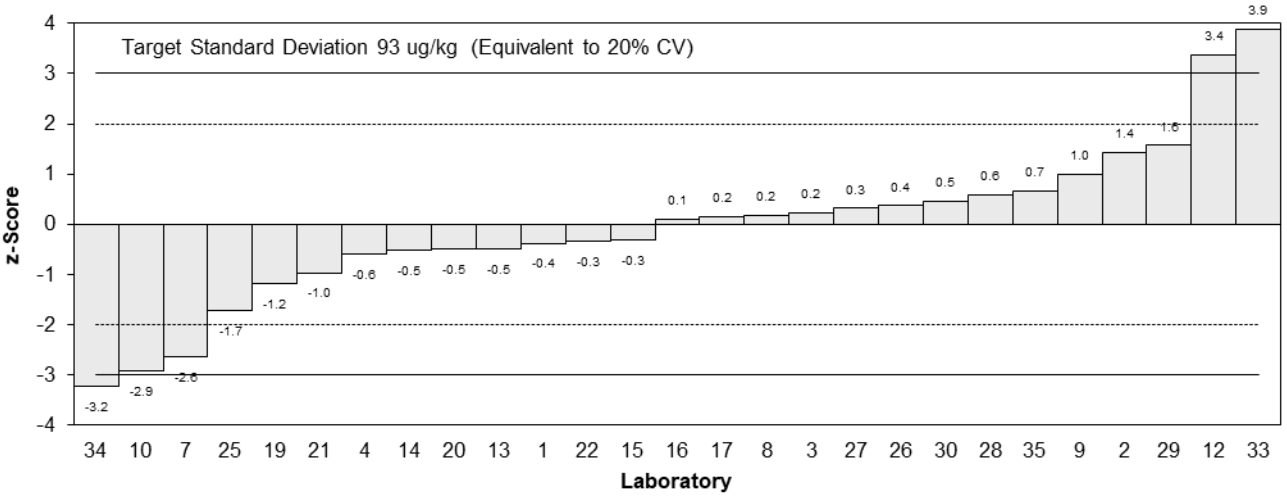
Statistics

Assigned Value*	466	40
Spike	Not Spiked	
Robust Average	458	56
Median	476	33
Mean	461	
N	27	
Max.	827	
Min.	165	

Robust SD	120	
Robust CV	25%	

*Robust Average excluding Laboratories 7, 10, 12, 33 and 34.


Kernel Density
Density
0.1
0.05
0
0
500
1000
1500
Result
Results: S1 - PFOA
Assigned Value = 466 ± 40 ug/kg
Results (ug/kg)
1400
1200
1000
800
600
400
200
0
34 10 7 25 19 21 4 14 20 13 1 22 15 16 17 8 3 27 26 30 28 35 9 2 29 12 33 5 11 18 23 24 32 6 Md R.A.
Laboratory


z-Scores: S1 - PFOA
Target Standard Deviation 93 ug/kg (Equivalent to 20% CV)
z-Score
4
3
2
1
0
-1
-2
-3
-4
-3.2 -2.9 -2.6 -1.7 -1.2 -1.0 -0.6 -0.5 -0.5 -0.5 -0.4 -0.3 -0.3 0.1 0.2 0.2 0.2 0.3 0.4 0.5 0.6 0.7 1.0 1.4 1.6 3.4 3.9
34 10 7 25 19 21 4 14 20 13 1 22 15 16 17 8 3 27 26 30 28 35 9 2 29 12 33
Laboratory

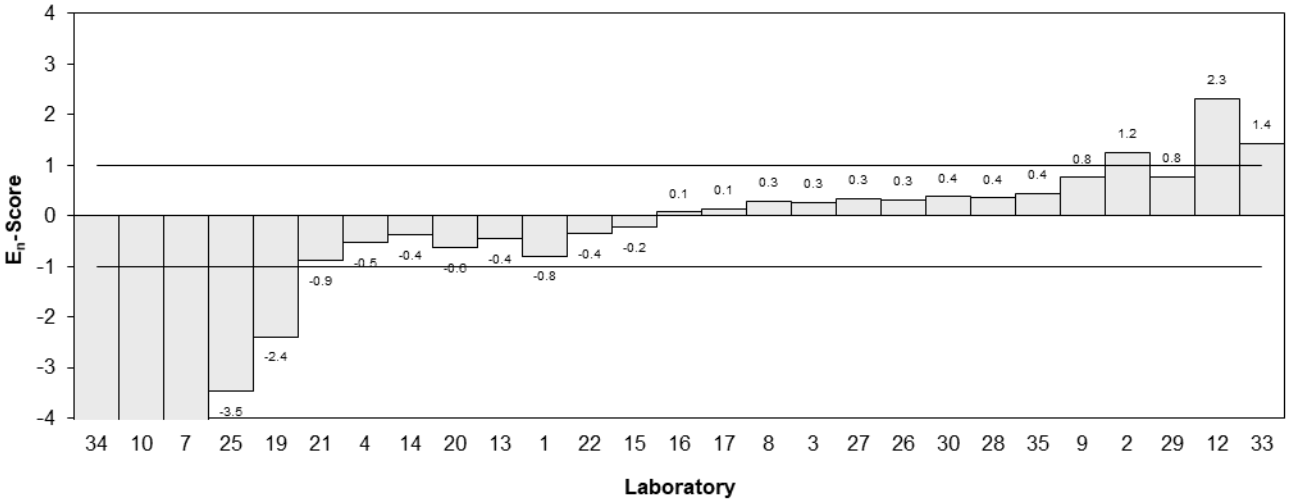

En-Scores: S1 - PFOA
En-Score
4
3
2
1
0
-1
-2
-3
-4
-3.5 -2.4 -0.9 -0.5 -0.4 -0.6 -0.4 -0.8 -0.4 -0.2 0.1 0.1 0.3 0.3 0.3 0.3 0.4 0.4 0.4 0.8 1.2 0.8 2.3 1.4
34 10 7 25 19 21 4 14 20 13 1 22 15 16 17 8 3 27 26 30 28 35 9 2 29 12 33
Laboratory

Figure 15

Table 19

Sample Details

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

Participant Results

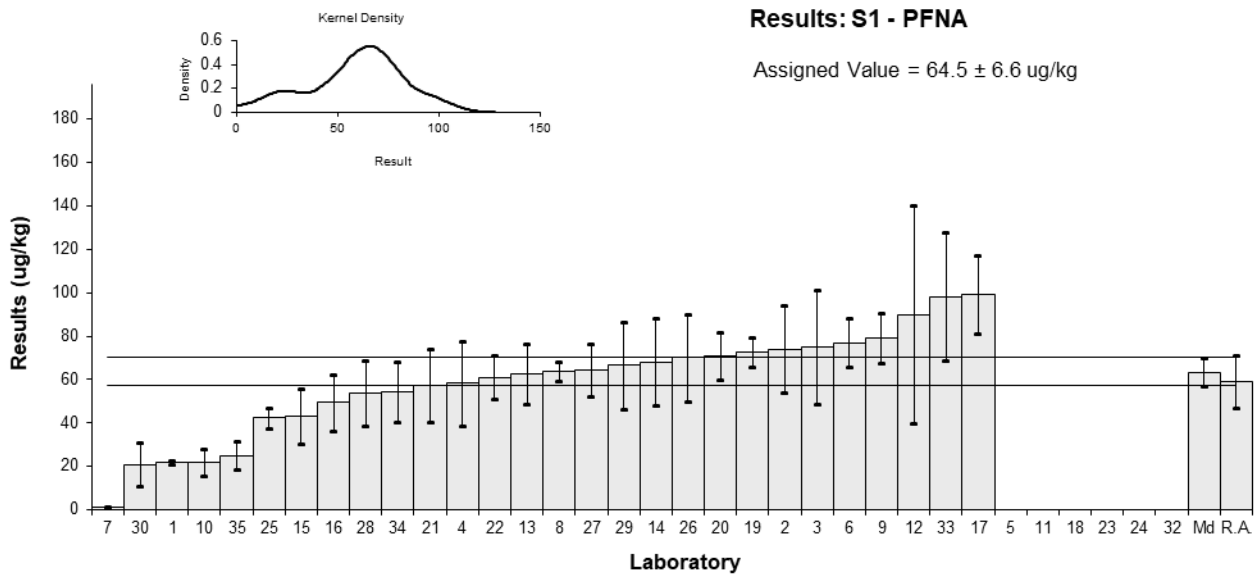
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	21.76	1.00	40	-3.31	-6.4
2	74	20	NR	0.74	0.45
3	75	26	33	0.81	0.39
4	58.4	19.4	65.2	-0.47	-0.30
5	NR	NR	NR		
6	77	11	NR	0.97	0.97
7	1.23	0.24	NR	-4.90	-9.58
8	63.8	4.5	NR	-0.05	-0.09
9	79.2	11.5	45	1.14	1.11
10	22.1	6.2	45	-3.29	-4.68
11	NT	NT	NT		
12	90	50	112	1.98	0.51
13	62.7	13.8	NR	-0.14	-0.12
14	68.2	20	84	0.29	0.18
15	43.1	12.9	81	-1.66	-1.48
16	49.4	13	94	-1.17	-1.04
17	99	18	64	2.67	1.80
18	NT	NT	NT		
19	72.8	6.79	45	0.64	0.88
20	71	11	73	0.50	0.51
21	57.4	16.8	77	-0.55	-0.39
22	61.0	10	90	-0.27	-0.29
23	NT	NT	NT		
24	NT	NT	NT		
25	42.3	4.9	66.1	-1.72	-2.7
26	70	20	NR	0.43	0.26
27	64.354	12.101	27.6	-0.01	-0.01
28	53.6	15	58	-0.84	-0.67
29	66.5	19.95	37	0.16	0.10
30	20.98	10.0704	33.4	-3.37	-3.61
32	NT	NT	NT		
33	98.3	29.5	14	2.62	1.12
34	54.4	13.6	107	-0.78	-0.67
35	25.1	6.3	70	-3.05	-4.32

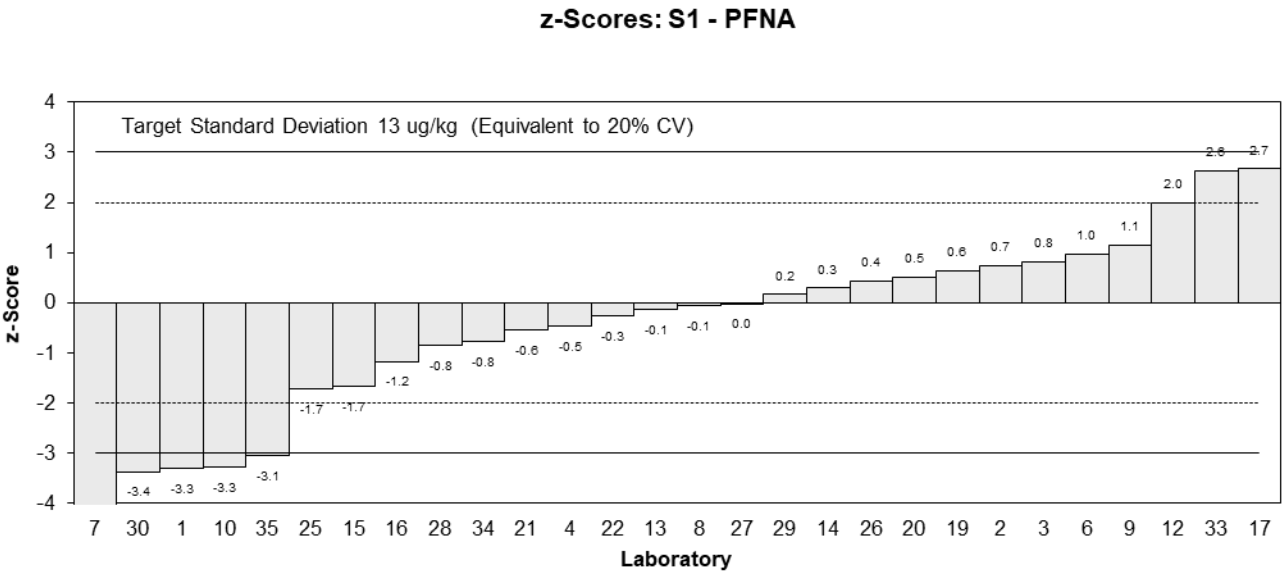
Statistics*

Assigned Value**	64.5	6.6
Spike	Not Spiked	
Robust Average	61.4	10
Median	63.8	6.0
Mean	60.8	
N	27	
Max.	99	
Min.	20.98	

Robust SD	21	
Robust CV	35%	

*Laboratoy 7 removed from statistical calculation
**Robust Average excluding Laboratories 1, 10, 17, 30, 33 and 35.


Kernel Density
Density
Result
Results: S1 - PFNA
Assigned Value = 64.5 ± 6.6 ug/kg
Results (ug/kg)
Laboratory
7 30 1 10 35 25 15 16 28 34 21 4 22 13 8 27 29 14 26 20 19 2 3 6 9 12 33 17 5 11 18 23 24 32 Md R.A.


z-Scores: S1 - PFNA
Target Standard Deviation 13 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
7 30 1 10 35 25 15 16 28 34 21 4 22 13 8 27 29 14 26 20 19 2 3 6 9 12 33 17

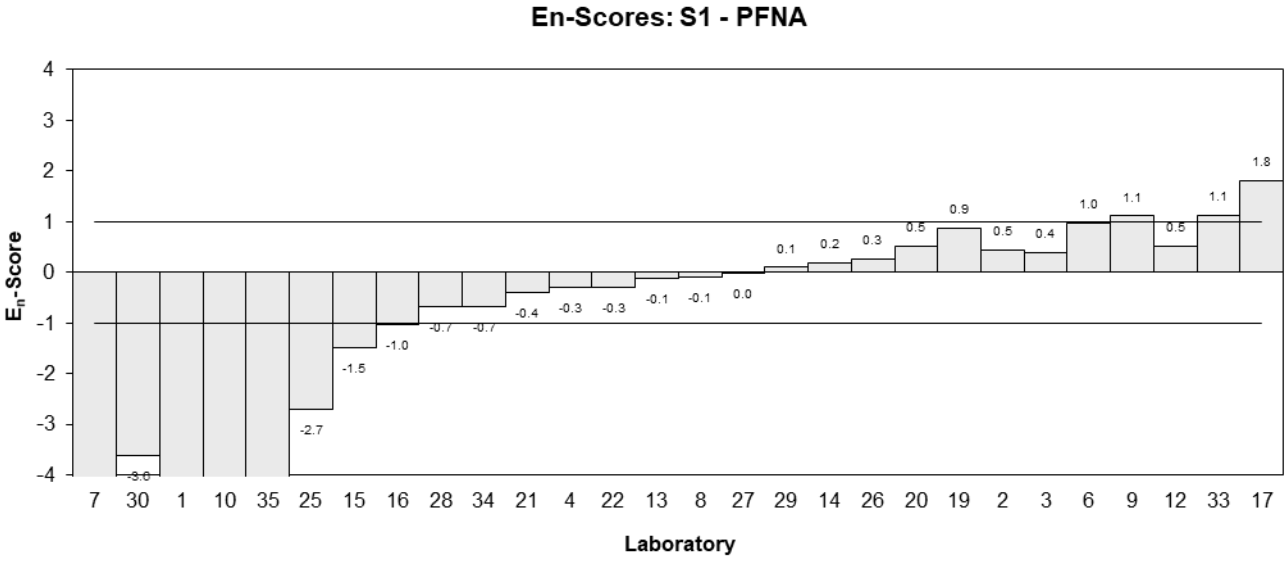

En-Scores: S1 - PFNA
En-Score
Laboratory
7 30 1 10 35 25 15 16 28 34 21 4 22 13 8 27 29 14 26 20 19 2 3 6 9 12 33 17

Figure 16

Table 20

Sample Details

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

Participant Results

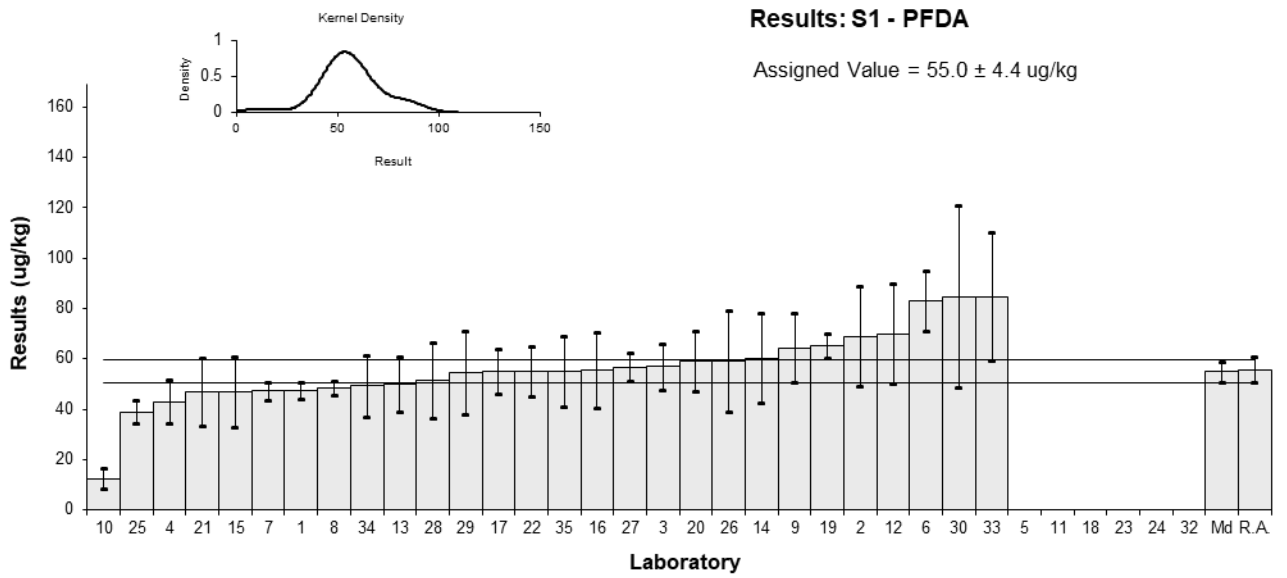
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	47.60	3.35	52	-0.67	-1.34
2	69	20	NR	1.27	0.68
3	57	9.1	101	0.18	0.20
4	43.1	8.6	112	-1.08	-1.23
5	NR	NR	NR		
6	83	12	NR	2.55	2.19
7	47.31	3.47	NR	-0.70	-1.37
8	48.3	2.9	NR	-0.61	-1.27
9	64.4	13.9	73	0.85	0.64
10	12.5	4	100	-3.86	-7.15
11	NT	NT	NT		
12	70	20	132	1.36	0.73
13	49.9	11.0	NR	-0.46	-0.43
14	60.4	18	56	0.49	0.29
15	47.0	14.1	85	-0.73	-0.54
16	55.6	15	94	0.05	0.04
17	55	9	96	0.00	0.00
18	NT	NT	NT		
19	65.2	4.78	78	0.93	1.57
20	59	12	104	0.36	0.31
21	46.9	13.7	92	-0.74	-0.56
22	55.0	10	75	0.00	0.00
23	NT	NT	NT		
24	NT	NT	NT		
25	39	4.4	92.2	-1.45	-2.57
26	59	20	NR	0.36	0.20
27	56.798	5.774	91.9	0.16	0.25
28	51.3	15	103	-0.34	-0.24
29	54.5	16.35	76	-0.05	-0.03
30	84.79	36.03575	33.4	2.71	0.82
32	NT	NT	NT		
33	84.8	25.4	92.7	2.71	1.16
34	49.3	12.325	104	-0.52	-0.44
35	55	14	40	0.00	0.00

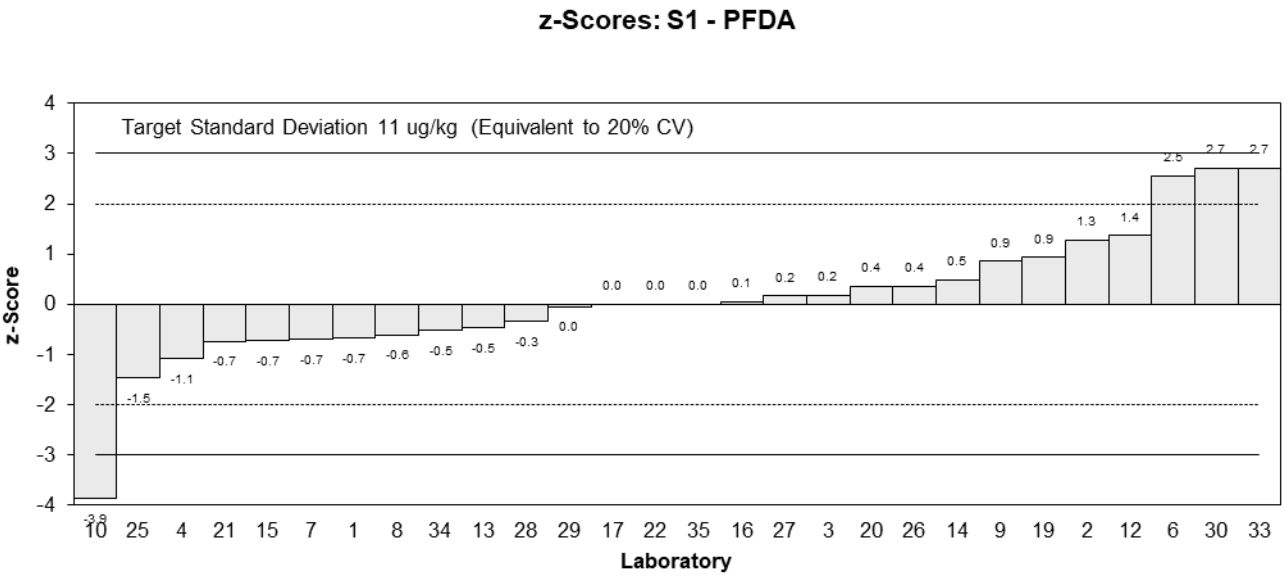
Statistics

Assigned Value*	55.0	4.4
Spike	Not Spiked	
Robust Average	55.8	5.2
Median	55.0	4.1
Mean	56.1	
N	28	
Max.	84.8	
Min.	12.5	

Robust SD	11	
Robust CV	20%	

*Robust Average excluding Laboratories 10, 30 and 33.


Kernel Density
Density
Result
Results: S1 - PFDA
Assigned Value = 55.0 ± 4.4 ug/kg
Results (ug/kg)
Laboratory
10 25 4 21 15 7 1 8 34 13 28 29 17 22 35 16 27 3 20 26 14 9 19 2 12 6 30 33 5 11 18 23 24 32 Md R.A.


z-Scores: S1 - PFDA
Target Standard Deviation 11 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 4 21 15 7 1 8 34 13 28 29 17 22 35 16 27 3 20 26 14 9 19 2 12 6 30 33

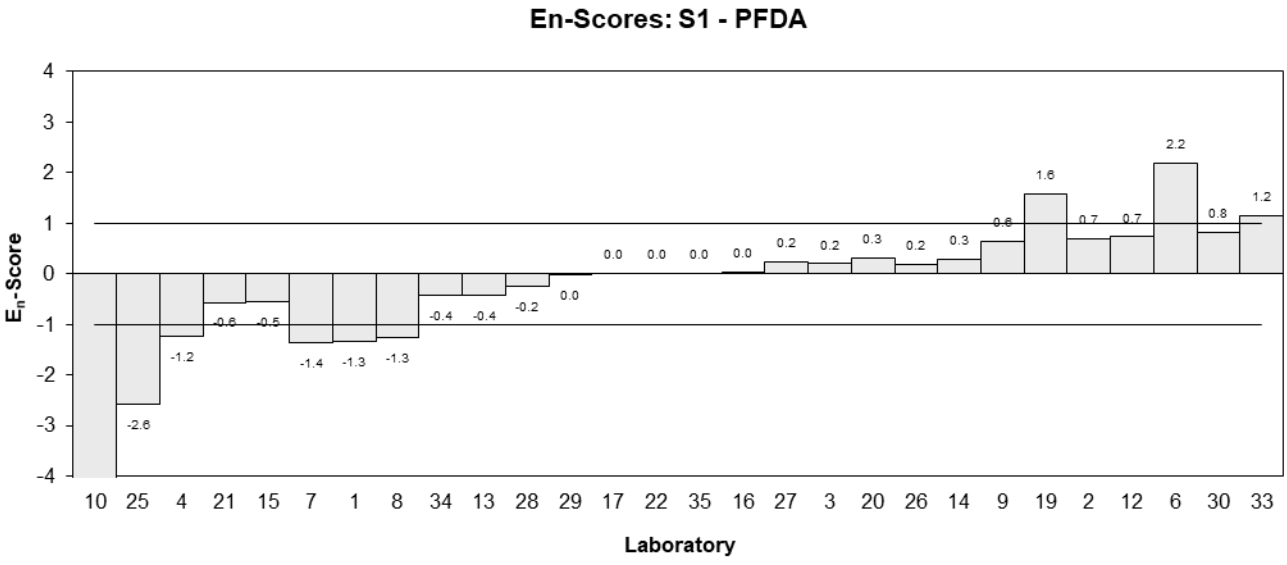

En-Scores: S1 - PFDA
En-Score
Laboratory
10 25 4 21 15 7 1 8 34 13 28 29 17 22 35 16 27 3 20 26 14 9 19 2 12 6 30 33

Figure 17

Table 21

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	PFUdA
Units	ug/kg

Participant Results

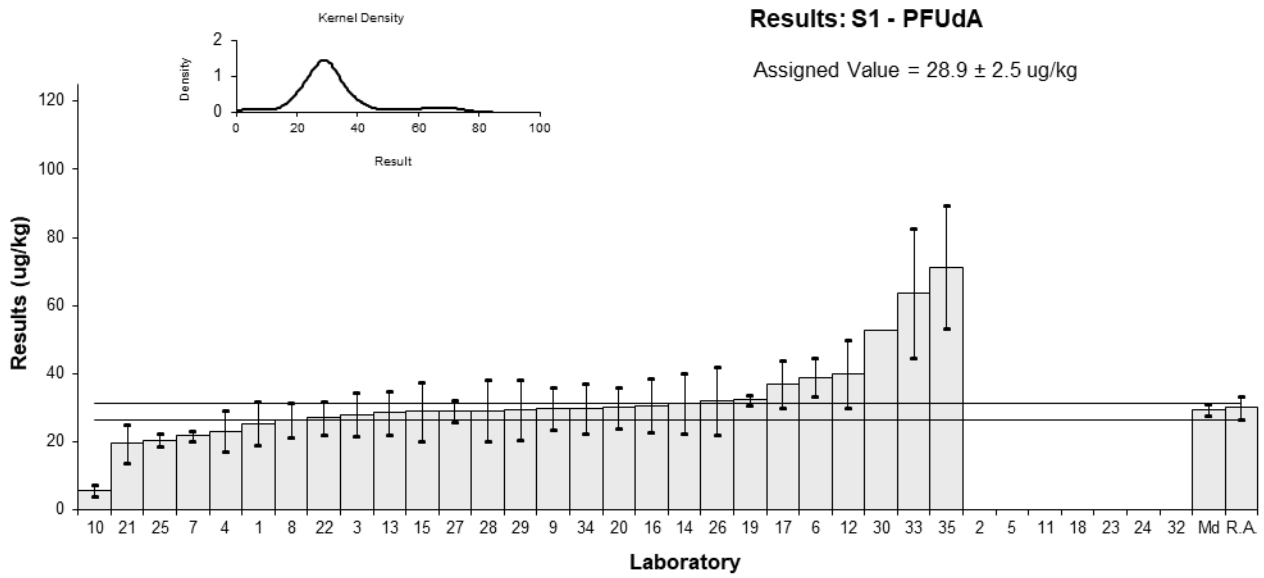
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	25.45	6.26	74	-0.60	-0.51
2	<50	NR	NR		
3	28	6.4	101	-0.16	-0.13
4	23.2	6.0	110	-0.99	-0.88
5	NR	NR	NR		
6	39	5.6	NR	1.75	1.65
7	21.76	1.44	NR	-1.24	-2.47
8	26.3	5.0	NR	-0.45	-0.47
9	29.7	6.3	77	0.14	0.12
10	5.6	1.7	88	-4.03	-7.71
11	NT	NT	NT		
12	40	10	150	1.92	1.08
13	28.5	6.3	NR	-0.07	-0.06
14	31.3	9	91	0.42	0.26
15	28.9	8.67	81	0.00	0.00
16	30.7	8	94	0.31	0.21
17	37	7	80	1.40	1.09
18	NT	NT	NT		
19	32.4	1.51	88	0.61	1.20
20	30	5.9	100	0.19	0.17
21	19.5	5.6	98	-1.63	-1.53
22	27.0	5	111	-0.33	-0.34
23	NT	NT	NT		
24	NT	NT	NT		
25	20.5	1.8	93.6	-1.45	-2.73
26	32	10	NR	0.54	0.30
27	29.04	3.345	54.5	0.02	0.03
28	29.2	8.9	106	0.05	0.03
29	29.4	8.82	75	0.09	0.05
30	52.84	NR	33.4	4.14	9.58
32	NT	NT	NT		
33	63.6	19.1	103	6.00	1.80
34	29.8	7.45	66	0.16	0.11
35	71.3	18	20	7.34	2.33

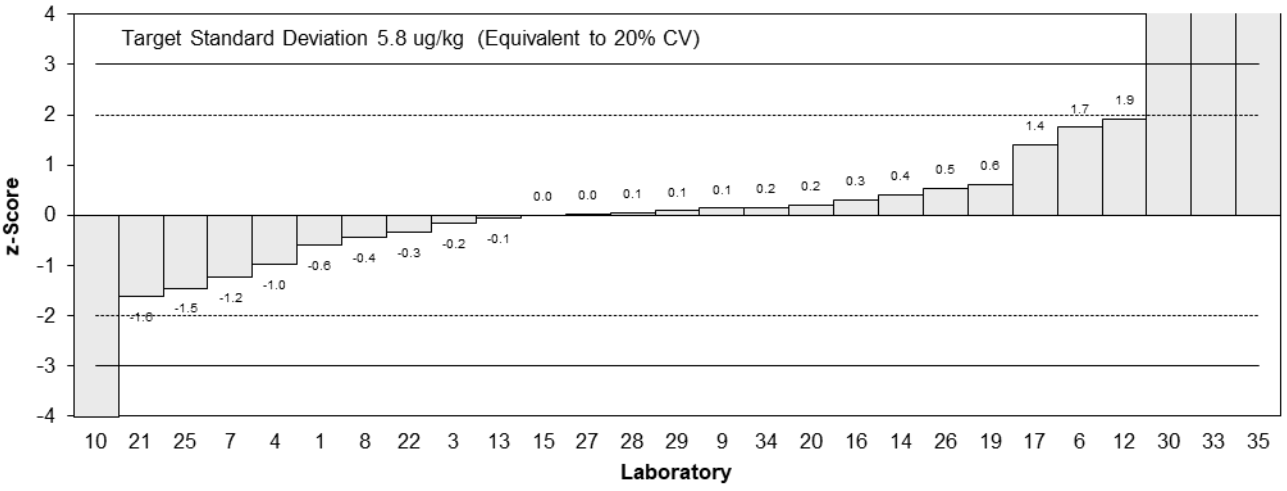
Statistics

Assigned Value*	28.9	2.5
Spike	Not Spiked	
Robust Average	30.0	3.5
Median	29.4	1.8
Mean	31.9	
N	27	
Max.	71.3	
Min.	5.6	

Robust SD	7.4	
Robust CV	25%	

*Robust Average excluding Laboratories 10, 30, 33 and 35.


Kernel Density
Density
Result
Results: S1 - PFUdA
Assigned Value = 28.9 ± 2.5 ug/kg
Results (ug/kg)
Laboratory
10 21 25 7 4 1 8 22 3 13 15 27 28 29 9 34 20 16 14 26 19 17 6 12 30 33 35 2 5 11 18 23 24 32 Md R.A.


z-Scores: S1 - PFUdA
Target Standard Deviation 5.8 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 21 25 7 4 1 8 22 3 13 15 27 28 29 9 34 20 16 14 26 19 17 6 12 30 33 35

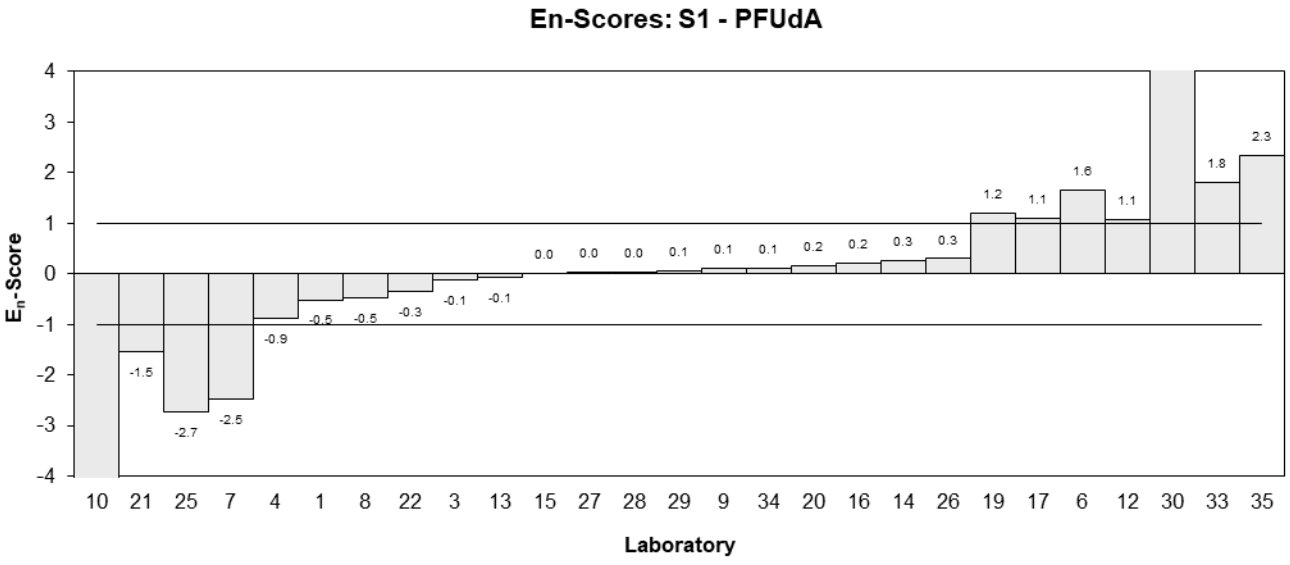

En-Scores: S1 - PFUdA
En-Score
Laboratory
10 21 25 7 4 1 8 22 3 13 15 27 28 29 9 34 20 16 14 26 19 17 6 12 30 33 35

Figure 18

Table 22

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	PFDoA
Units	ug/kg

Participant Results

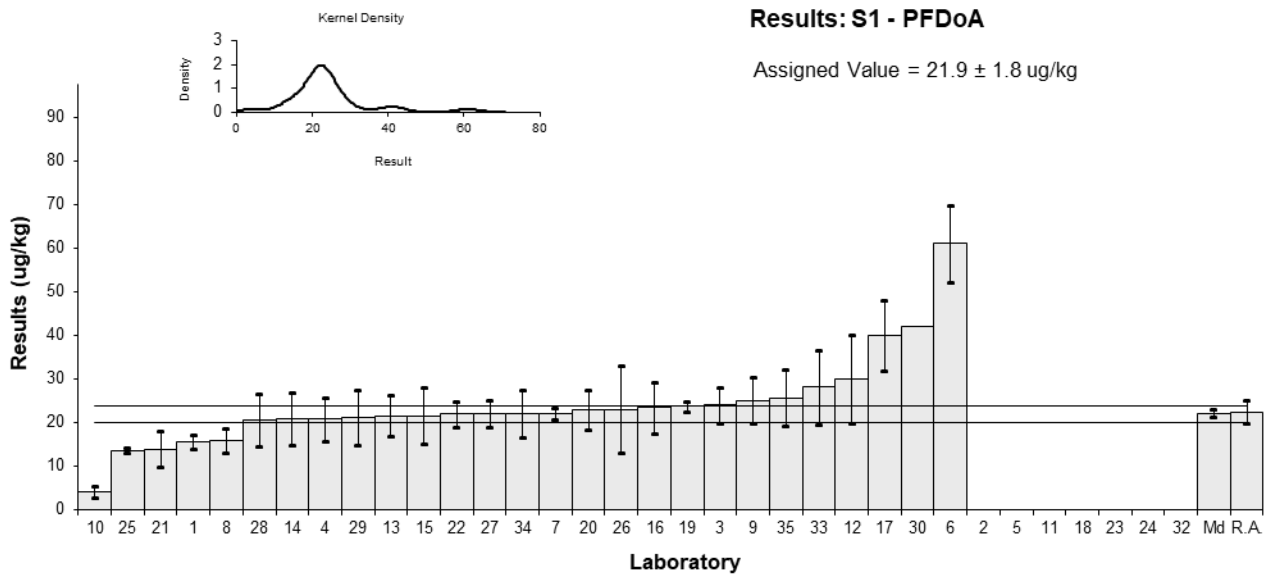
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	15.60	1.70	79	-1.44	-2.54
2	<50	NR	NR		
3	24	4.1	94	0.48	0.47
4	20.8	5.0	97.9	-0.25	-0.21
5	NR	NR	NR		
6	61	8.7	NR	8.93	4.40
7	22.13	1.29	NR	0.05	0.10
8	15.9	2.7	NR	-1.37	-1.85
9	25.1	5.3	76	0.73	0.57
10	4.1	1.3	106	-4.06	-8.02
11	NT	NT	NT		
12	30	10	111	1.85	0.80
13	21.5	4.7	NR	-0.09	-0.08
14	20.8	6	66	-0.25	-0.18
15	21.5	6.45	73	-0.09	-0.06
16	23.4	6	94	0.34	0.24
17	40	8	88	4.13	2.21
18	NT	NT	NT		
19	23.7	1.26	60	0.41	0.82
20	23	4.5	102	0.25	0.23
21	14.0	4.0	93	-1.80	-1.80
22	22.0	3	111	0.02	0.03
23	NT	NT	NT		
24	NT	NT	NT		
25	13.7	0.5	93.6	-1.87	-4.39
26	23	10	NR	0.25	0.11
27	22.096	3.065	55.4	0.04	0.06
28	20.6	6.1	104	-0.30	-0.20
29	21.1	6.33	53	-0.18	-0.12
30	42.01	NR	33.4	4.59	11.17
32	NT	NT	NT		
33	28.2	8.5	126	1.44	0.73
34	22.1	5.525	77	0.05	0.03
35	25.7	6.4	20	0.87	0.57

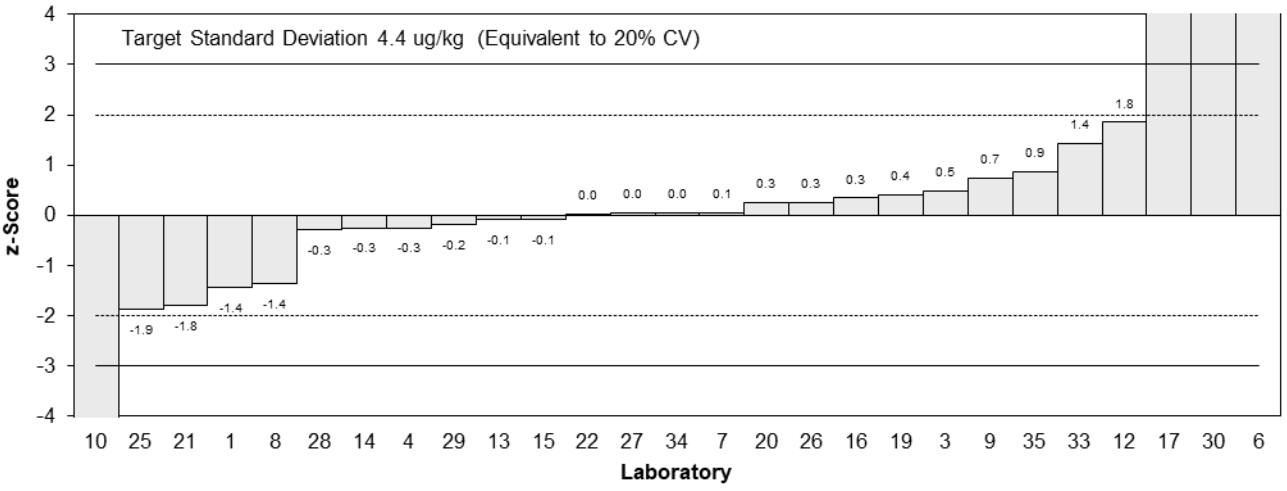
Statistics

Assigned Value*	21.9	1.8
Spike	Not Spiked	
Robust Average	22.5	2.7
Median	22.1	0.9
Mean	24.0	
N	27	
Max.	61	
Min.	4.1	

Robust SD	5.7	
Robust CV	25%	

*Robust Average excluding Laboratories 6, 10, 17 and 30.


Kernel Density
Density
Result
Results: S1 - PFDoA
Assigned Value = 21.9 ± 1.8 ug/kg
Results (ug/kg)
Laboratory
10 25 21 1 8 28 14 4 29 13 15 22 27 34 7 20 26 16 19 3 9 35 33 12 17 30 6 2 5 11 18 23 24 32 Md R.A.


z-Scores: S1 - PFDoA
Target Standard Deviation 4.4 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 21 1 8 28 14 4 29 13 15 22 27 34 7 20 26 16 19 3 9 35 33 12 17 30 6

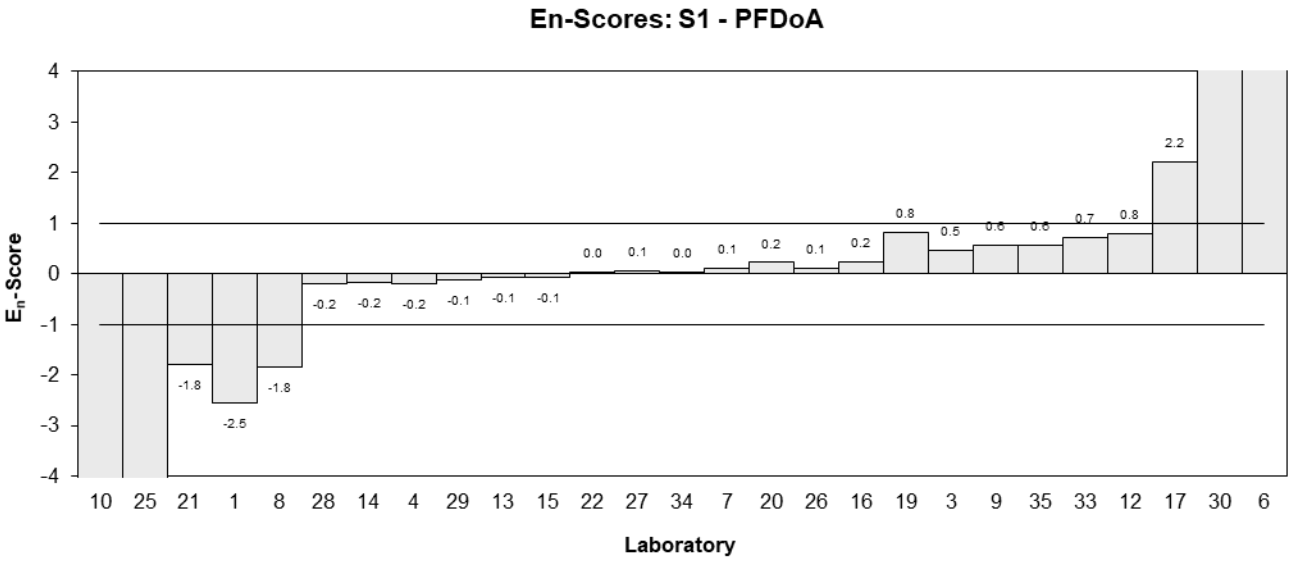

En-Scores: S1 - PFDoA
En-Score
Laboratory
10 25 21 1 8 28 14 4 29 13 15 22 27 34 7 20 26 16 19 3 9 35 33 12 17 30 6

Figure 19

Table 23

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	PFTrDA
Units	ug/kg

Participant Results

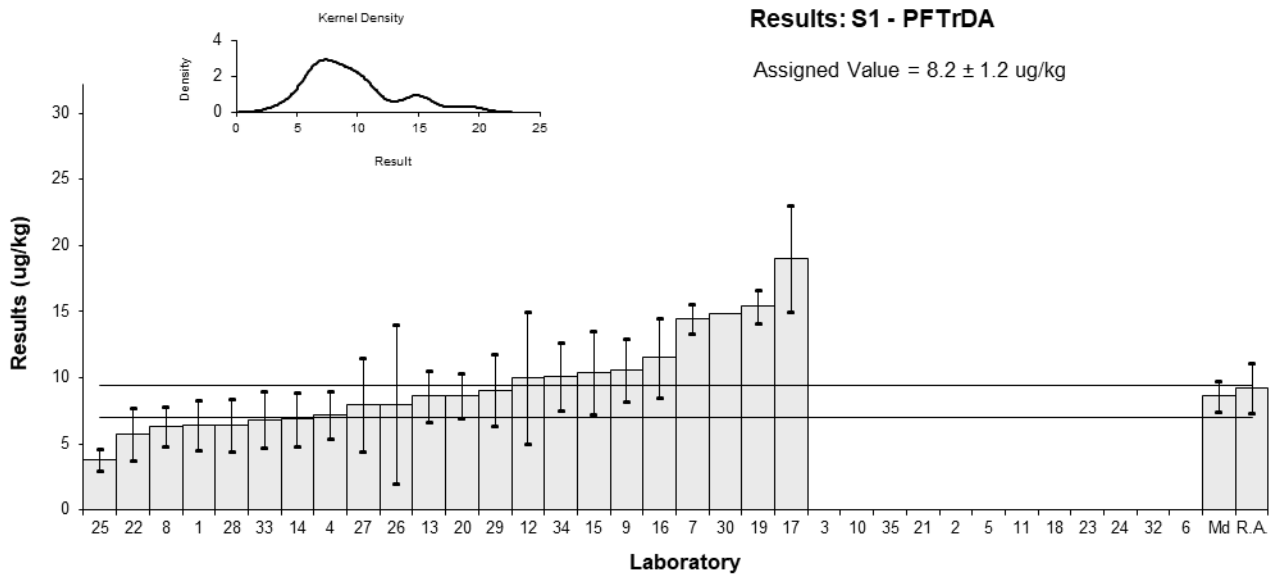
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	6.38	1.88	NR	-1.11	-0.82
2	<50	NR	NR		
3	< 10	NR	94		
4	7.2	1.8	97.9	-0.61	-0.46
5	NR	NR	NR		
6	NT	NT	NT		
7	14.45	1.09	NR	3.81	3.86
8	6.28	1.51	NR	-1.17	-1.00
9	10.6	2.4	76	1.46	0.89
10	<0.01	NR	NR		
11	NT	NT	NT		
12	10	5	111	1.10	0.35
13	8.6	1.9	NR	0.24	0.18
14	6.85	2	NR	-0.82	-0.58
15	10.4	3.12	73	1.34	0.66
16	11.5	3	94	2.01	1.02
17	19	4	NR	6.59	2.59
18	NT	NT	NT		
19	15.4	1.24	13	4.39	4.17
20	8.6	1.7	107	0.24	0.19
21	<5.0	NR	93		
22	5.73	2	NR	-1.51	-1.06
23	NT	NT	NT		
24	NT	NT	NT		
25	3.84	0.82	NR	-2.66	-3.00
26	8	6	NR	-0.12	-0.03
27	7.9525	3.519	55.4	-0.15	-0.07
28	6.4	2	122	-1.10	-0.77
29	9.06	2.718	53	0.52	0.29
30	14.85	NR	33.4	4.05	5.54
32	NT	NT	NT		
33	6.84	2.1	165	-0.83	-0.56
34	10.1	2.525	77	1.16	0.68
35	<10	NR	20		

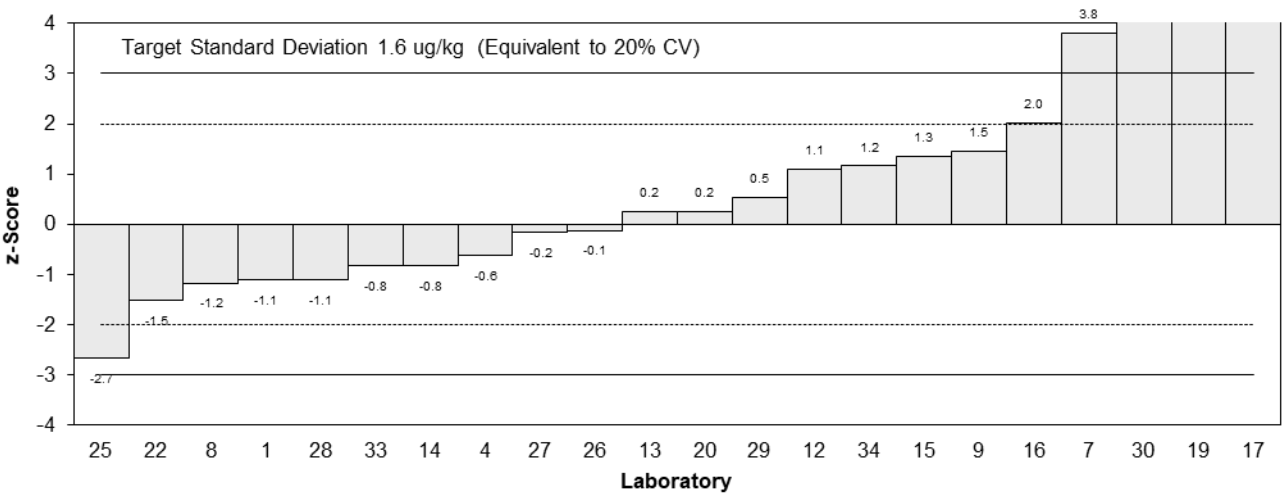
Statistics

Assigned Value*	8.2	1.2
Spike	Not Spiked	
Robust Average	9.2	1.9
Median	8.6	1.2
Mean	9.5	
N	22	
Max.	19	
Min.	3.84	

Robust SD	3.6	
Robust CV	39%	

*Robust Average excluding Laboratories 7, 17, 19, 25 and 30.


Kernel Density
Density
Result
Results: S1 - PFTrDA
Assigned Value = 8.2 ± 1.2 ug/kg
Results (ug/kg)
25 22 8 1 28 33 14 4 27 26 13 20 29 12 34 15 9 16 7 30 19 17 3 10 35 21 2 5 11 18 23 24 32 6 Md R.A.
Laboratory


z-Scores: S1 - PFTrDA
Target Standard Deviation 1.6 ug/kg (Equivalent to 20% CV)
z-Score
25 22 8 1 28 33 14 4 27 26 13 20 29 12 34 15 9 16 7 30 19 17
Laboratory

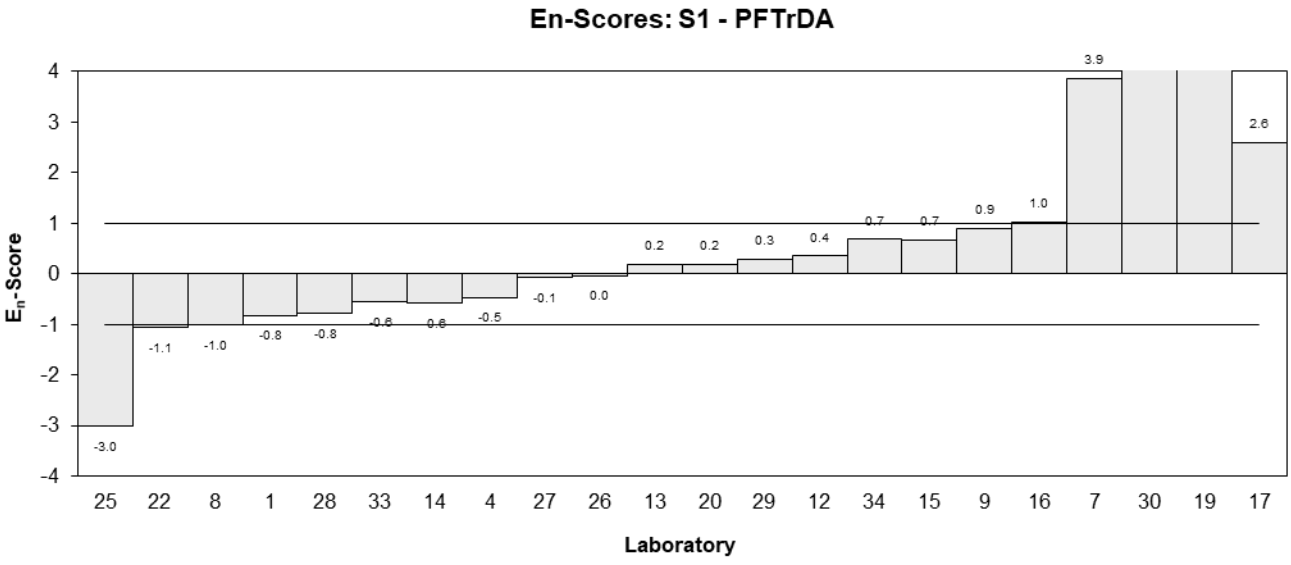

En-Scores: S1 - PFTrDA
En-Score
25 22 8 1 28 33 14 4 27 26 13 20 29 12 34 15 9 16 7 30 19 17
Laboratory

Figure 20

Table 24

Sample Details

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

Participant Results

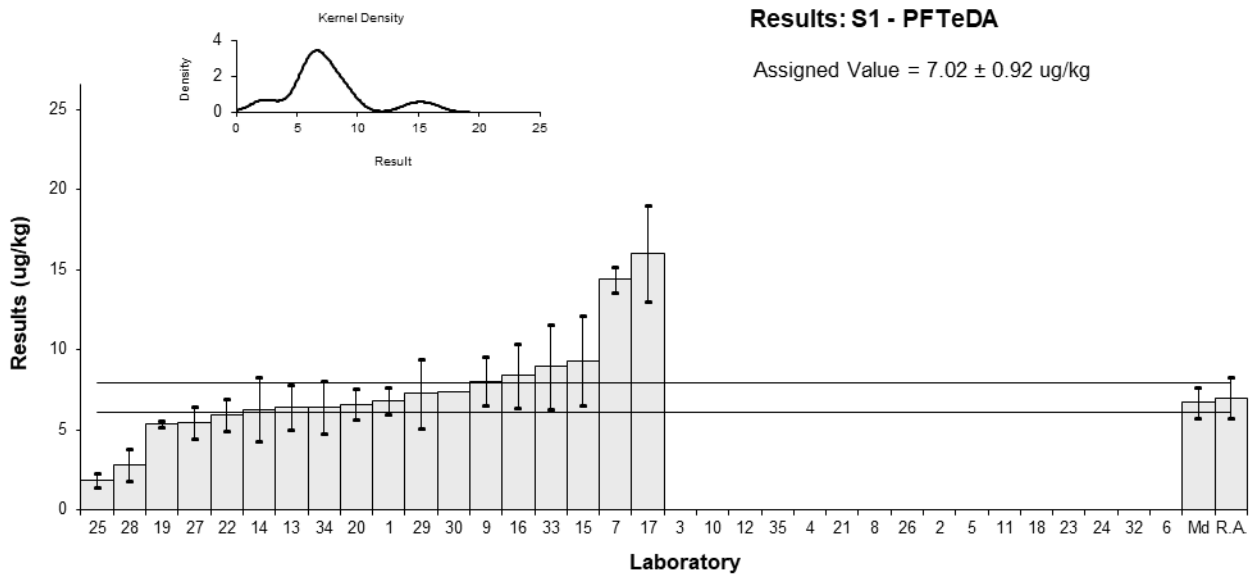
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	6.85	0.84	40	-0.12	-0.14
2	<500	NR	NR		
3	< 10	NR	66		
4	<12.2	NR	93.3		
5	NR	NR	NR		
6	NT	NT	NT		
7	14.39	0.80	NR	5.25	6.05
8	<12.5	NR	NR		
9	8.04	1.5	71	0.73	0.58
10	<0.01	NR	106		
11	NT	NT	NT		
12	<10	NR	70		
13	6.4	1.4	NR	-0.44	-0.37
14	6.27	2	51	-0.53	-0.34
15	9.32	2.80	76	1.64	0.78
16	8.4	2	94	0.98	0.63
17	16	3	NR	6.40	2.86
18	NT	NT	NT		
19	5.38	0.18	13	-1.17	-1.75
20	6.6	0.98	120	-0.30	-0.31
21	<12.5	NR	98		
22	5.91	1	95	-0.79	-0.82
23	NT	NT	NT		
24	NT	NT	NT		
25	1.85	0.43	NR	-3.68	-5.09
26	<50	NR	NR		
27	5.427	1.010	40.1	-1.13	-1.17
28	2.8	1	122	-3.01	-3.11
29	7.26	2.178	63	0.17	0.10
30	7.34	NR	33.4	0.23	0.35
32	NT	NT	NT		
33	8.94	2.68	165	1.37	0.68
34	6.42	1.605	81	-0.43	-0.32
35	<10	NR	70		

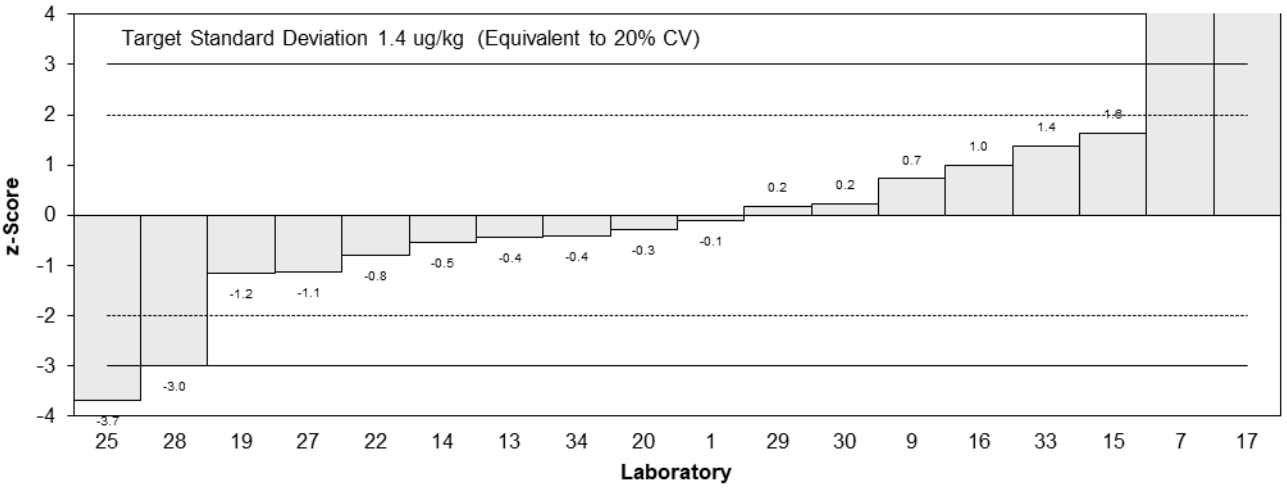
Statistics

Assigned Value*	7.02	0.92
Spike	Not Spiked	
Robust Average	7.0	1.3
Median	6.73	0.96
Mean	7.42	
N	18	
Max.	16	
Min.	1.85	

Robust SD	2.2	
Robust CV	31%	

*Robust Average excluding Laboratories 7, 17, 25 and 28.


Kernel Density
Density
Result
Results: S1 - PFTeDA
Assigned Value = 7.02 ± 0.92 ug/kg
Results (ug/kg)
Laboratory
25 28 19 27 22 14 13 34 20 1 29 30 9 16 33 15 7 17 3 10 12 35 4 21 8 26 2 5 11 18 23 24 32 6 Md R.A.


z-Scores: S1 - PFTeDA
Target Standard Deviation 1.4 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
25 28 19 27 22 14 13 34 20 1 29 30 9 16 33 15 7 17
-3.7 -3.0 -1.2 -1.1 -0.8 -0.5 -0.4 -0.4 -0.3 -0.1 0.2 0.2 0.7 1.0 1.4 1.6

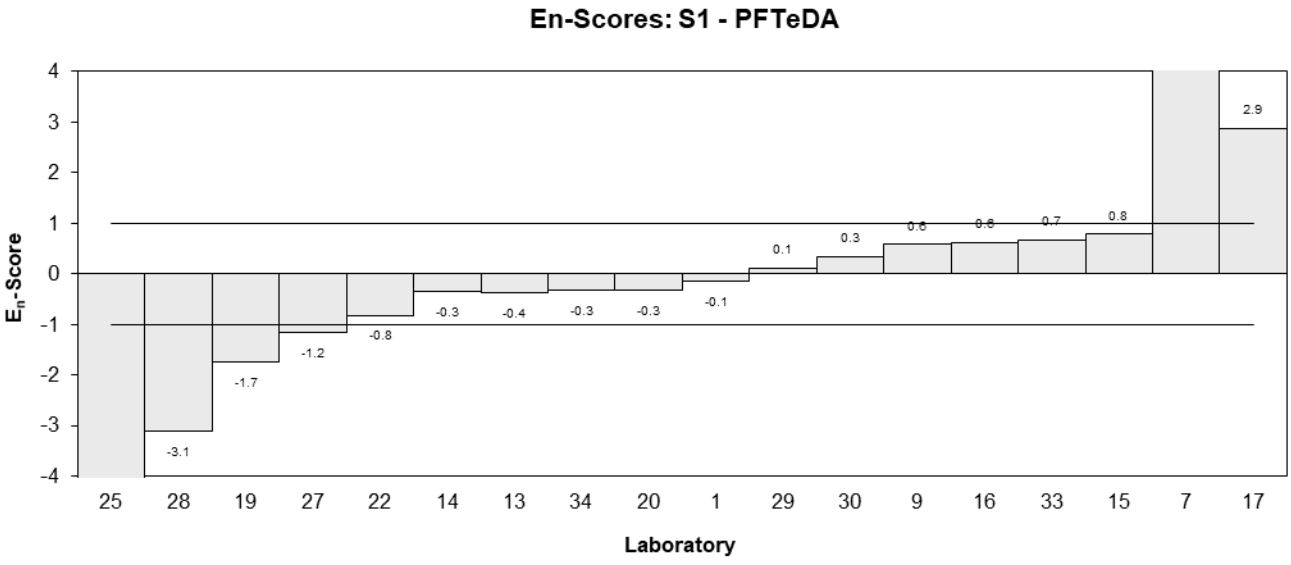

En-Scores: S1 - PFTeDA
En-Score
Laboratory
25 28 19 27 22 14 13 34 20 1 29 30 9 16 33 15 7 17
-3.1 -1.7 -1.2 -0.8 -0.3 -0.4 -0.3 -0.3 -0.1 0.1 0.3 0.6 0.6 0.7 0.8 2.9

Figure 21

Table 25

Sample Details

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

Participant Results

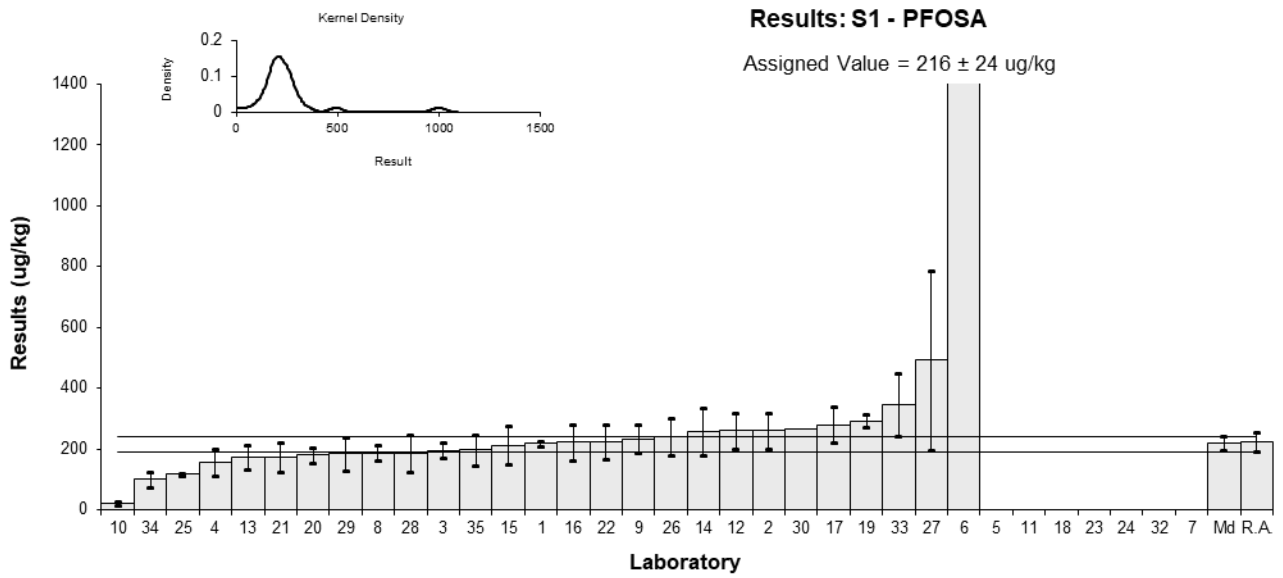
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	218.81	9.36	NR	0.07	0.11
2	260	60	NR	1.02	0.68
3	196	24	98	-0.46	-0.59
4	157	42.7	109	-1.37	-1.20
5	NR	NR	NR		
6	3600	510	NR	78.33	6.63
7	NT	NT	NT		
8	187	26	NR	-0.67	-0.82
9	234	46.4	70	0.42	0.34
10	20.2	5.9	NR	-4.53	-7.92
11	NT	NT	NT		
12	260	60	89	1.02	0.68
13	173.5	38.2	NR	-0.98	-0.94
14	258	77	50	0.97	0.52
15	212	63.6	69	-0.09	-0.06
16	222	60	94	0.14	0.09
17	280	60	NR	1.48	0.99
18	NT	NT	NT		
19	293	21.5	94	1.78	2.39
20	180	26	92	-0.83	-1.02
21	174	49	91	-0.97	-0.77
22	224	55	98	0.19	0.13
23	NT	NT	NT		
24	NT	NT	NT		
25	116.7	5.1	49.5	-2.30	-4.05
26	240	60	NR	0.56	0.37
27	492.912	294.5	18.5	6.41	0.94
28	188	61	115	-0.65	-0.43
29	185	55.5	78	-0.72	-0.51
30	266.11	NR	78.6	1.16	2.09
32	NT	NT	NT		
33	346	103.8	82.1	3.01	1.22
34	101	25.25	24	-2.66	-3.30
35	197	49	NR	-0.44	-0.35

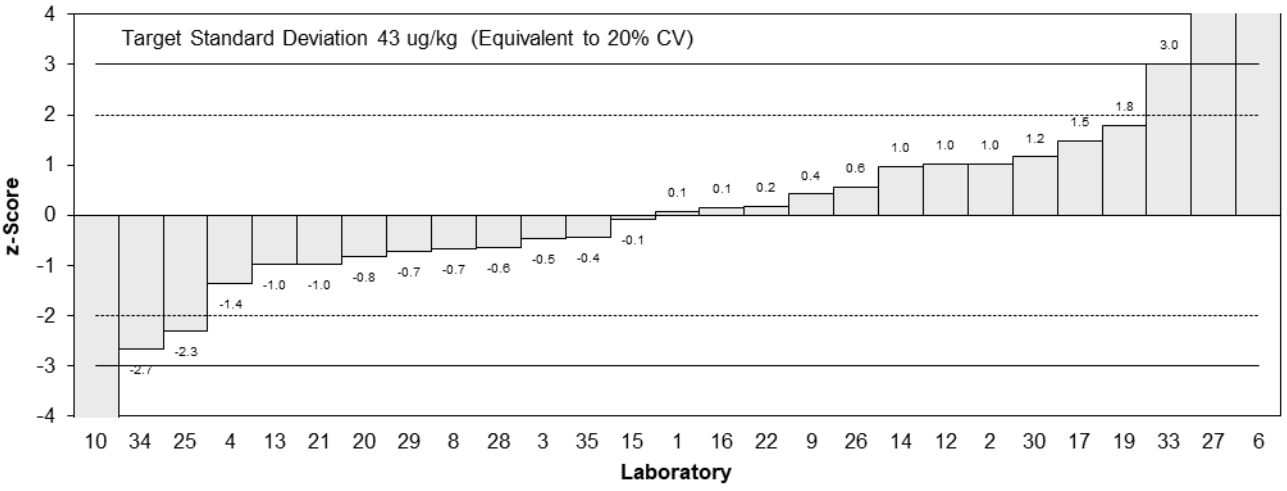
Statistics*

Assigned Value**	216	24
Spike	Not Spiked	
Robust Average	215	30
Median	215	25
Mean	218	
N	26	
Max.	492.912	
Min.	20.2	

Robust SD	61	
Robust CV	29%	

*Laboratory 6 removed from statistical calculation
**Robust Average excluding Laboratories 27, 33 and 34.


Kernel Density
Density
Result
Results: S1 - PFOSA
Assigned Value = 216 ± 24 ug/kg
Results (ug/kg)
Laboratory
10 34 25 4 13 21 20 29 8 28 3 35 15 1 16 22 9 26 14 12 2 30 17 19 33 27 6 5 11 18 23 24 32 7 Md R.A.


z-Scores: S1 - PFOSA
Target Standard Deviation 43 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 34 25 4 13 21 20 29 8 28 3 35 15 1 16 22 9 26 14 12 2 30 17 19 33 27 6

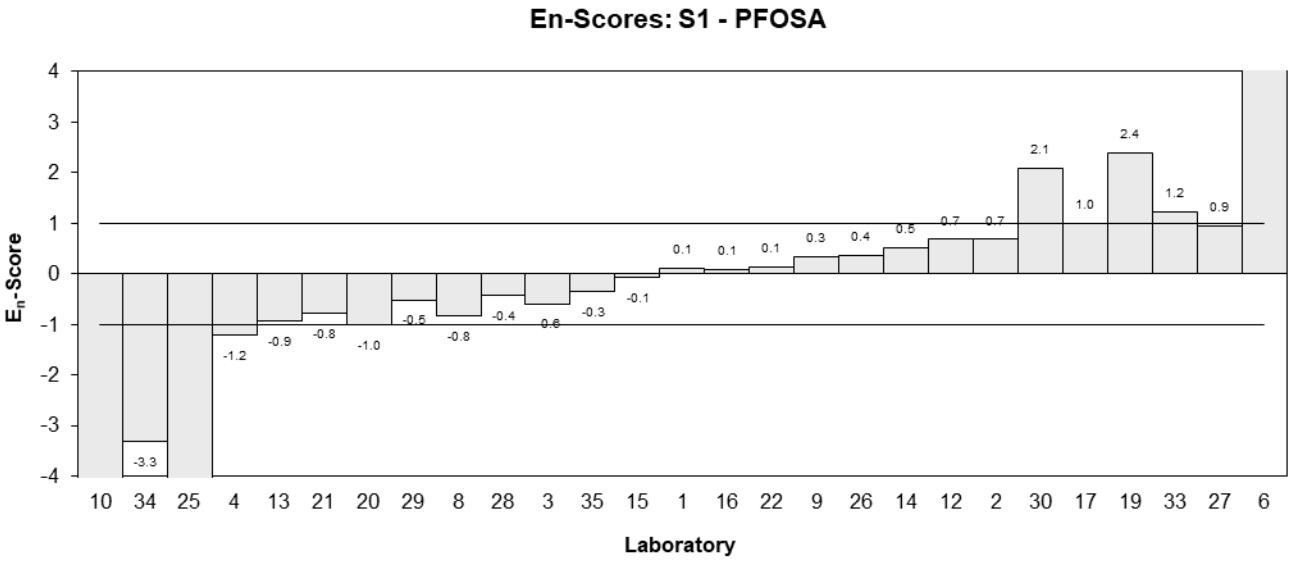

En-Scores: S1 - PFOSA
En-Score
Laboratory
10 34 25 4 13 21 20 29 8 28 3 35 15 1 16 22 9 26 14 12 2 30 17 19 33 27 6

Figure 22

Table 26

Sample Details

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

Participant Results

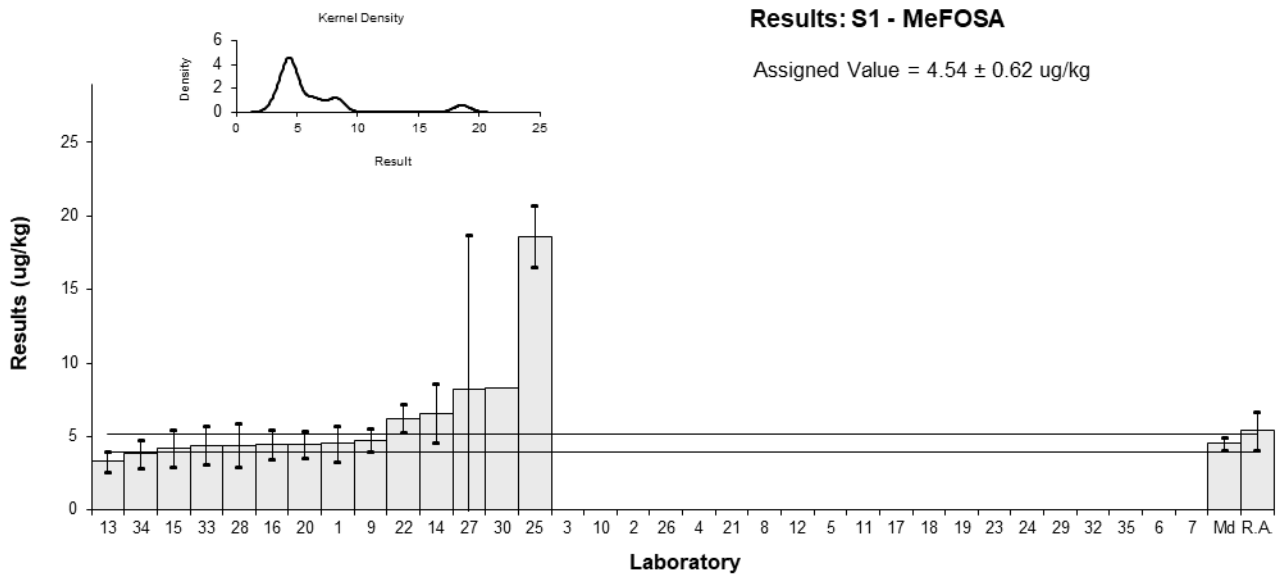
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	4.52	1.23	NR	-0.02	-0.01
2	<10	NR	NR		
3	< 10	NR	99		
4	<12.2	NR	97.4		
5	NR	NR	NR		
6	NT	NT	NT		
7	NT	NT	NT		
8	<12.5	NR	NR		
9	4.76	0.8	29	0.24	0.22
10	<0.02	NR	95		
11	NT	NT	NT		
12	<20	NR	150		
13	3.3	0.7	NR	-1.37	-1.33
14	6.58	2	51	2.25	0.97
15	4.22	1.27	70	-0.35	-0.23
16	4.5	1	94	-0.04	-0.03
17	NT	NT	NT		
18	NT	NT	NT		
19	NT	NT	NT		
20	4.5	0.91	108	-0.04	-0.04
21	<12.5	NR	96		
22	6.25	1	90	1.88	1.45
23	NT	NT	NT		
24	NT	NT	NT		
25	18.6	2.1	74.1	15.48	6.42
26	<10	NR	NR		
27	8.172	10.58	33.8	4.00	0.34
28	4.4	1.5	115	-0.15	-0.09
29	NT	NT	NT		
30	8.29	NR	33.4	4.13	6.05
32	NT	NT	NT		
33	4.38	1.31	46.6	-0.18	-0.11
34	3.84	0.96	30	-0.77	-0.61
35	NT	NT	NT		

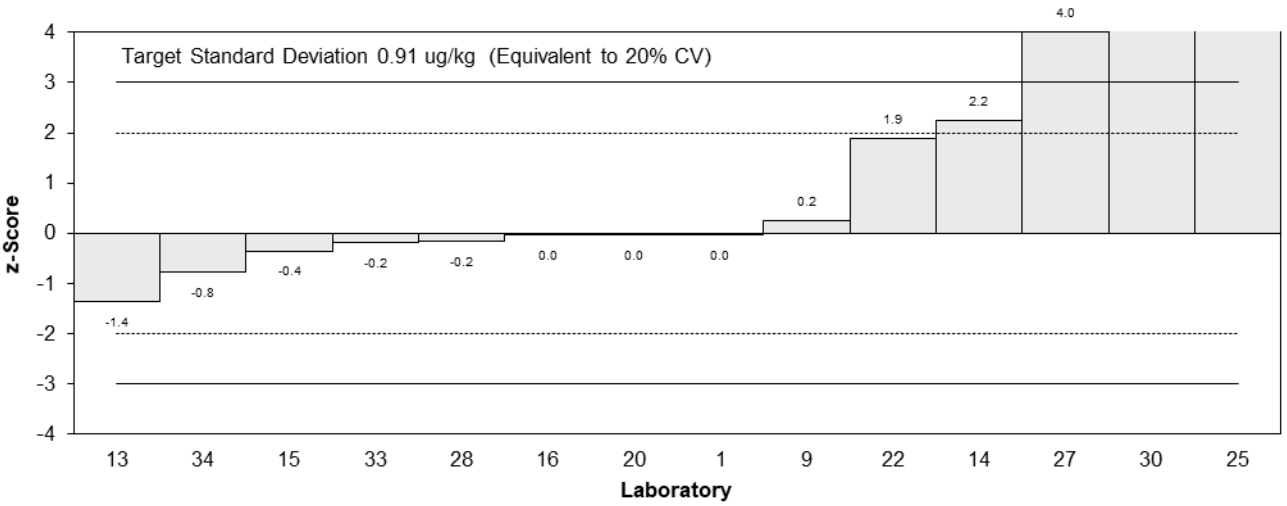
Statistics

Assigned Value*	4.54	0.62
Spike	Not Spiked	
Robust Average	5.4	1.3
Median	4.51	0.41
Mean	6.17	
N	14	
Max.	18.6	
Min.	3.3	

Robust SD	2.0	
Robust CV	37%	

*Robust Average excluding Laboratories 25, 27 and 30.


Kernel Density
Density
Result
Results: S1 - MeFOSA
Assigned Value = 4.54 ± 0.62 ug/kg
Results (ug/kg)
Laboratory
13 34 15 33 28 16 20 1 9 22 14 27 30 25 3 10 2 26 4 21 8 12 5 11 17 18 19 23 24 29 32 35 6 7 Md R.A.


z-Scores: S1 - MeFOSA
Target Standard Deviation 0.91 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
13 34 15 33 28 16 20 1 9 22 14 27 30 25
-1.4 -0.8 -0.4 -0.2 -0.2 0.0 0.0 0.0 0.2 1.9 2.2 4.0

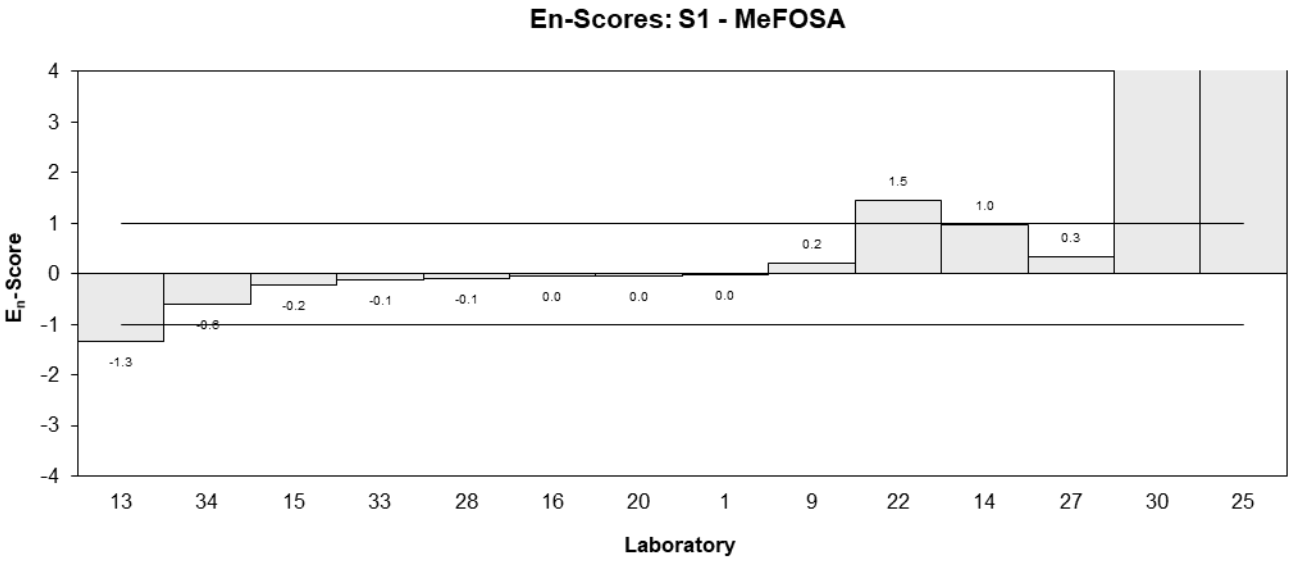

En-Scores: S1 - MeFOSA
En-Score
Laboratory
13 34 15 33 28 16 20 1 9 22 14 27 30 25
-1.3 -0.6 -0.2 -0.1 -0.1 0.0 0.0 0.0 0.2 1.5 1.0 0.3

Figure 23

Table 27

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	EtFOSA
Units	ug/kg

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	0.34	0.32	NR
2	<10	NR	NR
3	<10	NR	100
4	<12.2	NR	106
5	NR	NR	NR
6	NT	NT	NT
7	0.87	1.40	NR
8	<5.0	NR	NR
9	<19.3	NR	24
10	<0.02	NR	NR
11	NT	NT	NT
12	<20	NR	150
13	<1	NR	NR
14	0.22	0	51
15	0.280	0.280	73
16	<0.5	NR	94
17	NT	NT	NT
18	NT	NT	NT
19	NT	NT	NT
20	<2	NR	NR
21	<12.5	NR	100
22	<0.5	0	76
23	NT	NT	NT
24	NT	NT	NT
25	NR	NR	90.4
26	<10	NR	NR
27	0.26	0.134	39.8
28	<1.2	NR	119
29	NT	NT	NT
30	0.67	NR	33.4
32	NT	NT	NT
33	<2.35	0.705	40.5
34	0.3	0.075	30
35	NT	NT	NT

Statistics

Assigned Value	Not Set	
Spike	Not Spiked	
Robust Average	0.36	0.25
Median	0.290	0.074
Mean	0.420	
N	7	
Max.	0.87	
Min.	0.22	

Robust SD	0.29
Robust CV	81%

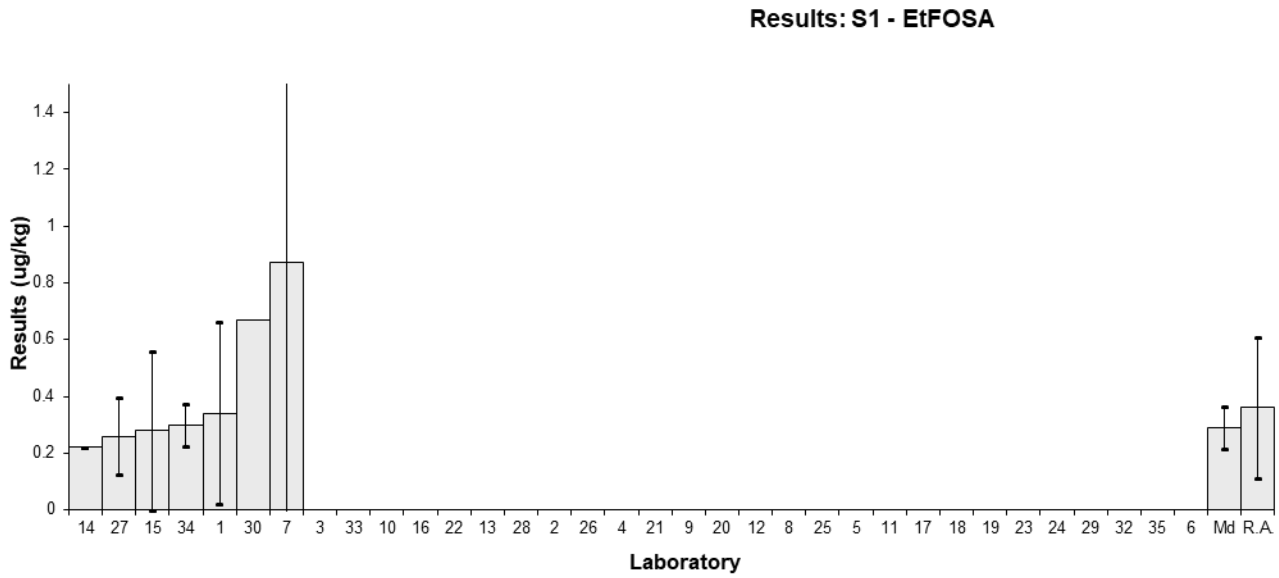

Results: S1 - EtFOSA
Results (ug/kg)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
14 27 15 34 1 30 7 3 33 10 16 22 13 28 2 26 4 21 9 20 12 8 25 5 11 17 18 19 23 24 29 32 35 6 Md R.A.
Laboratory

Figure 24

Table 28

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	MeFOSAA
Units	ug/kg

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	0.59	0.14	NR
2	<2	NR	NR
3	< 10	NR	96
4	<4.9	NR	104
5	NR	NR	NR
6	3.9	NR	NR
7	0.59	0.39	NR
8	<2.0	NR	NR
9	<193	NR	64
10	<0.02	NR	97
11	NT	NT	NT
12	<20	NR	150
13	<1	NR	NR
14	<0.5	0.2	74
15	26.4	7.92	75
16	29.2	8	94
17	NT	NT	NT
18	NT	NT	NT
19	0.71	0.03	67
20	<2	NR	NR
21	<5.0	NR	100
22	<0.5	0	69
23	NT	NT	NT
24	NT	NT	NT
25	0.95	0.09	92
26	<2	NR	NR
27	<0.1	NR	18.1
28	1.5	0.3	113
29	3.48	1.044	61
30	<0.5	NR	33.4
32	NT	NT	NT
33	< 2.35	0.705	39.1
34	0.851	0.21275	23
35	NT	NT	NT

Statistics

Assigned Value	Not Set	
Spike	Not Spiked	
Robust Average	2.7	2.4
Median	1.23	0.67
Mean	6.82	
N	10	
Max.	29.2	
Min.	0.59	

Robust SD	3.0
Robust CV	110%

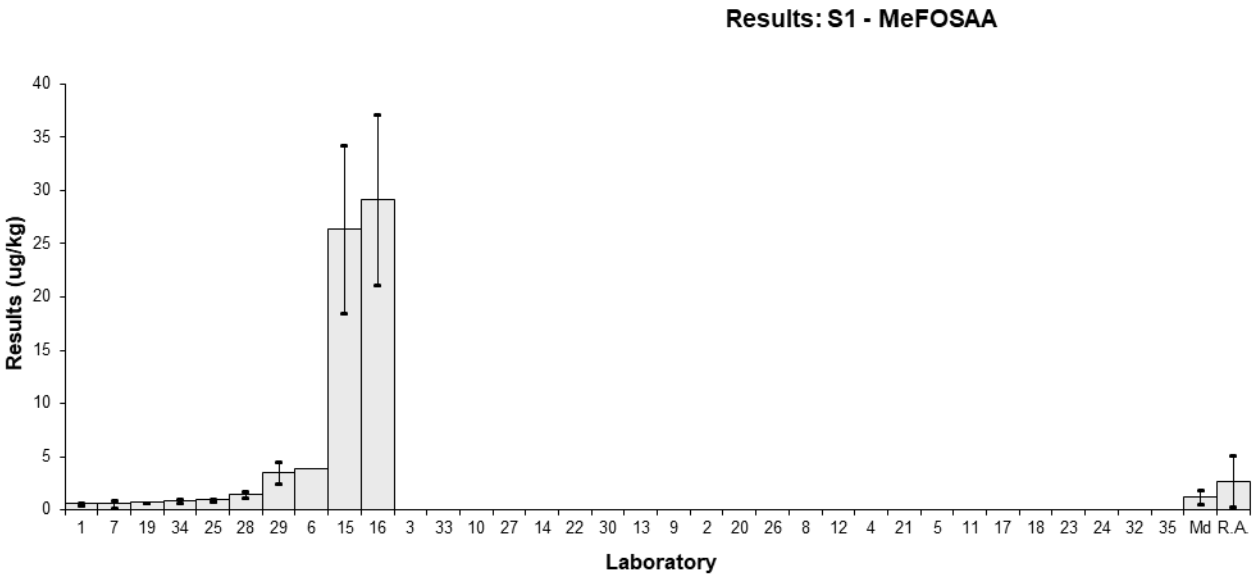

Results: S1 - MeFOSAA
Results (ug/kg)
40
35
30
25
20
15
10
5
0
1 7 19 34 25 28 29 6 15 16 3 33 10 27 14 22 30 13 9 2 20 26 8 12 4 21 5 11 17 18 23 24 32 35 Md R.A.
Laboratory

Figure 25

Table 29

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	EtFOSAA
Units	ug/kg

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	0.31	0.08	NR
2	<2	NR	NR
3	< 10	NR	101
4	<4.9	NR	106
5	NR	NR	NR
6	5.3	NR	NR
7	0.04	0.00	NR
8	<2.0	NR	NR
9	<193	NR	81
10	<0.02	NR	88
11	NT	NT	NT
12	<20	NR	150
13	<1	NR	NR
14	<0.5	0.2	52
15	<0.5	NR	71
16	<0.5	NR	94
17	NT	NT	NT
18	NT	NT	NT
19	0.19	0.02	65
20	<2	NR	NR
21	<5.0	NR	95
22	<0.5	0	74
23	NT	NT	NT
24	NT	NT	NT
25	NR	NR	83.7
26	<2	NR	NR
27	<0.1	NR	16.6
28	<0.5	NR	146
29	6.62	1.986	58
30	<0.5	NR	33.4
32	NT	NT	NT
33	< 2.35	0.705	60.2
34	0.266	0.0665	23
35	NT	NT	NT

Statistics

Assigned Value	Not Set	
Spike	Not Spiked	
Robust Average	1.8	3.1
Median	0.27	0.31
Mean	2.1	
N	6	
Max.	6.62	
Min.	0.04	

Robust SD	3.2
Robust CV	180%

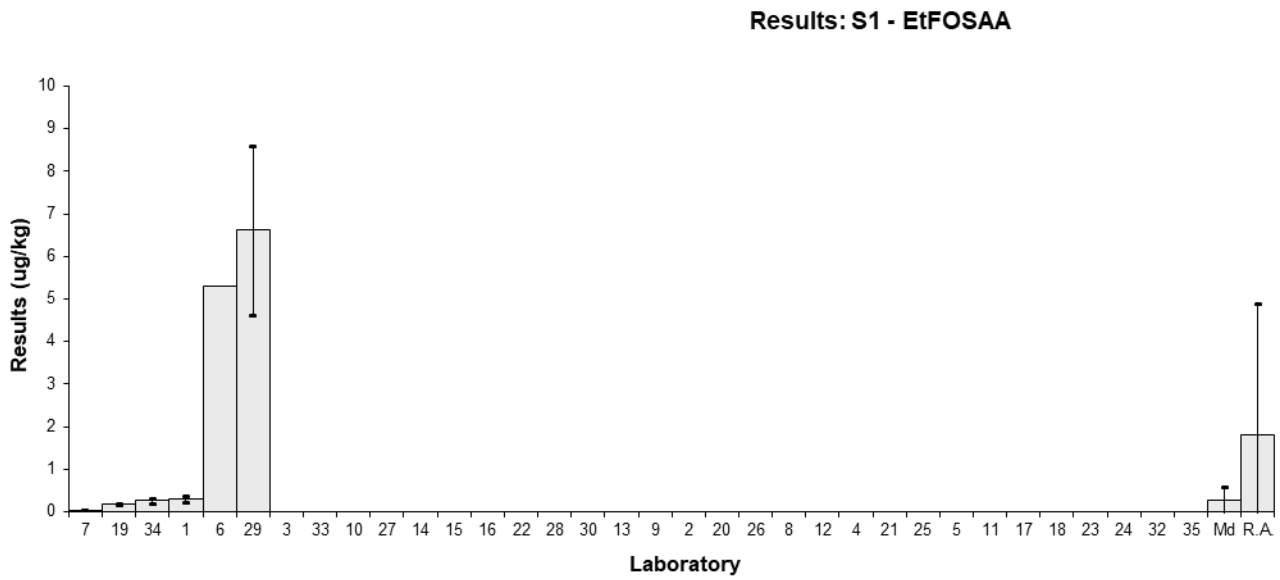

Results: S1 - EtFOSAA
Results (ug/kg)
10
9
8
7
6
5
4
3
2
1
0
7 19 34 1 6 29 3 33 10 27 14 15 16 22 28 30 13 9 2 20 26 8 12 4 21 25 5 11 17 18 23 24 32 35 Md R.A.
Laboratory

Figure 26

Table 30

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	MeFOSE
Units	ug/kg

Participant Results

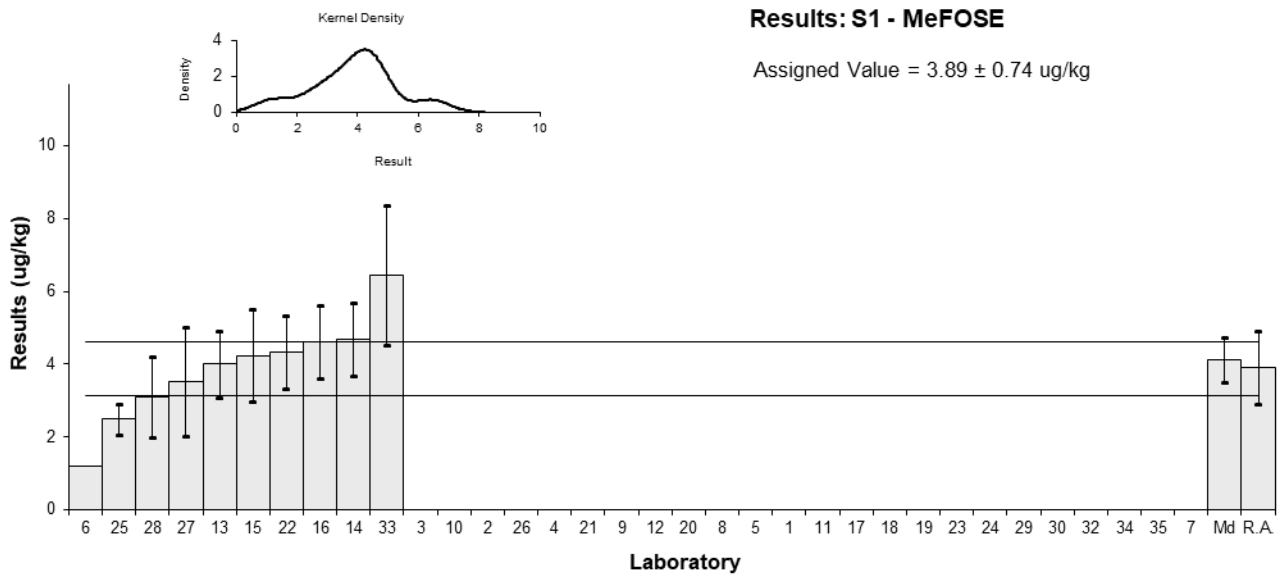
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	<10	NR	NR		
3	< 10	NR	106		
4	<12.2	NR	105		
5	NR	NR	NR		
6	1.2	NR	NR	-3.46	-3.64
7	NT	NT	NT		
8	<5.0	NR	NR		
9	<19.3	NR	32		
10	<0.02	NR	NR		
11	NT	NT	NT		
12	<40	NR	150		
13	4.0	0.9	NR	0.14	0.09
14	4.68	1	75	1.02	0.64
15	4.24	1.27	76	0.45	0.24
16	4.6	1	94	0.91	0.57
17	NT	NT	NT		
18	NT	NT	NT		
19	NT	NT	NT		
20	<5	NR	NR		
21	<12.5	NR	94		
22	4.34	1	98	0.58	0.36
23	NT	NT	NT		
24	NT	NT	NT		
25	2.49	0.41	NR	-1.80	-1.65
26	<10	NR	NR		
27	3.527	1.508	27.7	-0.47	-0.22
28	3.1	1.1	131	-1.02	-0.60
29	NT	NT	NT		
30	NT	NT	NT		
32	NT	NT	NT		
33	6.43	1.92	119	3.26	1.23
34	NT	NT	NT		
35	NT	NT	NT		

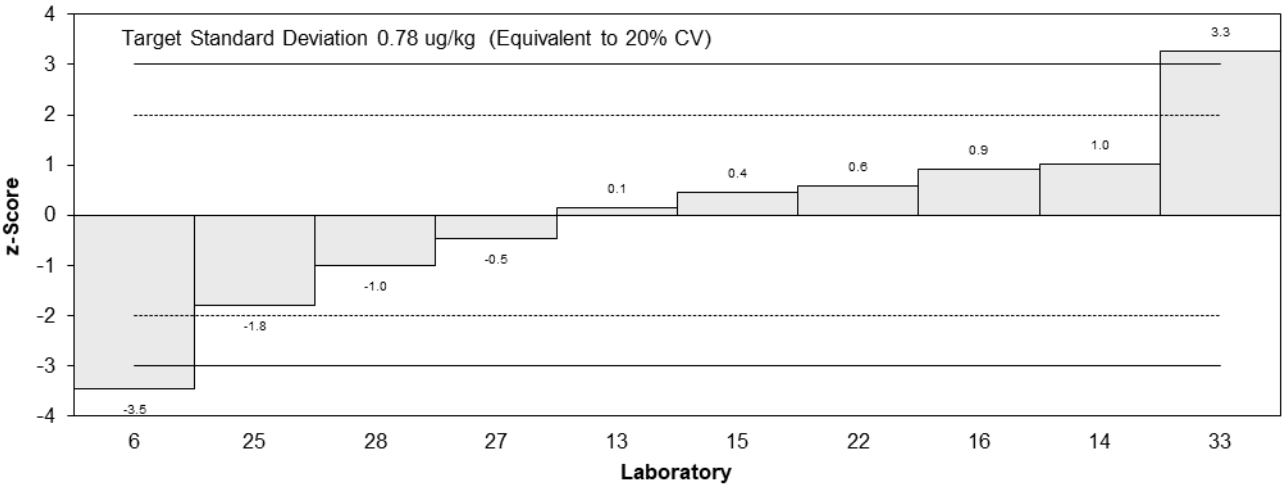
Statistics

Assigned Value*	3.89	0.74
Spike	Not Spiked	
Robust Average	3.9	1.0
Median	4.12	0.61
Mean	3.86	
N	10	
Max.	6.43	
Min.	1.2	

Robust SD	1.3	
Robust CV	33%	

*Robust Average excluding Laboratories 6 and 33.


Kernel Density
Density
Result
Results: S1 - MeFOSE
Assigned Value = 3.89 ± 0.74 ug/kg
Results (ug/kg)
Laboratory
6 25 28 27 13 15 22 16 14 33 3 10 2 26 4 21 9 12 20 8 5 1 11 17 18 19 23 24 29 30 32 34 35 7 Md R.A.


z-Scores: S1 - MeFOSE
Target Standard Deviation 0.78 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
6 25 28 27 13 15 22 16 14 33
-3.5
-1.8
-1.0
-0.5
0.1
0.4
0.6
0.9
1.0
3.3

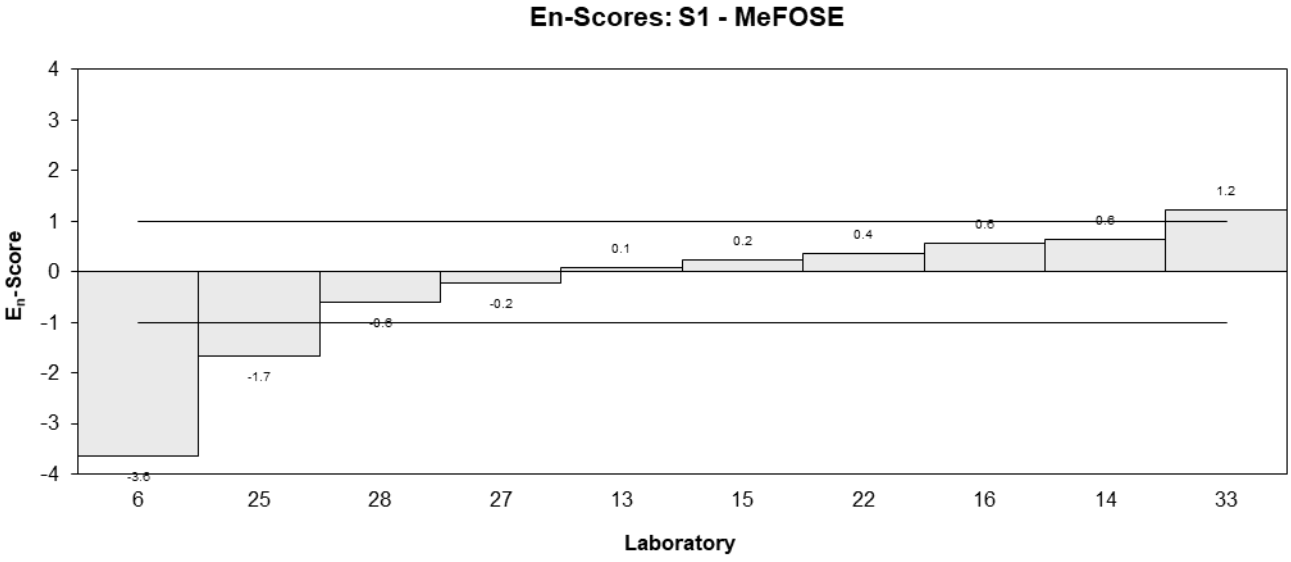

En-Scores: S1 - MeFOSE
En-Score
Laboratory
6 25 28 27 13 15 22 16 14 33
-3.6
-1.7
-0.8
-0.2
0.1
0.2
0.4
0.6
0.6
1.2

Figure 27

Table 31

Sample Details

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

Participant Results

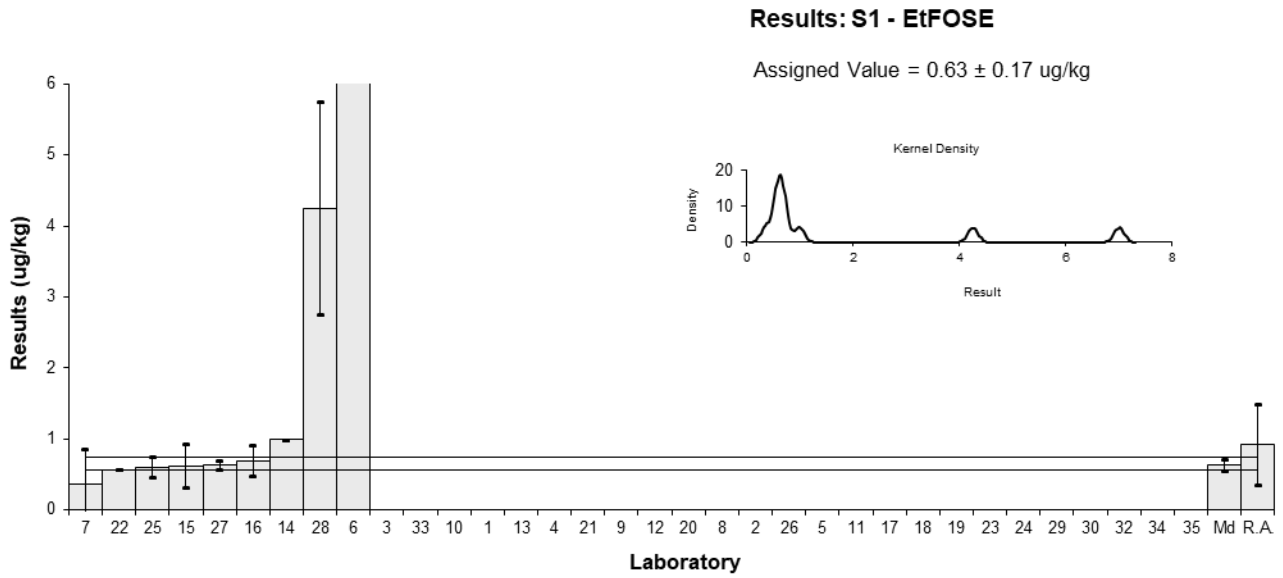
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	<1	NR	NR		
2	<50	NR	NR		
3	< 10	NR	105		
4	<12.2	NR	110		
5	NR	NR	NR		
6	15	NR	NR	114.62	84.55
7	0.36	0.50	NR	-2.13	-0.51
8	<5.0	NR	NR		
9	<19.3	NR	30		
10	<0.02	NR	85		
11	NT	NT	NT		
12	<40	NR	150		
13	<1	NR	NR		
14	0.99	0	61	2.89	2.14
15	0.623	0.312	69	-0.03	-0.01
16	0.696	0.21	94	0.55	0.26
17	NT	NT	NT		
18	NT	NT	NT		
19	NT	NT	NT		
20	<5	NR	NR		
21	<12.5	NR	93		
22	0.57	0	58	-0.45	-0.34
23	NT	NT	NT		
24	NT	NT	NT		
25	0.604	0.14	84.8	-0.18	-0.10
26	<50	NR	NR		
27	0.639	0.0657	28.7	0.10	0.07
28	4.25	1.5	114	28.89	2.4
29	NT	NT	NT		
30	NT	NT	NT		
32	NT	NT	NT		
33	< 4.70	1.41	109		
34	NT	NT	NT		
35	NT	NT	NT		

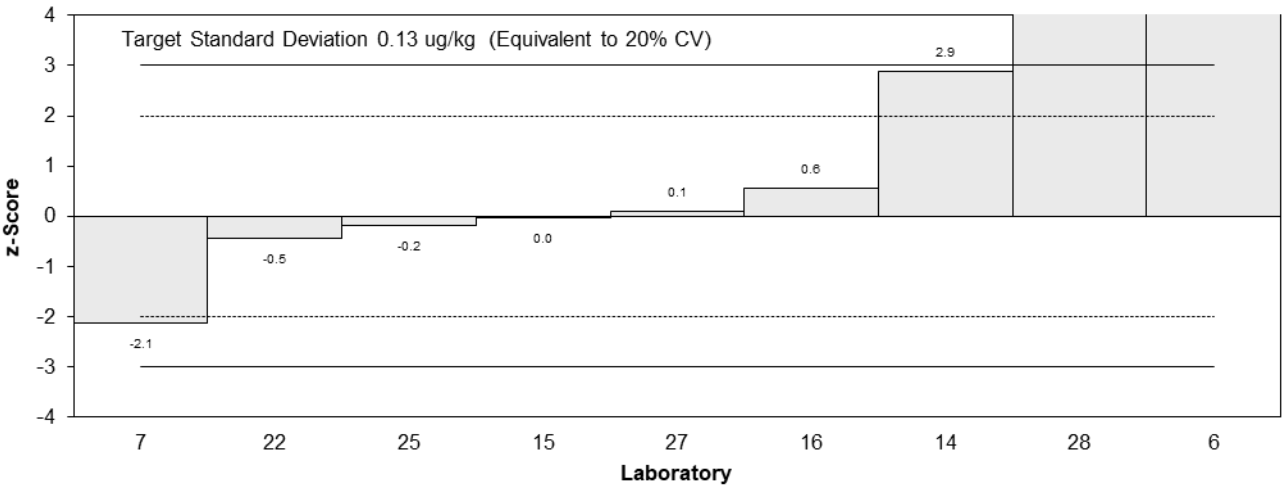
Statistics*

Assigned Value**	0.627	0.17
Spike	Not Spiked	
Robust Average	0.70	0.24
Median	0.631	0.078
Mean	1.09	
N	8	
Max.	4.25	
Min.	0.36	

Robust SD	0.27	
Robust CV	39%	

*Laboratory 6 excluded from statistical calculation
**Robust Average excluding Laboratory 28.


Results: S1 - EtFOSE
Assigned Value = 0.63 ± 0.17 ug/kg
Kernel Density
Density
Result
Results (ug/kg)
Laboratory
7 22 25 15 27 16 14 28 6 3 33 10 1 13 4 21 9 12 20 8 2 26 5 11 17 18 19 23 24 29 30 32 34 35 Md R.A.


z-Scores: S1 - EtFOSE
Target Standard Deviation 0.13 ug/kg (Equivalent to 20% CV)
z-Score
-2.1
-0.5
-0.2
0.0
0.1
0.6
2.9
Laboratory
7 22 25 15 27 16 14 28 6

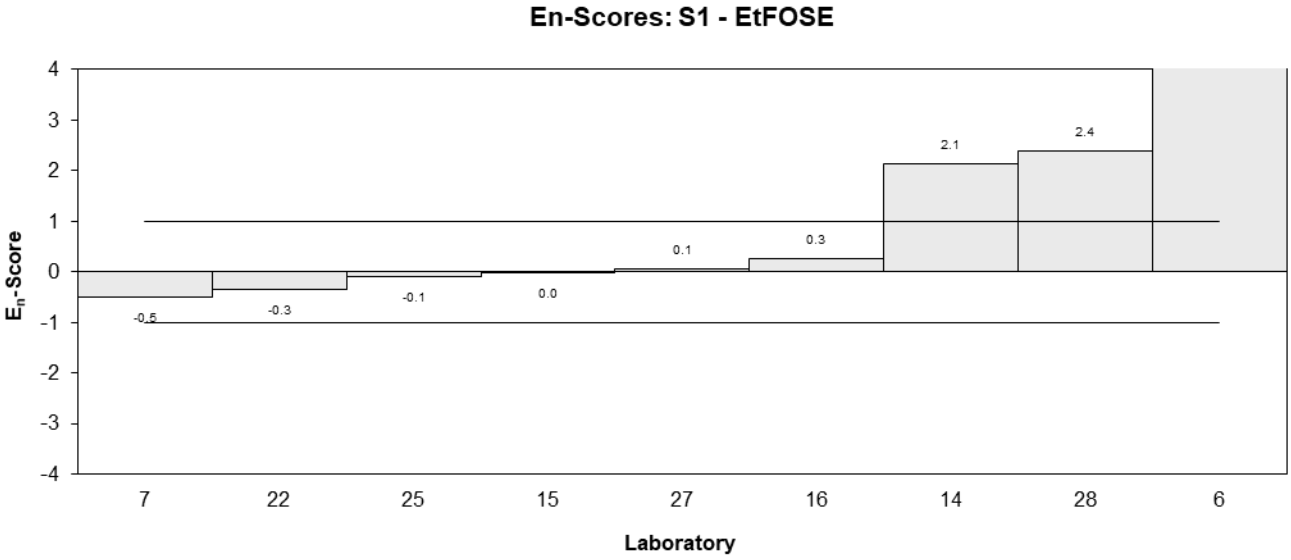

En-Scores: S1 - EtFOSE
En-Score
-0.5
-0.3
-0.1
0.0
0.1
0.3
2.1
2.4
Laboratory
7 22 25 15 27 16 14 28 6

Figure 28

Table 32

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	4:2 FTS
Units	ug/kg

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	0.43	0.03	NR
2	<1	NR	NR
3	< 10	NR	96
4	<4.9	NR	109
5	NR	NR	NR
6	0.1	0.06	NR
7	0.06	0.01	NR
8	<5.0	NR	NR
9	<193	NR	63
10	<0.02	NR	NR
11	NT	NT	NT
12	<20	NR	150
13	<1	NR	NR
14	0.33	0	51
15	0.265	0.265	72
16	<0.5	NR	94
17	NT	NT	NT
18	NT	NT	NT
19	0.43	0.01	177
20	<1	NR	NR
21	<5.0	NR	97
22	<0.5	0	113
23	NT	NT	NT
24	NT	NT	NT
25	3.24	0.44	NR
26	<1	NR	NR
27	0.353	0.0516	58.1
28	<0.5	NR	109
29	0.403	0.1209	84
30	<0.5	NR	33.4
32	NT	NT	NT
33	< 2.35	0.705	98.6
34	<0.20	NR	449
35	<10	NR	40

Statistics

Assigned Value	Not Set	
Spike	Not Spiked	
Robust Average	0.33	0.17
Median	0.353	0.088
Mean	0.623	
N	9	
Max.	3.24	
Min.	0.06	

Robust SD	0.20
Robust CV	60%

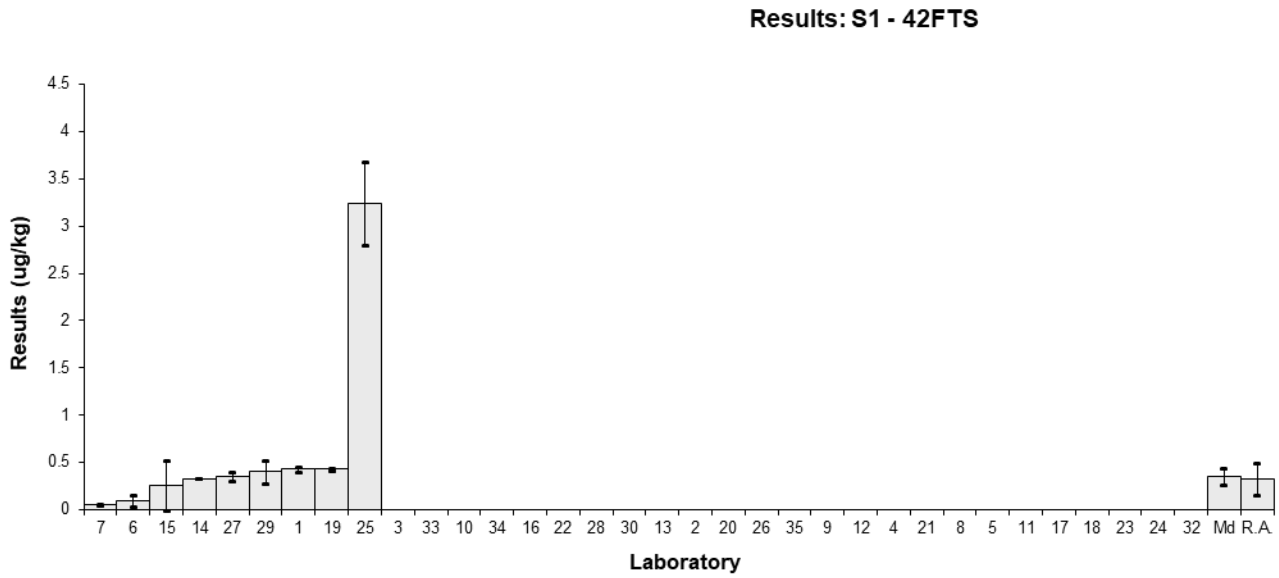

Results: S1 - 42FTS
Results (ug/kg)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
7 6 15 14 27 29 1 19 25 3 33 10 34 16 22 28 30 13 2 20 26 35 9 12 4 21 8 5 11 17 18 23 24 32 Md R.A.
Laboratory

Figure 29

Table 33

Sample Details

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

Participant Results

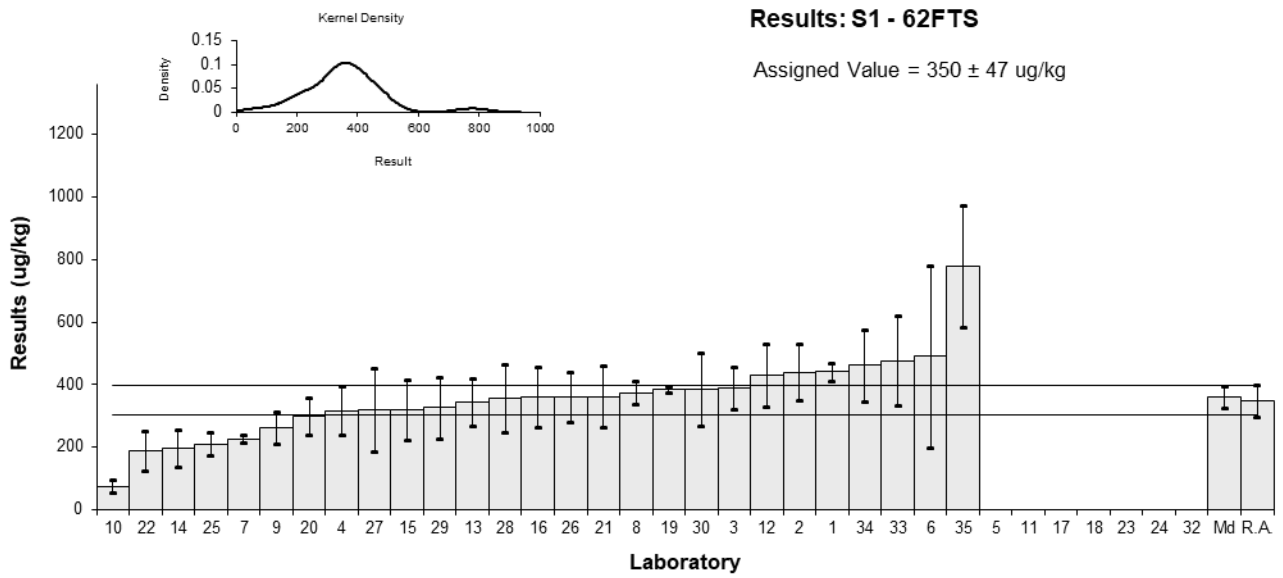
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	440.87	30.00	NR	1.30	1.63
2	440	90	NR	1.29	0.89
3	389	66	98	0.56	0.48
4	317	78.3	106	-0.47	-0.36
5	NR	NR	NR		
6	490	290	NR	2.00	0.48
7	227.60	13.95	NR	-1.75	-2.50
8	374	37	NR	0.34	0.40
9	261	51	134	-1.27	-1.28
10	74.8	20.2	100	-3.93	-5.38
11	NT	NT	NT		
12	430	100	150	1.14	0.72
13	344.2	75.7	NR	-0.08	-0.07
14	196	59	108	-2.20	-2.04
15	320	96.3	79	-0.43	-0.28
16	360	97	94	0.14	0.09
17	NT	NT	NT		
18	NT	NT	NT		
19	384	10.2	147	0.49	0.71
20	300	60	94	-0.71	-0.66
21	362	97	100	0.17	0.11
22	189	65	141	-2.30	-2.01
23	NT	NT	NT		
24	NT	NT	NT		
25	211.3	35.9	94.7	-1.98	-2.35
26	360	80	NR	0.14	0.11
27	318.4	133.57	238.5	-0.45	-0.22
28	358	108	107	0.11	0.07
29	327	98.1	85	-0.33	-0.21
30	385.09	115.527	78.6	0.50	0.28
32	NT	NT	NT		
33	477	143.1	107	1.81	0.84
34	461	115.25	100	1.59	0.89
35	777	194	40	6.10	2.14

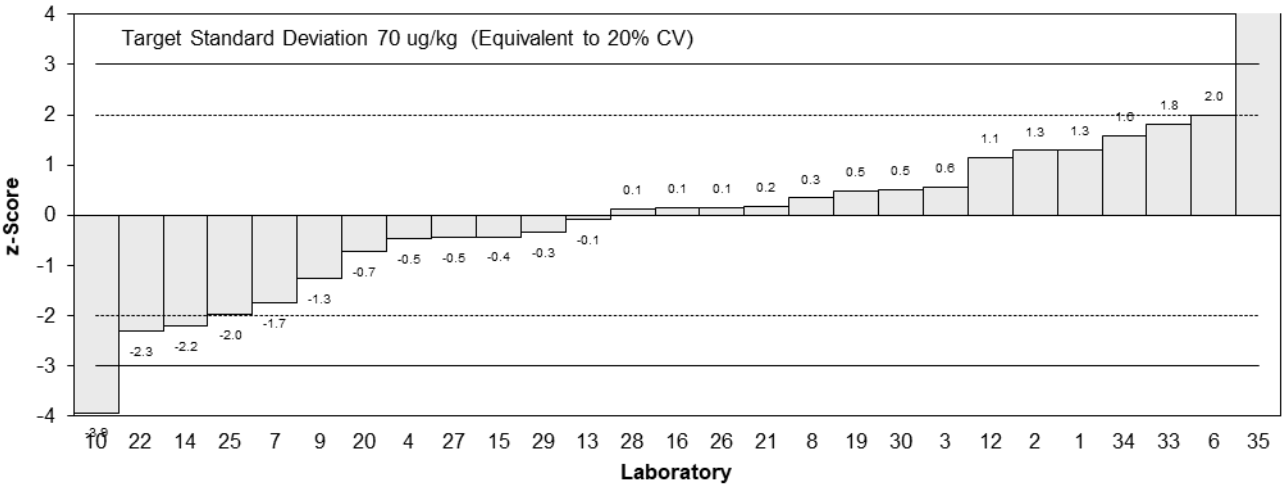
Statistics

Assigned Value*	350	47
Spike	Not Spiked	
Robust Average	349	50
Median	360	35
Mean	355	
N	27	
Max.	777	
Min.	74.8	

Robust SD	100	
Robust CV	30%	

*Robust Average excluding Laboratories 10 and 35.


Kernel Density
Density
Result
Results: S1 - 62FTS
Assigned Value = 350 ± 47 ug/kg
Results (ug/kg)
Laboratory
10 22 14 25 7 9 20 4 27 15 29 13 28 16 26 21 8 19 30 3 12 2 1 34 33 6 35 5 11 17 18 23 24 32 Md R.A.


z-Scores: S1 - 62FTS
Target Standard Deviation 70 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 22 14 25 7 9 20 4 27 15 29 13 28 16 26 21 8 19 30 3 12 2 1 34 33 6 35

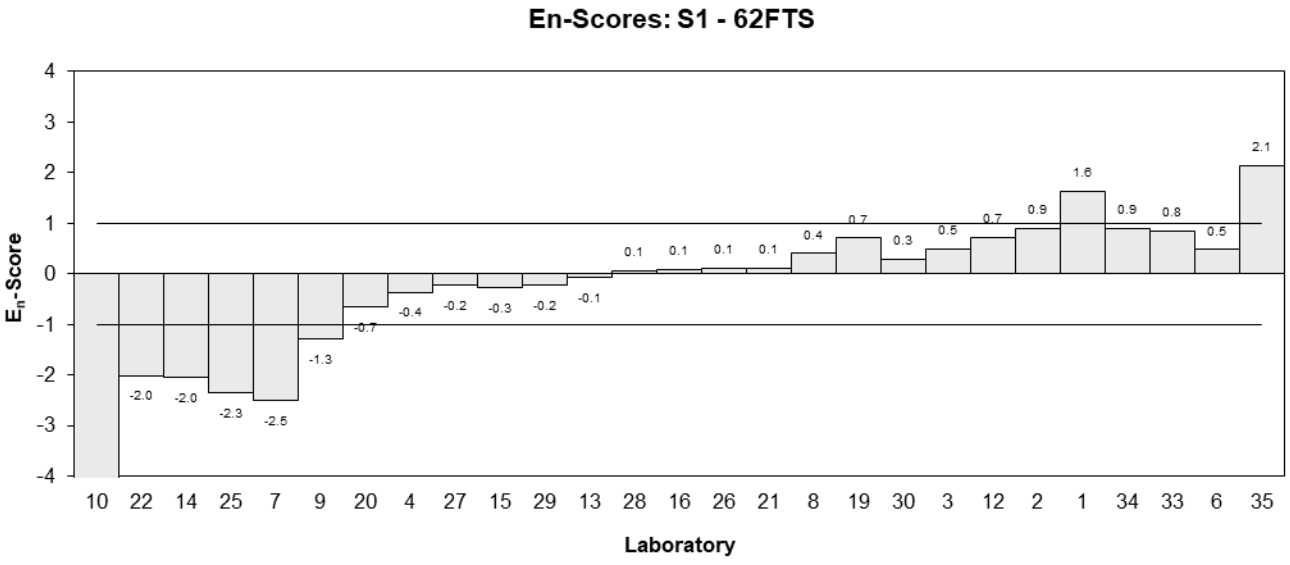

En-Scores: S1 - 62FTS
En-Score
Laboratory
10 22 14 25 7 9 20 4 27 15 29 13 28 16 26 21 8 19 30 3 12 2 1 34 33 6 35

Figure 30

Table 34

Sample Details

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

Participant Results

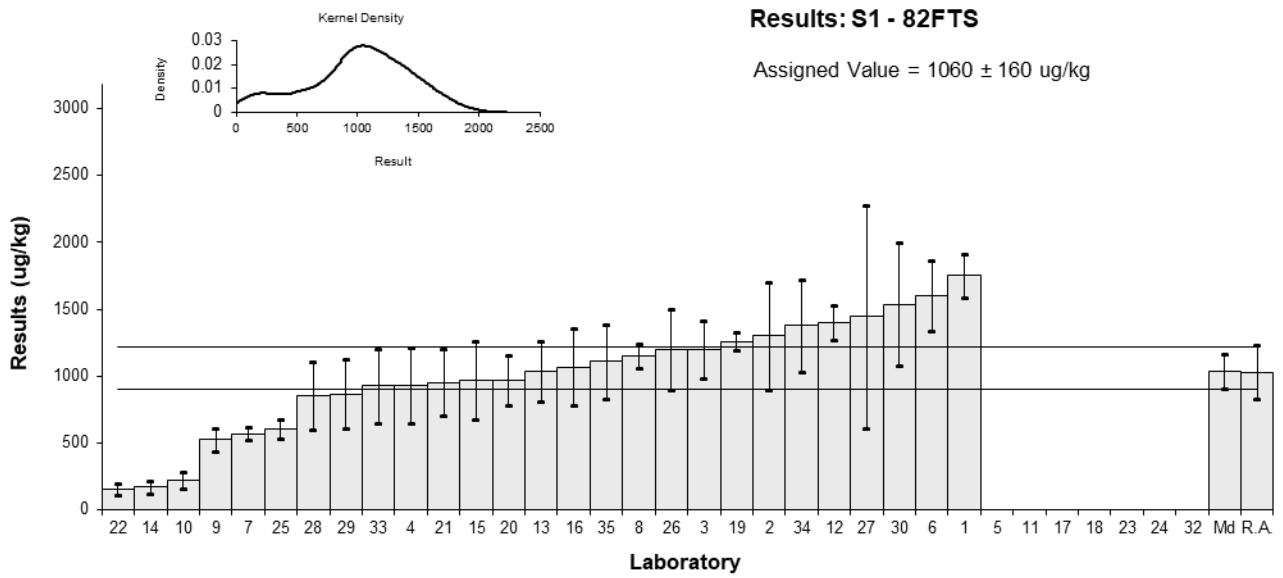
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	1751.26	160.74	NR	3.26	3.05
2	1300	400	NR	1.13	0.56
3	1203	216	114	0.67	0.53
4	932	283	109	-0.60	-0.39
5	NR	NR	NR		
6	1600	260	NR	2.55	1.77
7	567.03	47.77	NR	-2.33	-2.95
8	1148	92	NR	0.42	0.48
9	524	88	158	-2.53	-2.94
10	223.3	62.5	86	-3.95	-4.87
11	NT	NT	NT		
12	1400	130	150	1.60	1.65
13	1036.1	227.9	NR	-0.11	-0.09
14	170	51	114	-4.20	-5.30
15	968	290	83	-0.43	-0.28
16	1067	288	94	0.03	0.02
17	NT	NT	NT		
18	NT	NT	NT		
19	1260	67.2	124	0.94	1.15
20	970	190	94	-0.42	-0.36
21	953	248	107	-0.50	-0.36
22	156	43	NR	-4.26	-5.46
23	NT	NT	NT		
24	NT	NT	NT		
25	604.5	67.7	NR	-2.15	-2.62
26	1200	300	NR	0.66	0.41
27	1444	829.5	413.4	1.81	0.45
28	857	255	113	-0.96	-0.67
29	866	259.8	110	-0.92	-0.64
30	1535.02	460.506	78.6	2.24	0.97
32	NT	NT	NT		
33	929	278.7	171	-0.62	-0.41
34	1380	345	100	1.51	0.84
35	1110	277	40	0.24	0.16

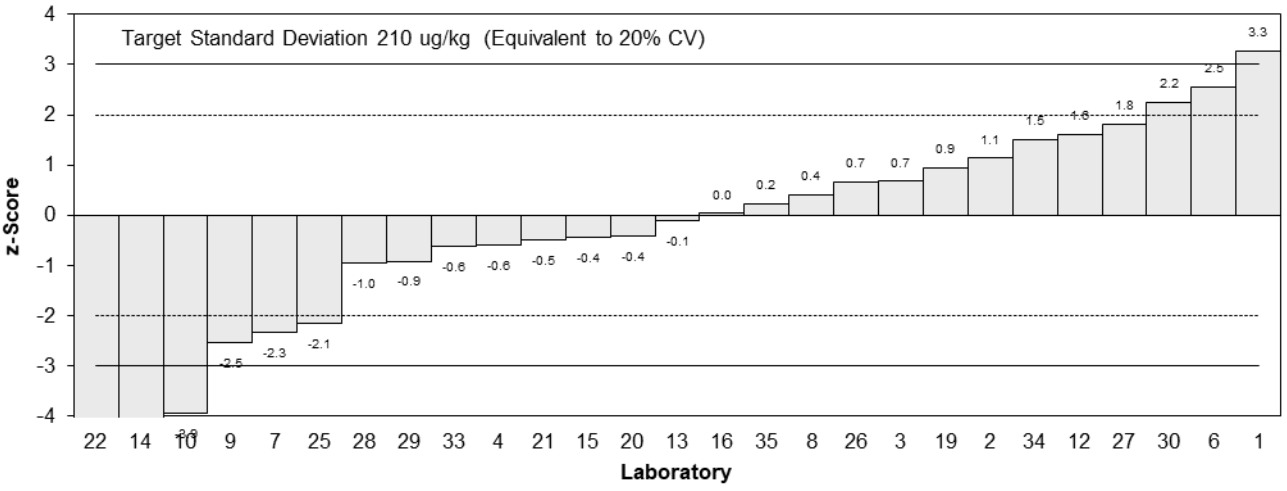
Statistics

Assigned Value*	1060	160
Spike	Not Spiked	
Robust Average	1030	200
Median	1040	130
Mean	1010	
N	27	
Max.	1751.26	
Min.	156	

Robust SD	420	
Robust CV	41%	

*Robust Average excluding Laboratories 1, 6, 10, 14 and 22.


Kernel Density
Density
Result
Results: S1 - 82FTS
Assigned Value = 1060 ± 160 ug/kg
Results (ug/kg)
Laboratory
22 14 10 9 7 25 28 29 33 4 21 15 20 13 16 35 8 26 3 19 2 34 12 27 30 6 1 5 11 17 18 23 24 32 Md R.A.


z-Scores: S1 - 82FTS
Target Standard Deviation 210 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
22 14 10 9 7 25 28 29 33 4 21 15 20 13 16 35 8 26 3 19 2 34 12 27 30 6 1

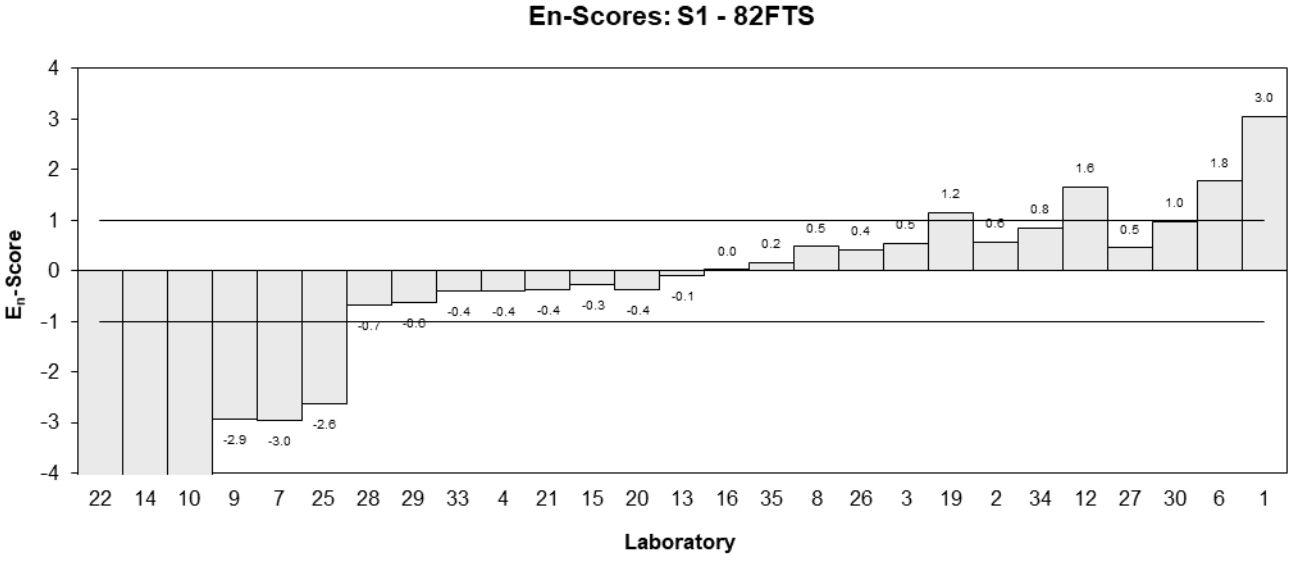

En-Scores: S1 - 82FTS
En-Score
Laboratory
22 14 10 9 7 25 28 29 33 4 21 15 20 13 16 35 8 26 3 19 2 34 12 27 30 6 1

Figure 31

Table 35

Sample Details

Sample No.	S1
Matrix.	Soil
Analyte.	10:2 FTS
Units	ug/kg

Participant Results

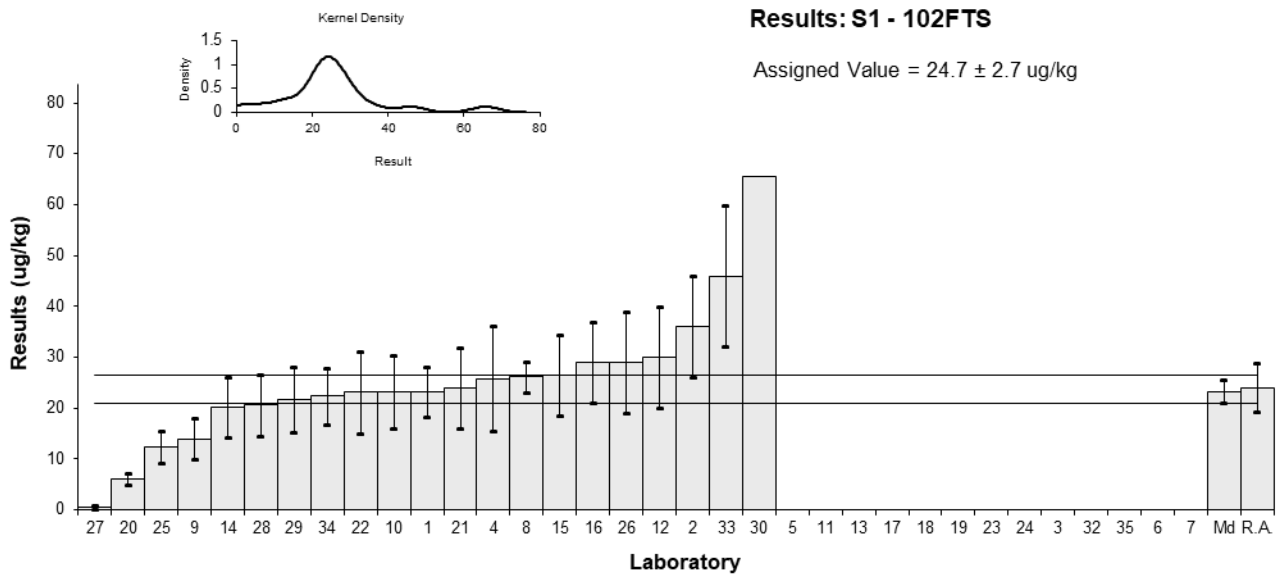
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	23.31	4.90	NR	-0.28	-0.25
2	36	10	NR	2.29	1.09
3	NT	NT	NT		
4	25.8	10.3	109	0.22	0.10
5	NR	NR	NR		
6	NT	NT	NT		
7	NT	NT	NT		
8	26.2	3	NR	0.300	0.37
9	14.0	4	158	-2.17	-2.22
10	23.3	7.2	NR	-0.28	-0.18
11	NT	NT	NT		
12	30	10	150	1.07	0.51
13	NT	NT	NT		
14	20.2	6	72	-0.91	-0.68
15	26.5	7.95	76	0.36	0.21
16	29	8	94	0.87	0.51
17	NT	NT	NT		
18	NT	NT	NT		
19	NT	NT	NT		
20	6.1	1.2	94	-3.77	-6.30
21	24.0	8.0	107	-0.14	-0.08
22	23.1	8	109	-0.32	-0.19
23	NT	NT	NT		
24	NT	NT	NT		
25	12.34	3.1	NR	-2.50	-3.01
26	29	10	NR	0.87	0.42
27	0.557	0.302	413.4	-4.89	-8.89
28	20.6	6	113	-0.83	-0.62
29	21.7	6.51	95	-0.61	-0.43
30	65.67	NR	33.4	8.29	15.17
32	NT	NT	NT		
33	46	13.8	171	4.31	1.51
34	22.4	5.6	100	-0.47	-0.37
35	NT	NT	NT		

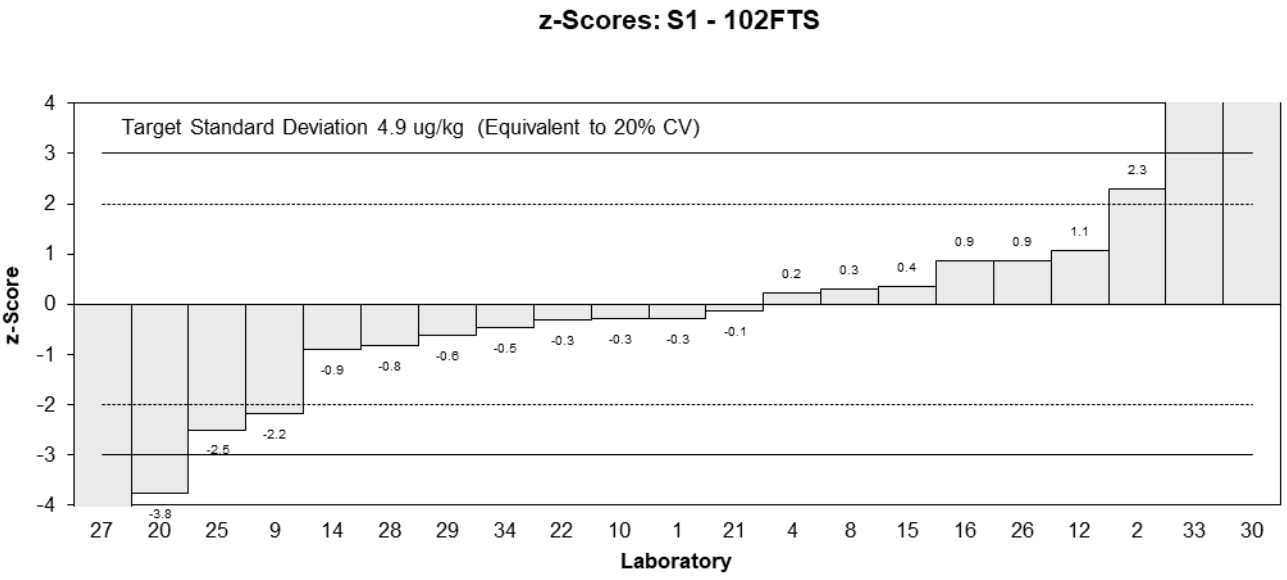
Statistics*

Assigned Value**	24.7	2.7
Spike	Not Spiked	
Robust Average	24.7	4.5
Median	23.7	2.3
Mean	26.3	
N	20	
Max.	65.67	
Min.	6.1	

Robust SD	8	
Robust CV	32%	

*Laboratory 27 excluded from statistical calculation
**Robust Average excluding Laboratories 2, 20, 30 and 33.


Kernel Density
Density
Result
Results: S1 - 102FTS
Assigned Value = 24.7 ± 2.7 ug/kg
Results (ug/kg)
Laboratory
27 20 25 9 14 28 29 34 22 10 1 21 4 8 15 16 26 12 2 33 30 5 11 13 17 18 19 23 24 3 32 35 6 7 Md R.A.


z-Scores: S1 - 102FTS
Target Standard Deviation 4.9 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
27 20 25 9 14 28 29 34 22 10 1 21 4 8 15 16 26 12 2 33 30

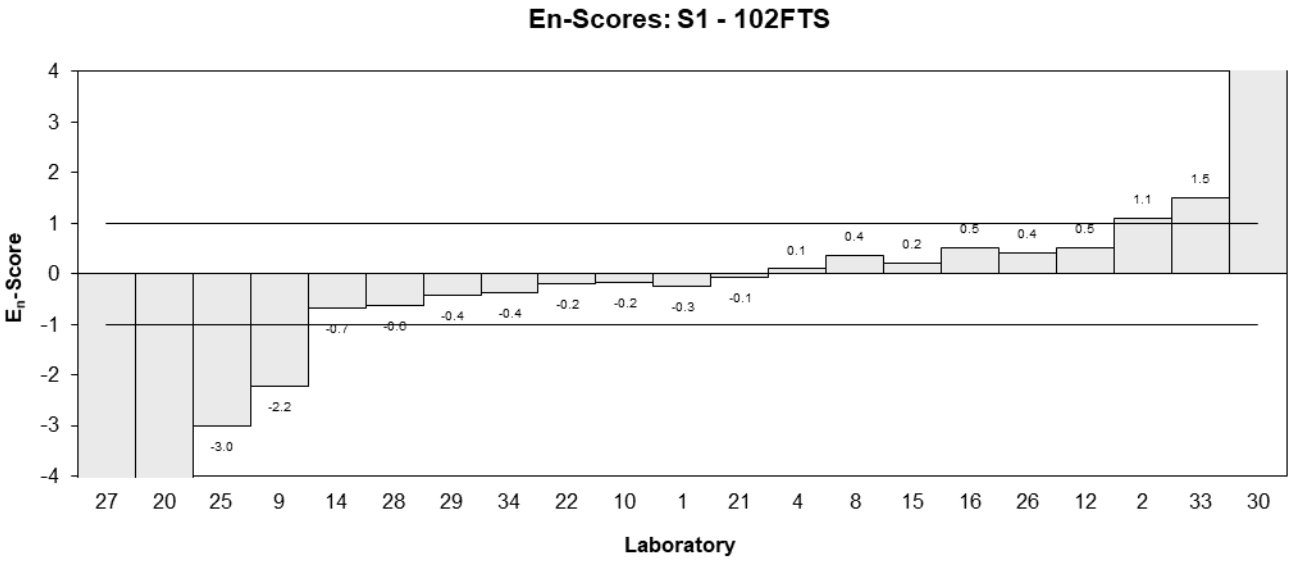

En-Scores: S1 - 102FTS
En-Score
Laboratory
27 20 25 9 14 28 29 34 22 10 1 21 4 8 15 16 26 12 2 33 30

Figure 32

Table 36

Sample Details

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

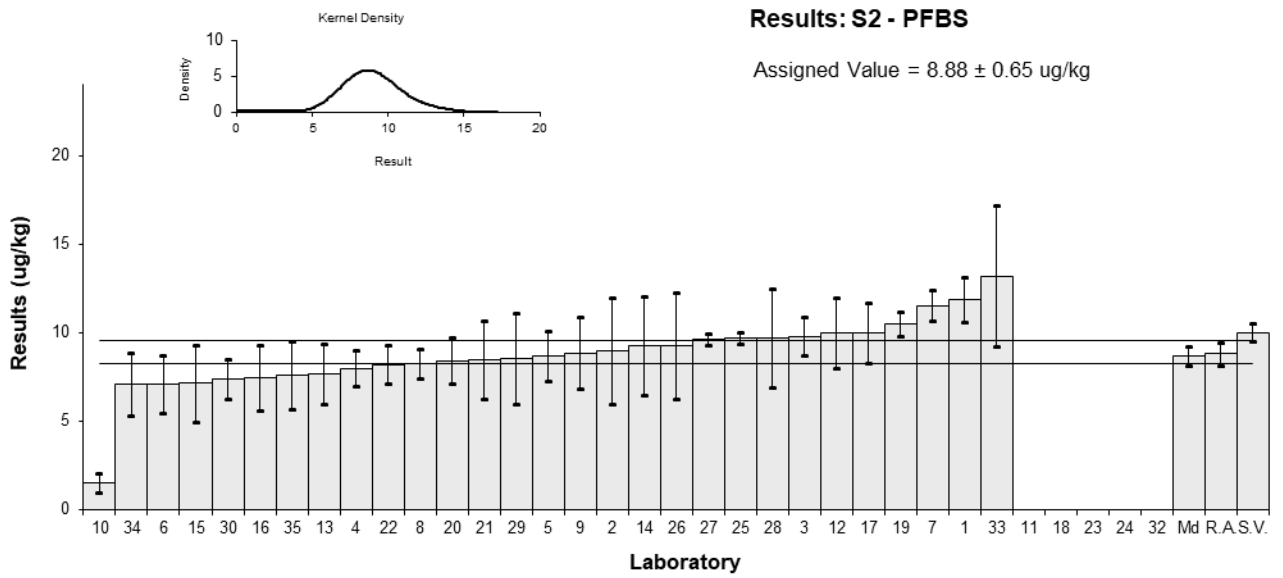
Participant Results

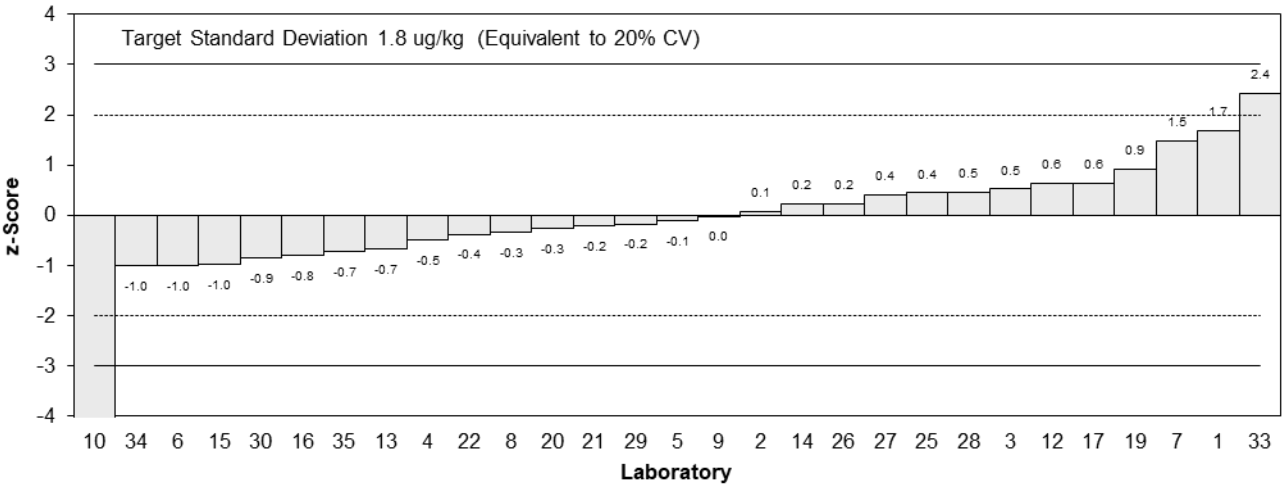
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	11.87	1.25	NR	1.68	2.12
2	9.0	3	103	0.07	0.04
3	9.8	1.1	104	0.52	0.72
4	8.0	1.0	96	-0.50	-0.74
5	8.7	1.4	61	-0.10	-0.12
6	7.1	1.6	NR	-1.00	-1.03
7	11.52	0.87	NR	1.49	2.43
8	8.27	0.83	NR	-0.34	-0.58
9	8.86	2.03	89	-0.01	-0.01
10	1.54	0.54	62	-4.13	-8.69
11	NT	NT	NT		
12	10	2	123	0.63	0.53
13	7.7	1.7	NR	-0.66	-0.65
14	9.28	2.8	74	0.23	0.14
15	7.14	2.14	85	-0.98	-0.78
16	7.44	1.86	101	-0.81	-0.73
17	10	1.7	NR	0.63	0.62
18	NT	NT	NT		
19	10.5	0.70	66	0.91	1.70
20	8.4	1.3	113	-0.27	-0.33
21	8.5	2.2	94	-0.21	-0.17
22	8.21	1.1	102	-0.38	-0.52
23	NT	NT	NT		
24	NT	NT	NT		
25	9.67	0.33	97.4	0.44	1.08
26	9.3	3	97	0.24	0.14
27	9.608	0.324	68.6	0.41	1.00
28	9.7	2.8	80	0.46	0.29
29	8.57	2.571	71	-0.17	-0.12
30	7.36	1.11136	49.9	-0.86	-1.18
32	NT	NT	NT		
33	13.2	3.96	85.5	2.43	1.08
34	7.09	1.7725	95	-1.01	-0.95
35	7.6	1.9	40	-0.72	-0.64

Statistics

Assigned Value*	8.88	0.65	**Robust SD**	1.4	
Spike	10.0	0.5	**Robust CV**	16%	
Robust Average	8.80	0.67			
Median	8.70	0.56			
Mean	8.76				
N	29				
Max.	13.2				
Min.	1.54				

*Robust Average excluding Laboratory 10.


Kernel Density
Density
Result
Results: S2 - PFBS
Assigned Value = 8.88 ± 0.65 ug/kg
Results (ug/kg)
Laboratory
10 34 6 15 30 16 35 13 4 22 8 20 21 29 5 9 2 14 26 27 25 28 3 12 17 19 7 1 33 11 18 23 24 32 Md R.A.S.V.


z-Scores: S2 - PFBS
Target Standard Deviation 1.8 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 34 6 15 30 16 35 13 4 22 8 20 21 29 5 9 2 14 26 27 25 28 3 12 17 19 7 1 33

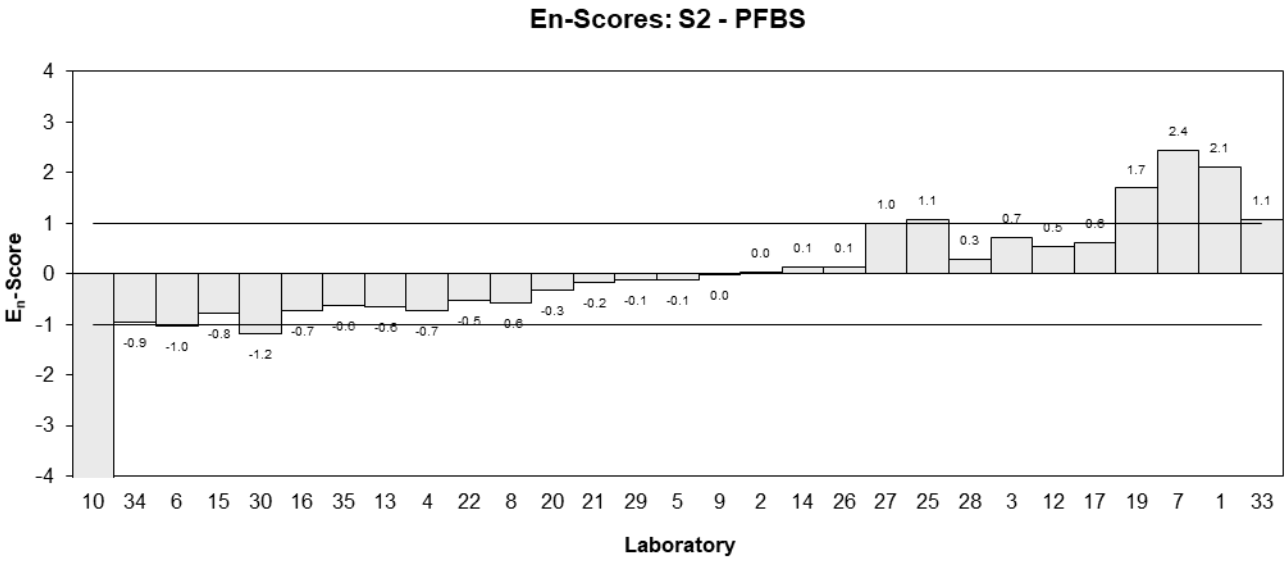

En-Scores: S2 - PFBS
En-Score
Laboratory
10 34 6 15 30 16 35 13 4 22 8 20 21 29 5 9 2 14 26 27 25 28 3 12 17 19 7 1 33

Figure 33

Table 37

Sample Details

Sample No.	S2
Matrix.	Soil
Analyte.	PFPeS
Units	ug/kg

Participant Results

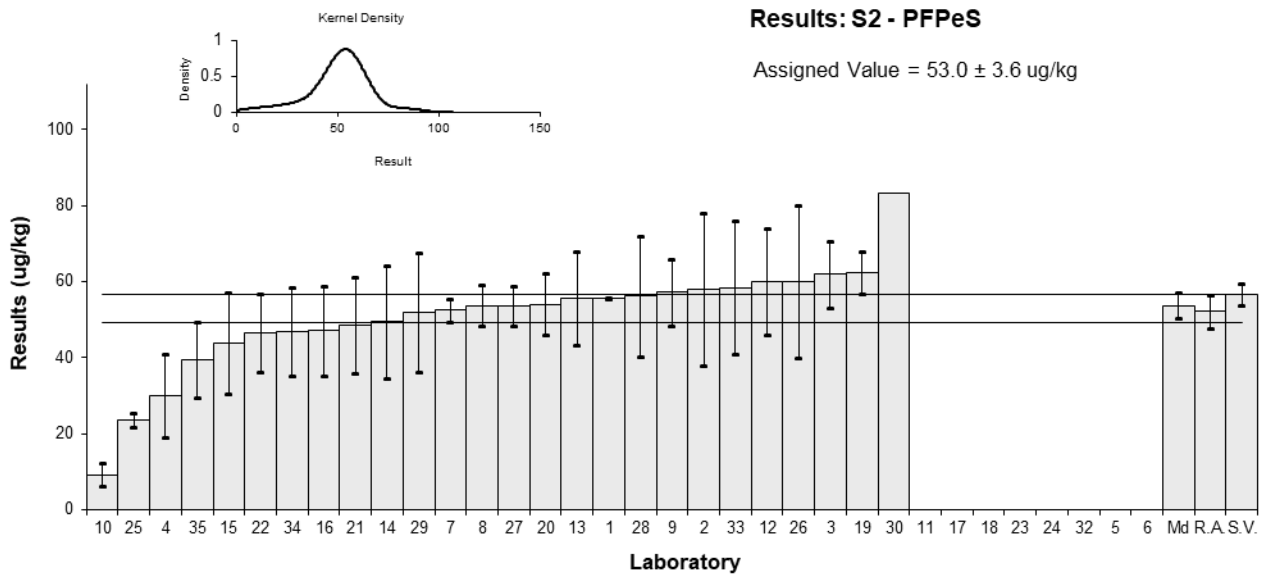
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	55.79	0.18	NR	0.26	0.77
2	58	20	103	0.47	0.25
3	62	8.7	105	0.85	0.96
4	30.0	10.9	93.4	-2.17	-2.00
5	NT	NT	NT		
6	NT	NT	NT		
7	52.48	3.10	NR	-0.05	-0.11
8	53.7	5.4	NR	0.07	0.11
9	57.2	8.9	89	0.40	0.44
10	9.31	3.1	NR	-4.12	-9.20
11	NT	NT	NT		
12	60	14	100	0.66	0.48
13	55.7	12.2	NR	0.25	0.21
14	49.5	14.9	NR	-0.33	-0.23
15	43.9	13.2	81	-0.86	-0.67
16	47.15	11.79	101	-0.55	-0.47
17	NT	NT	NT		
18	NT	NT	NT		
19	62.4	5.41	66	0.89	1.45
20	54	8.1	113	0.09	0.11
21	48.6	12.6	94	-0.42	-0.34
22	46.6	10.2	NR	-0.60	-0.59
23	NT	NT	NT		
24	NT	NT	NT		
25	23.54	1.8	NR	-2.78	-7.32
26	60	20	97	0.66	0.34
27	53.75	5.180	66.7	0.07	0.12
28	56.2	15.8	80	0.30	0.20
29	52	15.6	76	-0.09	-0.06
30	83.24	NR	49.9	2.85	8.40
32	NT	NT	NT		
33	58.4	17.52	85.5	0.51	0.30
34	46.9	11.725	98	-0.58	-0.50
35	39.6	9.9	40	-1.26	-1.27

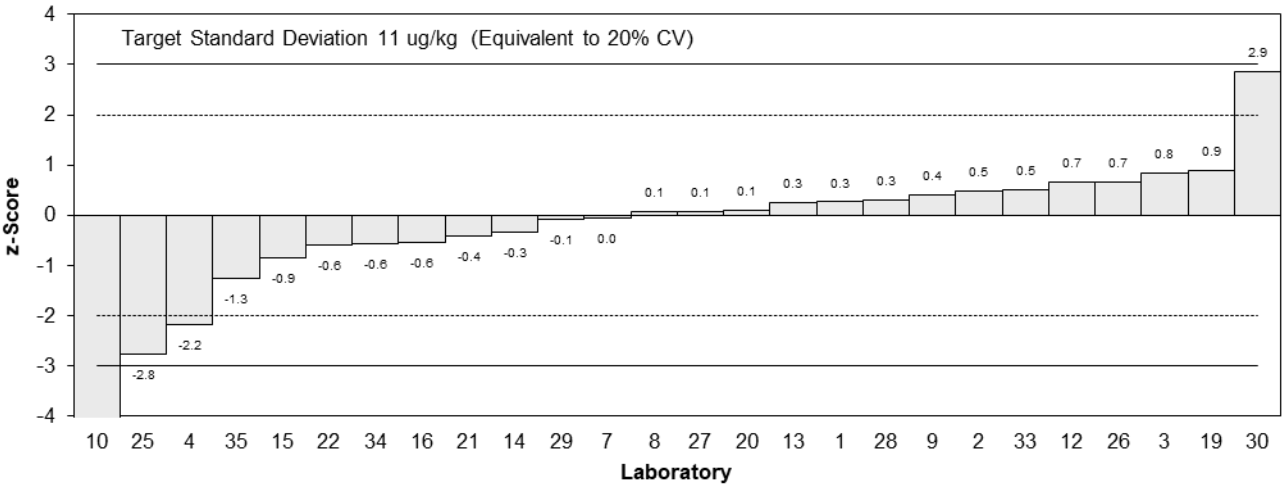
Statistics

Assigned Value*	53.0	3.6
Spike	56.6	2.8
Robust Average	52.2	4.3
Median	53.7	3.4
Mean	50.8	
N	26	
Max.	83.24	
Min.	9.31	

Robust SD	8.8	
Robust CV	17%	

*Robust Average excluding Laboratories 10, 25 and 30.


Kernel Density
Density
Result
Results: S2 - PFPeS
Assigned Value = 53.0 ± 3.6 ug/kg
Results (ug/kg)
Laboratory
10 25 4 35 15 22 34 16 21 14 29 7 8 27 20 13 1 28 9 2 33 12 26 3 19 30 11 17 18 23 24 32 5 6 Md R.A. S.V.


z-Scores: S2 - PFPeS
Target Standard Deviation 11 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 4 35 15 22 34 16 21 14 29 7 8 27 20 13 1 28 9 2 33 12 26 3 19 30

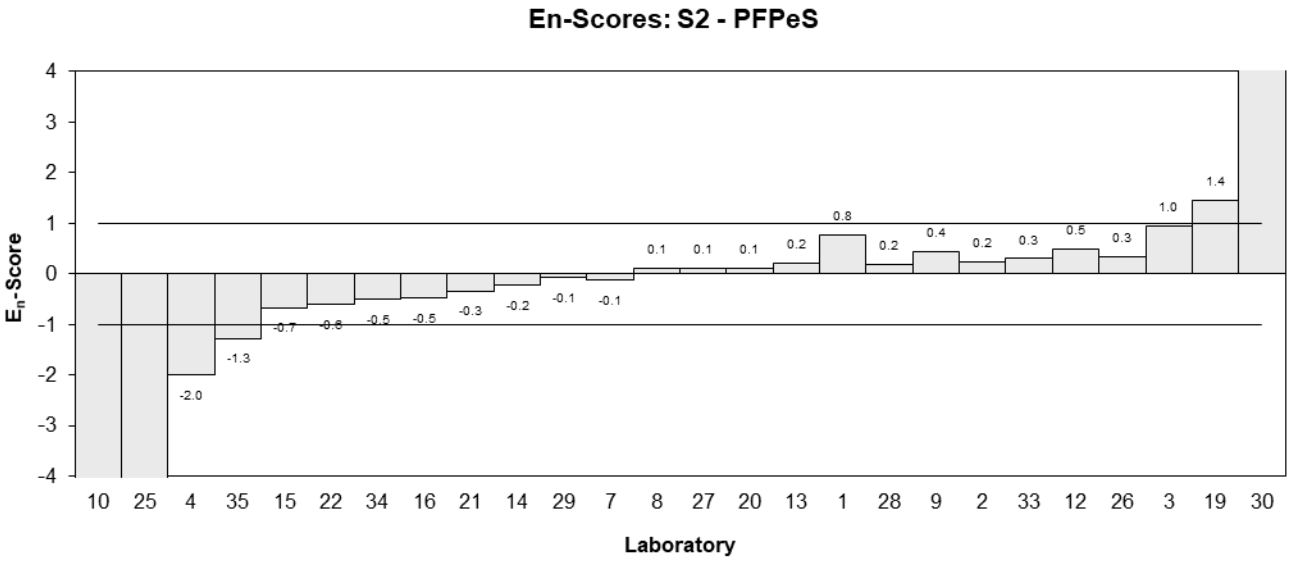

En-Scores: S2 - PFPeS
En-Score
Laboratory
10 25 4 35 15 22 34 16 21 14 29 7 8 27 20 13 1 28 9 2 33 12 26 3 19 30

Figure 34

Table 38

Sample Details

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

Participant Results

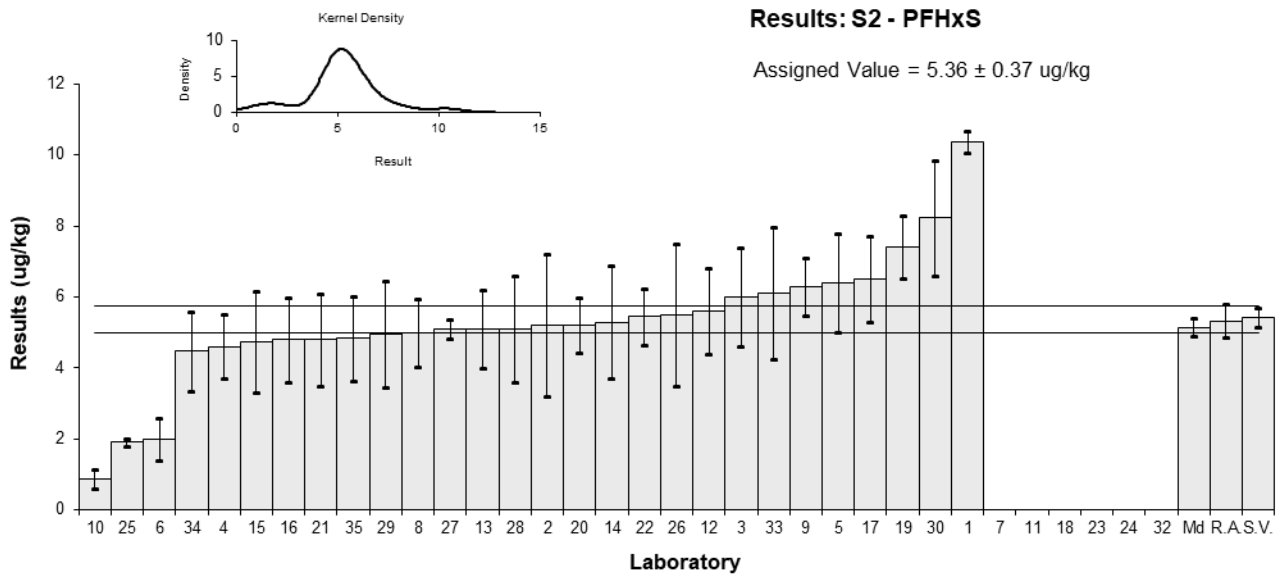
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	10.37	0.31	NR	4.67	10.38
2	5.2	2	96	-0.15	-0.08
3	6.0	1.4	99	0.60	0.44
4	4.6	0.9	93.6	-0.71	-0.78
5	6.4	1.4	51	0.97	0.72
6	2.0	0.59	NR	-3.13	-4.82
7	NR	NR	NR		
8	4.98	0.95	NR	-0.35	-0.37
9	6.29	0.81	84	0.87	1.04
10	0.87	0.28	64	-4.19	-9.68
11	NT	NT	NT		
12	5.6	1.2	100	0.22	0.19
13	5.1	1.1	NR	-0.24	-0.22
14	5.29	1.6	78	-0.07	-0.04
15	4.75	1.43	81	-0.57	-0.41
16	4.8	1.2	101	-0.52	-0.45
17	6.5	1.2	105	1.06	0.91
18	NT	NT	NT		
19	7.41	0.89	74	1.91	2.13
20	5.2	0.78	105	-0.15	-0.19
21	4.8	1.3	94	-0.52	-0.41
22	5.45	0.8	109	0.08	0.10
23	NT	NT	NT		
24	NT	NT	NT		
25	1.91	0.11	96.9	-3.22	-8.94
26	5.5	2	97	0.13	0.07
27	5.091	0.276	66.7	-0.25	-0.58
28	5.1	1.5	86	-0.24	-0.17
29	4.95	1.485	73	-0.38	-0.27
30	8.23	1.62954	49.9	2.68	1.72
32	NT	NT	NT		
33	6.11	1.86	67.5	0.70	0.40
34	4.48	1.12	95	-0.82	-0.75
35	4.83	1.2	40	-0.49	-0.42

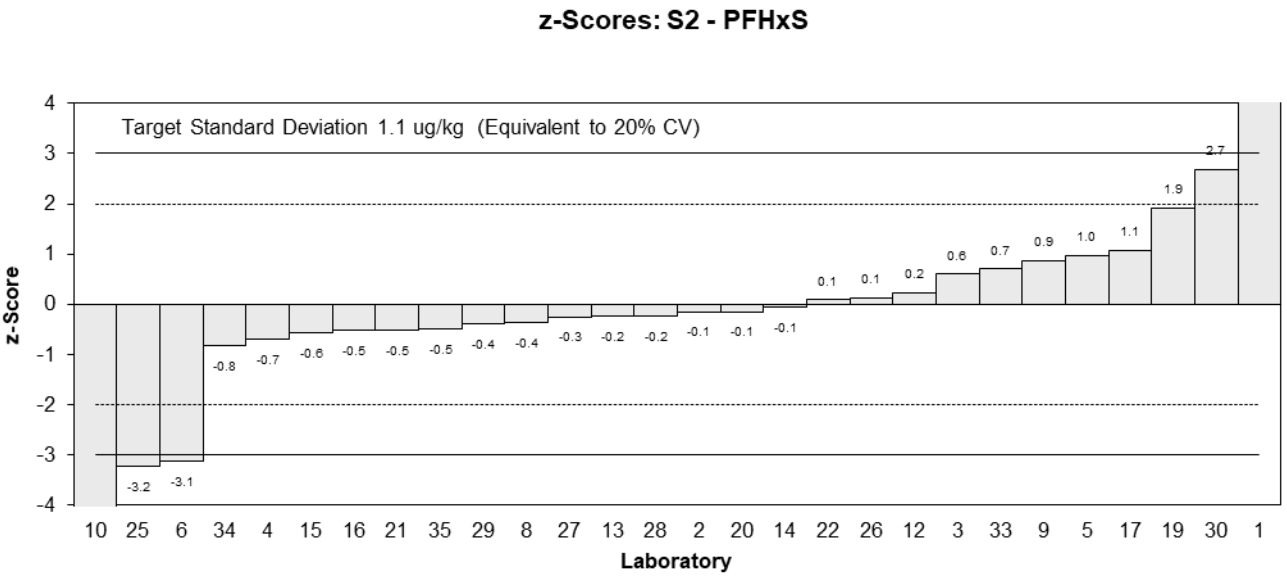
Statistics

Assigned Value*	5.36	0.37
Spike	5.41	0.27
Robust Average	5.32	0.47
Median	5.15	0.24
Mean	5.28	
N	28	
Max.	10.37	
Min.	0.87	

Robust SD	1.0	
Robust CV	19%	

*Robust Average excluding Laboratories 1, 6, 10, 25 and 30.


Kernel Density
Density
Result
Results: S2 - PFHxS
Assigned Value = 5.36 ± 0.37 ug/kg
Results (ug/kg)
Laboratory
10 25 6 34 4 15 16 21 35 29 8 27 13 28 2 20 14 22 26 12 3 33 9 5 17 19 30 1 7 11 18 23 24 32 Md R.A.S.V.


z-Scores: S2 - PFHxS
Target Standard Deviation 1.1 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 6 34 4 15 16 21 35 29 8 27 13 28 2 20 14 22 26 12 3 33 9 5 17 19 30 1

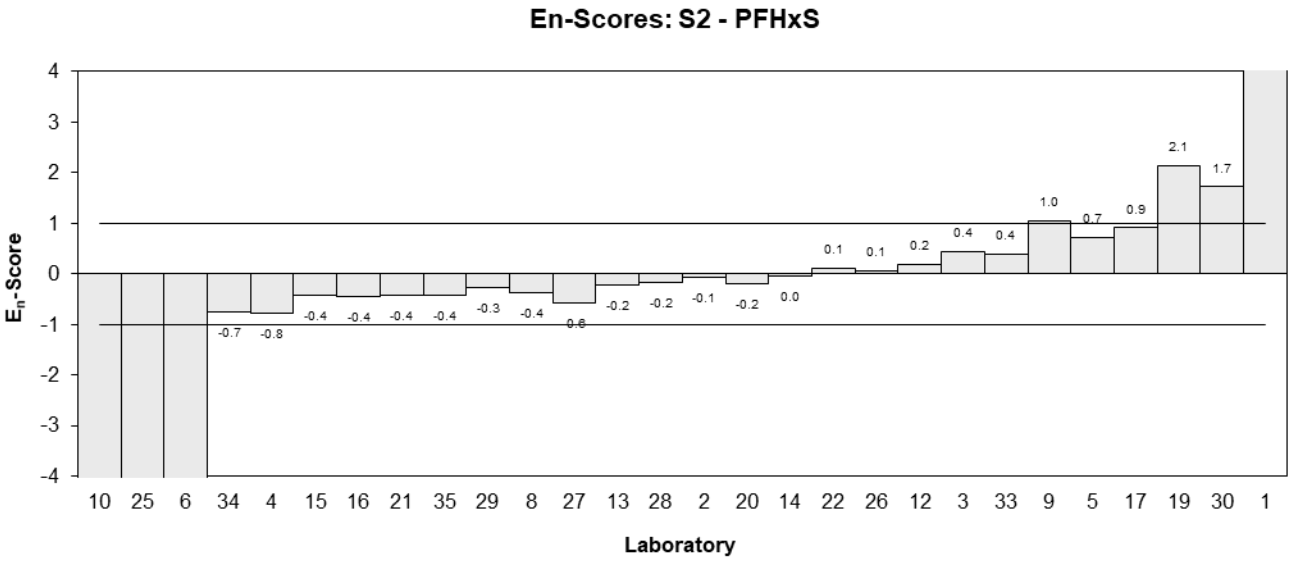

En-Scores: S2 - PFHxS
En-Score
Laboratory
10 25 6 34 4 15 16 21 35 29 8 27 13 28 2 20 14 22 26 12 3 33 9 5 17 19 30 1

Figure 35

Table 39

Sample Details

Sample No.	S2
Matrix.	Soil
Analyte.	PFHxS_L
Units	ug/kg

Participant Results

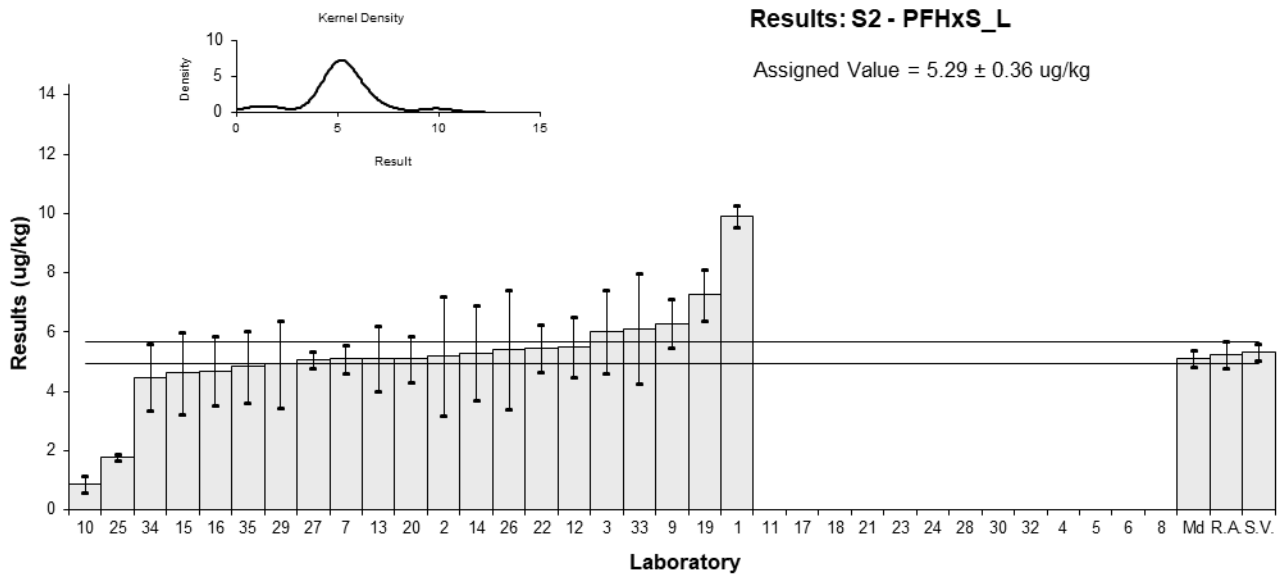
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	9.9	0.36	73	4.36	9.05
2	5.2	2	96	-0.09	-0.04
3	6.0	1.4	99	0.67	0.49
4	NT	NT	NT		
5	NT	NT	NT		
6	NT	NT	NT		
7	5.09	0.47	NR	-0.19	-0.34
8	NT	NT	NT		
9	6.29	0.81	84	0.95	1.13
10	0.87	0.28	NR	-4.18	-9.69
11	NT	NT	NT		
12	5.5	1.0	100	0.20	0.20
13	5.1	1.1	NR	-0.18	-0.16
14	5.29	1.6	78	0.00	0.00
15	4.62	1.39	81	-0.63	-0.47
16	4.69	1.17	101	-0.57	-0.49
17	NT	NT	NT		
18	NT	NT	NT		
19	7.26	0.87	74	1.86	2.09
20	5.1	0.77	105	-0.18	-0.22
21	NT	NT	NT		
22	5.45	0.8	109	0.15	0.18
23	NT	NT	NT		
24	NT	NT	NT		
25	1.78	0.10	96.9	-3.32	-9.39
26	5.4	2	97	0.10	0.05
27	5.045	0.281	66.7	-0.23	-0.54
28	NT	NT	NT		
29	4.92	1.476	73	-0.35	-0.24
30	NT	NT	NT		
32	NT	NT	NT		
33	6.11	1.86	67.5	0.78	0.43
34	4.48	1.12	95	-0.77	-0.69
35	4.83	1.2	40	-0.43	-0.37

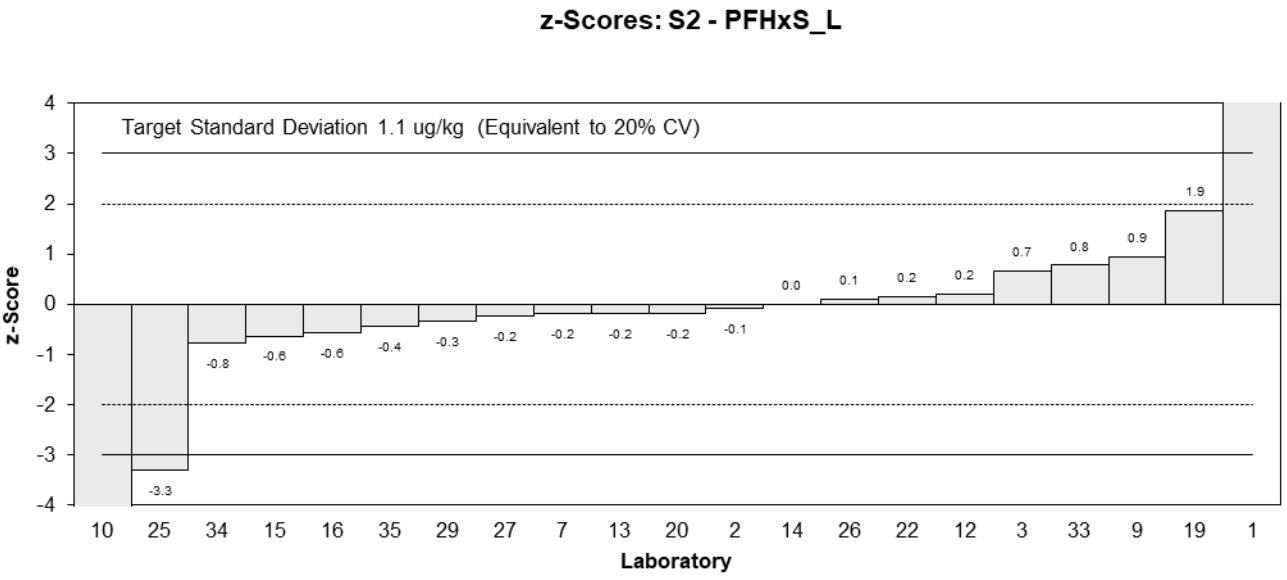
Statistics

Assigned Value*	5.29	0.36
Spike	5.33	0.27
Robust Average	5.24	0.44
Median	5.10	0.27
Mean	5.19	
N	21	
Max.	9.9	
Min.	0.87	

Robust SD	0.80	
Robust CV	15%	

*Robust Average excluding Laboratories 1, 10 and 25.


Kernel Density
Density
Result
Results: S2 - PFHxS_L
Assigned Value = 5.29 ± 0.36 ug/kg
Results (ug/kg)
Laboratory
10 25 34 15 16 35 29 27 7 13 20 2 14 26 22 12 3 33 9 19 1 11 17 18 21 23 24 28 30 32 4 5 6 8 Md R.A. S.V.


z-Scores: S2 - PFHxS_L
Target Standard Deviation 1.1 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 34 15 16 35 29 27 7 13 20 2 14 26 22 12 3 33 9 19 1

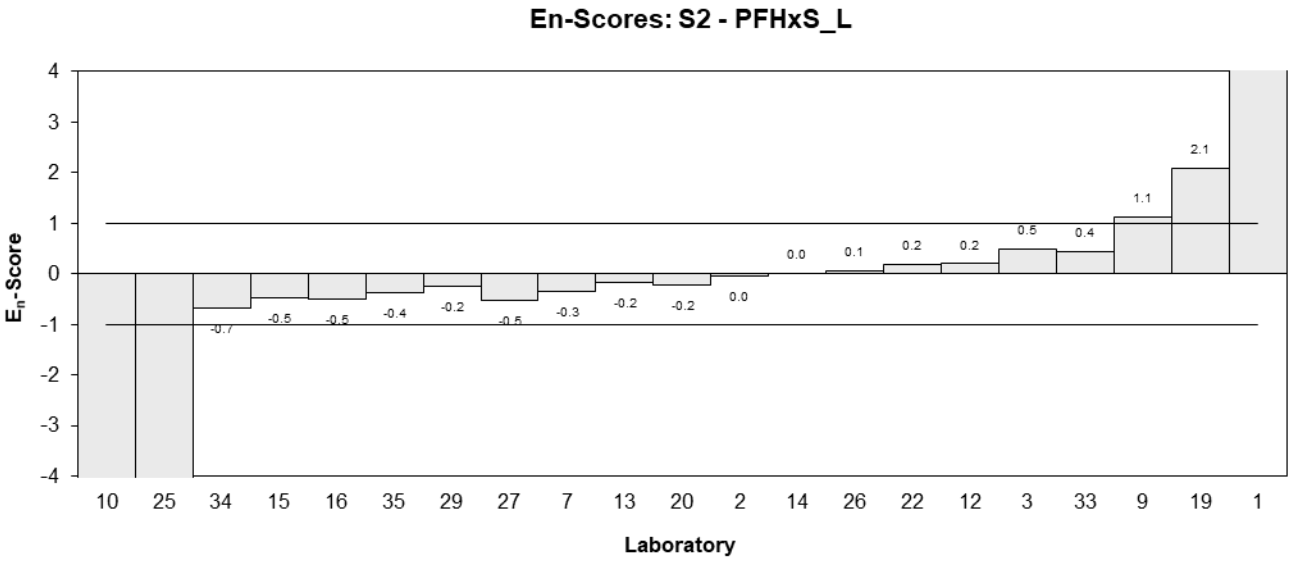

En-Scores: S2 - PFHxS_L
En-Score
Laboratory
10 25 34 15 16 35 29 27 7 13 20 2 14 26 22 12 3 33 9 19 1

Figure 36

Table 40

Sample Details

Sample No.	S2
Matrix.	Soil
Analyte.	PFHpS
Units	ug/kg

Participant Results

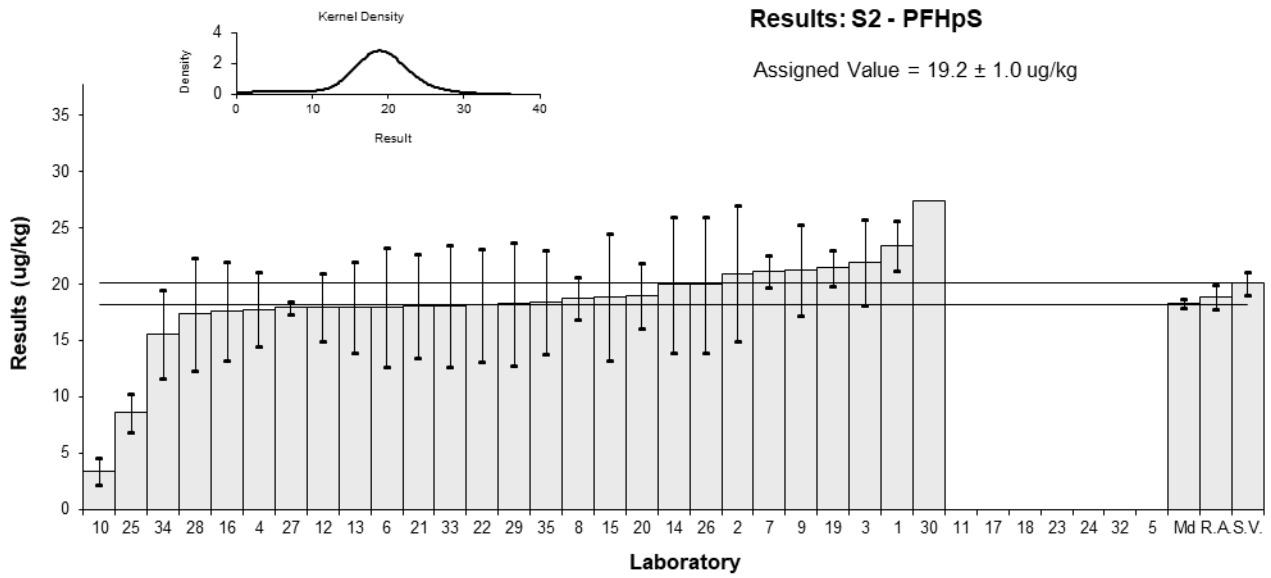
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	23.48	2.24	NR	1.11	1.74
2	21	6	96	0.47	0.30
3	22	3.8	99	0.73	0.71
4	17.8	3.3	100	-0.36	-0.41
5	NT	NT	NT		
6	18	5.3	NR	-0.31	-0.22
7	21.16	1.43	NR	0.51	1.12
8	18.8	1.9	NR	-0.10	-0.19
9	21.3	4	84	0.55	0.51
10	3.44	1.17	NR	-4.10	-10.24
11	NT	NT	NT		
12	18	3	100	-0.31	-0.38
13	18.0	4.0	NR	-0.31	-0.29
14	20	6.0	NR	0.21	0.13
15	18.9	5.67	76	-0.08	-0.05
16	17.66	4.41	101	-0.40	-0.34
17	NT	NT	NT		
18	NT	NT	NT		
19	21.5	1.58	74	0.60	1.23
20	19	2.9	105	-0.05	-0.07
21	18.1	4.6	94	-0.29	-0.23
22	18.2	5.0	NR	-0.26	-0.20
23	NT	NT	NT		
24	NT	NT	NT		
25	8.62	1.71	NR	-2.76	-5.34
26	20	6	101	0.21	0.13
27	17.96	0.554	66.7	-0.32	-1.08
28	17.4	5	88	-0.47	-0.35
29	18.3	5.49	70	-0.23	-0.16
30	27.41	NR	49.9	2.14	8.21
32	NT	NT	NT		
33	18.1	5.43	67.5	-0.29	-0.20
34	15.6	3.9	95	-0.94	-0.89
35	18.4	4.6	40	-0.21	-0.17

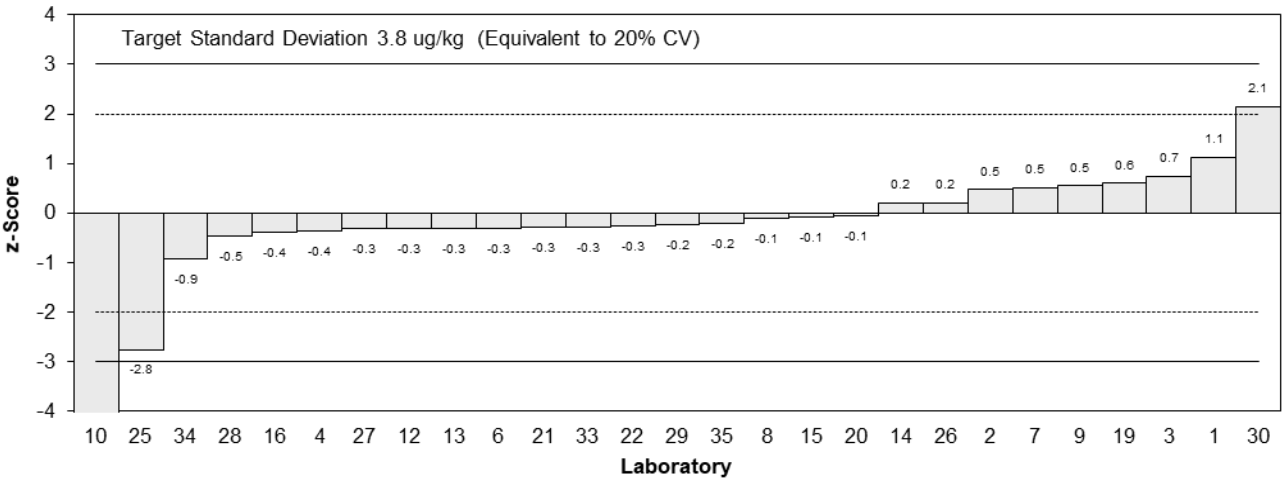
Statistics

Assigned Value*	19.2	1.0
Spike	20.1	1.0
Robust Average	18.9	1.1
Median	18.3	0.4
Mean	18.4	
N	27	
Max.	27.41	
Min.	3.44	

Robust SD	2.2	
Robust CV	12%	

*Robust Average excluding Laboratories 10 and 25.


Kernel Density
Density
Result
Results: S2 - PFHpS
Assigned Value = 19.2 ± 1.0 ug/kg
Results (ug/kg)
Laboratory
10 25 34 28 16 4 27 12 13 6 21 33 22 29 35 8 15 20 14 26 2 7 9 19 3 1 30 11 17 18 23 24 32 5 Md R.A.S.V.


z-Scores: S2 - PFHpS
Target Standard Deviation 3.8 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 34 28 16 4 27 12 13 6 21 33 22 29 35 8 15 20 14 26 2 7 9 19 3 1 30

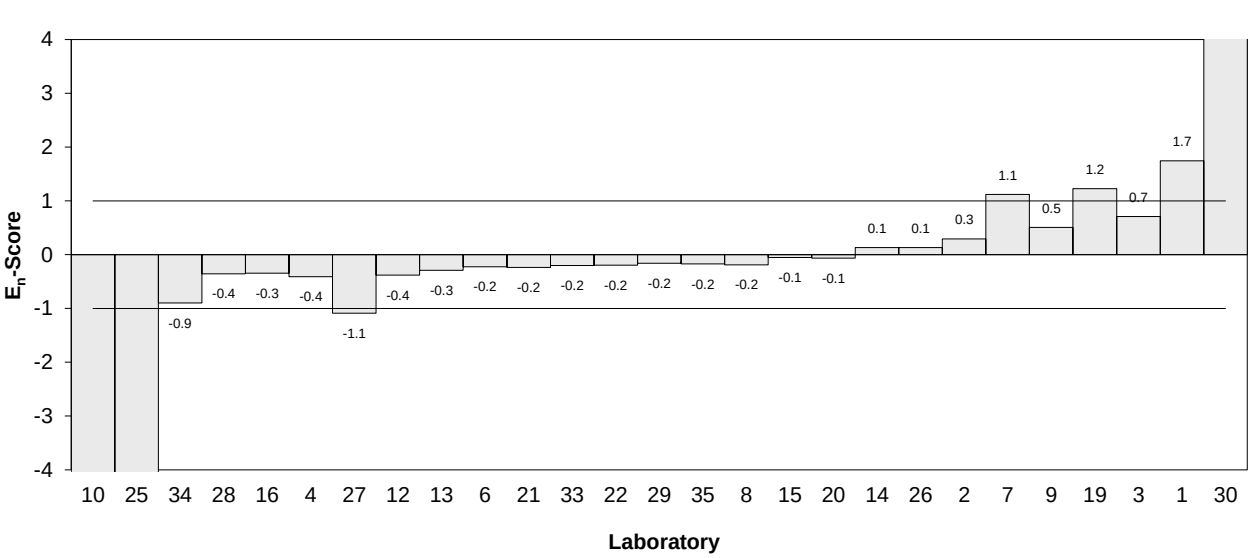

En-Scores: S2 - PFHpS
En-Score
Laboratory
10 25 34 28 16 4 27 12 13 6 21 33 22 29 35 8 15 20 14 26 2 7 9 19 3 1 30

Figure 37

Table 41

Sample Details

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

Participant Results

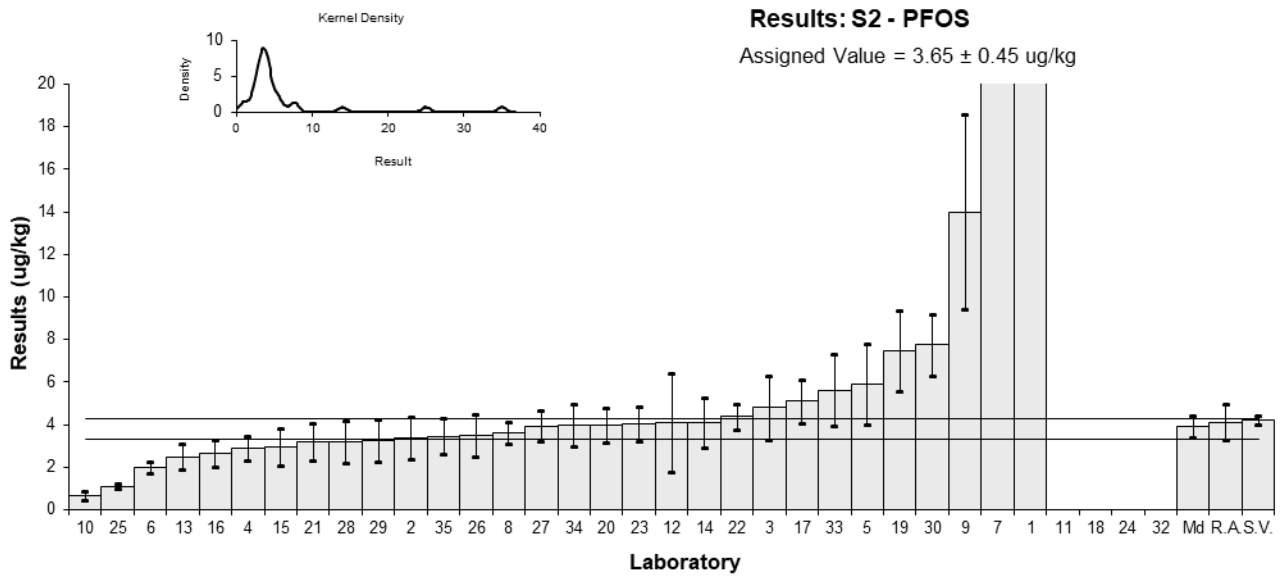
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	79.3	6.02	NR	103.63	12.53
2	3.4	1	102	-0.34	-0.23
3	4.8	1.5	99	1.58	0.73
4	2.9	0.6	100	-1.03	-1.00
5	5.9	1.9	50	3.08	1.15
6	2.0	0.29	NR	-2.26	-3.08
7	62.27	11.71	85.42	80.30	5.00
8	3.64	0.51	NR	-0.01	-0.01
9	14.0	4.6	78	14.18	2.24
10	0.68	0.22	69	-4.07	-5.93
11	NT	NT	NT		
12	4.1	2.3	83	0.62	0.19
13	2.5	0.6	NR	-1.58	-1.53
14	4.1	1.2	75	0.62	0.35
15	2.95	0.885	76	-0.96	-0.71
16	2.66	0.66	101	-1.36	-1.24
17	5.1	1	108	1.99	1.32
18	NT	NT	NT		
19	7.49	1.90	78	5.26	1.97
20	4	0.8	99	0.48	0.38
21	3.2	0.9	98	-0.62	-0.45
22	4.40	0.6	101	1.03	1.00
23	4.05	0.811	82.9	0.55	0.43
24	NT	NT	NT		
25	1.12	0.11	97.1	-3.47	-5.46
26	3.5	1	101	-0.21	-0.14
27	3.937	0.734	70.5	0.39	0.33
28	3.2	1	88	-0.62	-0.41
29	3.26	0.978	67	-0.53	-0.36
30	7.76	1.45112	49.9	5.63	2.71
32	NT	NT	NT		
33	5.62	1.69	86.2	2.70	1.13
34	3.97	0.9925	97	0.44	0.29
35	3.47	0.87	40	-0.25	-0.18

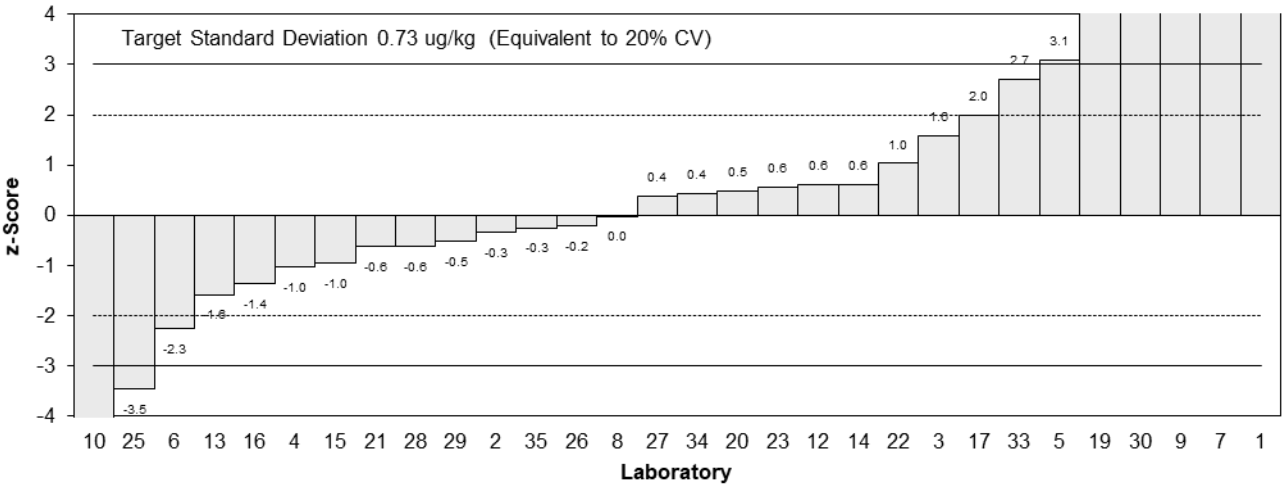
Statistics*

Assigned Value**	3.65	0.45
Spike	4.20	0.21
Robust Average	3.86	0.68
Median	3.79	0.42
Mean	4.20	
N	28	
Max.	14	
Min.	0.68	

Robust SD	1.4	
Robust CV	37%	

*Laboratories 1 and 7 excluded from statistical calculation
**Robust Average excluding Laboratories, 9, 10, 19, 25 and 30.


Kernel Density
Density
Result
Results: S2 - PFOS
Assigned Value = 3.65 ± 0.45 ug/kg
Results (ug/kg)
Laboratory
10 25 6 13 16 4 15 21 28 29 2 35 26 8 27 34 20 23 12 14 22 3 17 33 5 19 30 9 7 1 11 18 24 32 Md R.A.S.V.


z-Scores: S2 - PFOS
Target Standard Deviation 0.73 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 6 13 16 4 15 21 28 29 2 35 26 8 27 34 20 23 12 14 22 3 17 33 5 19 30 9 7 1

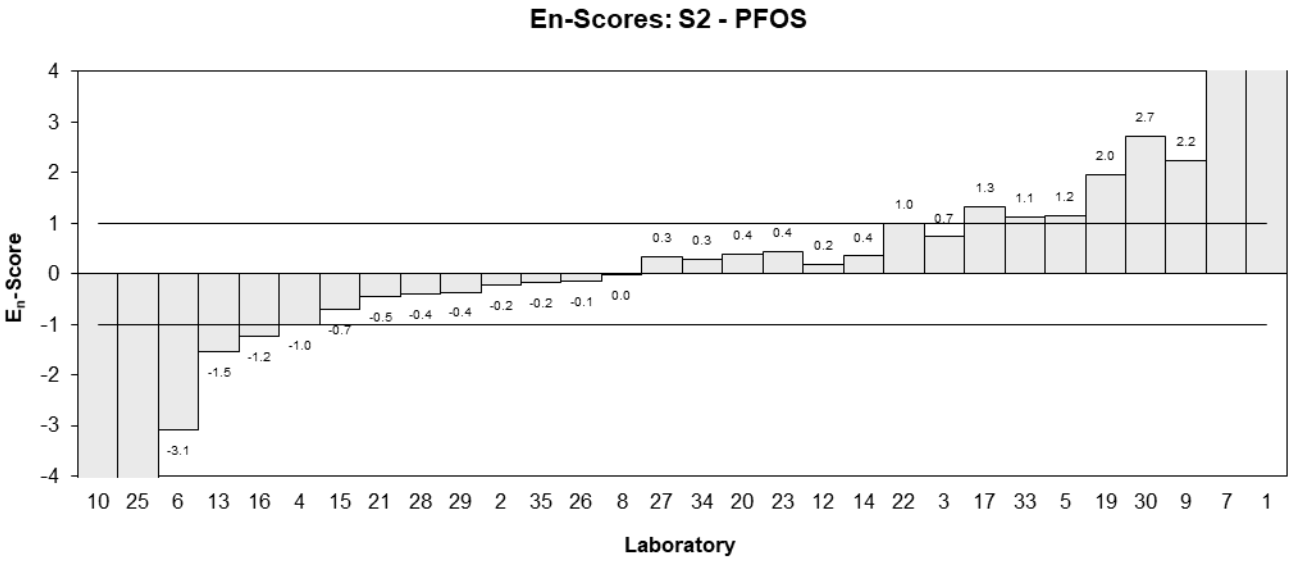

En-Scores: S2 - PFOS
En-Score
Laboratory
10 25 6 13 16 4 15 21 28 29 2 35 26 8 27 34 20 23 12 14 22 3 17 33 5 19 30 9 7 1

Figure 38

Table 42

Sample Details

Sample No.	S2
Matrix.	Soil
Analyte.	PFOS_L
Units	ug/kg

Participant Results

Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	56.15	6.00	66	108.21	8.94
2	2.1	1	102	-0.77	-0.37
3	3.6	1.2	99	2.26	0.92
4	2.6	0.5	100	0.24	0.22
5	NT	NT	NT		
6	NT	NT	NT		
7	NR	NR	NR		
8	NT	NT	NT		
9	8.14	2.69	78	11.41	2.10
10	0.45	0.14	NR	-4.09	-7.54
11	NT	NT	NT		
12	2.8	1.3	83	0.65	0.24
13	2.5	0.6	98	0.04	0.03
14	2.7	0.8	75	0.44	0.26
15	2.13	0.639	76	-0.71	-0.52
16	1.99	0.5	101	-0.99	-0.89
17	NT	NT	NT		
18	NT	NT	NT		
19	4.61	1.17	78	4.29	1.79
20	2.9	0.6	99	0.85	0.65
21	NT	NT	NT		
22	2.85	0.4	101	0.75	0.80
23	NT	NT	NT		
24	NT	NT	NT		
25	0.68	0.06	97.1	-3.63	-7.57
26	2.2	1	101	-0.56	-0.27
27	2.698	0.475	70.5	0.44	0.41
28	2.3	0.8	88	-0.36	-0.22
29	2.14	0.642	67	-0.69	-0.50
30	5.64	NR	NR	6.37	13.74
32	NT	NT	NT		
33	4.11	1.233	86.2	3.29	1.30
34	2.55	0.6375	97	0.14	0.10
35	2.25	0.56	40	-0.46	-0.38

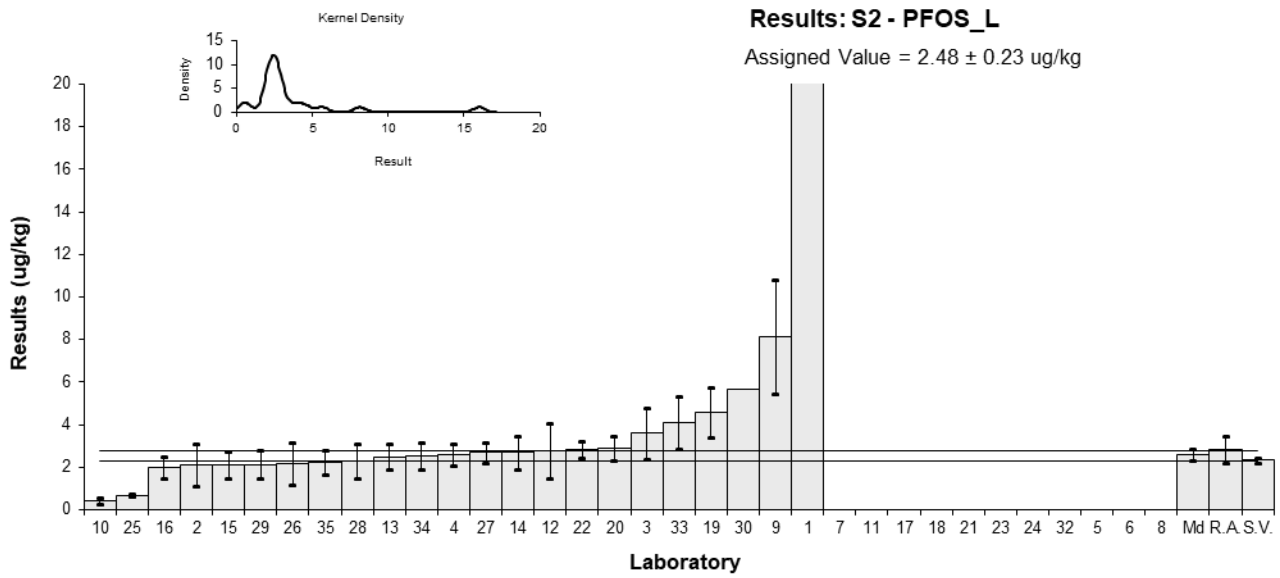
Statistics*

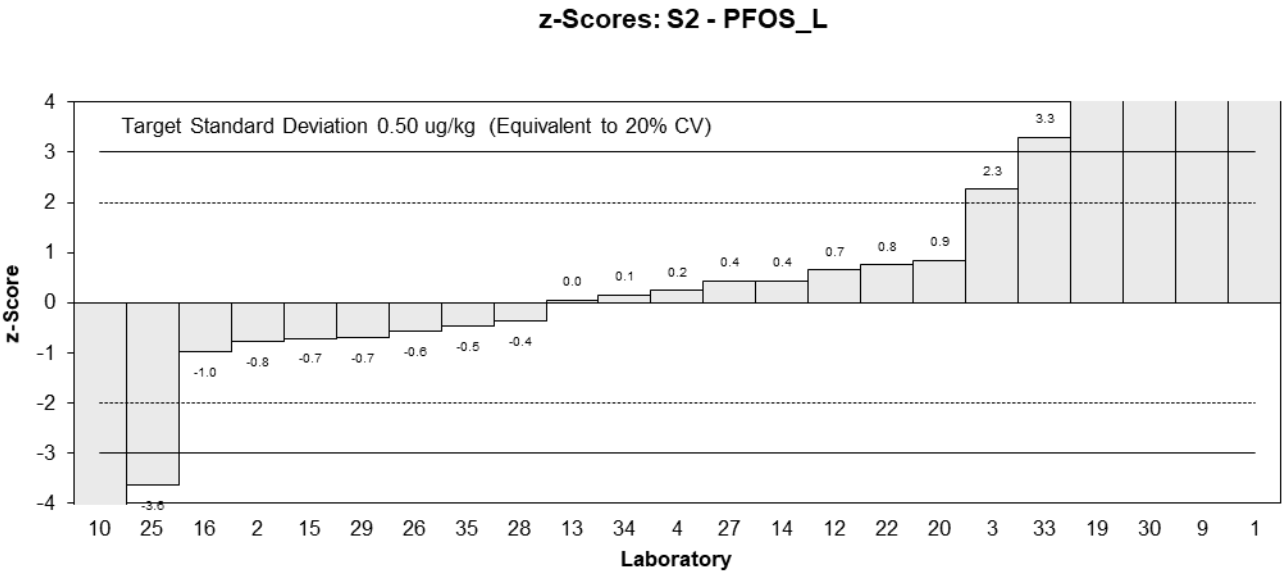
Assigned Value**	2.48	0.23
Spike	2.34	0.12
Robust Average	2.70	0.53
Median	2.58	0.27
Mean	2.91	
N	22	
Max.	8.14	
Min.	0.45	

Robust SD	1	
Robust CV	37%	

*The result reported by Laboratory 1 was ecluded from statistical calculation.

**Robust Average excluding Laboratories 9, 10, 19, 25 and 30


Kernel Density
Density
Result
Results: S2 - PFOS_L
Assigned Value = 2.48 ± 0.23 ug/kg
Results (ug/kg)
Laboratory
10 25 16 2 15 29 26 35 28 13 34 4 27 14 12 22 20 3 33 19 30 9 1 7 11 17 18 21 23 24 32 5 6 8 Md R.A. S.V.


z-Scores: S2 - PFOS_L
Target Standard Deviation 0.50 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 16 2 15 29 26 35 28 13 34 4 27 14 12 22 20 3 33 19 30 9 1
-3.6 -1.0 -0.8 -0.7 -0.7 -0.6 -0.5 -0.4 0.0 0.1 0.2 0.4 0.4 0.7 0.8 0.9 2.3 3.3

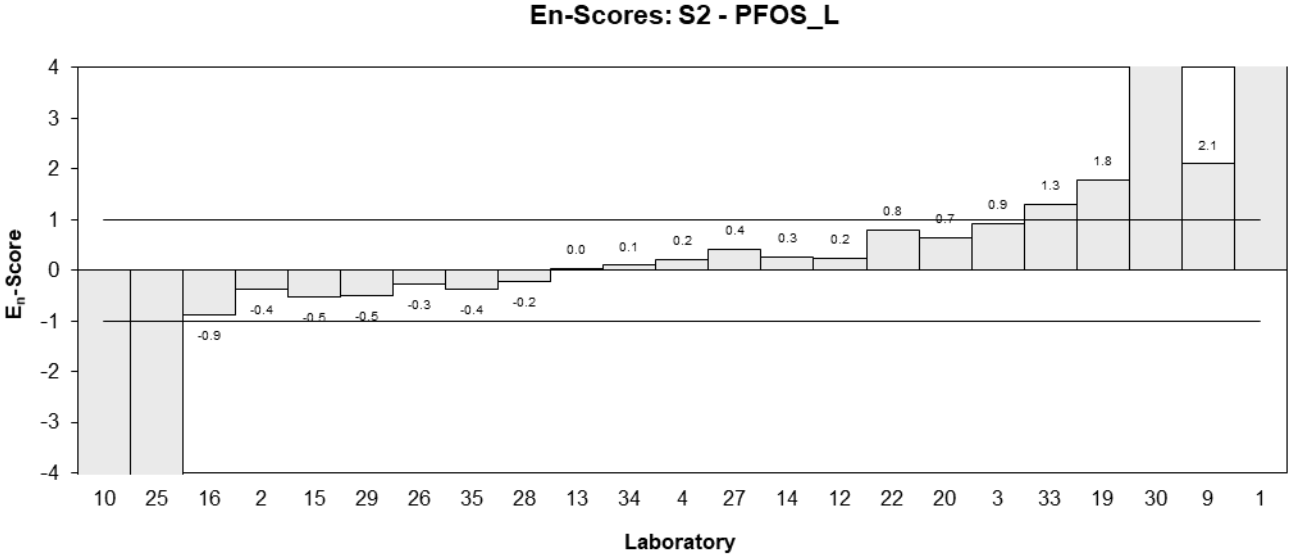

En-Scores: S2 - PFOS_L
En-Score
Laboratory
10 25 16 2 15 29 26 35 28 13 34 4 27 14 12 22 20 3 33 19 30 9 1
-0.9 -0.4 -0.5 -0.5 -0.3 -0.4 -0.2 0.0 0.1 0.2 0.4 0.3 0.2 0.8 0.7 0.9 1.3 1.8 2.1

Figure 39

Table 43

Sample Details

Sample No.	S2
Matrix.	Soil
Analyte.	PFNS
Units	ug/kg

Participant Results

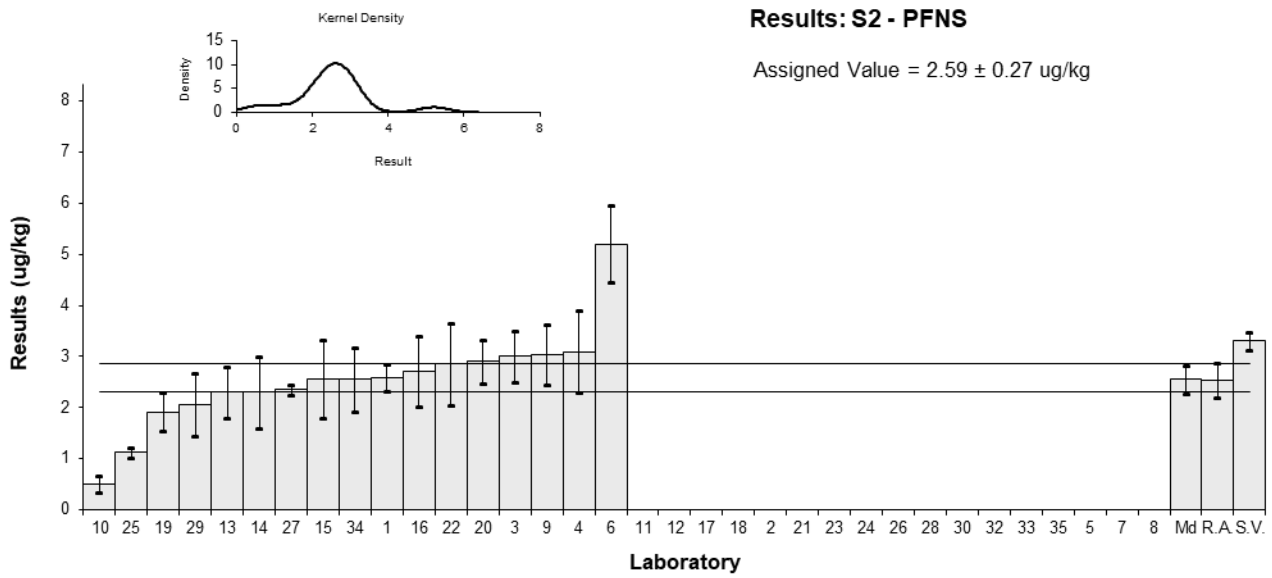
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	2.58	0.26	NR	-0.02	-0.03
2	NT	NT	NT		
3	3.0	0.49	99	0.79	0.73
4	3.1	0.8	76.8	0.98	0.60
5	NT	NT	NT		
6	5.2	0.75	NR	5.04	3.27
7	NT	NT	NT		
8	NT	NT	NT		
9	3.04	0.59	78	0.87	0.69
10	0.51	0.17	NR	-4.02	-6.52
11	NT	NT	NT		
12	NT	NT	NT		
13	2.3	0.5	NR	-0.56	-0.51
14	2.3	0.7	NR	-0.56	-0.39
15	2.55	0.765	76	-0.08	-0.05
16	2.71	0.68	101	0.23	0.16
17	NT	NT	NT		
18	NT	NT	NT		
19	1.92	0.38	78	-1.29	-1.44
20	2.9	0.43	99	0.60	0.61
21	NT	NT	NT		
22	2.85	0.8	NR	0.50	0.31
23	NT	NT	NT		
24	NT	NT	NT		
25	1.12	0.10	NR	-2.84	-5.11
26	NT	NT	NT		
27	2.356	0.101	70.5	-0.45	-0.81
28	NT	NT	NT		
29	2.05	0.615	67	-1.04	-0.80
30	NT	NT	NT		
32	NT	NT	NT		
33	NT	NT	NT		
34	2.55	0.6375	97	-0.08	-0.06
35	NT	NT	NT		

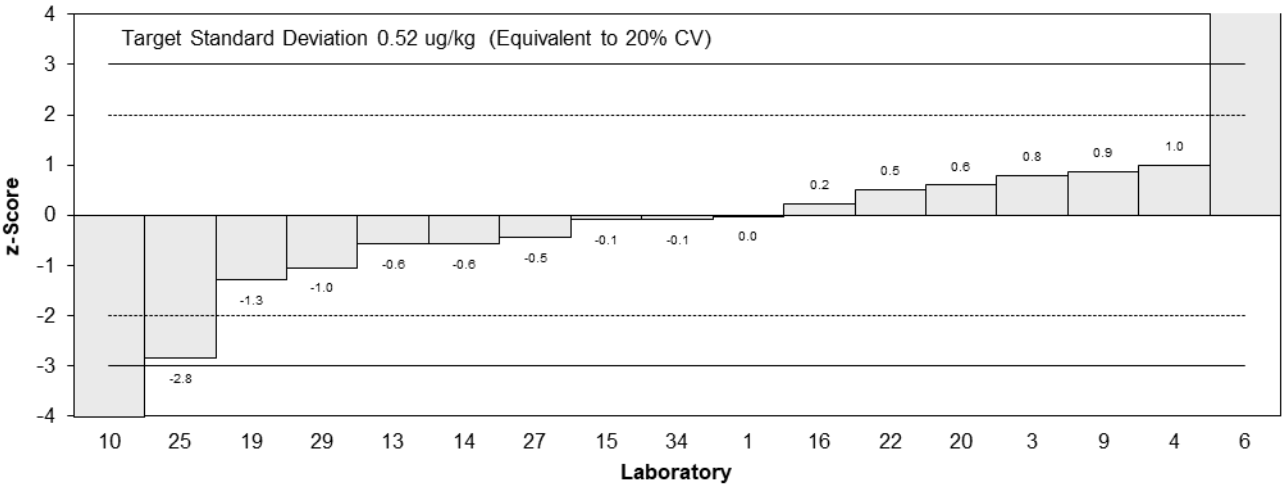
Statistics

Assigned Value*	2.59	0.27
Spike	3.31	0.17
Robust Average	2.53	0.34
Median	2.55	0.27
Mean	2.53	
N	17	
Max.	5.2	
Min.	0.51	

Robust SD	0.57	
Robust CV	22%	

*Robust Average excluding Laboratories 6, 10 and 25.


Kernel Density
Density
Result
Results: S2 - PFNS
Assigned Value = 2.59 ± 0.27 ug/kg
Results (ug/kg)
10 25 19 29 13 14 27 15 34 1 16 22 20 3 9 4 6 11 12 17 18 2 21 23 24 26 28 30 32 33 35 5 7 8 Md R.A. S.V.
Laboratory


z-Scores: S2 - PFNS
Target Standard Deviation 0.52 ug/kg (Equivalent to 20% CV)
z-Score
-2.8 -1.3 -1.0 -0.6 -0.6 -0.5 -0.1 -0.1 0.0 0.2 0.5 0.6 0.8 0.9 1.0
10 25 19 29 13 14 27 15 34 1 16 22 20 3 9 4 6
Laboratory

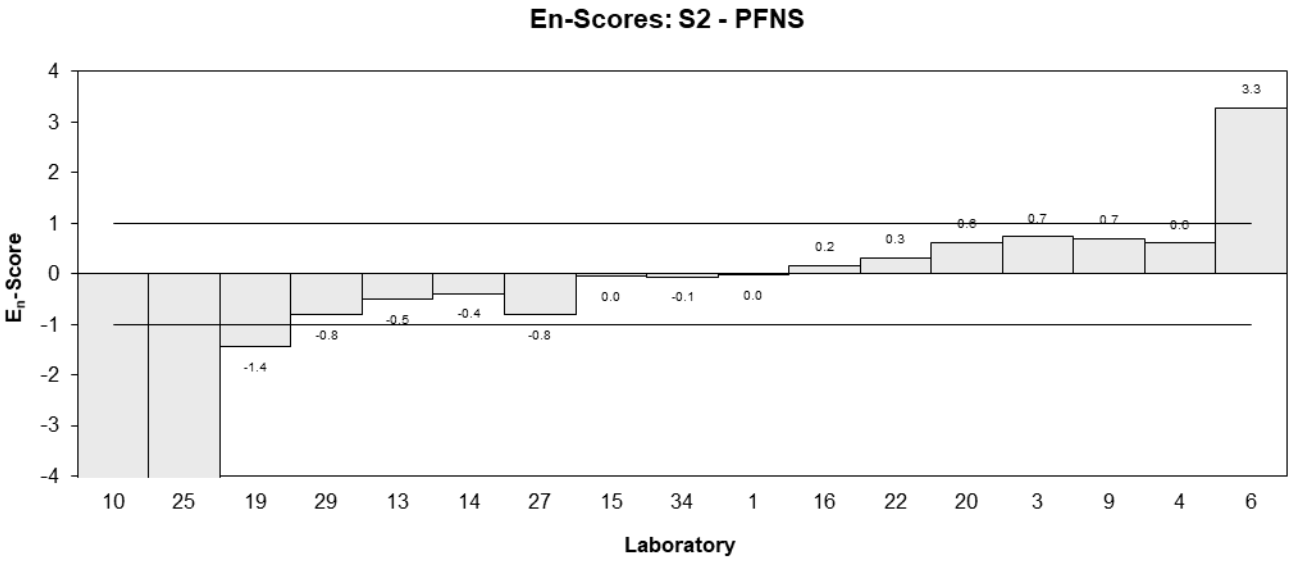

En-Scores: S2 - PFNS
En-Score
-1.4 -0.8 -0.5 -0.4 -0.8 0.0 -0.1 0.0 0.2 0.3 0.6 0.7 0.7 0.6 3.3
10 25 19 29 13 14 27 15 34 1 16 22 20 3 9 4 6
Laboratory

Figure 40

Table 44

Sample Details

Sample No.	S2
Matrix.	Soil
Analyte.	PFDS
Units	ug/kg

Participant Results

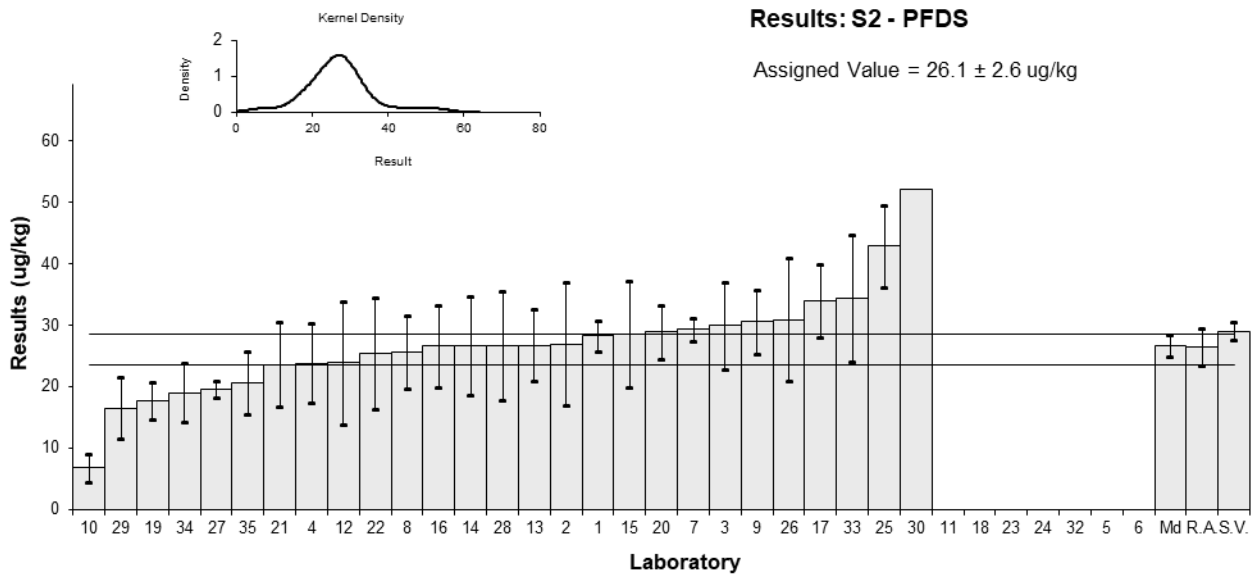
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	28.35	2.53	NR	0.43	0.62
2	27	10	102	0.17	0.09
3	30	7.1	99	0.75	0.52
4	23.9	6.5	100	-0.42	-0.31
5	NT	NT	NT		
6	NT	NT	NT		
7	29.37	1.86	NR	0.63	1.02
8	25.7	5.9	NR	-0.08	-0.06
9	30.6	5.2	78	0.86	0.77
10	6.83	2.32	NR	-3.69	-5.53
11	NT	NT	NT		
12	24	10	130	-0.40	-0.20
13	26.8	5.9	NR	0.13	0.11
14	26.7	8.0	NR	0.11	0.07
15	28.6	8.58	82	0.48	0.28
16	26.67	6.67	101	0.11	0.08
17	34	6	NR	1.51	1.21
18	NT	NT	NT		
19	17.8	3.09	78	-1.59	-2.06
20	29	4.4	99	0.56	0.57
21	23.7	6.8	98	-0.46	-0.33
22	25.5	9.0	NR	-0.11	-0.06
23	NT	NT	NT		
24	NT	NT	NT		
25	42.9	6.60	NR	3.22	2.37
26	31	10	101	0.94	0.47
27	19.67	1.388	70.5	-1.23	-2.18
28	26.7	8.8	80	0.11	0.07
29	16.6	4.98	67	-1.82	-1.69
30	52.25	NR	49.9	5.01	10.06
32	NT	NT	NT		
33	34.4	10.32	80.2	1.59	0.78
34	19.1	4.775	97	-1.34	-1.29
35	20.6	5.1	40	-1.05	-0.96

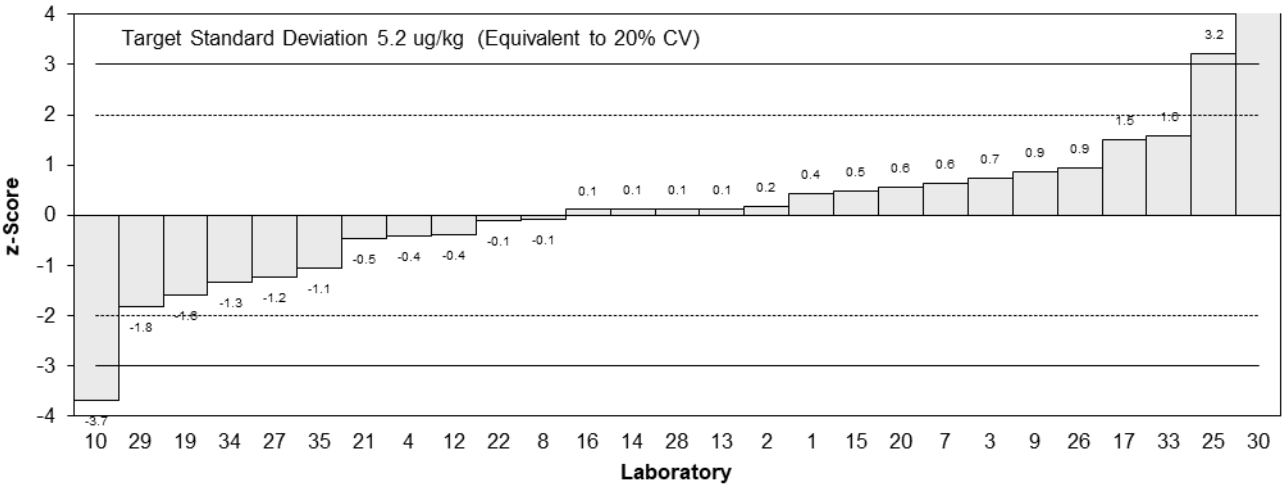
Statistics

Assigned Value*	26.1	2.6
Spike	29.1	1.5
Robust Average	26.5	3.0
Median	26.7	1.8
Mean	27.0	
N	27	
Max.	52.25	
Min.	6.83	

Robust SD	6.2	
Robust CV	23%	

*Robust Average excluding Laboratories 10, 25 and 30.


Kernel Density
Density
Result
Results: S2 - PFDS
Assigned Value = 26.1 ± 2.6 ug/kg
Results (ug/kg)
Laboratory
10 29 19 34 27 35 21 4 12 22 8 16 14 28 13 2 1 15 20 7 3 9 26 17 33 25 30 11 18 23 24 32 5 6 Md R.A.S.V.


z-Scores: S2 - PFDS
Target Standard Deviation 5.2 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 29 19 34 27 35 21 4 12 22 8 16 14 28 13 2 1 15 20 7 3 9 26 17 33 25 30

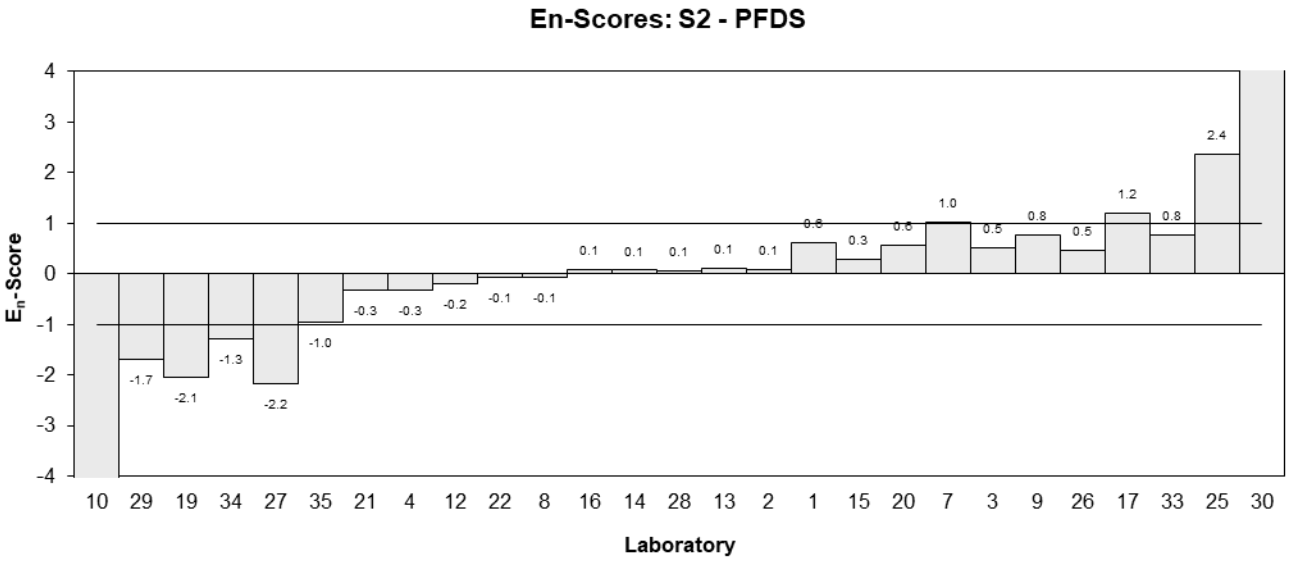

En-Scores: S2 - PFDS
En-Score
Laboratory
10 29 19 34 27 35 21 4 12 22 8 16 14 28 13 2 1 15 20 7 3 9 26 17 33 25 30

Figure 41

Table 45

Sample Details

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

Participant Results

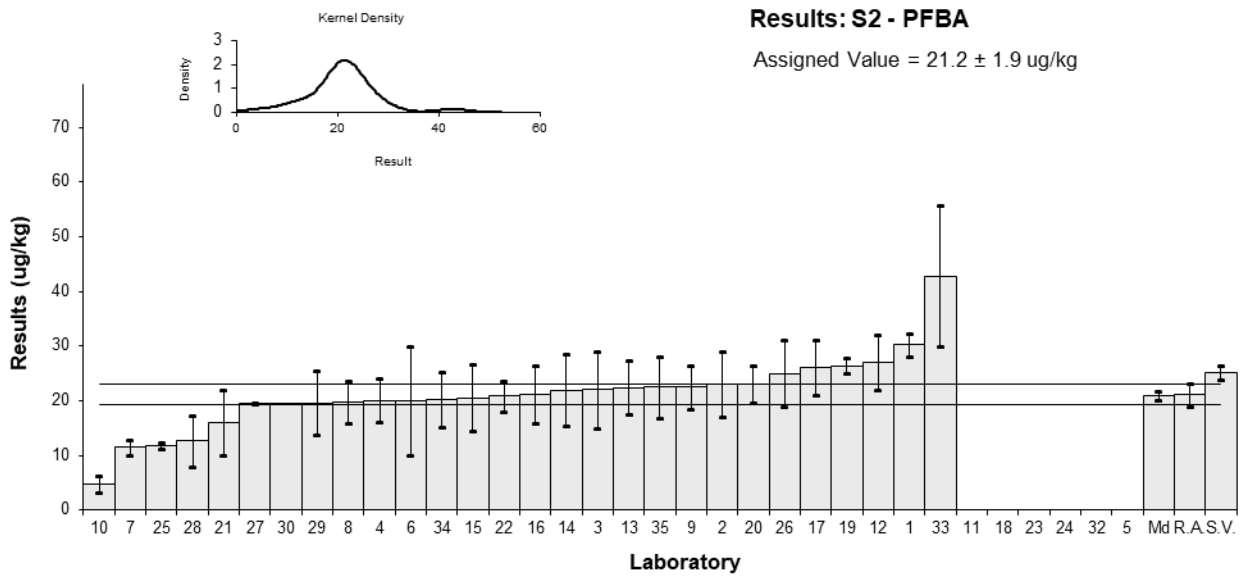
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	30.17	2.13	86	2.12	3.14
2	23	6	101	0.42	0.29
3	22	7.0	101	0.19	0.11
4	20.0	4	106	-0.28	-0.27
5	NT	NT	NT		
6	20	10	NR	-0.28	-0.12
7	11.44	1.44	NR	-2.30	-4.09
8	19.7	3.9	NR	-0.35	-0.35
9	22.5	4	88	0.31	0.29
10	4.72	1.6	106	-3.89	-6.63
11	NT	NT	NT		
12	27	5	148	1.37	1.08
13	22.4	4.9	NR	0.28	0.23
14	21.9	6.6	NR	0.17	0.10
15	20.5	6.15	77	-0.17	-0.11
16	21.08	5.27	101	-0.03	-0.02
17	26	5	84	1.13	0.90
18	NT	NT	NT		
19	26.3	1.41	52	1.20	2.16
20	23	3.5	104	0.42	0.45
21	16	6	107	-1.23	-0.83
22	20.8	2.9	NR	-0.09	-0.12
23	NT	NT	NT		
24	NT	NT	NT		
25	11.73	0.55	95.7	-2.23	-4.79
26	25	6	86	0.90	0.60
27	19.50	0.167	69.5	-0.40	-0.89
28	12.6	4.7	80	-2.03	-1.70
29	19.6	5.88	75	-0.38	-0.26
30	19.55	NR	49.9	-0.39	-0.87
32	NT	NT	NT		
33	42.8	12.84	52.2	5.09	1.66
34	20.1	5.025	62	-0.26	-0.20
35	22.5	5.6	70	0.31	0.22

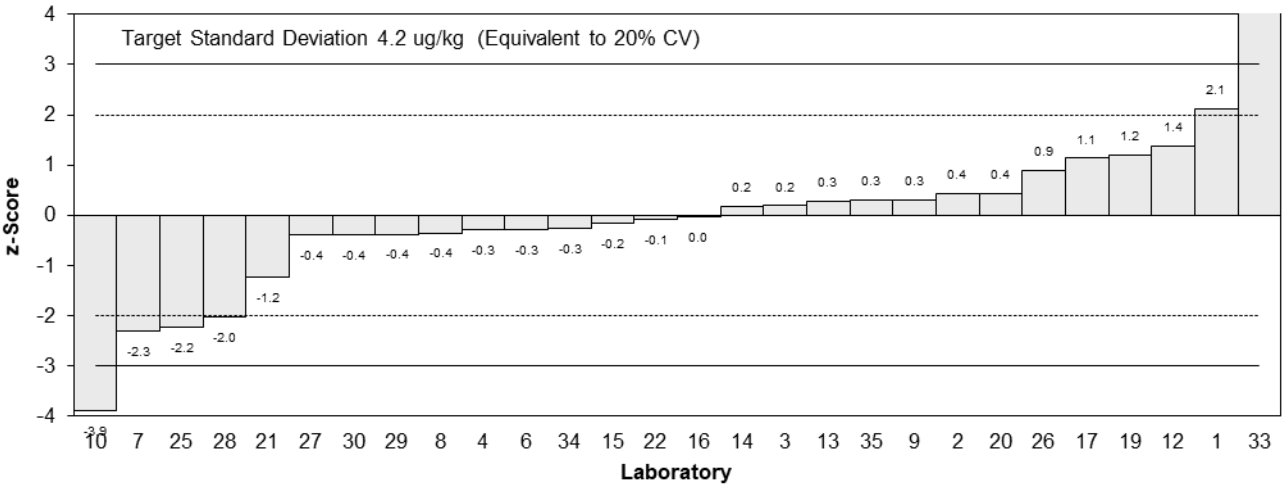
Statistics

Assigned Value*	21.2	1.9
Spike	25.1	1.3
Robust Average	21.1	2.1
Median	20.9	0.9
Mean	21.1	
N	28	
Max.	42.8	
Min.	4.72	

Robust SD	4.5	
Robust CV	21%	

*Robust Average excluding Laboratories 10 and 33.


Kernel Density
Density
Result
Results: S2 - PFBA
Assigned Value = 21.2 ± 1.9 ug/kg
Results (ug/kg)
Laboratory
10 7 25 28 21 27 30 29 8 4 6 34 15 22 16 14 3 13 35 9 2 20 26 17 19 12 1 33 11 18 23 24 32 5 Md R.A.S.V.


z-Scores: S2 - PFBA
Target Standard Deviation 4.2 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 7 25 28 21 27 30 29 8 4 6 34 15 22 16 14 3 13 35 9 2 20 26 17 19 12 1 33

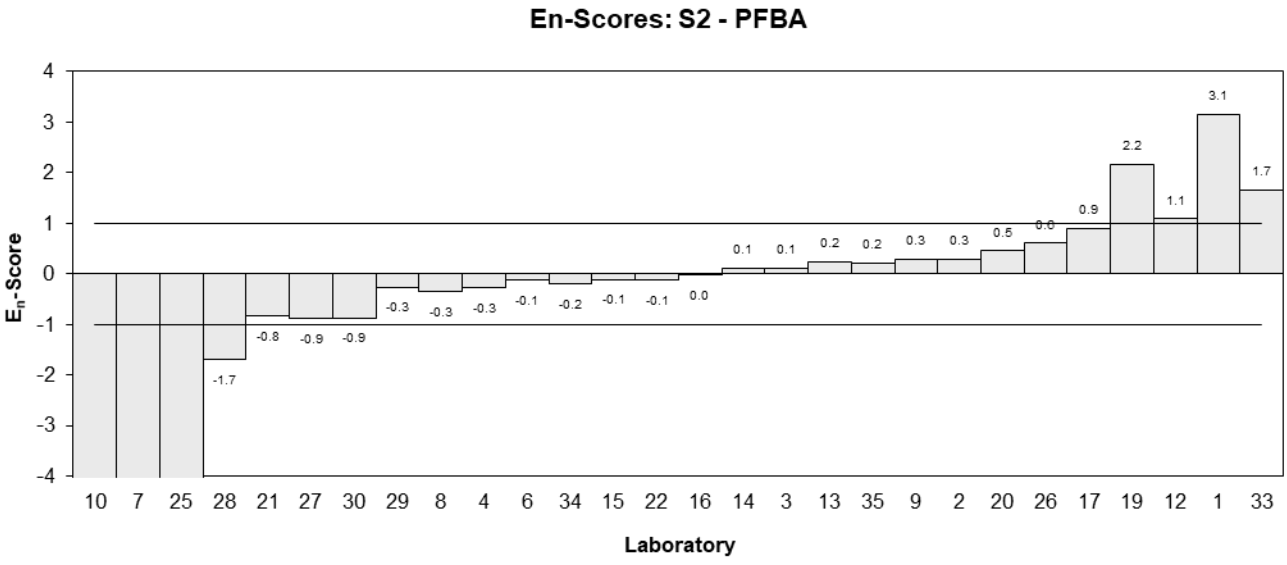

En-Scores: S2 - PFBA
En-Score
Laboratory
10 7 25 28 21 27 30 29 8 4 6 34 15 22 16 14 3 13 35 9 2 20 26 17 19 12 1 33

Figure 42

Table 46

Sample Details

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

Participant Results

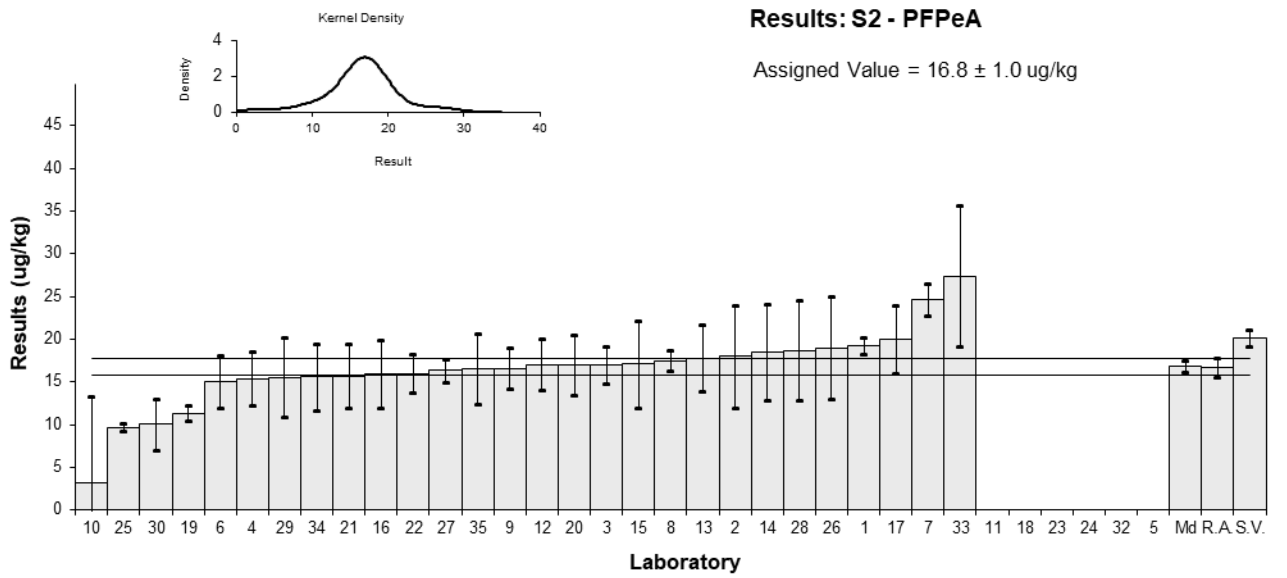
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	19.18	0.98	80	0.71	1.70
2	18	6	94	0.36	0.20
3	17	2.2	105	0.06	0.08
4	15.4	3.1	91.2	-0.42	-0.43
5	NT	NT	NT		
6	15	3.1	NR	-0.54	-0.55
7	24.59	1.90	NR	2.32	3.63
8	17.5	1.2	NR	0.21	0.45
9	16.6	2.4	89	-0.06	-0.08
10	3.25	10.07	68	-4.03	-1.34
11	NT	NT	NT		
12	17	3	132	0.06	0.06
13	17.8	3.9	NR	0.30	0.25
14	18.5	5.6	77	0.51	0.30
15	17.1	5.13	78	0.09	0.06
16	15.87	3.97	101	-0.28	-0.23
17	20	4	NR	0.95	0.78
18	NT	NT	NT		
19	11.3	0.90	122	-1.64	-4.09
20	17	3.5	106	0.06	0.05
21	15.7	3.8	91	-0.33	-0.28
22	16.0	2.2	96	-0.24	-0.33
23	NT	NT	NT		
24	NT	NT	NT		
25	9.67	0.42	96.45	-2.12	-6.57
26	19	6	96	0.65	0.36
27	16.32	1.351	69.3	-0.14	-0.29
28	18.7	5.8	87	0.57	0.32
29	15.5	4.65	77	-0.39	-0.27
30	10.06	3.018	49.9	-2.01	-2.12
32	NT	NT	NT		
33	27.4	8.22	107.1	3.15	1.28
34	15.6	3.9	69	-0.36	-0.30
35	16.5	4.1	80	-0.09	-0.07

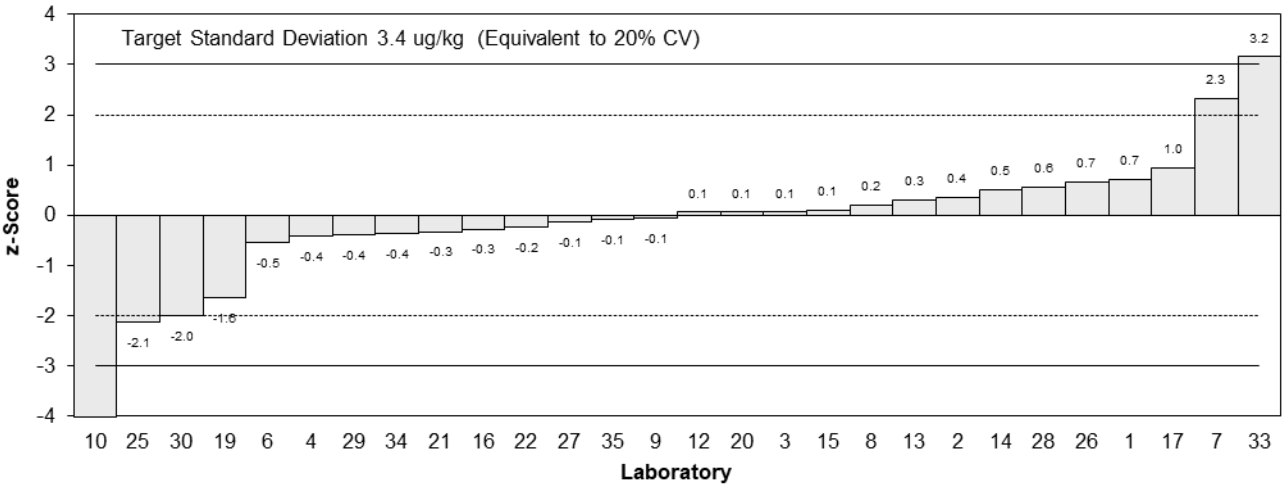
Statistics

Assigned Value*	16.8	1.0
Spike	20.1	1.0
Robust Average	16.7	1.1
Median	16.8	0.7
Mean	16.5	
N	28	
Max.	27.4	
Min.	3.25	

Robust SD	2.4	
Robust CV	14%	

*Robust Average excluding Laboratories 10 and 33.


Kernel Density
Density
Result
Results: S2 - PFPeA
Assigned Value = 16.8 ± 1.0 ug/kg
Results (ug/kg)
Laboratory
10 25 30 19 6 4 29 34 21 16 22 27 35 9 12 20 3 15 8 13 2 14 28 26 1 17 7 33 11 18 23 24 32 5 Md R.A. S.V.


z-Scores: S2 - PFPeA
Target Standard Deviation 3.4 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 30 19 6 4 29 34 21 16 22 27 35 9 12 20 3 15 8 13 2 14 28 26 1 17 7 33

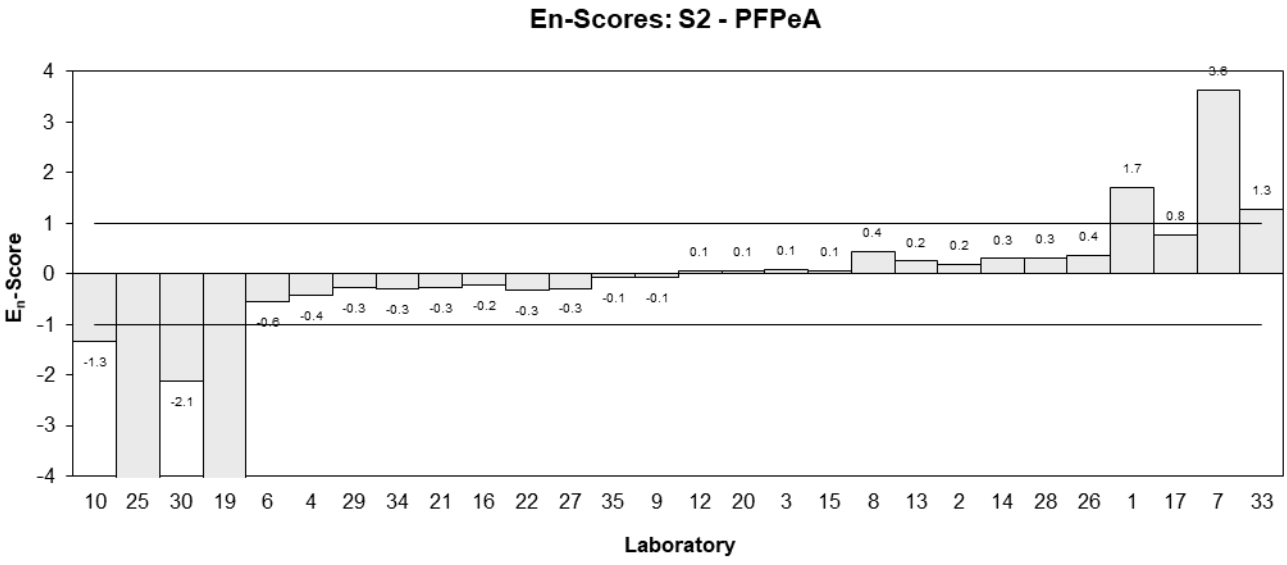

En-Scores: S2 - PFPeA
En-Score
Laboratory
10 25 30 19 6 4 29 34 21 16 22 27 35 9 12 20 3 15 8 13 2 14 28 26 1 17 7 33

Figure 43

Table 47

Sample Details

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

Participant Results

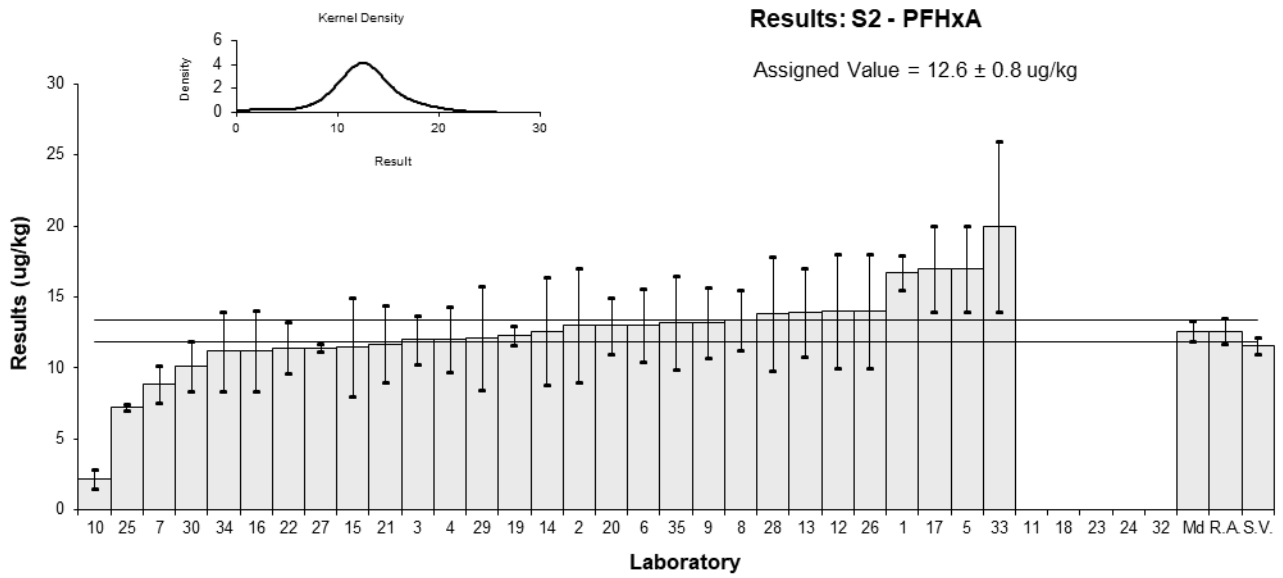
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	16.70	1.23	80	1.63	2.79
2	13	4	97	0.16	0.10
3	12	1.7	105	-0.24	-0.32
4	12	2.3	69.1	-0.24	-0.25
5	17	3	57	1.75	1.42
6	13	2.6	NR	0.16	0.15
7	8.87	1.32	NR	-1.48	-2.42
8	13.4	2.1	NR	0.32	0.36
9	13.2	2.5	89	0.24	0.23
10	2.20	0.68	80	-4.13	-9.91
11	NT	NT	NT		
12	14	4	124	0.56	0.34
13	13.9	3.1	NR	0.52	0.41
14	12.6	3.8	98	0.00	0.00
15	11.5	3.45	72	-0.44	-0.31
16	11.21	2.8	101	-0.55	-0.48
17	17	3	87	1.75	1.42
18	NT	NT	NT		
19	12.3	0.66	81	-0.12	-0.29
20	13	2	109	0.16	0.19
21	11.7	2.7	93	-0.36	-0.32
22	11.4	1.8	100	-0.48	-0.61
23	NT	NT	NT		
24	NT	NT	NT		
25	7.24	0.26	93.4	-2.13	-6.37
26	14	4	98	0.56	0.34
27	11.41	0.254	73.2	-0.47	-1.42
28	13.8	4	97	0.48	0.29
29	12.1	3.63	78	-0.20	-0.13
30	10.1	1.7574	49.9	-0.99	-1.29
32	NT	NT	NT		
33	20	6	78.7	2.94	1.22
34	11.2	2.8	77	-0.56	-0.48
35	13.2	3.3	80	0.24	0.18

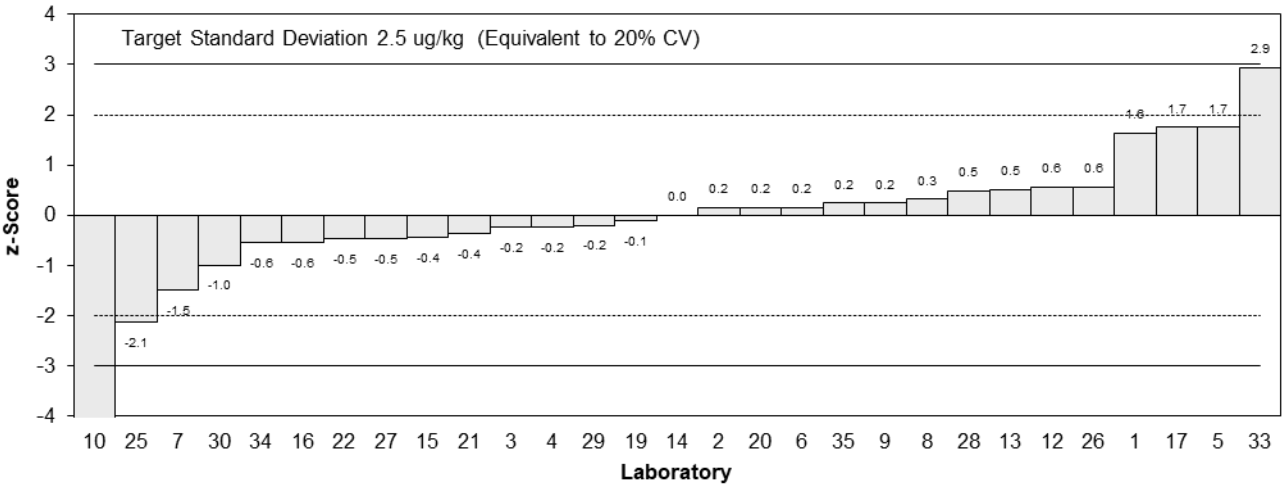
Statistics

Assigned Value*	12.6	0.8
Spike	11.6	0.6
Robust Average	12.6	0.9
Median	12.6	0.7
Mean	12.5	
N	29	
Max.	20	
Min.	2.2	

Robust SD	2.0	
Robust CV	16%	

*Robust Average excluding Laboratories 10 and 33.


Kernel Density
Density
Result
Results: S2 - PFHxA
Assigned Value = 12.6 ± 0.8 ug/kg
Results (ug/kg)
Laboratory
10 25 7 30 34 16 22 27 15 21 3 4 29 19 14 2 20 6 35 9 8 28 13 12 26 1 17 5 33 11 18 23 24 32 Md R.A. S.V.


z-Scores: S2 - PFHxA
Target Standard Deviation 2.5 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 7 30 34 16 22 27 15 21 3 4 29 19 14 2 20 6 35 9 8 28 13 12 26 1 17 5 33

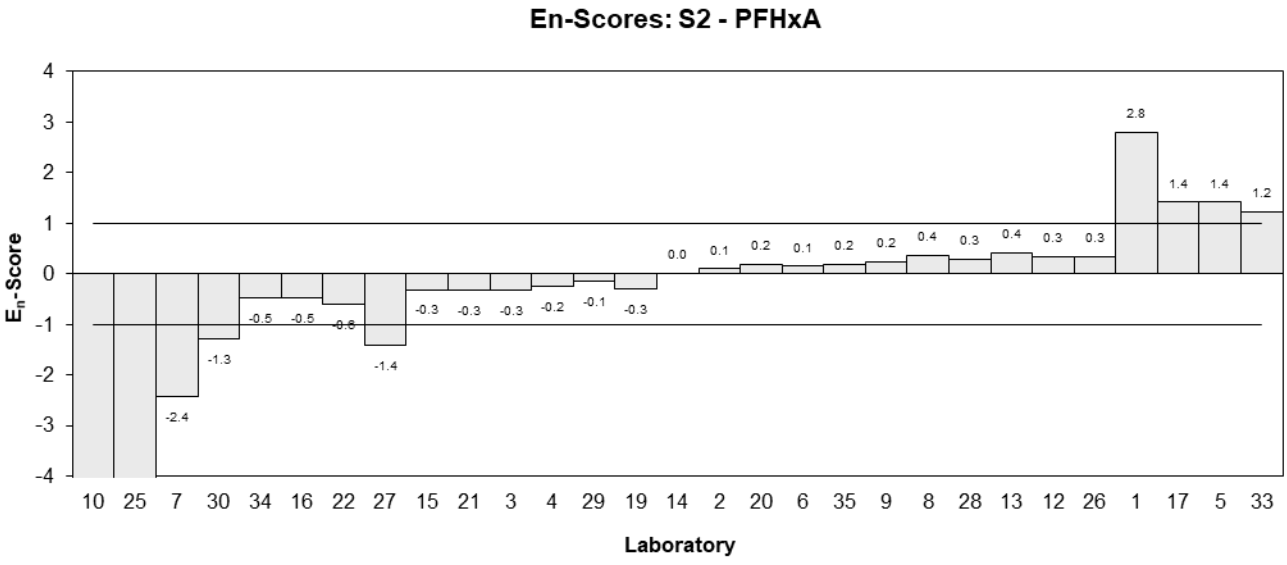

En-Scores: S2 - PFHxA
En-Score
Laboratory
10 25 7 30 34 16 22 27 15 21 3 4 29 19 14 2 20 6 35 9 8 28 13 12 26 1 17 5 33

Figure 44

Table 48

Sample Details

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

Participant Results

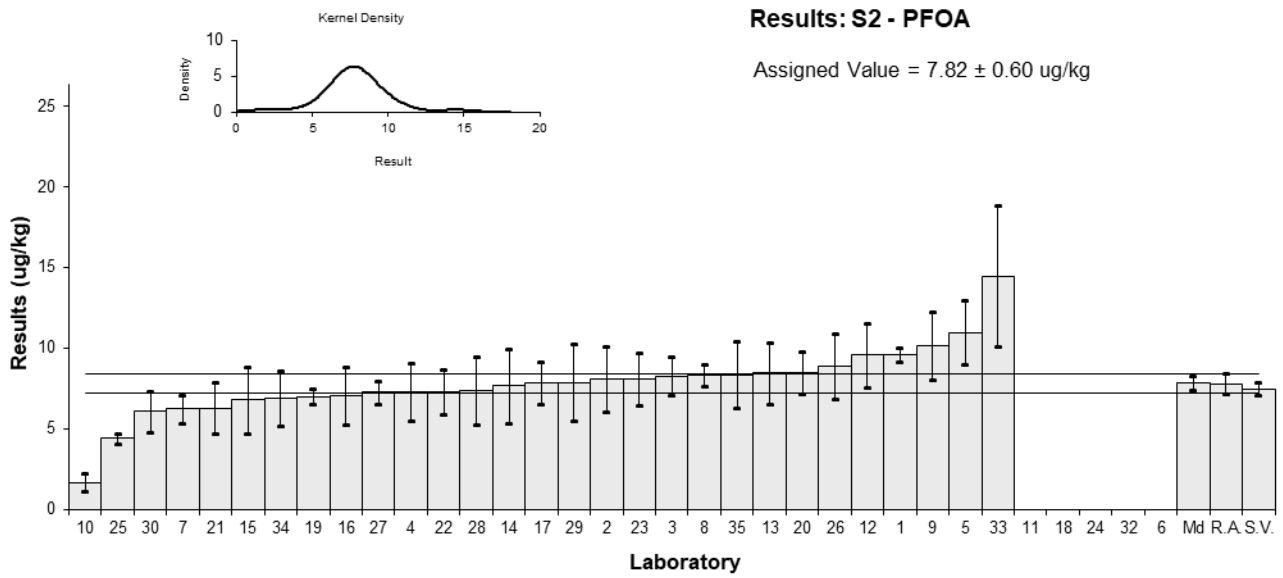
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	9.61	0.43	79	1.14	2.42
2	8.1	2	98	0.18	0.13
3	8.3	1.2	100	0.31	0.36
4	7.3	1.8	91.1	-0.33	-0.27
5	11	2	51	2.03	1.52
6	NT	NT	NT		
7	6.28	0.88	113.93	-0.98	-1.45
8	8.38	0.67	NR	0.36	0.62
9	10.2	2.1	87	1.52	1.09
10	1.72	0.57	123	-3.90	-7.37
11	NT	NT	NT		
12	9.6	2.0	98	1.14	0.85
13	8.5	1.9	100	0.43	0.34
14	7.7	2.3	89	-0.08	-0.05
15	6.82	2.05	81	-0.64	-0.47
16	7.11	1.78	101	-0.45	-0.38
17	7.9	1.3	134	0.05	0.06
18	NT	NT	NT		
19	7.02	0.47	93	-0.51	-1.05
20	8.5	1.3	102	0.43	0.47
21	6.3	1.6	96	-0.97	-0.89
22	7.33	1.4	95	-0.31	-0.32
23	8.10	1.62	101.1	0.18	0.16
24	NT	NT	NT		
25	4.44	0.33	95.9	-2.16	-4.94
26	8.9	2	96	0.69	0.52
27	7.282	0.750	74.1	-0.34	-0.56
28	7.4	2.1	87	-0.27	-0.19
29	7.90	2.37	72	0.05	0.03
30	6.1	1.281	49.9	-1.10	-1.22
32	NT	NT	NT		
33	14.5	4.35	87	4.27	1.52
34	6.92	1.73	90	-0.58	-0.49
35	8.39	2.1	80	0.36	0.26

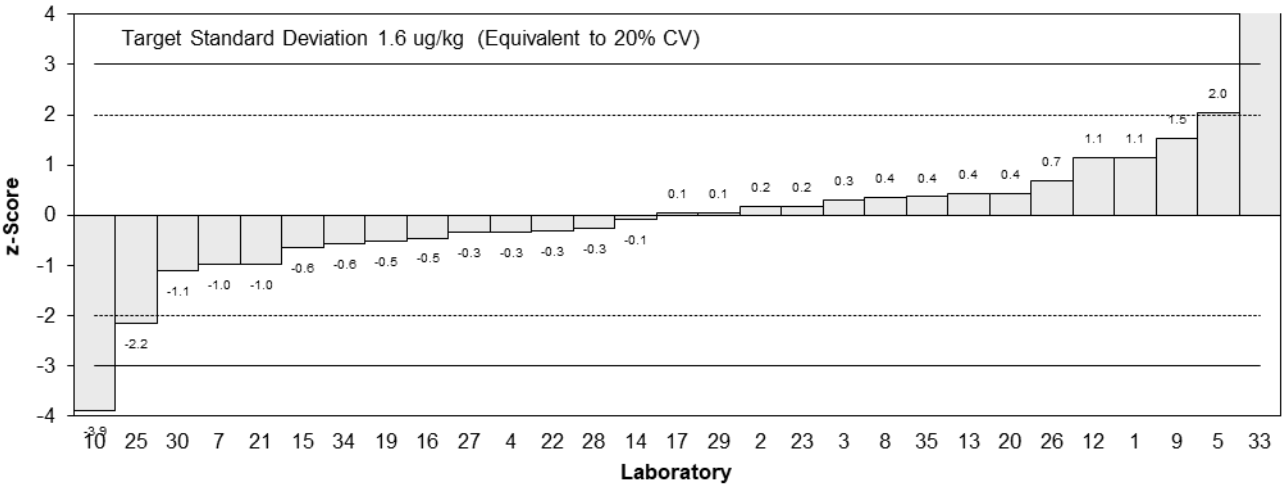
Statistics

Assigned Value*	7.82	0.60
Spike	7.51	0.38
Robust Average	7.83	0.66
Median	7.90	0.45
Mean	7.85	
N	29	
Max.	14.5	
Min.	1.72	

Robust SD	1.4	
Robust CV	18%	

*Robust Average excluding Laboratories 10 and 33.


Kernel Density
Density
Result
Results: S2 - PFOA
Assigned Value = 7.82 ± 0.60 ug/kg
Results (ug/kg)
Laboratory
10 25 30 7 21 15 34 19 16 27 4 22 28 14 17 29 2 23 3 8 35 13 20 26 12 1 9 5 33 11 18 24 32 6 Md R.A. S.V.


z-Scores: S2 - PFOA
Target Standard Deviation 1.6 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 30 7 21 15 34 19 16 27 4 22 28 14 17 29 2 23 3 8 35 13 20 26 12 1 9 5 33

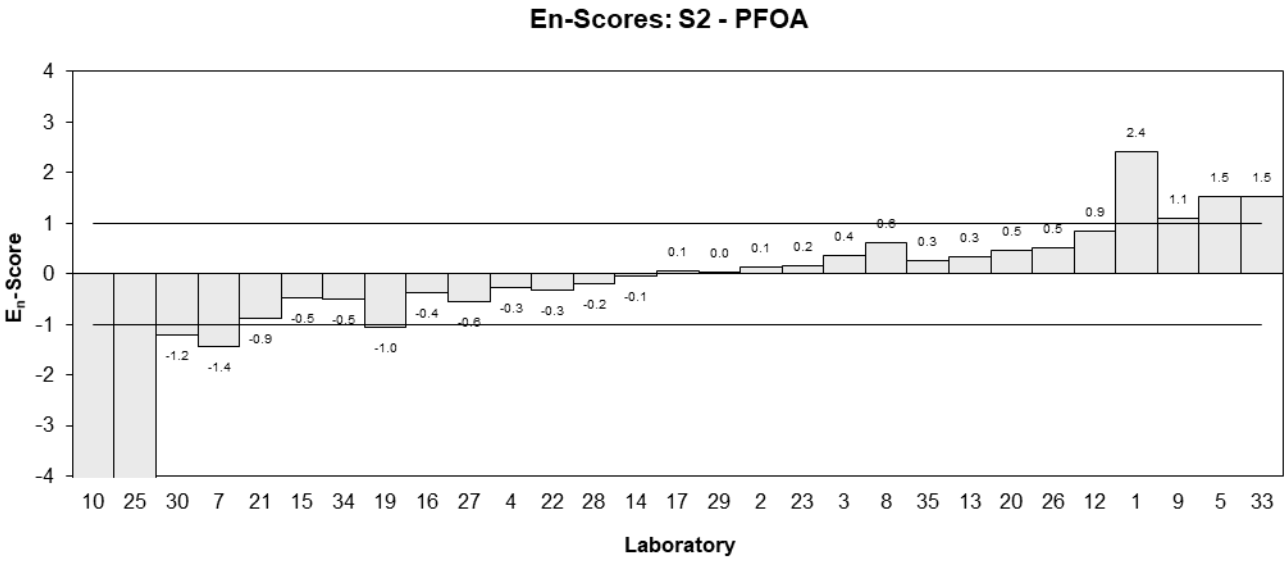

En-Scores: S2 - PFOA
En-Score
Laboratory
10 25 30 7 21 15 34 19 16 27 4 22 28 14 17 29 2 23 3 8 35 13 20 26 12 1 9 5 33

Figure 45

Table 49

Sample Details

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

Participant Results

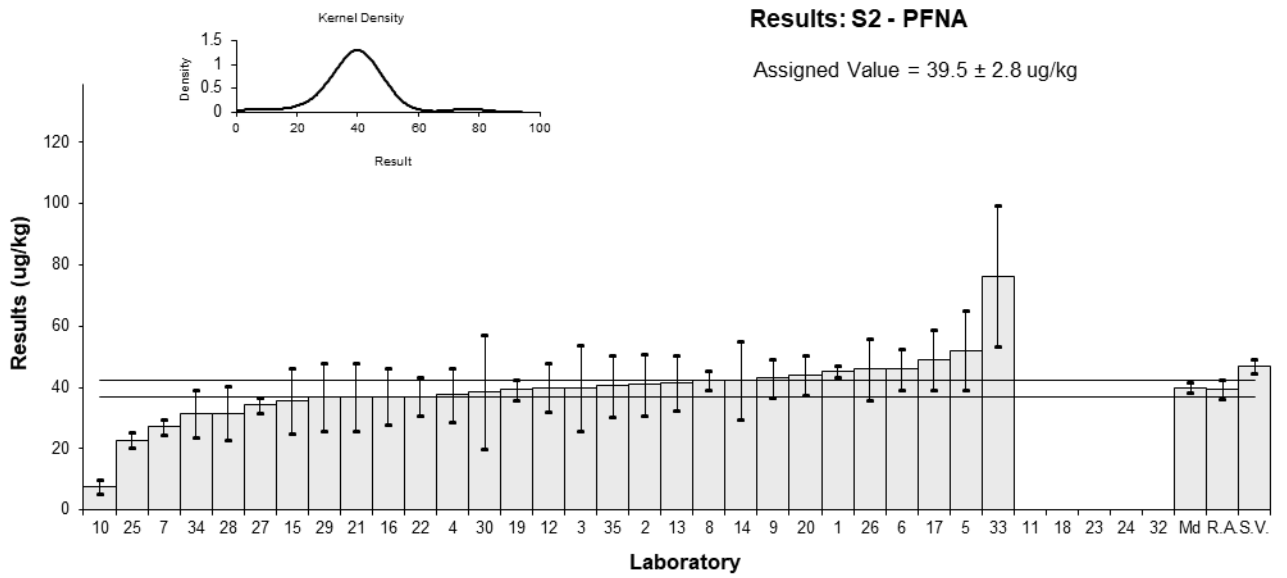
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	45.33	1.80	70	0.74	1.75
2	41	10	97	0.19	0.14
3	40	14	100	0.06	0.04
4	37.6	8.9	76.8	-0.24	-0.20
5	52	13	58	1.58	0.94
6	46	6.6	NR	0.82	0.91
7	27.20	2.48	NR	-1.56	-3.29
8	42.4	3.0	NR	0.37	0.71
9	43.1	6.3	88	0.46	0.52
10	7.71	2.39	138	-4.02	-8.64
11	NT	NT	NT		
12	40	8	90	0.06	0.06
13	41.4	9.1	NR	0.24	0.20
14	42.5	12.8	105	0.38	0.23
15	35.5	10.7	79	-0.51	-0.36
16	37.02	9.26	101	-0.31	-0.26
17	49	10	87	1.20	0.91
18	NT	NT	NT		
19	39.3	3.40	115	-0.03	-0.05
20	44	6.6	96	0.57	0.63
21	37.0	11.0	95	-0.32	-0.22
22	37.1	6.3	94	-0.30	-0.35
23	NT	NT	NT		
24	NT	NT	NT		
25	22.8	2.64	96.3	-2.11	-4.34
26	46	10	89	0.82	0.63
27	34.24	2.566	72.2	-0.67	-1.38
28	31.5	8.8	122	-1.01	-0.87
29	36.9	11.07	69	-0.33	-0.23
30	38.54	18.4992	49.9	-0.12	-0.05
32	NT	NT	NT		
33	76.4	22.92	122.6	4.67	1.60
34	31.4	7.85	107	-1.03	-0.97
35	40.5	10	80	0.13	0.10

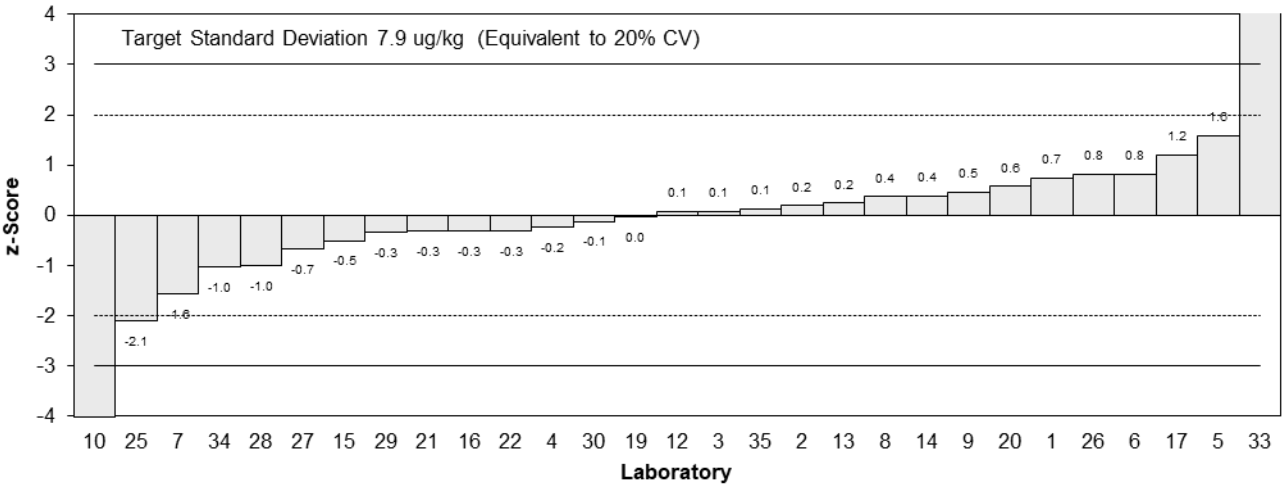
Statistics

Assigned Value*	39.5	2.8
Spike	46.9	2.3
Robust Average	39.5	3.1
Median	40.0	1.7
Mean	39.4	
N	29	
Max.	76.4	
Min.	7.71	

Robust SD	6.7	
Robust CV	17%	

*Robust Average excluding Laboratories 10 and 33.


Kernel Density
Density
Result
Results: S2 - PFNA
Assigned Value = 39.5 ± 2.8 ug/kg
Results (ug/kg)
Laboratory
10 25 7 34 28 27 15 29 21 16 22 4 30 19 12 3 35 2 13 8 14 9 20 1 26 6 17 5 33 11 18 23 24 32 Md R.A.S.V.


z-Scores: S2 - PFNA
Target Standard Deviation 7.9 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 7 34 28 27 15 29 21 16 22 4 30 19 12 3 35 2 13 8 14 9 20 1 26 6 17 5 33

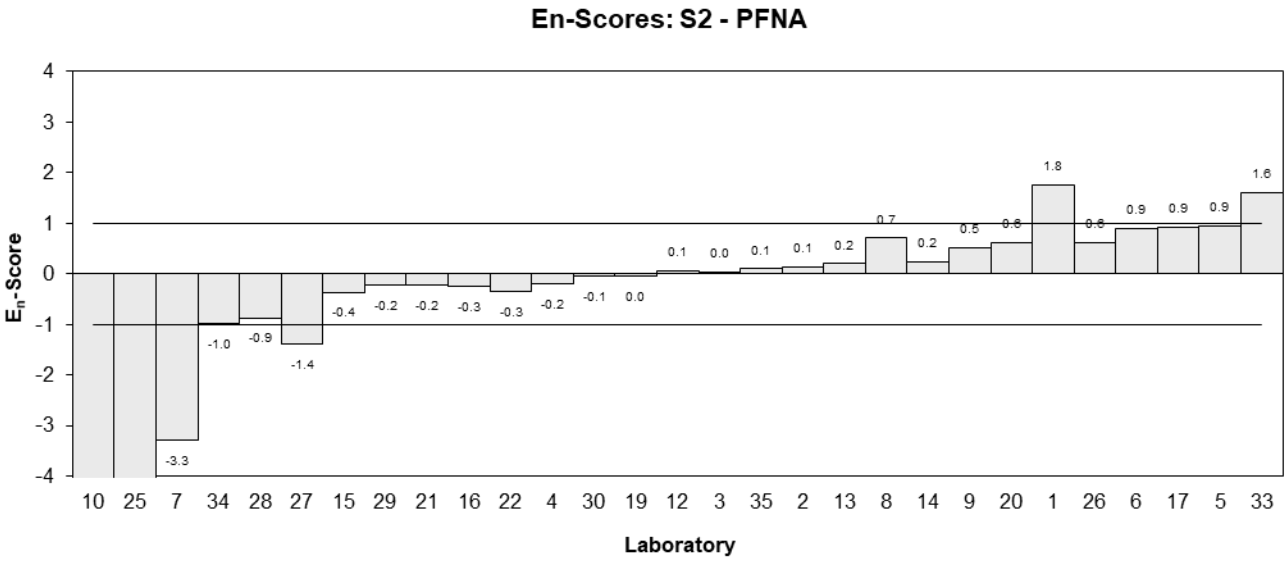

En-Scores: S2 - PFNA
En-Score
Laboratory
10 25 7 34 28 27 15 29 21 16 22 4 30 19 12 3 35 2 13 8 14 9 20 1 26 6 17 5 33

Figure 46

Table 50

Sample Details

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

Participant Results

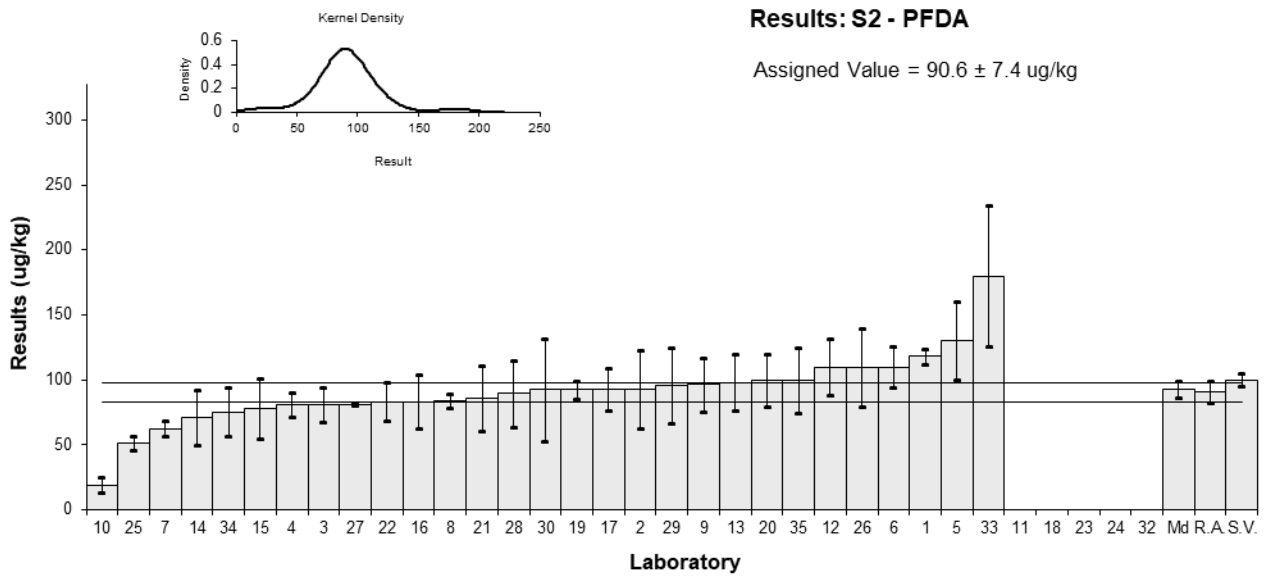
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	118.14	5.92	71	1.52	2.91
2	93	30	87	0.13	0.08
3	81	13	103	-0.53	-0.64
4	80.7	9.5	120	-0.55	-0.82
5	130	30	47	2.17	1.28
6	110	16	NR	1.07	1.10
7	62.71	5.96	NR	-1.54	-2.94
8	83.9	5.0	NR	-0.37	-0.75
9	96.3	20.8	92	0.31	0.26
10	19.34	5.61	125	-3.93	-7.67
11	NT	NT	NT		
12	110	22	71	1.07	0.84
13	98.0	21.6	NR	0.41	0.32
14	71.0	21.3	104	-1.08	-0.87
15	78.1	23.4	81	-0.69	-0.51
16	83.46	20.86	101	-0.39	-0.32
17	93	16	99	0.13	0.14
18	NT	NT	NT		
19	92.6	6.79	84	0.11	0.20
20	100	20	108	0.52	0.44
21	86.0	25.0	100	-0.25	-0.18
22	83.2	14.8	98	-0.41	-0.45
23	NT	NT	NT		
24	NT	NT	NT		
25	51.4	5.80	94	-2.16	-4.17
26	110	30	88	1.07	0.63
27	81.11	1.003	65.4	-0.52	-1.27
28	89.4	25.7	91	-0.07	-0.04
29	95.7	28.71	53	0.28	0.17
30	92.51	39.31675	49.9	0.11	0.05
32	NT	NT	NT		
33	180	54	77.1	4.93	1.64
34	75.5	18.875	104	-0.83	-0.74
35	100	25	30	0.52	0.36

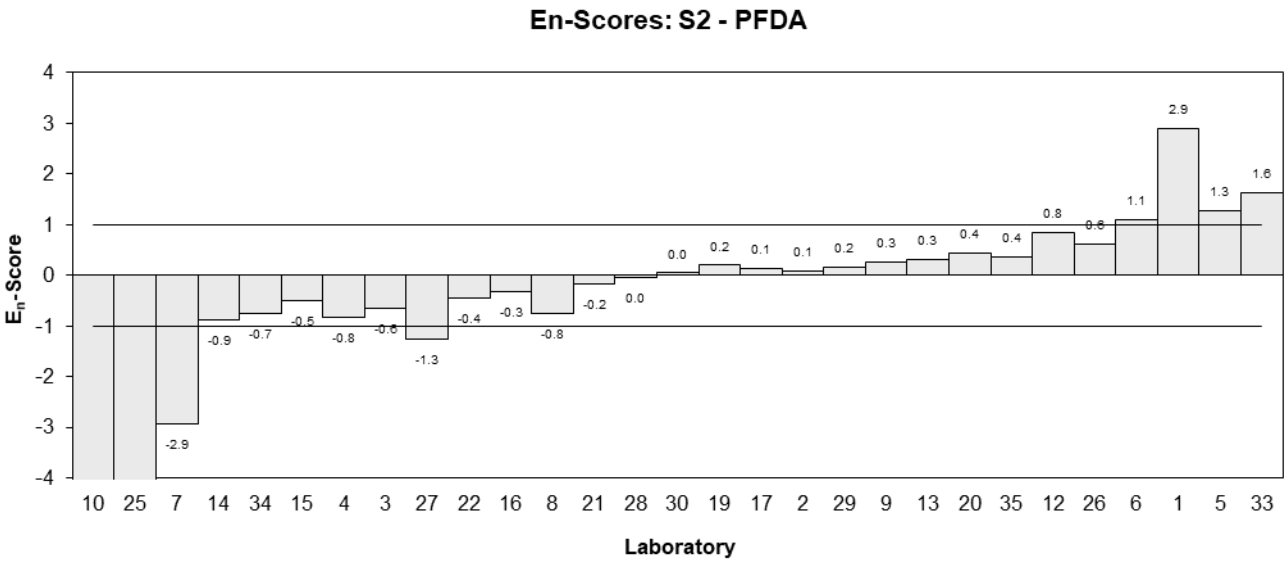
Statistics

Assigned Value*	90.6	7.4
Spike	100	5
Robust Average	90.6	8.3
Median	92.5	6.4
Mean	91.2	
N	29	
Max.	180	
Min.	19.34	

Robust SD	18	
Robust CV	20%	

*Robust Average excluding Laboratories 10 and 33.


Kernel Density
Density
Result
Results: S2 - PFDA
Assigned Value = 90.6 ± 7.4 ug/kg
Results (ug/kg)
Laboratory
10 25 7 14 34 15 4 3 27 22 16 8 21 28 30 19 17 2 29 9 13 20 35 12 26 6 1 5 33 11 18 23 24 32 Md R.A. S.V.


En-Scores: S2 - PFDA
En-Score
Laboratory
10 25 7 14 34 15 4 3 27 22 16 8 21 28 30 19 17 2 29 9 13 20 35 12 26 6 1 5 33

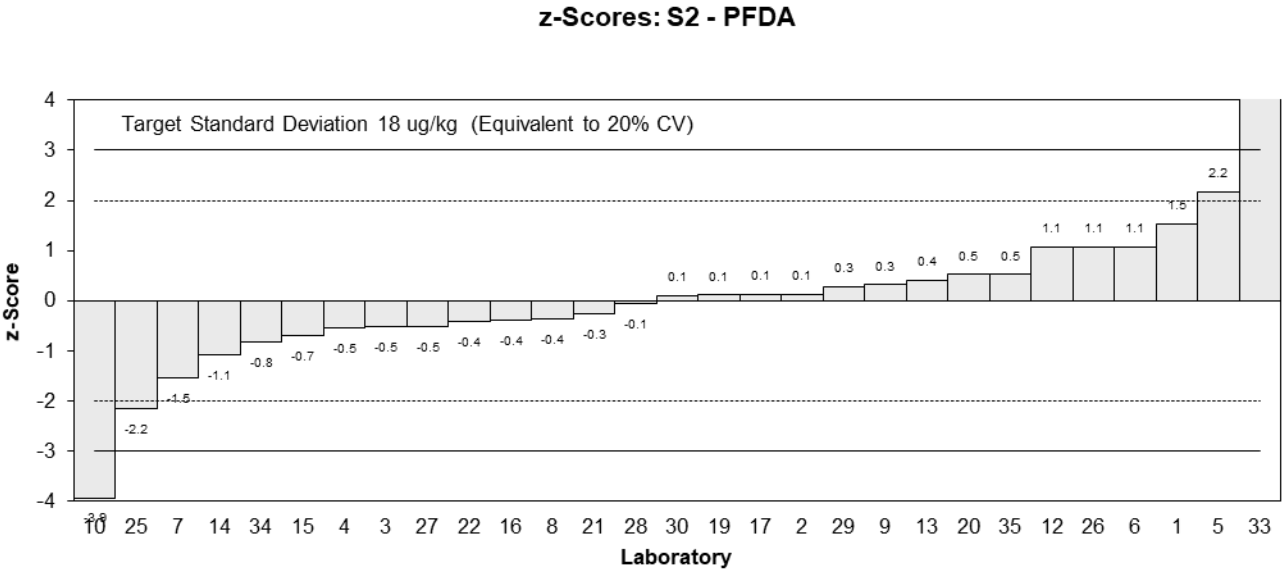

z-Scores: S2 - PFDA
Target Standard Deviation 18 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 7 14 34 15 4 3 27 22 16 8 21 28 30 19 17 2 29 9 13 20 35 12 26 6 1 5 33

Figure 47

Table 51

Sample Details

Sample No.	S2
Matrix.	Soil
Analyte.	PFUdA
Units	ug/kg

Participant Results

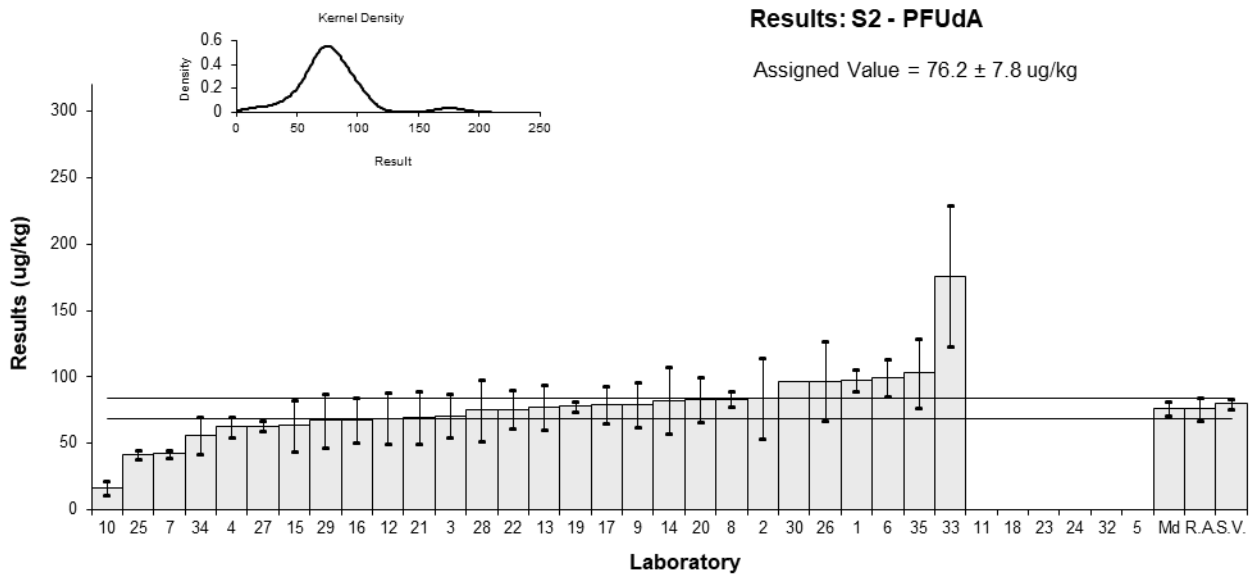
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	97.49	8.32	76	1.40	1.87
2	84	30	107	0.51	0.25
3	71	16	89	-0.34	-0.29
4	62.4	8.0	107	-0.91	-1.24
5	NT	NT	NT		
6	99	14	NR	1.50	1.42
7	42.34	2.86	NR	-2.22	-4.08
8	83.2	5.8	NR	0.46	0.72
9	79.3	16.8	91	0.20	0.17
10	16.43	5.09	119	-3.92	-6.42
11	NT	NT	NT		
12	69	19	69	-0.47	-0.35
13	76.9	16.9	NR	0.05	0.04
14	82.5	24.8	128	0.41	0.24
15	63.5	19.1	80	-0.83	-0.62
16	67.62	16.9	101	-0.56	-0.46
17	79	14	65	0.18	0.17
18	NT	NT	NT		
19	77.8	3.63	67	0.10	0.19
20	83	17	106	0.45	0.36
21	69.6	19.9	93	-0.43	-0.31
22	75.8	14.1	121	-0.03	-0.02
23	NT	NT	NT		
24	NT	NT	NT		
25	41.7	3.66	95.2	-2.26	-4.00
26	97	30	94	1.36	0.67
27	62.96	3.768	54.0	-0.87	-1.53
28	74.9	22.8	98	-0.09	-0.05
29	67.3	20.19	55	-0.58	-0.41
30	96.87	NR	49.9	1.36	2.65
32	NT	NT	NT		
33	176	52.8	80.2	6.55	1.87
34	56.3	14.075	110	-1.31	-1.24
35	103	26	15	1.76	0.99

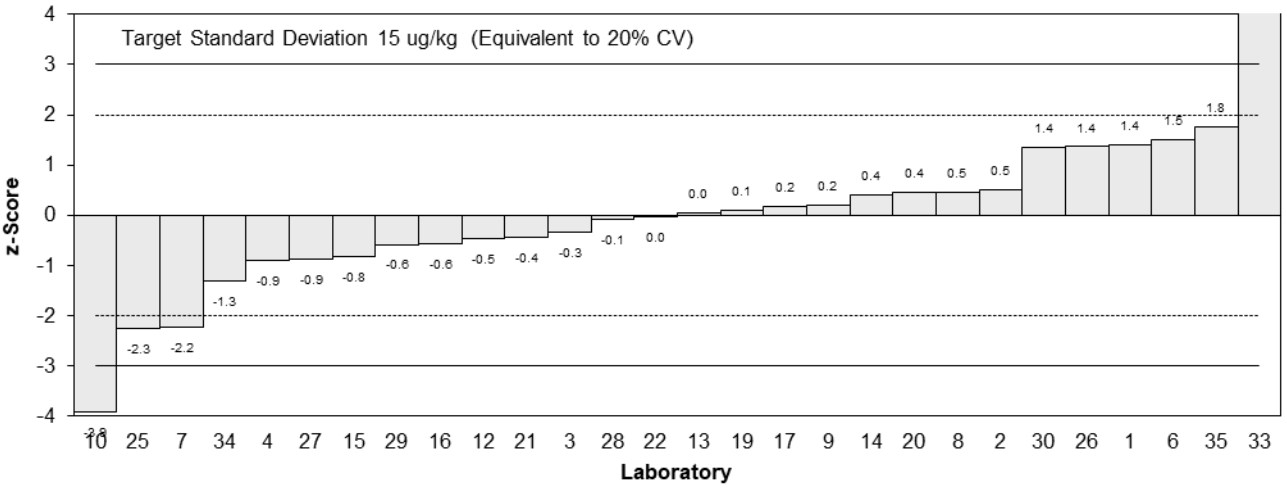
Statistics

Assigned Value*	76.2	7.8
Spike	80.0	4.0
Robust Average	76.0	8.6
Median	76.4	5.1
Mean	77.0	
N	28	
Max.	176	
Min.	16.43	

Robust SD	18	
Robust CV	24%	

*Robust Average excluding Laboratories 10 and 33.


Kernel Density
Density
Result
Results: S2 - PFUdA
Assigned Value = 76.2 ± 7.8 ug/kg
Results (ug/kg)
Laboratory
10 25 7 34 4 27 15 29 16 12 21 3 28 22 13 19 17 9 14 20 8 2 30 26 1 6 35 33 11 18 23 24 32 5 Md R.A.S.V.


z-Scores: S2 - PFUdA
Target Standard Deviation 15 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 7 34 4 27 15 29 16 12 21 3 28 22 13 19 17 9 14 20 8 2 30 26 1 6 35 33

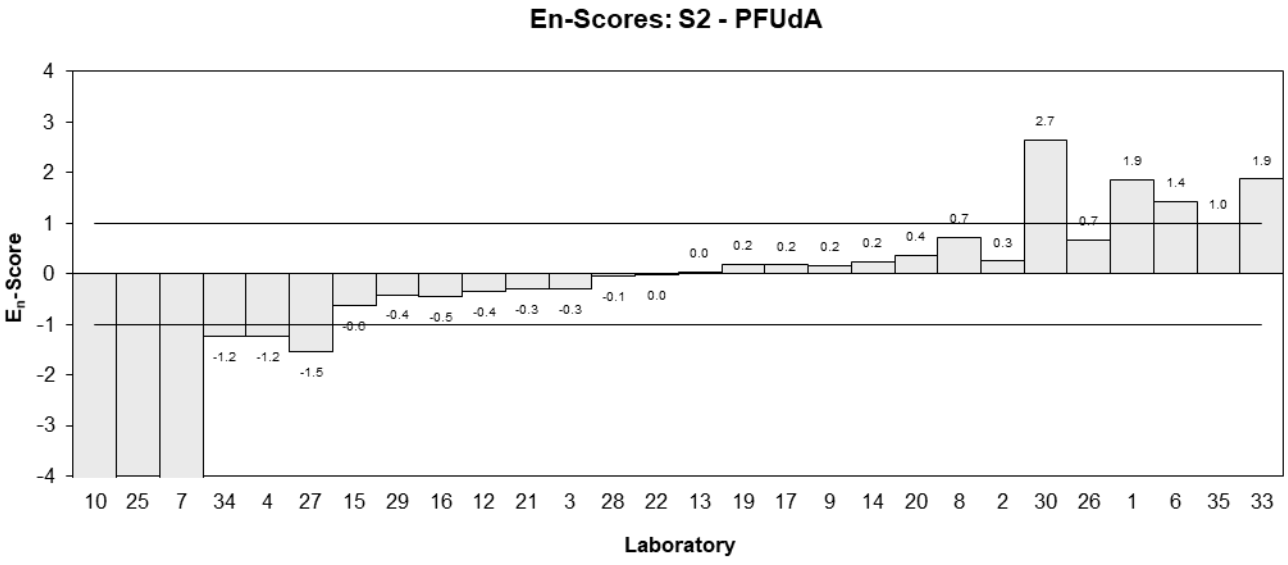

En-Scores: S2 - PFUdA
En-Score
Laboratory
10 25 7 34 4 27 15 29 16 12 21 3 28 22 13 19 17 9 14 20 8 2 30 26 1 6 35 33

Figure 48

Table 52

Sample Details

Sample No.	S2
Matrix.	Soil
Analyte.	PFDoA
Units	ug/kg

Participant Results

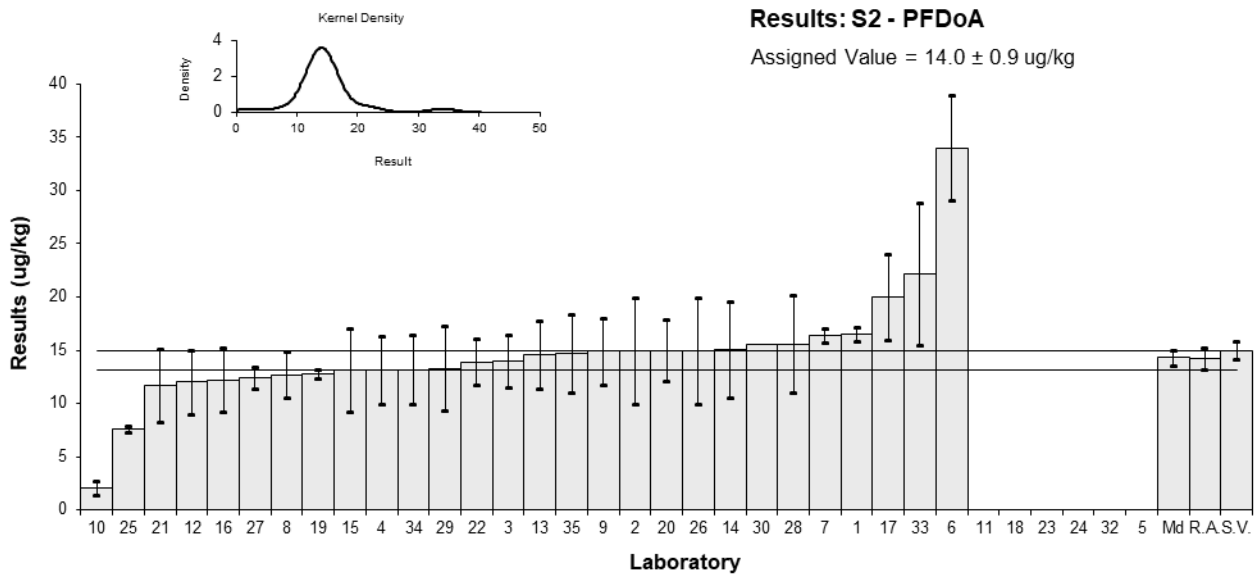
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	16.50	0.68	93	0.89	2.22
2	15	5	121	0.36	0.20
3	14	2.5	98	0.00	0.00
4	13.1	3.2	86.2	-0.32	-0.27
5	NT	NT	NT		
6	34	4.9	NR	7.14	4.01
7	16.39	0.72	NR	0.85	2.07
8	12.7	2.2	NR	-0.46	-0.55
9	14.9	3.1	89	0.32	0.28
10	2.08	0.67	127	-4.26	-10.62
11	NT	NT	NT		
12	12	3	122	-0.71	-0.64
13	14.6	3.2	NR	0.21	0.18
14	15.1	4.5	131	0.39	0.24
15	13.1	3.93	71	-0.32	-0.22
16	12.23	3.06	101	-0.63	-0.55
17	20	4	113	2.14	1.46
18	NT	NT	NT		
19	12.8	0.43	79	-0.43	-1.20
20	15	2.9	101	0.36	0.33
21	11.7	3.4	94	-0.82	-0.65
22	13.9	2.2	94	-0.04	-0.04
23	NT	NT	NT		
24	NT	NT	NT		
25	7.63	0.28	NR	-2.28	-6.76
26	15	5	101	0.36	0.20
27	12.42	1.052	34.0	-0.56	-1.14
28	15.6	4.6	100	0.57	0.34
29	13.3	3.99	35	-0.25	-0.17
30	15.58	NR	49.9	0.56	1.76
32	NT	NT	NT		
33	22.2	6.66	63.6	2.93	1.22
34	13.2	3.3	88	-0.29	-0.23
35	14.7	3.7	15	0.25	0.18

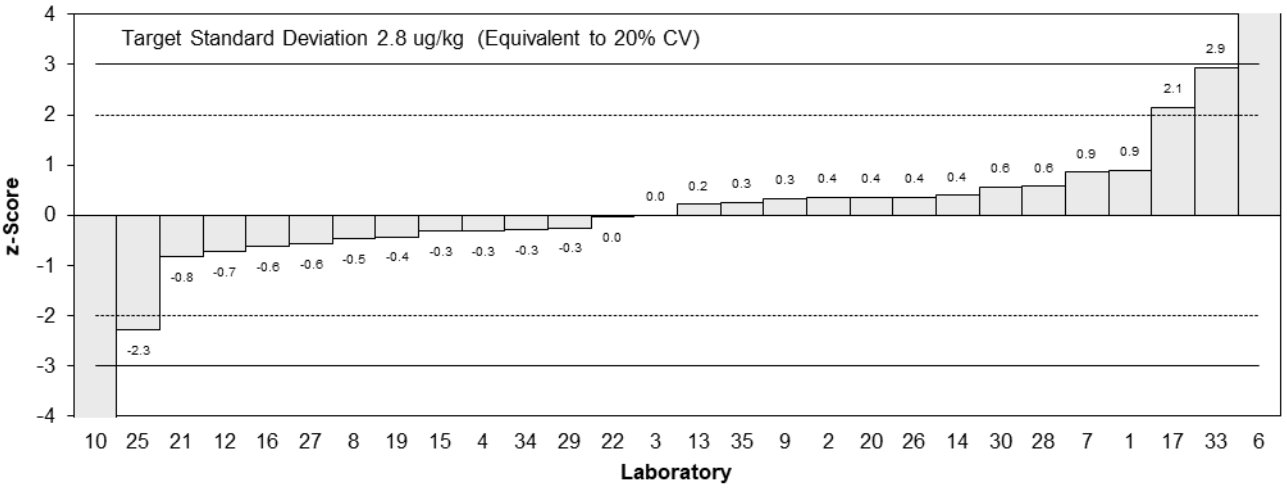
Statistics

Assigned Value*	14.0	0.9
Spike	15.0	0.8
Robust Average	14.2	1.0
Median	14.3	0.7
Mean	14.6	
N	28	
Max.	34	
Min.	2.08	

Robust SD	2.1	
Robust CV	15%	

*Robust Average excluding Laboratories 6, 10 and 33.


Kernel Density
Density
Result
Results: S2 - PFDoA
Assigned Value = 14.0 ± 0.9 ug/kg
Results (ug/kg)
Laboratory
10 25 21 12 16 27 8 19 15 4 34 29 22 3 13 35 9 2 20 26 14 30 28 7 1 17 33 6 11 18 23 24 32 5 Md R.A.S.V.


z-Scores: S2 - PFDoA
Target Standard Deviation 2.8 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 21 12 16 27 8 19 15 4 34 29 22 3 13 35 9 2 20 26 14 30 28 7 1 17 33 6

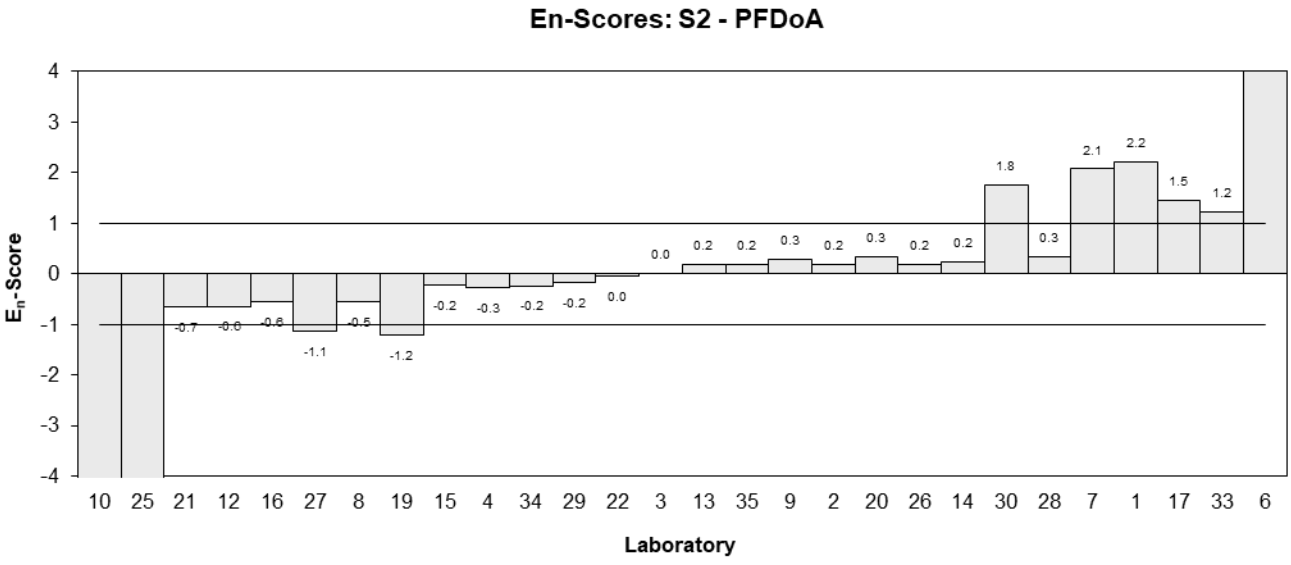

En-Scores: S2 - PFDoA
En-Score
Laboratory
10 25 21 12 16 27 8 19 15 4 34 29 22 3 13 35 9 2 20 26 14 30 28 7 1 17 33 6

Figure 49

Table 53

Sample Details

Sample No.	S2
Matrix.	Soil
Analyte.	PFTrDA
Units	ug/kg

Participant Results

Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	51.72	7.43	NR	1.55	1.52
2	39	10	81	-0.06	-0.05
3	34	12	98	-0.70	-0.44
4	33.9	8.4	86.2	-0.71	-0.63
5	NT	NT	NT		
6	NT	NT	NT		
7	34.72	1.50	NR	-0.61	-1.39
8	43.2	3.5	NR	0.47	0.79
9	45.7	10.4	89	0.78	0.57
10	1.51	0.5	NR	-4.81	-12.10
11	NT	NT	NT		
12	32	9	122	-0.95	-0.79
13	45.1	9.9	NR	0.71	0.54
14	35.9	10.8	NR	-0.46	-0.32
15	38.5	11.6	71	-0.13	-0.08
16	37.88	9.47	101	-0.21	-0.16
17	65	13	NR	3.23	1.91
18	NT	NT	NT		
19	34.2	5.94	123	-0.67	-0.79
20	45	9	103	0.70	0.58
21	35.0	12.0	94	-0.57	-0.36
22	38.0	11.7	NR	-0.19	-0.12
23	NT	NT	NT		
24	NT	NT	NT		
25	22.4	4.78	NR	-2.16	-3.00
26	40	10	90	0.06	0.05
27	17.937	5.420	34.0	-2.73	-3.45
28	43.2	13.8	120	0.47	0.26
29	40.7	12.21	36	0.15	0.10
30	49.97	NR	49.9	1.33	3.38
32	NT	NT	NT		
33	47.4	14.22	108.9	1.00	0.54
34	41.000	10.25	94	0.19	0.14
35	36.3	9.1	15	-0.41	-0.33

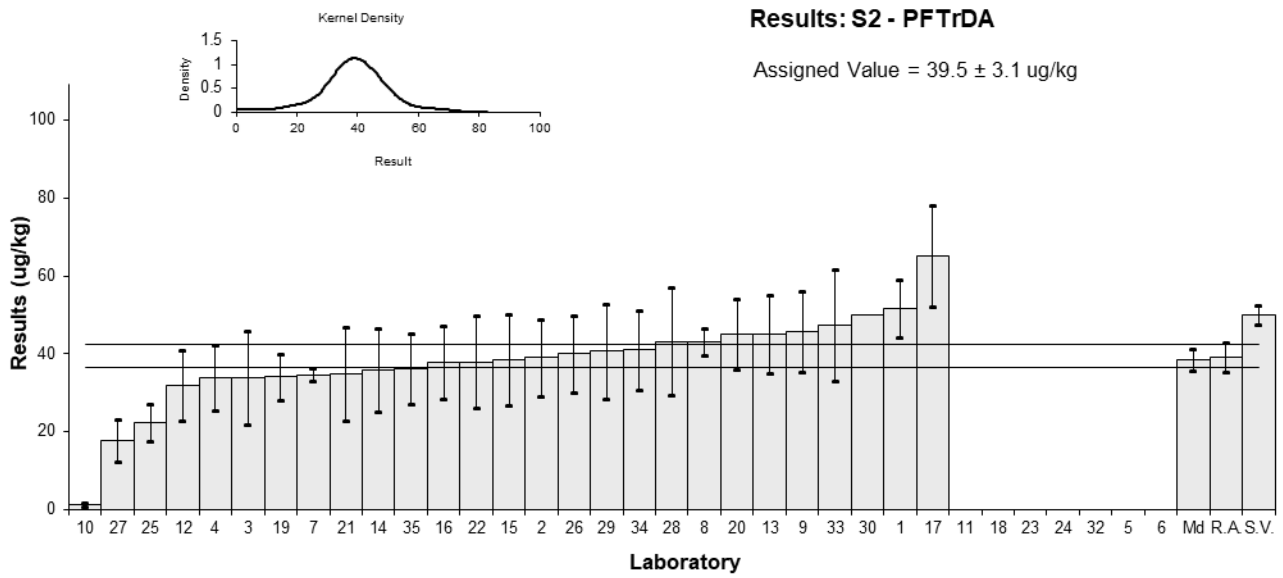
Statistics*

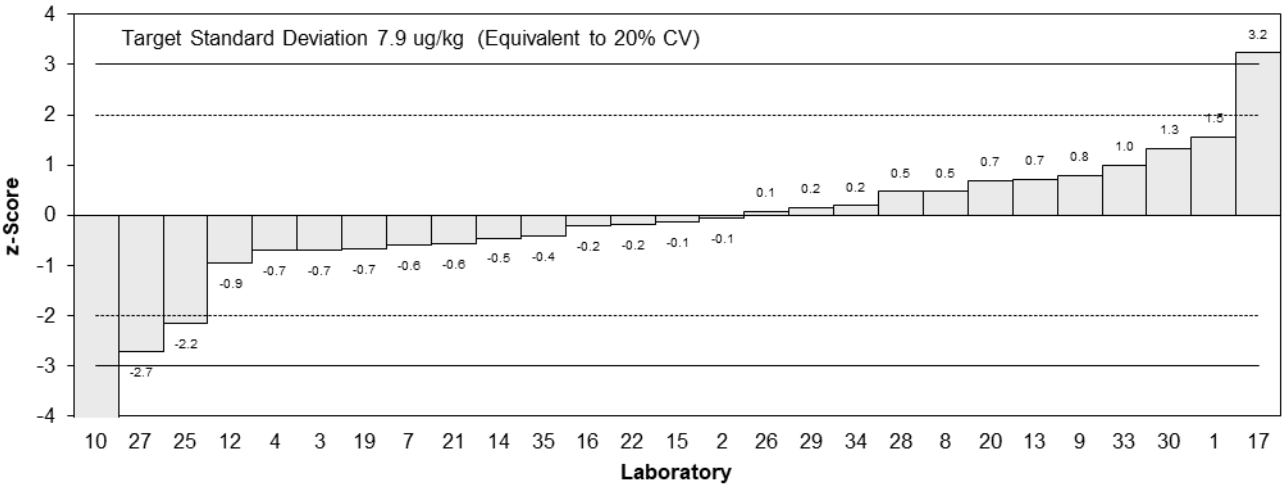
Assigned Value**	39.5	3.1
Spike	50.0	2.5
Robust Average	39.6	3.5
Median	38.8	2.7
Mean	39.5	
N	26	
Max.	65	
Min.	17.937	

Robust SD	7.1	
Robust CV	18%	

*The result from Laboratory 10 was excluded from statistical calculation

**Robust Average excluding Laboratories 17 and 27.


Kernel Density
Density
Result
Results: S2 - PFTrDA
Assigned Value = 39.5 ± 3.1 ug/kg
Results (ug/kg)
Laboratory
10 27 25 12 4 3 19 7 21 14 35 16 22 15 2 26 29 34 28 8 20 13 9 33 30 1 17 11 18 23 24 32 5 6 Md R.A. S.V.


z-Scores: S2 - PFTrDA
Target Standard Deviation 7.9 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 27 25 12 4 3 19 7 21 14 35 16 22 15 2 26 29 34 28 8 20 13 9 33 30 1 17

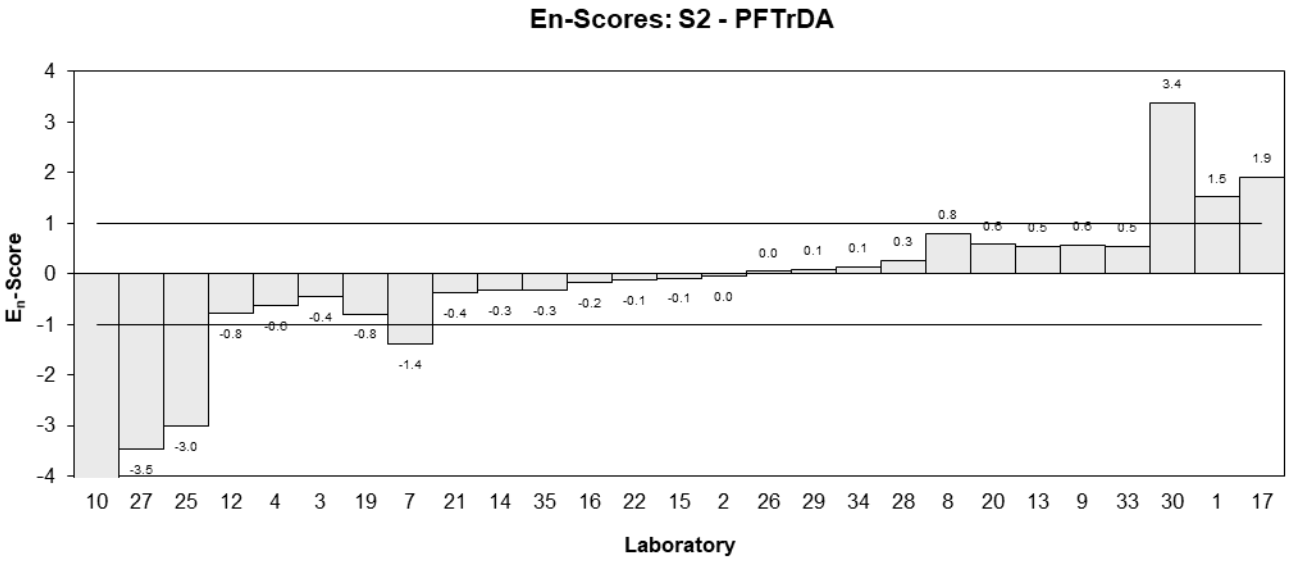

En-Scores: S2 - PFTrDA
En-Score
Laboratory
10 27 25 12 4 3 19 7 21 14 35 16 22 15 2 26 29 34 28 8 20 13 9 33 30 1 17

Figure 50

Table 54

Sample Details

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

Participant Results

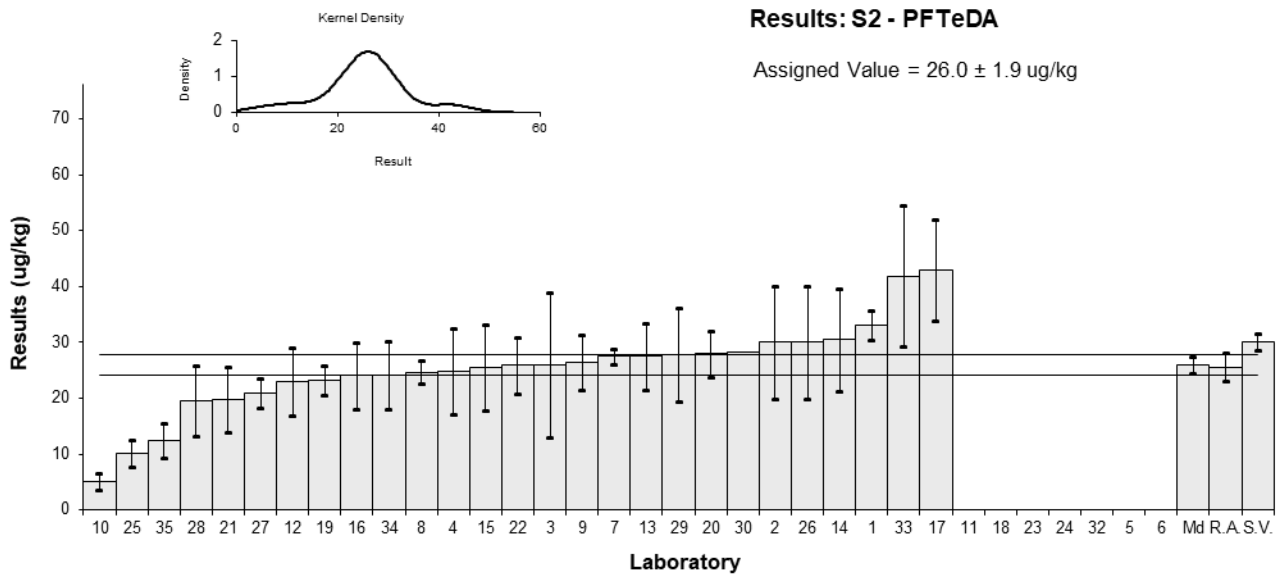
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	33.1	2.69	61	1.37	2.16
2	30	10	81	0.77	0.39
3	26	13	111	0.00	0.00
4	24.8	7.6	75.2	-0.23	-0.15
5	NT	NT	NT		
6	NT	NT	NT		
7	27.48	1.32	NR	0.28	0.64
8	24.7	2.1	NR	-0.25	-0.46
9	26.4	5	89	0.08	0.07
10	4.98	1.49	120	-4.04	-8.71
11	NT	NT	NT		
12	23	6	52	-0.58	-0.48
13	27.5	6.0	NR	0.29	0.24
14	30.5	9.2	82	0.87	0.48
15	25.6	7.68	72	-0.08	-0.05
16	24.08	6.02	101	-0.37	-0.30
17	43	9	NR	3.27	1.85
18	NT	NT	NT		
19	23.3	2.64	123	-0.52	-0.83
20	28	4.1	103	0.38	0.44
21	19.8	5.8	98	-1.19	-1.02
22	25.9	5.1	146	-0.02	-0.02
23	NT	NT	NT		
24	NT	NT	NT		
25	10.2	2.37	NR	-3.04	-5.20
26	30	10	90	0.77	0.39
27	20.86	2.599	5.3	-0.99	-1.60
28	19.5	6.3	120	-1.25	-0.99
29	27.9	8.37	37	0.37	0.22
30	28.34	NR	49.9	0.45	1.23
32	NT	NT	NT		
33	41.9	12.57	108.9	3.06	1.25
34	24.1	6.025	55	-0.37	-0.30
35	12.5	3.1	40	-2.60	-3.71

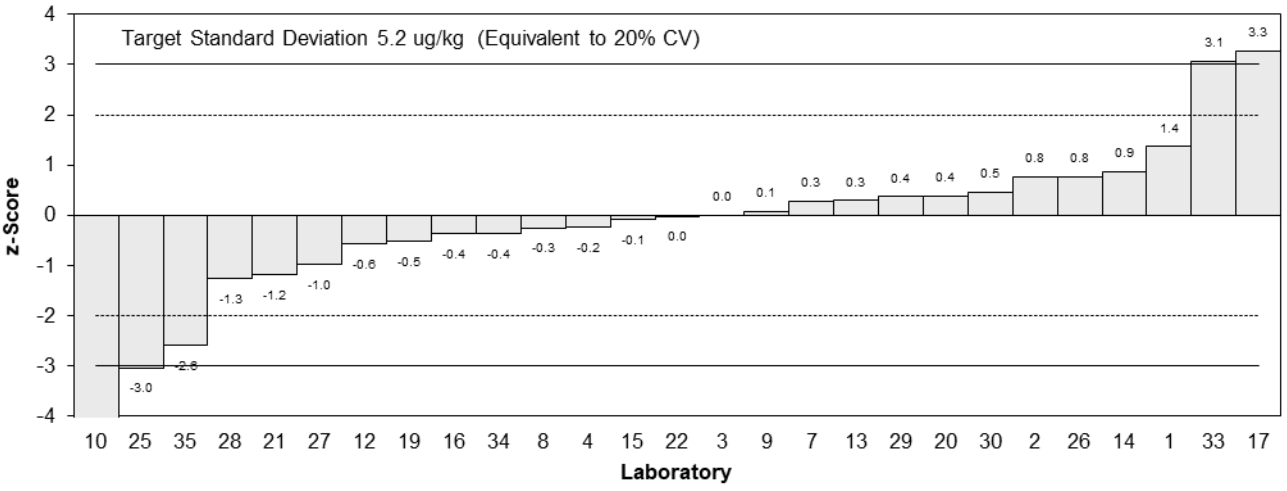
Statistics

Assigned Value*	26.0	1.9
Spike	30.1	1.5
Robust Average	25.6	2.6
Median	25.9	1.5
Mean	25.3	
N	27	
Max.	43	
Min.	4.98	

Robust SD	5.3	
Robust CV	21%	

*Robust Average excluding Laboratories 10, 17, 25, 33 and 35.


Kernel Density
Density
Result
Results: S2 - PFTeDA
Assigned Value = 26.0 ± 1.9 ug/kg
Results (ug/kg)
Laboratory
10 25 35 28 21 27 12 19 16 34 8 4 15 22 3 9 7 13 29 20 30 2 26 14 1 33 17 11 18 23 24 32 5 6 Md R.A. S.V.


z-Scores: S2 - PFTeDA
Target Standard Deviation 5.2 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 35 28 21 27 12 19 16 34 8 4 15 22 3 9 7 13 29 20 30 2 26 14 1 33 17

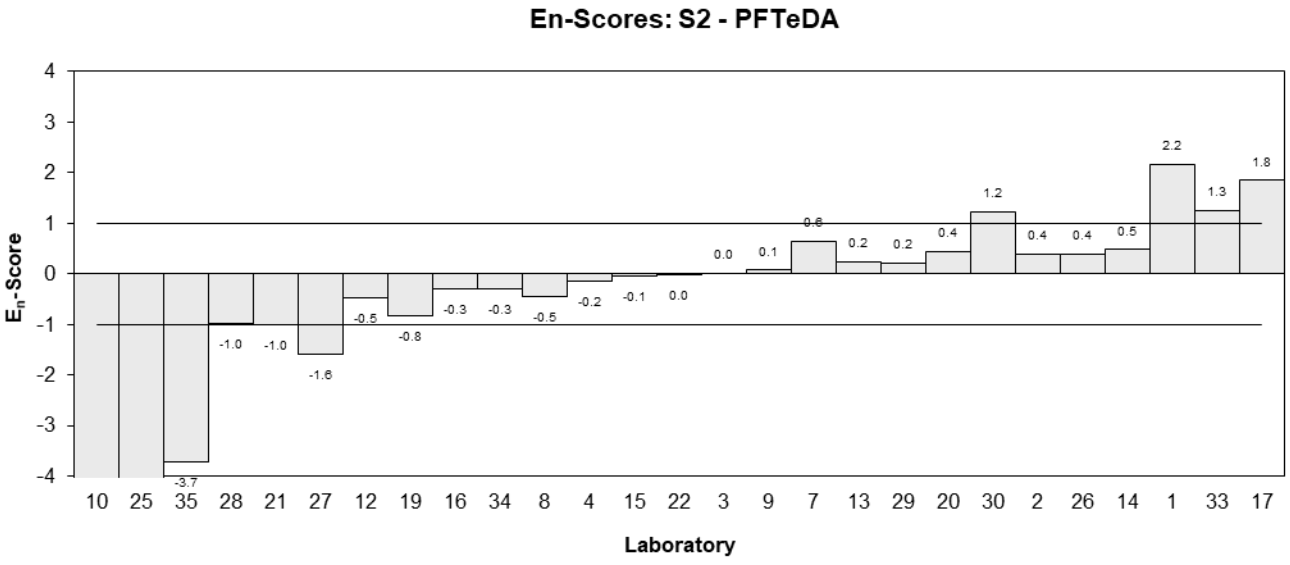

En-Scores: S2 - PFTeDA
En-Score
Laboratory
10 25 35 28 21 27 12 19 16 34 8 4 15 22 3 9 7 13 29 20 30 2 26 14 1 33 17

Figure 51

Table 55

Sample Details

Sample No.	S2
Matrix.	Soil
Analyte.	GenX
Units	ug/kg

Participant Results

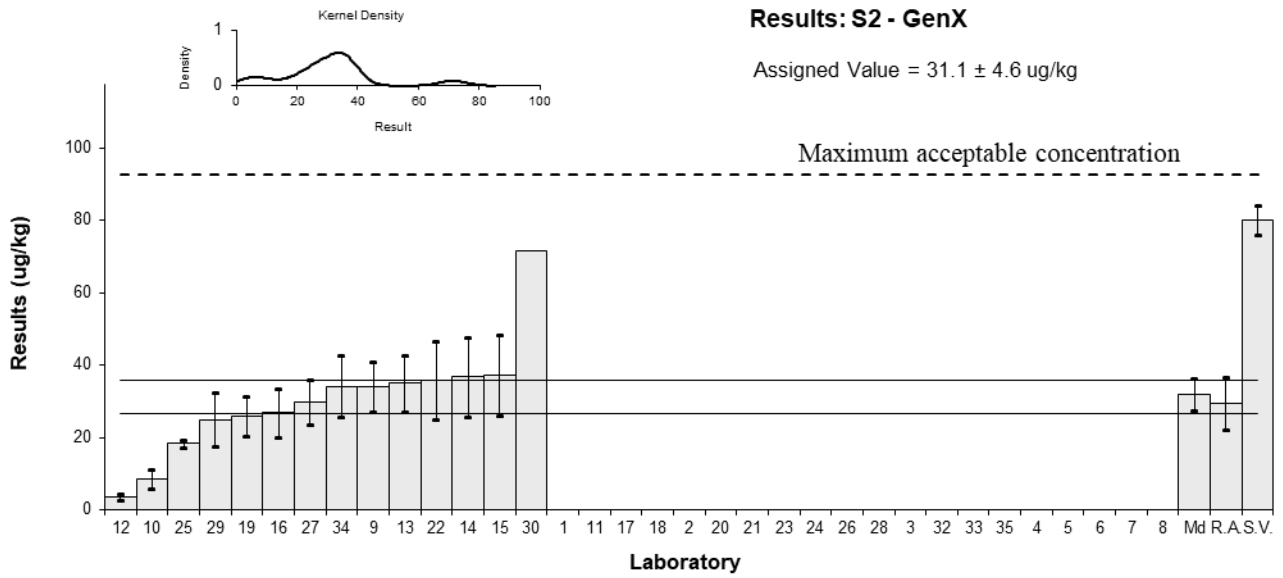
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	NT	NT	NT		
4	NT	NT	NT		
5	NT	NT	NT		
6	NT	NT	NT		
7	NT	NT	NT		
8	NT	NT	NT		
9	34.1	6.8	88	0.48	0.37
10	8.43	2.7	114	-3.64	-4.25
11	NT	NT	NT		
12	3.6	1.0	98	-4.42	-5.84
13	35.0	7.7	NR	0.63	0.43
14	36.7	11.0	108	0.90	0.47
15	37.2	11.16	72	0.98	0.51
16	26.89	6.72	101	-0.68	-0.52
17	NT	NT	NT		
18	NT	NT	NT		
19	26.0	5.54	29	-0.82	-0.71
20	NT	NT	NT		
21	NT	NT	NT		
22	35.84	10.75	117	0.76	0.41
23	NT	NT	NT		
24	NT	NT	NT		
25	18.3	1.06	92.2	-2.06	-2.71
26	NT	NT	NT		
27	29.85	6.272	57.3	-0.20	-0.16
28	NT	NT	NT		
29	24.9	7.47	108	-1.00	-0.71
30*	71.38	NR	49.9	2.00	1.00
32	NT	NT	NT		
33	NT	NT	NT		
34	34.1	8.525	63	0.48	0.31
35	NT	NT	NT		

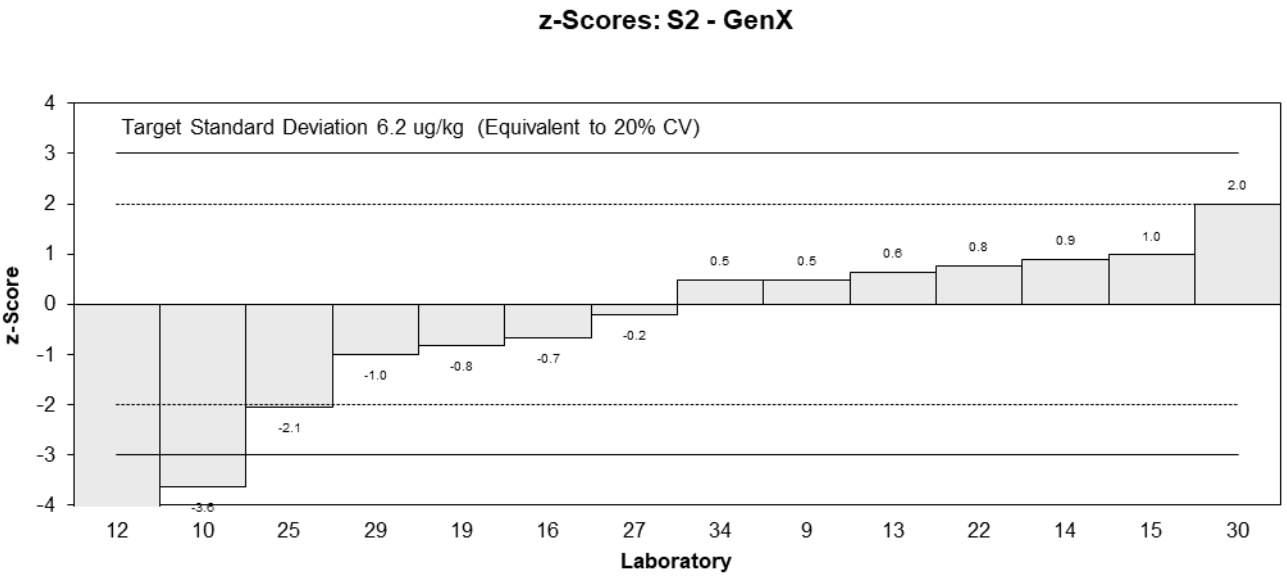
Statistics

Assigned Value**	31.1	4.6
Spike	80.0	4.0
Robust Average	29.4	7.2
Median	32.0	4.4
Mean	30.2	
N	14	
Max.	71.38	
Min.	3.6	

Robust SD	11	
Robust CV	37%	

*z-Score adjusted to 2 and E_n-score adjusted to 1 (see Section 6.3).
**Robust Average excluding Laboratories 10, 12 and 30.


Kernel Density
Density
Result
Results: S2 - GenX
Assigned Value = 31.1 ± 4.6 ug/kg
Maximum acceptable concentration
Results (ug/kg)
Laboratory
12 10 25 29 19 16 27 34 9 13 22 14 15 30 1 11 17 18 2 20 21 23 24 26 28 3 32 33 35 4 5 6 7 8 Md R.A.S.V.


z-Scores: S2 - GenX
Target Standard Deviation 6.2 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
12 10 25 29 19 16 27 34 9 13 22 14 15 30
-3.6
-2.1
-1.0
-0.8
-0.7
-0.2
0.5
0.5
0.6
0.8
0.9
1.0
2.0

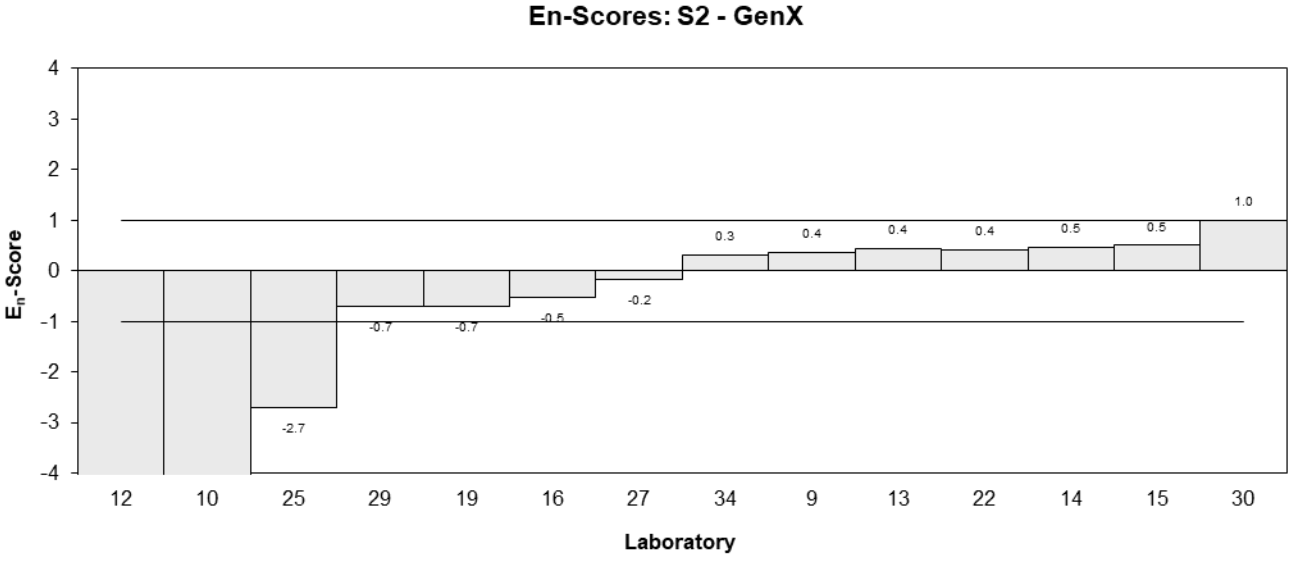

En-Scores: S2 - GenX
En-Score
Laboratory
12 10 25 29 19 16 27 34 9 13 22 14 15 30
-2.7
-0.7
-0.7
-0.5
-0.2
0.3
0.4
0.4
0.4
0.5
0.5
1.0

Figure 52

Table 56

Sample Details

Sample No.	S2
Matrix.	Soil
Analyte.	ADONA
Units	ug/kg

Participant Results

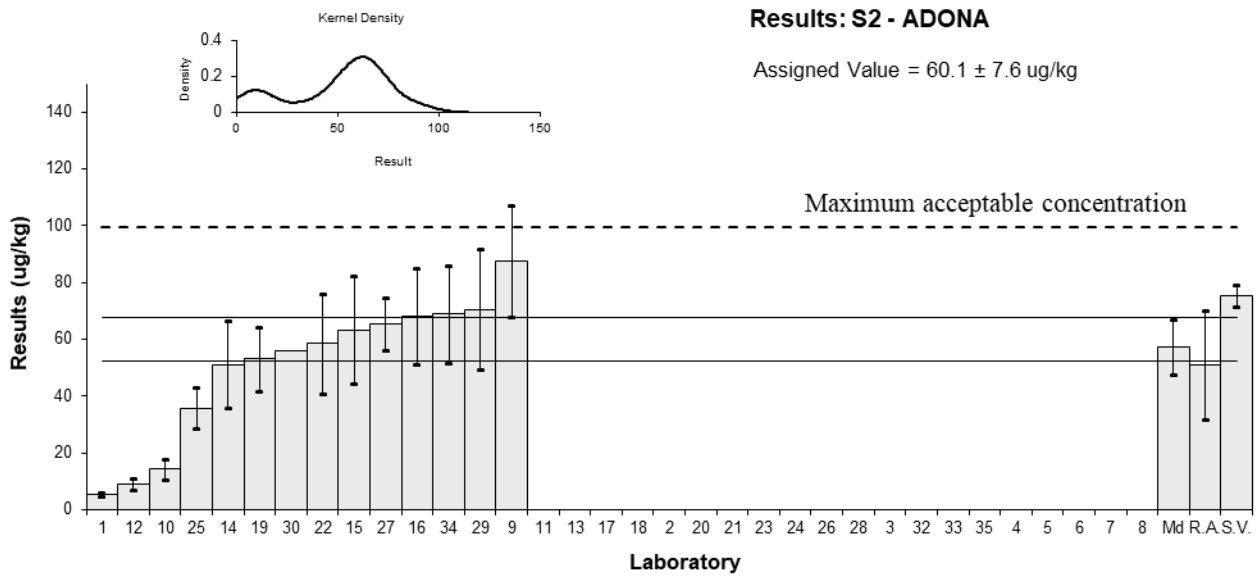
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	5.47	0.55	NR	-4.54	-7.17
2	NT	NT	NT		
3	NT	NT	NT		
4	NT	NT	NT		
5	NT	NT	NT		
6	NT	NT	NT		
7	NT	NT	NT		
8	NT	NT	NT		
9*	87.4	19.6	87	2.00	1.00
10	14.44	3.61	NR	-3.80	-5.43
11	NT	NT	NT		
12	8.9	2.0	98	-4.26	-6.52
13	NT	NT	NT		
14	51.2	15.4	NR	-0.74	-0.52
15	63.4	19.02	81	0.27	0.16
16	68.21	17.05	101	0.67	0.43
17	NT	NT	NT		
18	NT	NT	NT		
19	53.1	11.3	115	-0.58	-0.51
20	NT	NT	NT		
21	NT	NT	NT		
22	58.47	17.54	NR	-0.14	-0.09
23	NT	NT	NT		
24	NT	NT	NT		
25	35.8	7.20	NR	-2.02	-2.32
26	NT	NT	NT		
27	65.44	9.402	74.5	0.44	0.44
28	NT	NT	NT		
29	70.5	21.15	70	0.87	0.46
30	56	NR	49.9	-0.34	-0.54
32	NT	NT	NT		
33	NT	NT	NT		
34	68.9	17.225	94	0.73	0.47
35	NT	NT	NT		

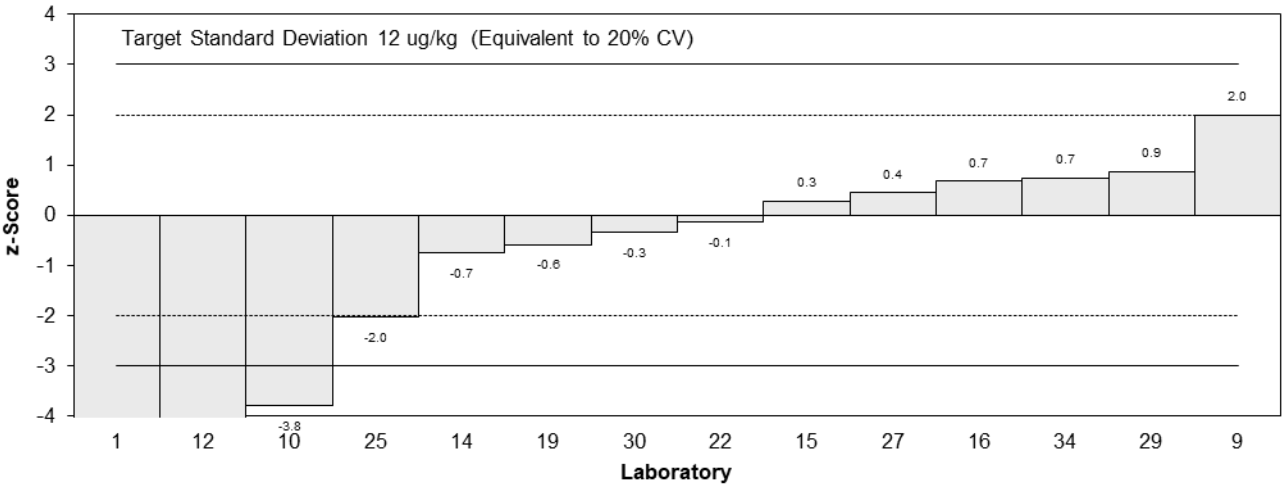
Statistics

Assigned Value**	60.1	7.6
Spike	75.4	3.8
Robust Average	51	19
Median	57.2	9.7
Mean	50.5	
N	14	
Max.	87.4	
Min.	5.47	

Robust SD	28	
Robust CV	55%	

*z-Score adjusted to 2 and E_n-score adjusted to 1 (see Section 6.3).
**Robust Average excluding Laboratories 1, 9, 10 and 12.


Kernel Density
Density
Result
Results: S2 - ADONA
Assigned Value = 60.1 ± 7.6 ug/kg
Maximum acceptable concentration
Results (ug/kg)
Laboratory
1 12 10 25 14 19 30 22 15 27 16 34 29 9 11 13 17 18 2 20 21 23 24 26 28 3 32 33 35 4 5 6 7 8 Md R.A.S.V.


z-Scores: S2 - ADONA
Target Standard Deviation 12 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
1 12 10 25 14 19 30 22 15 27 16 34 29 9
2.0
0.9
0.7
0.7
0.4
0.3
-0.1
-0.3
-0.6
-0.7
-2.0
-3.8

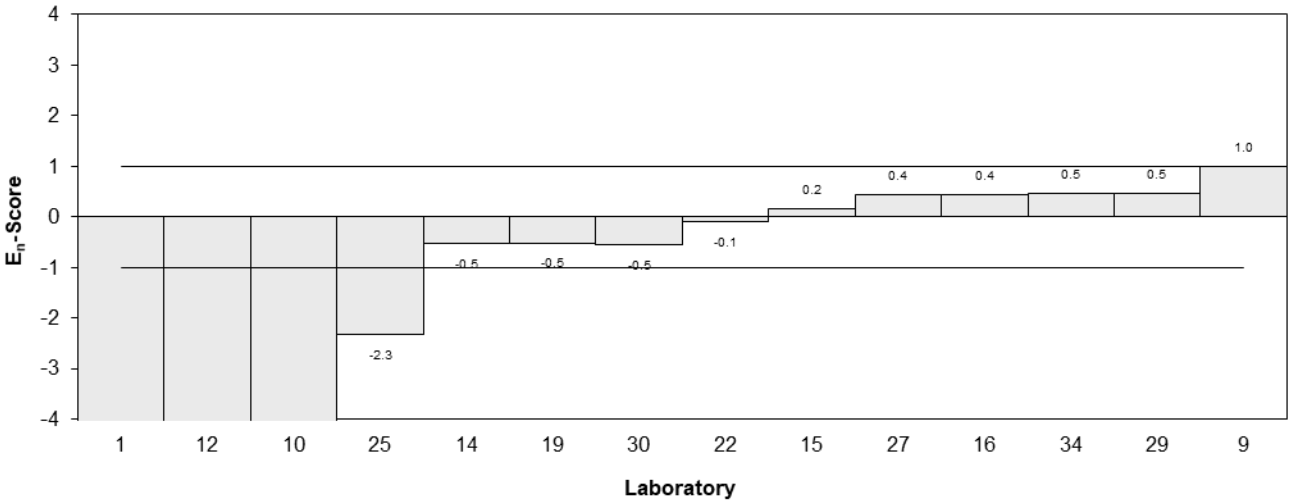

En-Scores: S2 - ADONA
En-Score
Laboratory
1 12 10 25 14 19 30 22 15 27 16 34 29 9
1.0
0.5
0.5
0.4
0.4
0.2
-0.1
-0.5
-0.5
-0.5
-2.3

Figure 53

Table 57

Sample Details

Sample No.	S2
Matrix.	Soil
Analyte.	9Cl-PF3ONS
Units	ug/kg

Participant Results

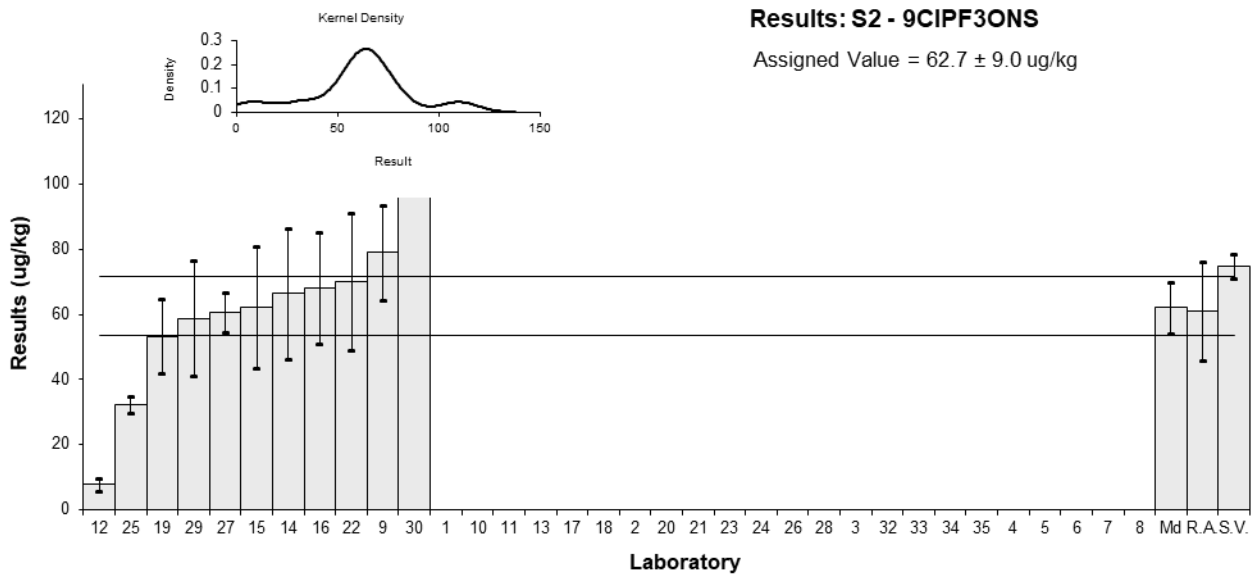
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	NT	NT	NT		
4	NT	NT	NT		
5	NT	NT	NT		
6	NT	NT	NT		
7	NT	NT	NT		
8	NT	NT	NT		
9	78.9	14.4	87	1.29	0.95
10	NT	NT	NT		
11	NT	NT	NT		
12	7.8	2.0	83	-4.38	-5.95
13	NT	NT	NT		
14	66.3	19.9	NR	0.29	0.16
15	62.1	18.63	79	-0.05	-0.03
16	67.99	17	101	0.42	0.28
17	NT	NT	NT		
18	NT	NT	NT		
19	53.2	11.4	78	-0.76	-0.65
20	NT	NT	NT		
21	NT	NT	NT		
22	70.06	21.02	NR	0.59	0.32
23	NT	NT	NT		
24	NT	NT	NT		
25	32.3	2.45	NR	-2.42	-3.26
26	NT	NT	NT		
27	60.70	6.046	70.5	-0.16	-0.18
28	NT	NT	NT		
29	58.8	17.64	70	-0.31	-0.20
30	110	NR	49.9	3.77	5.26
32	NT	NT	NT		
33	NT	NT	NT		
34	NT	NT	NT		
35	NT	NT	NT		

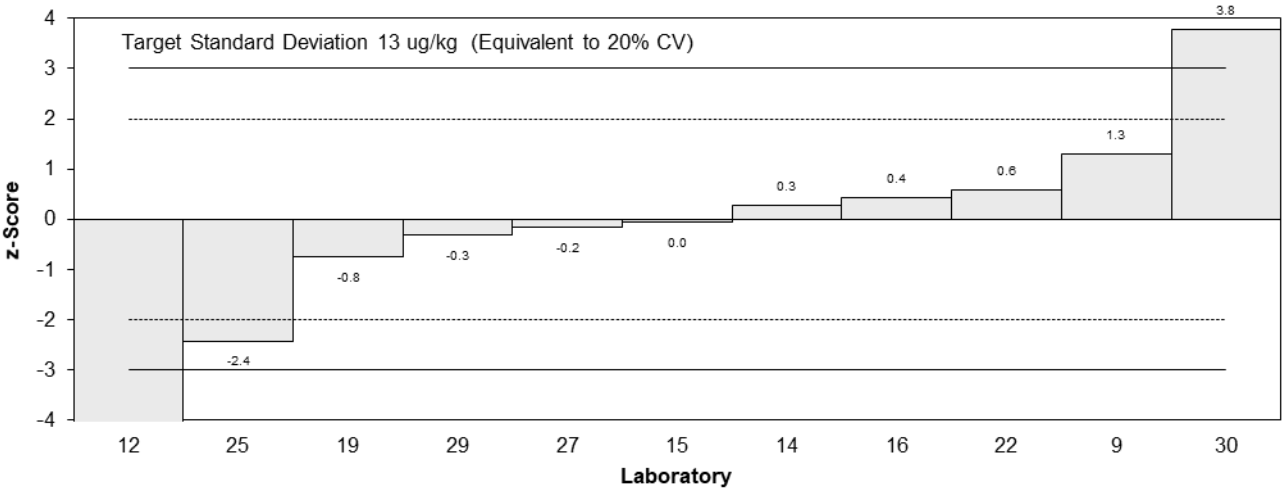
Statistics

Assigned Value*	62.7	9.0
Spike	74.6	3.7
Robust Average	61	15
Median	62.1	7.9
Mean	60.7	
N	11	
Max.	110	
Min.	7.8	

Robust SD	20	
Robust CV	33%	

*Robust Average excluding Laboratories 12 and 30.


Kernel Density
Density
Result
Results: S2 - 9ClPF3ONS
Assigned Value = 62.7 ± 9.0 ug/kg
Results (ug/kg)
Laboratory
12 25 19 29 27 15 14 16 22 9 30 1 10 11 13 17 18 2 20 21 23 24 26 28 3 32 33 34 35 4 5 6 7 8 Md R.A.S.V.


z-Scores: S2 - 9ClPF3ONS
Target Standard Deviation 13 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
12 25 19 29 27 15 14 16 22 9 30
-2.4
-0.8
-0.3
-0.2
0.0
0.3
0.4
0.6
1.3
3.8

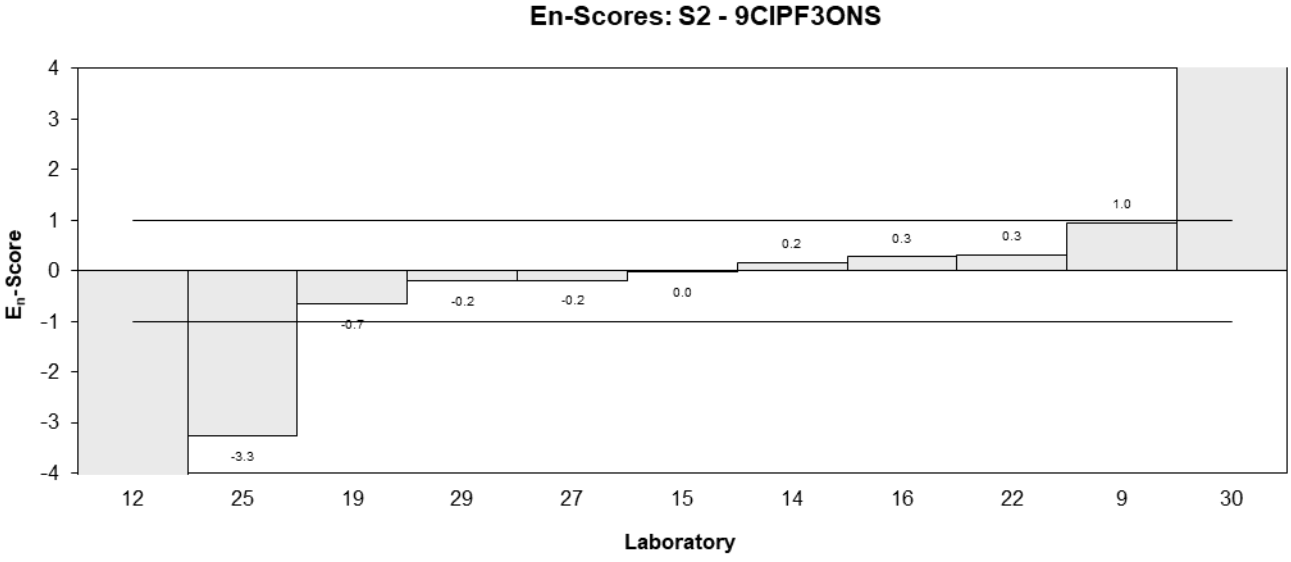

En-Scores: S2 - 9ClPF3ONS
En-Score
Laboratory
12 25 19 29 27 15 14 16 22 9 30
-3.3
-0.7
-0.2
-0.2
0.0
0.2
0.3
0.3
1.0

Figure 54

Table 58

Sample Details

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

Participant Results

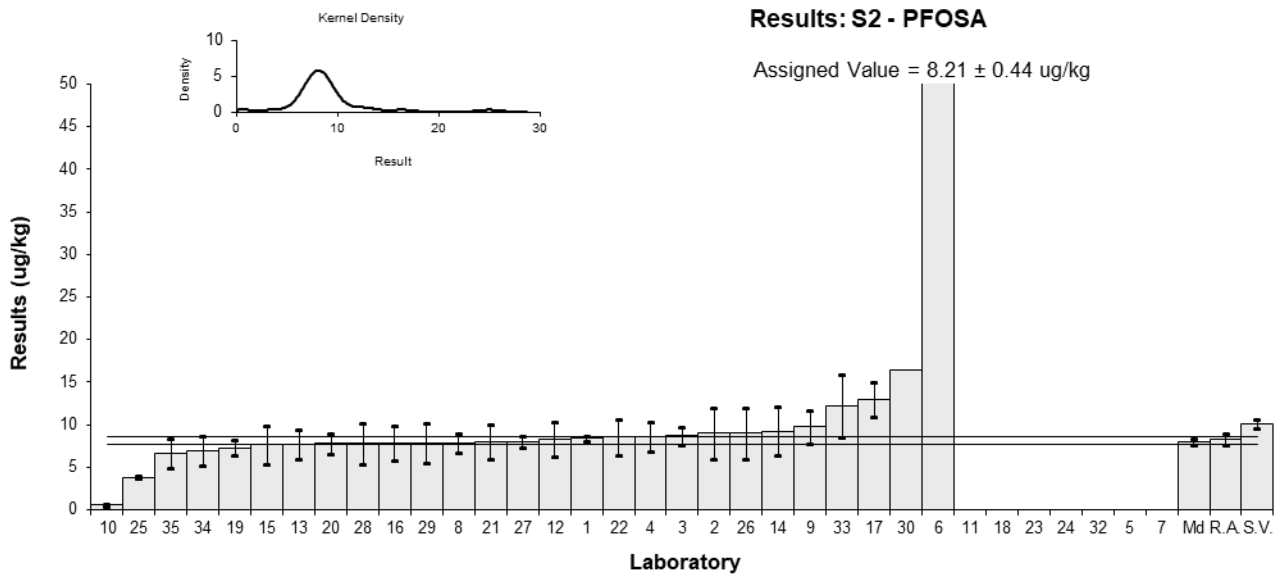
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	8.44	0.31	NR	0.14	0.43
2	9	3	109	0.48	0.26
3	8.7	1.0	98	0.30	0.45
4	8.6	1.7	86.9	0.24	0.22
5	NT	NT	NT		
6	120	17	NR	68.08	6.57
7	NT	NT	NT		
8	7.88	1.10	NR	-0.20	-0.28
9	9.75	1.93	85	0.94	0.78
10	0.56	0.18	NR	-4.66	-16.09
11	NT	NT	NT		
12	8.3	2.0	63	0.05	0.04
13	7.7	1.7	NR	-0.31	-0.29
14	9.28	2.8	81	0.65	0.38
15	7.65	2.30	73	-0.34	-0.24
16	7.85	1.96	101	-0.22	-0.18
17	13	2	NR	2.92	2.34
18	NT	NT	NT		
19	7.32	0.93	115	-0.54	-0.87
20	7.8	1.2	96	-0.25	-0.32
21	8.0	2.0	91	-0.13	-0.10
22	8.58	2.1	98	0.23	0.17
23	NT	NT	NT		
24	NT	NT	NT		
25	3.85	0.17	84.6	-2.66	-9.24
26	9	3	105	0.48	0.26
27	8.009	0.673	57.7	-0.12	-0.25
28	7.8	2.4	90	-0.25	-0.17
29	7.88	2.364	66	-0.20	-0.14
30	16.47	NR	49.9	5.03	18.77
32	NT	NT	NT		
33	12.2	3.66	99.8	2.43	1.08
34	6.98	1.745	20	-0.75	-0.68
35	6.61	1.7	NR	-0.97	-0.91

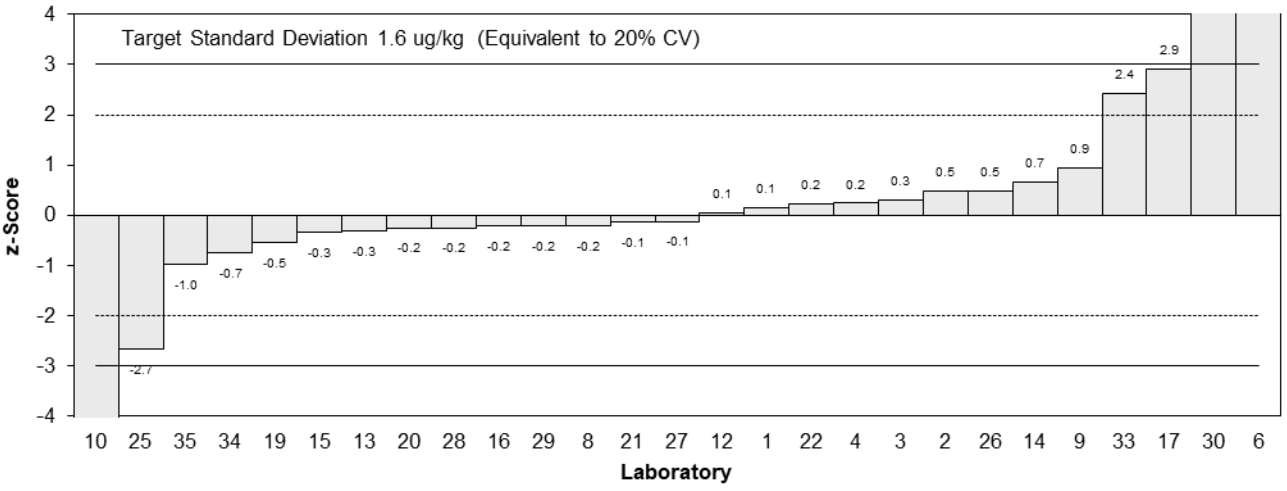
Statistics*

Assigned Value**	8.21	0.44
Spike	10.1	0.5
Robust Average	8.42	0.61
Median	8.15	0.31
Mean	12.9	
N	26	
Max.	120	
Min.	3.85	

Robust SD	1.3	
Robust CV	15%	

*Laboratory 10 excluded from statistical calculation.
**Robust Average excluding Laboratories 6, 17, 25 and 30.


Kernel Density
Density
Result
Results: S2 - PFOSA
Assigned Value = 8.21 ± 0.44 ug/kg
Results (ug/kg)
Laboratory
10 25 35 34 19 15 13 20 28 16 29 8 21 27 12 1 22 4 3 2 26 14 9 33 17 30 6 11 18 23 24 32 5 7 Md R.A. S.V.


z-Scores: S2 - PFOSA
Target Standard Deviation 1.6 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 35 34 19 15 13 20 28 16 29 8 21 27 12 1 22 4 3 2 26 14 9 33 17 30 6

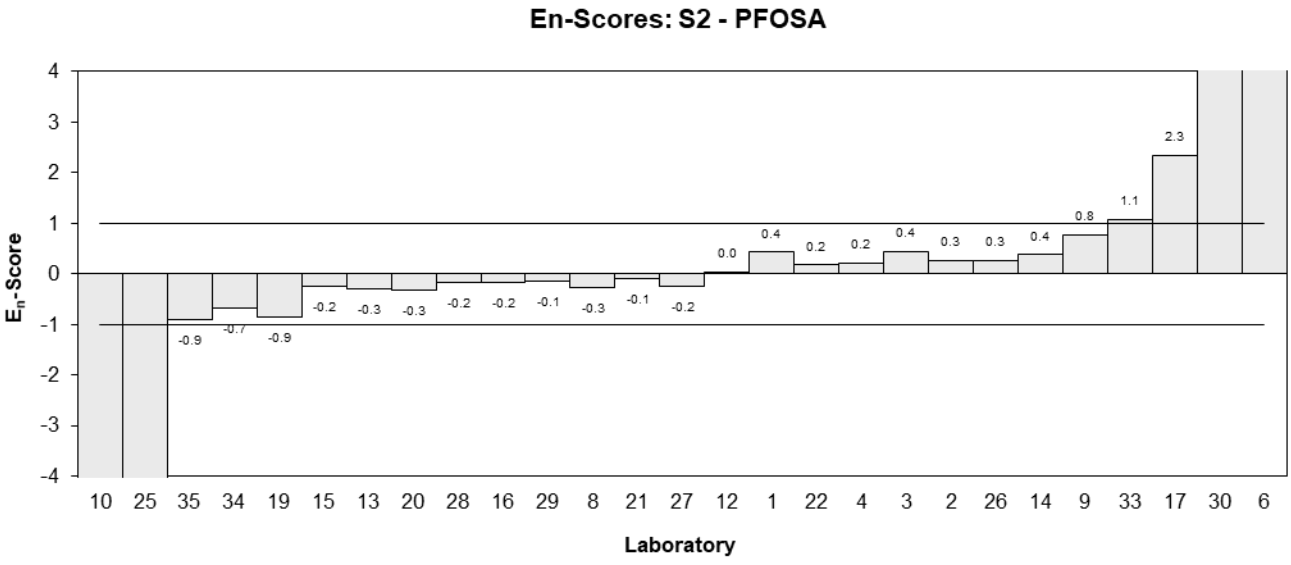

En-Scores: S2 - PFOSA
En-Score
Laboratory
10 25 35 34 19 15 13 20 28 16 29 8 21 27 12 1 22 4 3 2 26 14 9 33 17 30 6

Figure 55

Table 59

Sample Details

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

Participant Results

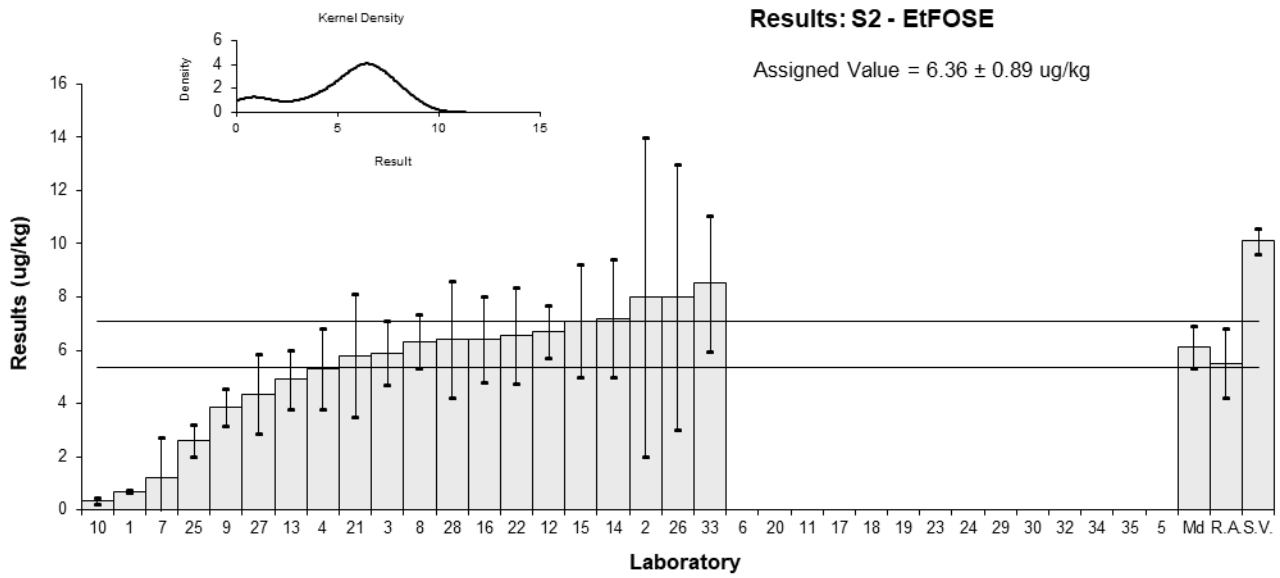
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.69	0.05	NR	-4.46	-6.36
2	8	6	100	1.29	0.27
3	5.9	1.2	99	-0.36	-0.31
4	5.3	1.5	99	-0.83	-0.61
5	NT	NT	NT		
6	< 0.05	NR	NR		
7	1.19	1.53	NR	-4.06	-2.92
8	6.33	1.01	NR	-0.02	-0.02
9	3.87	0.7	44	-1.96	-2.2
10	0.35	0.12	144	-4.72	-6.69
11	NT	NT	NT		
12	6.7	1.0	71	0.27	0.25
13	4.9	1.1	NR	-1.15	-1.03
14	7.2	2.2	103	0.66	0.35
15	7.11	2.133	69	0.59	0.32
16	6.43	1.61	101	0.06	0.04
17	NT	NT	NT		
18	NT	NT	NT		
19	NT	NT	NT		
20	<5	NR	NR		
21	5.8	2.3	93	-0.44	-0.23
22	6.54	1.8	62	0.14	0.09
23	NT	NT	NT		
24	NT	NT	NT		
25	2.61	0.60	92.8	-2.95	-3.49
26	8	5	99	1.29	0.32
27	4.362	1.491	34.6	-1.57	-1.15
28	6.4	2.2	85	0.03	0.02
29	NT	NT	NT		
30	NT	NT	NT		
32	NT	NT	NT		
33	8.51	2.55	86.6	1.69	0.80
34	NT	NT	NT		
35	NT	NT	NT		

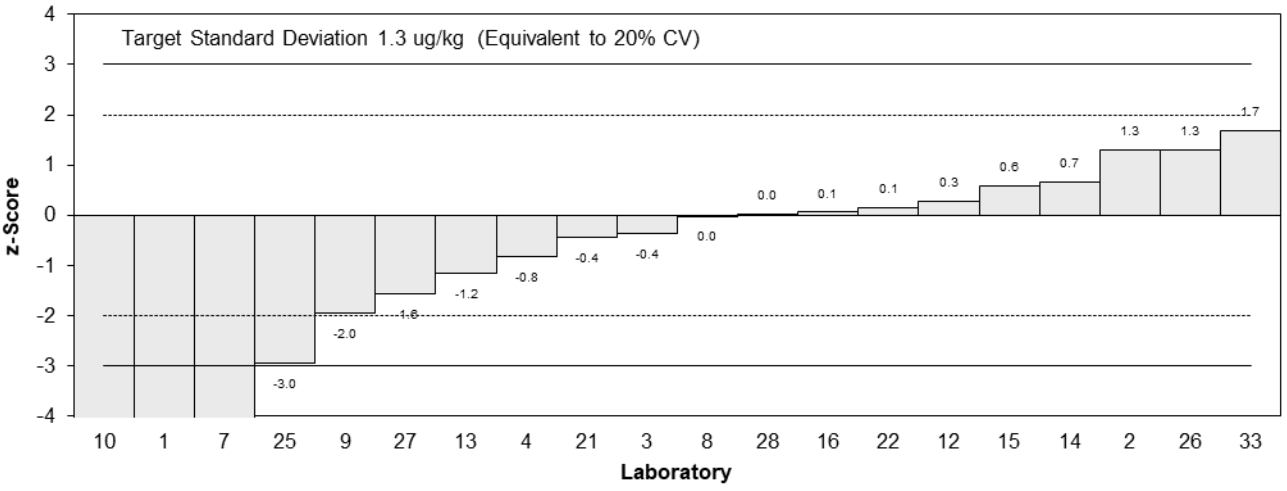
Statistics*

Assigned Value**	6.36	0.89
Spike	10.1	0.5
Robust Average	6.0	1.0
Median	6.37	0.70
Mean	5.84	
N	18	
Max.	8.51	
Min.	1.19	

Robust SD	1.8	
Robust CV	29%	

*Laboratories 1 and 10 excluded from statistical calculation.
**Robust Average excluding Laboratories 7 and 25


Results: S2 - EtFOSE
Assigned Value = 6.36 ± 0.89 ug/kg
Kernel Density
Density
Result
Results (ug/kg)
Laboratory
10 1 7 25 9 27 13 4 21 3 8 28 16 22 12 15 14 2 26 33 6 20 11 17 18 19 23 24 29 30 32 34 35 5 Md R.A.S.V.


z-Scores: S2 - EtFOSE
Target Standard Deviation 1.3 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 1 7 25 9 27 13 4 21 3 8 28 16 22 12 15 14 2 26 33

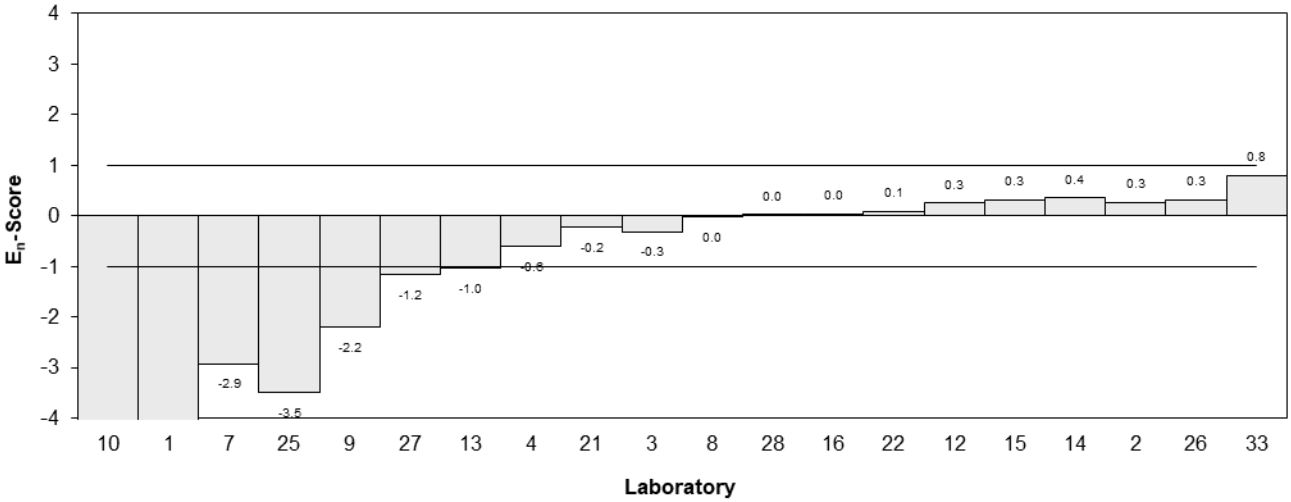

En-Scores: S2 - EtFOSE
En-Score
Laboratory
10 1 7 25 9 27 13 4 21 3 8 28 16 22 12 15 14 2 26 33

Figure 56

Table 60

Sample Details

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

Participant Results

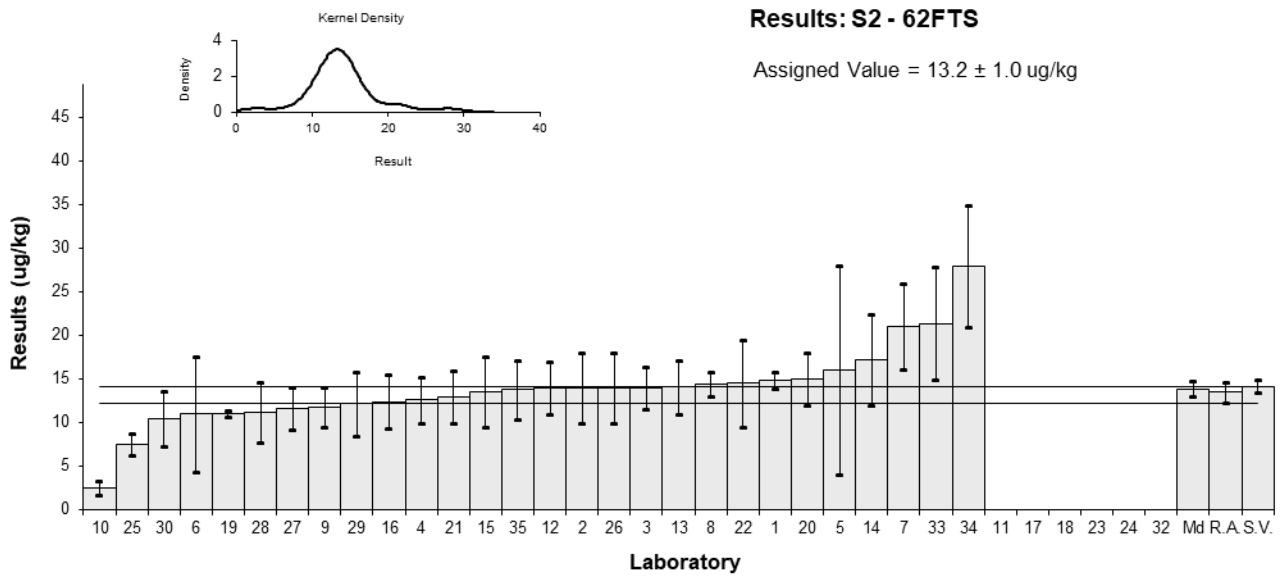
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	14.91	0.96	NR	0.65	1.23
2	14	4	113	0.30	0.19
3	14	2.4	98	0.30	0.31
4	12.6	2.7	87	-0.23	-0.21
5	16	12	86	1.06	0.23
6	11	6.6	NR	-0.83	-0.33
7	21.08	4.95	NR	2.98	1.56
8	14.4	1.4	NR	0.45	0.70
9	11.8	2.3	87	-0.53	-0.56
10	2.48	0.79	93	-4.06	-8.41
11	NT	NT	NT		
12	14	3	150	0.30	0.25
13	14.1	3.1	NR	0.34	0.28
14	17.2	5.2	52	1.52	0.76
15	13.5	4.05	82	0.11	0.07
16	12.42	3.1	101	-0.30	-0.24
17	NT	NT	NT		
18	NT	NT	NT		
19	11.1	0.37	159	-0.80	-1.97
20	15	3	86	0.68	0.57
21	13.0	3.0	105	-0.08	-0.06
22	14.5	5.0	124	0.49	0.25
23	NT	NT	NT		
24	NT	NT	NT		
25	7.51	1.28	100.4	-2.16	-3.50
26	14	4	123	0.30	0.19
27	11.65	2.413	65.3	-0.59	-0.59
28	11.2	3.4	112	-0.76	-0.56
29	12.2	3.66	66	-0.38	-0.26
30	10.49	3.147	49.9	-1.03	-0.82
32	NT	NT	NT		
33	21.4	6.42	65.4	3.11	1.26
34	27.9	6.975	100	5.57	2.09
35	13.8	3.4	40	0.23	0.17

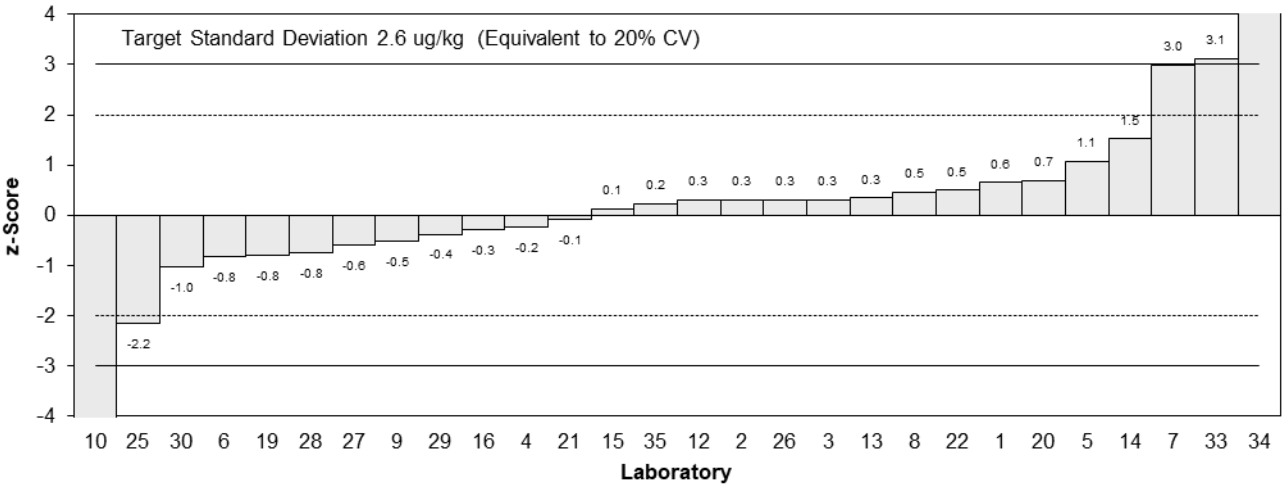
Statistics

Assigned Value*	13.2	1.0
Spike	14.2	0.7
Robust Average	13.5	1.2
Median	13.9	0.9
Mean	13.8	
N	28	
Max.	27.9	
Min.	2.48	

Robust SD	2.6	
Robust CV	19%	

*Robust Average excluding Laboratories 7, 10, 33 and 34.


Kernel Density
Density
Result
Results: S2 - 62FTS
Assigned Value = 13.2 ± 1.0 ug/kg
Results (ug/kg)
Laboratory
10 25 30 6 19 28 27 9 29 16 4 21 15 35 12 2 26 3 13 8 22 1 20 5 14 7 33 34 11 17 18 23 24 32 Md R.A. S.V.


z-Scores: S2 - 62FTS
Target Standard Deviation 2.6 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 30 6 19 28 27 9 29 16 4 21 15 35 12 2 26 3 13 8 22 1 20 5 14 7 33 34

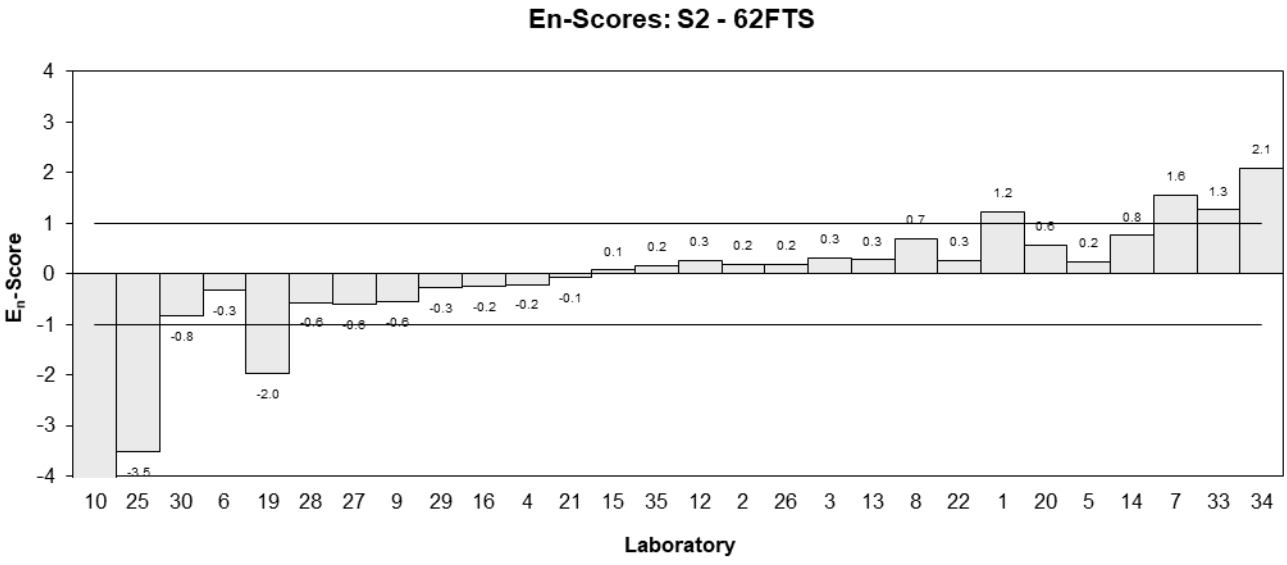

En-Scores: S2 - 62FTS
En-Score
Laboratory
10 25 30 6 19 28 27 9 29 16 4 21 15 35 12 2 26 3 13 8 22 1 20 5 14 7 33 34

Figure 57

Table 61

Sample Details

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

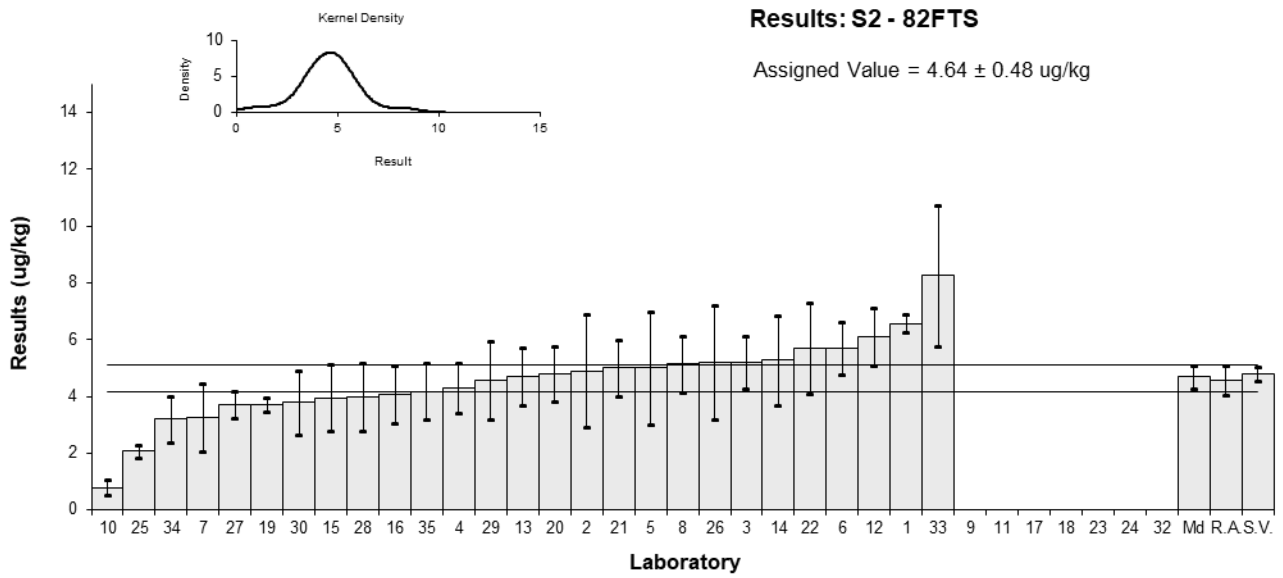
Participant Results

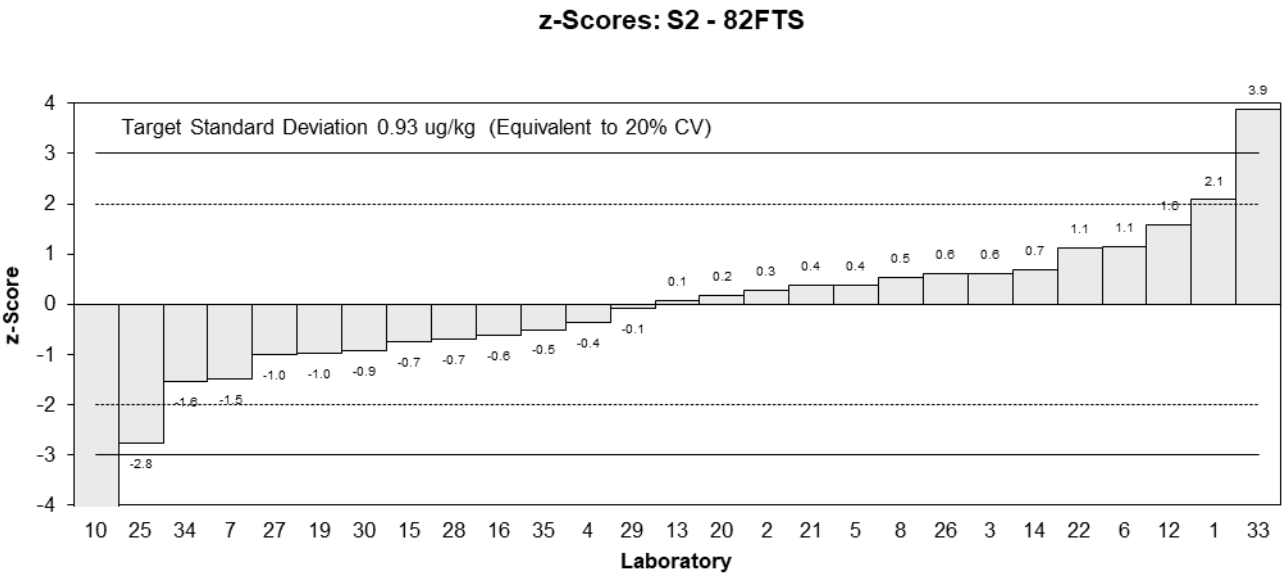
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	6.57	0.32	NR	2.08	3.35
2	4.9	2	99	0.28	0.13
3	5.2	0.94	95	0.60	0.53
4	4.3	0.9	95.7	-0.37	-0.33
5	5	2	70	0.39	0.18
6	5.7	0.94	NR	1.14	1.00
7	3.25	1.19	NR	-1.50	-1.08
8	5.14	0.98	NR	0.54	0.46
9	<37.8	NR	118		
10	0.79	0.26	117	-4.15	-7.05
11	NT	NT	NT		
12	6.1	1.0	116	1.57	1.32
13	4.7	1.0	NR	0.06	0.05
14	5.27	1.6	85	0.68	0.38
15	3.95	1.185	81	-0.74	-0.54
16	4.07	1.02	101	-0.61	-0.51
17	NT	NT	NT		
18	NT	NT	NT		
19	3.73	0.25	137	-0.98	-1.68
20	4.8	0.96	81	0.17	0.15
21	5.0	1.0	105	0.39	0.32
22	5.69	1.6	87	1.13	0.63
23	NT	NT	NT		
24	NT	NT	NT		
25	2.08	0.23	NR	-2.76	-4.81
26	5.2	2	98	0.60	0.27
27	3.711	0.467	50.5	-1.00	-1.39
28	4.0	1.2	98	-0.69	-0.50
29	4.57	1.371	50	-0.08	-0.05
30	3.78	1.134	49.9	-0.93	-0.70
32	NT	NT	NT		
33	8.25	2.47	58.8	3.89	1.43
34	3.20	0.8	119	-1.55	-1.54
35	4.17	1.0	40	-0.51	-0.42

Statistics

Assigned Value*	4.64	0.48	**Robust SD**	1.1	
Spike	4.79	0.24	**Robust CV**	24%	
Robust Average	4.58	0.53			
Median	4.70	0.41			
Mean	4.56				
N	27				
Max.	8.25				
Min.	0.79				

*Robust Average excluding Laboratories 10, 25 and 33.


Kernel Density
Density
Result
Results: S2 - 82FTS
Assigned Value = 4.64 ± 0.48 ug/kg
Results (ug/kg)
Laboratory
10 25 34 7 27 19 30 15 28 16 35 4 29 13 20 2 21 5 8 26 3 14 22 6 12 1 33 9 11 17 18 23 24 32 Md R.A.S.V.


z-Scores: S2 - 82FTS
Target Standard Deviation 0.93 ug/kg (Equivalent to 20% CV)
z-Score
Laboratory
10 25 34 7 27 19 30 15 28 16 35 4 29 13 20 2 21 5 8 26 3 14 22 6 12 1 33

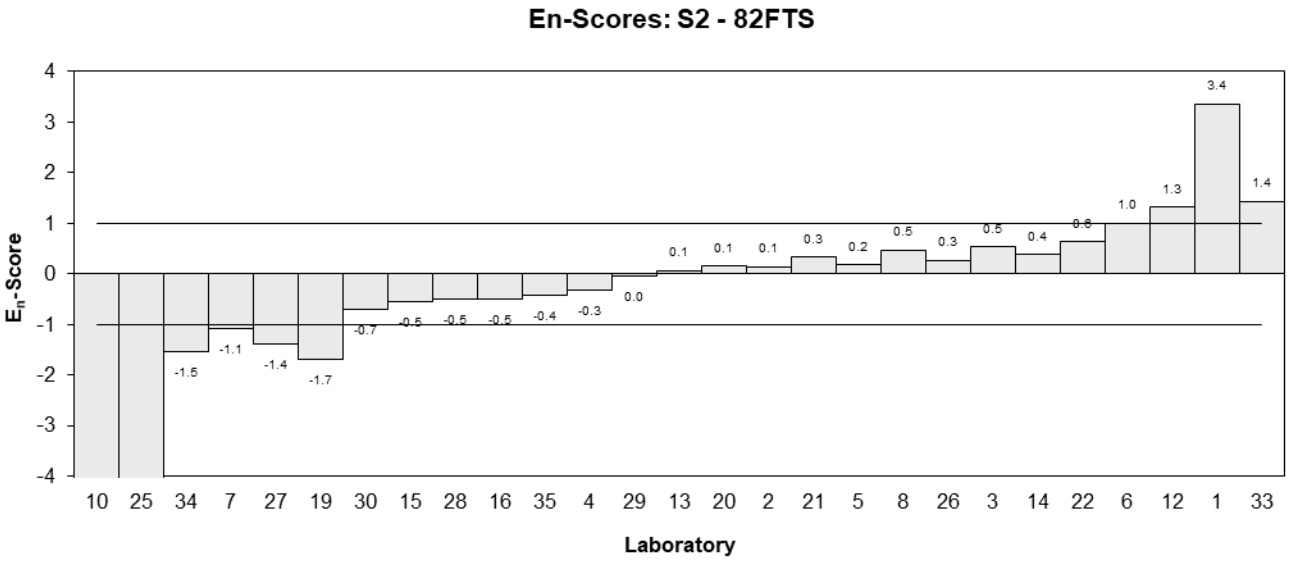

En-Scores: S2 - 82FTS
En-Score
Laboratory
10 25 34 7 27 19 30 15 28 16 35 4 29 13 20 2 21 5 8 26 3 14 22 6 12 1 33

Figure 58

Table 62

Sample Details

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

Participant Results

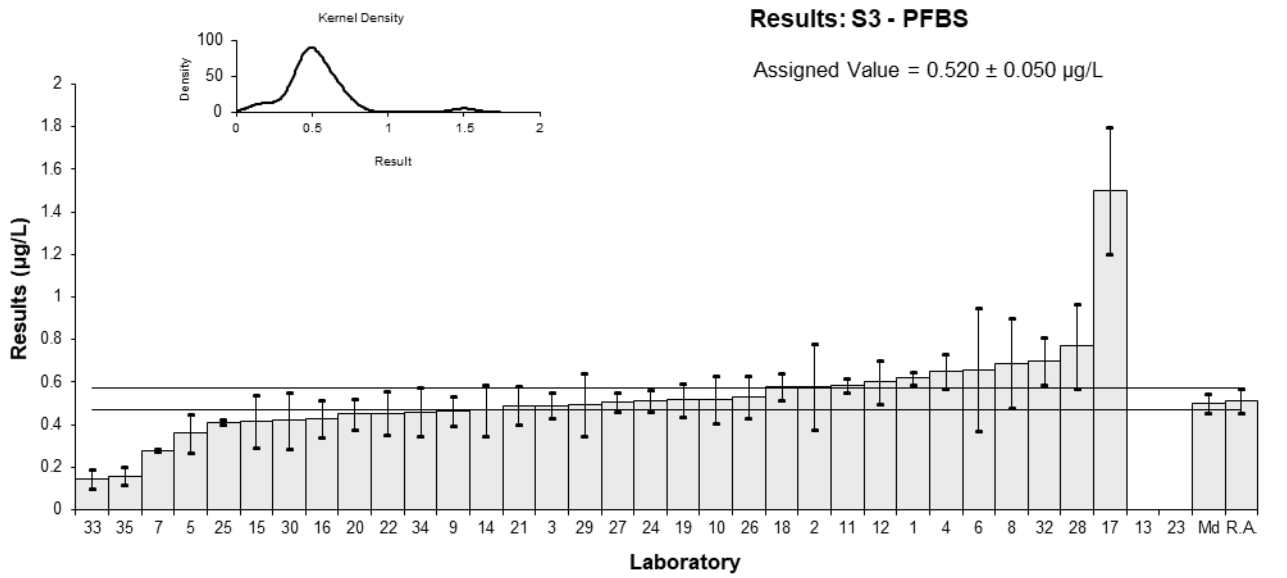
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.62	0.03	NR	0.96	1.71
2	0.58	0.2	88	0.58	0.29
3	0.49	0.059	97	-0.29	-0.39
4	0.65	0.08	107	1.25	1.38
5	0.36	0.09	54	-1.54	-1.55
6	0.66	0.29	NR	1.35	0.48
7	0.280	0.008	NR	-2.31	-4.74
8	0.69	0.21	NR	1.63	0.79
9	0.463	0.069	91	-0.55	-0.67
10	0.52	0.11	64	0.00	0.00
11	0.584	0.0321	43	0.62	1.08
12	0.60	0.10	147	0.77	0.72
13	NT	NT	NT		
14	0.47	0.12	90	-0.48	-0.38
15	0.415	0.125	80	-1.01	-0.78
16	0.43	0.086	80	-0.87	-0.90
17	1.5	0.3	NR	9.42	3.22
18	0.58	0.065	NR	0.58	0.73
19	0.517	0.079	60	-0.03	-0.03
20	0.45	0.07	101	-0.67	-0.81
21	0.49	0.09	81	-0.29	-0.29
22	0.455	0.1	66	-0.62	-0.58
23	NT	NT	NT		
24	0.51	0.051	NT	-0.10	-0.14
25	0.413	0.012	99.6	-1.03	-2.08
26	0.53	0.1	91	0.10	0.09
27	0.5065	0.0445	97.2	-0.13	-0.20
28	0.77	0.2	111	2.40	1.21
29	0.493	0.1479	86	-0.26	-0.17
30	0.42	0.1302	106.2	-0.96	-0.72
32	0.7	0.11	93	1.73	1.49
33	0.145	0.0435	315	-3.61	-5.66
34	0.461	0.11525	54	-0.57	-0.47
35	0.16	0.040	30	-3.46	-5.62

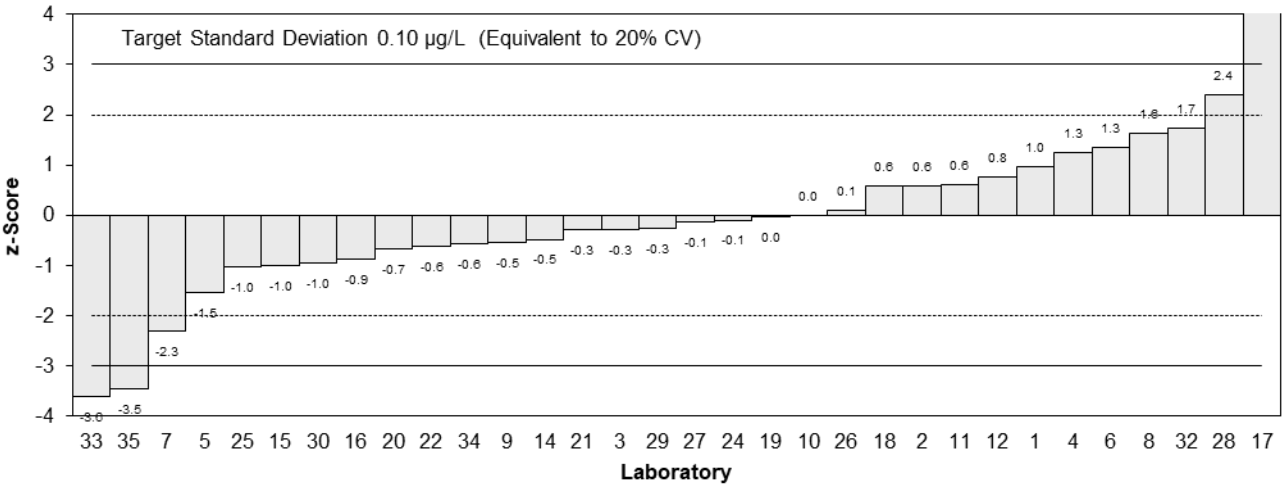
Statistics

Assigned Value*	0.520	0.050
Spike	Not Spiked	
Robust Average	0.514	0.057
Median	0.500	0.043
Mean	0.529	
N	32	
Max.	1.5	
Min.	0.145	

Robust SD	0.13	
Robust CV	25%	

*Robust Average excluding Laboratories 17, 33 and 35.


Kernel Density
Density
Result
Results: S3 - PFBS
Assigned Value = 0.520 ± 0.050 µg/L
Results (µg/L)
Laboratory
33 35 7 5 25 15 30 16 20 22 34 9 14 21 3 29 27 24 19 10 26 18 2 11 12 1 4 6 8 32 28 17 13 23 Md R.A.


z-Scores: S3 - PFBS
Target Standard Deviation 0.10 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
33 35 7 5 25 15 30 16 20 22 34 9 14 21 3 29 27 24 19 10 26 18 2 11 12 1 4 6 8 32 28 17

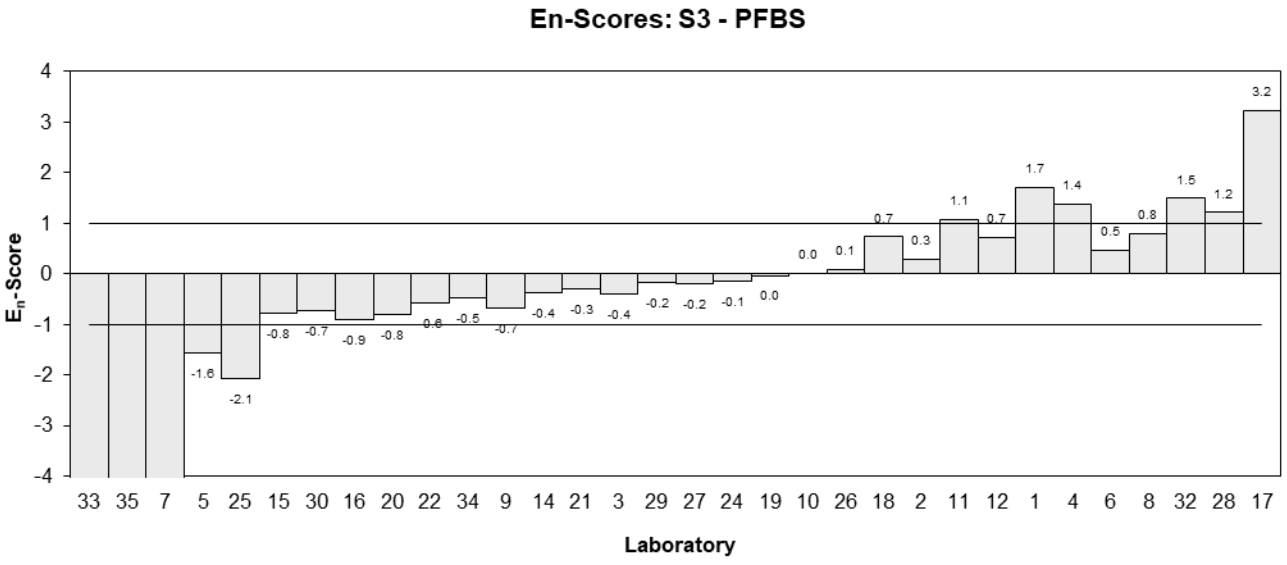

En-Scores: S3 - PFBS
En-Score
Laboratory
33 35 7 5 25 15 30 16 20 22 34 9 14 21 3 29 27 24 19 10 26 18 2 11 12 1 4 6 8 32 28 17

Figure 59

Table 63

Sample Details

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

Participant Results

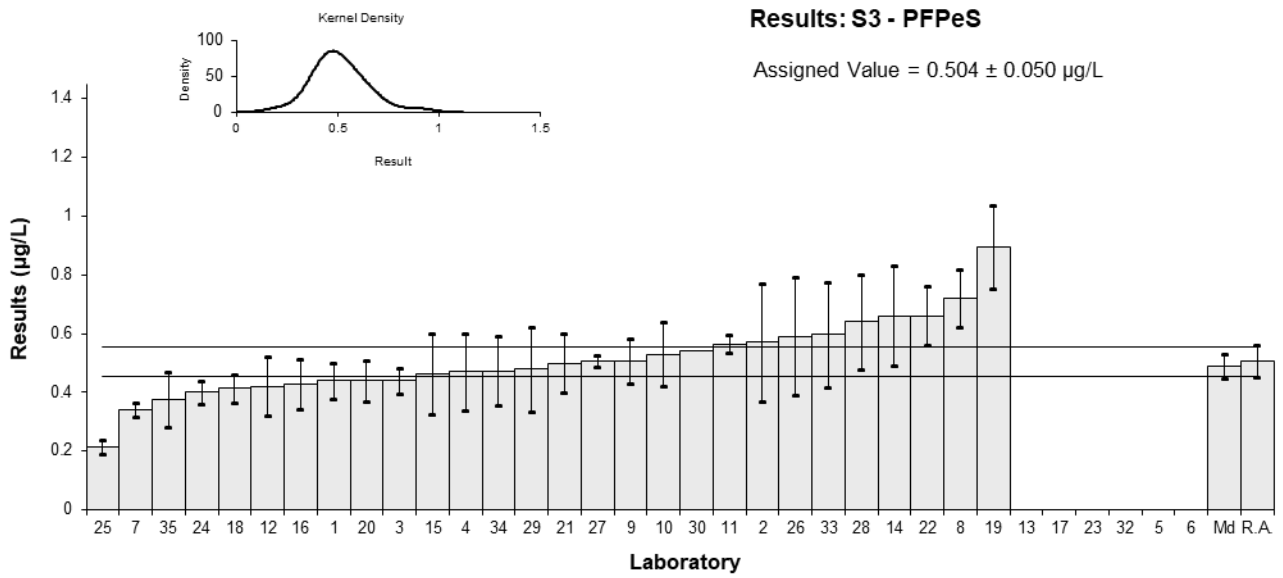
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.44	0.06	NR	-0.63	-0.82
2	0.57	0.2	88	0.65	0.32
3	0.44	0.044	105	-0.63	-0.96
4	0.47	0.13	81	-0.34	-0.24
5	NT	NT	NT		
6	NT	NT	NT		
7	0.343	0.024	NR	-1.60	-2.90
8	0.72	0.1	NR	2.14	1.93
9	0.508	0.076	91	0.04	0.04
10	0.53	0.11	NR	0.26	0.22
11	0.565	0.0311	NR	0.61	1.04
12	0.42	0.10	130	-0.83	-0.75
13	NT	NT	NT		
14	0.66	0.17	NR	1.55	0.88
15	0.463	0.139	82	-0.41	-0.28
16	0.428	0.086	75	-0.75	-0.76
17	NT	NT	NT		
18	0.414	0.048	NR	-0.89	-1.30
19	0.894	0.141	60	3.87	2.61
20	0.44	0.07	101	-0.63	-0.74
21	0.50	0.10	86	-0.04	-0.04
22	0.660	0.1	NR	1.55	1.40
23	NT	NT	NT		
24	0.40	0.040	NT	-1.03	-1.62
25	0.216	0.024	NR	-2.86	-5.19
26	0.59	0.2	89	0.85	0.42
27	0.506	0.0212	92.8	0.02	0.04
28	0.64	0.16	111	1.35	0.81
29	0.48	0.144	84	-0.24	-0.16
30	0.541	NR	70	0.37	0.74
32	NT	NT	NT		
33	0.596	0.1788	315	0.91	0.50
34	0.473	0.11825	54	-0.31	-0.24
35	0.375	0.094	30	-1.28	-1.21

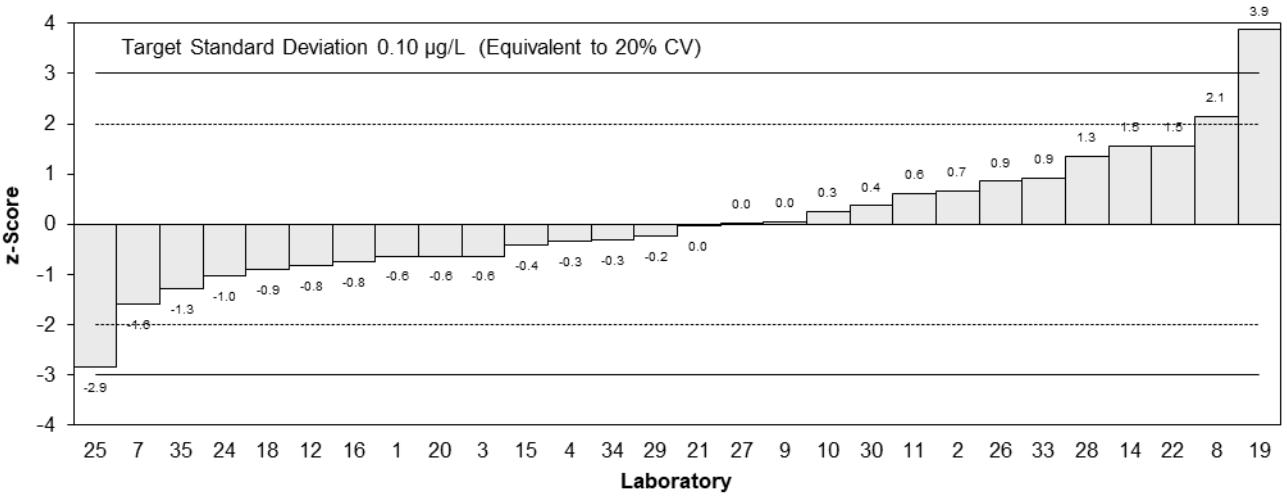
Statistics

Assigned Value*	0.504	0.050
Spike	Not Spiked	
Robust Average	0.505	0.054
Median	0.490	0.042
Mean	0.510	
N	28	
Max.	0.894	
Min.	0.216	

Robust SD	0.11	
Robust CV	23%	

*Robust Average excluding Laboratories 19 and 25.


Kernel Density
Density
Result
Results: S3 - PFPeS
Assigned Value = 0.504 ± 0.050 µg/L
Results (µg/L)
Laboratory
25 7 35 24 18 12 16 1 20 3 15 4 34 29 21 27 9 10 30 11 2 26 33 28 14 22 8 19 13 17 23 32 5 6 Md R.A.


z-Scores: S3 - PFPeS
Target Standard Deviation 0.10 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 7 35 24 18 12 16 1 20 3 15 4 34 29 21 27 9 10 30 11 2 26 33 28 14 22 8 19

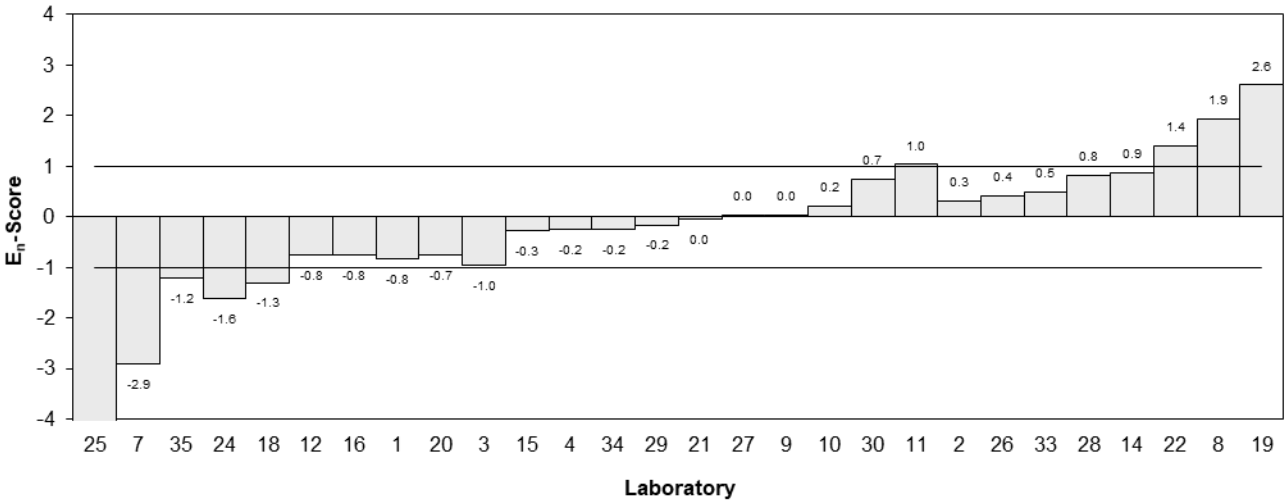

En-Scores: S3 - PFPeS
En-Score
Laboratory
25 7 35 24 18 12 16 1 20 3 15 4 34 29 21 27 9 10 30 11 2 26 33 28 14 22 8 19

Figure 60

Table 64

Sample Details

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

Participant Results

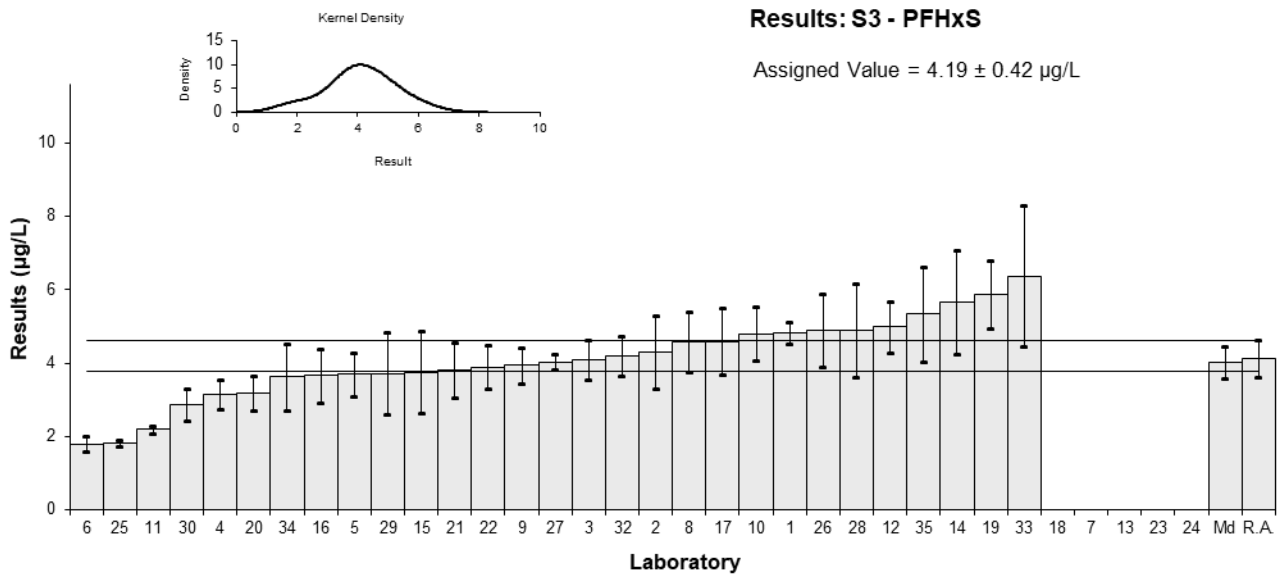
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	4.82	0.30	NR	0.75	1.22
2	4.3	1	82	0.13	0.10
3	4.1	0.53	104	-0.11	-0.13
4	3.16	0.41	81	-1.23	-1.75
5	3.7	0.6	66	-0.58	-0.67
6	1.8	0.21	NR	-2.85	-5.09
7	NR	NR	NR		
8	4.59	0.83	NR	0.48	0.43
9	3.95	0.49	97	-0.29	-0.37
10	4.81	0.72	94	0.74	0.74
11	2.195	0.102	NR	-2.38	-4.62
12	5.0	0.7	130	0.97	0.99
13	NT	NT	NT		
14	5.67	1.42	73	1.77	1.00
15	3.76	1.13	82	-0.51	-0.36
16	3.668	0.734	88	-0.62	-0.62
17	4.6	0.9	90.2	0.49	0.41
18	NR	NR	NR		
19	5.871	0.922	120	2.01	1.66
20	3.2	0.47	111	-1.18	-1.57
21	3.81	0.76	112	-0.45	-0.44
22	3.90	0.6	116	-0.35	-0.40
23	NT	NT	NT		
24	NT	NT	NT		
25	1.822	0.078	116.1	-2.83	-5.54
26	4.9	1	89	0.85	0.65
27	4.033	0.2036	92.8	-0.19	-0.34
28	4.9	1.29	90	0.85	0.52
29	3.72	1.116	96	-0.56	-0.39
30	2.87	0.45059	106.2	-1.58	-2.14
32	4.2	0.54	100	0.01	0.01
33	6.38	1.914	285	2.61	1.12
34	3.63	0.9075	73	-0.67	-0.56
35	5.34	1.3	30	1.37	0.84

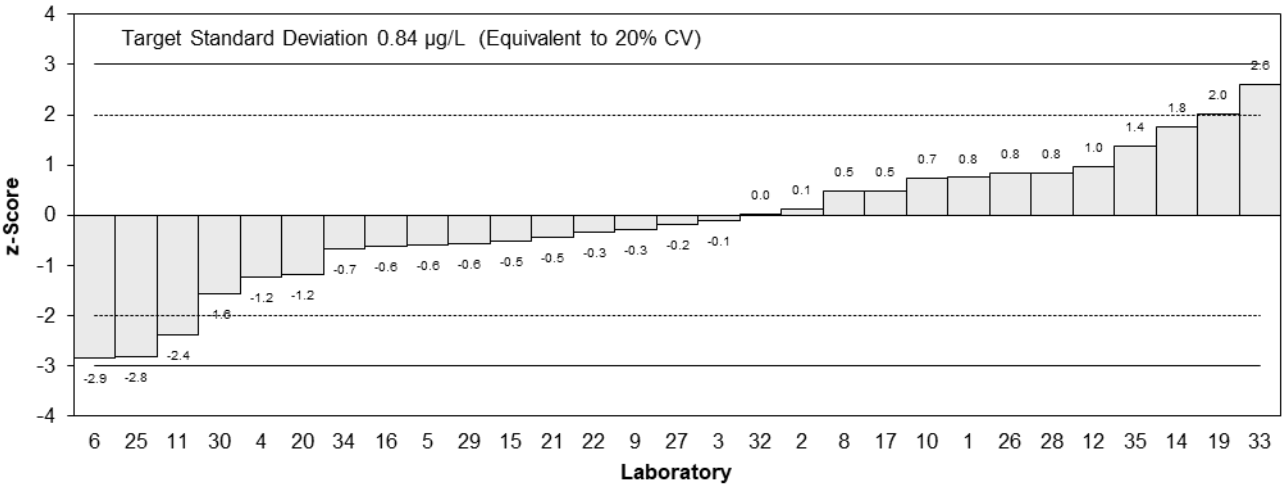
Statistics

Assigned Value*	4.19	0.42
Spike	Not Spiked	
Robust Average	4.13	0.49
Median	4.03	0.44
Mean	4.09	
N	29	
Max.	6.38	
Min.	1.8	

Robust SD	1.1	
Robust CV	26%	

*Robust Average excluding Laboratories 6, 25 and 33.


Kernel Density
Density
Result
Results: S3 - PFHxS
Assigned Value = 4.19 ± 0.42 µg/L
Results (µg/L)
Laboratory
6 25 11 30 4 20 34 16 5 29 15 21 22 9 27 3 32 2 8 17 10 1 26 28 12 35 14 19 33 18 7 13 23 24 Md R.A.


z-Scores: S3 - PFHxS
Target Standard Deviation 0.84 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
6 25 11 30 4 20 34 16 5 29 15 21 22 9 27 3 32 2 8 17 10 1 26 28 12 35 14 19 33

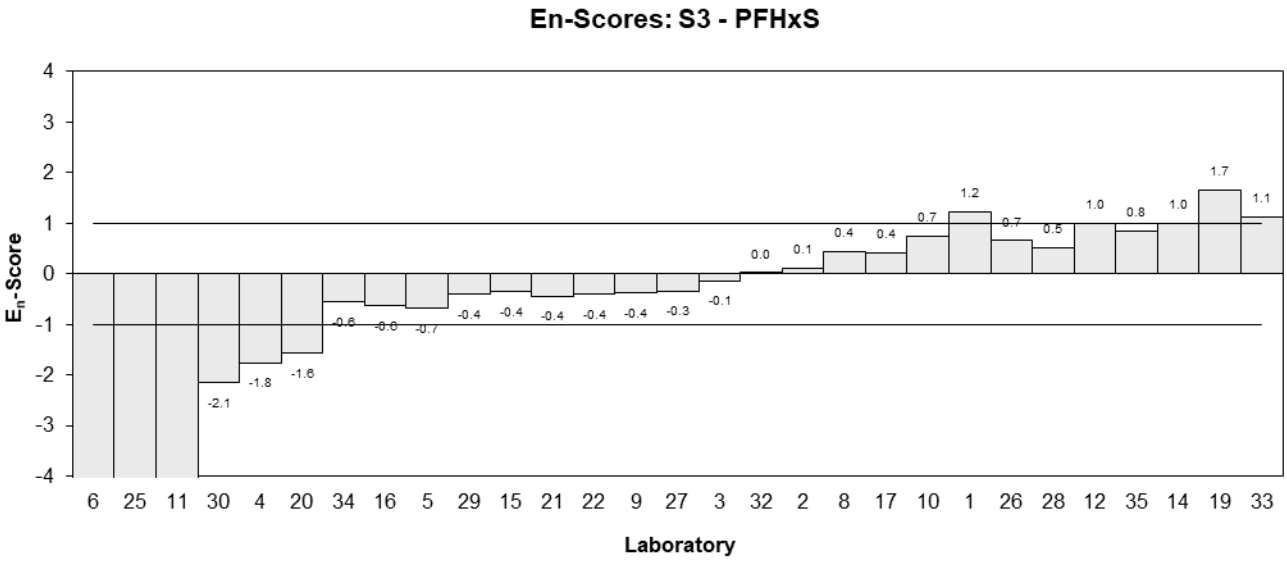

En-Scores: S3 - PFHxS
En-Score
Laboratory
6 25 11 30 4 20 34 16 5 29 15 21 22 9 27 3 32 2 8 17 10 1 26 28 12 35 14 19 33

Figure 61

Table 65

Sample Details

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

Participant Results

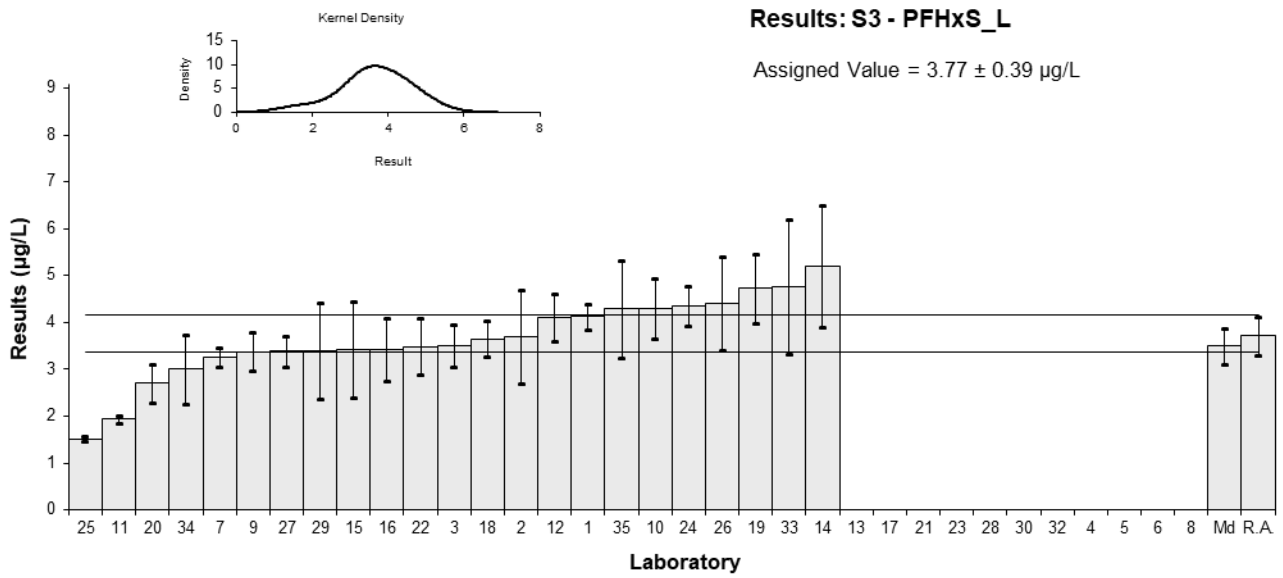
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	4.12	0.27	73	0.46	0.74
2	3.7	1	82	-0.09	-0.07
3	3.5	0.45	104	-0.36	-0.45
4	NT	NT	NT		
5	NT	NT	NT		
6	NT	NT	NT		
7	3.260	0.209	NR	-0.68	-1.15
8	NT	NT	NT		
9	3.38	0.42	97	-0.52	-0.68
10	4.30	0.65	NR	0.70	0.70
11	1.941	0.083	65	-2.43	-4.59
12	4.1	0.5	130	0.44	0.52
13	NT	NT	NT		
14	5.19	1.30	73	1.88	1.05
15	3.42	1.03	82	-0.46	-0.32
16	3.42	0.68	88	-0.46	-0.45
17	NT	NT	NT		
18	3.653	0.371	NR	-0.16	-0.22
19	4.730	0.743	120	1.27	1.14
20	2.7	0.4	111	-1.42	-1.92
21	NT	NT	NT		
22	3.48761	0.6	116	-0.37	-0.39
23	NT	NT	NT		
24	4.35	0.435	NT	0.77	0.99
25	1.519	0.065	116.1	-2.99	-5.69
26	4.4	1	89	0.84	0.59
27	3.3825	0.3288	92.8	-0.51	-0.76
28	NT	NT	NT		
29	3.39	1.017	96	-0.50	-0.35
30	NT	NT	NT		
32	NT	NT	NT		
33	4.76	1.428	285	1.31	0.67
34	3.00	0.75	73	-1.02	-0.91
35	4.29	1.04	30	0.69	0.47

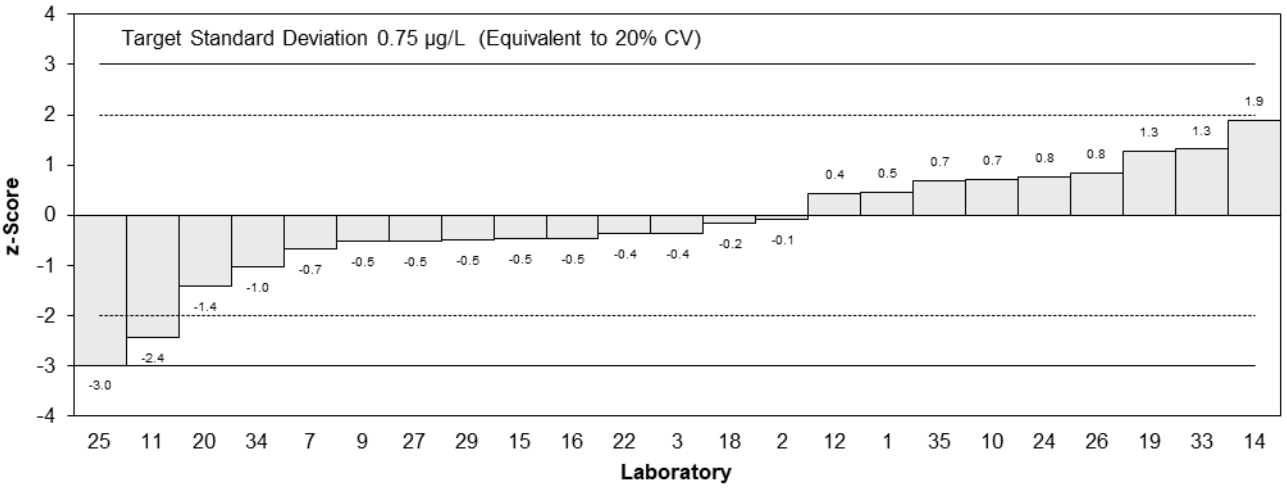
Statistics

Assigned Value*	3.77	0.39
Spike	Not Spiked	
Robust Average	3.71	0.41
Median	3.50	0.38
Mean	3.65	
N	23	
Max.	5.19	
Min.	1.519	

Robust SD	0.78	
Robust CV	21%	

*Robust Average excluding Laboratory 25.


Kernel Density
Density
Result
Results: S3 - PFHxS_L
Assigned Value = 3.77 ± 0.39 µg/L
Results (µg/L)
25 11 20 34 7 9 27 29 15 16 22 3 18 2 12 1 35 10 24 26 19 33 14 13 17 21 23 28 30 32 4 5 6 8 Md R.A.
Laboratory


z-Scores: S3 - PFHxS_L
Target Standard Deviation 0.75 µg/L (Equivalent to 20% CV)
z-Score
-3.0 -2.4 -1.4 -1.0 -0.7 -0.5 -0.5 -0.5 -0.5 -0.5 -0.4 -0.4 -0.2 -0.1 0.4 0.5 0.7 0.7 0.8 0.8 1.3 1.3 1.9
25 11 20 34 7 9 27 29 15 16 22 3 18 2 12 1 35 10 24 26 19 33 14
Laboratory

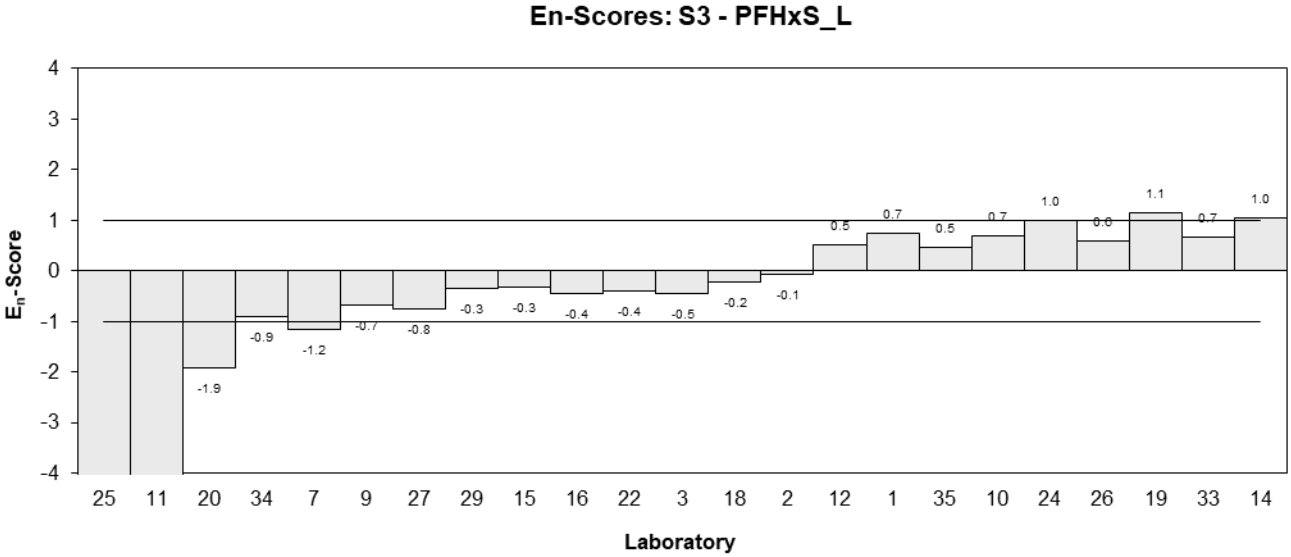

En-Scores: S3 - PFHxS_L
En-Score
-1.9 -0.9 -1.2 -0.7 -0.8 -0.3 -0.3 -0.4 -0.4 -0.5 -0.2 -0.1 0.5 0.7 0.5 0.7 1.0 0.6 1.1 0.7 1.0
25 11 20 34 7 9 27 29 15 16 22 3 18 2 12 1 35 10 24 26 19 33 14
Laboratory

Figure 62

Table 66

Sample Details

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

Participant Results

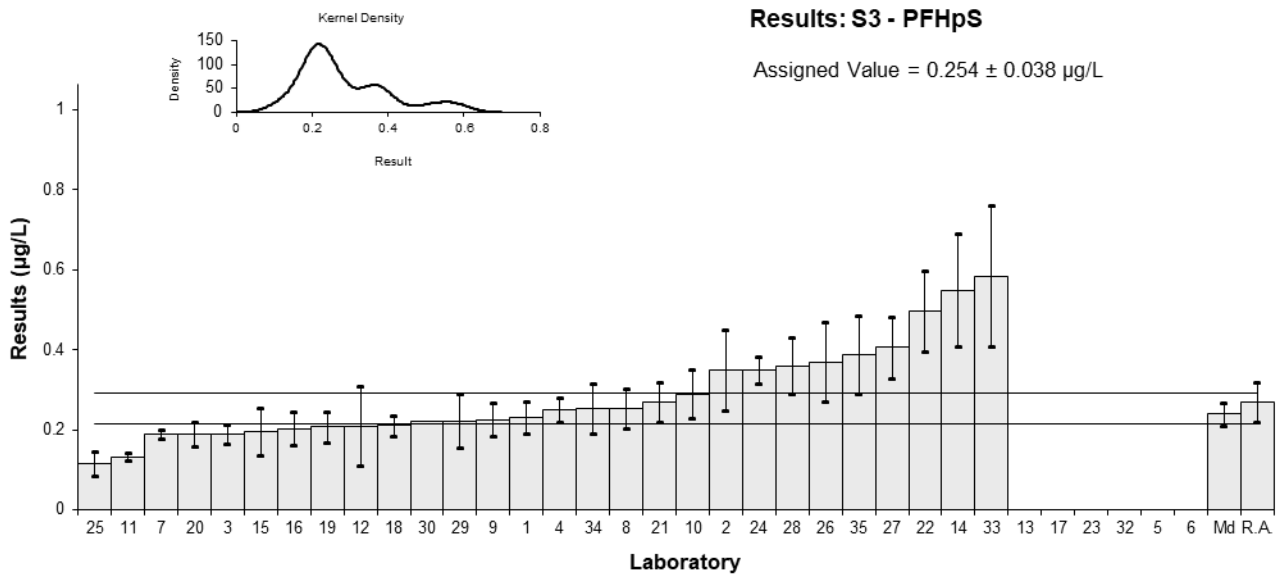
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.23	0.04	NR	-0.47	-0.43
2	0.35	0.1	82	1.89	0.90
3	0.19	0.025	104	-1.26	-1.41
4	0.25	0.03	104	-0.08	-0.08
5	NT	NT	NT		
6	NT	NT	NT		
7	0.189	0.012	NR	-1.28	-1.63
8	0.254	0.05	NR	0.00	0.00
9	0.226	0.042	97	-0.55	-0.49
10	0.29	0.06	NR	0.71	0.51
11	0.133	0.0101	NR	-2.38	-3.08
12	0.21	0.10	130	-0.87	-0.41
13	NT	NT	NT		
14	0.55	0.14	NR	5.83	2.04
15	0.197	0.0591	78	-1.12	-0.81
16	0.204	0.041	73	-0.98	-0.89
17	NT	NT	NT		
18	0.211	0.026	NR	-0.85	-0.93
19	0.208	0.039	120	-0.91	-0.84
20	0.19	0.03	95	-1.26	-1.32
21	0.27	0.05	86	0.31	0.25
22	0.497	0.1	NR	4.78	2.27
23	NT	NT	NT		
24	0.35	0.035	NT	1.89	1.86
25	0.117	0.03	NR	-2.70	-2.83
26	0.37	0.1	101	2.28	1.08
27	0.406	0.0766	83.1	2.99	1.78
28	0.36	0.07	96	2.09	1.33
29	0.223	0.0669	89	-0.61	-0.40
30	0.221	NR	70	-0.65	-0.87
32	NT	NT	NT		
33	0.585	0.1755	285	6.52	1.84
34	0.253	0.06325	54	-0.02	-0.01
35	0.388	0.097	30	2.64	1.29

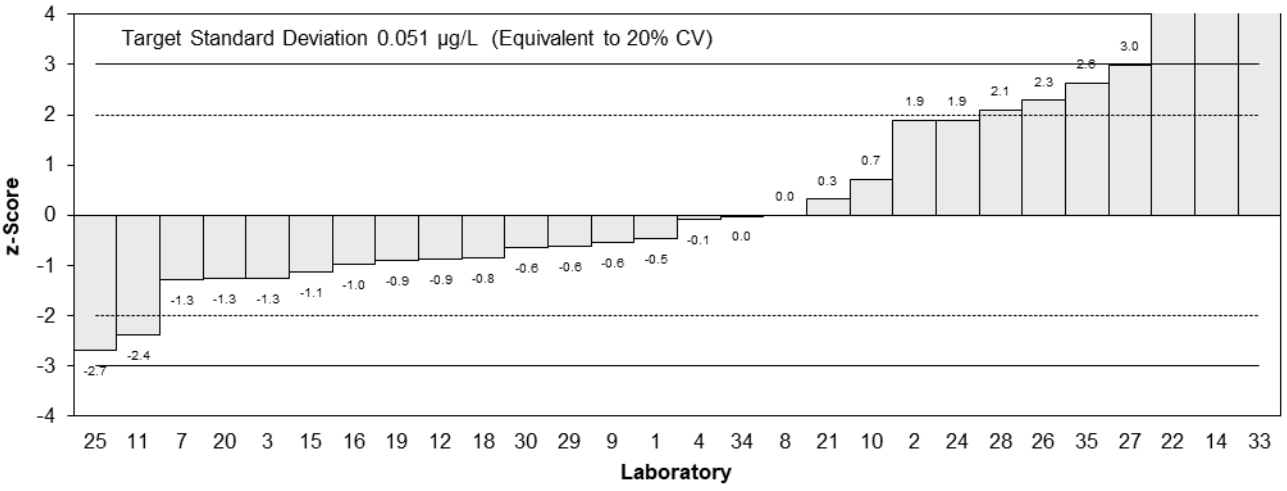
Statistics

Assigned Value*	0.254	0.038
Spike	Not Spiked	
Robust Average	0.270	0.049
Median	0.240	0.029
Mean	0.283	
N	28	
Max.	0.585	
Min.	0.117	

Robust SD	0.10	
Robust CV	39%	

*Robust Average excluding Laboratories 11, 14, 22, 25, 27 and 33.


Kernel Density
Density
Result
Results: S3 - PFHpS
Assigned Value = 0.254 ± 0.038 µg/L
Results (µg/L)
Laboratory
25 11 7 20 3 15 16 19 12 18 30 29 9 1 4 34 8 21 10 2 24 28 26 35 27 22 14 33 13 17 23 32 5 6 Md R.A.


z-Scores: S3 - PFHpS
Target Standard Deviation 0.051 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 11 7 20 3 15 16 19 12 18 30 29 9 1 4 34 8 21 10 2 24 28 26 35 27 22 14 33

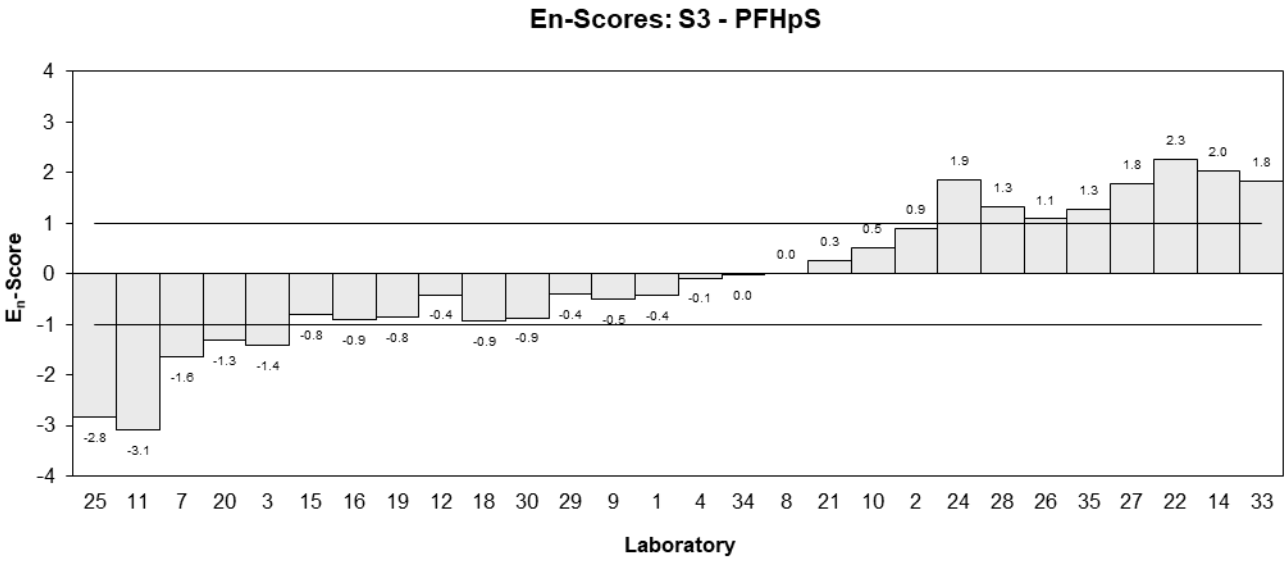

En-Scores: S3 - PFHpS
En-Score
Laboratory
25 11 7 20 3 15 16 19 12 18 30 29 9 1 4 34 8 21 10 2 24 28 26 35 27 22 14 33

Figure 63

Table 67

Sample Details

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

Participant Results

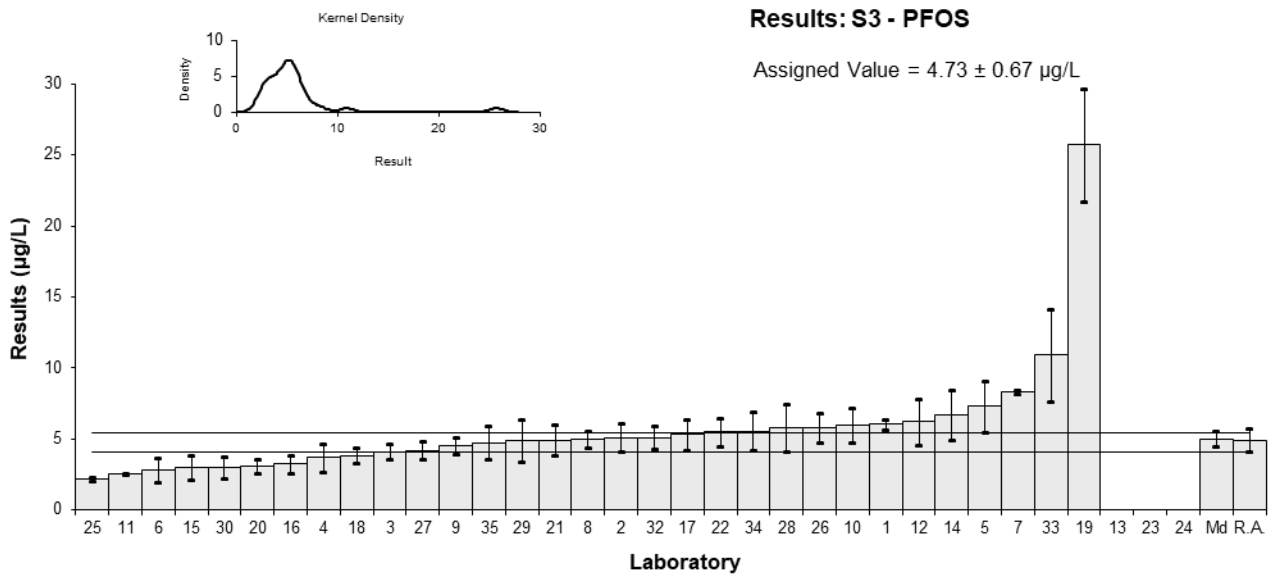
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	6.04	0.36	NR	1.38	1.72
2	5.1	1	98	0.39	0.31
3	4.1	0.54	103	-0.67	-0.73
4	3.68	1.01	104	-1.11	-0.87
5	7.3	1.8	59	2.72	1.34
6	2.8	0.83	NR	-2.04	-1.81
7	8.341	0.119	77.18	3.82	5.31
8	5.005	0.600	NR	0.29	0.31
9	4.53	0.63	105	-0.21	-0.22
10	5.99	1.2	98	1.33	0.92
11	2.564	0.0265	NR	-2.29	-3.23
12	6.2	1.6	102	1.55	0.85
13	NT	NT	NT		
14	6.71	1.74	84	2.09	1.06
15	2.99	0.897	78	-1.84	-1.55
16	3.245	0.649	95	-1.57	-1.59
17	5.3	1.1	59	0.60	0.44
18	3.852	0.51	NR	-0.93	-1.04
19	25.7	4.0	96	22.17	5.17
20	3.1	0.47	95	-1.72	-1.99
21	4.92	1.06	124	0.20	0.15
22	5.49	1.0	112	0.80	0.63
23	NT	NT	NT		
24	NT	NT	NT		
25	2.184	0.149	98	-2.69	-3.71
26	5.8	1	101	1.13	0.89
27	4.2105	0.6428	101.5	-0.55	-0.56
28	5.78	1.64	96	1.11	0.59
29	4.91	1.473	92	0.19	0.11
30	3.002	0.747498	138.4	-1.83	-1.72
32	5.1	0.82	101	0.39	0.35
33	10.9	3.27	324	6.52	1.85
34	5.56	1.39	55	0.88	0.54
35	4.74	1.2	30	0.01	0.01

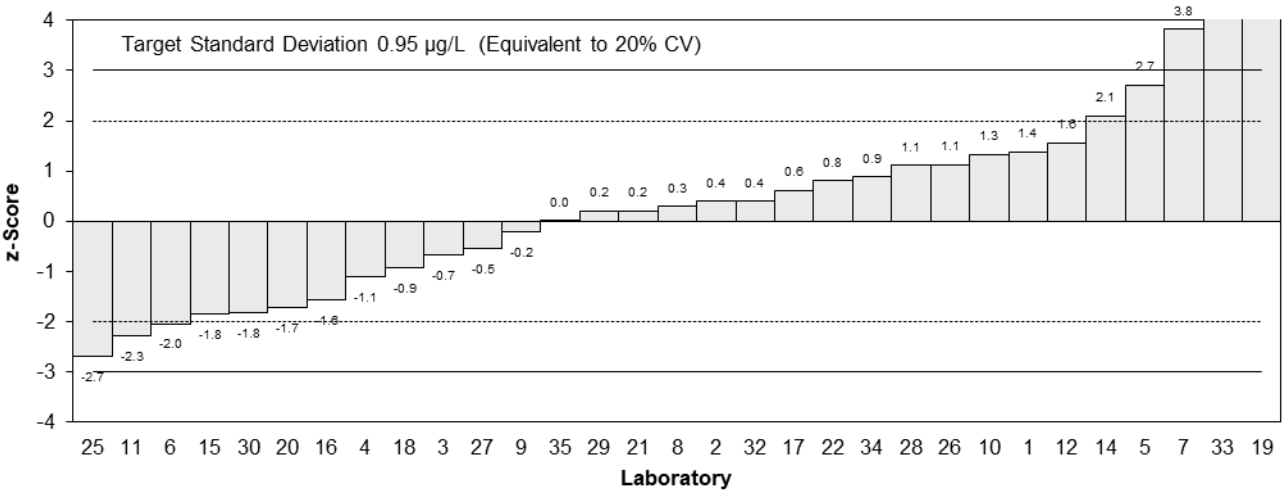
Statistics

Assigned Value*	4.73	0.67
Spike	Not Spiked	
Robust Average	4.93	0.78
Median	5.01	0.56
Mean	5.65	
N	31	
Max.	25.7	
Min.	2.184	

Robust SD	1.7	
Robust CV	35%	

*Robust Average excluding Laboratories 7, 19, 25 and 33.


Kernel Density
Density
Result
Results: S3 - PFOS
Assigned Value = 4.73 ± 0.67 µg/L
Results (µg/L)
Laboratory
25 11 6 15 30 20 16 4 18 3 27 9 35 29 21 8 2 32 17 22 34 28 26 10 1 12 14 5 7 33 19 13 23 24 Md R.A.


z-Scores: S3 - PFOS
Target Standard Deviation 0.95 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 11 6 15 30 20 16 4 18 3 27 9 35 29 21 8 2 32 17 22 34 28 26 10 1 12 14 5 7 33 19

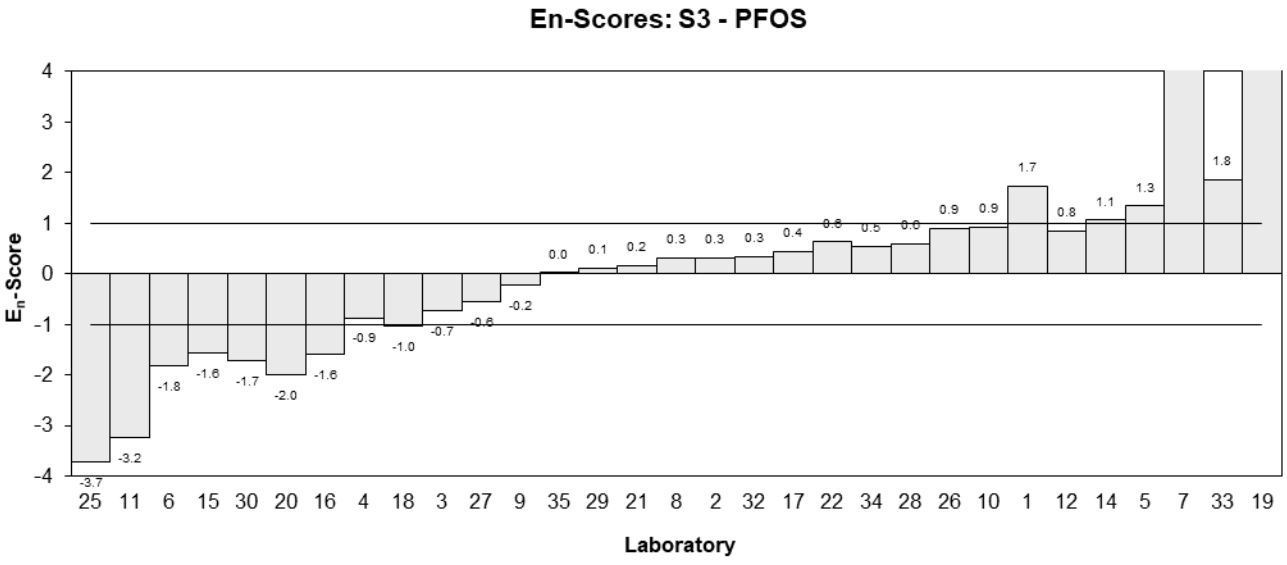

En-Scores: S3 - PFOS
En-Score
Laboratory
25 11 6 15 30 20 16 4 18 3 27 9 35 29 21 8 2 32 17 22 34 28 26 10 1 12 14 5 7 33 19

Figure 64

Table 68

Sample Details

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

Participant Results

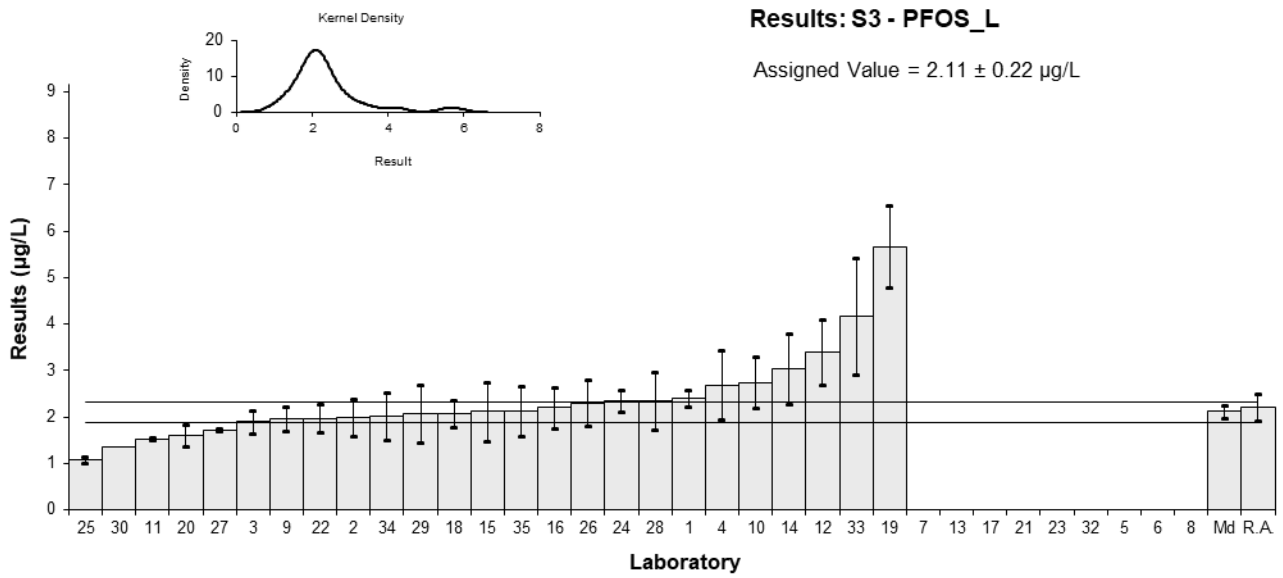
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	2.41	0.18	86	0.71	1.06
2	2.0	0.4	98	-0.26	-0.24
3	1.9	0.25	103	-0.50	-0.63
4	2.69	0.74	104	1.37	0.75
5	NT	NT	NT		
6	NT	NT	NT		
7	NR	NR	NR		
8	NT	NT	NT		
9	1.96	0.27	105	-0.36	-0.43
10	2.74	0.55	NR	1.49	1.06
11	1.535	0.0226	87	-1.36	-2.60
12	3.4	0.7	102	3.06	1.76
13	NT	NT	NT		
14	3.05	0.76	84	2.23	1.19
15	2.12	0.636	78	0.02	0.01
16	2.202	0.44	95	0.22	0.19
17	NT	NT	NT		
18	2.085	0.289	NR	-0.06	-0.07
19	5.67	0.88	96	8.44	3.92
20	1.6	0.24	95	-1.21	-1.57
21	NT	NT	NT		
22	1.97558	0.3	112	-0.32	-0.36
23	NT	NT	NT		
24	2.35	0.235	114	0.57	0.75
25	1.072	0.073	98	-2.46	-4.48
26	2.3	0.5	101	0.45	0.35
27	1.725	0.0339	101.5	-0.91	-1.73
28	2.35	0.62	96	0.57	0.36
29	2.08	0.624	92	-0.07	-0.05
30	1.347	NR	NR	-1.81	-3.47
32	NT	NT	NT		
33	4.17	1.251	324	4.88	1.62
34	2.02	0.505	55	-0.21	-0.16
35	2.13	0.54	30	0.05	0.03

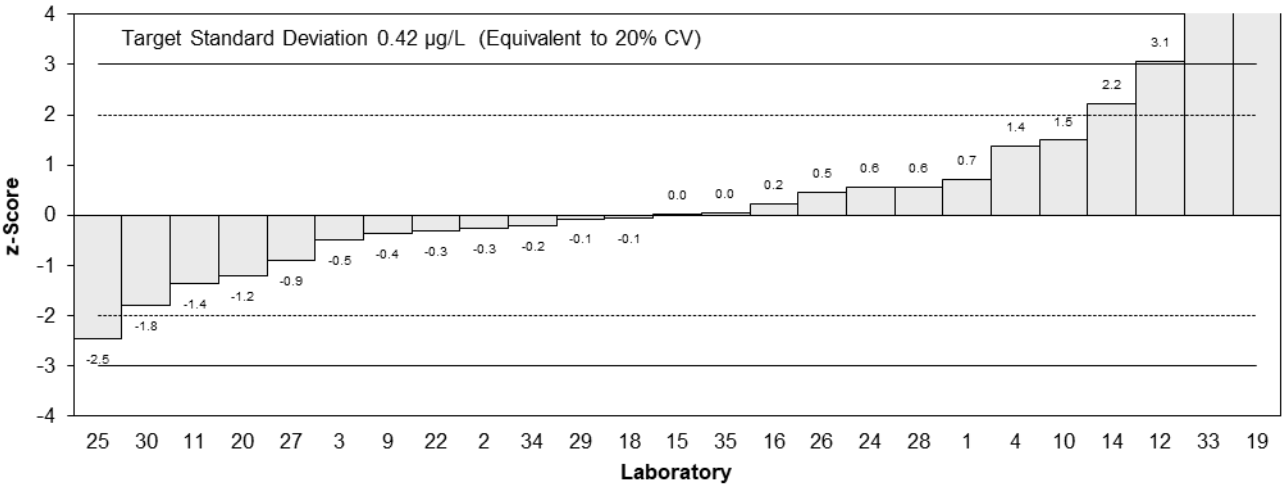
Statistics

Assigned Value*	2.11	0.22
Spike	Not Spiked	
Robust Average	2.21	0.30
Median	2.12	0.14
Mean	2.36	
N	25	
Max.	5.67	
Min.	1.072	

Robust SD	0.60	
Robust CV	27%	

*Robust Average excluding Laboratories 12, 19, 25 and 33.


Kernel Density
Density
Result
Results: S3 - PFOS_L
Assigned Value = 2.11 ± 0.22 µg/L
Results (µg/L)
Laboratory
25 30 11 20 27 3 9 22 2 34 29 18 15 35 16 26 24 28 1 4 10 14 12 33 19 7 13 17 21 23 32 5 6 8 Md R.A.


z-Scores: S3 - PFOS_L
Target Standard Deviation 0.42 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 30 11 20 27 3 9 22 2 34 29 18 15 35 16 26 24 28 1 4 10 14 12 33 19
-2.5 -1.8 -1.4 -1.2 -0.9 -0.5 -0.4 -0.3 -0.3 -0.2 -0.1 -0.1 0.0 0.0 0.2 0.5 0.6 0.6 0.7 1.4 1.5 2.2 3.1

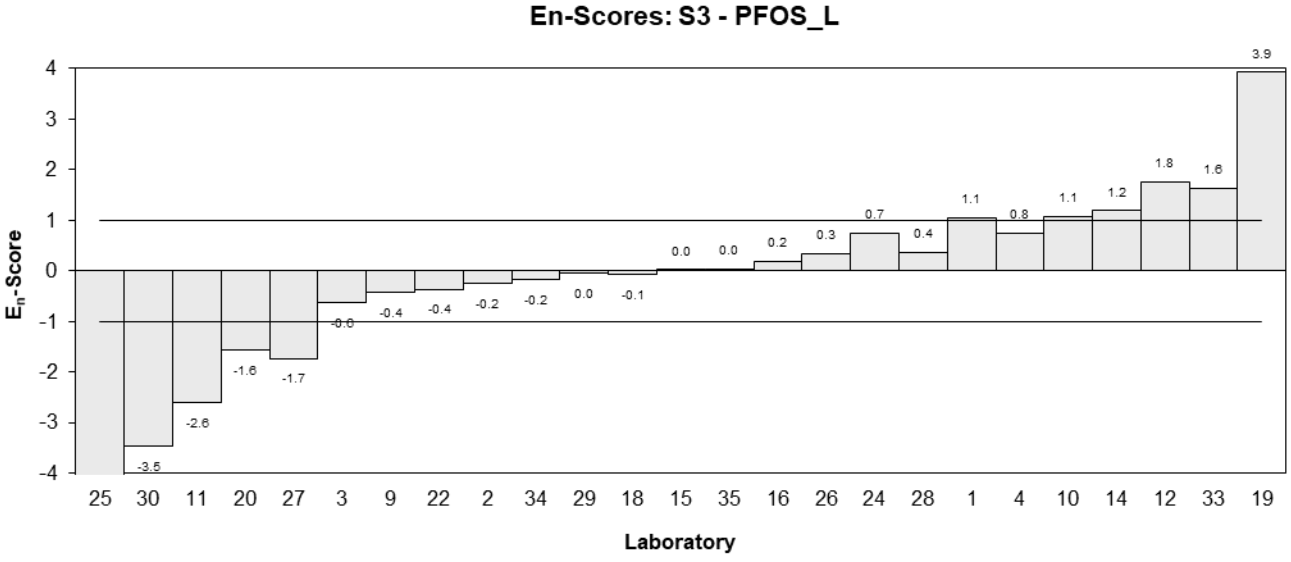

En-Scores: S3 - PFOS_L
En-Score
Laboratory
25 30 11 20 27 3 9 22 2 34 29 18 15 35 16 26 24 28 1 4 10 14 12 33 19
-3.5 -2.6 -1.6 -1.7 -0.6 -0.4 -0.4 -0.2 -0.2 0.0 -0.1 0.0 0.0 0.2 0.3 0.7 0.4 1.1 0.8 1.1 1.2 1.8 1.6 3.9

Figure 65

Table 69

Sample Details

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

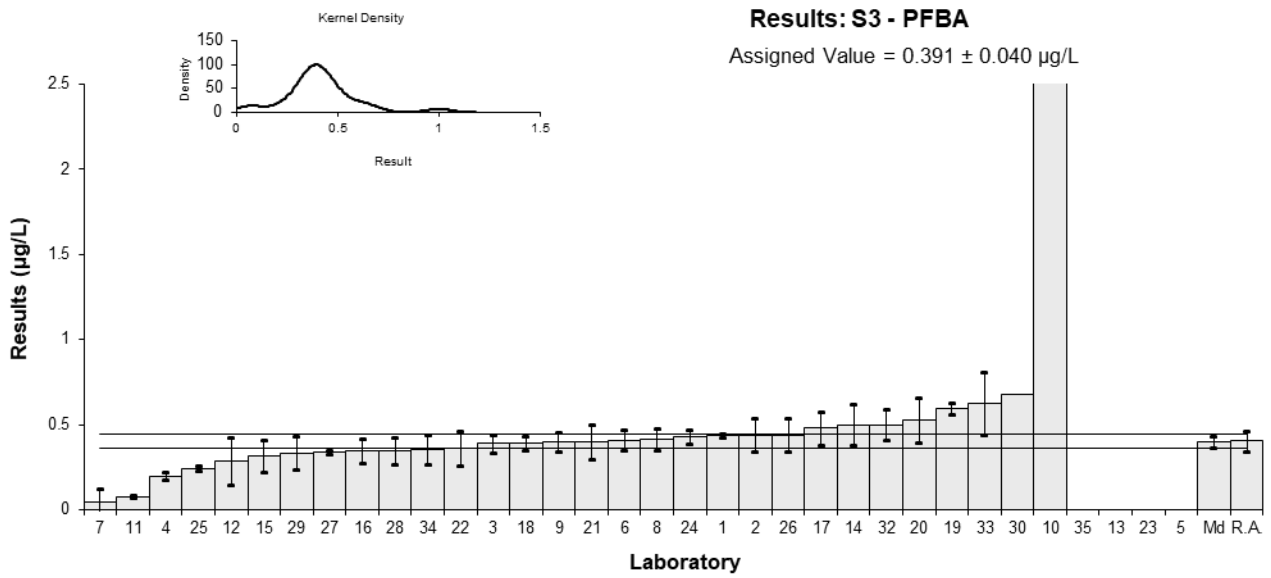
Participant Results

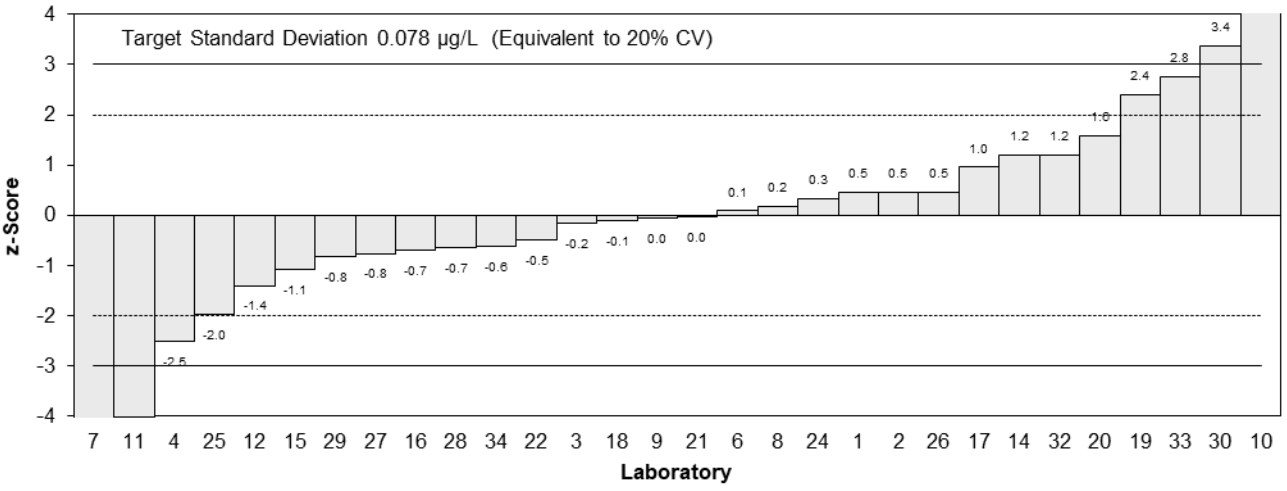
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.44	0.01	88	0.63	1.19
2	0.44	0.1	49	0.63	0.45
3	0.39	0.055	101	-0.01	-0.01
4	0.2	0.02	48.5	-2.44	-4.27
5	NT	NT	NT		
6	0.41	0.06	NR	0.24	0.26
7	0.049	0.077	NR	-4.37	-3.94
8	0.417	0.063	NR	0.33	0.35
9	0.399	0.054	34	0.10	0.12
10	3.91	1.09	97	45.00	3.23
11	0.079	0.0088	25	-3.99	-7.62
12	0.29	0.14	65	-1.29	-0.69
13	NT	NT	NT		
14	0.50	0.12	53	1.39	0.86
15	0.315	0.0945	72	-0.97	-0.74
16	0.347	0.069	80	-0.56	-0.55
17	0.48	0.1	14.9	1.14	0.83
18	0.394	0.042	NR	0.04	0.05
19	0.596	0.037	82	2.62	3.76
20	0.53	0.13	83	1.78	1.02
21	0.4	0.1	90	0.12	0.08
22	0.364	0.1	NR	-0.35	-0.25
23	NT	NT	NT		
24	0.43	0.043	110	0.50	0.66
25	0.244	0.015	37.2	-1.88	-3.44
26	0.44	0.1	73	0.63	0.45
27	0.3415	0.011	97.3	-0.63	-1.19
28	0.35	0.08	56	-0.52	-0.46
29	0.336	0.1008	52	-0.70	-0.51
30	0.675	NR	70	3.63	7.10
32	0.5	0.09	96	1.39	1.11
33	0.626	0.1878	46.2	3.01	1.22
34	0.353	0.08825	93	-0.49	-0.39
35	<2	NR	20		

Statistics*

Assigned Value**	0.391	0.040	**Robust SD**	0.11	
Spike	Not Spiked		**Robust CV**	29%	
Robust Average	0.396	0.053			
Median	0.399	0.032			
Mean	0.391				
N	29				
Max.	0.675				
Min.	0.049				

*Laboratory 10 excluded from statistical calculation
**Robust Average excluding Laboratories 7, 11, 30 and 33.


Kernel Density
Density
Result
Results: S3 - PFBA
Assigned Value = 0.391 ± 0.040 µg/L
Results (µg/L)
Laboratory
7 11 4 25 12 15 29 27 16 28 34 22 3 18 9 21 6 8 24 1 2 26 17 14 32 20 19 33 30 10 35 13 23 5 Md R.A.


z-Scores: S3 - PFBA
Target Standard Deviation 0.078 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
7 11 4 25 12 15 29 27 16 28 34 22 3 18 9 21 6 8 24 1 2 26 17 14 32 20 19 33 30 10

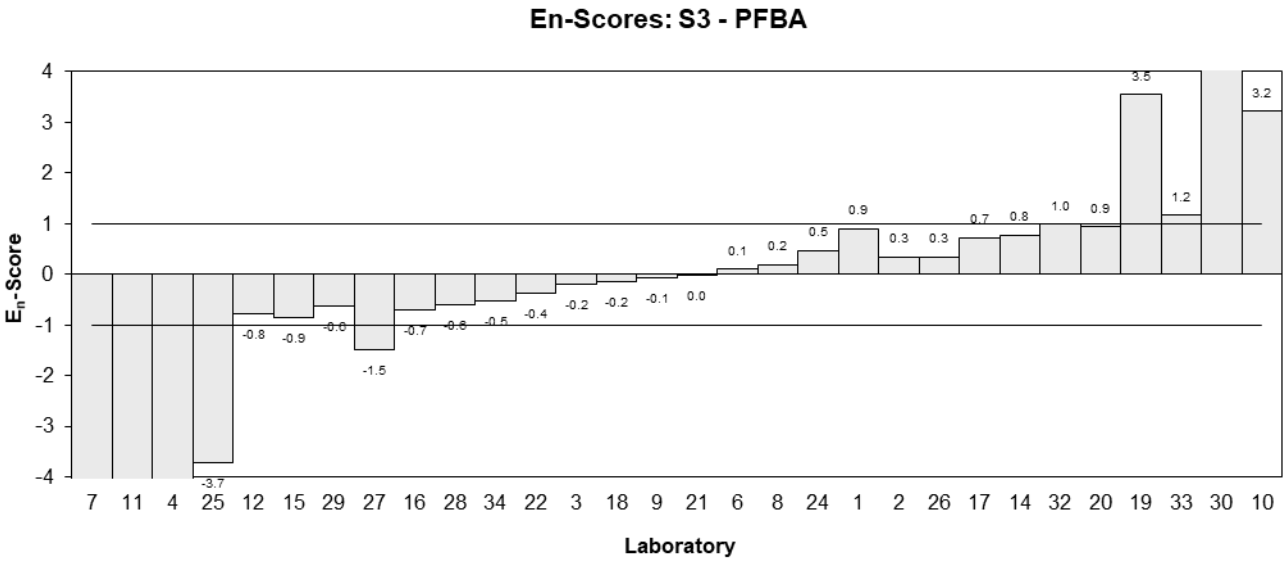

En-Scores: S3 - PFBA
En-Score
Laboratory
7 11 4 25 12 15 29 27 16 28 34 22 3 18 9 21 6 8 24 1 2 26 17 14 32 20 19 33 30 10

Figure 66

Table 70

Sample Details

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

Participant Results

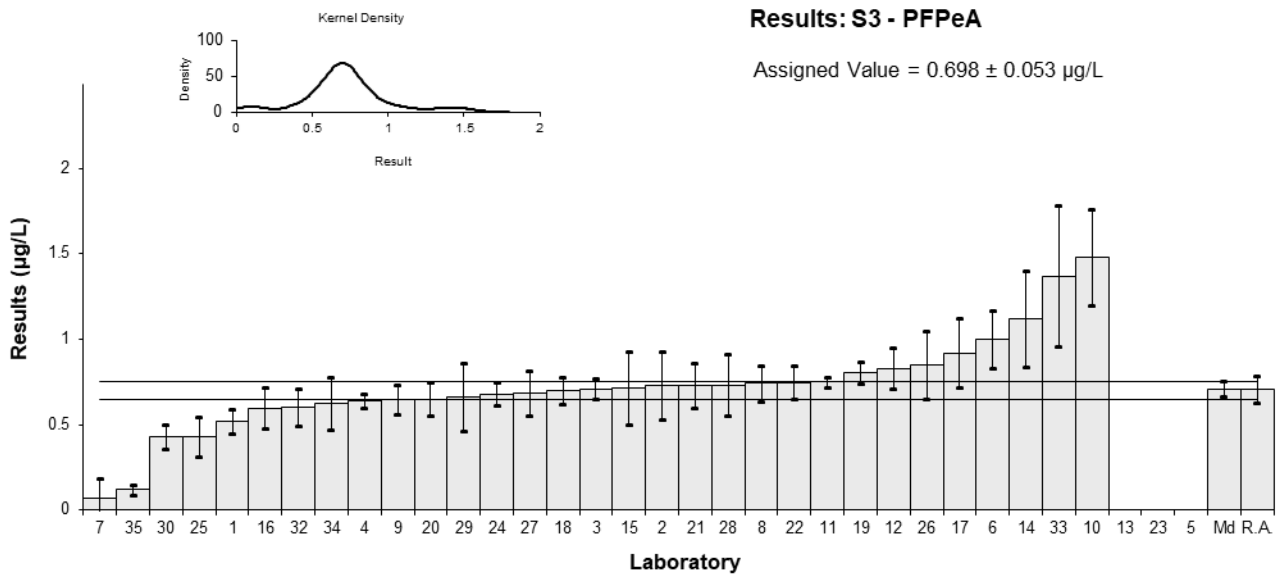
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.52	0.07	NR	-1.28	-2.03
2	0.73	0.2	56	0.23	0.15
3	0.71	0.062	101	0.09	0.15
4	0.64	0.04	22.9	-0.42	-0.87
5	NT	NT	NT		
6	1.0	0.17	NR	2.16	1.70
7	0.071	0.111	NR	-4.49	-5.10
8	0.743	0.104	NR	0.32	0.39
9	0.646	0.089	58	-0.37	-0.50
10	1.48	0.28	75	5.60	2.74
11	0.748	0.0336	20	0.36	0.80
12	0.83	0.12	118	0.95	1.01
13	NT	NT	NT		
14	1.12	0.28	64	3.02	1.48
15	0.715	0.215	75	0.12	0.08
16	0.597	0.119	75	-0.72	-0.78
17	0.92	0.2	NR	1.59	1.07
18	0.701	0.08	NR	0.02	0.03
19	0.805	0.061	147	0.77	1.32
20	0.65	0.1	57	-0.34	-0.42
21	0.73	0.13	82	0.23	0.23
22	0.747	0.1	87	0.35	0.43
23	NT	NT	NT		
24	0.68	0.068	NT	-0.13	-0.21
25	0.431	0.116	70.9	-1.91	-2.09
26	0.85	0.2	99	1.09	0.73
27	0.687	0.132	60.9	-0.08	-0.08
28	0.73	0.18	68	0.23	0.17
29	0.659	0.1977	82	-0.28	-0.19
30	0.43	0.07267	42.3	-1.92	-2.98
32	0.6	0.11	94	-0.70	-0.80
33	1.37	0.411	66.6	4.81	1.62
34	0.624	0.156	33	-0.53	-0.45
35	0.12	0.030	40	-4.14	-9.49

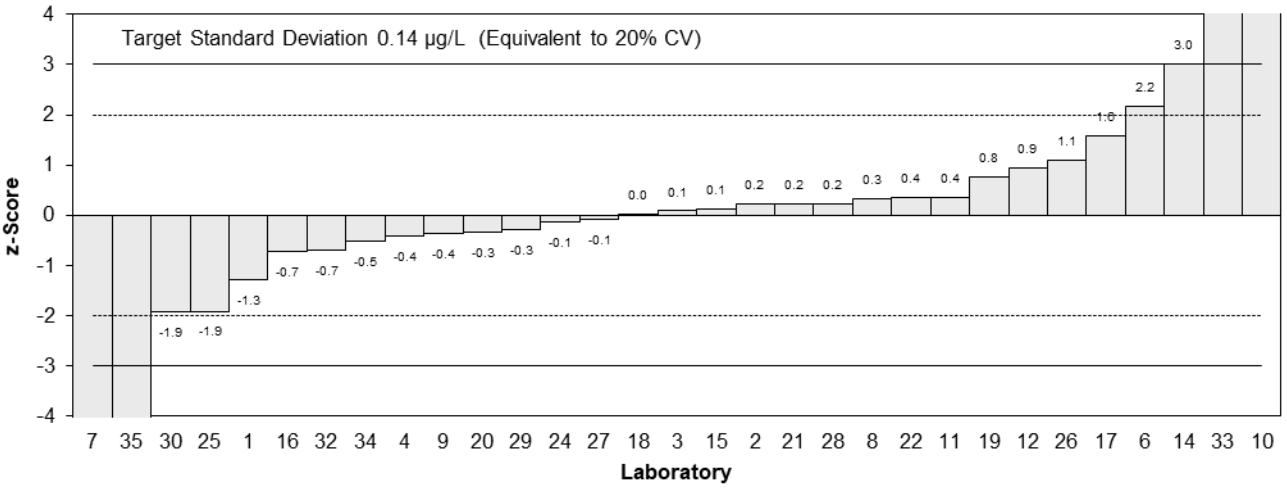
Statistics

Assigned Value*	0.698	0.053
Spike	Not Spiked	
Robust Average	0.707	0.081
Median	0.710	0.047
Mean	0.719	
N	31	
Max.	1.48	
Min.	0.071	

Robust SD	0.18	
Robust CV	26%	

*Robust Average excluding Laboratories 7, 10, 14, 33 and 35.


Kernel Density
Density
Result
Results: S3 - PFPeA
Assigned Value = 0.698 ± 0.053 µg/L
Results (µg/L)
Laboratory
7 35 30 25 1 16 32 34 4 9 20 29 24 27 18 3 15 2 21 28 8 22 11 19 12 26 17 6 14 33 10 13 23 5 Md R.A.


z-Scores: S3 - PFPeA
Target Standard Deviation 0.14 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
7 35 30 25 1 16 32 34 4 9 20 29 24 27 18 3 15 2 21 28 8 22 11 19 12 26 17 6 14 33 10

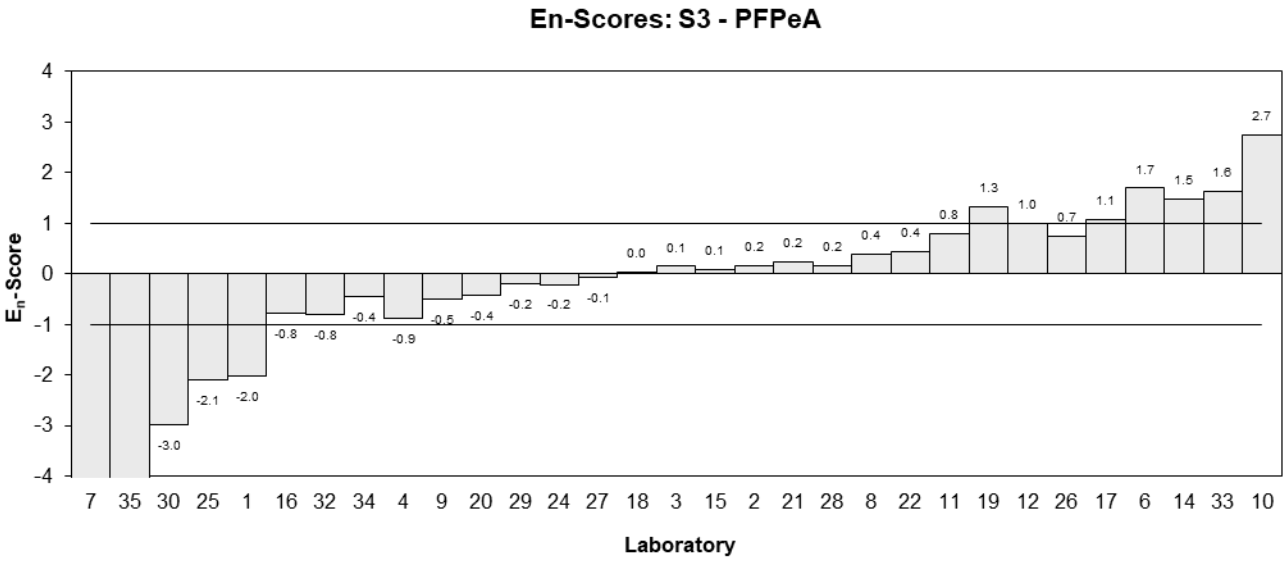

En-Scores: S3 - PFPeA
En-Score
Laboratory
7 35 30 25 1 16 32 34 4 9 20 29 24 27 18 3 15 2 21 28 8 22 11 19 12 26 17 6 14 33 10

Figure 67

Table 71

Sample Details

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

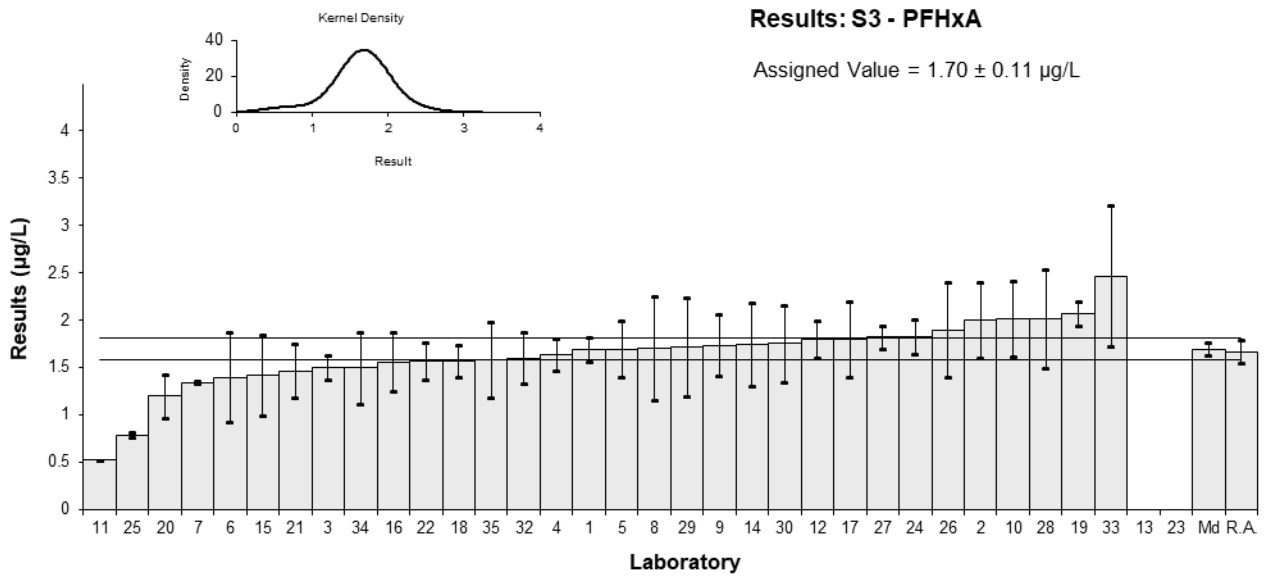
Participant Results

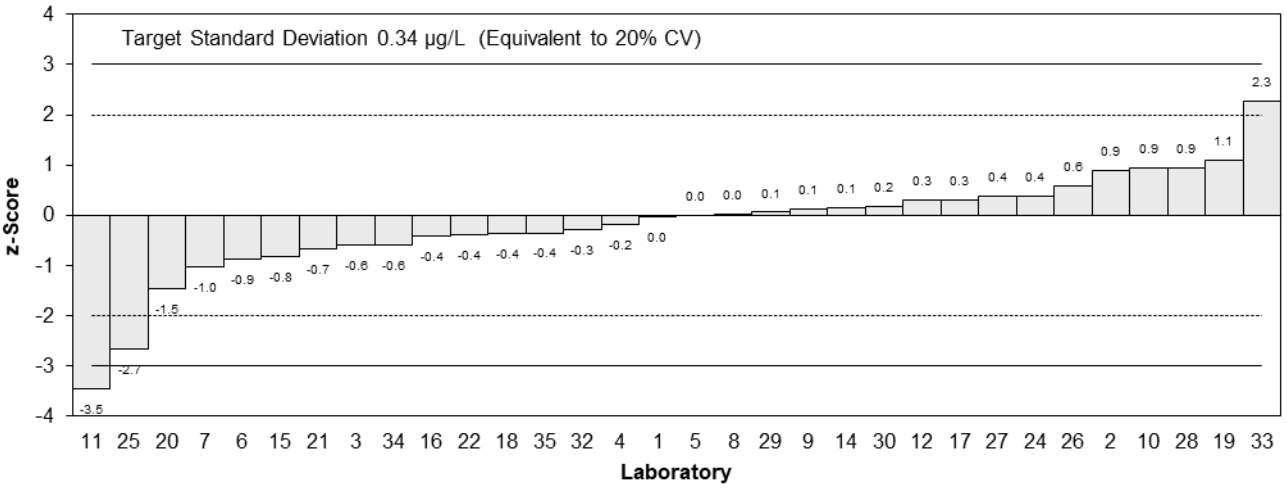
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	1.69	0.13	74	-0.03	-0.06
2	2.0	0.4	61	0.88	0.72
3	1.5	0.13	105	-0.59	-1.17
4	1.64	0.17	28.7	-0.18	-0.30
5	1.7	0.3	57	0.00	0.00
6	1.4	0.47	NR	-0.88	-0.62
7	1.346	0.014	NR	-1.04	-3.19
8	1.704	0.545	NR	0.01	0.01
9	1.74	0.33	61	0.12	0.11
10	2.02	0.4	91	0.94	0.77
11	0.525	0.0037	30	-3.46	-10.68
12	1.8	0.2	116	0.29	0.44
13	NT	NT	NT		
14	1.75	0.44	71	0.15	0.11
15	1.42	0.426	74	-0.82	-0.64
16	1.56	0.312	77	-0.41	-0.42
17	1.8	0.4	135	0.29	0.24
18	1.576	0.17	NR	-0.36	-0.61
19	2.07	0.13	90	1.09	2.17
20	1.2	0.23	79	-1.47	-1.96
21	1.47	0.28	119	-0.68	-0.76
22	1.57	0.2	117	-0.38	-0.57
23	NT	NT	NT		
24	1.83	0.183	NT	0.38	0.61
25	0.791	0.026	87.1	-2.67	-8.04
26	1.9	0.5	95	0.59	0.39
27	1.827	0.123	103.5	0.37	0.77
28	2.02	0.52	88	0.94	0.60
29	1.72	0.516	82	0.06	0.04
30	1.756	0.407392	42.3	0.16	0.13
32	1.6	0.27	109	-0.29	-0.34
33	2.47	0.741	96.6	2.26	1.03
34	1.50	0.375	92	-0.59	-0.51
35	1.58	0.40	40	-0.35	-0.29

Statistics

Assigned Value*	1.70	0.11	**Robust SD**	0.26	
Spike	Not Spiked		**Robust CV**	16%	
Robust Average	1.67	0.12			
Median	1.70	0.07			
Mean	1.64				
N	32				
Max.	2.47				
Min.	0.525				

*Robust Average excluding Laboratories 11 and 25.


Kernel Density
Density
Result
Results: S3 - PFHxA
Assigned Value = 1.70 ± 0.11 µg/L
Results (µg/L)
Laboratory
11 25 20 7 6 15 21 3 34 16 22 18 35 32 4 1 5 8 29 9 14 30 12 17 27 24 26 2 10 28 19 33 13 23 Md R.A.


z-Scores: S3 - PFHxA
Target Standard Deviation 0.34 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
11 25 20 7 6 15 21 3 34 16 22 18 35 32 4 1 5 8 29 9 14 30 12 17 27 24 26 2 10 28 19 33

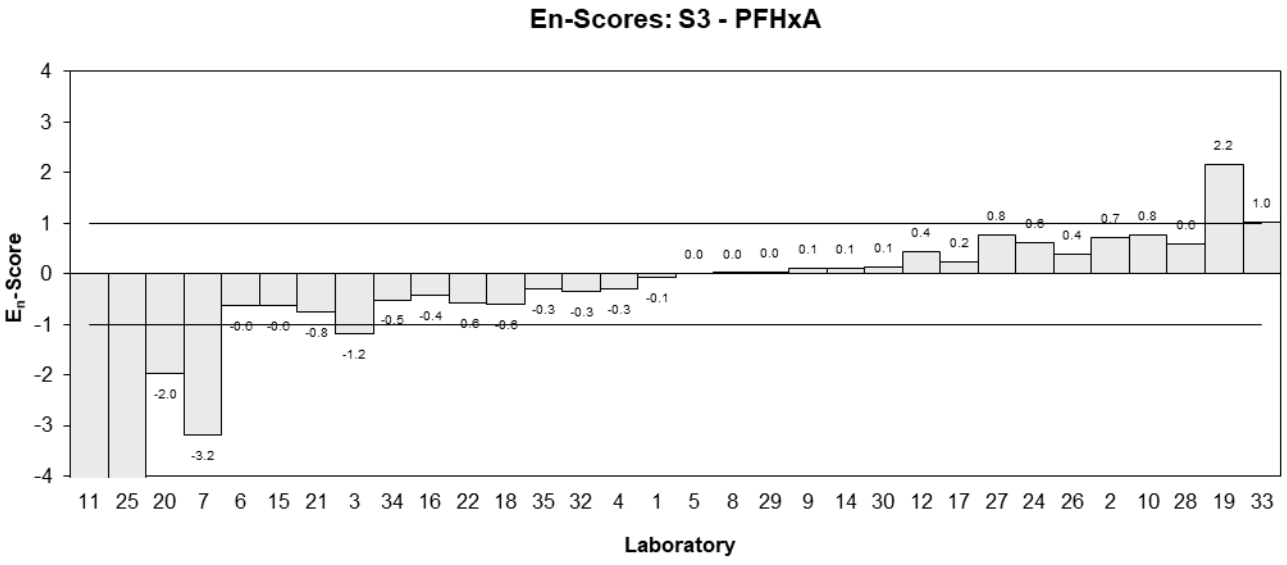

En-Scores: S3 - PFHxA
En-Score
Laboratory
11 25 20 7 6 15 21 3 34 16 22 18 35 32 4 1 5 8 29 9 14 30 12 17 27 24 26 2 10 28 19 33

Figure 68

Table 72

Sample Details

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

Participant Results

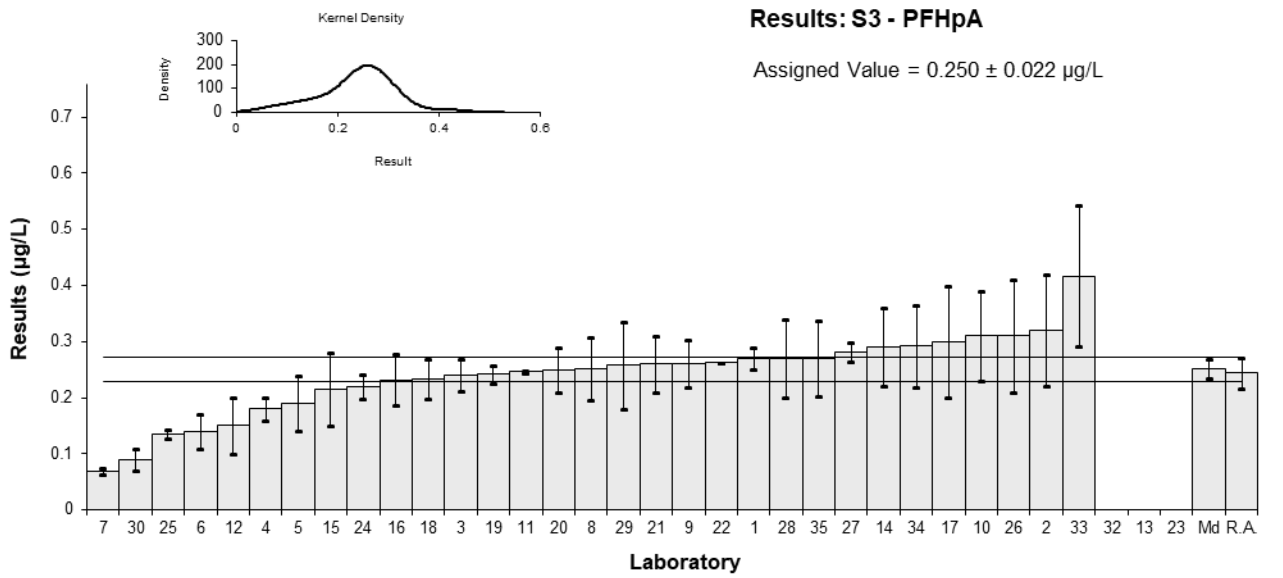
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.27	0.02	78	0.40	0.67
2	0.32	0.1	77	1.40	0.68
3	0.24	0.029	106	-0.20	-0.27
4	0.18	0.02	24.2	-1.40	-2.35
5	0.19	0.05	51	-1.20	-1.10
6	0.14	0.03	NR	-2.20	-2.96
7	0.069	0.005	NR	-3.62	-8.02
8	0.251	0.056	NR	0.02	0.02
9	0.260	0.042	80	0.20	0.21
10	0.31	0.08	97	1.20	0.72
11	0.246	0.003	42	-0.08	-0.18
12	0.15	0.05	121	-2.00	-1.83
13	NT	NT	NT		
14	0.29	0.07	89	0.80	0.55
15	0.215	0.0645	76	-0.70	-0.51
16	0.232	0.046	83	-0.36	-0.35
17	0.3	0.1	NR	1.00	0.49
18	0.233	0.036	NR	-0.34	-0.40
19	0.242	0.016	99	-0.16	-0.29
20	0.25	0.04	99	0.00	0.00
21	0.26	0.05	68	0.20	0.18
22	0.262	0.0	108	0.24	0.55
23	NT	NT	NT		
24	0.22	0.022	NT	-0.60	-0.96
25	0.136	0.008	79.6	-2.28	-4.87
26	0.31	0.1	95	1.20	0.59
27	0.281	0.017	84.0	0.62	1.11
28	0.27	0.07	68	0.40	0.27
29	0.258	0.0774	80	0.16	0.10
30	0.089	0.019491	70	-3.22	-5.48
32	<0.3	NR	97		
33	0.417	0.1251	143.6	3.34	1.31
34	0.292	0.073	40	0.84	0.55
35	0.27	0.068	40	0.40	0.28

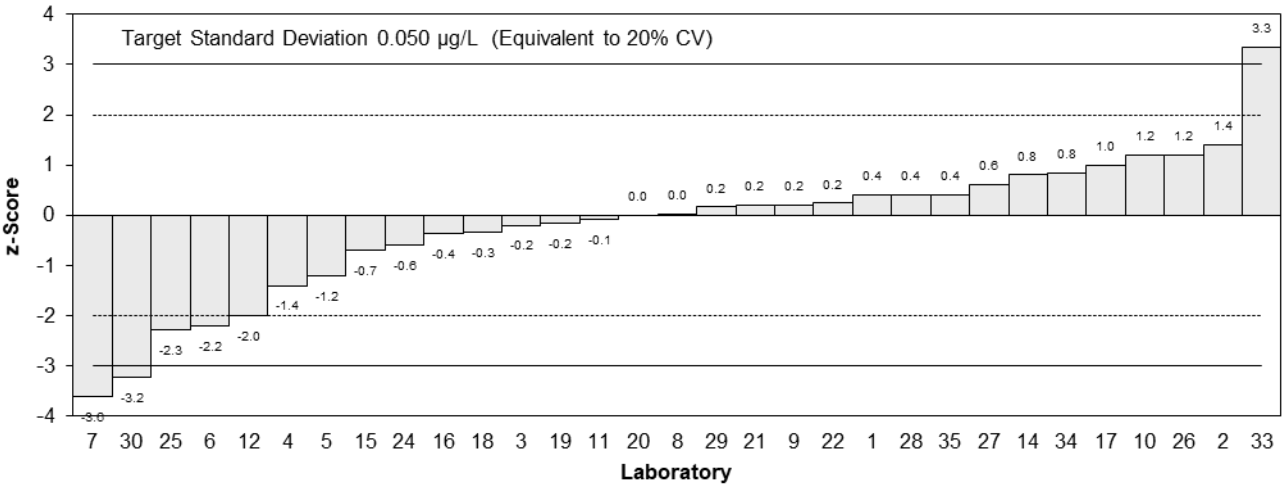
Statistics

Assigned Value*	0.250	0.022
Spike	Not Spiked	
Robust Average	0.244	0.027
Median	0.251	0.017
Mean	0.240	
N	31	
Max.	0.417	
Min.	0.069	

Robust SD	0.060	
Robust CV	25%	

*Robust Average excluding Laboratories 7, 30 and 33.


Kernel Density
Density
Result
Results: S3 - PFHpA
Assigned Value = 0.250 ± 0.022 µg/L
Results (µg/L)
Laboratory
7 30 25 6 12 4 5 15 24 16 18 3 19 11 20 8 29 21 9 22 1 28 35 27 14 34 17 10 26 2 33 32 13 23 Md R.A.


z-Scores: S3 - PFHpA
Target Standard Deviation 0.050 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
7 30 25 6 12 4 5 15 24 16 18 3 19 11 20 8 29 21 9 22 1 28 35 27 14 34 17 10 26 2 33

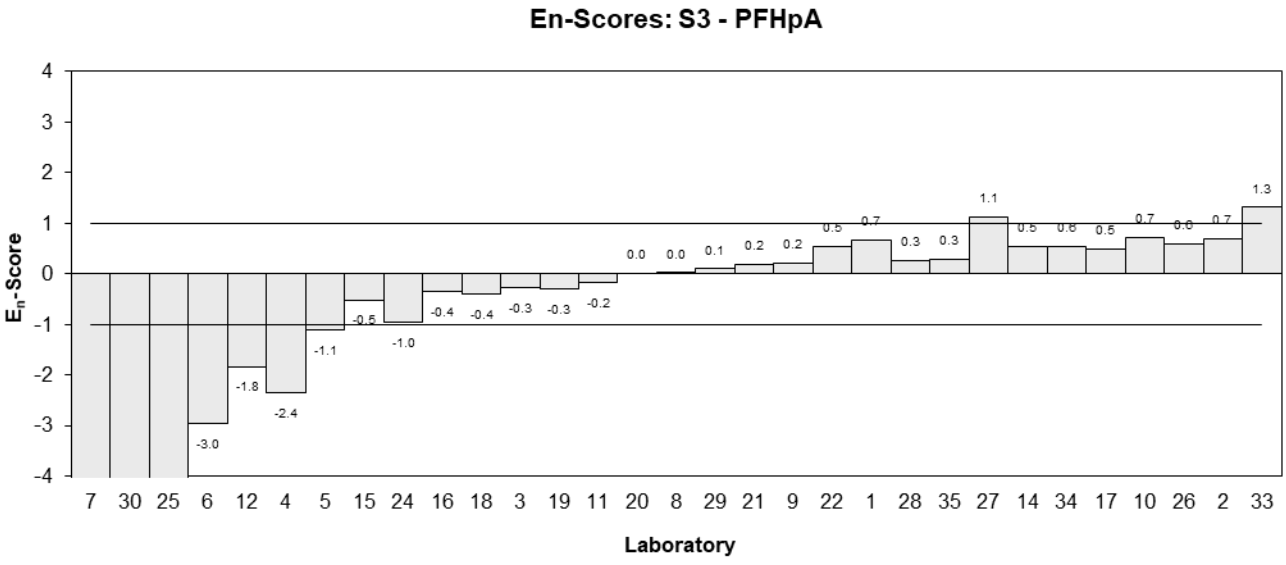

En-Scores: S3 - PFHpA
En-Score
Laboratory
7 30 25 6 12 4 5 15 24 16 18 3 19 11 20 8 29 21 9 22 1 28 35 27 14 34 17 10 26 2 33

Figure 69

Table 73

Sample Details

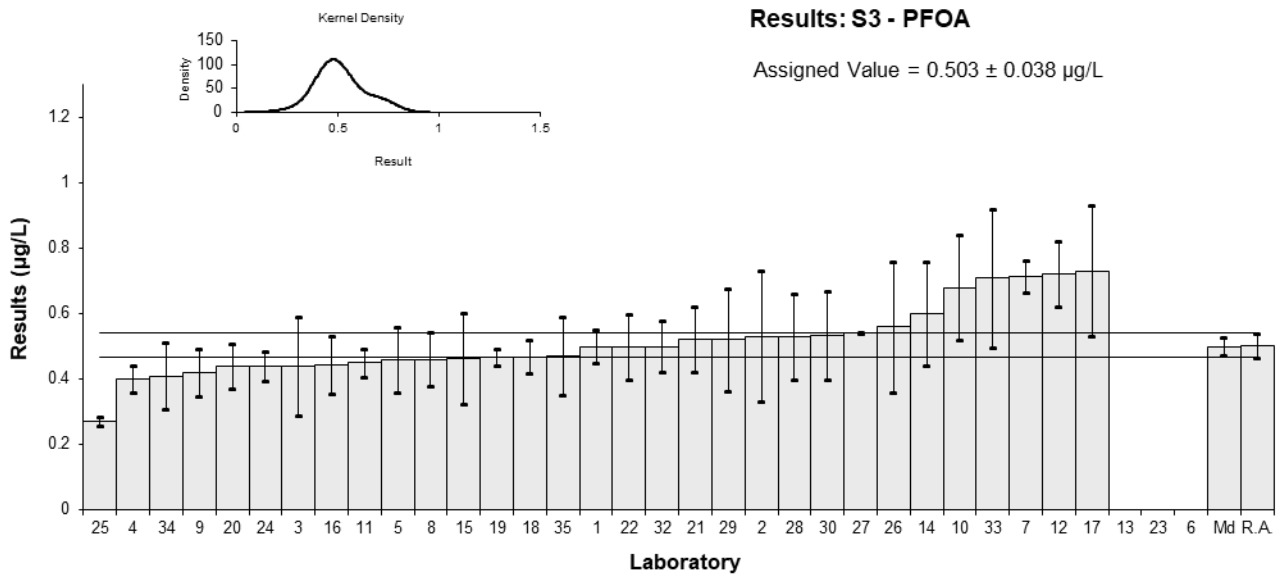
Sample No.	S3
Matrix.	Water
Analyte.	PFOA
Units	µg/L

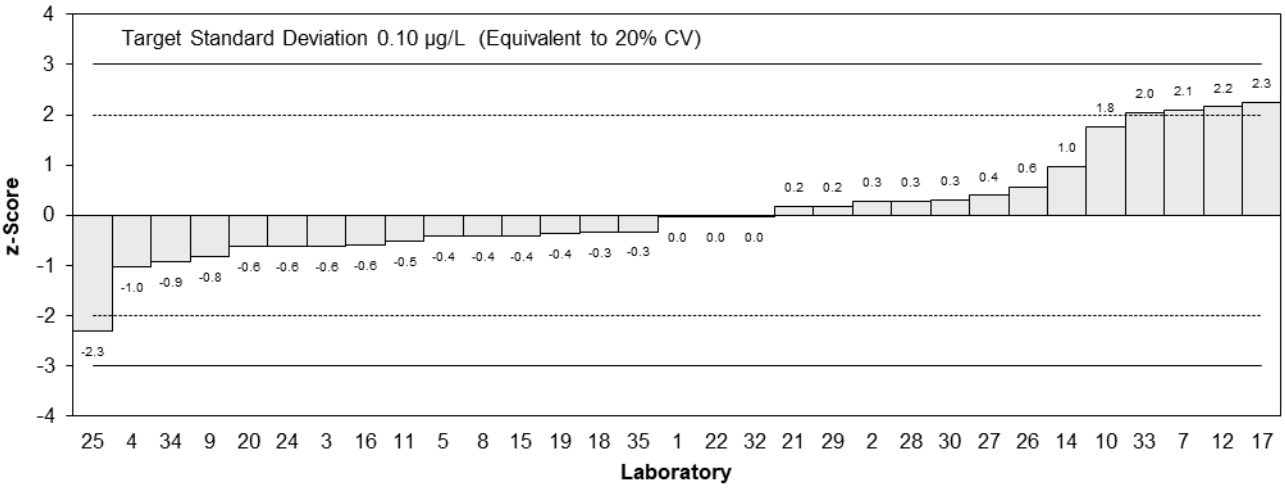
Participant Results

Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.50	0.05	80	-0.03	-0.05
2	0.53	0.2	92	0.27	0.13
3	0.44	0.15	104	-0.63	-0.41
4	0.4	0.04	59.7	-1.02	-1.87
5	0.46	0.10	78	-0.43	-0.40
6	NT	NT	NT		
7	0.713	0.048	149.42	2.09	3.43
8	0.461	0.081	NR	-0.42	-0.47
9	0.420	0.071	102	-0.83	-1.03
10	0.68	0.16	98	1.76	1.08
11	0.450	0.0434	65	-0.53	-0.92
12	0.72	0.10	122	2.16	2.03
13	NT	NT	NT		
14	0.60	0.16	93	0.96	0.59
15	0.462	0.139	78	-0.41	-0.28
16	0.443	0.089	88	-0.60	-0.62
17	0.73	0.2	154	2.26	1.12
18	0.468	0.051	NR	-0.35	-0.55
19	0.467	0.027	100	-0.36	-0.77
20	0.44	0.07	97	-0.63	-0.79
21	0.52	0.10	73	0.17	0.16
22	0.500	0.1	84	-0.03	-0.03
23	NT	NT	NT		
24	0.44	0.044	111	-0.63	-1.08
25	0.27	0.014	90.7	-2.32	-5.75
26	0.56	0.2	98	0.57	0.28
27	0.5425	0.002	101.4	0.39	1.04
28	0.53	0.13	103	0.27	0.20
29	0.521	0.1563	95	0.18	0.11
30	0.534	0.135636	70	0.31	0.22
32	0.5	0.08	94	-0.03	-0.03
33	0.708	0.2124	96.6	2.04	0.95
34	0.410	0.1025	63	-0.92	-0.85
35	0.47	0.12	40	-0.33	-0.26

Statistics

Assigned Value	0.503	0.038	**Robust SD**	0.085	
Spike	Not Spiked		**Robust CV**	17%	
Robust Average	0.503	0.038			
Median	0.500	0.027			
Mean	0.513				
N	31				
Max.	0.73				
Min.	0.27				


Kernel Density
Density
Result
Results: S3 - PFOA
Assigned Value = 0.503 ± 0.038 µg/L
Results (µg/L)
Laboratory
25 4 34 9 20 24 3 16 11 5 8 15 19 18 35 1 22 32 21 29 2 28 30 27 26 14 10 33 7 12 17 13 23 6 Md R.A.


z-Scores: S3 - PFOA
Target Standard Deviation 0.10 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 4 34 9 20 24 3 16 11 5 8 15 19 18 35 1 22 32 21 29 2 28 30 27 26 14 10 33 7 12 17

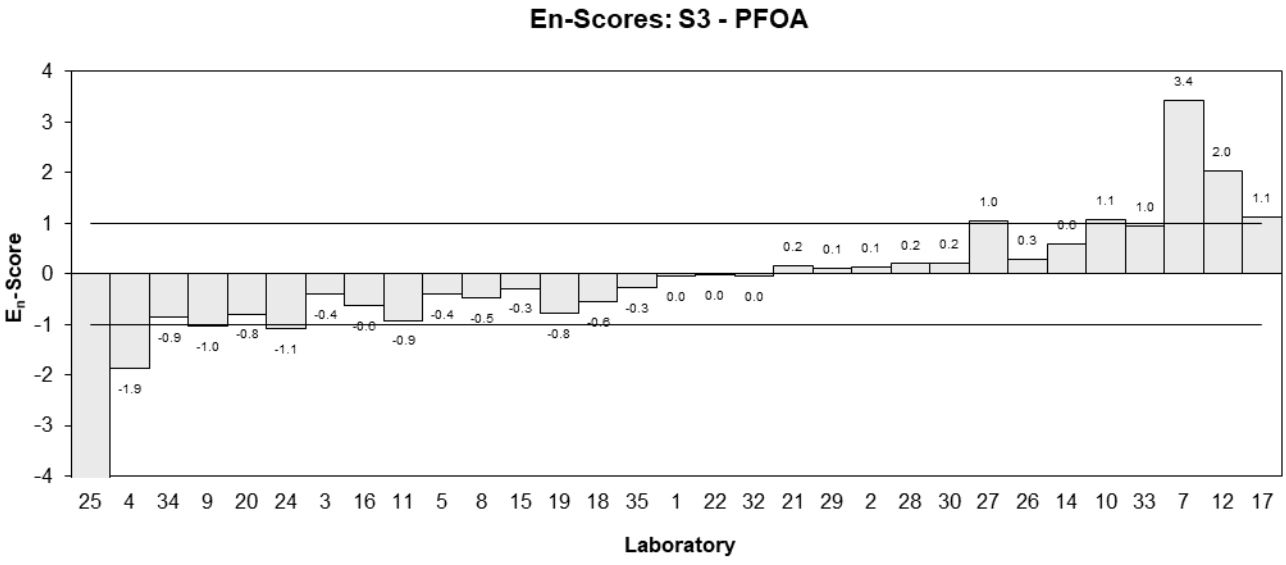

En-Scores: S3 - PFOA
En-Score
Laboratory
25 4 34 9 20 24 3 16 11 5 8 15 19 18 35 1 22 32 21 29 2 28 30 27 26 14 10 33 7 12 17

Figure 70

Table 74

Sample Details

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

Participant Results

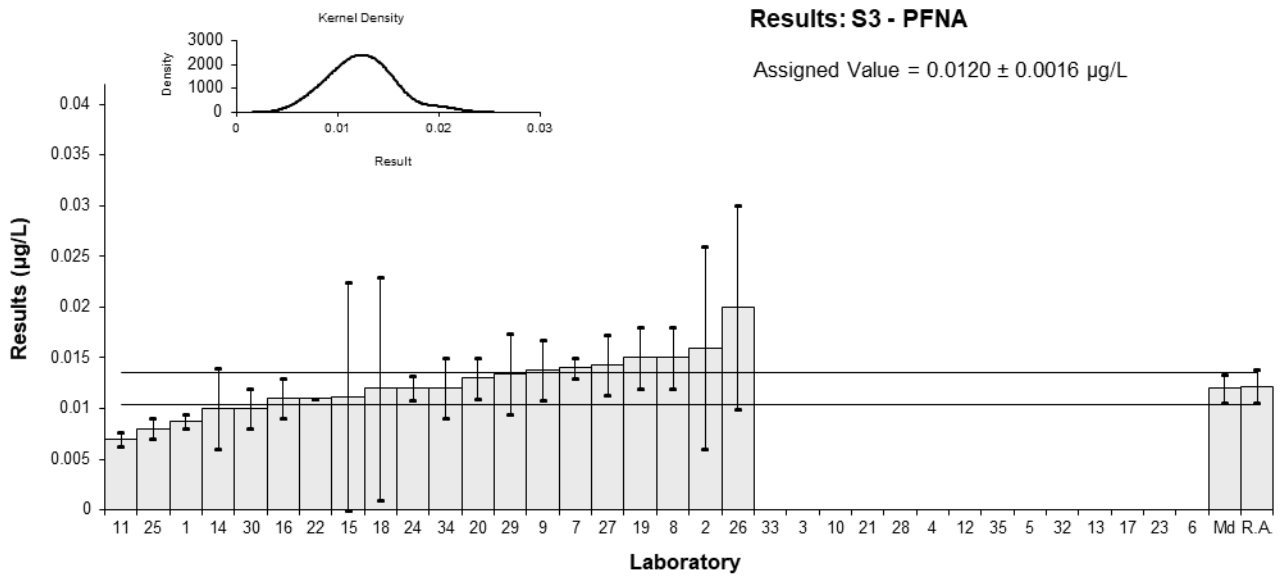
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.0087	0.0007	89	-1.38	-1.89
2	0.016	0.01	95	1.67	0.39
3	< 0.025	NR	97		
4	<0.02	NR	75.4		
5	<0.08	NR	104		
6	NT	NT	NT		
7	0.014	0.001	NR	0.83	1.06
8	0.015	0.003	NR	1.25	0.88
9	0.0138	0.003	90	0.75	0.53
10	<0.005	NR	104		
11	0.007	0.0007	90	-2.08	-2.86
12	<0.05	NR	134		
13	NT	NT	NT		
14	0.01	0.004	60	-0.83	-0.46
15	0.0112	0.0112	82	-0.33	-0.07
16	0.011	0.002	98	-0.42	-0.39
17	NT	NT	NT		
18	0.012	0.011	NR	0.00	0.00
19	0.015	0.003	91	1.25	0.88
20	0.013	0.002	95	0.42	0.39
21	<0.02	NR	73		
22	0.011	0.0	80	-0.42	-0.63
23	NT	NT	NT		
24	0.012	0.0012	NT	0.00	0.00
25	0.008	0.001	89.5	-1.67	-2.12
26	0.020	0.01	77	3.33	0.79
27	0.0143	0.003	106.4	0.96	0.68
28	<0.02	NR	109		
29	0.0134	0.00402	88	0.58	0.32
30	0.01	0.002	125.6	-0.83	-0.78
32	<0.3	NR	106		
33	< 0.017	0.0051	213		
34	0.0120	0.003	75	0.00	0.00
35	<0.05	NR	40		

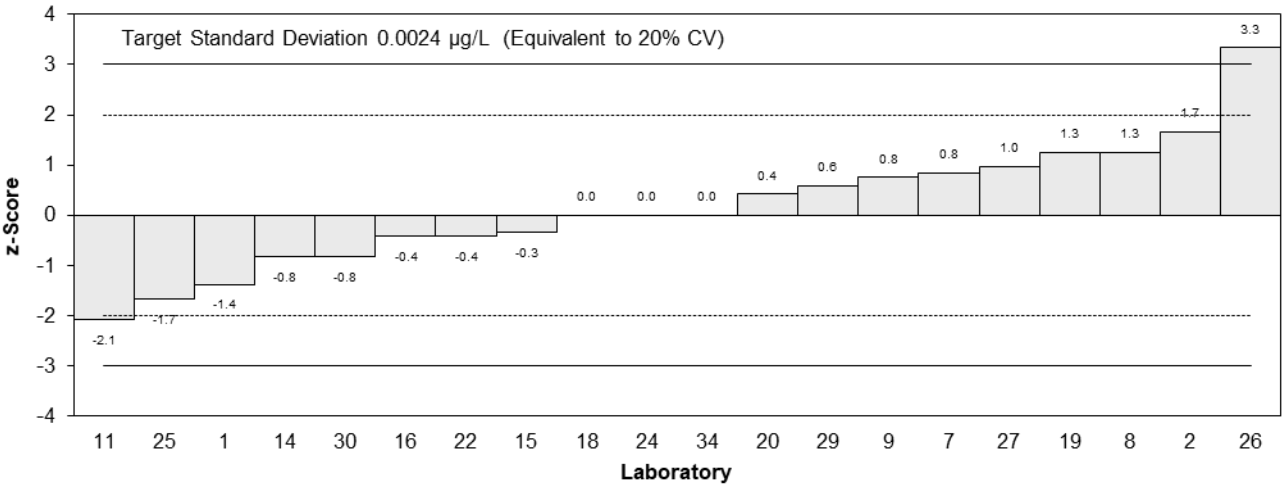
Statistics

Assigned Value*	0.0120	0.0016
Spike	Not Spiked	
Robust Average	0.0122	0.0016
Median	0.0120	0.0014
Mean	0.0124	
N	20	
Max.	0.02	
Min.	0.007	

Robust SD	0.0029	
Robust CV	24%	

*Robust Average excluding Laboratory 26.


Kernel Density
Density
Result
Results: S3 - PFNA
Assigned Value = 0.0120 ± 0.0016 µg/L
Results (µg/L)
Laboratory
11 25 1 14 30 16 22 15 18 24 34 20 29 9 7 27 19 8 2 26 33 3 10 21 28 4 12 35 5 32 13 17 23 6 Md R.A.


z-Scores: S3 - PFNA
Target Standard Deviation 0.0024 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
11 25 1 14 30 16 22 15 18 24 34 20 29 9 7 27 19 8 2 26

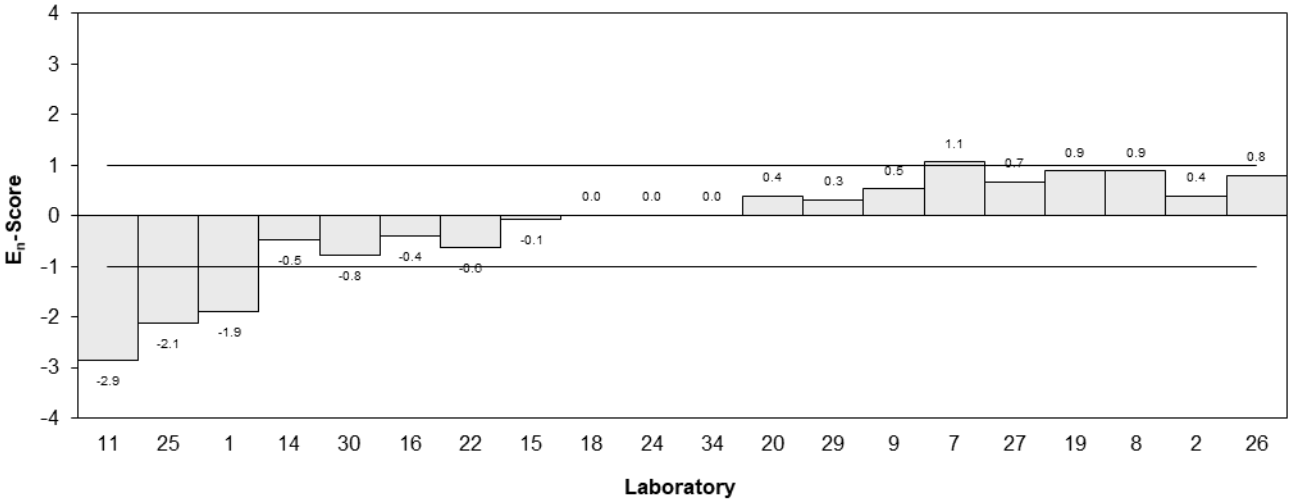

En-Scores: S3 - PFNA
En-Score
Laboratory
11 25 1 14 30 16 22 15 18 24 34 20 29 9 7 27 19 8 2 26

Figure 71

Table 75

Sample Details

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

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	<0.01	NR	87
2	0.003	0.002	50
3	< 0.025	NR	102
4	<0.02	NR	93.6
5	NT	NT	NT
6	NT	NT	NT
7	0.001	0.001	NR
8	<0.005	NR	NR
9	0.00260	0.0006	116
10	<0.005	NR	118
11	NR	NR	NR
12	<0.05	NR	129
13	NT	NT	NT
14	< 0.01	0.003	98
15	0.00200	0.00200	78
16	0.002	0.0003	73
17	NT	NT	NT
18	NR	NR	NR
19	0.015	0.003	99
20	<0.01	NR	NR
21	<0.02	NR	202
22	< 0.01	0.001	112
23	NT	NT	NT
24	0.005	0.0005	118
25	0.27	0.008	98.5
26	0.002	0.002	62
27	0.004	0	132.6
28	<0.02	NR	111
29	0.00319	0.000957	81
30	<0.005	NR	138.7
32	<0.3	NR	114
33	< 0.017	0.0051	234
34	<0.0100	NR	85
35	<0.05	NR	30

Statistics

Assigned Value	Not Set	
Spike	Not Spiked	
Robust Average	0.0035	0.0017
Median	0.0030	0.0010
Mean	0.028	
N	11	
Max.	0.27	
Min.	0.001	

Robust SD	0.0022
Robust CV	64%

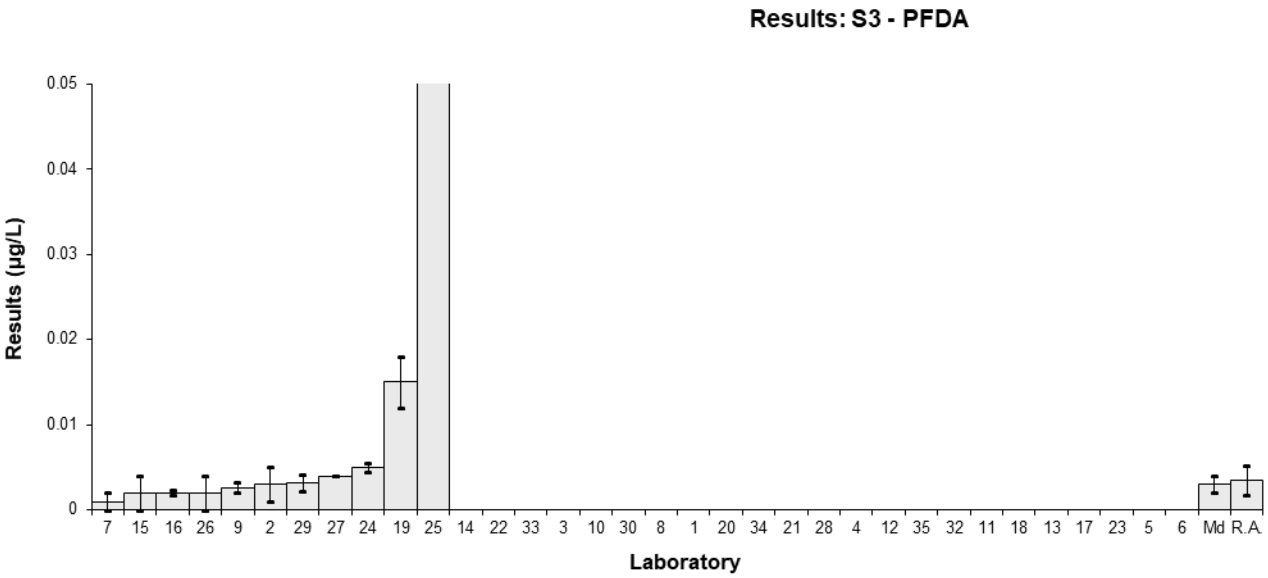

Results: S3 - PFDA
Results (µg/L)
0.05
0.04
0.03
0.02
0.01
0
7 15 16 26 9 2 29 27 24 19 25 14 22 33 3 10 30 8 1 20 34 21 28 4 12 35 32 11 18 13 17 23 5 6 Md R.A.
Laboratory

Figure 72

Table 76

Sample Details

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

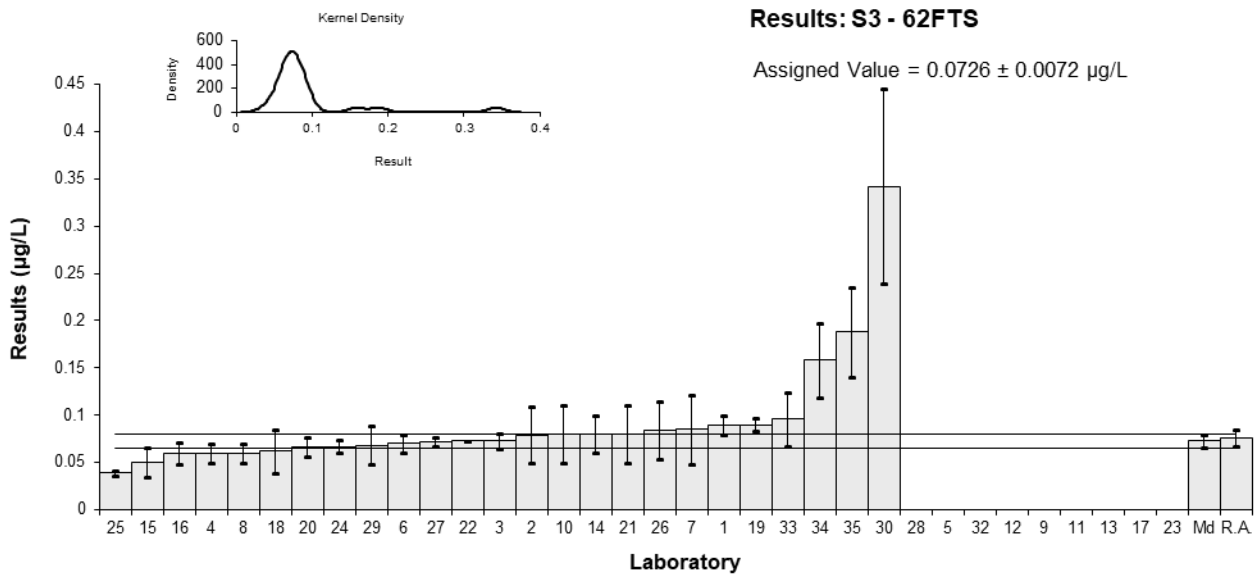
Participant Results

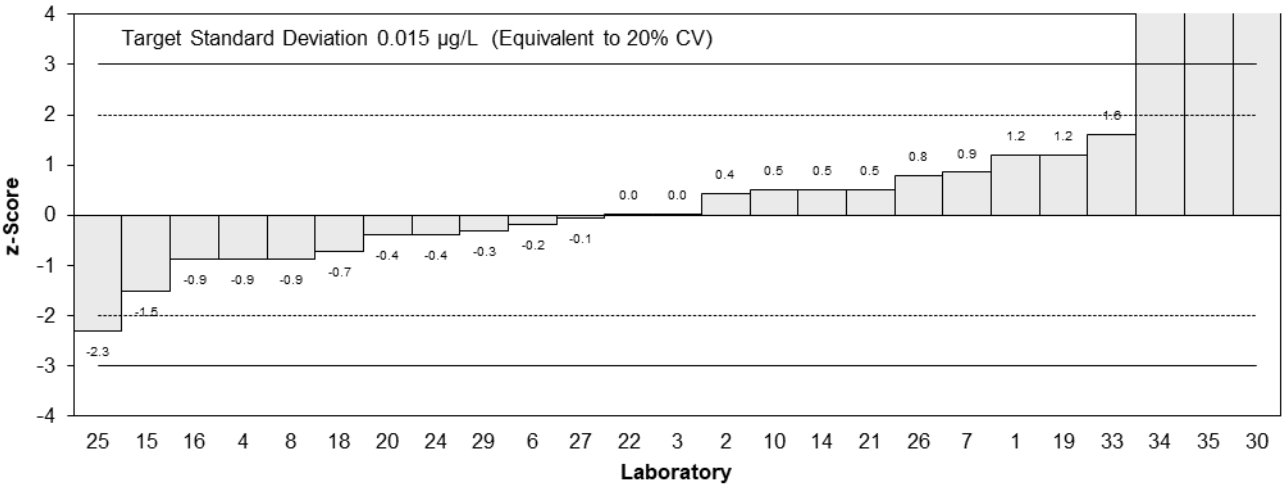
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.09	0.01	NR	1.20	1.41
2	0.079	0.03	153	0.44	0.21
3	0.073	0.0080	108	0.03	0.04
4	0.06	0.01	169	-0.87	-1.02
5	<0.06	NR	264		
6	0.07	0.01	NR	-0.18	-0.21
7	0.085	0.037	NR	0.85	0.33
8	0.06	0.01	NR	-0.87	-1.02
9	<0.474	NR	155		
10	0.08	0.03	108	0.51	0.24
11	NT	NT	NT		
12	<0.2	NR	128		
13	NT	NT	NT		
14	0.08	0.02	85	0.51	0.35
15	0.0505	0.0152	85	-1.52	-1.31
16	0.06	0.012	105	-0.87	-0.90
17	NT	NT	NT		
18	0.062	0.023	NR	-0.73	-0.44
19	0.090	0.007	91	1.20	1.73
20	0.067	0.01	141	-0.39	-0.45
21	0.08	0.03	156	0.51	0.24
22	0.073	0.0	189	0.03	0.06
23	NT	NT	NT		
24	0.067	0.0067	NT	-0.39	-0.57
25	0.039	0.003	105.2	-2.31	-4.31
26	0.084	0.03	129	0.79	0.37
27	0.0717	0.0046	132.5	-0.06	-0.11
28	<0.05	NR	236		
29	0.0681	0.02043	115	-0.31	-0.21
30	0.342	0.1026	70	18.55	2.62
32	<0.1	NR	93		
33	0.0958	0.02874	1923	1.60	0.78
34	0.158	0.0395	95	5.88	2.13
35	0.188	0.047	30	7.95	2.43

Statistics

Assigned Value*	0.0726	0.0072	**Robust SD**	0.017	
Spike	Not Spiked		**Robust CV**	23%	
Robust Average	0.0761	0.0086			
Median	0.0730	0.0067			
Mean	0.0909				
N	25				
Max.	0.342				
Min.	0.039				

*Robust Average excluding Laboratories 30, 34 and 35.


Kernel Density
Density
Result
Results: S3 - 62FTS
Assigned Value = 0.0726 ± 0.0072 µg/L
Results (µg/L)
Laboratory
25 15 16 4 8 18 20 24 29 6 27 22 3 2 10 14 21 26 7 1 19 33 34 35 30 28 5 32 12 9 11 13 17 23 Md R.A.


z-Scores: S3 - 62FTS
Target Standard Deviation 0.015 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 15 16 4 8 18 20 24 29 6 27 22 3 2 10 14 21 26 7 1 19 33 34 35 30

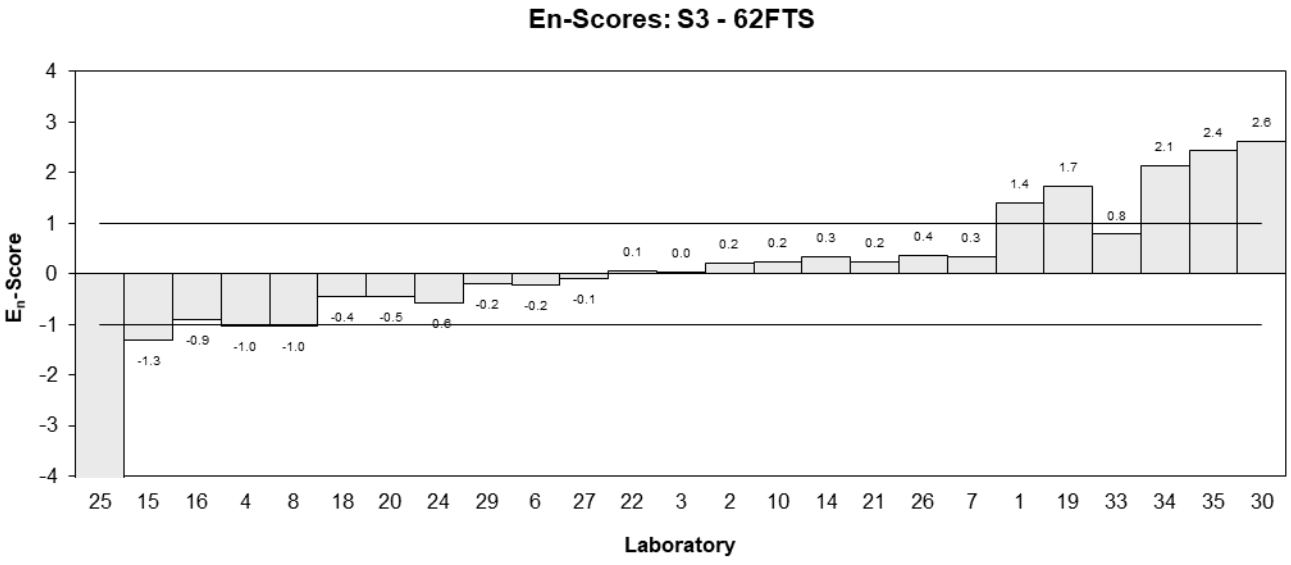

En-Scores: S3 - 62FTS
En-Score
Laboratory
25 15 16 4 8 18 20 24 29 6 27 22 3 2 10 14 21 26 7 1 19 33 34 35 30

Figure 73

Table 77

Sample Details

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

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	<0.025	NR	NR
2	0.003	0.002	136
3	< 0.1	NR	97
4	<0.05	NR	205
5	<0.08	NR	223
6	0.002	0.001	NR
7	0.000201697	0	NR
8	<0.01	NR	NR
9	<0.190	NR	150
10	<0.005	NR	105
11	NT	NT	NT
12	<0.2	NR	150
13	NT	NT	NT
14	< 0.01	0.003	133
15	0.00200	0.00200	79
16	<0.01	NR	113
17	NT	NT	NT
18	NR	NR	NR
19	<0.002	0.002	93
20	<0.01	NR	NR
21	<0.05	NR	122
22	<0.05	0.002	142
23	NT	NT	NT
24	<0.005	0.0005	NT
25	0.003	0.001	NR
26	0.004	0.004	154
27	0.0027	0.0017	121.3
28	<0.05	NR	93
29	0.00548	0.001644	89
30	0.008	0.00236	70
32	<0.3	NR	93
33	< 0.033	0.0099	1309
34	<0.0100	NR	301
35	<0.10	NR	30

Statistics

Assigned Value	Not Set	
Spike	Not Spiked	
Robust Average	0.0032	0.0018
Median	0.0030	0.0011
Mean	0.0038	
N	8	
Max.	0.008	
Min.	0.002	

Robust SD	0.0022
Robust CV	69%

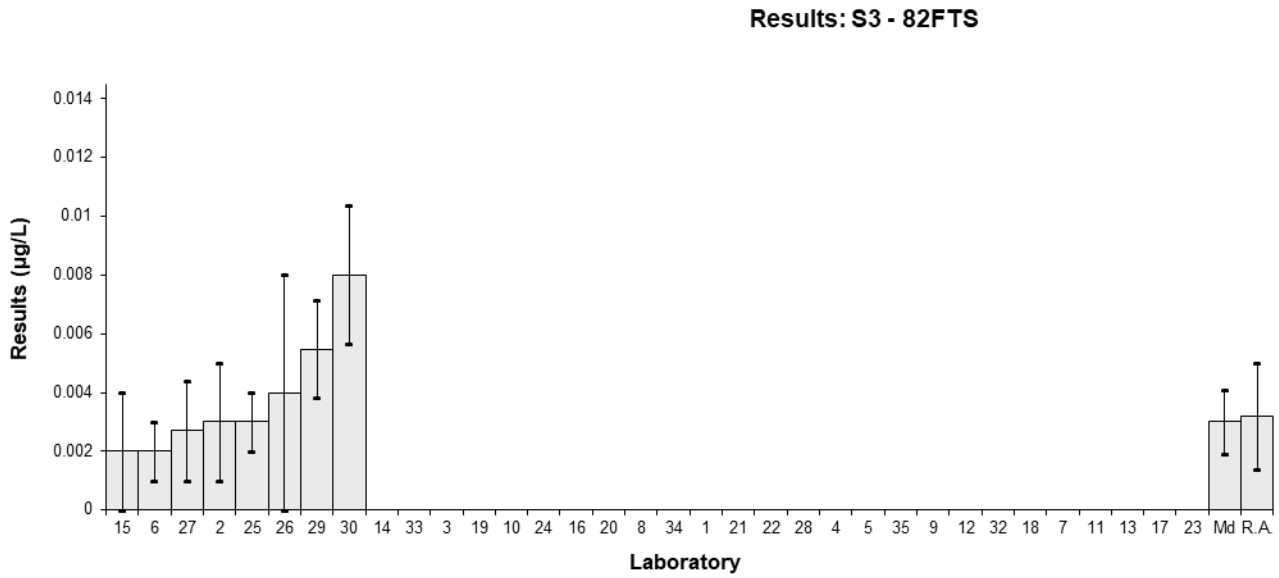

Results: S3 - 82FTS
Results (µg/L)
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
15 6 27 2 25 26 29 30 14 33 3 19 10 24 16 20 8 34 1 21 22 28 4 5 35 9 12 32 18 7 11 13 17 23 Md R.A.
Laboratory

Figure 74

Table 78

Sample Details

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

Participant Results

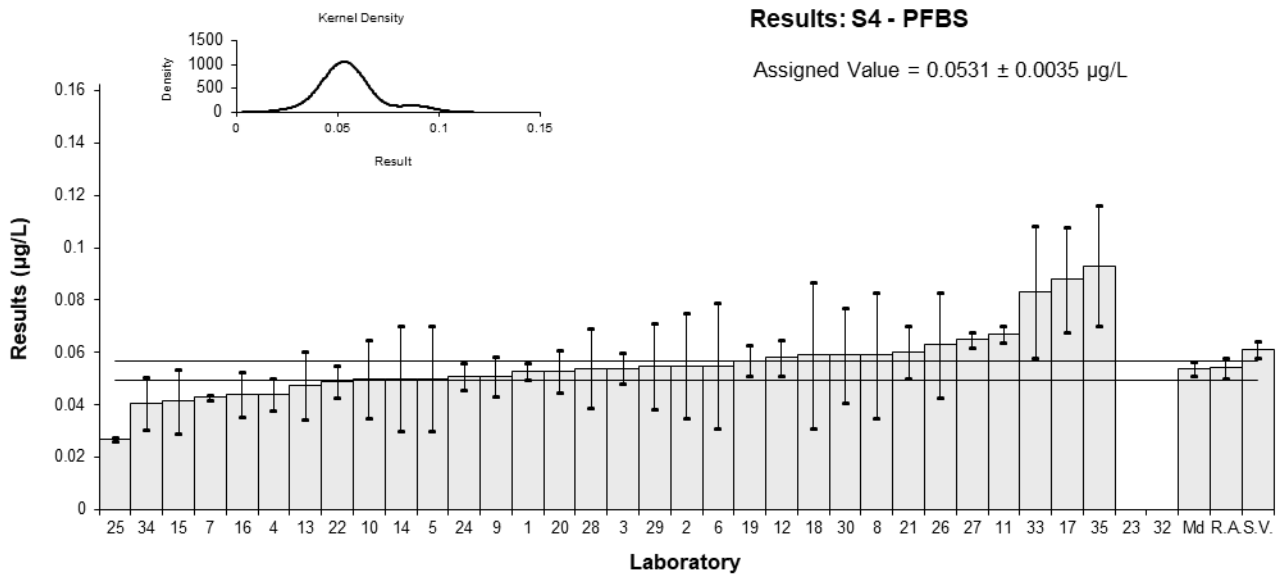
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.0530	0.0031	NR	-0.01	-0.02
2	0.055	0.02	95	0.18	0.09
3	0.054	0.0059	124	0.08	0.13
4	0.044	0.006	120	-0.86	-1.31
5	0.05	0.02	61	-0.29	-0.15
6	0.055	0.024	NR	0.18	0.08
7	0.043	0.001	NR	-0.95	-2.77
8	0.059	0.024	NR	0.56	0.24
9	0.0511	0.0076	89	-0.19	-0.24
10	0.050	0.015	64	-0.29	-0.20
11	0.067	0.0031	55	1.31	2.97
12	0.058	0.007	117	0.46	0.63
13	0.0476	0.0129	107	-0.52	-0.41
14	0.05	0.02	93	-0.29	-0.15
15	0.0414	0.0124	95	-1.10	-0.91
16	0.044	0.0087	85	-0.86	-0.97
17	0.088	0.02	NR	3.29	1.72
18	0.059	0.028	NR	0.56	0.21
19	0.057	0.006	96	0.37	0.56
20	0.053	0.008	101	-0.01	-0.01
21	0.06	0.01	97	0.65	0.65
22	0.049	0.006	61	-0.39	-0.59
23	NT	NT	NT		
24	0.051	0.0051	NT	-0.20	-0.34
25	0.027	0.0008	99.8	-2.46	-7.27
26	0.063	0.02	98	0.93	0.49
27	0.065	0.003	101.85	1.12	2.58
28	0.054	0.015	103	0.08	0.06
29	0.0547	0.01641	105	0.15	0.10
30	0.059	0.01829	160.7	0.56	0.32
32	NT	NT	NT		
33	0.0832	0.02496	196	2.83	1.19
34	0.0407	0.010175	104	-1.17	-1.15
35	0.093	0.023	40	3.76	1.72

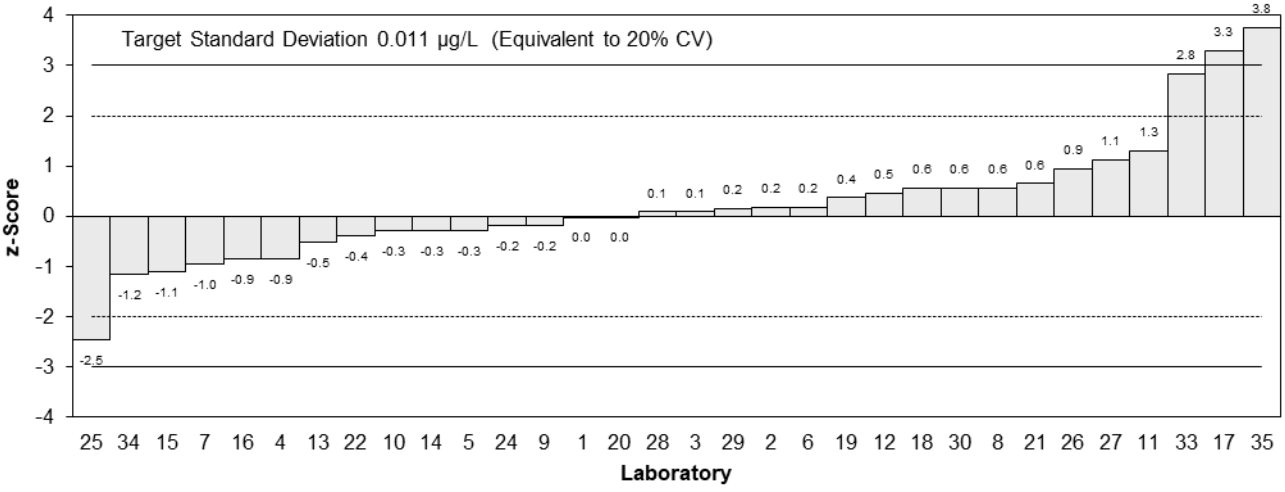
Statistics

Assigned Value*	0.0531	0.0035
Spike	0.0612	0.0031
Robust Average	0.0541	0.0041
Median	0.0540	0.0027
Mean	0.0556	
N	32	
Max.	0.093	
Min.	0.027	

Robust SD	0.0093	
Robust CV	17%	

*Robust Average excluding Laboratories 17, 25, 33 and 35.


Kernel Density
Density
Result
Results: S4 - PFBS
Assigned Value = 0.0531 ± 0.0035 µg/L
Results (µg/L)
Laboratory
25 34 15 7 16 4 13 22 10 14 5 24 9 1 20 28 3 29 2 6 19 12 18 30 8 21 26 27 11 33 17 35 23 32 Md R.A.S.V.


z-Scores: S4 - PFBS
Target Standard Deviation 0.011 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 34 15 7 16 4 13 22 10 14 5 24 9 1 20 28 3 29 2 6 19 12 18 30 8 21 26 27 11 33 17 35

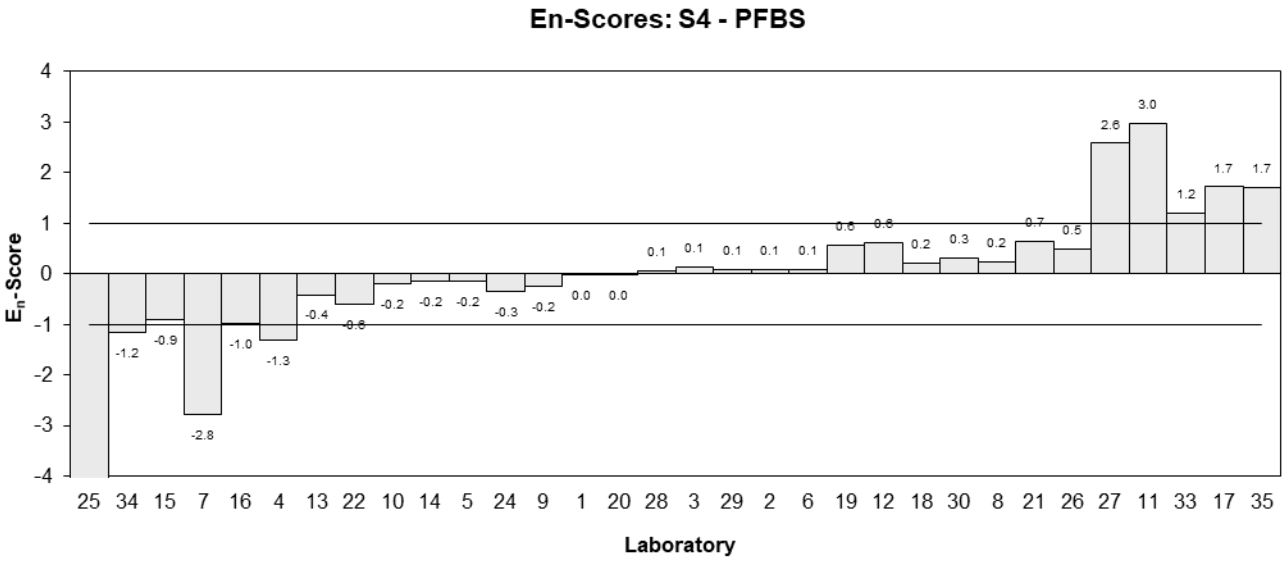

En-Scores: S4 - PFBS
En-Score
Laboratory
25 34 15 7 16 4 13 22 10 14 5 24 9 1 20 28 3 29 2 6 19 12 18 30 8 21 26 27 11 33 17 35

Figure 75

Table 79

Sample Details

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

Participant Results

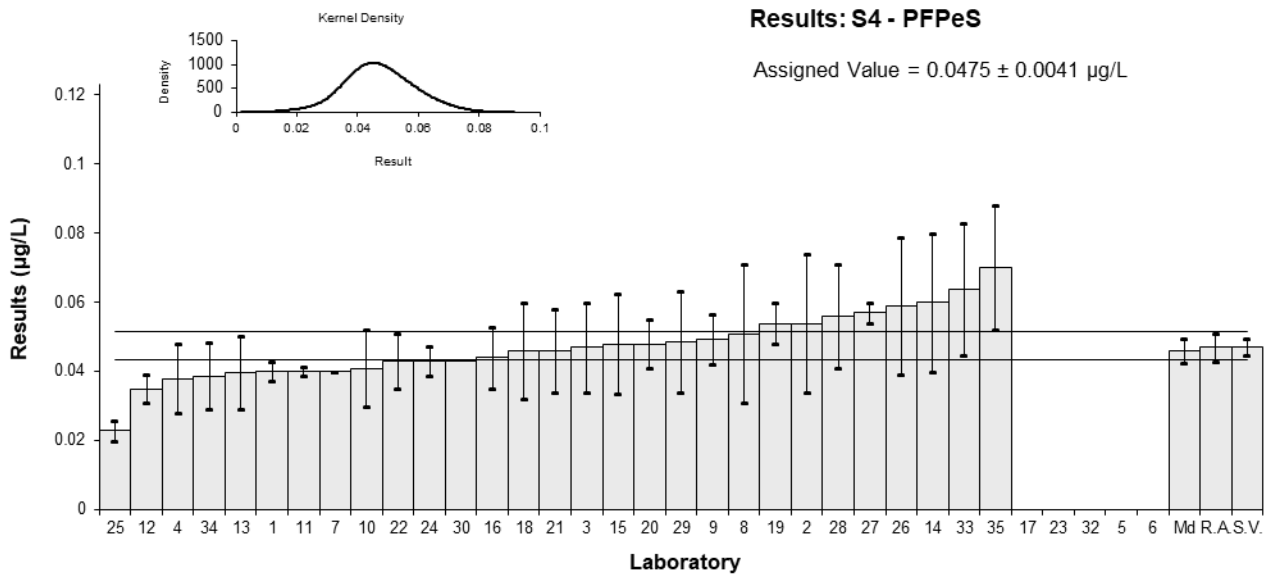
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.0400	0.0028	NR	-0.79	-1.51
2	0.054	0.02	95	0.68	0.32
3	0.047	0.013	111	-0.05	-0.04
4	0.038	0.010	109	-1.00	-0.88
5	NT	NT	NT		
6	NT	NT	NT		
7	0.040	0.000	NR	-0.79	-1.83
8	0.051	0.020	NR	0.37	0.17
9	0.0493	0.0073	89	0.19	0.21
10	0.041	0.011	NR	-0.68	-0.55
11	0.040	0.0013	NR	-0.79	-1.74
12	0.035	0.004	113	-1.32	-2.18
13	0.0397	0.0107	NR	-0.82	-0.68
14	0.06	0.02	NR	1.32	0.61
15	0.0480	0.0144	91	0.05	0.03
16	0.044	0.0088	75	-0.37	-0.36
17	NT	NT	NT		
18	0.046	0.014	NR	-0.16	-0.10
19	0.054	0.006	96	0.68	0.89
20	0.048	0.007	101	0.05	0.06
21	0.046	0.012	108	-0.16	-0.12
22	0.043	0.008	NR	-0.47	-0.50
23	NT	NT	NT		
24	0.043	0.0043	NT	-0.47	-0.76
25	0.023	0.003	NR	-2.58	-4.82
26	0.059	0.02	99	1.21	0.56
27	0.057	0.003	90.25	1.00	1.87
28	0.056	0.015	103	0.89	0.55
29	0.0486	0.01458	106	0.12	0.07
30	0.043	NR	144.5	-0.47	-1.10
32	NT	NT	NT		
33	0.0639	0.01917	196	1.73	0.84
34	0.0387	0.009675	104	-0.93	-0.84
35	0.07	0.018	40	2.37	1.22

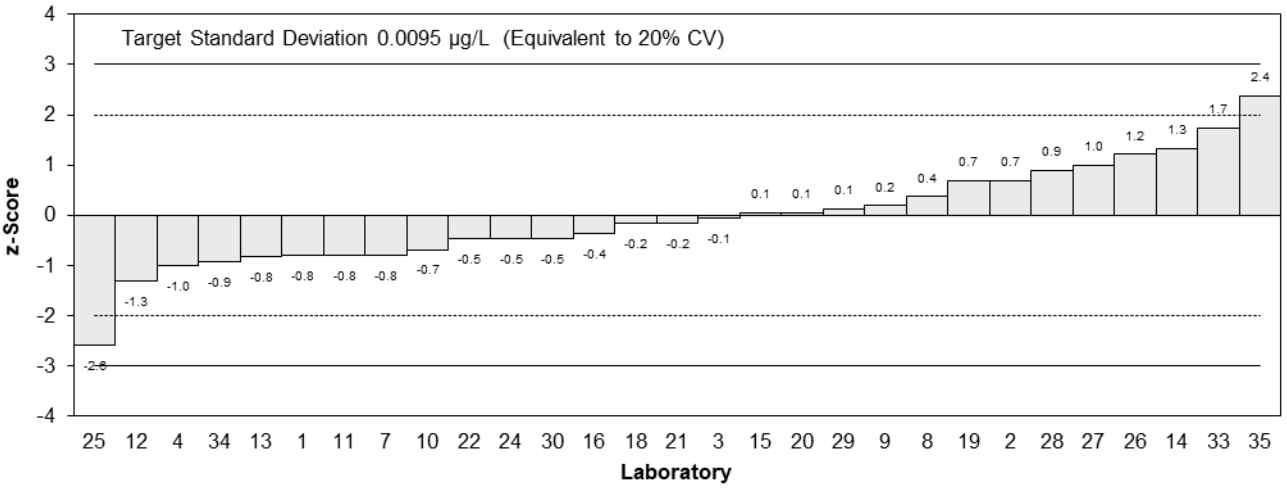
Statistics

Assigned Value*	0.0475	0.0041
Spike	0.0472	0.0023
Robust Average	0.0470	0.0042
Median	0.0460	0.0034
Mean	0.0471	
N	29	
Max.	0.07	
Min.	0.023	

Robust SD	0.0090	
Robust CV	19%	

*Robust Average excluding Laboratory 25.


Results: S4 - PFPeS
Assigned Value = 0.0475 ± 0.0041 µg/L
Kernel Density
Density
Result
Results (µg/L)
Laboratory
25 12 4 34 13 1 11 7 10 22 24 30 16 18 21 3 15 20 29 9 8 19 2 28 27 26 14 33 35 17 23 32 5 6 Md R.A.S.V.


z-Scores: S4 - PFPeS
Target Standard Deviation 0.0095 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 12 4 34 13 1 11 7 10 22 24 30 16 18 21 3 15 20 29 9 8 19 2 28 27 26 14 33 35

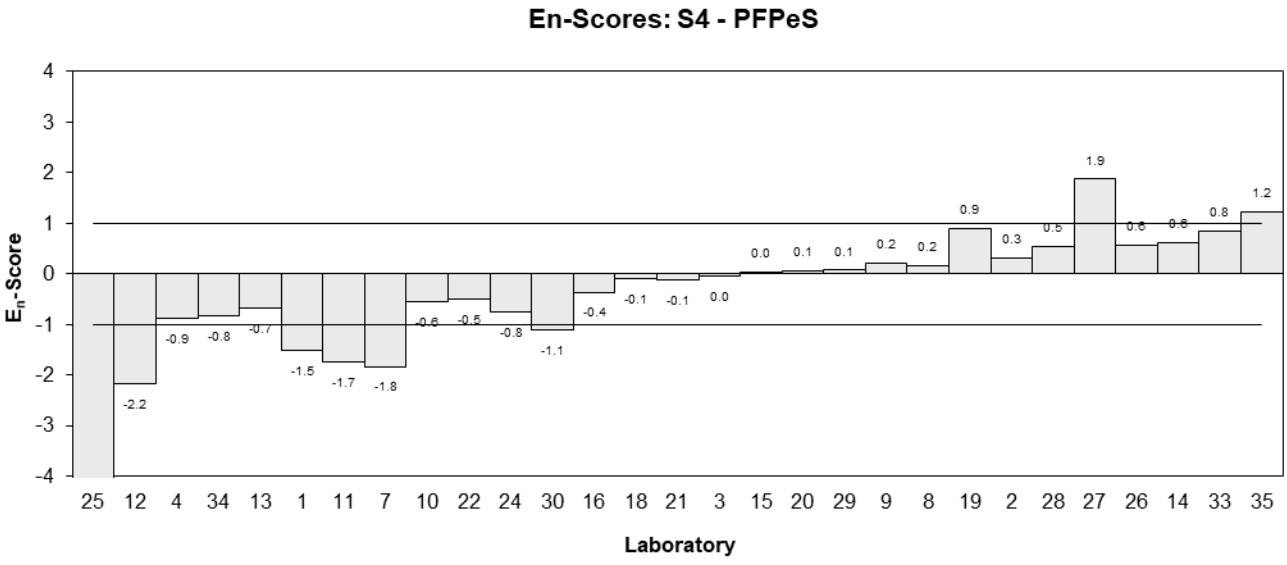

En-Scores: S4 - PFPeS
En-Score
Laboratory
25 12 4 34 13 1 11 7 10 22 24 30 16 18 21 3 15 20 29 9 8 19 2 28 27 26 14 33 35

Figure 76

Table 80

Sample Details

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

Participant Results

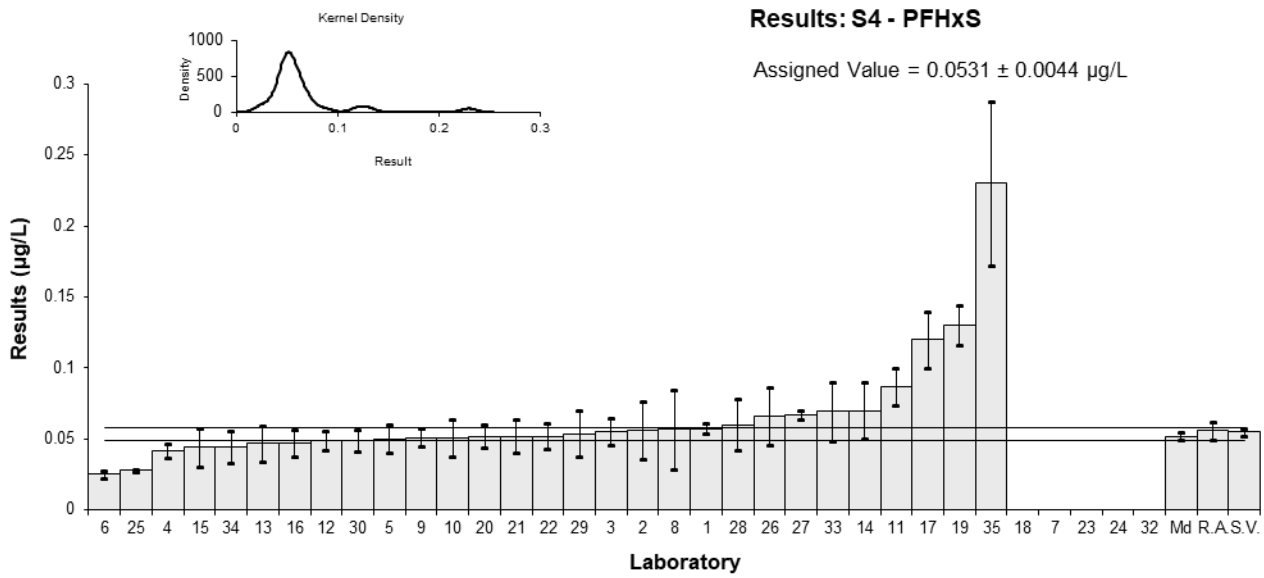
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.0574	0.0036	NR	0.40	0.76
2	0.056	0.02	86	0.27	0.14
3	0.055	0.0093	134	0.18	0.18
4	0.042	0.005	109	-1.05	-1.67
5	0.05	0.01	69	-0.29	-0.28
6	0.025	0.003	NR	-2.65	-5.28
7	NR	NR	NR		
8	0.057	0.028	NR	0.37	0.14
9	0.0508	0.00627	95	-0.22	-0.30
10	0.051	0.013	58	-0.20	-0.15
11	0.087	0.0132	NR	3.19	2.44
12	0.049	0.007	113	-0.39	-0.50
13	0.0468	0.0126	NR	-0.59	-0.47
14	0.07	0.02	85	1.59	0.83
15	0.0440	0.0132	91	-0.86	-0.65
16	0.047	0.0094	88	-0.57	-0.59
17	0.12	0.02	88.4	6.30	3.27
18	NR	NR	NR		
19	0.130	0.014	94	7.24	5.24
20	0.052	0.008	102	-0.10	-0.12
21	0.052	0.012	108	-0.10	-0.09
22	0.052	0.009	77	-0.10	-0.11
23	NT	NT	NT		
24	NT	NT	NT		
25	0.028	0.001	94.1	-2.36	-5.56
26	0.066	0.02	99	1.21	0.63
27	0.067	0.003	90.25	1.31	2.61
28	0.060	0.018	94	0.65	0.37
29	0.0536	0.01608	106	0.05	0.03
30	0.049	0.007693	160.7	-0.39	-0.46
32	NT	NT	NT		
33	0.0694	0.02082	203	1.53	0.77
34	0.0447	0.011175	104	-0.79	-0.70
35	0.23	0.058	40	16.66	3.04

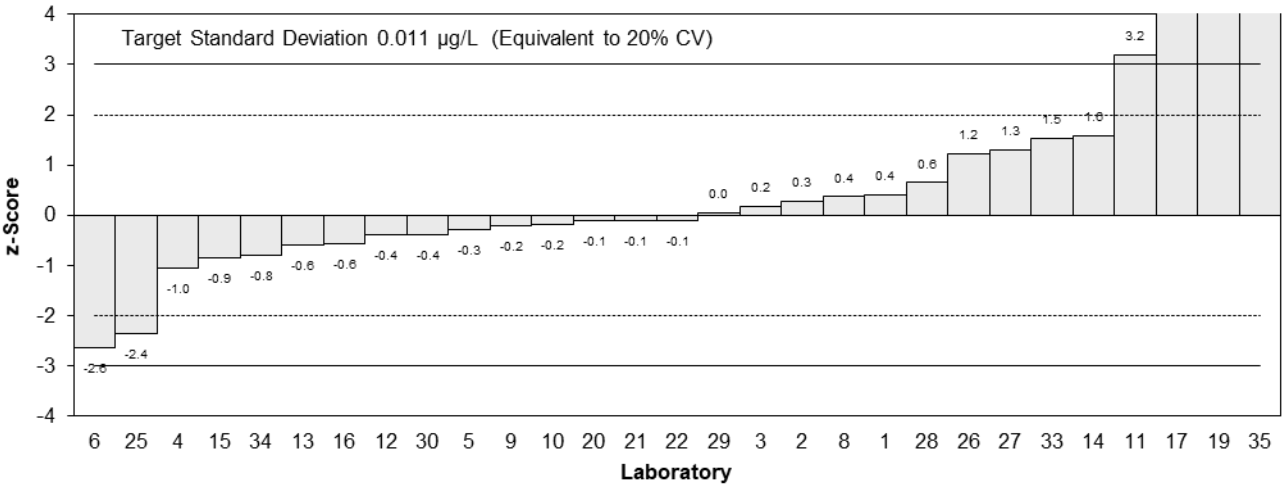
Statistics

Assigned Value*	0.0531	0.0044
Spike	0.0551	0.0028
Robust Average	0.0557	0.0061
Median	0.0520	0.0030
Mean	0.0642	
N	29	
Max.	0.23	
Min.	0.025	

Robust SD	0.013	
Robust CV	24%	

*Robust Average excluding Laboratories 6, 11, 17, 19 and 35.


Kernel Density
Density
Result
Results: S4 - PFHxS
Assigned Value = 0.0531 ± 0.0044 µg/L
Results (µg/L)
Laboratory
6 25 4 15 34 13 16 12 30 5 9 10 20 21 22 29 3 2 8 1 28 26 27 33 14 11 17 19 35 18 7 23 24 32 Md R.A.S.V.


z-Scores: S4 - PFHxS
Target Standard Deviation 0.011 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
6 25 4 15 34 13 16 12 30 5 9 10 20 21 22 29 3 2 8 1 28 26 27 33 14 11 17 19 35

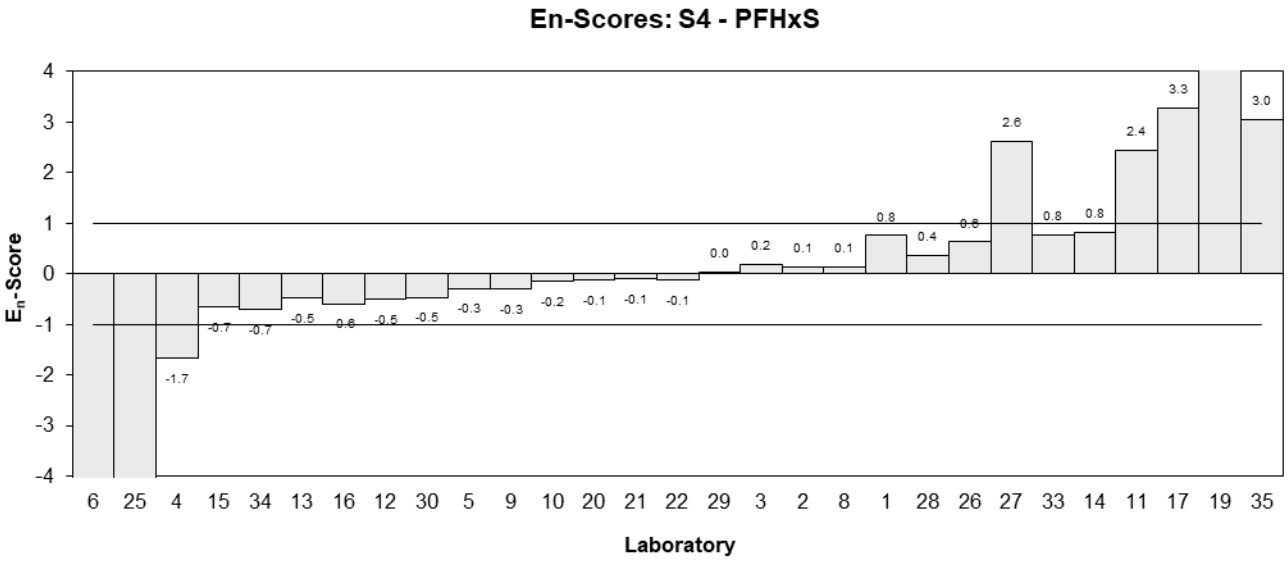

En-Scores: S4 - PFHxS
En-Score
Laboratory
6 25 4 15 34 13 16 12 30 5 9 10 20 21 22 29 3 2 8 1 28 26 27 33 14 11 17 19 35

Figure 77

Table 81

Sample Details

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

Participant Results

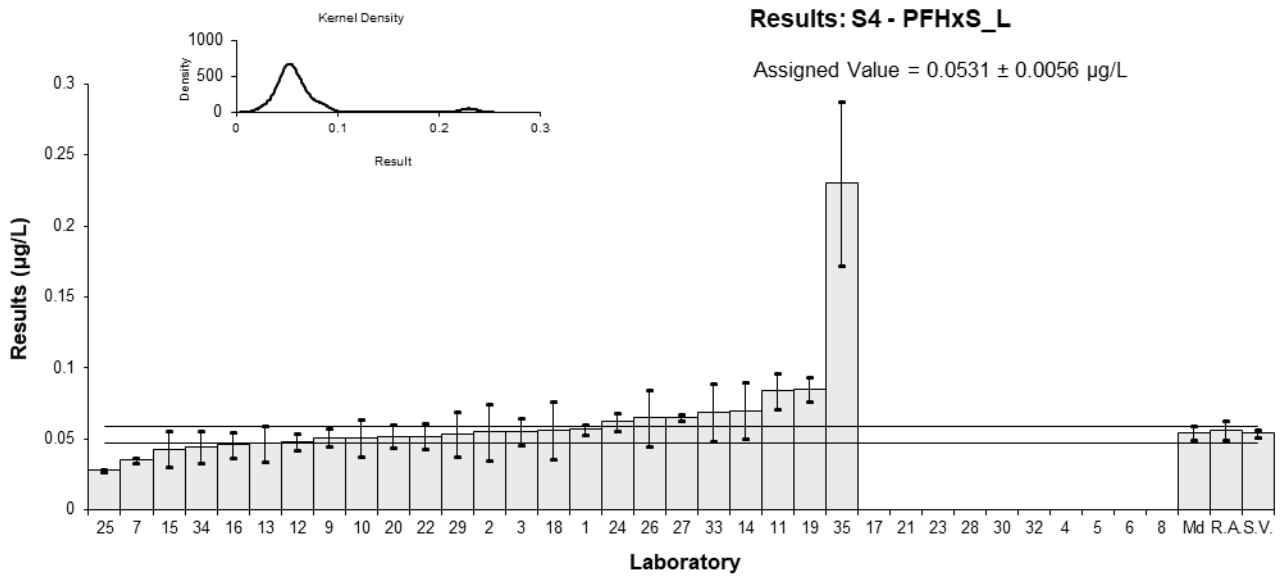
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.0566	0.0036	88	0.33	0.53
2	0.055	0.02	86	0.18	0.09
3	0.055	0.0093	134	0.18	0.18
4	NT	NT	NT		
5	NT	NT	NT		
6	NT	NT	NT		
7	0.035	0.002	NR	-1.70	-3.04
8	NT	NT	NT		
9	0.0508	0.0063	95	-0.22	-0.27
10	0.051	0.013	NR	-0.20	-0.15
11	0.084	0.0127	57	2.91	2.23
12	0.048	0.006	113	-0.48	-0.62
13	0.0468	0.0126	111	-0.59	-0.46
14	0.07	0.02	85	1.59	0.81
15	0.0430	0.0129	91	-0.95	-0.72
16	0.046	0.0092	88	-0.67	-0.66
17	NT	NT	NT		
18	0.056	0.02	NR	0.27	0.14
19	0.085	0.009	94	3.00	3.01
20	0.052	0.008	102	-0.10	-0.11
21	NT	NT	NT		
22	0.052	0.009	77	-0.10	-0.10
23	NT	NT	NT		
24	0.062	0.0062	NT	0.84	1.07
25	0.028	0.001	94.1	-2.36	-4.41
26	0.065	0.02	99	1.12	0.57
27	0.065	0.002	90.25	1.12	2.00
28	NT	NT	NT		
29	0.0533	0.01599	106	0.02	0.01
30	NT	NT	NT		
32	NT	NT	NT		
33	0.0687	0.02061	203	1.47	0.73
34	0.0447	0.011175	104	-0.79	-0.67
35	0.23	0.058	40	16.66	3.04

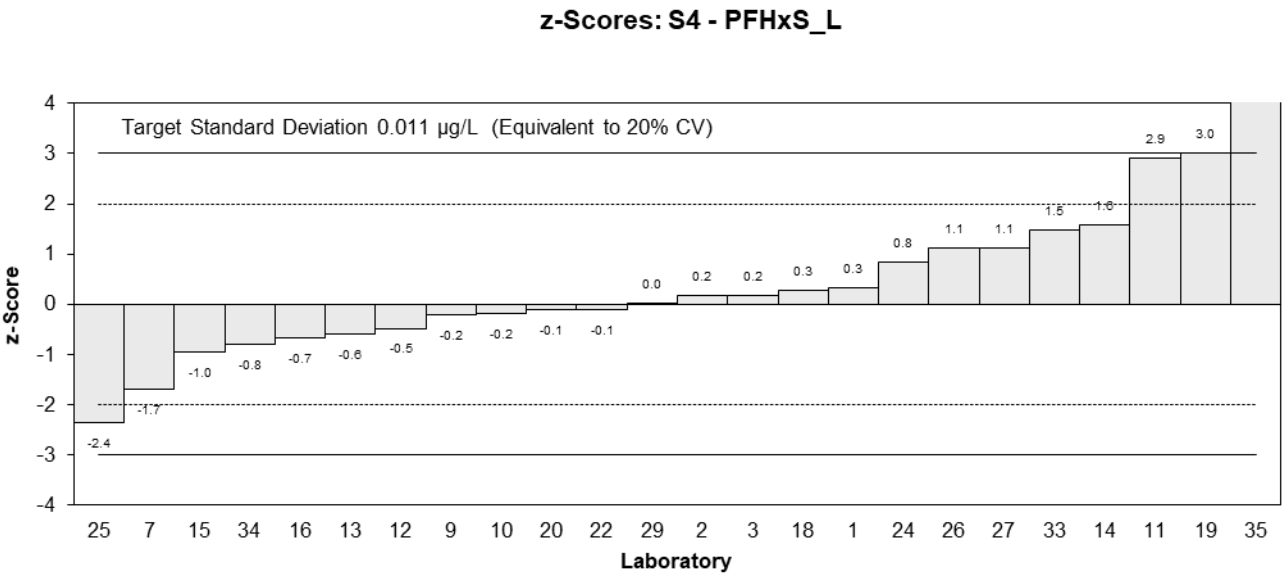
Statistics

Assigned Value*	0.0531	0.0056
Spike	0.0542	0.0027
Robust Average	0.0558	0.0068
Median	0.0542	0.0050
Mean	0.0626	
N	24	
Max.	0.23	
Min.	0.028	

Robust SD	0.013	
Robust CV	24%	

*Robust Average excluding Laboratories 11, 19 and 35.


Kernel Density
Density
Result
Results: S4 - PFHxS_L
Assigned Value = 0.0531 ± 0.0056 µg/L
Results (µg/L)
Laboratory
25 7 15 34 16 13 12 9 10 20 22 29 2 3 18 1 24 26 27 33 14 11 19 35 17 21 23 28 30 32 4 5 6 8 Md R.A.S.V.


z-Scores: S4 - PFHxS_L
Target Standard Deviation 0.011 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 7 15 34 16 13 12 9 10 20 22 29 2 3 18 1 24 26 27 33 14 11 19 35

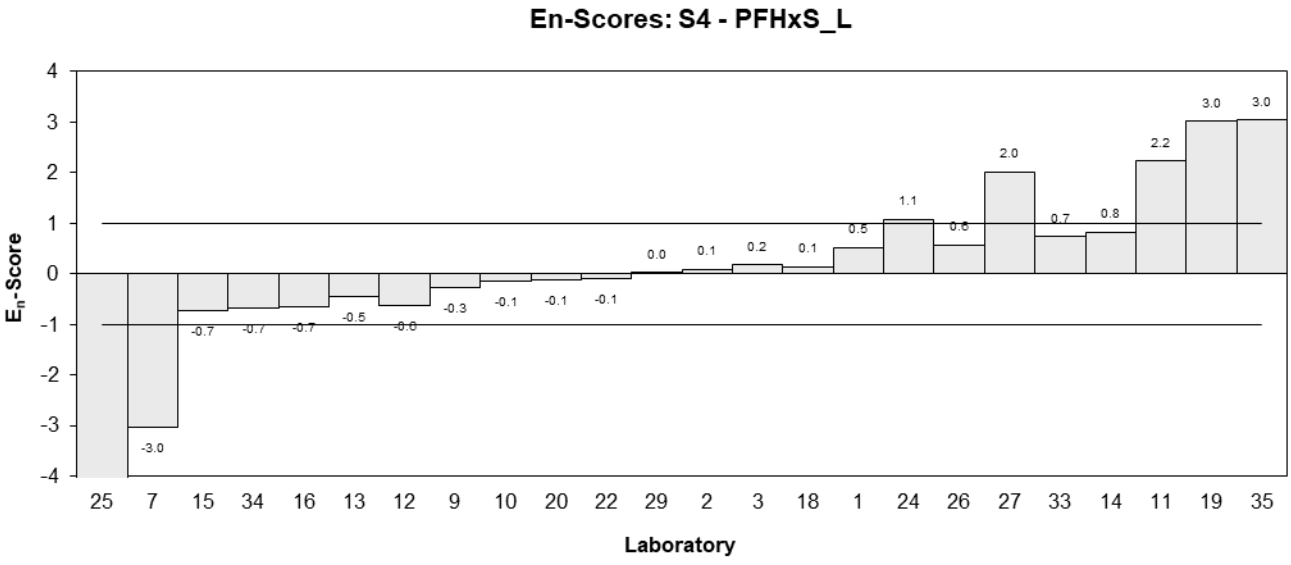

En-Scores: S4 - PFHxS_L
En-Score
Laboratory
25 7 15 34 16 13 12 9 10 20 22 29 2 3 18 1 24 26 27 33 14 11 19 35

Figure 78

Table 82

Sample Details

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

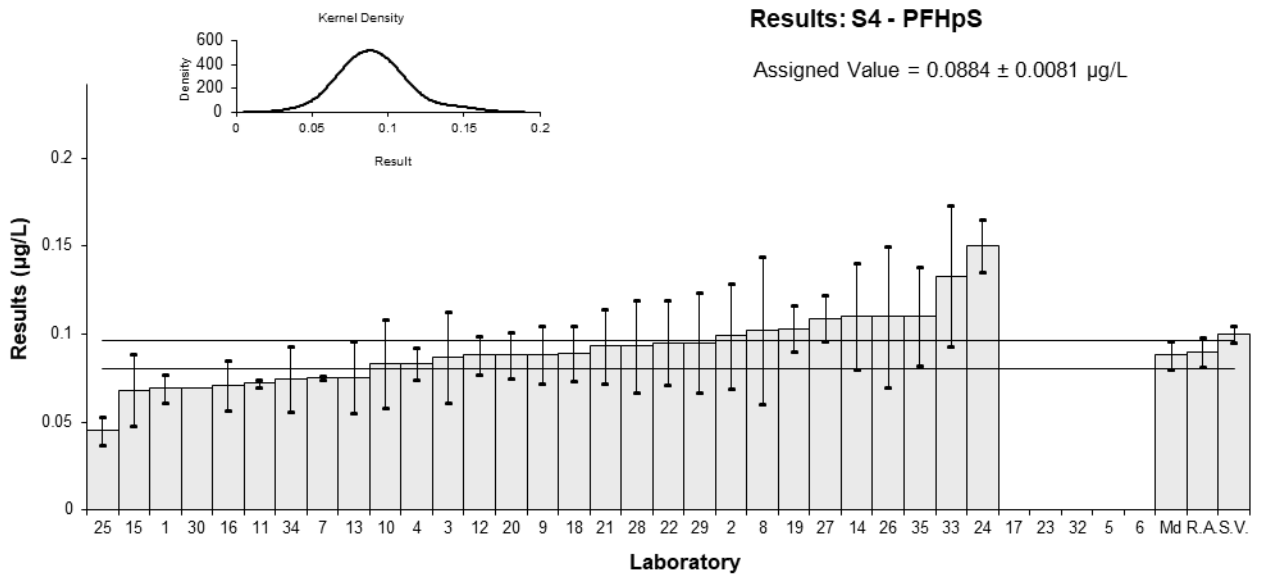
Participant Results

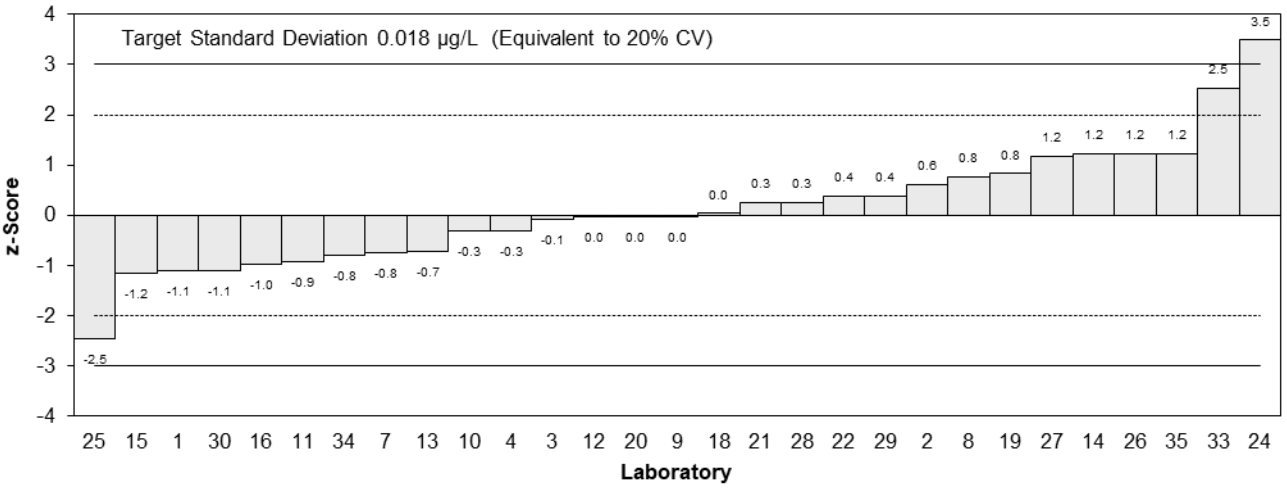
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.0690	0.0077	NR	-1.10	-1.74
2	0.099	0.03	86	0.60	0.34
3	0.087	0.026	134	-0.08	-0.05
4	0.083	0.009	107	-0.31	-0.45
5	NT	NT	NT		
6	NT	NT	NT		
7	0.075	0.001	NR	-0.76	-1.64
8	0.102	0.042	NR	0.77	0.32
9	0.0880	0.0163	95	-0.02	-0.02
10	0.083	0.025	NR	-0.31	-0.21
11	0.072	0.0021	NR	-0.93	-1.96
12	0.088	0.011	113	-0.02	-0.03
13	0.0755	0.0204	NR	-0.73	-0.59
14	0.11	0.03	NR	1.22	0.70
15	0.0680	0.0204	85	-1.15	-0.93
16	0.071	0.0142	83	-0.98	-1.06
17	NT	NT	NT		
18	0.089	0.016	NR	0.03	0.03
19	0.103	0.013	94	0.83	0.95
20	0.088	0.013	105	-0.02	-0.03
21	0.093	0.021	108	0.26	0.20
22	0.095	0.024	NR	0.37	0.26
23	NT	NT	NT		
24	0.15	0.015	NT	3.48	3.61
25	0.045	0.008	NR	-2.45	-3.81
26	0.11	0.04	107	1.22	0.53
27	0.109	0.013	90.25	1.17	1.34
28	0.093	0.026	92	0.26	0.17
29	0.0951	0.02853	96	0.38	0.23
30	0.069	NR	144.5	-1.10	-2.40
32	NT	NT	NT		
33	0.133	0.0399	203	2.52	1.10
34	0.0742	0.01855	104	-0.80	-0.70
35	0.11	0.028	40	1.22	0.74

Statistics

Assigned Value*	0.0884	0.0081	**Robust SD**	0.018	
Spike	0.100	0.005	**Robust CV**	20%	
Robust Average	0.0895	0.0083			
Median	0.0880	0.0078			
Mean	0.0906				
N	29				
Max.	0.15				
Min.	0.045				

*Robust Average excluding Laboratory 24.


Kernel Density
Density
Result
Results: S4 - PFHpS
Assigned Value = 0.0884 ± 0.0081 µg/L
Results (µg/L)
Laboratory
25 15 1 30 16 11 34 7 13 10 4 3 12 20 9 18 21 28 22 29 2 8 19 27 14 26 35 33 24 17 23 32 5 6 Md R.A.S.V.


z-Scores: S4 - PFHpS
Target Standard Deviation 0.018 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 15 1 30 16 11 34 7 13 10 4 3 12 20 9 18 21 28 22 29 2 8 19 27 14 26 35 33 24

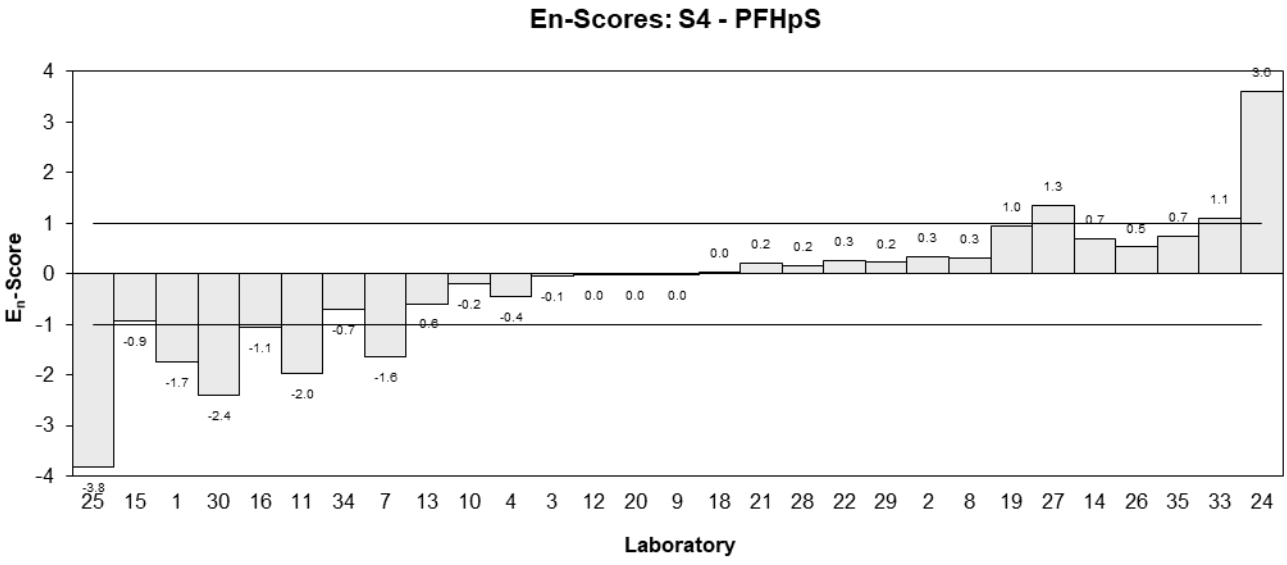

En-Scores: S4 - PFHpS
En-Score
Laboratory
25 15 1 30 16 11 34 7 13 10 4 3 12 20 9 18 21 28 22 29 2 8 19 27 14 26 35 33 24

Figure 79

Table 83

Sample Details

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

Participant Results

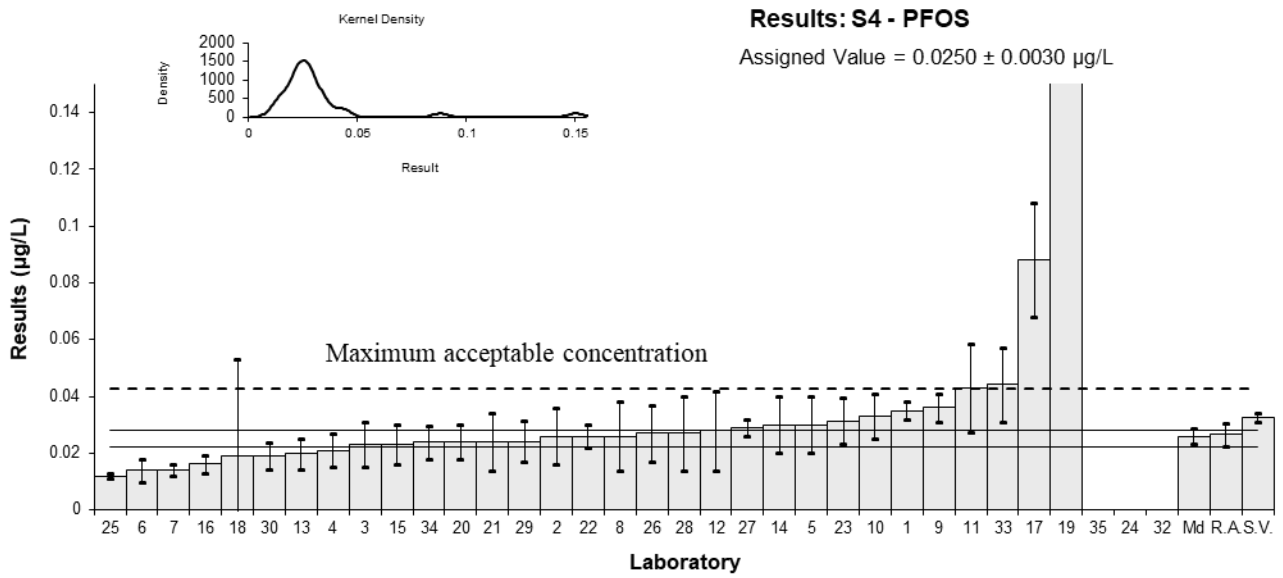
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.0350	0.0032	NR	2.00	2.28
2	0.026	0.01	81	0.20	0.10
3	0.023	0.0079	142	-0.40	-0.24
4	0.021	0.006	107	-0.80	-0.60
5	0.03	0.01	58	1.00	0.48
6	0.014	0.004	NR	-2.20	-2.20
7	0.014	0.002	80.99	-2.20	-3.05
8	0.026	0.012	NR	0.20	0.08
9*	0.0360	0.005	95	2.00	1.00
10	0.033	0.008	70	1.60	0.94
11	0.043	0.0155	NR	3.60	1.14
12	0.028	0.014	83	0.60	0.21
13	0.0199	0.0054	NR	-1.02	-0.83
14	0.03	0.01	105	1.00	0.48
15	0.0231	0.00693	85	-0.38	-0.25
16	0.0162	0.0032	95	-1.76	-2.01
17	0.088	0.02	78.8	12.60	3.12
18	0.019	0.034	NR	-1.20	-0.18
19	2.788	0.288	88	552.60	9.59
20	0.024	0.006	105	-0.20	-0.15
21	0.024	0.010	115	-0.20	-0.10
22	0.026	0.004	86	0.20	0.20
23	0.0314	0.0082	91.6	1.28	0.73
24	NT	NT	NT		
25	0.012	0.0008	96	-2.60	-4.19
26	0.027	0.01	107	0.40	0.19
27	0.029	0.003	103.4	0.80	0.94
28	0.027	0.013	92	0.40	0.15
29	0.0241	0.00723	96	-0.18	-0.11
30	0.019	0.004731	145.8	-1.20	-1.07
32	NT	NT	NT		
33	0.0441	0.01323	185	3.82	1.41
34	0.0238	0.00595	100	-0.24	-0.18
35	<0.05	NR	40		

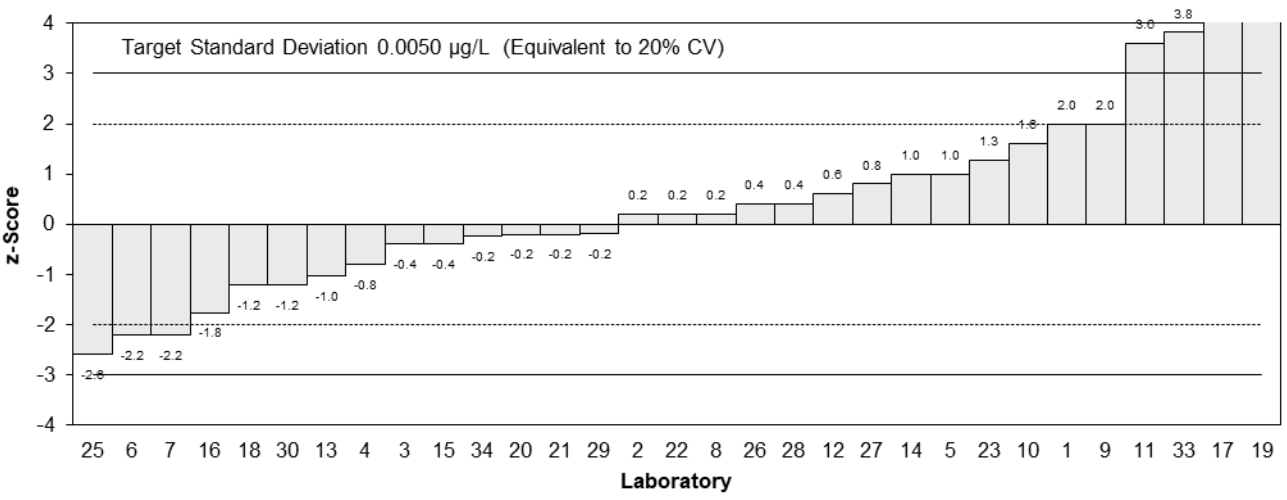
Statistics**

Assigned Value***	0.0250	0.0030
Spike	0.0326	0.0016
Robust Average	0.0259	0.0037
Median	0.0260	0.0025
Mean	0.0279	
N	30	
Max.	2.788	
Min.	0.012	

Robust SD	0.0081	
Robust CV	31%	

*z-Score adjusted to 2 and E_n-score adjusted to 1 (see Section 6.3).
**Laboratory 19 excluded from statistical calculation.
***Robust Average excluding Laboratories 11, 17, 25 and 33.


Kernel Density
Density
Result
Results: S4 - PFOS
Assigned Value = 0.0250 ± 0.0030 µg/L
Maximum acceptable concentration
Results (µg/L)
Laboratory
25 6 7 16 18 30 13 4 3 15 34 20 21 29 2 22 8 26 28 12 27 14 5 23 10 1 9 11 33 17 19 35 24 32 Md R.A.S.V.


z-Scores: S4 - PFOS
Target Standard Deviation 0.0050 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 6 7 16 18 30 13 4 3 15 34 20 21 29 2 22 8 26 28 12 27 14 5 23 10 1 9 11 33 17 19

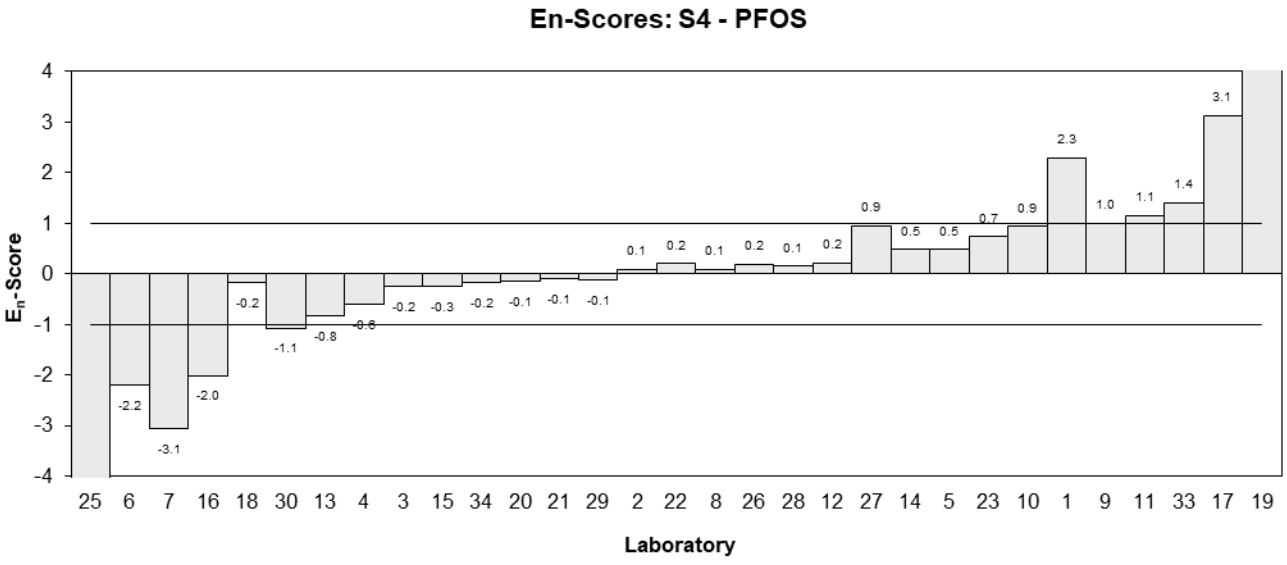

En-Scores: S4 - PFOS
En-Score
Laboratory
25 6 7 16 18 30 13 4 3 15 34 20 21 29 2 22 8 26 28 12 27 14 5 23 10 1 9 11 33 17 19

Figure 80

Table 84

Sample Details

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

Participant Results

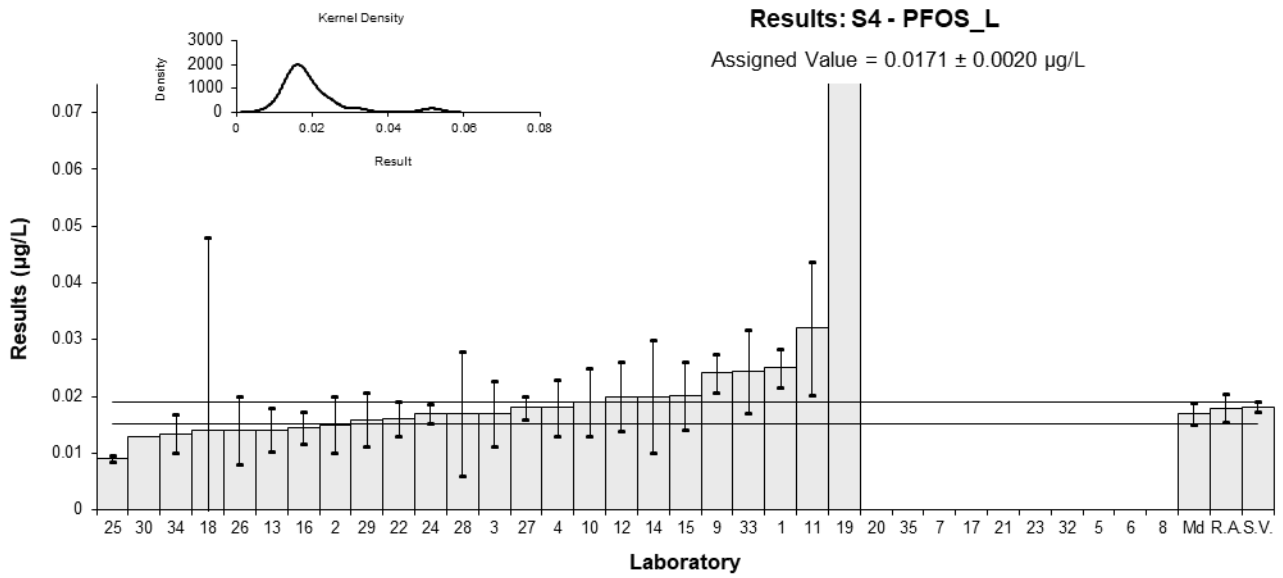
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.0250	0.0033	93	2.31	2.05
2	0.015	0.005	81	-0.61	-0.39
3	0.017	0.0057	142	-0.03	-0.02
4	0.018	0.005	107	0.26	0.17
5	NT	NT	NT		
6	NT	NT	NT		
7	NR	NR	NR		
8	NT	NT	NT		
9	0.0241	0.0034	95	2.05	1.77
10	0.019	0.006	NR	0.56	0.30
11	0.032	0.0117	70	4.36	1.26
12	0.020	0.006	83	0.85	0.46
13	0.0141	0.0038	106	-0.88	-0.70
14	0.02	0.01	105	0.85	0.28
15	0.0201	0.00603	85	0.88	0.47
16	0.0145	0.0029	95	-0.76	-0.74
17	NT	NT	NT		
18	0.014	0.034	NR	-0.91	-0.09
19	0.515	0.053	88	145.58	9.39
20	<0.02	NR	NR		
21	NT	NT	NT		
22	0.016	0.003	86	-0.32	-0.31
23	NT	NT	NT		
24	0.017	0.0017	107	-0.03	-0.04
25	0.009	0.0006	96	-2.37	-3.88
26	0.014	0.006	107	-0.91	-0.49
27	0.018	0.002	103.4	0.26	0.32
28	0.017	0.011	92	-0.03	-0.01
29	0.0159	0.00477	96	-0.35	-0.23
30	0.013	NR	NR	-1.20	-2.05
32	NT	NT	NT		
33	0.0245	0.00735	185	2.16	0.97
34	0.0134	0.00335	100	-1.08	-0.95
35	<0.05	NR	40		

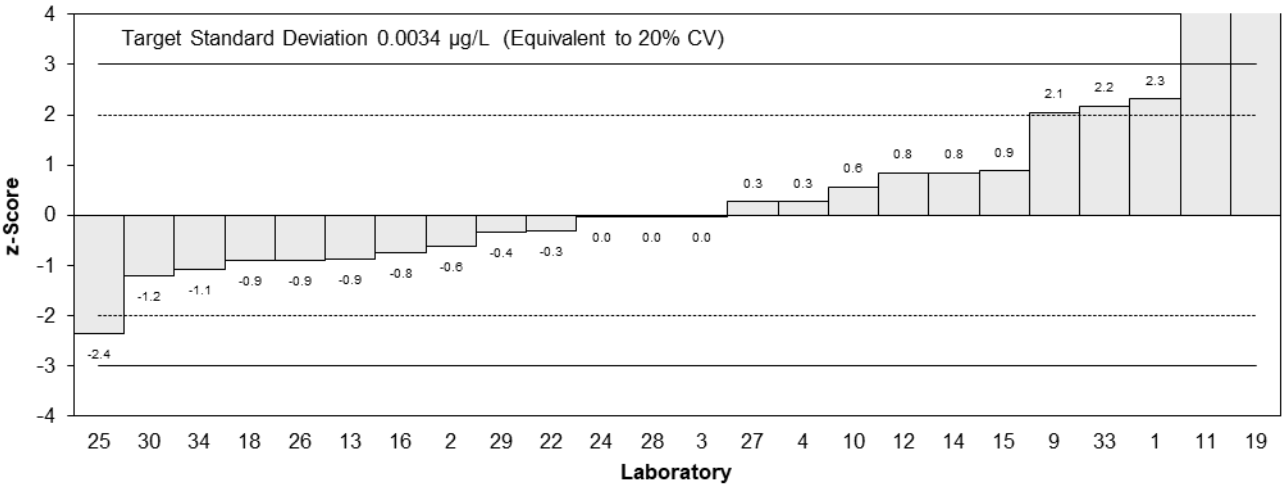
Statistics*

Assigned Value**	0.0171	0.0020
Spike	0.0182	0.0009
Robust Average	0.0175	0.0023
Median	0.0170	0.0019
Mean	0.0179	
N	23	
Max.	0.032	
Min.	0.009	

Robust SD	0.0044	
Robust CV	25%	

*Laboratory 19 excluded from statistical calculation.
**Robust Average excluding Laboratory 11.


Kernel Density
Density
Result
Results: S4 - PFOS_L
Assigned Value = 0.0171 ± 0.0020 µg/L
Results (µg/L)
Laboratory
25 30 34 18 26 13 16 2 29 22 24 28 3 27 4 10 12 14 15 9 33 1 11 19 20 35 7 17 21 23 32 5 6 8 Md R.A.S.V.


z-Scores: S4 - PFOS_L
Target Standard Deviation 0.0034 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 30 34 18 26 13 16 2 29 22 24 28 3 27 4 10 12 14 15 9 33 1 11 19

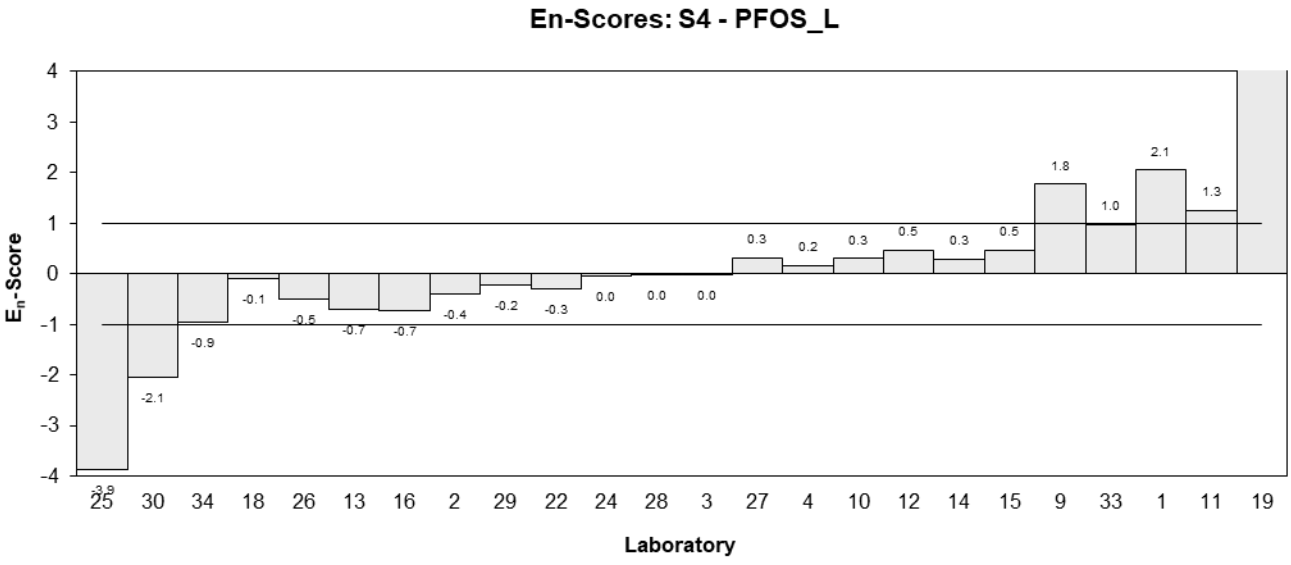

En-Scores: S4 - PFOS_L
En-Score
Laboratory
25 30 34 18 26 13 16 2 29 22 24 28 3 27 4 10 12 14 15 9 33 1 11 19

Figure 81

Table 85

Sample Details

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

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	<0.0250	NR	NR
2	NT	NT	NT
3	NR	NR	NR
4	<0.005	NR	99.3
5	NT	NT	NT
6	NT	NT	NT
7	NT	NT	NT
8	NT	NT	NT
9	0.00302	0.00061	95
10	<0.005	NR	NR
11	NR	NR	NR
12	NT	NT	NT
13	0.0029	0.0008	NR
14	< 0.01	0.003	NR
15	<0.01	NR	85
16	<0.01	NR	77
17	NT	NT	NT
18	NR	NR	NR
19	0.004	0.002	88
20	<0.01	NR	NR
21	NT	NT	NT
22	<0.01	0.002	NR
23	NT	NT	NT
24	<0.005	0.0005	NT
25	0.002	0.0002	NR
26	NT	NT	NT
27	<0.002	NR	103.4
28	NT	NT	NT
29	0.00346	0.001038	96
30	NT	NT	NT
32	NT	NT	NT
33	NT	NT	NT
34	<0.0100	NR	100
35	NT	NT	NT

Statistics

Assigned Value	Not Set		**Robust SD**	0.00084
Spike	0.00480	0.00024	**Robust CV**	27%
Robust Average	0.00308	0.00094		
Median	0.00302	0.00081		
Mean	0.00308			
N	5			
Max.	0.004			
Min.	0.002			

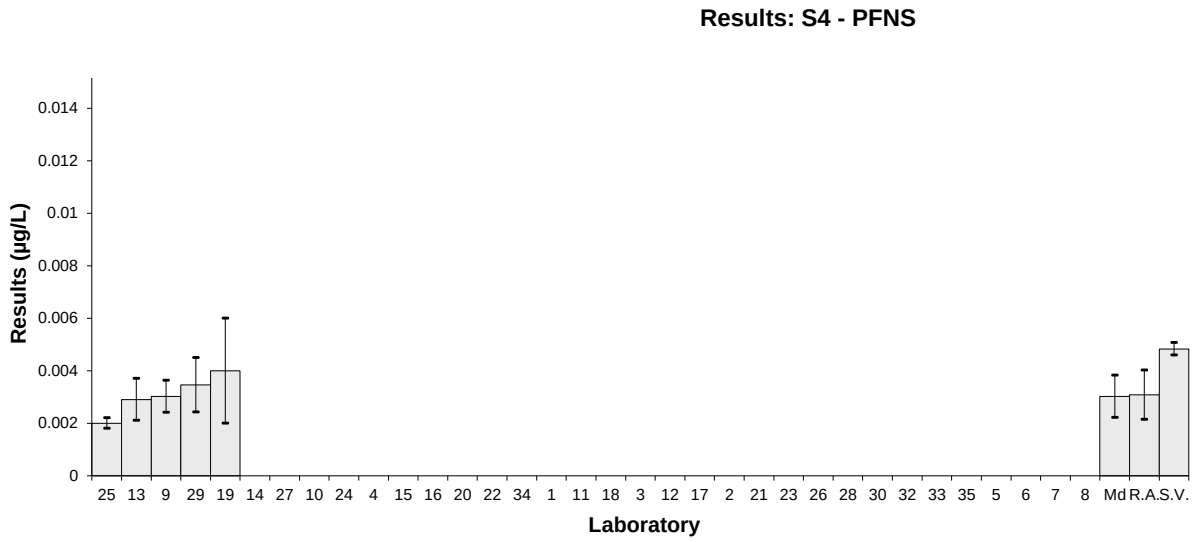

Results: S4 - PFNS
Results (µg/L)
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
25 13 9 29 19 14 27 10 24 4 15 16 20 22 34 1 11 18 3 12 17 2 21 23 26 28 30 32 33 35 5 6 7 8 Md R.A. S.V.
Laboratory

Figure 82

Table 86

Sample Details

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

Participant Results

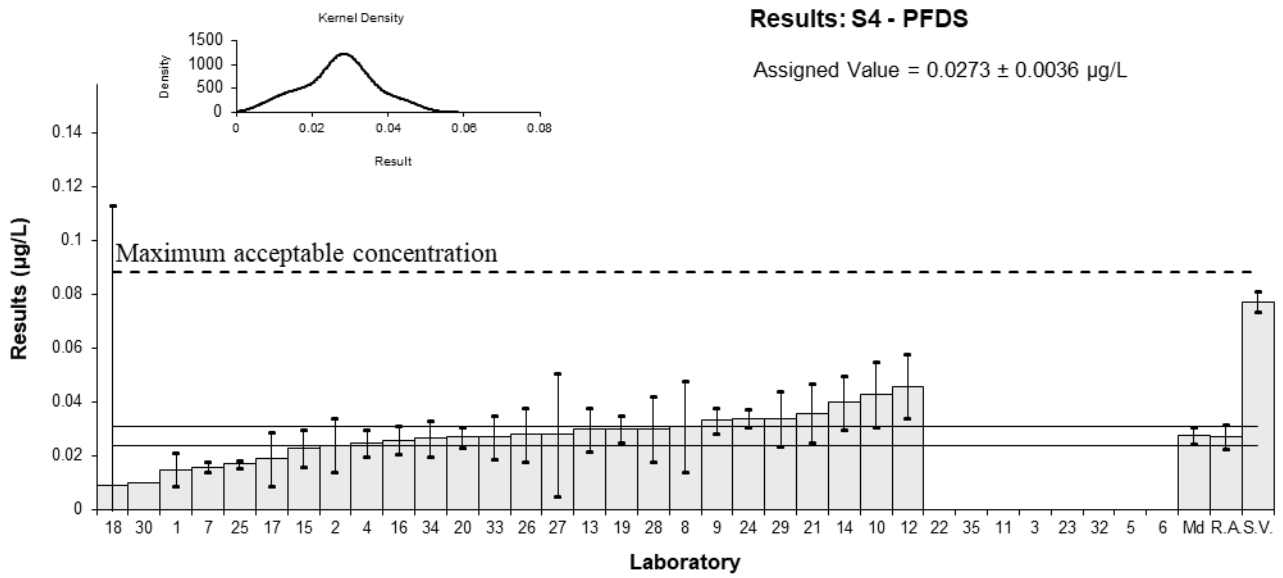
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.0150	0.0063	NR	-2.25	-1.70
2	0.024	0.01	81	-0.60	-0.31
3	NR	NR	NR		
4	0.025	0.005	107	-0.42	-0.37
5	NT	NT	NT		
6	NT	NT	NT		
7	0.016	0.002	NR	-2.07	-2.74
8	0.031	0.017	NR	0.68	0.21
9	0.0332	0.0048	95	1.08	0.98
10*	0.043	0.012	NR	2.00	1.00
11	NR	NR	NR		
12*	0.046	0.012	120	2.00	1.00
13	0.0299	0.0081	NR	0.48	0.29
14*	0.04	0.01	NR	2.00	1.00
15	0.0231	0.00693	79	-0.77	-0.54
16	0.026	0.0052	73	-0.24	-0.21
17	0.019	0.01	NR	-1.52	-0.78
18	0.009	0.104	NR	-3.35	-0.18
19	0.030	0.005	88	0.49	0.44
20	0.027	0.004	118	-0.05	-0.06
21	0.036	0.011	115	1.59	0.75
22	<0.01	0.002	NR		
23	NT	NT	NT		
24	0.034	0.0034	NT	1.23	1.35
25	0.017	0.0014	NR	-1.89	-2.67
26	0.028	0.01	107	0.13	0.07
27	0.028	0.023	103.4	0.13	0.03
28	0.030	0.012	101	0.49	0.22
29	0.0341	0.01023	96	1.25	0.63
30	0.01	NR	145.8	-3.17	-4.81
32	NT	NT	NT		
33	0.0271	0.00813	159	-0.04	-0.02
34	0.0267	0.006675	100	-0.11	-0.08
35	<0.05	NR	40		

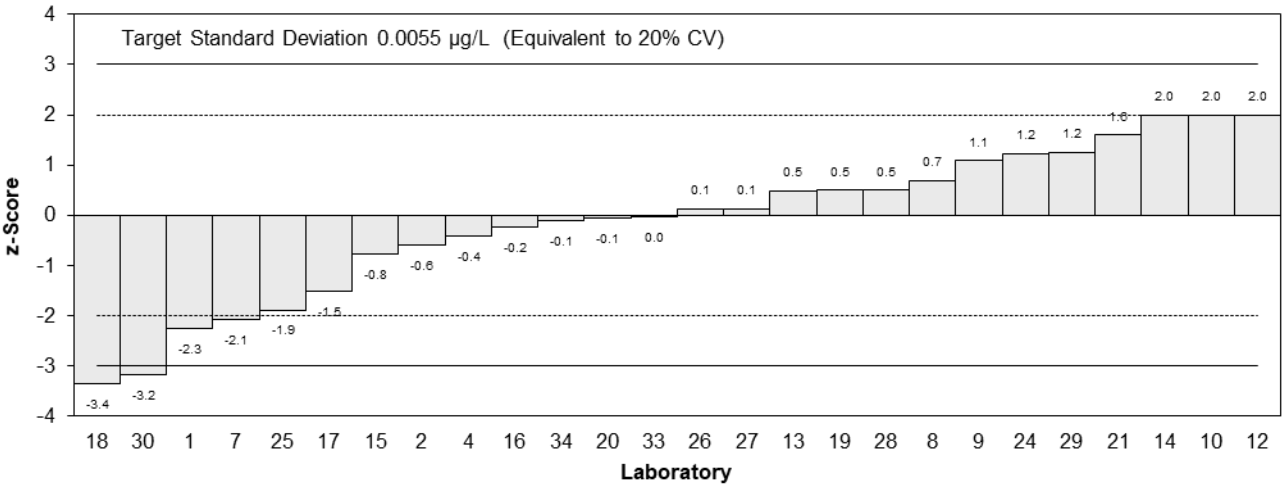
Statistics

Assigned Value**	0.0273	0.0036
Spike	0.0773	0.0039
Robust Average	0.0273	0.0045
Median	0.0276	0.0030
Mean	0.0272	
N	26	
Max.	0.046	
Min.	0.009	

Robust SD	0.0092	
Robust CV	34%	

*z-Score adjusted to 2 and E_n-score adjusted to 1 (see Section 6.3).
**Robust Average excluding Laboratories 10, 12, 18 and 30.


Kernel Density
Density
Result
Results: S4 - PFDS
Assigned Value = 0.0273 ± 0.0036 µg/L
Maximum acceptable concentration
Results (µg/L)
Laboratory
18 30 1 7 25 17 15 2 4 16 34 20 33 26 27 13 19 28 8 9 24 29 21 14 10 12 22 35 11 3 23 32 5 6 Md R.A.S.V.


z-Scores: S4 - PFDS
Target Standard Deviation 0.0055 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
18 30 1 7 25 17 15 2 4 16 34 20 33 26 27 13 19 28 8 9 24 29 21 14 10 12

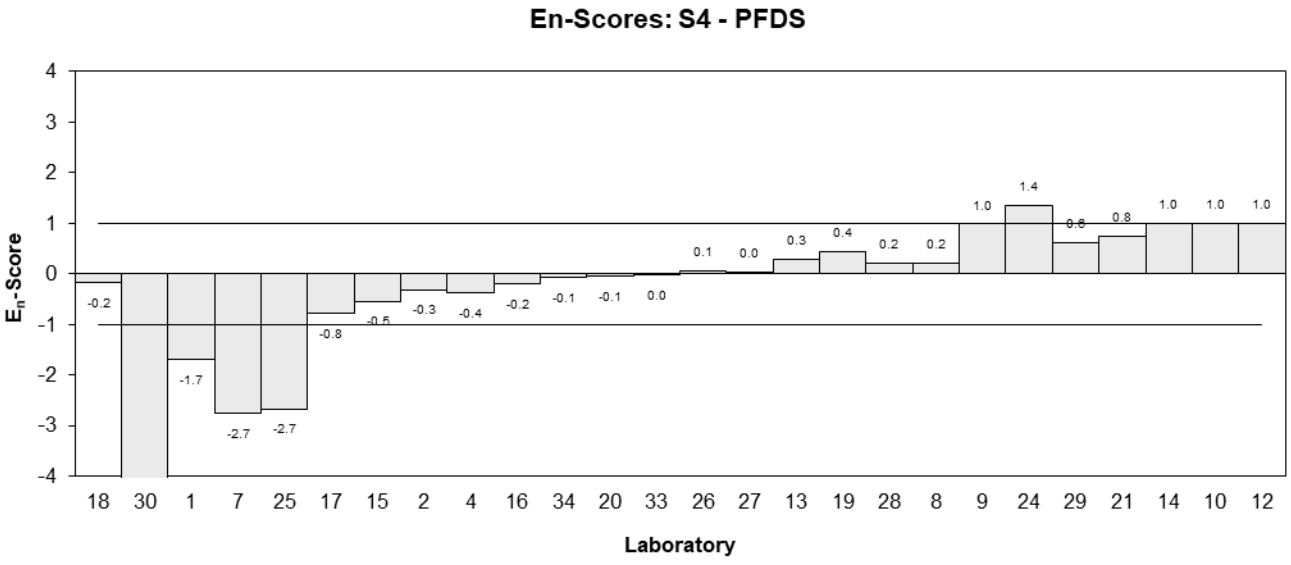

En-Scores: S4 - PFDS
En-Score
Laboratory
18 30 1 7 25 17 15 2 4 16 34 20 33 26 27 13 19 28 8 9 24 29 21 14 10 12

Figure 83

Table 87

Sample Details

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

Participant Results

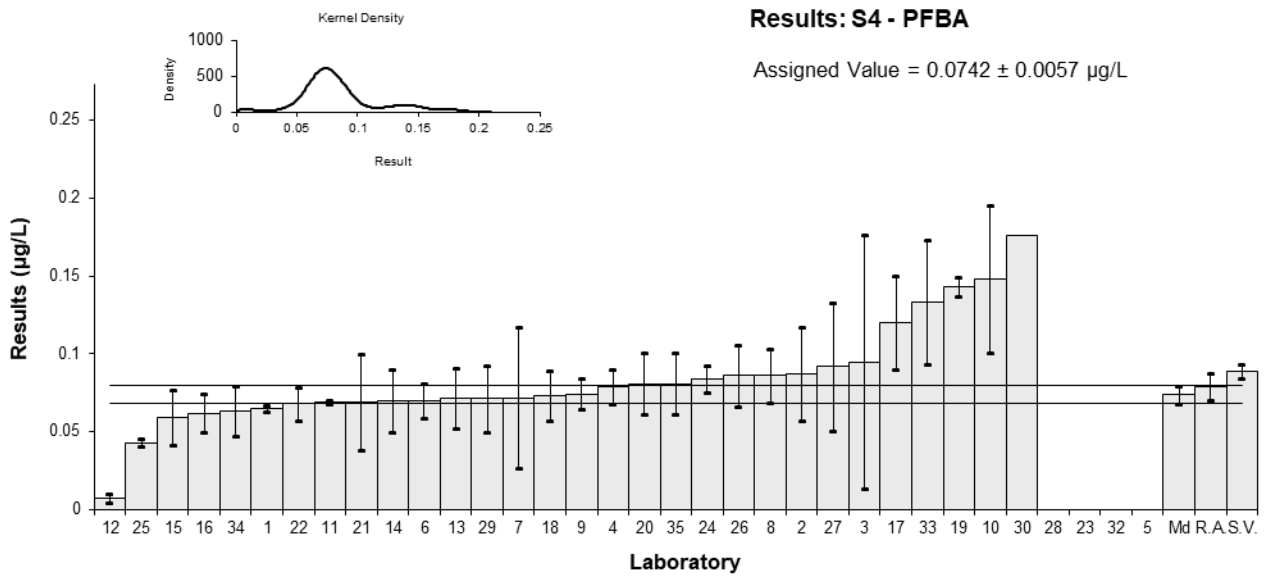
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.0650	0.0022	90	-0.62	-1.51
2	0.087	0.03	65	0.86	0.42
3	0.095	0.081	91	1.40	0.26
4	0.079	0.011	47.7	0.32	0.39
5	NT	NT	NT		
6	0.070	0.011	NR	-0.28	-0.34
7	0.072	0.045	NR	-0.15	-0.05
8	0.086	0.017	NR	0.80	0.66
9	0.0744	0.01	79	0.01	0.02
10	0.148	0.047	77	4.97	1.56
11	0.069	0.0013	34	-0.35	-0.89
12	0.0077	0.0030	98	-4.48	-10.32
13	0.0713	0.0193	92	-0.20	-0.14
14	0.07	0.02	95	-0.28	-0.20
15	0.0590	0.0177	86	-1.02	-0.82
16	0.062	0.0124	80	-0.82	-0.89
17	0.12	0.03	16.6	3.09	1.50
18	0.073	0.016	NR	-0.08	-0.07
19	0.143	0.006	58	4.64	8.31
20	0.081	0.02	93	0.46	0.33
21	0.069	0.031	99	-0.35	-0.16
22	0.068	0.011	66	-0.42	-0.50
23	NT	NT	NT		
24	0.084	0.0084	105	0.66	0.97
25	0.043	0.0025	88.2	-2.10	-5.01
26	0.086	0.02	78	0.80	0.57
27	0.092	0.041	96.55	1.20	0.43
28	<0.1	NR	101		
29	0.0714	0.02142	103	-0.19	-0.13
30	0.176	NR	144.5	6.86	17.86
32	NT	NT	NT		
33	0.133	0.0399	46.4	3.96	1.46
34	0.0633	0.015825	77	-0.73	-0.65
35	0.081	0.020	70	0.46	0.33

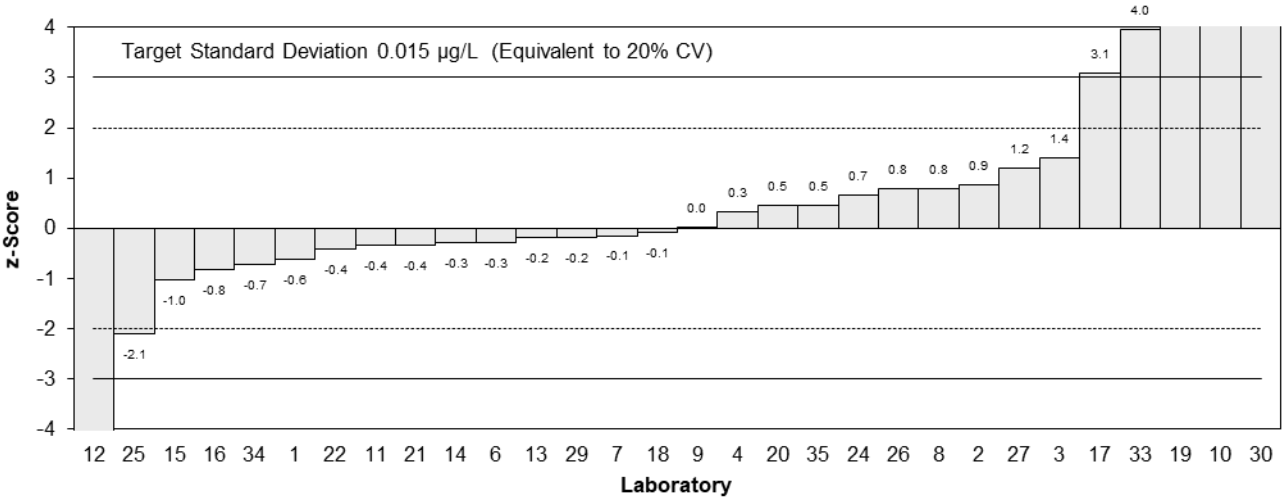
Statistics

Assigned Value*	0.0742	0.0057
Spike	0.0892	0.0045
Robust Average	0.0788	0.0086
Median	0.0737	0.0057
Mean	0.0833	
N	30	
Max.	0.176	
Min.	0.0077	

Robust SD	0.019	
Robust CV	24%	

*Robust Average excluding Laboratories 10, 12, 17, 19, 30 and 33.


Kernel Density
Density
1000
500
0
0
0.05
0.1
0.15
0.2
0.25
Result
Results: S4 - PFBA
Assigned Value = 0.0742 ± 0.0057 µg/L
Results (µg/L)
0.25
0.2
0.15
0.1
0.05
0
12 25 15 16 34 1 22 11 21 14 6 13 29 7 18 9 4 20 35 24 26 8 2 27 3 17 33 19 10 30 28 23 32 5 Md R.A.S.V.
Laboratory


z-Scores: S4 - PFBA
Target Standard Deviation 0.015 µg/L (Equivalent to 20% CV)
z-Score
4
3
2
1
0
-1
-2
-3
-4
-2.1
-1.0
-0.8
-0.7
-0.6
-0.4
-0.4
-0.4
-0.3
-0.3
-0.2
-0.2
-0.1
-0.1
0.0
0.3
0.5
0.5
0.7
0.8
0.8
0.9
1.2
1.4
3.1
4.0
12 25 15 16 34 1 22 11 21 14 6 13 29 7 18 9 4 20 35 24 26 8 2 27 3 17 33 19 10 30
Laboratory

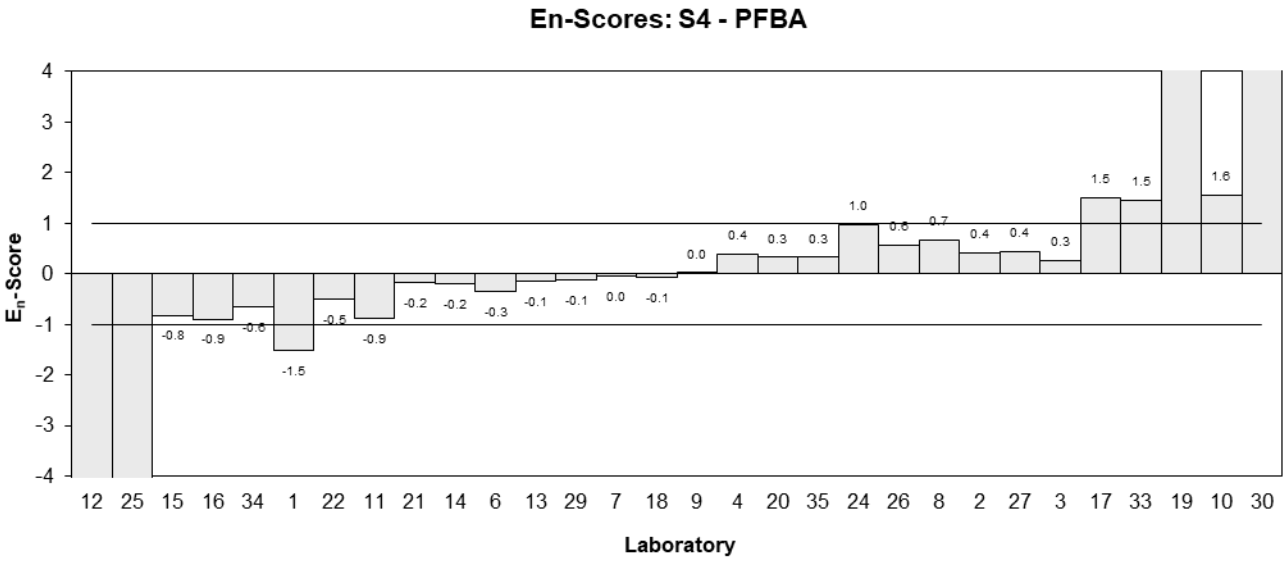

En-Scores: S4 - PFBA
En-Score
4
3
2
1
0
-1
-2
-3
-4
-0.8
-0.9
-0.6
-1.5
-0.5
-0.9
-0.2
-0.2
-0.3
-0.1
-0.1
0.0
-0.1
0.0
0.4
0.3
0.3
1.0
0.6
0.7
0.4
0.4
0.3
1.5
1.5
1.6
12 25 15 16 34 1 22 11 21 14 6 13 29 7 18 9 4 20 35 24 26 8 2 27 3 17 33 19 10 30
Laboratory

Figure 84

Table 88

Sample Details

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

Participant Results

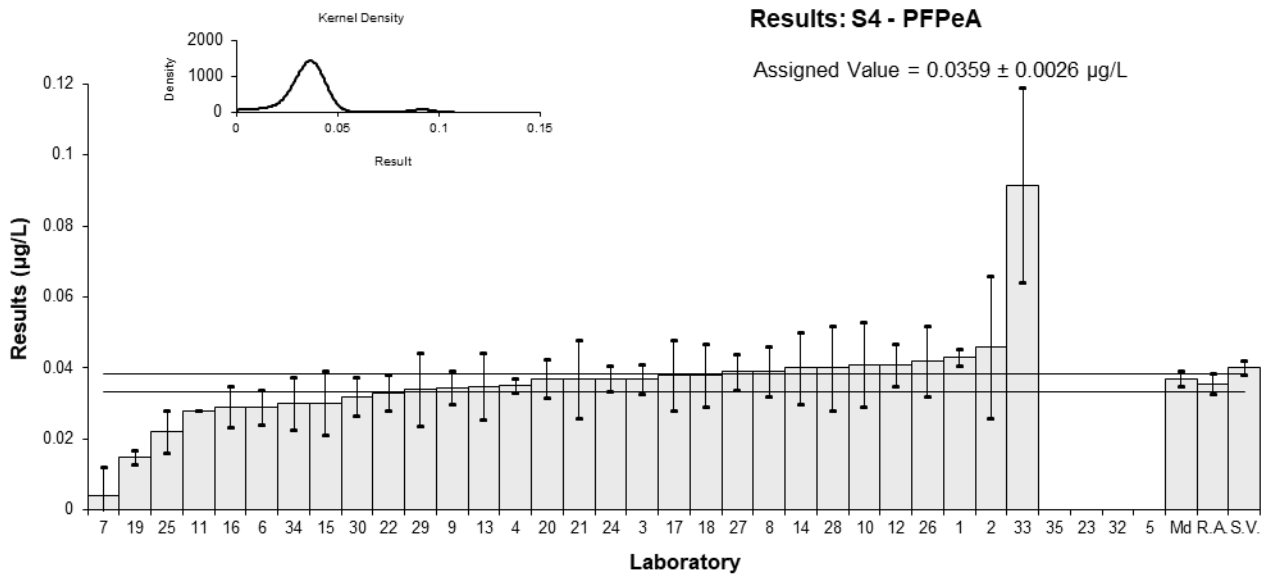
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.0430	0.0024	NR	0.99	2.01
2	0.046	0.02	63	1.41	0.50
3	0.037	0.0041	108	0.15	0.23
4	0.035	0.002	74.7	-0.13	-0.27
5	NT	NT	NT		
6	0.029	0.005	NR	-0.96	-1.22
7	0.004	0.008	NR	-4.44	-3.79
8	0.039	0.007	NR	0.43	0.42
9	0.0345	0.0048	87	-0.19	-0.26
10	0.041	0.012	57	0.71	0.42
11	0.028	0.0001	46	-1.10	-3.04
12	0.041	0.006	124	0.71	0.78
13	0.0349	0.0094	109	-0.14	-0.10
14	0.04	0.01	90	0.57	0.40
15	0.0302	0.00906	85	-0.79	-0.60
16	0.029	0.0058	85	-0.96	-1.09
17	0.038	0.01	NR	0.29	0.20
18	0.038	0.009	NR	0.29	0.22
19	0.015	0.002	106	-2.91	-6.37
20	0.037	0.0055	93	0.15	0.18
21	0.037	0.011	81	0.15	0.10
22	0.033	0.005	87	-0.40	-0.51
23	NT	NT	NT		
24	0.037	0.0037	NT	0.15	0.24
25	0.022	0.0059	91	-1.94	-2.16
26	0.042	0.01	102	0.85	0.59
27	0.039	0.005	102.35	0.43	0.55
28	0.040	0.012	98	0.57	0.33
29	0.0341	0.01023	104	-0.25	-0.17
30	0.032	0.005408	170.9	-0.54	-0.65
32	NT	NT	NT		
33	0.0916	0.02748	77.8	7.76	2.02
34	0.03	0.0075	96	-0.82	-0.74
35	<0.05	NR	70		

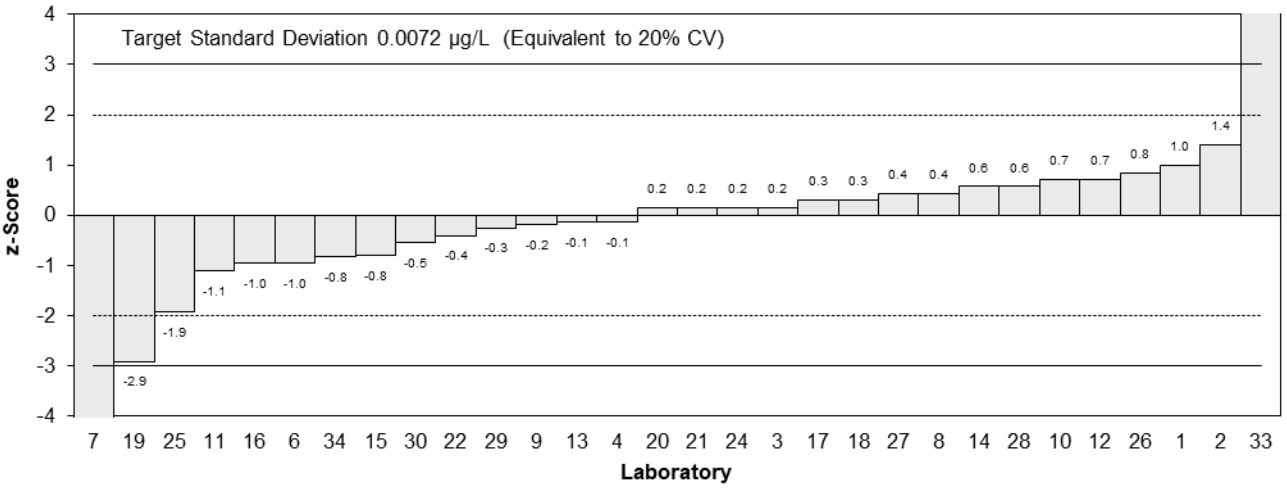
Statistics

Assigned Value*	0.0359	0.0026
Spike	0.0400	0.0020
Robust Average	0.0356	0.0029
Median	0.0370	0.0022
Mean	0.0359	
N	30	
Max.	0.0916	
Min.	0.004	

Robust SD	0.0064	
Robust CV	18%	

*Robust Average excluding Laboratories 7, 19 and 33.


Kernel Density
Density
Result
Results: S4 - PFPeA
Assigned Value = 0.0359 ± 0.0026 µg/L
Results (µg/L)
Laboratory
7 19 25 11 16 6 34 15 30 22 29 9 13 4 20 21 24 3 17 18 27 8 14 28 10 12 26 1 2 33 35 23 32 5 Md R.A. S.V.


z-Scores: S4 - PFPeA
Target Standard Deviation 0.0072 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
7 19 25 11 16 6 34 15 30 22 29 9 13 4 20 21 24 3 17 18 27 8 14 28 10 12 26 1 2 33

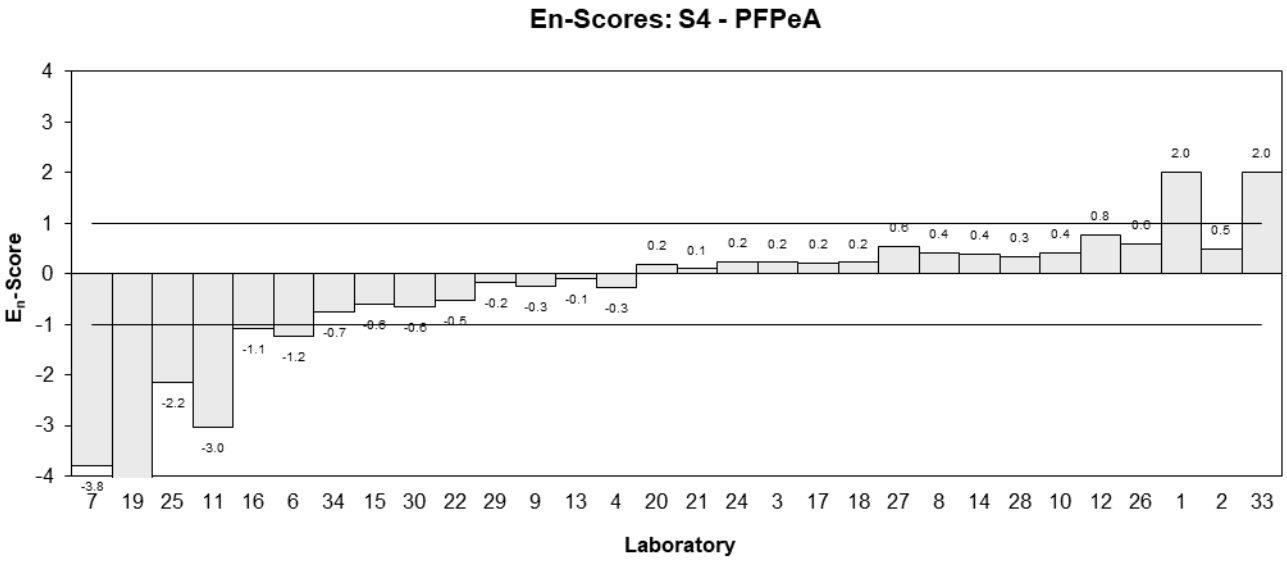

En-Scores: S4 - PFPeA
En-Score
Laboratory
7 19 25 11 16 6 34 15 30 22 29 9 13 4 20 21 24 3 17 18 27 8 14 28 10 12 26 1 2 33

Figure 85

Table 89

Sample Details

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

Participant Results

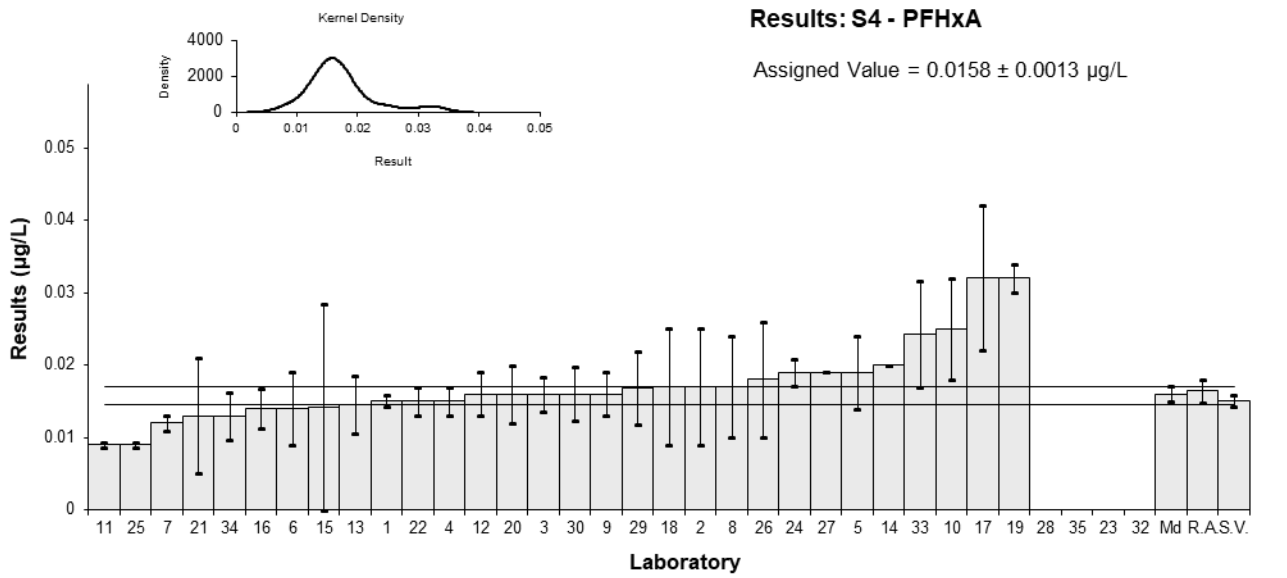
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.0150	0.0008	94	-0.25	-0.52
2	0.017	0.008	84	0.38	0.15
3	0.016	0.0024	111	0.06	0.07
4	0.015	0.002	79.7	-0.25	-0.34
5	0.019	0.005	50	1.01	0.62
6	0.014	0.005	NR	-0.57	-0.35
7	0.012	0.001	NR	-1.20	-2.32
8	0.017	0.007	NR	0.38	0.17
9	0.0160	0.003	89	0.06	0.06
10	0.025	0.007	75	2.91	1.29
11	0.009	0.0003	50	-2.15	-5.10
12	0.016	0.003	145	0.06	0.06
13	0.0146	0.0040	107	-0.38	-0.29
14	0.02	0.00	99	1.33	3.23
15	0.0142	0.0142	79	-0.51	-0.11
16	0.014	0.0027	77	-0.57	-0.60
17	0.032	0.01	145	5.13	1.61
18	0.017	0.008	NR	0.38	0.15
19	0.032	0.002	86	5.13	6.79
20	0.016	0.004	95	0.06	0.05
21	0.013	0.008	111	-0.89	-0.35
22	0.015	0.002	90	-0.25	-0.34
23	NT	NT	NT		
24	0.019	0.0019	NT	1.01	1.39
25	0.009	0.0003	90.7	-2.15	-5.10
26	0.018	0.008	96	0.70	0.27
27	0.019	0	107.7	1.01	2.46
28	<0.02	NR	101		
29	0.0168	0.00504	107	0.32	0.19
30	0.016	0.003712	170.9	0.06	0.05
32	NT	NT	NT		
33	0.0243	0.00729	114	2.69	1.15
34	0.013	0.00325	97	-0.89	-0.80
35	<0.05	NR	70		

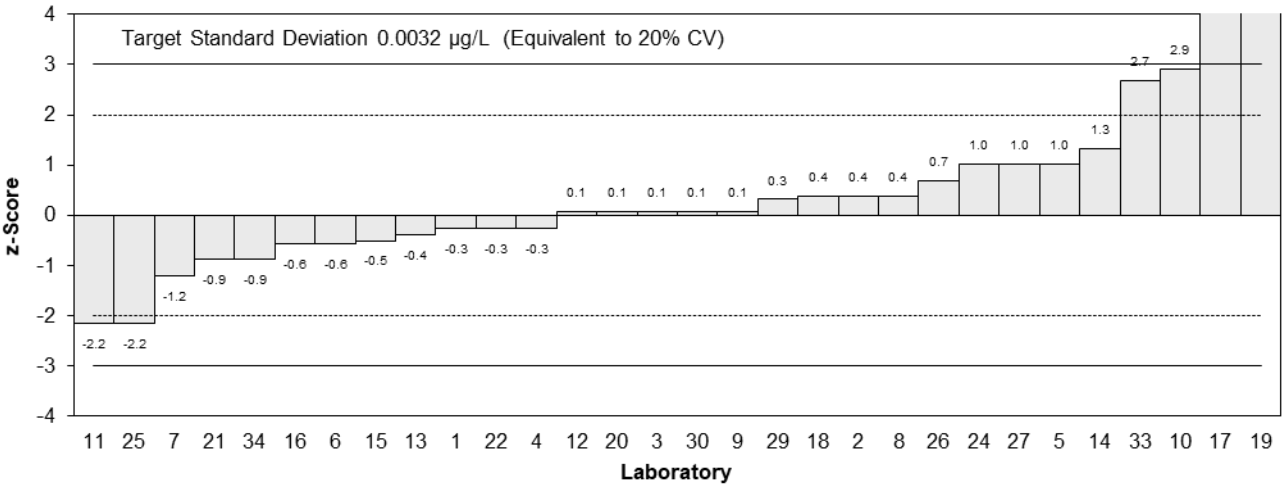
Statistics

Assigned Value*	0.0158	0.0013
Spike	0.0150	0.0008
Robust Average	0.0164	0.0016
Median	0.0160	0.0011
Mean	0.0171	
N	30	
Max.	0.032	
Min.	0.009	

Robust SD	0.0034	
Robust CV	21%	

*Robust Average excluding Laboratories 10, 17 and 19.


Kernel Density
Density
Result
Results: S4 - PFHxA
Assigned Value = 0.0158 ± 0.0013 µg/L
Results (µg/L)
Laboratory
11 25 7 21 34 16 6 15 13 1 22 4 12 20 3 30 9 29 18 2 8 26 24 27 5 14 33 10 17 19 28 35 23 32 Md R.A.S.V.


z-Scores: S4 - PFHxA
Target Standard Deviation 0.0032 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
11 25 7 21 34 16 6 15 13 1 22 4 12 20 3 30 9 29 18 2 8 26 24 27 5 14 33 10 17 19

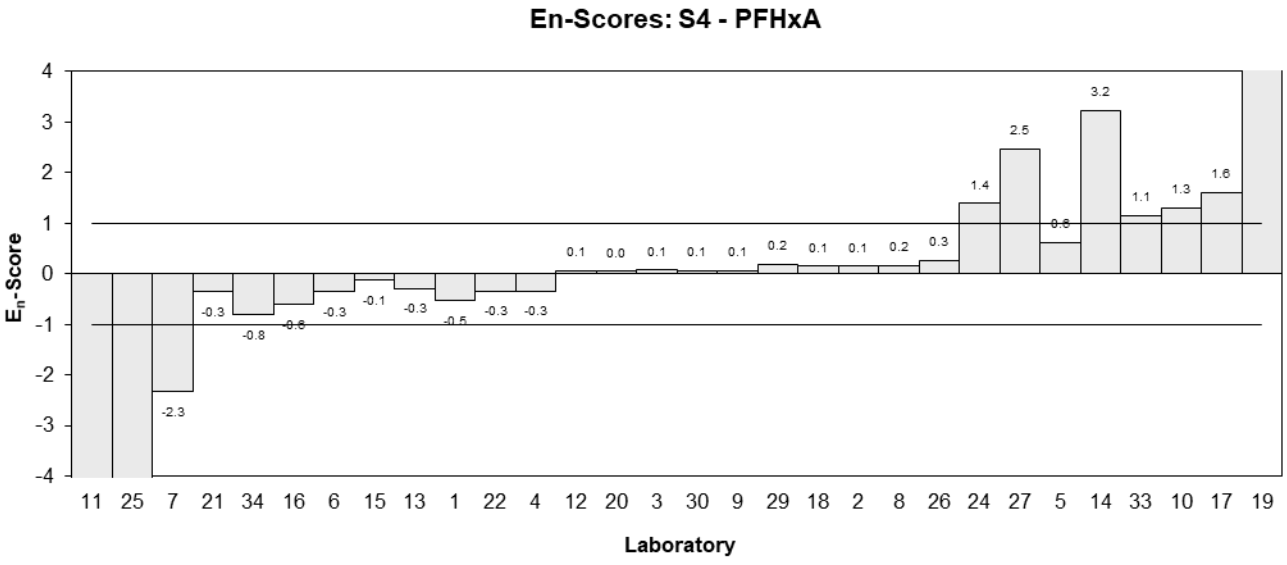

En-Scores: S4 - PFHxA
En-Score
Laboratory
11 25 7 21 34 16 6 15 13 1 22 4 12 20 3 30 9 29 18 2 8 26 24 27 5 14 33 10 17 19

Figure 86

Table 90

Sample Details

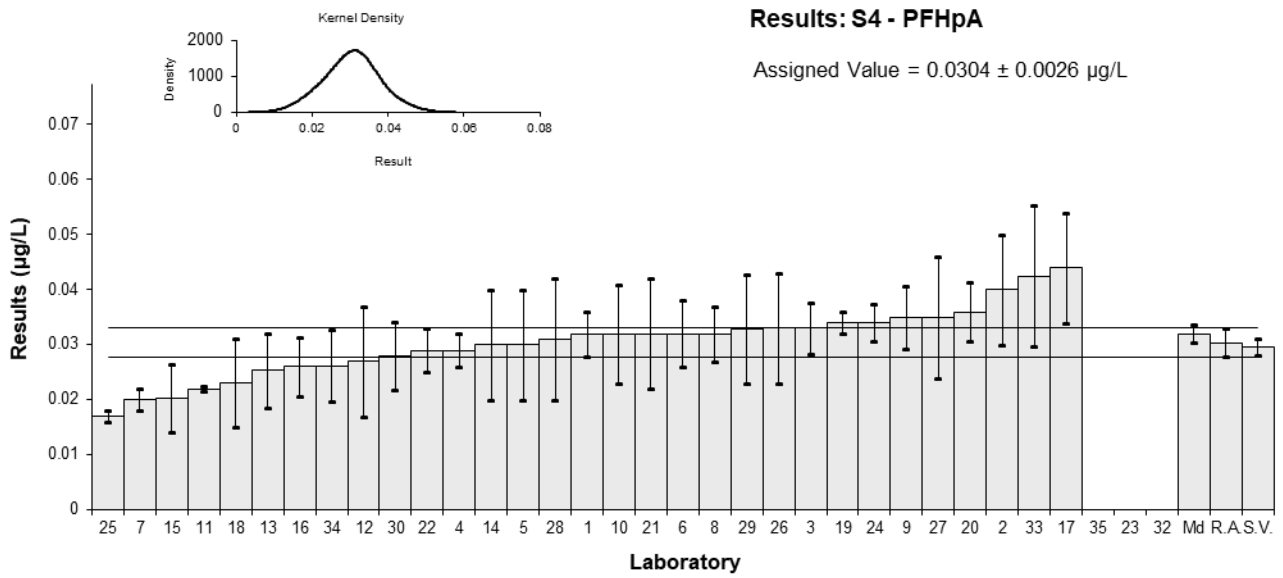
Sample No.	S4
Matrix.	Water
Analyte.	PFHpA
Units	µg/L

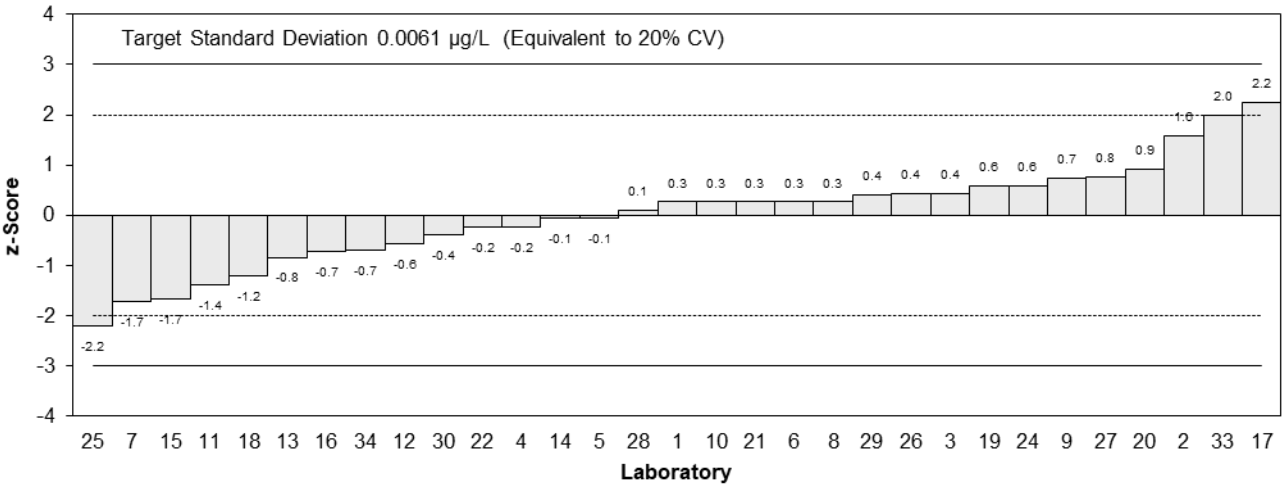
Participant Results

Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.0320	0.0041	91	0.26	0.33
2	0.040	0.01	94	1.58	0.93
3	0.033	0.0046	116	0.43	0.49
4	0.029	0.003	76.4	-0.23	-0.35
5	0.03	0.01	70	-0.07	-0.04
6	0.032	0.006	NR	0.26	0.24
7	0.020	0.002	NR	-1.71	-3.17
8	0.032	0.005	NR	0.26	0.28
9	0.0349	0.0057	97	0.74	0.72
10	0.032	0.009	62	0.26	0.17
11	0.022	0.0005	52	-1.38	-3.17
12	0.027	0.010	117	-0.56	-0.33
13	0.0253	0.0068	122	-0.84	-0.70
14	0.03	0.01	105	-0.07	-0.04
15	0.0203	0.00609	88	-1.66	-1.53
16	0.026	0.0053	83	-0.72	-0.75
17	0.044	0.01	NR	2.24	1.32
18	0.023	0.008	NR	-1.22	-0.88
19	0.034	0.002	84	0.59	1.10
20	0.036	0.0054	89	0.92	0.93
21	0.032	0.010	108	0.26	0.15
22	0.029	0.004	74	-0.23	-0.29
23	NT	NT	NT		
24	0.034	0.0034	NT	0.59	0.84
25	0.017	0.001	92.1	-2.20	-4.81
26	0.033	0.01	94	0.43	0.25
27	0.035	0.011	96.4	0.76	0.41
28	0.031	0.011	101	0.10	0.05
29	0.0329	0.00987	103	0.41	0.24
30	0.028	0.006132	144.5	-0.39	-0.36
32	NT	NT	NT		
33	0.0425	0.01275	136	1.99	0.93
34	0.0262	0.00655	97	-0.69	-0.60
35	<0.05	NR	70		

Statistics

Assigned Value	0.0304	0.0026	**Robust SD**	0.0059	
Spike	0.0295	0.0015	**Robust CV**	19%	
Robust Average	0.0304	0.0026			
Median	0.0320	0.0016			
Mean	0.0304				
N	31				
Max.	0.044				
Min.	0.017				


Kernel Density
Density
Result
Results: S4 - PFHpA
Assigned Value = 0.0304 ± 0.0026 µg/L
Results (µg/L)
Laboratory
25 7 15 11 18 13 16 34 12 30 22 4 14 5 28 1 10 21 6 8 29 26 3 19 24 9 27 20 2 33 17 35 23 32 Md R.A.S.V.


z-Scores: S4 - PFHpA
Target Standard Deviation 0.0061 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 7 15 11 18 13 16 34 12 30 22 4 14 5 28 1 10 21 6 8 29 26 3 19 24 9 27 20 2 33 17

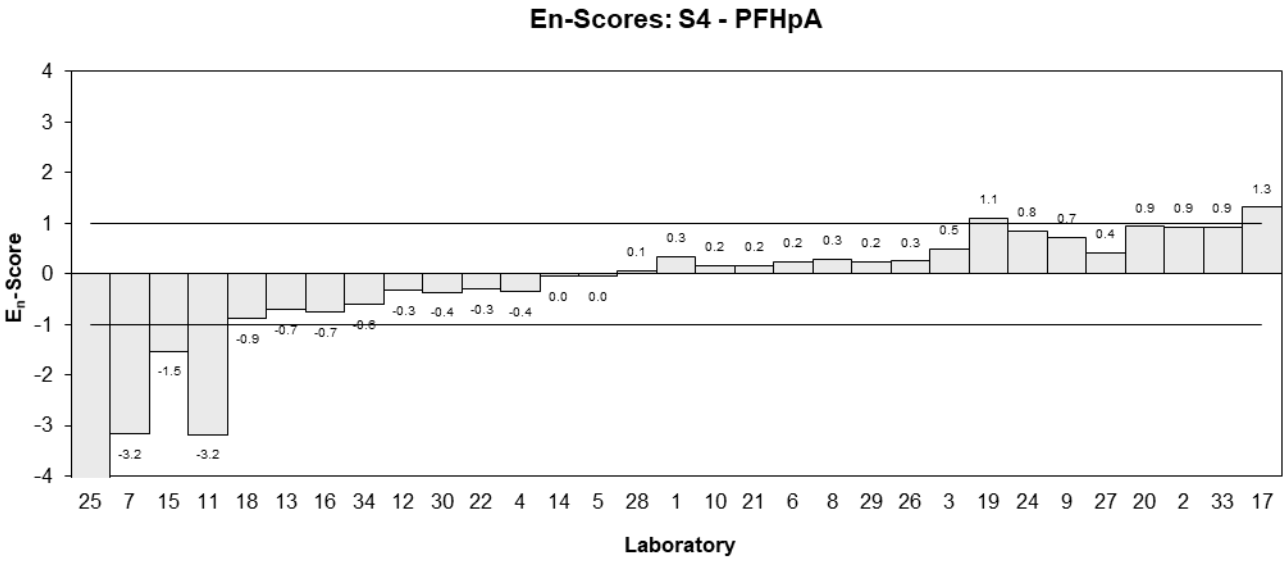

En-Scores: S4 - PFHpA
En-Score
Laboratory
25 7 15 11 18 13 16 34 12 30 22 4 14 5 28 1 10 21 6 8 29 26 3 19 24 9 27 20 2 33 17

Figure 87

Table 91

Sample Details

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

Participant Results

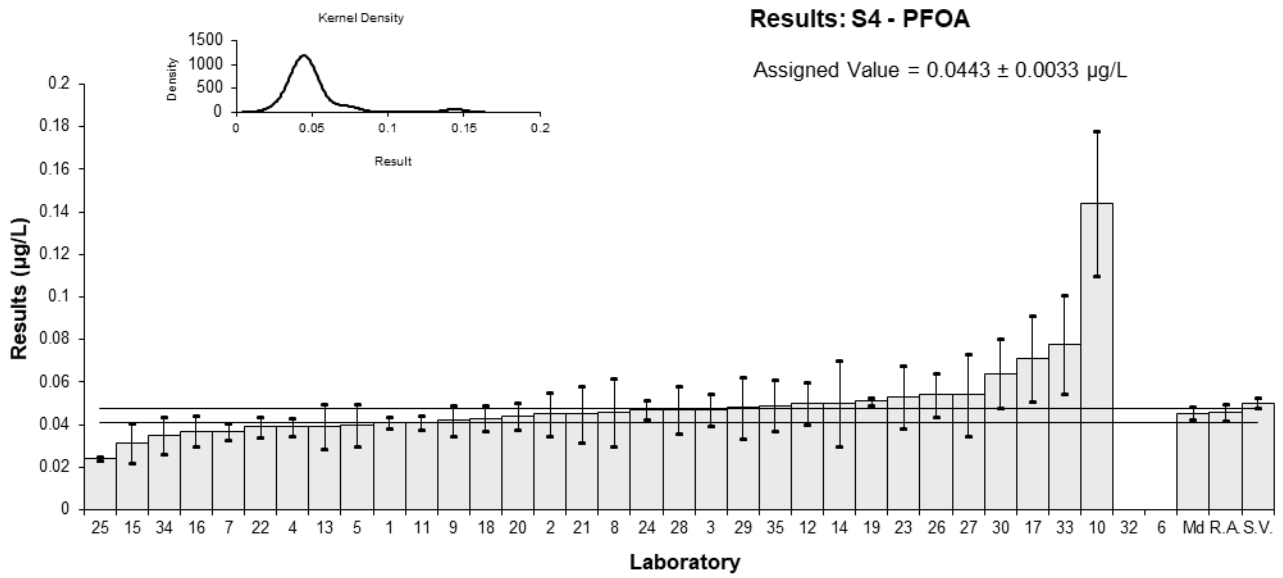
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.0410	0.0029	85	-0.37	-0.75
2	0.045	0.01	97	0.08	0.07
3	0.047	0.0076	118	0.30	0.33
4	0.039	0.004	107	-0.60	-1.02
5	0.04	0.01	71	-0.49	-0.41
6	NT	NT	NT		
7	0.037	0.004	83.04	-0.82	-1.41
8	0.046	0.016	NR	0.19	0.10
9	0.0421	0.0071	104	-0.25	-0.28
10	0.144	0.034	82	11.25	2.92
11	0.041	0.0033	52	-0.37	-0.71
12	0.050	0.010	134	0.64	0.54
13	0.0391	0.0106	115	-0.59	-0.47
14	0.05	0.02	98	0.64	0.28
15	0.0312	0.00936	82	-1.48	-1.32
16	0.037	0.0074	88	-0.82	-0.90
17	0.071	0.02	129	3.01	1.32
18	0.043	0.006	NR	-0.15	-0.19
19	0.051	0.002	90	0.76	1.74
20	0.044	0.0065	97	-0.03	-0.04
21	0.045	0.013	101	0.08	0.05
22	0.039	0.005	90	-0.60	-0.88
23	0.0529	0.0148	100.0	0.97	0.57
24	0.047	0.0047	100	0.30	0.47
25	0.024	0.001	92.1	-2.29	-5.89
26	0.054	0.01	95	1.09	0.92
27	0.054	0.019	105.95	1.09	0.50
28	0.047	0.011	103	0.30	0.24
29	0.0481	0.01443	94	0.43	0.26
30	0.064	0.016256	144.5	2.22	1.19
32	NT	NT	NT		
33	0.0776	0.02328	107	3.76	1.42
34	0.035	0.00875	105	-1.05	-0.99
35	0.049	0.012	70	0.53	0.38

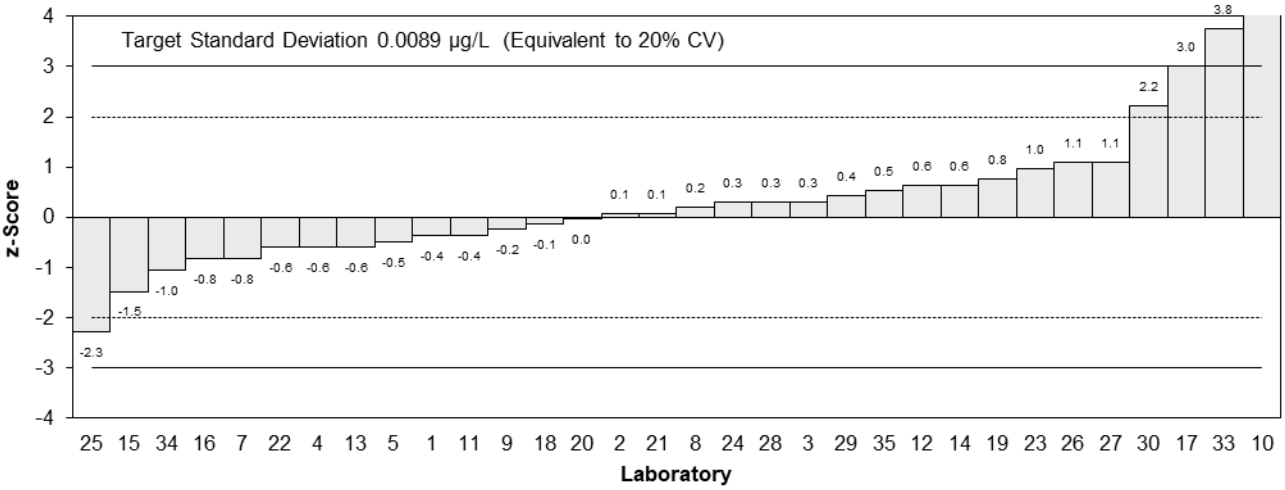
Statistics

Assigned Value*	0.0443	0.0033
Spike	0.0503	0.0025
Robust Average	0.0457	0.0038
Median	0.0455	0.0029
Mean	0.0492	
N	32	
Max.	0.144	
Min.	0.024	

Robust SD	0.0086	
Robust CV	19%	

*Robust Average excluding Laboratories 10, 17 and 33.


Kernel Density
Density
Result
Results: S4 - PFOA
Assigned Value = 0.0443 ± 0.0033 µg/L
Results (µg/L)
Laboratory
25 15 34 16 7 22 4 13 5 1 11 9 18 20 2 21 8 24 28 3 29 35 12 14 19 23 26 27 30 17 33 10 32 6 Md R.A. S.V.


z-Scores: S4 - PFOA
Target Standard Deviation 0.0089 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 15 34 16 7 22 4 13 5 1 11 9 18 20 2 21 8 24 28 3 29 35 12 14 19 23 26 27 30 17 33 10

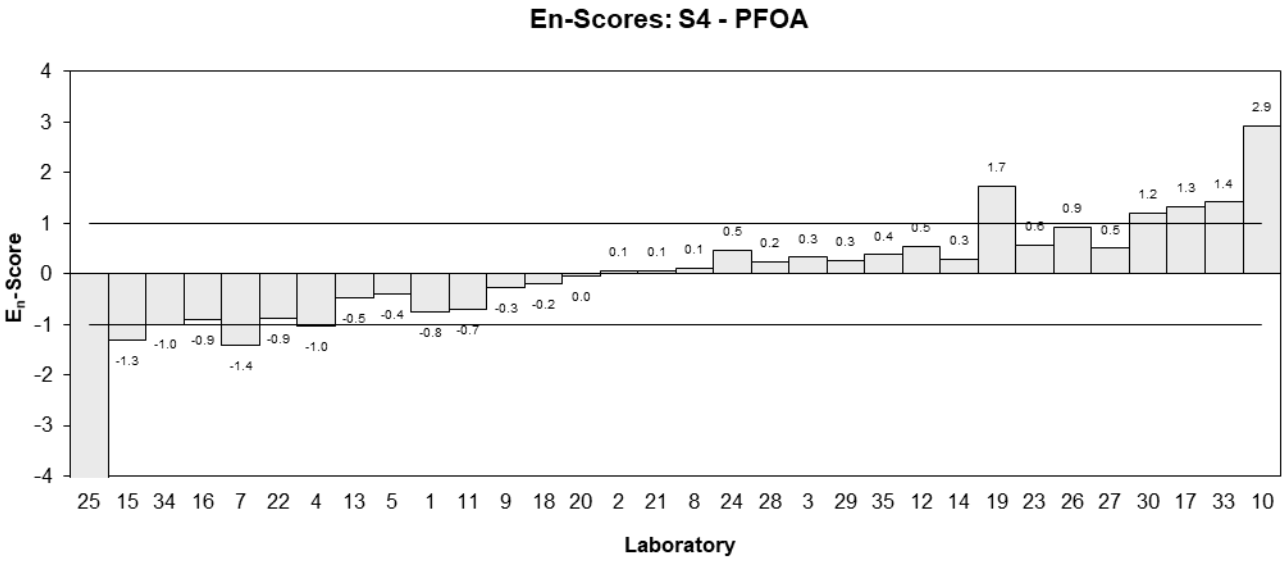

En-Scores: S4 - PFOA
En-Score
Laboratory
25 15 34 16 7 22 4 13 5 1 11 9 18 20 2 21 8 24 28 3 29 35 12 14 19 23 26 27 30 17 33 10

Figure 88

Table 92

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	0.0980	0.0139	89	-1.34	-2.10
2	0.15	0.03	94	0.60	0.51
3	0.14	0.027	119	0.22	0.21
4	0.127	0.010	99.3	-0.26	-0.49
5	0.14	0.05	71	0.22	0.12
6	NT	NT	NT		
7	0.108	0.006	NR	-0.97	-2.23
8	0.140	0.051	NR	0.22	0.12
9	0.138	0.02497	111	0.15	0.15
10	0.132	0.034	88	-0.07	-0.06
11	0.129	0.0026	49	-0.19	-0.48
12	0.15	0.017	125	0.60	0.81
13	0.1134	0.0306	114	-0.77	-0.64
14	0.15	0.05	102	0.60	0.31
15	0.114	0.0342	81	-0.75	-0.56
16	0.116	0.0231	98	-0.67	-0.72
17	0.18	0.04	101	1.72	1.12
18	0.129	0.017	NR	-0.19	-0.25
19	0.147	0.014	85	0.49	0.76
20	0.145	0.022	98	0.41	0.46
21	0.135	0.026	104	0.04	0.04
22	0.135	0.021	77	0.04	0.04
23	NT	NT	NT		
24	0.11	0.011	NT	-0.90	-1.61
25	0.074	0.005	93	-2.24	-5.37
26	0.16	0.05	98	0.97	0.51
27	0.160	0.054	98.4	0.97	0.47
28	0.142	0.039	92	0.30	0.20
29	0.145	0.0435	93	0.41	0.25
30	0.142	0.0284	145.4	0.30	0.27
32	NT	NT	NT		
33	0.198	0.0594	137	2.39	1.06
34	0.114	0.0285	96	-0.75	-0.66
35	0.1	0.025	70	-1.27	-1.26

Statistics

Assigned Value	0.134	0.010	**Robust SD**	0.022	
Spike	0.152	0.005	**Robust CV**	16%	
Robust Average	0.134	0.010			
Median	0.138	0.007			
Mean	0.134				
N	31				
Max.	0.198				
Min.	0.074				

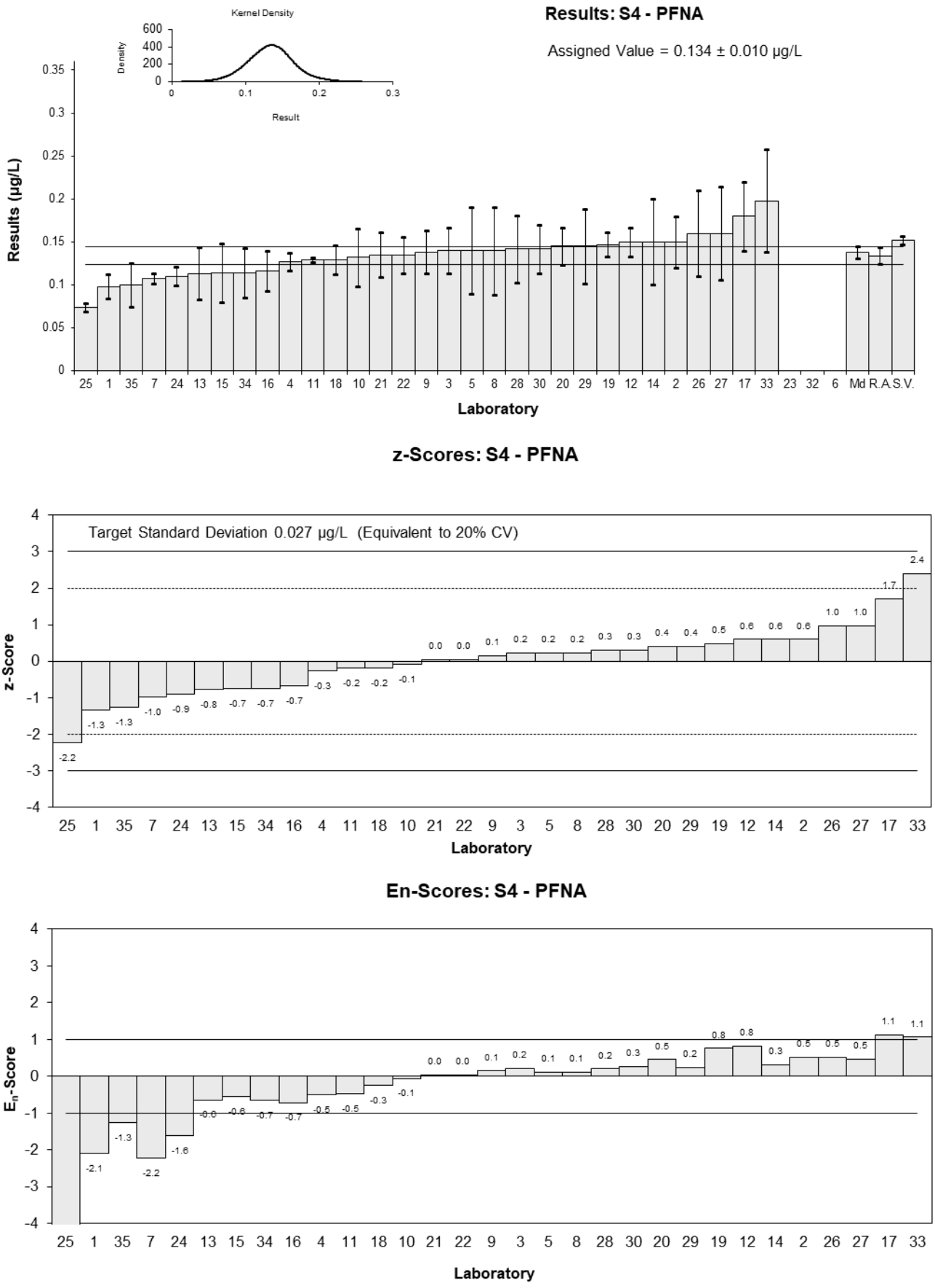

Kernel Density
Density
Result
Results: S4 - PFNA
Assigned Value = 0.134 ± 0.010 µg/L
Results (µg/L)
Laboratory
25 1 35 7 24 13 15 34 16 4 11 18 10 21 22 9 3 5 8 28 30 20 29 19 12 14 2 26 27 17 33 23 32 6 Md R.A.S.V.
z-Scores: S4 - PFNA
Target Standard Deviation 0.027 µg/L (Equivalent to 20% CV)
z-Score
25 1 35 7 24 13 15 34 16 4 11 18 10 21 22 9 3 5 8 28 30 20 29 19 12 14 2 26 27 17 33
Laboratory
En-Scores: S4 - PFNA
En-Score
25 1 35 7 24 13 15 34 16 4 11 18 10 21 22 9 3 5 8 28 30 20 29 19 12 14 2 26 27 17 33
Laboratory

Figure 89

Table 93

Sample Details

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

Participant Results

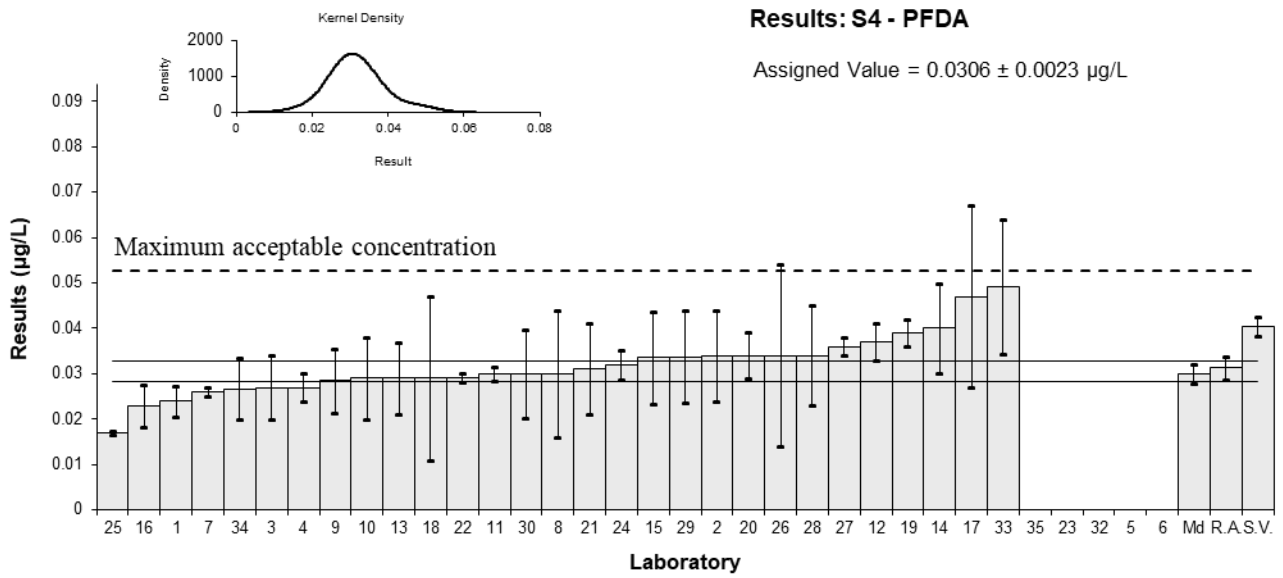
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.0240	0.0034	89	-1.08	-1.61
2	0.034	0.01	93	0.56	0.33
3	0.027	0.0070	137	-0.59	-0.49
4	0.027	0.003	112	-0.59	-0.95
5	NT	NT	NT		
6	NT	NT	NT		
7	0.026	0.001	NR	-0.75	-1.83
8	0.030	0.014	NR	-0.10	-0.04
9	0.0285	0.007	110	-0.34	-0.29
10	0.029	0.009	108	-0.26	-0.17
11	0.030	0.0015	40	-0.10	-0.22
12	0.037	0.004	148	1.05	1.39
13	0.0290	0.0078	106	-0.26	-0.20
14	0.04	0.01	103	1.54	0.92
15	0.0335	0.0101	86	0.47	0.28
16	0.023	0.0047	73	-1.24	-1.45
17*	0.047	0.02	90	2.00	0.81
18	0.029	0.018	NR	-0.26	-0.09
19	0.039	0.003	90	1.37	2.22
20	0.034	0.0051	103	0.56	0.61
21	0.031	0.010	133	0.07	0.04
22	0.029	0.001	80	-0.26	-0.64
23	NT	NT	NT		
24	0.032	0.0032	112	0.23	0.36
25	0.017	0.0005	93.5	-2.22	-5.78
26	0.034	0.02	98	0.56	0.17
27	0.036	0.002	100.05	0.88	1.77
28	0.034	0.011	92	0.56	0.30
29	0.0337	0.01011	83	0.51	0.30
30	0.03	0.00972	153.8	-0.10	-0.06
32	NT	NT	NT		
33**	0.0492	0.01476	75.2	2.00	1.00
34	0.0267	0.006675	103	-0.64	-0.55
35	<0.05	NR	30		

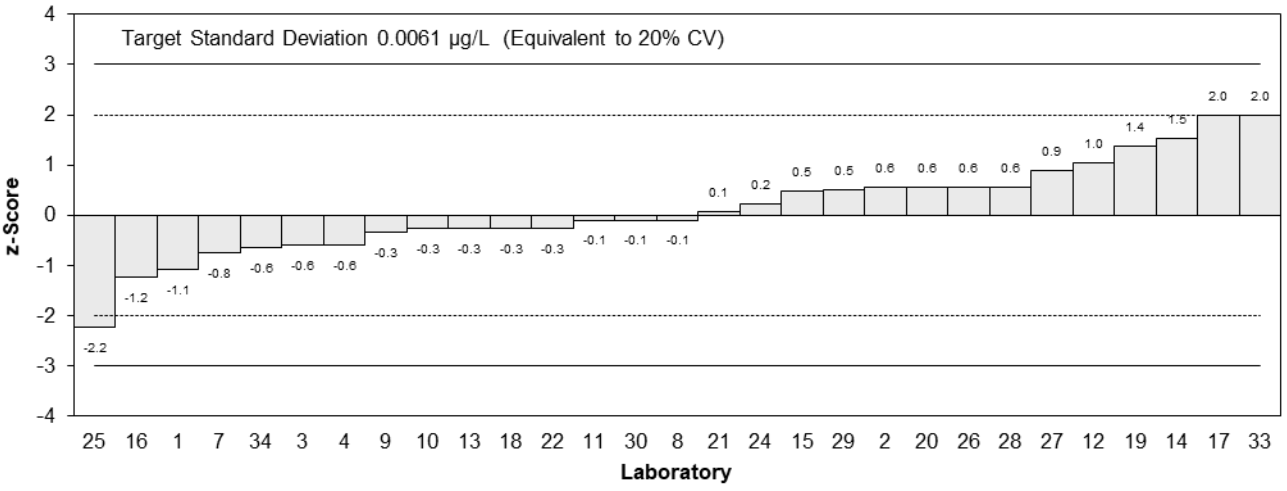
Statistics

Assigned Value***	0.0306	0.0023
Spike	0.0404	0.0020
Robust Average	0.0313	0.0026
Median	0.0300	0.0021
Mean	0.0317	
N	29	
Max.	0.0492	
Min.	0.017	

Robust SD	0.0056	
Robust CV	18%	

*z-Score adjusted to 2 (see Section 6.3).
**z-Score adjusted to 2 and E_n-score adjusted to 1 (see Section 6.3).
***Robust Average excluding Laboratories 17 and 33.


Kernel Density
Density
Result
Results: S4 - PFDA
Assigned Value = 0.0306 ± 0.0023 µg/L
Maximum acceptable concentration
Results (µg/L)
Laboratory
25 16 1 7 34 3 4 9 10 13 18 22 11 30 8 21 24 15 29 2 20 26 28 27 12 19 14 17 33 35 23 32 5 6 Md R.A.S.V.


z-Scores: S4 - PFDA
Target Standard Deviation 0.0061 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 16 1 7 34 3 4 9 10 13 18 22 11 30 8 21 24 15 29 2 20 26 28 27 12 19 14 17 33

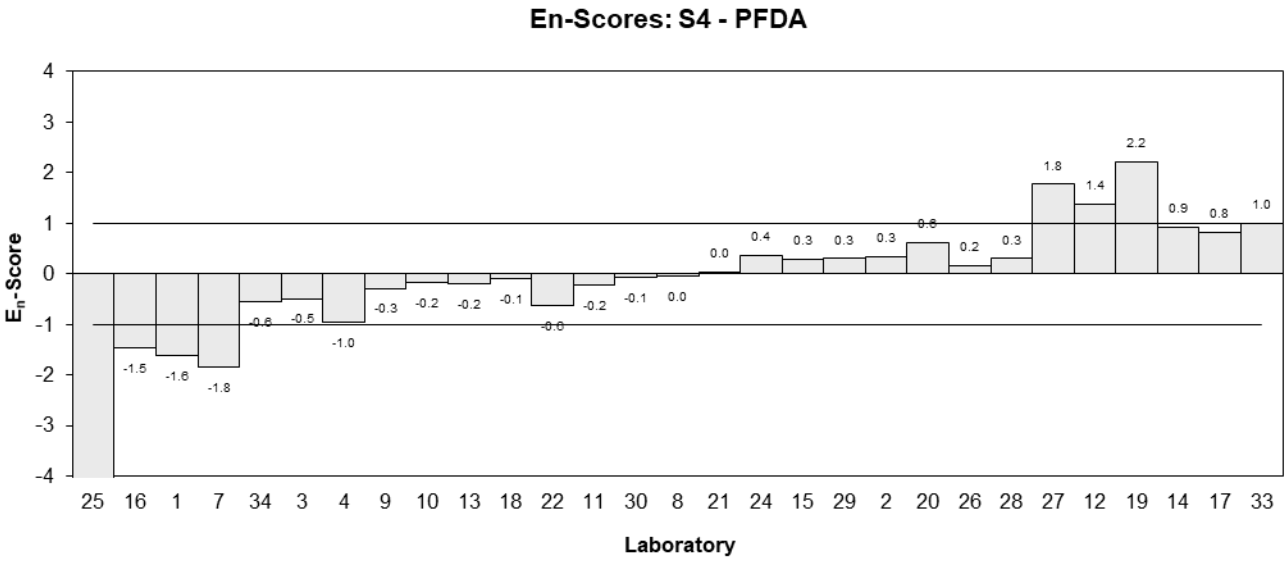

En-Scores: S4 - PFDA
En-Score
Laboratory
25 16 1 7 34 3 4 9 10 13 18 22 11 30 8 21 24 15 29 2 20 26 28 27 12 19 14 17 33

Figure 90

Table 94

Sample Details

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

Participant Results

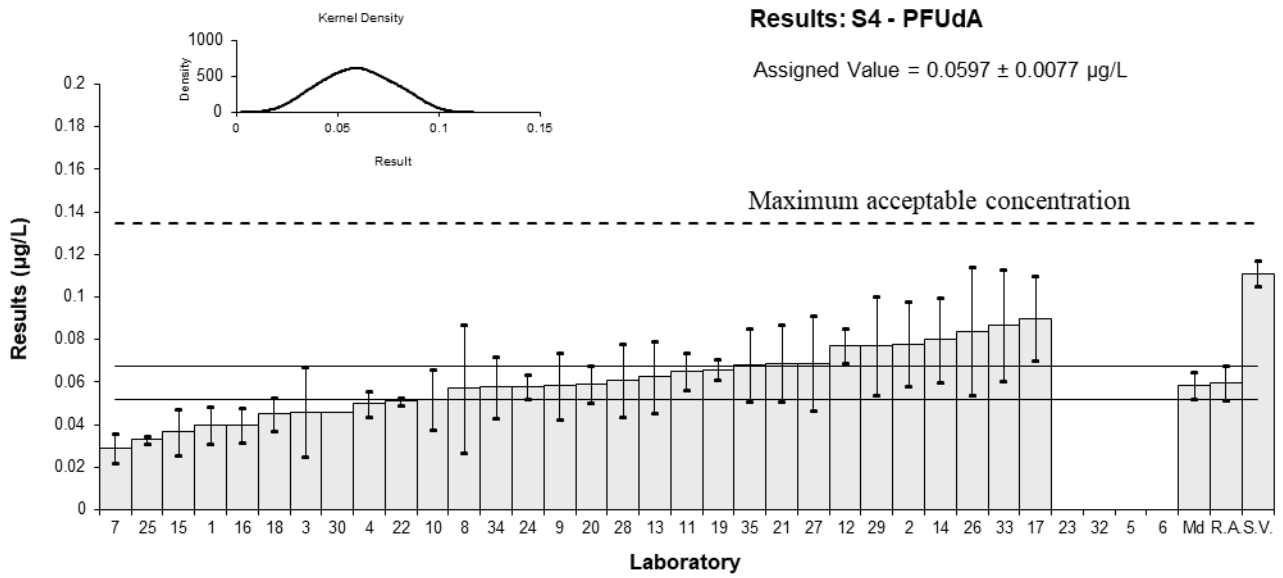
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.0400	0.0088	68	-1.65	-1.68
2	0.078	0.02	84	1.53	0.85
3	0.046	0.021	170	-1.15	-0.61
4	0.050	0.006	108	-0.81	-0.99
5	NT	NT	NT		
6	NT	NT	NT		
7	0.029	0.007	NR	-2.57	-2.95
8	0.057	0.030	NR	-0.23	-0.09
9	0.0583	0.0155	107	-0.12	-0.08
10	0.052	0.014	93	-0.64	-0.48
11	0.065	0.0088	55	0.44	0.45
12	0.077	0.008	134	1.45	1.56
13	0.0625	0.0169	99	0.23	0.15
14	0.08	0.02	84	1.70	0.95
15	0.0366	0.0110	82	-1.93	-1.72
16	0.04	0.008	85	-1.65	-1.77
17*	0.090	0.02	43.4	2.00	1.00
18	0.045	0.008	NR	-1.23	-1.32
19	0.066	0.005	98	0.53	0.69
20	0.059	0.0088	78	-0.06	-0.06
21	0.069	0.018	108	0.78	0.48
22	0.051	0.002	67	-0.73	-1.09
23	NT	NT	NT		
24	0.058	0.0058	NT	-0.14	-0.18
25	0.033	0.0018	96.1	-2.24	-3.38
26**	0.084	0.03	98	2.00	0.78
27	0.069	0.022	84.05	0.78	0.40
28	0.061	0.017	110	0.11	0.07
29	0.077	0.0231	75	1.45	0.71
30	0.046	NR	100.3	-1.15	-1.78
32	NT	NT	NT		
33**	0.0868	0.02604	159	2.00	1.00
34	0.0576	0.0144	99	-0.18	-0.13
35	0.068	0.017	20	0.70	0.44

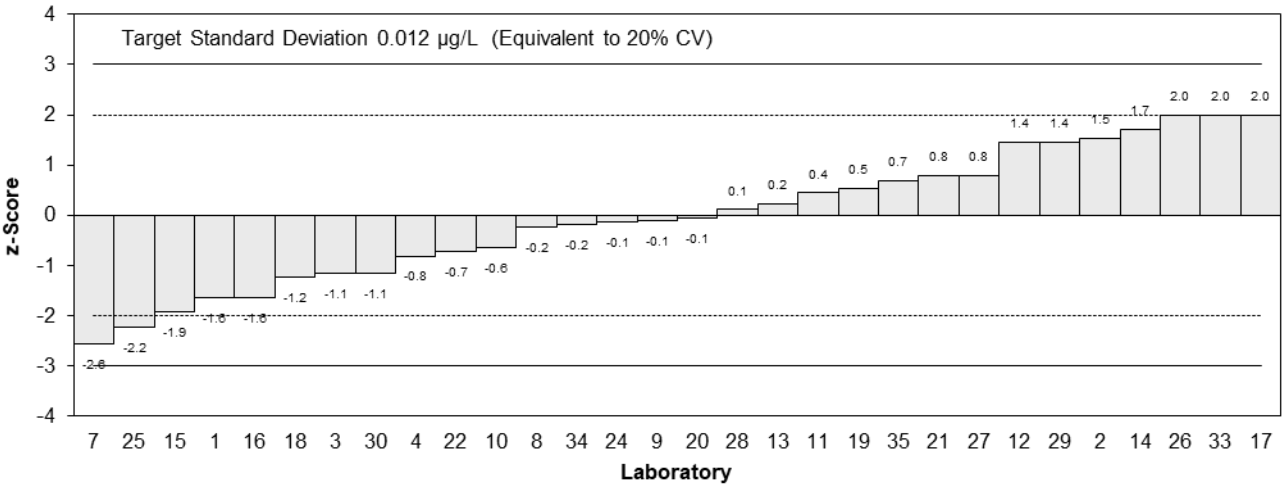
Statistics

Assigned Value***	0.0597	0.0077
Spike	0.111	0.006
Robust Average	0.0597	0.0082
Median	0.0587	0.0064
Mean	0.0597	
N	30	
Max.	0.09	
Min.	0.029	

Robust SD	0.018	
Robust CV	30%	

*z-Score adjusted to 2 and E_n-score adjusted to 1 (see Section 6.3).
**z-Score adjusted to 2 (see Section 6.3).
***Robust Average excluding Laboratories 7 and 17.


Kernel Density
Density
Result
Results: S4 - PFUdA
Assigned Value = 0.0597 ± 0.0077 µg/L
Maximum acceptable concentration
Results (µg/L)
Laboratory
7 25 15 1 16 18 3 30 4 22 10 8 34 24 9 20 28 13 11 19 35 21 27 12 29 2 14 26 33 17 23 32 5 6 Md R.A.S.V.


z-Scores: S4 - PFUdA
Target Standard Deviation 0.012 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
7 25 15 1 16 18 3 30 4 22 10 8 34 24 9 20 28 13 11 19 35 21 27 12 29 2 14 26 33 17

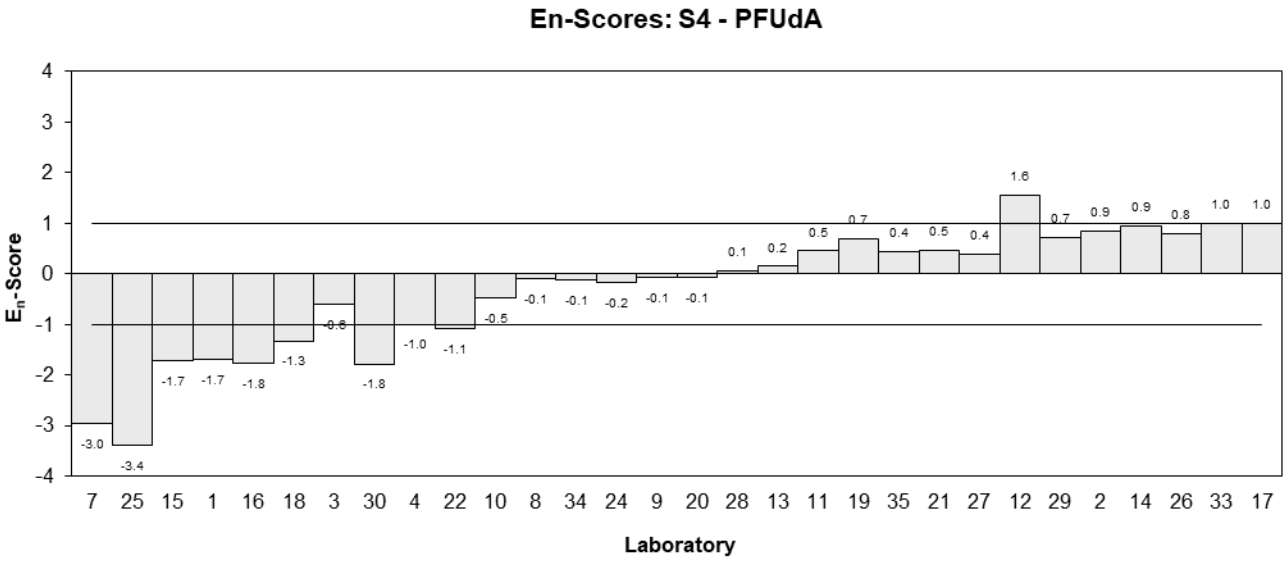

En-Scores: S4 - PFUdA
En-Score
Laboratory
7 25 15 1 16 18 3 30 4 22 10 8 34 24 9 20 28 13 11 19 35 21 27 12 29 2 14 26 33 17

Figure 91

Table 95

Sample Details

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

Participant Results

Lab Code	Result	Uncertainty	Recovery
1	<0.0250	NR	NR
2	0.14	0.07	141
3	NR	NR	NR
4	0.124	0.013	91.3
5	NT	NT	NT
6	NT	NT	NT
7	0.028	0.005	NR
8	0.109	0.017	NR
9	0.131	0.035	76
10	0.136	0.044	108
11	0.090	0.0060	20
12	0.14	0.025	55
13	0.1038	0.0280	67
14	0.09	0.03	63
15	0.0111	0.0111	80
16	0.015	0.0029	73
17	NT	NT	NT
18	0.032	0.02	NR
19	0.136	0.017	119
20	0.1	0.015	101
21	0.119	0.033	116
22	0.045	0.003	85
23	NT	NT	NT
24	0.077	0.0077	NT
25	0.032	0.0057	NR
26	0.13	0.07	98
27	0.118	0.005	52.3
28	0.104	0.034	110
29	0.136	0.0408	64
30	<0.005	NR	100.3
32	NT	NT	NT
33	0.0541	0.01623	96.9
34	0.0948	0.0237	53
35	<0.10	NR	40

Statistics

Assigned Value	Not Set		**Robust SD**	0.047
Spike	0.0850	0.0042	**Robust CV**	51%
Robust Average	0.093	0.024		
Median	0.104	0.017		
Mean	0.0918			
N	25			
Max.	0.14			
Min.	0.0111			

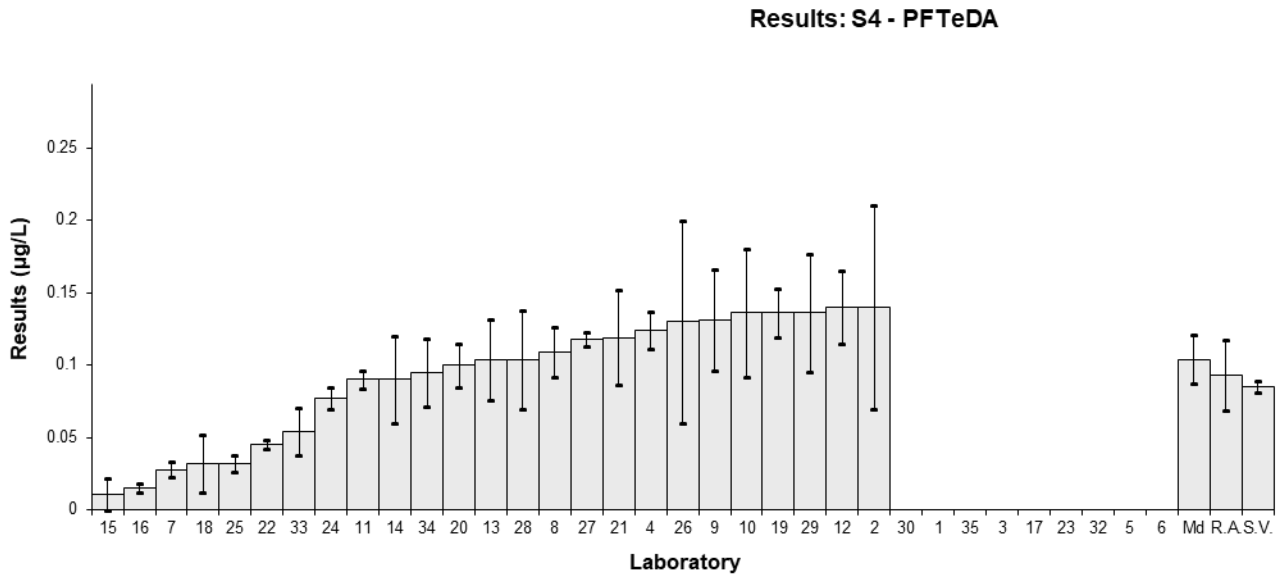

Results: S4 - PFTeDA
Results (µg/L)
0.25
0.2
0.15
0.1
0.05
0
15 16 7 18 25 22 33 24 11 14 34 20 13 28 8 27 21 4 26 9 10 19 29 12 2 30 1 35 3 17 23 32 5 6 Md R.A.S.V.
Laboratory

Figure 92

Table 96

Sample Details

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

Participant Results

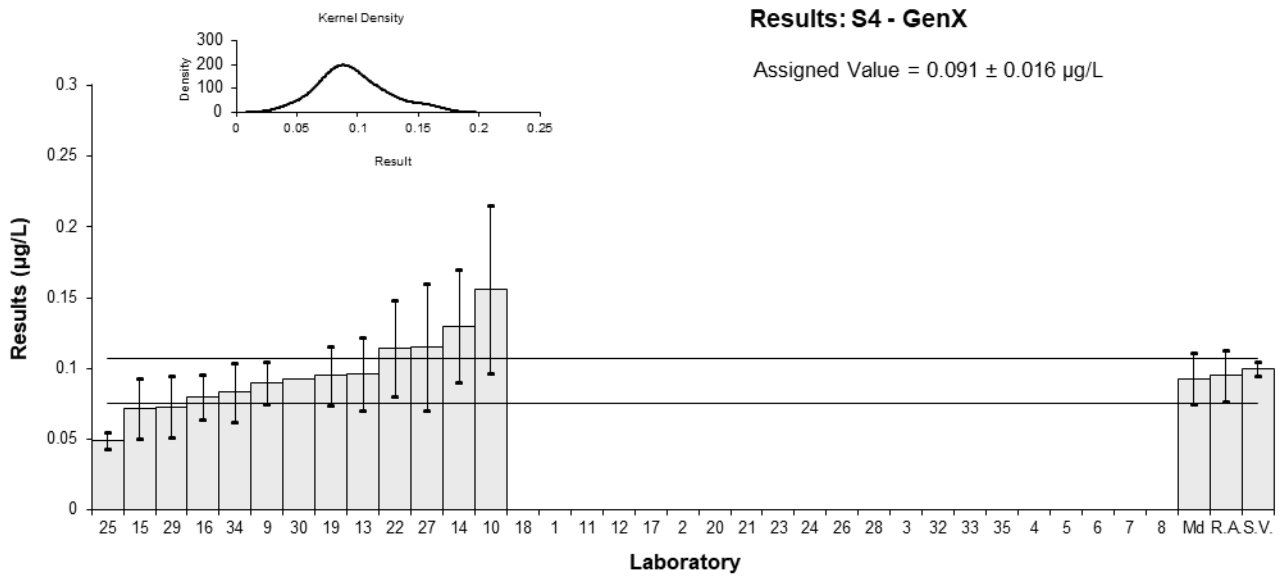
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	NT	NT	NT		
4	NT	NT	NT		
5	NT	NT	NT		
6	NT	NT	NT		
7	NT	NT	NT		
8	NT	NT	NT		
9	0.0899	0.0151	90	-0.06	-0.05
10	0.156	0.059	85	3.57	1.06
11	NT	NT	NT		
12	NT	NT	NT		
13	0.0964	0.0260	105	0.30	0.18
14	0.13	0.04	113	2.14	0.91
15	0.0715	0.0215	78	-1.07	-0.73
16	0.08	0.016	70	-0.60	-0.49
17	NT	NT	NT		
18	NR	NR	NR		
19	0.095	0.021	71	0.22	0.15
20	NT	NT	NT		
21	NT	NT	NT		
22	0.114	0.034	80	1.26	0.61
23	NT	NT	NT		
24	NT	NT	NT		
25	0.049	0.0059	86	-2.31	-2.46
26	NT	NT	NT		
27	0.115	0.045	91.9	1.32	0.50
28	NT	NT	NT		
29	0.0728	0.02184	150	-1.00	-0.67
30	0.093	NR	144.5	0.11	0.13
32	NT	NT	NT		
33	NT	NT	NT		
34	0.0834	0.02085	85	-0.42	-0.29
35	NT	NT	NT		

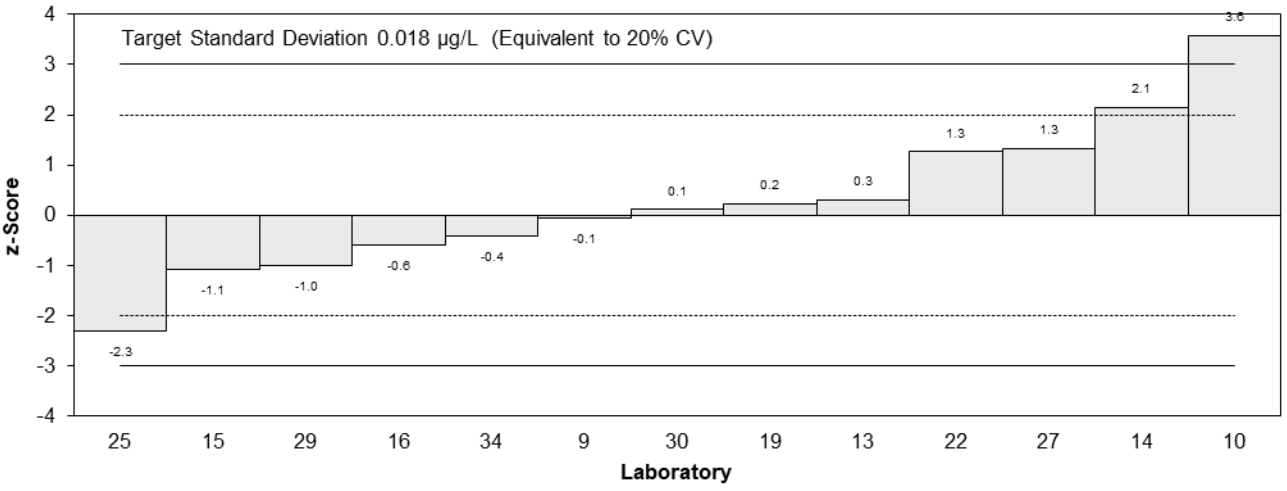
Statistics

Assigned Value*	0.091	0.016
Spike	0.0999	0.0050
Robust Average	0.095	0.018
Median	0.093	0.018
Mean	0.096	
N	13	
Max.	0.156	
Min.	0.049	

Robust SD	0.027	
Robust CV	28%	

*Robust Average excluding Laboratory 10.


Kernel Density
Density
Result
Results: S4 - GenX
Assigned Value = 0.091 ± 0.016 µg/L
Results (µg/L)
Laboratory
25 15 29 16 34 9 30 19 13 22 27 14 10 18 1 11 12 17 2 20 21 23 24 26 28 3 32 33 35 4 5 6 7 8 Md R.A.S.V.


z-Scores: S4 - GenX
Target Standard Deviation 0.018 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 15 29 16 34 9 30 19 13 22 27 14 10
-2.3 -1.1 -1.0 -0.6 -0.4 -0.1 0.1 0.2 0.3 1.3 1.3 2.1 3.6

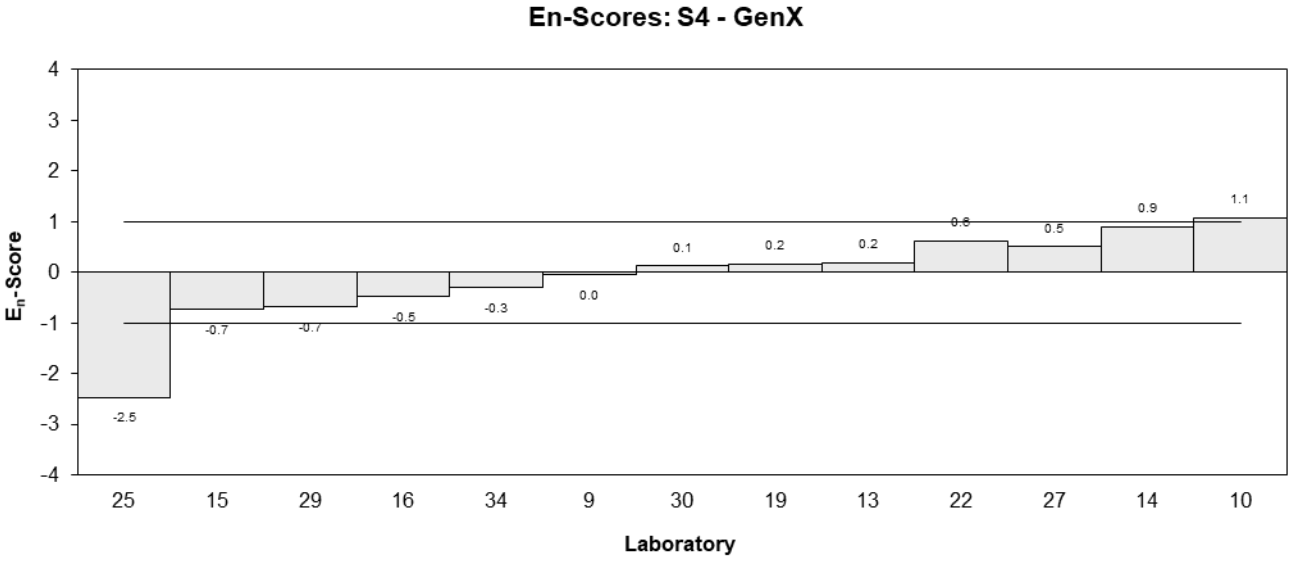

En-Scores: S4 - GenX
En-Score
Laboratory
25 15 29 16 34 9 30 19 13 22 27 14 10
-2.5 -0.7 -0.7 -0.5 -0.3 0.0 0.1 0.2 0.2 0.6 0.5 0.9 1.1

Figure 93

Table 97

Sample Details

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

Participant Results

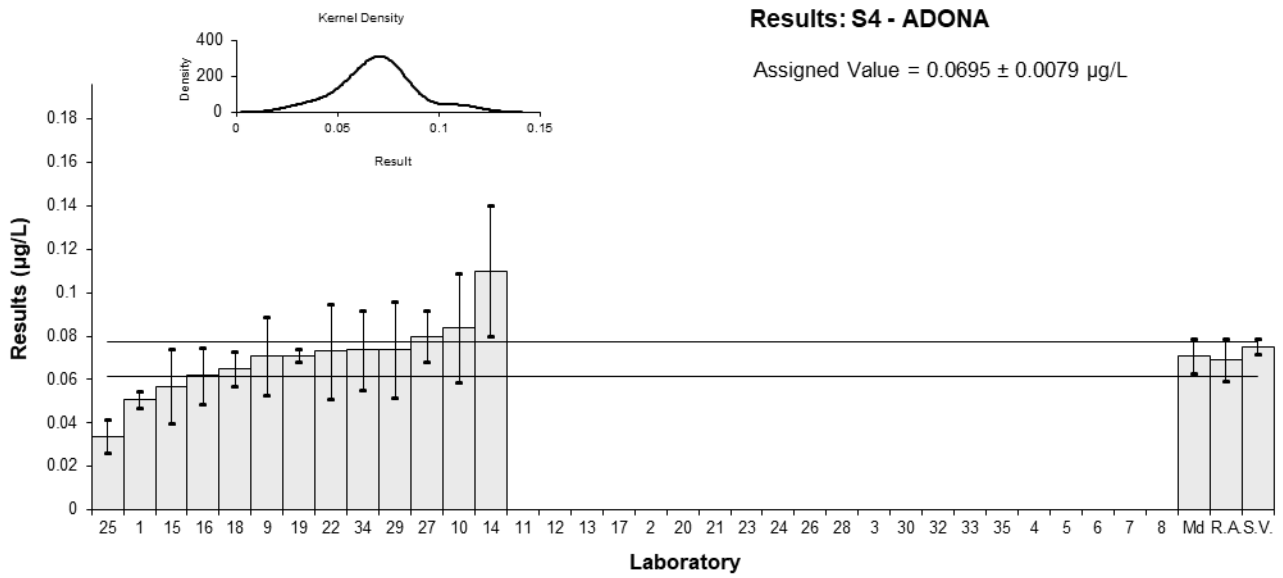
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.051	0.0038	NR	-1.33	-2.11
2	NT	NT	NT		
3	NT	NT	NT		
4	NT	NT	NT		
5	NT	NT	NT		
6	NT	NT	NT		
7	NT	NT	NT		
8	NT	NT	NT		
9	0.0709	0.018	104	0.10	0.07
10	0.084	0.025	NR	1.04	0.55
11	NT	NT	NT		
12	NT	NT	NT		
13	NT	NT	NT		
14	0.11	0.03	NR	2.91	1.31
15	0.0569	0.0171	91	-0.91	-0.67
16	0.062	0.013	71	-0.54	-0.49
17	NT	NT	NT		
18	0.065	0.008	NR	-0.32	-0.40
19	0.071	0.003	85	0.11	0.18
20	NT	NT	NT		
21	NT	NT	NT		
22	0.073	0.022	NR	0.25	0.15
23	NT	NT	NT		
24	NT	NT	NT		
25	0.034	0.0075	NR	-2.55	-3.26
26	NT	NT	NT		
27	0.080	0.012	96.4	0.76	0.73
28	NT	NT	NT		
29	0.0739	0.02217	96	0.32	0.19
30	NT	NT	NT		
32	NT	NT	NT		
33	NT	NT	NT		
34	0.0736	0.0184	85	0.29	0.20
35	NT	NT	NT		

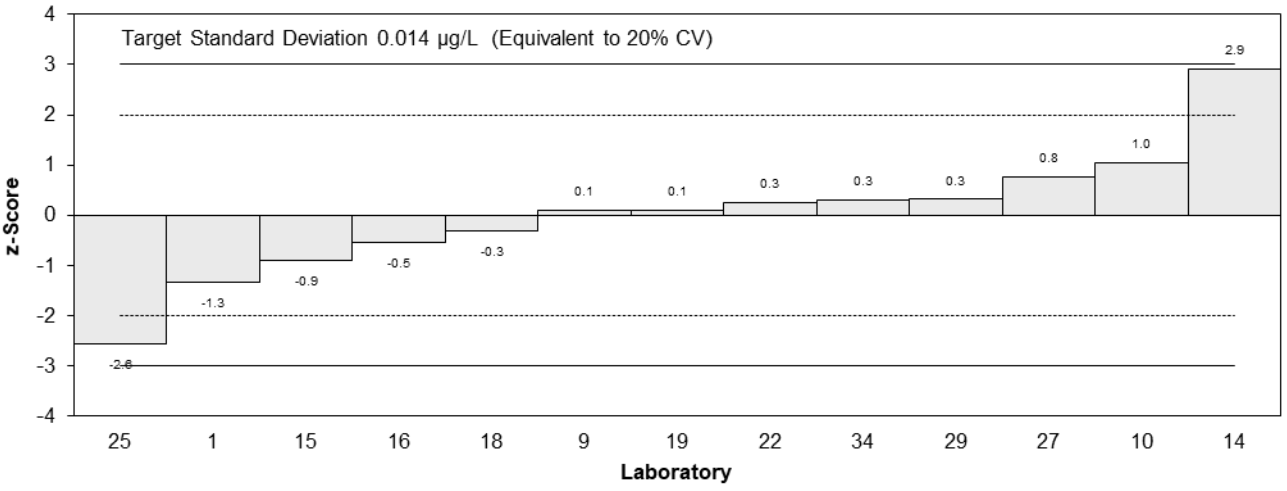
Statistics

Assigned Value*	0.0695	0.0079
Spike	0.0753	0.0038
Robust Average	0.0692	0.0097
Median	0.0710	0.0081
Mean	0.0696	
N	13	
Max.	0.11	
Min.	0.034	

Robust SD	0.014	
Robust CV	20%	

*Robust Average excluding Laboratories 14 and 25.


Kernel Density
Density
Result
Results: S4 - ADONA
Assigned Value = 0.0695 ± 0.0079 µg/L
Results (µg/L)
Laboratory
25 1 15 16 18 9 19 22 34 29 27 10 14 11 12 13 17 2 20 21 23 24 26 28 3 30 32 33 35 4 5 6 7 8 Md R.A.S.V.


z-Scores: S4 - ADONA
Target Standard Deviation 0.014 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 1 15 16 18 9 19 22 34 29 27 10 14
-2.6 -1.3 -0.9 -0.5 -0.3 0.1 0.1 0.3 0.3 0.3 0.8 1.0 2.9

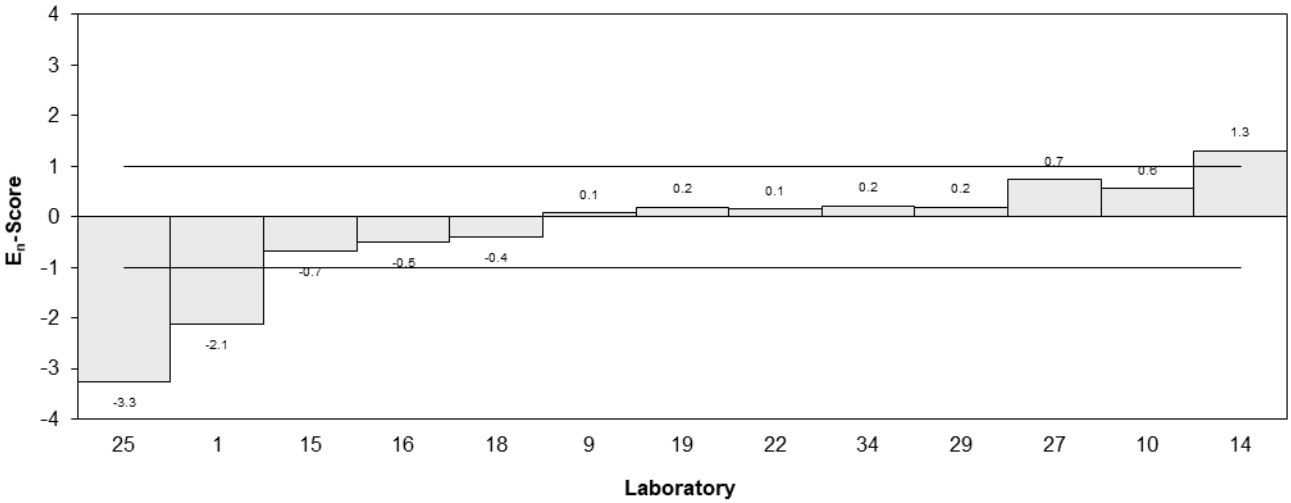

En-Scores: S4 - ADONA
En-Score
Laboratory
25 1 15 16 18 9 19 22 34 29 27 10 14
-3.3 -2.1 -0.7 -0.5 -0.4 0.1 0.2 0.1 0.2 0.2 0.7 0.6 1.3

Figure 94

Table 98

Sample Details

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

Participant Results

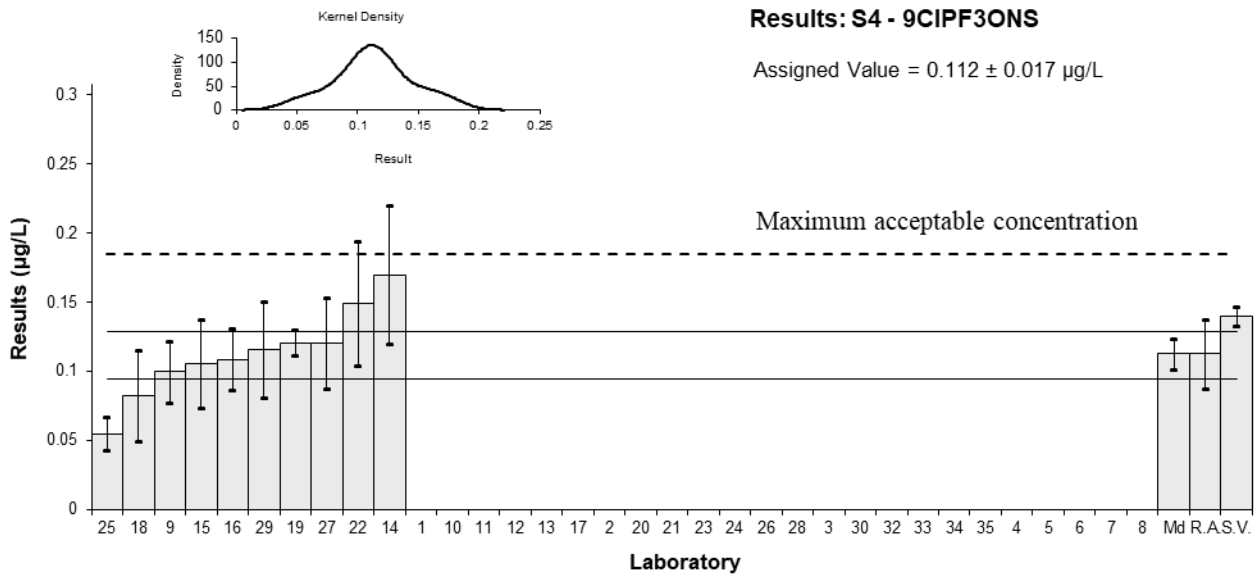
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	NT	NT	NT		
2	NT	NT	NT		
3	NT	NT	NT		
4	NT	NT	NT		
5	NT	NT	NT		
6	NT	NT	NT		
7	NT	NT	NT		
8	NT	NT	NT		
9	0.100	0.0225	104	-0.54	-0.43
10	NT	NT	NT		
11	NT	NT	NT		
12	NT	NT	NT		
13	NT	NT	NT		
14*	0.17	0.05	NR	2.00	1.00
15	0.106	0.0318	81	-0.27	-0.17
16	0.109	0.022	72	-0.13	-0.11
17	NT	NT	NT		
18	0.083	0.033	NR	-1.29	-0.78
19	0.121	0.009	88	0.40	0.47
20	NT	NT	NT		
21	NT	NT	NT		
22	0.149	0.045	NR	1.65	0.77
23	NT	NT	NT		
24	NT	NT	NT		
25	0.055	0.0119	NR	-2.54	-2.75
26	NT	NT	NT		
27	0.121	0.033	103.4	0.40	0.24
28	NT	NT	NT		
29	0.116	0.0348	96	0.18	0.10
30	NT	NT	NT		
32	NT	NT	NT		
33	NT	NT	NT		
34	NT	NT	NT		
35	NT	NT	NT		

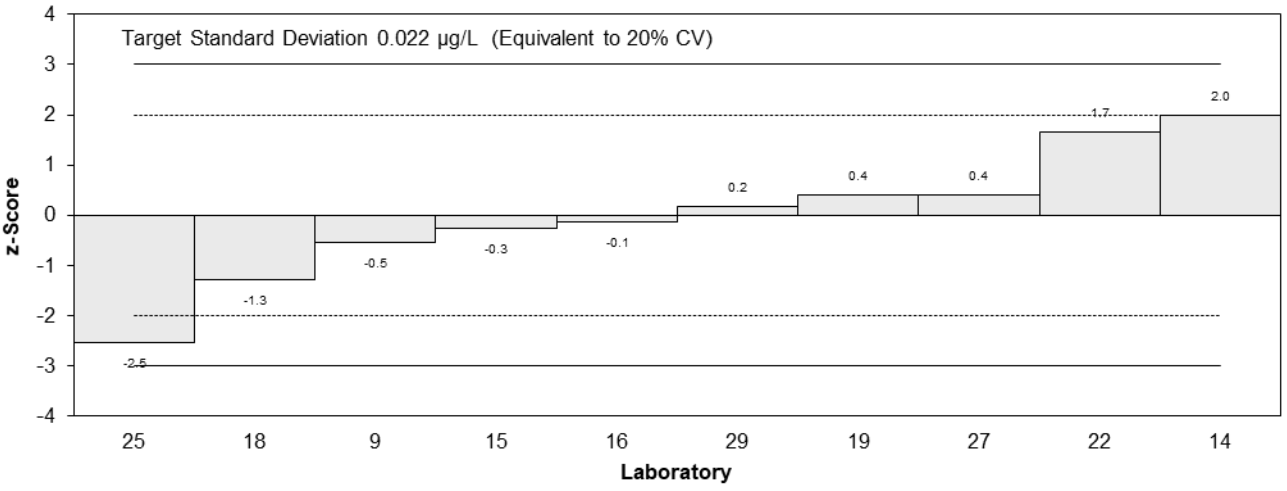
Statistics

Assigned Value**	0.112	0.017
Spike	0.140	0.007
Robust Average	0.113	0.025
Median	0.113	0.011
Mean	0.113	
N	10	
Max.	0.17	
Min.	0.055	

Robust SD	0.032	
Robust CV	28%	

*z-Score adjusted to 2 and E_n-score adjusted to 1 (see Section 6.3).
**Robust Average excluding Laboratories 14 and 25.


Kernel Density
Density
Result
Results: S4 - 9CIPF3ONS
Assigned Value = 0.112 ± 0.017 µg/L
Maximum acceptable concentration
Results (µg/L)
Laboratory
25 18 9 15 16 29 19 27 22 14 1 10 11 12 13 17 2 20 21 23 24 26 28 3 30 32 33 34 35 4 5 6 7 8 Md R.A.S.V.


z-Scores: S4 - 9CIPF3ONS
Target Standard Deviation 0.022 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
25 18 9 15 16 29 19 27 22 14
-2.5
-1.3
-0.5
-0.3
-0.1
0.2
0.4
0.4
1.7
2.0

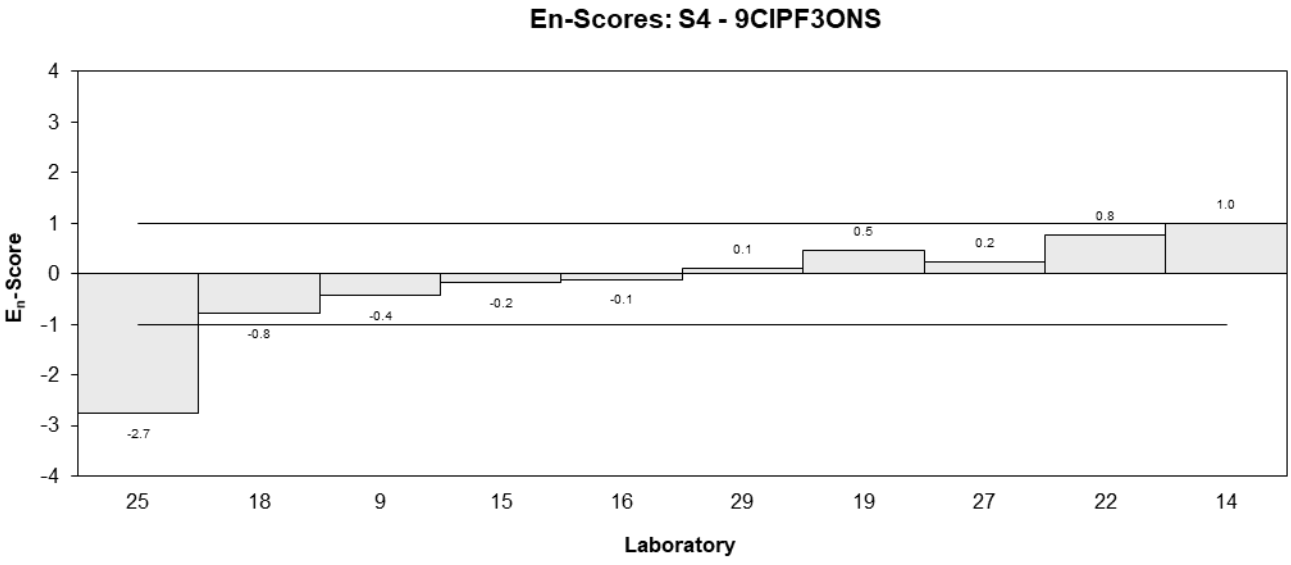

En-Scores: S4 - 9CIPF3ONS
En-Score
Laboratory
25 18 9 15 16 29 19 27 22 14
-2.7
-0.8
-0.4
-0.2
-0.1
0.1
0.5
0.2
0.8
1.0

Figure 95

Table 99

Sample Details

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

Participant Results

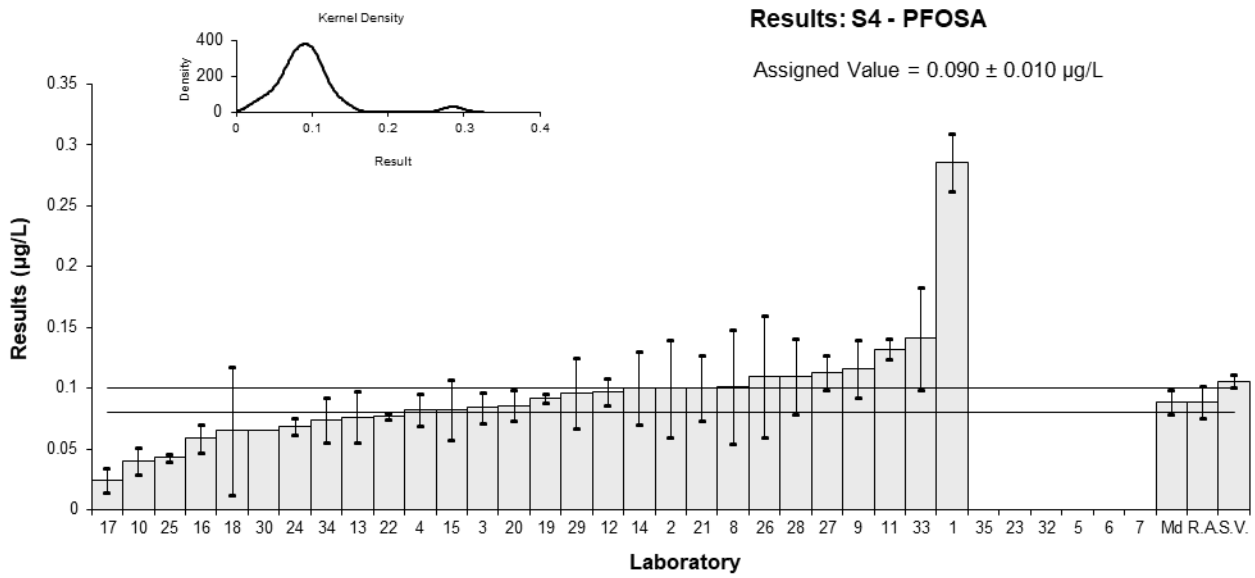
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.2855	0.0241	NR	10.86	7.49
2	0.10	0.04	73	0.56	0.24
3	0.084	0.013	140	-0.33	-0.37
4	0.082	0.013	97.5	-0.44	-0.49
5	NT	NT	NT		
6	NT	NT	NT		
7	NT	NT	NT		
8	0.101	0.047	NR	0.61	0.23
9	0.116	0.024	92	1.44	1.00
10	0.040	0.011	NR	-2.78	-3.36
11	0.132	0.0084	70	2.33	3.22
12	0.097	0.011	104	0.39	0.47
13	0.0765	0.0207	103	-0.75	-0.59
14	0.10	0.03	99	0.56	0.32
15	0.0822	0.0247	86	-0.43	-0.29
16	0.059	0.0117	80	-1.72	-2.01
17	0.024	0.01	NR	-3.67	-4.67
18	0.065	0.053	NR	-1.39	-0.46
19	0.092	0.004	80	0.11	0.19
20	0.086	0.013	73	-0.22	-0.24
21	0.100	0.027	100	0.56	0.35
22	0.077	0.003	74	-0.72	-1.25
23	NT	NT	NT		
24	0.069	0.0069	NT	-1.17	-1.73
25	0.043	0.0035	77.2	-2.61	-4.44
26	0.11	0.05	101	1.11	0.39
27	0.113	0.014	58	1.28	1.34
28	0.110	0.031	95	1.11	0.61
29	0.096	0.0288	77	0.33	0.20
30	0.066	NR	187.8	-1.33	-2.40
32	NT	NT	NT		
33	0.141	0.0423	44.3	2.83	1.17
34	0.0737	0.018425	79	-0.91	-0.78
35	<2	NR	NR		

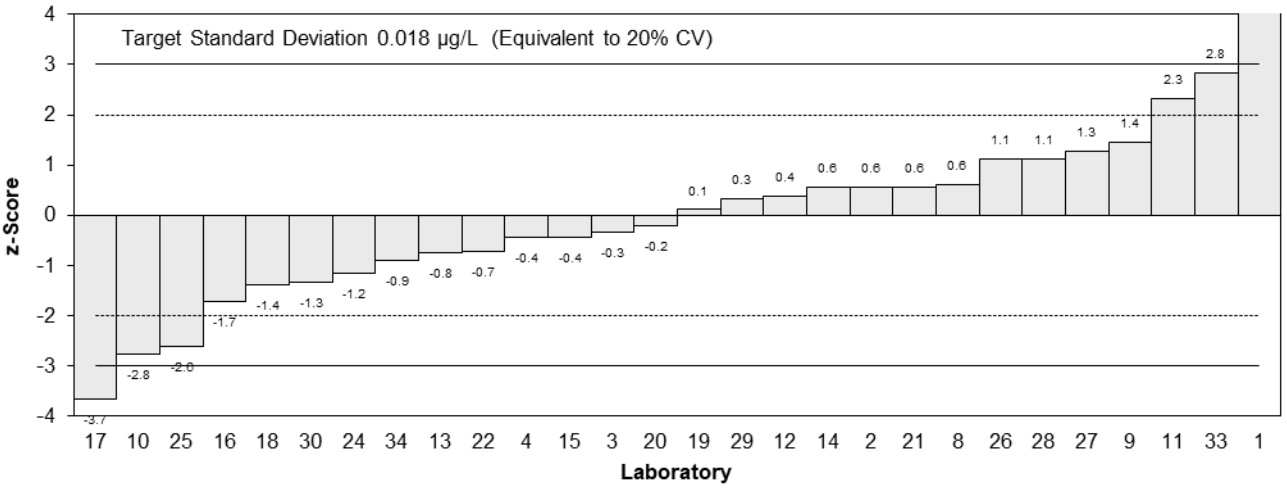
Statistics

Assigned Value*	0.090	0.010
Spike	0.106	0.005
Robust Average	0.089	0.013
Median	0.089	0.010
Mean	0.094	
N	28	
Max.	0.2855	
Min.	0.024	

Robust SD	0.028	
Robust CV	31%	

*Robust Average excluding Laboratories 1, 10, 17, 25 and 33.


Kernel Density
Density
Result
Results: S4 - PFOSA
Assigned Value = 0.090 ± 0.010 µg/L
Results (µg/L)
Laboratory
17 10 25 16 18 30 24 34 13 22 4 15 3 20 19 29 12 14 2 21 8 26 28 27 9 11 33 1 35 23 32 5 6 7 Md R.A.S.V.


z-Scores: S4 - PFOSA
Target Standard Deviation 0.018 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
17 10 25 16 18 30 24 34 13 22 4 15 3 20 19 29 12 14 2 21 8 26 28 27 9 11 33 1

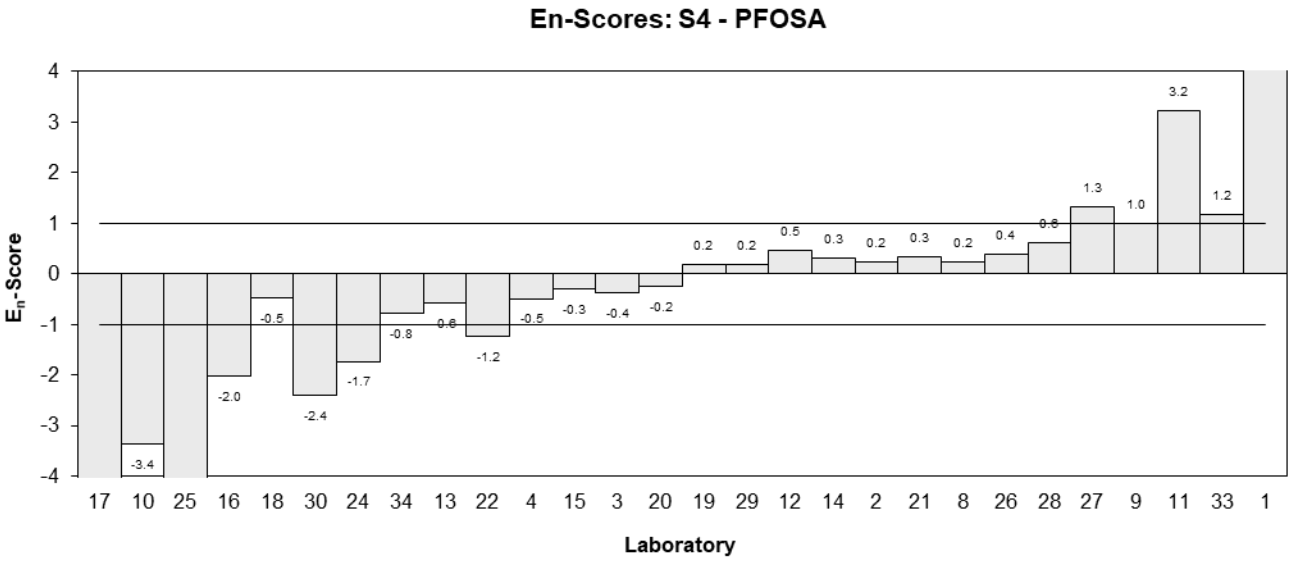

En-Scores: S4 - PFOSA
En-Score
Laboratory
17 10 25 16 18 30 24 34 13 22 4 15 3 20 19 29 12 14 2 21 8 26 28 27 9 11 33 1

Figure 96

Table 100

Sample Details

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

Participant Results

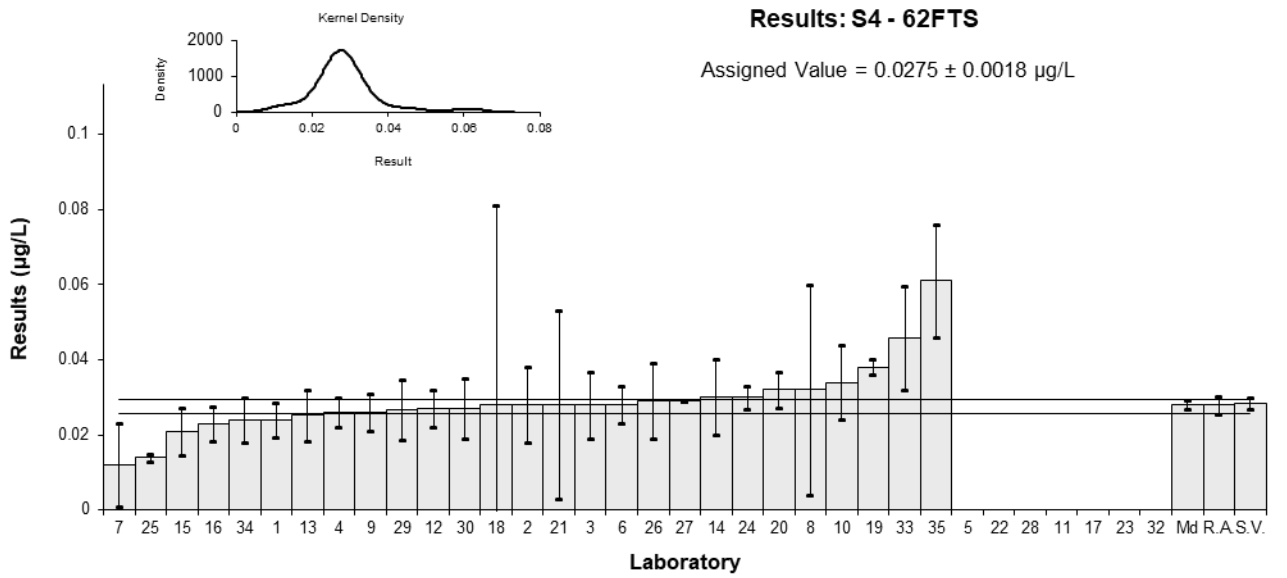
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.024	0.0046	81	-0.64	-0.71
2	0.028	0.01	156	0.09	0.05
3	0.028	0.0089	131	0.09	0.06
4	0.026	0.004	136	-0.27	-0.34
5	<0.03	NR	149		
6	0.028	0.005	NR	0.09	0.09
7	0.012	0.011	NR	-2.82	-1.39
8	0.032	0.028	NR	0.82	0.16
9	0.0260	0.0049	118	-0.27	-0.29
10	0.034	0.01	94	1.18	0.64
11	NT	NT	NT		
12	0.027	0.005	150	-0.09	-0.09
13	0.0252	0.0068	97	-0.42	-0.33
14	0.03	0.01	113	0.45	0.25
15	0.0210	0.00631	79	-1.18	-0.99
16	0.023	0.0046	110	-0.82	-0.91
17	NT	NT	NT		
18	0.028	0.053	NR	0.09	0.01
19	0.038	0.002	69	1.91	3.90
20	0.032	0.0048	63	0.82	0.88
21	0.028	0.025	104	0.09	0.02
22	<0.05	0.015	147		
23	NT	NT	NT		
24	0.030	0.003	NT	0.45	0.71
25	0.014	0.001	84.4	-2.45	-6.56
26	0.029	0.01	104	0.27	0.15
27	0.029	0	144.15	0.27	0.83
28	<0.05	NR	146		
29	0.0267	0.00801	104	-0.15	-0.10
30	0.027	0.0081	144.5	-0.09	-0.06
32	NT	NT	NT		
33	0.0459	0.01377	881	3.35	1.32
34	0.0238	0.00595	108	-0.67	-0.60
35	0.061	0.015	40	6.09	2.22

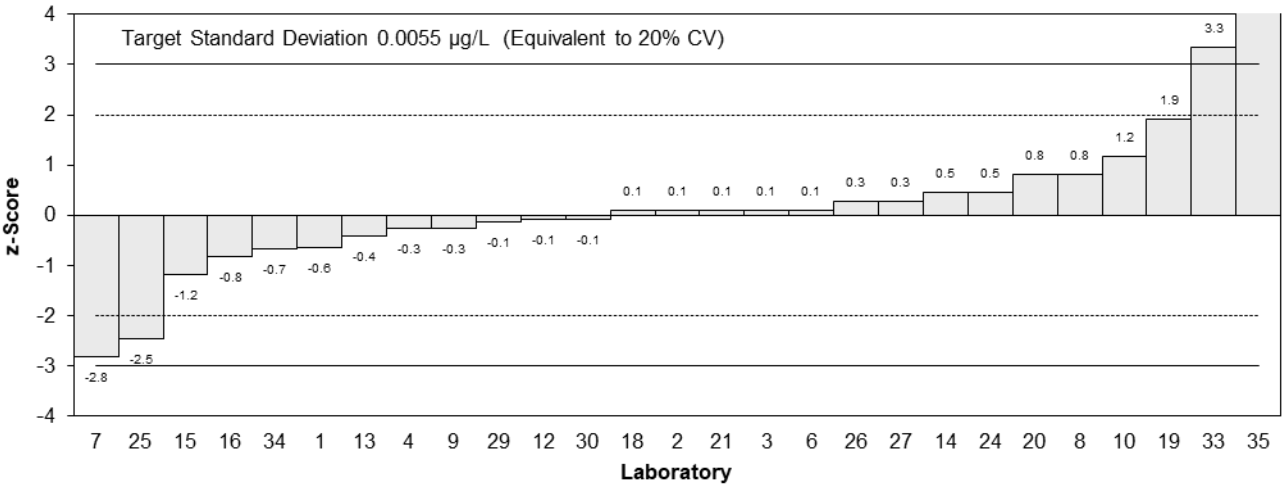
Statistics

Assigned Value*	0.0275	0.0018
Spike	0.0284	0.0014
Robust Average	0.0279	0.0023
Median	0.0280	0.0012
Mean	0.0288	
N	27	
Max.	0.061	
Min.	0.012	

Robust SD	0.0047	
Robust CV	17%	

*Robust Average excluding Laboratories 7, 33 and 35.


Kernel Density
Density
Result
Results: S4 - 62FTS
Assigned Value = 0.0275 ± 0.0018 µg/L
Results (µg/L)
Laboratory
7 25 15 16 34 1 13 4 9 29 12 30 18 2 21 3 6 26 27 14 24 20 8 10 19 33 35 5 22 28 11 17 23 32 Md R.A.S.V.


z-Scores: S4 - 62FTS
Target Standard Deviation 0.0055 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
7 25 15 16 34 1 13 4 9 29 12 30 18 2 21 3 6 26 27 14 24 20 8 10 19 33 35

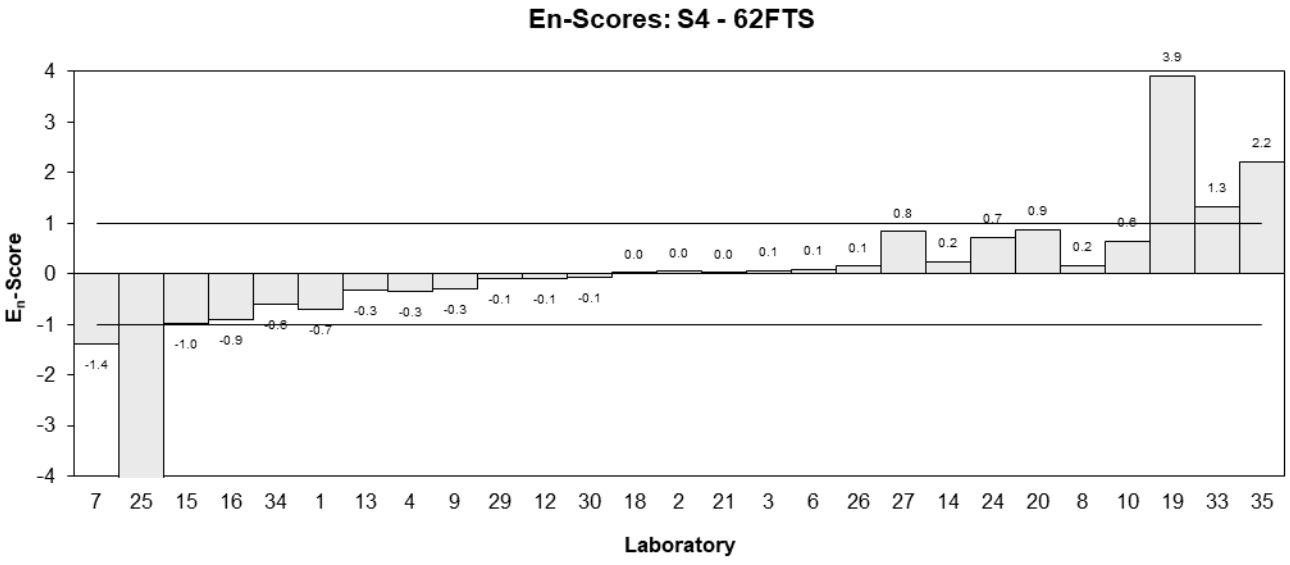

En-Scores: S4 - 62FTS
En-Score
Laboratory
7 25 15 16 34 1 13 4 9 29 12 30 18 2 21 3 6 26 27 14 24 20 8 10 19 33 35

Figure 97

Table 101

Sample Details

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

Participant Results

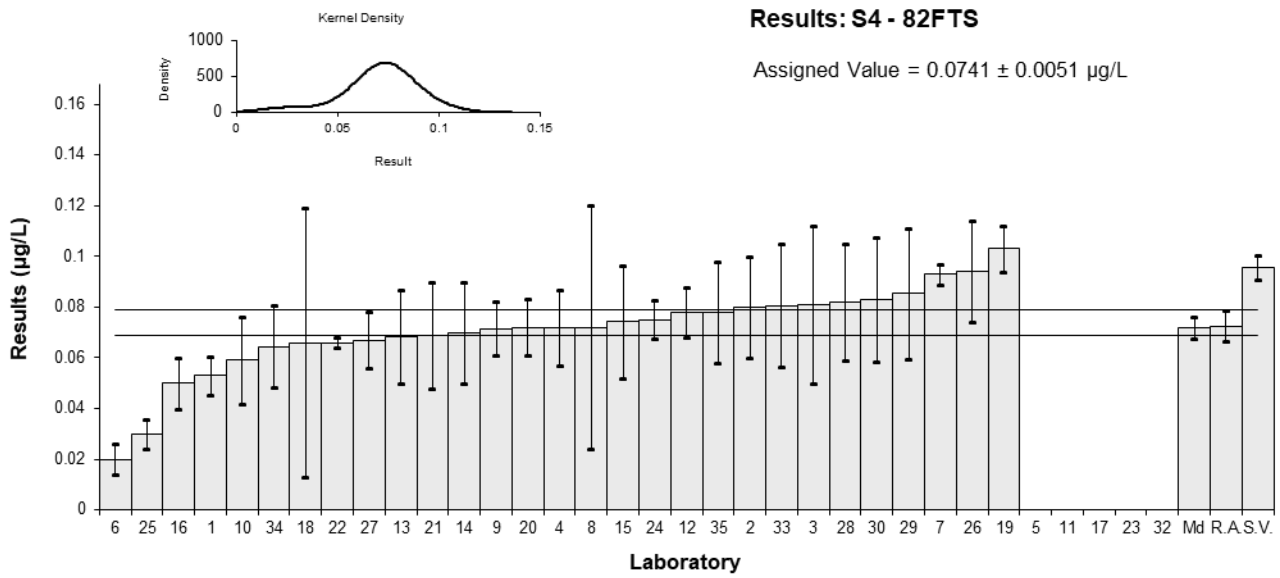
Lab Code	Result	Uncertainty	Recovery	z-Score	E_n-Score
1	0.053	0.0077	84	-1.42	-2.28
2	0.080	0.02	109	0.40	0.29
3	0.081	0.031	128	0.47	0.22
4	0.072	0.015	122	-0.14	-0.13
5	<0.04	NR	107		
6	0.020	0.006	NR	-3.65	-6.87
7	0.093	0.004	NR	1.28	2.92
8	0.072	0.048	NR	-0.14	-0.04
9	0.0715	0.0107	134	-0.18	-0.22
10	0.059	0.017	113	-1.02	-0.85
11	NT	NT	NT		
12	0.078	0.010	150	0.26	0.35
13	0.0685	0.0185	98	-0.38	-0.29
14	0.07	0.02	118	-0.28	-0.20
15	0.0742	0.0223	82	0.01	0.00
16	0.05	0.01	110	-1.63	-2.15
17	NT	NT	NT		
18	0.066	0.053	NR	-0.55	-0.15
19	0.103	0.009	71	1.95	2.79
20	0.072	0.011	72	-0.14	-0.17
21	0.069	0.021	120	-0.34	-0.24
22	0.066	0.002	81	-0.55	-1.48
23	NT	NT	NT		
24	0.075	0.0075	NT	0.06	0.10
25	0.03	0.0057	NR	-2.98	-5.77
26	0.094	0.02	114	1.34	0.96
27	0.067	0.011	123.05	-0.48	-0.59
28	0.082	0.023	228	0.53	0.34
29	0.0853	0.02559	92	0.76	0.43
30	0.083	0.024485	144.5	0.60	0.36
32	NT	NT	NT		
33	0.0807	0.02421	1006	0.45	0.27
34	0.0645	0.016125	108	-0.65	-0.57
35	0.078	0.020	40	0.26	0.19

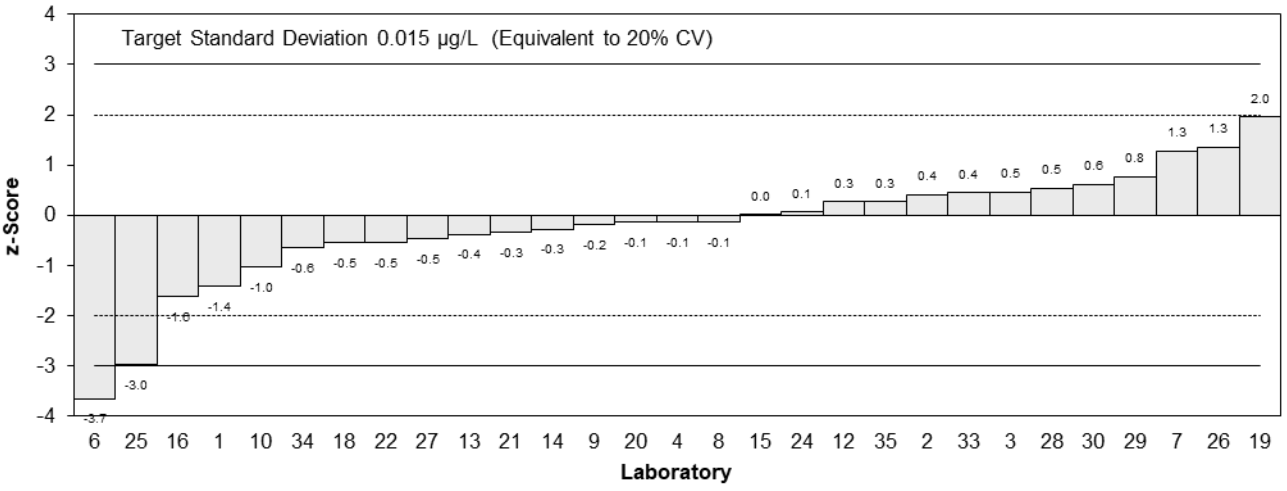
Statistics

Assigned Value*	0.0741	0.0051
Spike	0.0957	0.0049
Robust Average	0.0725	0.0060
Median	0.0720	0.0042
Mean	0.0710	
N	29	
Max.	0.103	
Min.	0.02	

Robust SD	0.013	
Robust CV	18%	

*Robust Average excluding Laboratories 6 and 25.


Kernel Density
Density
Result
Results: S4 - 82FTS
Assigned Value = 0.0741 ± 0.0051 µg/L
Results (µg/L)
Laboratory
6 25 16 1 10 34 18 22 27 13 21 14 9 20 4 8 15 24 12 35 2 33 3 28 30 29 7 26 19 5 11 17 23 32 Md R.A.S.V.


z-Scores: S4 - 82FTS
Target Standard Deviation 0.015 µg/L (Equivalent to 20% CV)
z-Score
Laboratory
6 25 16 1 10 34 18 22 27 13 21 14 9 20 4 8 15 24 12 35 2 33 3 28 30 29 7 26 19

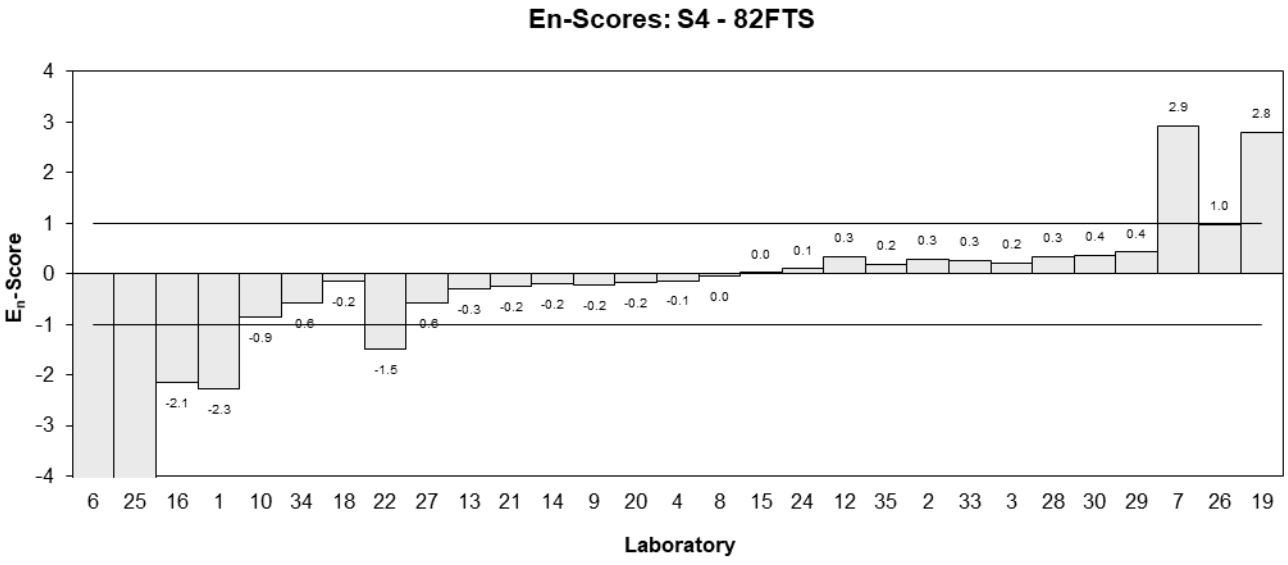

En-Scores: S4 - 82FTS
En-Score
Laboratory
6 25 16 1 10 34 18 22 27 13 21 14 9 20 4 8 15 24 12 35 2 33 3 28 30 29 7 26 19

Figure 98

6 DISCUSSION OF RESULTS

6.1 Assigned Value

Assigned values for the tests in the study samples were the robust averages of participants' results. The robust averages and their associated expanded uncertainties were calculated using the procedures described in ISO 13528:2015(E). Results less than 50% or more than 150% of the robust average were removed before calculation of the assigned value.[8] Appendix 2 sets out the calculation for the expanded uncertainty of the robust average of PFBS in S1.

No assigned values were calculated for PFNS, PFDS, 4:2 FTS, N-EtFOSA, N-MeFOSAA and N-EtFOSAA in Sample S1, 8:2 FTS, PFDA in Sample S3 and PFTeDA and PFNS in Sample S4, because few laboratories reported numeric results and/or the reported 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.

Assigned values for spiked analytes in Samples S2 and S4 were within the range 35% to 109% of the spiked concentration for that analyte (Table 102).

Although a low spiked recovery was found for GenX in S2 and PFDS and PFUdA in S4, an assigned value was still set for these analytes because there was reasonable consensus between reported results with between-laboratory CV's of 20% to 27% (Table 103).

Table 102 Comparison of Assigned Value and Spiked Concentration.

Sample	Matrix	Analyte	Units	Spiked Concentration	Assigned Value	Assigned/ Spike (%)
S2	Soil	PFBS	µg/kg	10.0	8.88	89
S2	Soil	PFPeS	µg/kg	56.6	53.0	94
S2	Soil	PFHxS	µg/kg	5.41	5.36	99
S2	Soil	PFHxS_L	µg/kg	5.33	5.29	99
S2	Soil	PFHpS	µg/kg	20.1	19.2	96
S2	Soil	PFOS	µg/kg	4.20	3.65	87
S2	Soil	PFOS_L	µg/kg	2.34	2.48	106
S2	Soil	PFNS	µg/kg	3.31	2.59	78
S2	Soil	PFDS	µg/kg	29.1	26.1	90
S2	Soil	PFBA	µg/kg	25.1	21.2	84
S2	Soil	PFPeA	µg/kg	20.1	16.8	84
S2	Soil	PFHxA	µg/kg	11.6	12.6	109
S2	Soil	PFOA	µg/kg	7.51	7.82	104
S2	Soil	PFNA	µg/kg	46.9	39.5	84
S2	Soil	PFDA	µg/kg	100	90.6	91
S2	Soil	PFUdA	µg/kg	80.0	76.2	95
S2	Soil	PFDoA	µg/kg	15.0	14.0	93
S2	Soil	PFTrDA	µg/kg	50.0	39.5	79
S2	Soil	PFTeDA	µg/kg	30.1	26.0	86

Sample	Matrix	Analyte	Units	Spiked Concentration	Assigned Value	Assigned/ Spike (%)
S2	Soil	GenX	µg/kg	80.0	31.1	39
S2	Soil	ADONA	µg/kg	75.4	60.1	80
S2	Soil	9Cl-PF3ONS	µg/kg	74.6	62.7	84
S2	Soil	PFOSA	µg/kg	10.1	8.21	81
S2	Soil	EtFOSE	µg/kg	10.1	6.36	63
S2	Soil	6:2 FTS	µg/kg	14.2	13.2	93
S2	Soil	8:2 FTS	µg/kg	4.79	4.64	97
S4	Water	PFBS	µg/L	0.0612	0.0531	87
S4	Water	PFPeS	µg/L	0.0472	0.0475	101
S4	Water	PFHxS	µg/L	0.0551	0.0531	96
S4	Water	PFHxS_L	µg/L	0.0542	0.0531	98
S4	Water	PFHpS	µg/L	0.100	0.0884	88
S4	Water	PFOS	µg/L	0.0326	0.0250	77
S4	Water	PFOS_L	µg/L	0.0182	0.0171	94
S4	Water	PFNS	µg/L	0.00480	0.00308*	64
S4	Water	PFDS	µg/L	0.0773	0.0273	35
S4	Water	PFBA	µg/L	0.0892	0.0742	83
S4	Water	PFPeA	µg/L	0.0400	0.0359	90
S4	Water	PFHxA	µg/L	0.0150	0.0158	105
S4	Water	PFHpA	µg/L	0.0295	0.0304	103
S4	Water	PFOA	µg/L	0.0503	0.0443	88
S4	Water	PFNA	µg/L	0.152	0.134	88
S4	Water	PFDA	µg/L	0.0404	0.0306	76
S4	Water	PFUdA	µg/L	0.111	0.0597	54
S4	Water	PFTeDA	µg/L	0.085	0.093*	109
S4	Water	GenX	µg/L	0.0999	0.091	91
S4	Water	ADONA	µg/L	0.0753	0.0695	92
S4	Water	9Cl-PF3ONS	µg/L	0.140	0.112	80
S4	Water	PFOSA	µg/L	0.106	0.090	85
S4	Water	6:2 FTS	µg/L	0.0284	0.0275	97
S4	Water	8:2 FTS	µg/L	0.0957	0.0741	77

*Robust Average

6.2 Measurement Uncertainty Reported by Participants

Participants were asked to report an estimate of the expanded measurement uncertainty associated with their results. Of 2363 numerical results, 2321 were reported with an expanded measurement uncertainty, indicating that not all laboratories have addressed this requirement

of ISO 17025.[7] The participants used a wide variety of procedures to estimate expanded measurement uncertainty. These are presented in Table 2.

Proficiency tests allow a check of participants' uncertainty estimates. Results and the expanded MU are presented in the bar charts for each analyte (Figure 2 to 98). In this study, the magnitude of the reported expanded uncertainties was within the range 0% to 1155% of the reported value. 314 were less than 10% relative, which the study coordinator believes is unrealistically small for a routine PFAS measurement, and 62 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. An estimate of uncertainty expressed as a numerical value cannot be attached to a result expressed as a range.[8]

In some cases results were reported with an inappropriate number of significant figures. The recommended format is to write uncertainty to no more than two significant figures and then to write the result with the corresponding number of decimal places (for example a results of of "12.808 ± 2.818 µg/L", should instead be expressed as "12.8 ± 2.8 µg/L").[8]

6.3 E_n-Score

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

The dispersal of participants' E_n-scores is graphically presented in Figure 99. Where a laboratory did not report an expanded uncertainty with a result, an expanded uncertainty of zero (0) was used to calculate the E_n-score.

Of 2238 results for which E_n-scores were calculated, 1555 (69%) returned a satisfactory score of $|E_n| \leq 1.0$ indicating agreement of the participants' results with the assigned values within their respective expanded measurement uncertainties.

6.4 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[6] and the between-laboratories CV are presented for comparison in Table 103.

To account for possible bias in the consensus values due to laboratories using inefficient analytical/extraction techniques, z-scores were adjusted for GenX and ADONA in Sample S2 and PFOS (total), PFDS, PFDA, PFUdA, and 9Cl-PF3ONS in Sample S4. 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 by laboratory in Figures 100 and 102 and by analyte in Figures 101 and 103.

Of the 2238 results for which z-scores were calculated, 1855 (83%) returned a satisfactory z-score of $|z| \leq 2.0$ and 171 (8%) were questionable with a z-score of $2.0 < |z| < 3.0$.

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

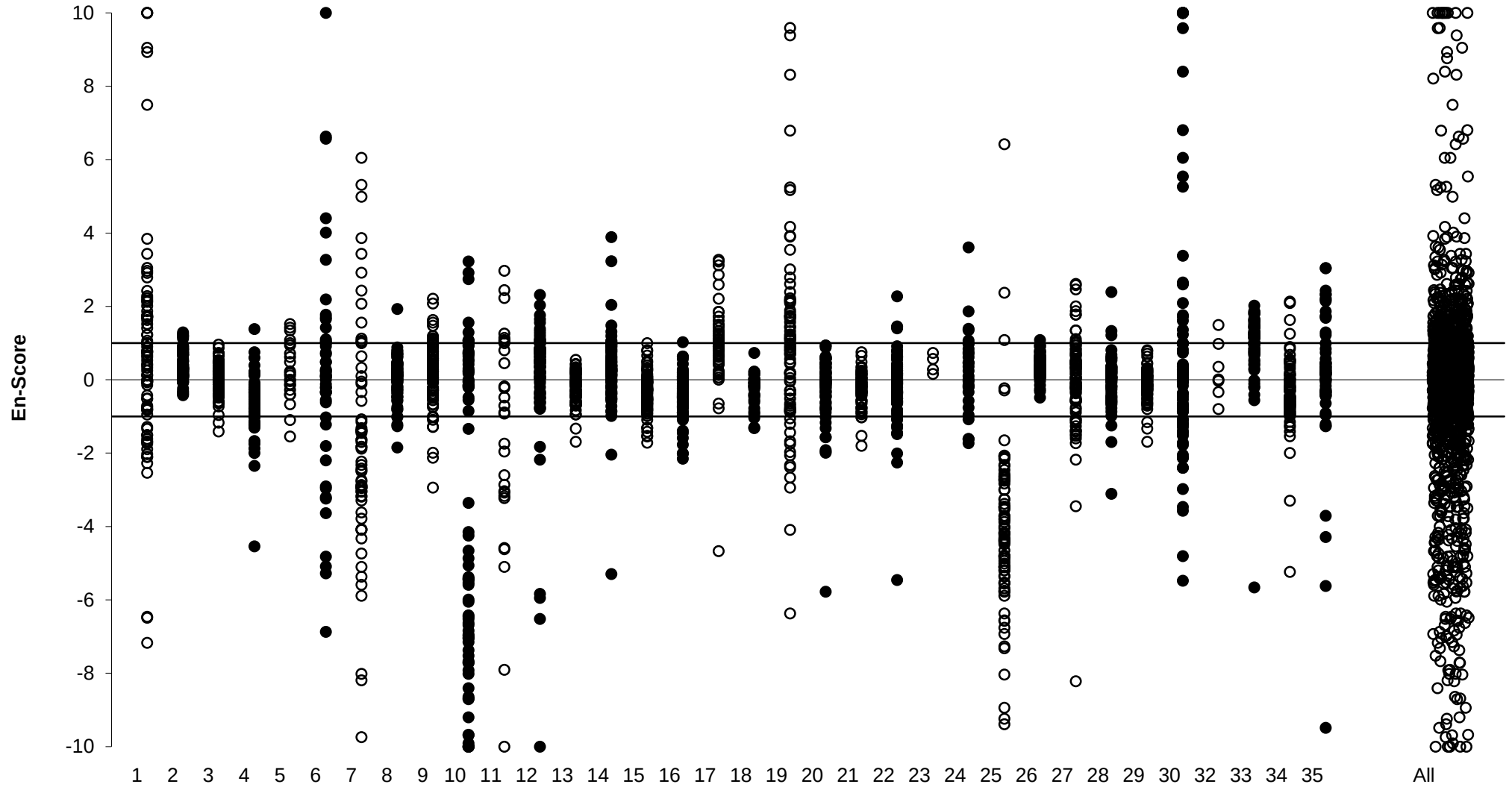
Table 103 Performance Target standard deviation, modified Horwitz values and between laboratories CV

Sample	Analyte	Assigned value	Unit	Target SD (as PCV, %)	Modified Horwitz CV (%)	Between laboratories' CV* (%)
S1	PFBS	160	µg/kg	20	21	17
S1	PFPeS	197	µg/kg	20	20	17
S1	PFHxS	1480	µg/kg	20	15	19
S1	PFHxS_L	1310	µg/kg	20	15	20
S1	PFHpS	450	µg/kg	20	18	17
S1	PFOS	37900	µg/kg	20	9.2	28
S1	PFOS_L	31600	µg/kg	20	9.5	22
S1	PFNS	Not Set	µg/kg	Not Set	NA	67
S1	PFDS	Not Set	µg/kg	Not Set	NA	59
S1	PFBA	255	µg/kg	20	20	21
S1	PFPeA	361	µg/kg	20	19	24
S1	PFHxA	1340	µg/kg	20	15	22
S1	PFHpA	136	µg/kg	20	22	15
S1	PFOA	466	µg/kg	20	18	16
S1	PFNA	64.5	µg/kg	20	22	19
S1	PFDA	55.0	µg/kg	20	22	16
S1	PFUdA	28.9	µg/kg	20	22	17
S1	PFDoA	21.9	µg/kg	20	22	16
S1	PFTrDA	8.2	µg/kg	20	22	24
S1	PFTeDA	7.02	µg/kg	20	22	20
S1	PFOSA	216	µg/kg	20	20	21
S1	MeFOSA	4.54	µg/kg	20	22	18
S1	EtFOSA	Not Set	µg/kg	Not Set	NA	80
S1	MeFOSAA	Not Set	µg/kg	Not Set	NA	110
S1	EtFOSAA	Not Set	µg/kg	Not Set	NA	180
S1	MeFOSE	3.89	µg/kg	20	22	21
S1	EtFOSE	0.652	µg/kg	20	22	29
S1	4:2 FTS	Not Set	µg/kg	Not Set	NA	60
S1	6:2 FTS	350	µg/kg	20	19	27
S1	8:2 FTS	1060	µg/kg	20	16	28
S1	10:2 FTS	24.7	µg/kg	20	22	17

Sample	Analyte	Assigned value	Unit	Target SD (as PCV, %)	Modified Horwitz CV (%)	Between laboratories' CV* (%)
S2	PFBS	8.88	µg/kg	20	22	16
S2	PFPeS	53.0	µg/kg	20	22	13
S2	PFHxS	5.36	µg/kg	20	22	13
S2	PFHxS_L	5.29	µg/kg	20	22	12
S2	PFHpS	19.2	µg/kg	20	22	10
S2	PFOS	3.65	µg/kg	20	22	23
S2	PFOS_L	2.48	µg/kg	20	22	15
S2	PFNS	2.59	µg/kg	20	22	16
S2	PFDS	26.1	µg/kg	20	22	19
S2	PFBA	21.2	µg/kg	20	22	18
S2	PFPeA	16.8	µg/kg	20	22	12
S2	PFHxA	12.6	µg/kg	20	22	13
S2	PFOA	7.82	µg/kg	20	22	16
S2	PFNA	39.5	µg/kg	20	22	15
S2	PFDA	90.6	µg/kg	20	22	17
S2	PFUdA	76.2	µg/kg	20	22	21
S2	PFDoA	14.0	µg/kg	20	22	13
S2	PFTrDA	39.5	µg/kg	20	22	15
S2	PFTeDA	26.0	µg/kg	20	22	14
S2	GenX	31.1	µg/kg	20	22	20
S2	ADONA	60.1	µg/kg	20	22	16
S2	9Cl-PF3ONS	62.7	µg/kg	20	22	17
S2	PFOSA	8.21	µg/kg	20	22	10
S2	EtFOSE	6.36	µg/kg	20	22	22
S2	6:2 FTS	13.2	µg/kg	20	22	14
S2	8:2 FTS	4.64	µg/kg	20	22	20
S3	PFBS	0.520	µg/L	20	22	21
S3	PFPeS	0.504	µg/L	20	22	20
S3	PFHxS	4.19	µg/L	20	22	21
S3	PFHxS_L	3.77	µg/L	20	22	19
S3	PFHpS	0.254	µg/L	20	22	28
S3	PFOS	4.73	µg/L	20	22	30
S3	PFOS_L	2.11	µg/L	20	22	19
S3	PFBA	0.391	µg/L	20	22	20
S3	PFPeA	0.698	µg/L	20	22	16

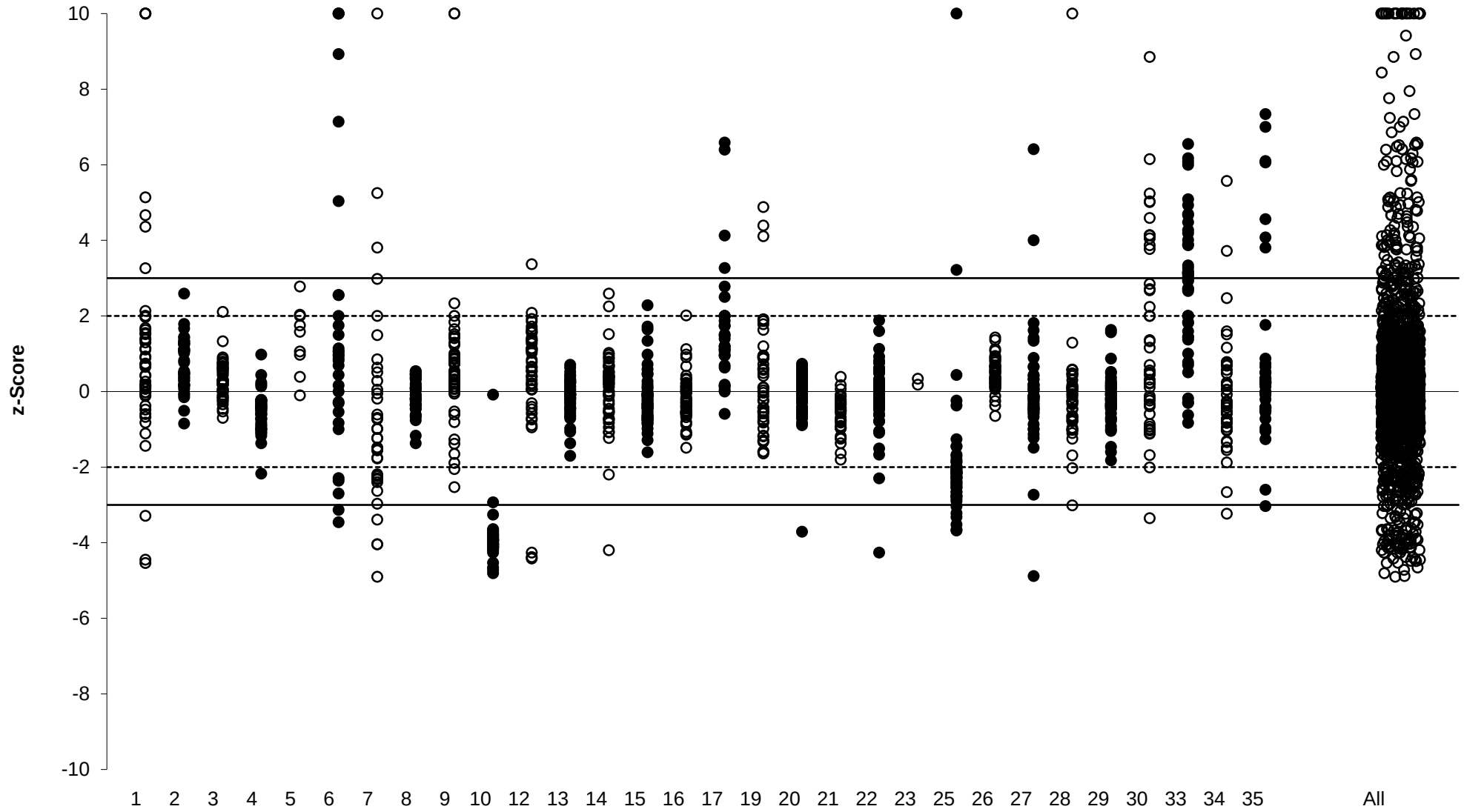
Sample	Analyte	Assigned value	Unit	Target SD (as PCV, %)	Modified Horwitz CV (%)	Between laboratories' CV* (%)
S3	PFHxA	1.70	µg/L	20	22	14
S3	PFHpA	0.250	µg/L	20	22	19
S3	PFOA	0.503	µg/L	20	22	17
S3	PFNA	0.0120	µg/L	20	22	23
S3	PFDA	Not Set	µg/L	Not Set	NA	64
S3	6:2 FTS	0.0726	µg/L	20	22	19
S3	8:2 FTS	Not Set	µg/L	Not Set	NA	69
S4	PFBS	0.0531	µg/L	20	22	14
S4	PFPeS	0.0475	µg/L	20	22	18
S4	PFHxS	0.0531	µg/L	20	22	16
S4	PFHxS_L	0.0531	µg/L	20	22	19
S4	PFHpS	0.0884	µg/L	20	22	19
S4	PFOS	0.0250	µg/L	20	22	25
S4	PFOS_L	0.0171	µg/L	20	22	22
S4	PFNS	Not Set	µg/L	Not Set	NA	27
S4	PFDS	0.0273	µg/L	20	22	25
S4	PFBA	0.0742	µg/L	20	22	15
S4	PFPeA	0.0359	µg/L	20	22	15
S4	PFHxA	0.0158	µg/L	20	22	17
S4	PFHpA	0.0304	µg/L	20	22	19
S4	PFOA	0.0443	µg/L	20	22	16
S4	PFNA	0.134	µg/L	20	22	16
S4	PFDA	0.0306	µg/L	20	22	16
S4	PFUdA	0.0597	µg/L	20	22	27
S4	PFTeDA	Not Set	µg/L	Not Set	NA	51
S4	GenX	0.091	µg/L	20	22	25
S4	ADONA	0.0695	µg/L	20	22	15
S4	9Cl-PF3ONS	0.112	µg/L	20	22	17
S4	PFOSA	0.090	µg/L	20	22	22
S4	6:2 FTS	0.0275	µg/L	20	22	13
S4	8:2 FTS	0.0741	µg/L	20	22	14

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



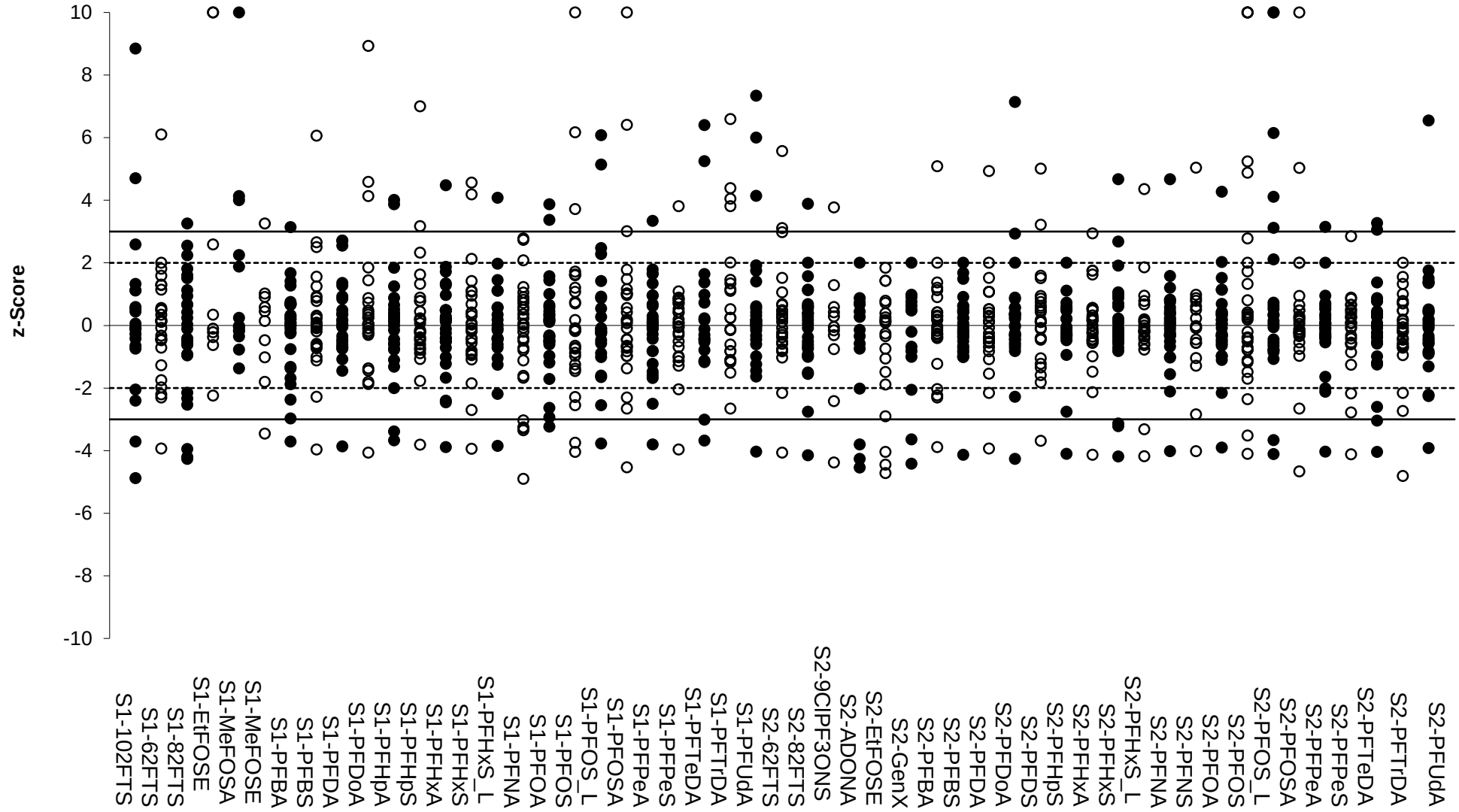
Scores greater than 10 have been plotted as 10.

Figure 99 E_n-Score Dispersal by Laboratory



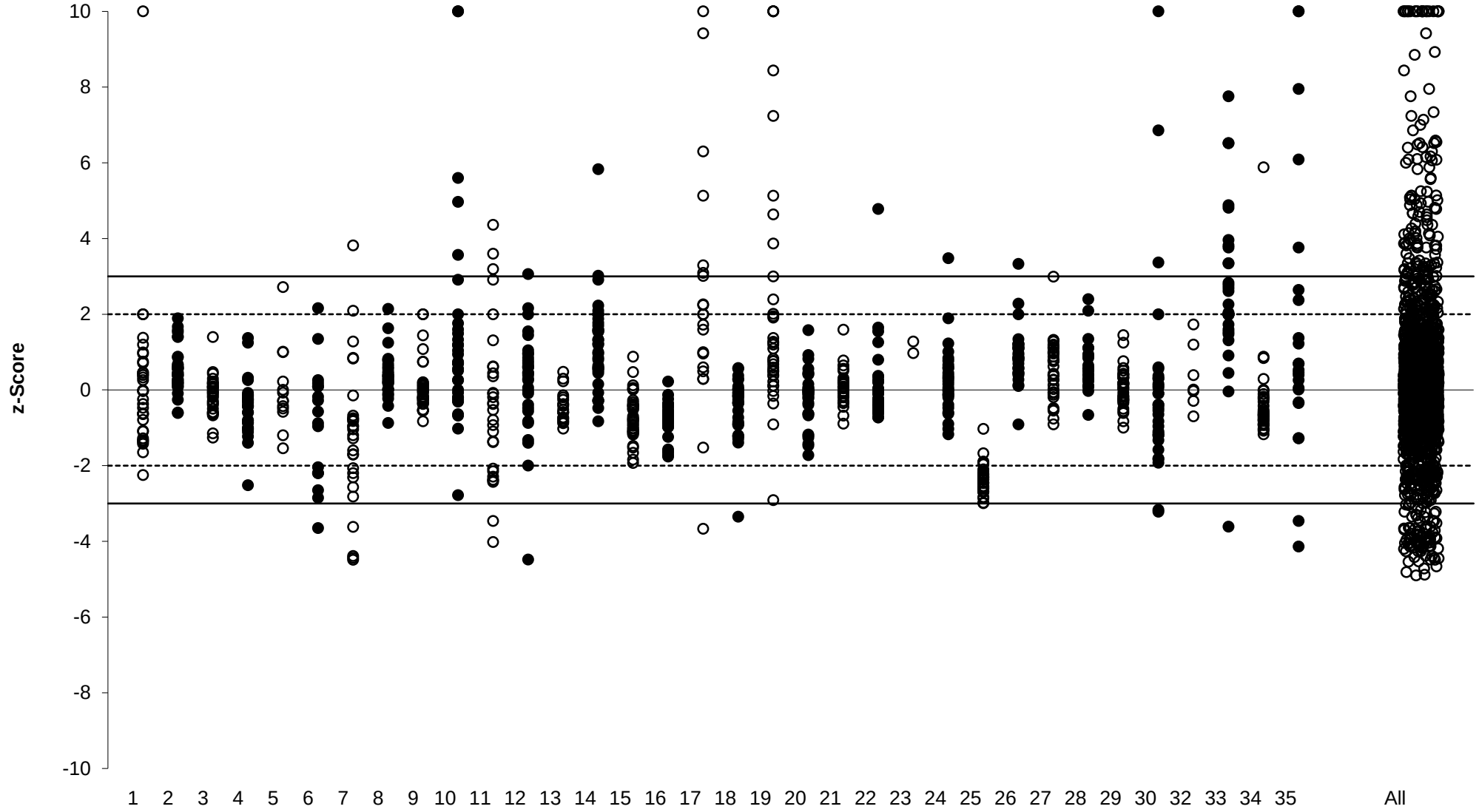
Scores greater than 10 have been plotted as 10.

Figure 100 z-Score Dispersal by Laboratory for Soil Samples S1 and S2



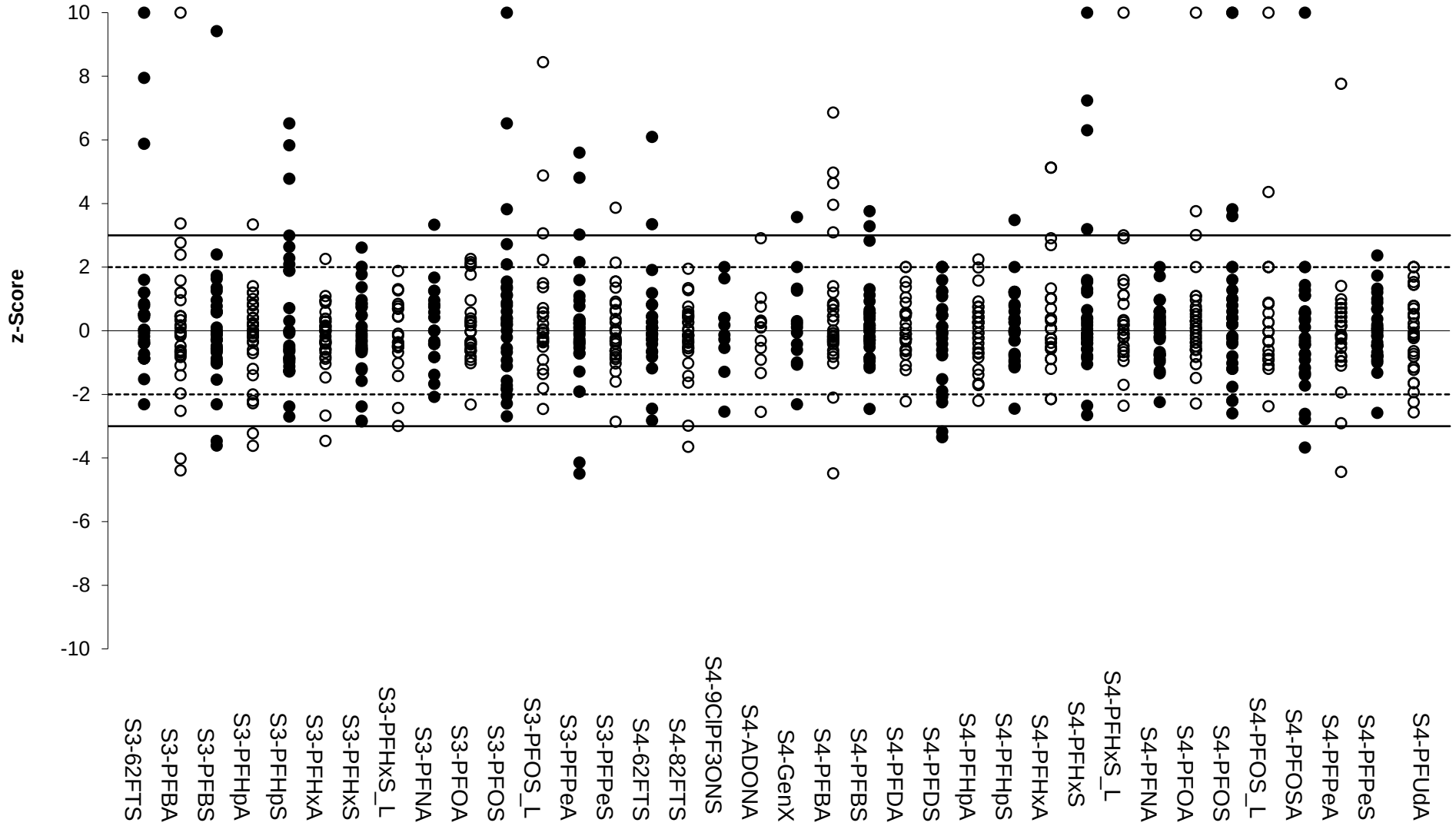
Scores greater than 10 have been plotted as 10.

Figure 101 z-Score Dispersal by Analyte for Soil Samples S1 and S2



Scores greater than 10 have been plotted as 10.

Figure 102 z-Score Dispersal by Laboratory for Water Samples S3 and S4

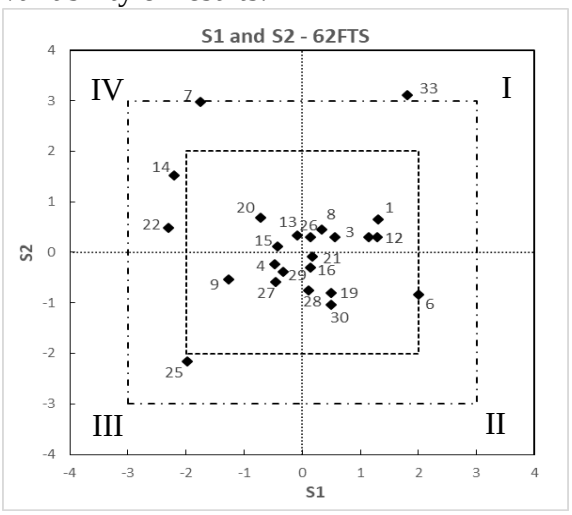


Scores greater than 10 have been plotted as 10.

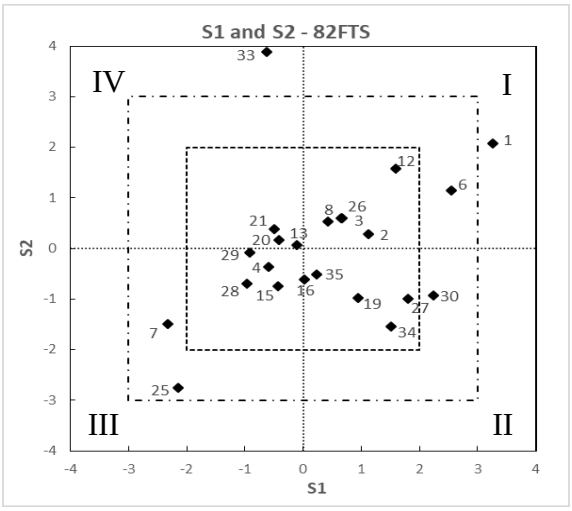
Figure 103 z-Score Dispersal by Analyte for Water Samples S3 and S4

6.5 z-Score Scatter Plots

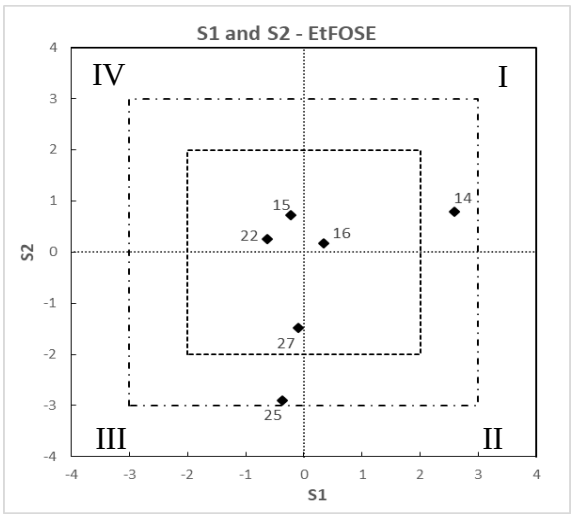
Scatter plots of z-scores for all analytes are presented in Figure 104. Scores are predominantly plotted in quadrants I and III, indicating that laboratory bias is the major contributor to the variability of results.



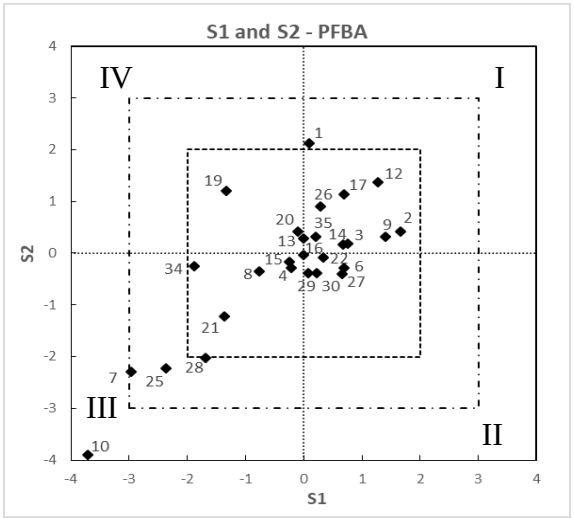
Laboratories 10, 34 and 36 are offscale.



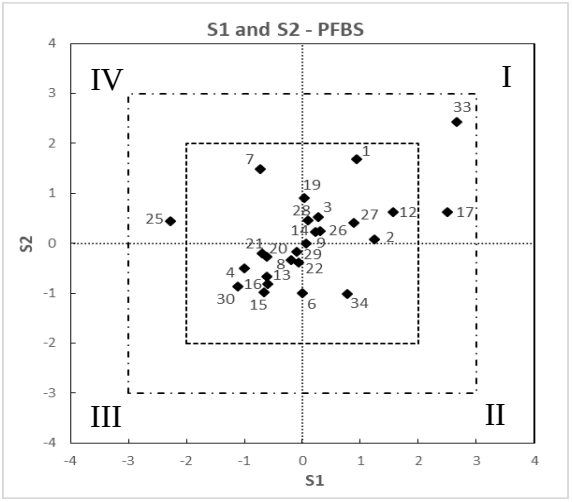
Laboratories 10, 14 and 22 are offscale.



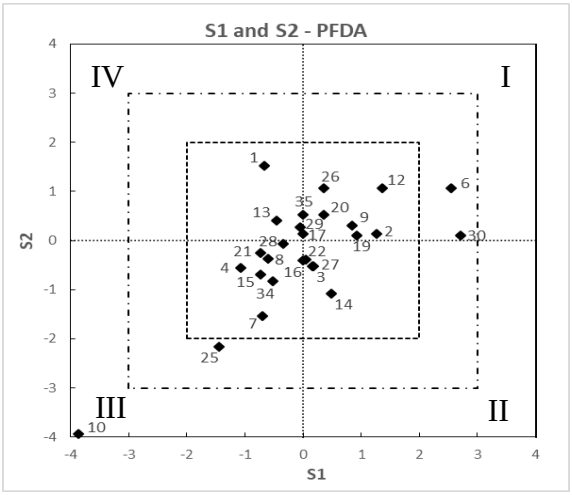
Laboratories 7 and 28 are offscale.



Laboratory 33 is offscale.

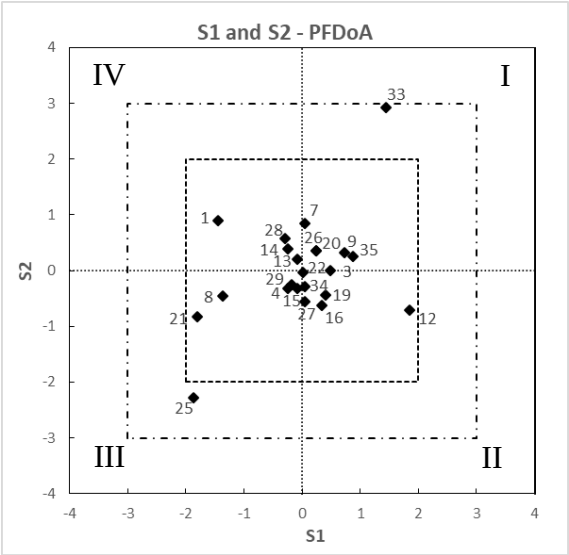


Laboratories 10 and 35 are offscale.

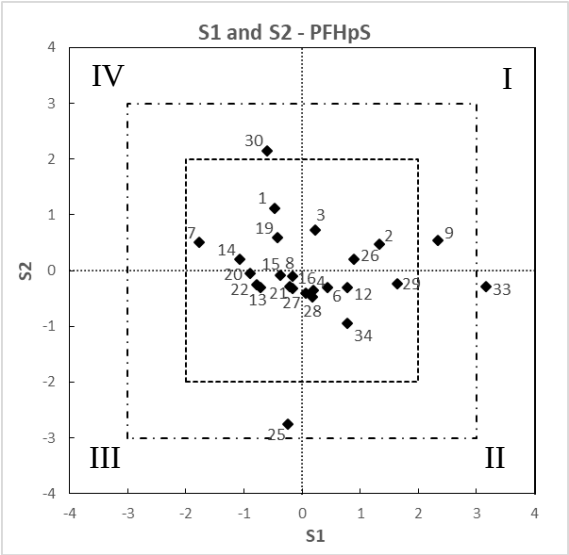


Laboratory 33 is offscale.

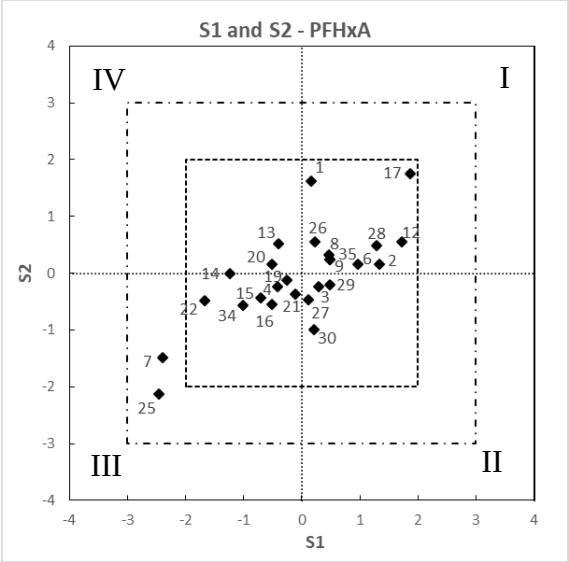
Figure 104 z-Score Scatter Plots



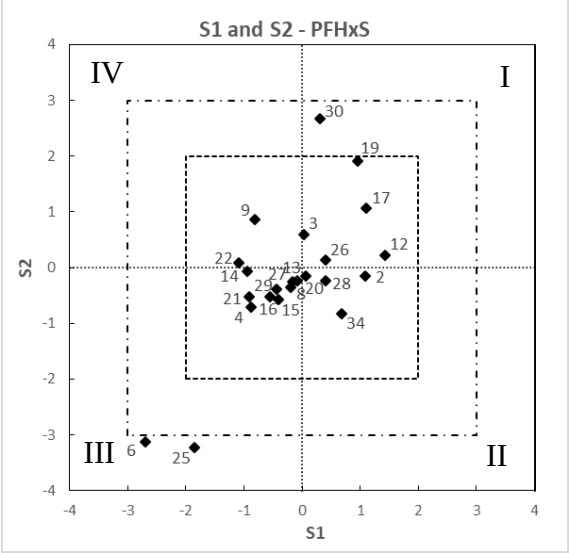
Laboratories 6, 10, 17 and 30 are offscale.



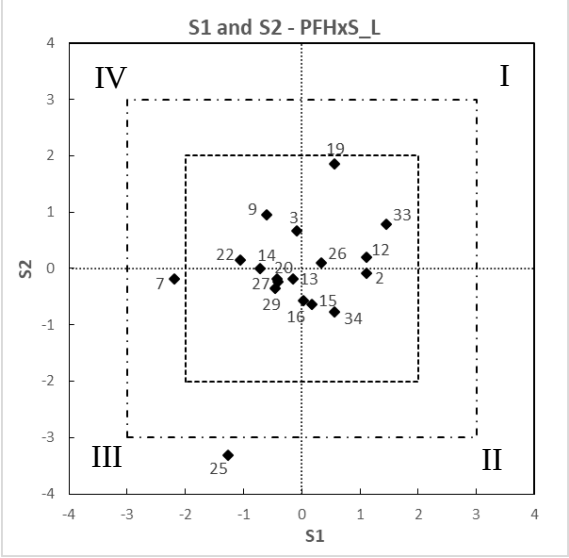
Laboratories 10 and 35 is offscale.



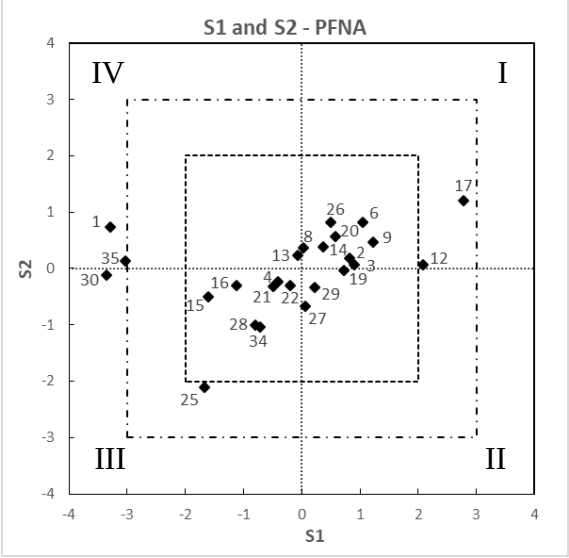
Laboratories 10 and 33 are offscale.



Laboratories 1, 10, 33 and 35 are offscale.

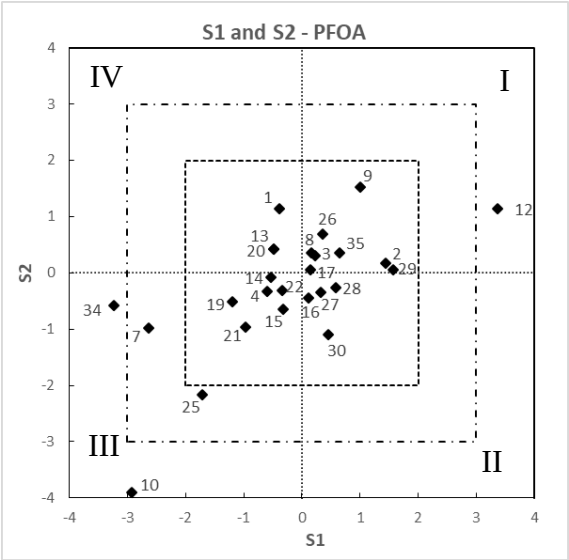


Laboratories 1, 10 and 35 are offscale.

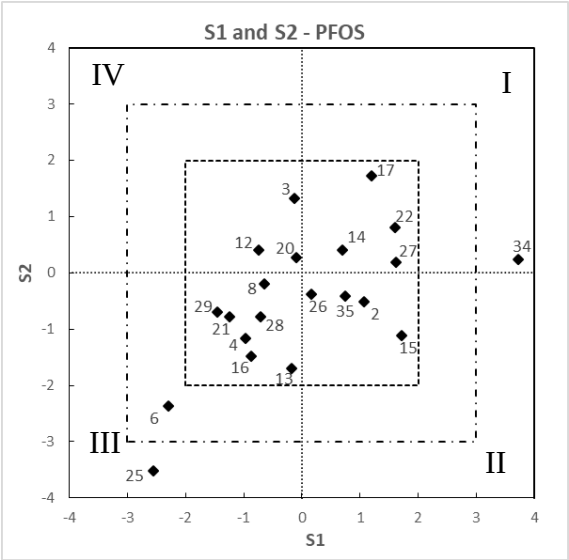


Laboratories 7, 10 and 33 are offscale.

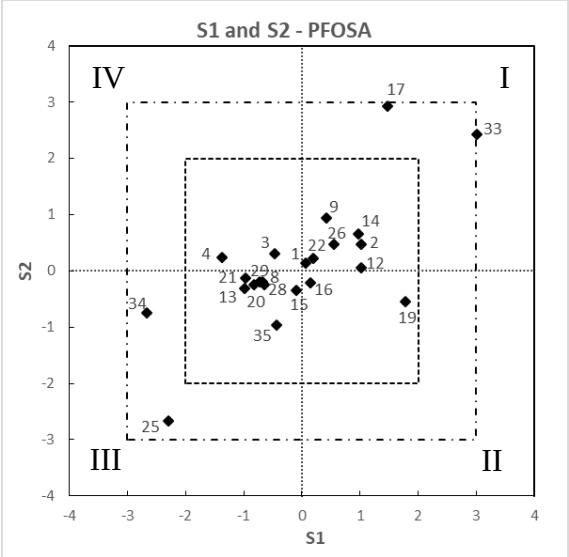
Figure 104 z-Score Scatter Plots (continued)



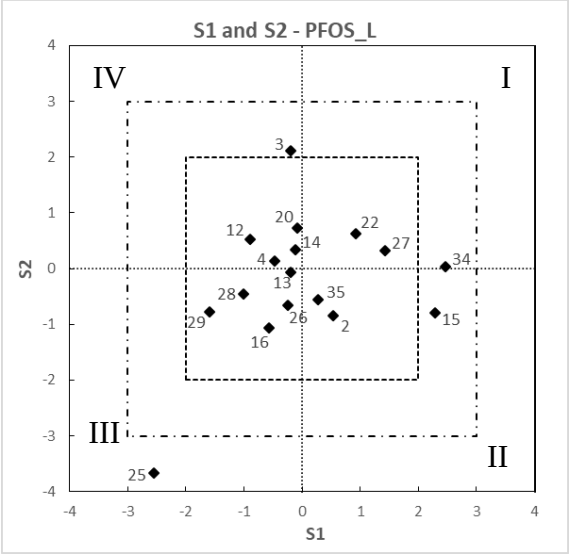
Laboratory 33 is offscale.



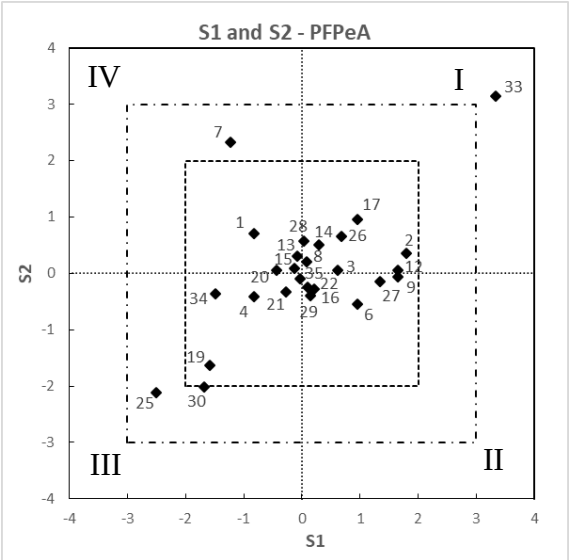
Laboratories 1, 7, 9, 10, 19, 30 and 33 are off scale.



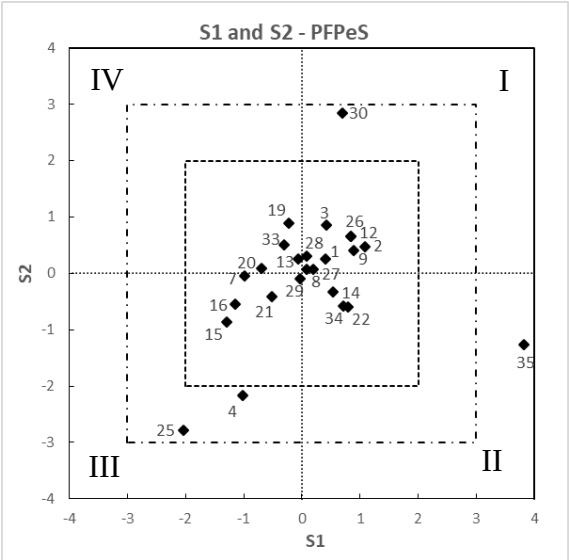
Laboratories 6, 10, 27 and 30 are offscale.



Laboratories 1, 9, 10, 19, 30 and 33 are offscale.

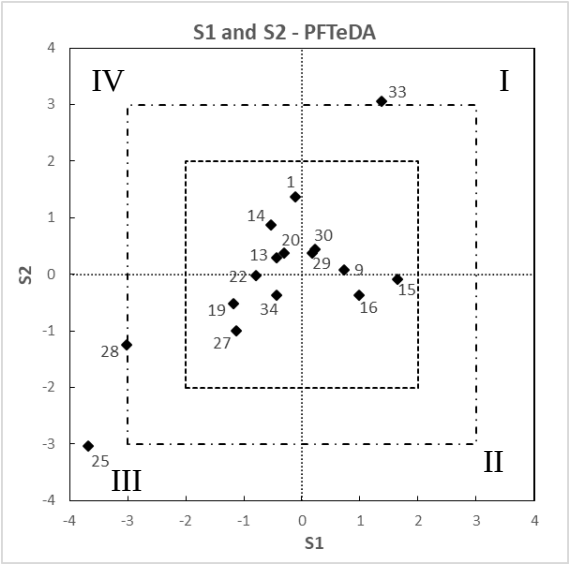


Laboratory 10 is offscale.

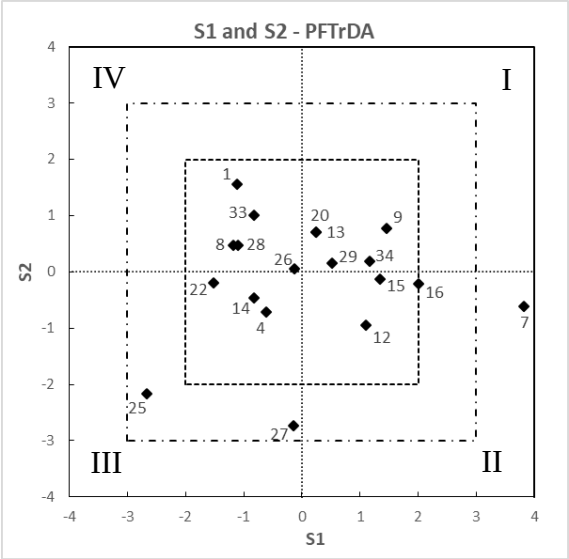


Laboratory 10 is offscale.

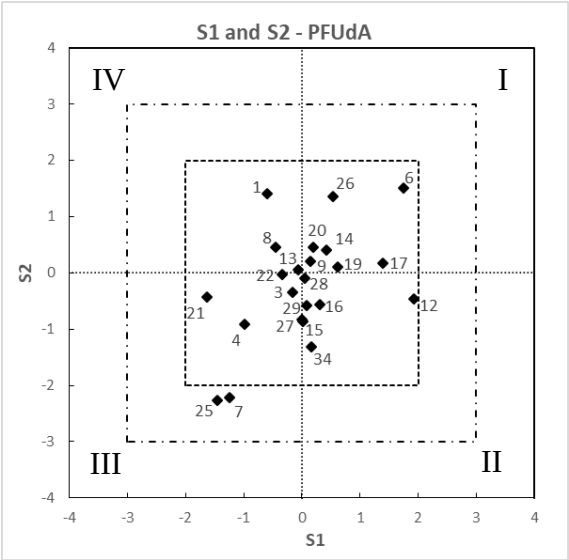
Figure 104 z-Score Scatter Plots (continued)



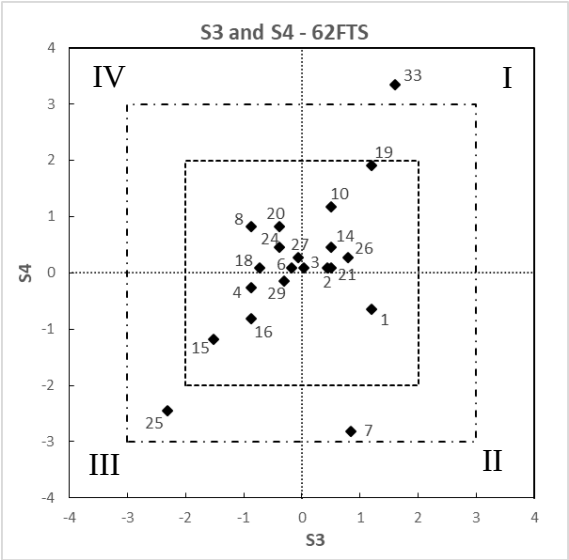
Laboratories 7 and 17 are offscale.



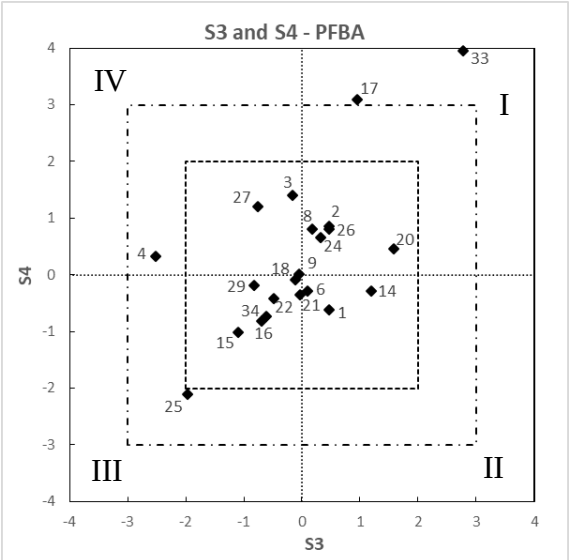
Laboratories 17, 19 and 30 are offscale.



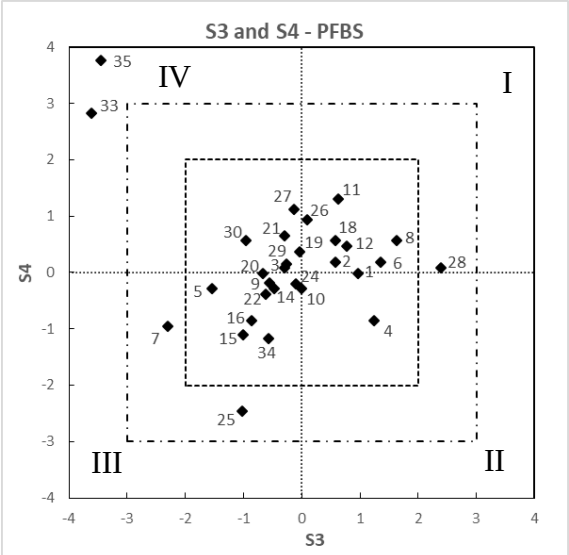
Laboratories 10, 30, 33 and 35 are offscale.



Laboratories 30, 34 and 35 are offscale.

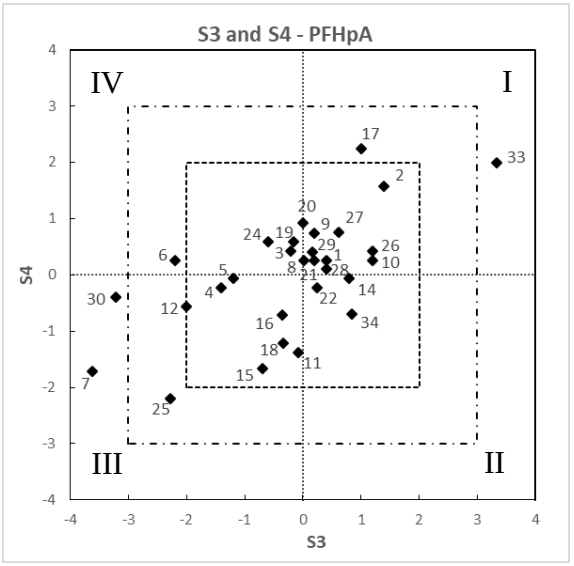


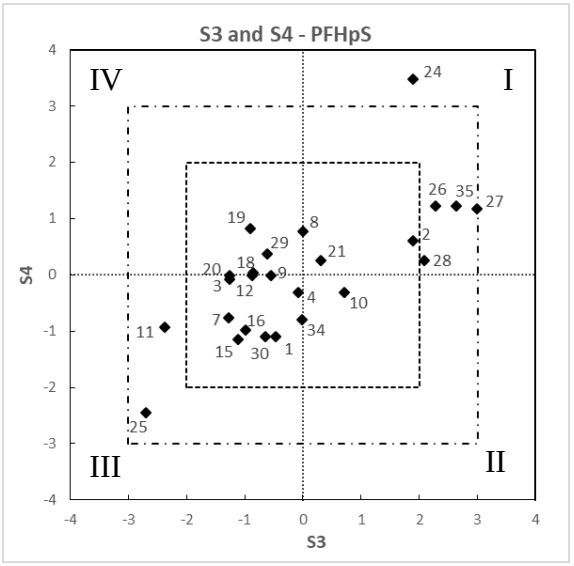
Laboratories 7, 10, 11, 12, 19 and 30 are offscale.



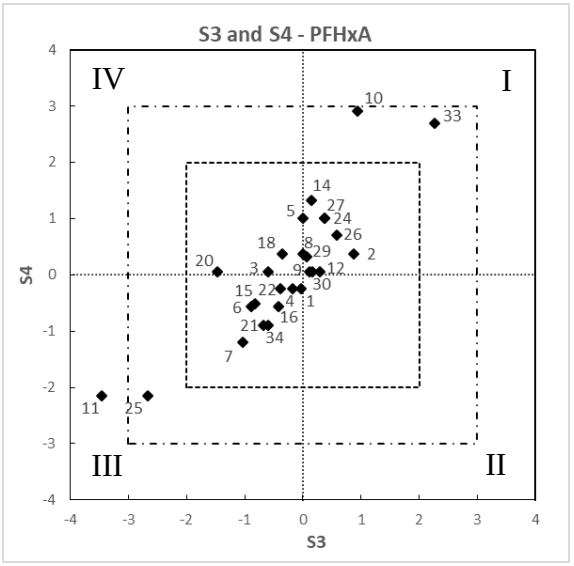
Laboratory 17 are offscale.

Figure 104 z-Score Scatter Plots (continued)

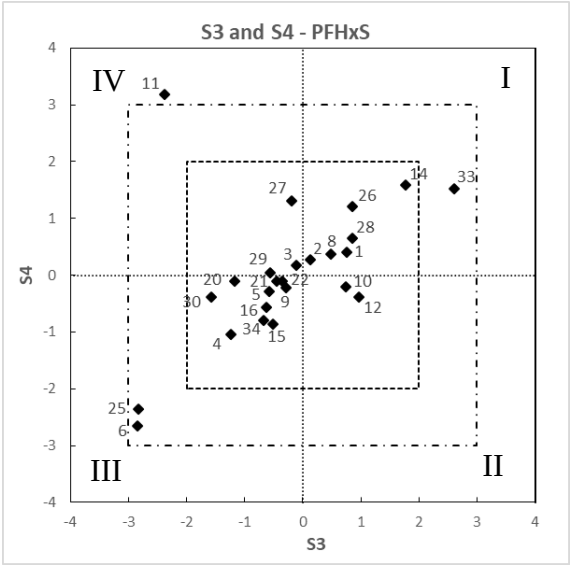




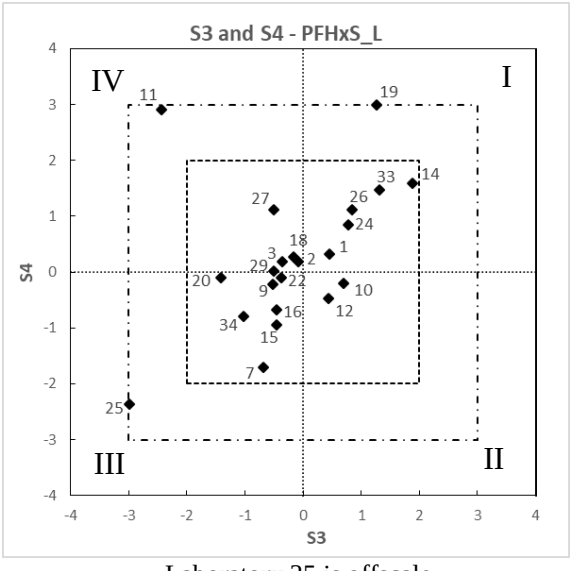
Laboratories 14, 22 and 33 are offscale.



Laboratories 17 and 19 are offscale.



Laboratories 17, 19 and 35 are offscale.



Laboratory 35 is offscale.

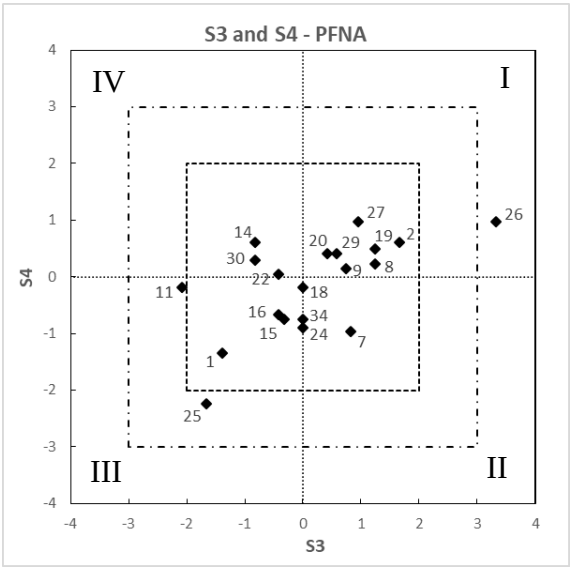
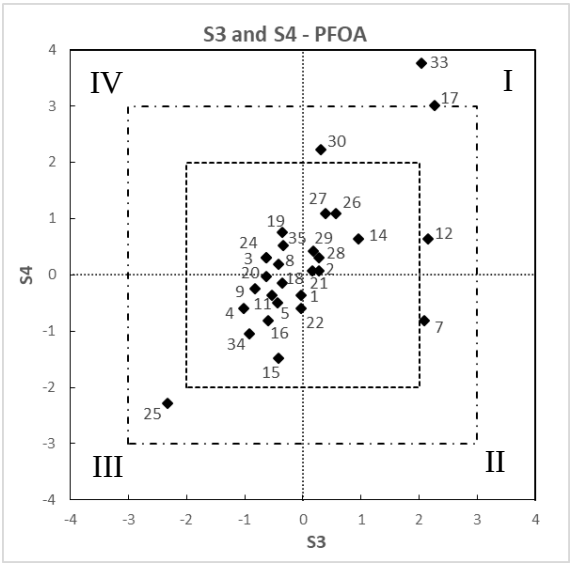
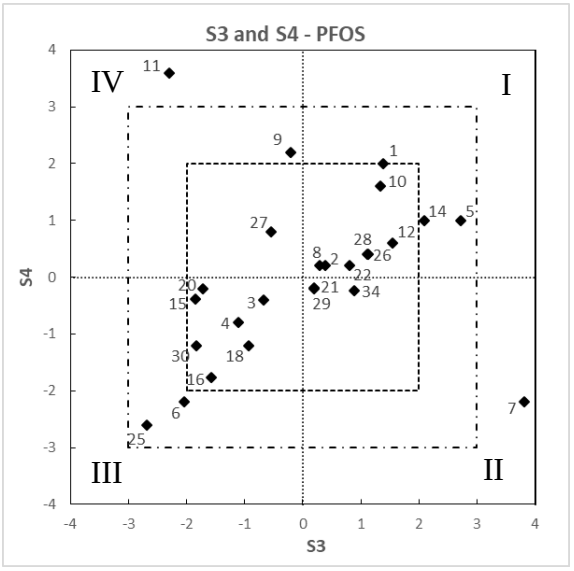


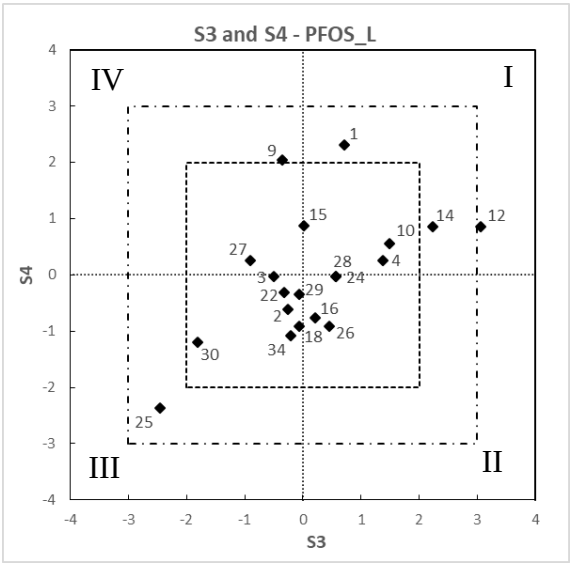
Figure 104 z-Score Scatter Plots (continued)



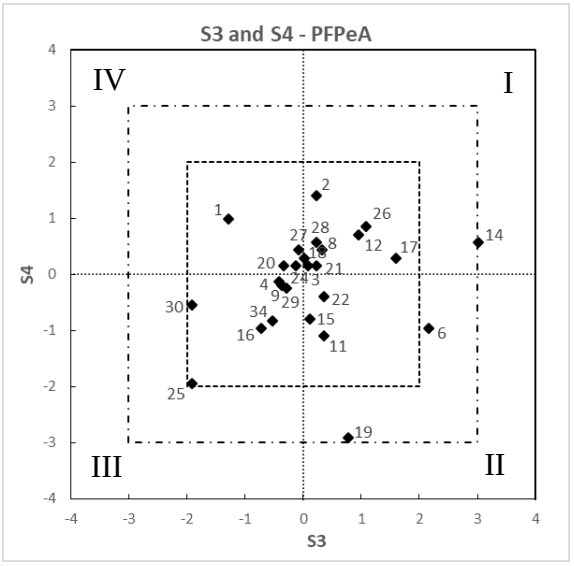
Laboratory 10 is offscale.



Laboratories 17, 19 and 33 are offscale.



Laboratories 11, 19 and 33 are offscale.



Laboratories 7, 10 and 33 are offscale.

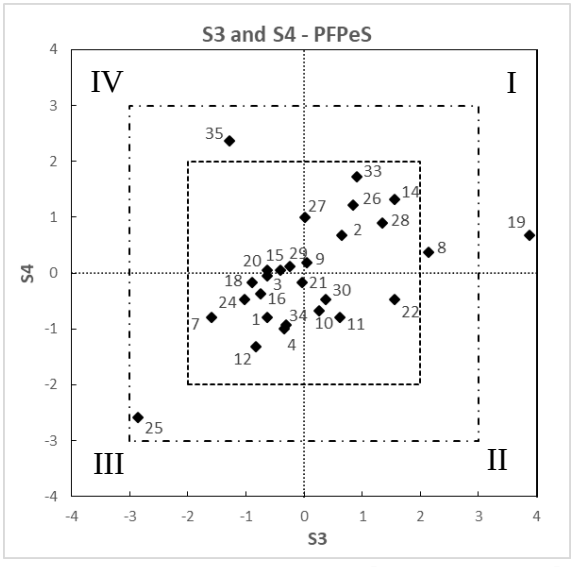


Figure 104 z-Score Scatter Plots (continued)

6.6 Summary of Participants' Results and Performances

Summaries of participants' results and performances for scored analytes in this PT study are presented in Tables 104 to 107, and Figures 105 and 106.

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

Thirty laboratories analysed both matrices. Laboratories **15** and **16** returned satisfactory z-scores for 86 of a total of 87 analytes for which z-scores were calculated. All results reported by laboratories **29** (83), **13** (67), **21** (66), **32** (7) and **23** (4) returned satisfactory z-scores.

From the laboratories that analysed both matrices (soil and water), Laboratory **29** had the highest number of satisfactory E_n-scores (80 out of 83). Laboratory **23** returned satisfactory E_n-scores for all analytes reported (4).

Four laboratories analysed the water matrix only (Figure 106). None of these laboratories reported results for all analytes for which z-scores were calculated (36). Laboratory **18** returned the highest number of satisfactory z-scores (30).

Laboratory **18** also returned the highest number of satisfactory E_n-scores (30 out of 33 reported).

Laboratories 10, 25, 33 and 35 should check for laboratory/method bias, as the unsatisfactory results reported were consistently lower or higher than the assigned value. Most of the unsatisfactory results reported by Laboratory 10 in soil samples S1 and S2 and by Laboratory 25 in S1, S2, S3 and S4 were below the assigned value by approximately the same factor (of 5 and 2 respectively). A positive bias was also noticed for Laboratory 33 in S1, S2, S3 and S4 and for Laboratory 35 in S1; most of the unsatisfactory results they have reported were higher than the assigned value by almost same factor, approximately 2. These laboratories may need to check their sample preparation, dilution factors and/or standard preparation procedure. The results from these laboratories were not included in the analysis of the extraction methods and instrumental techniques employed by participants.

Table 104 Summary of Participants' Results and Performance for Sample S1 (all values are in µg/kg)*

Lab. Code	PFBS	PFPeS	PFHxS	PFHxS_L	PFHpS	PFOS	PFOS_L	PFNS	PFDS	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA
A.V.	160	197	1480	1310	450	37900	31600	Not Set	Not Set	255	361	1340	136	466	64.5	55.0
1	189.73	213.18	2110.91	1826.16	406.59	471293.5	64098.17	277.22	146.02	259.54	301.60	1381.62	140.81	430.83	21.76	47.60
2	200	240	1800	1600	570	47000	35000	NT	260	340	490	1700	170	600	74	69
3	169	214	1490	1286	471	37685	30375	56	64	293	406	1418	141	487	75	57
4	128	157	1220	NT	467	31200	28610	202	158	244	302	1230	106	410	58.4	43.1
5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
6	160	NT	680	NT	490	21000	NT	690	NT	290	430	1600	160	NT	77	83
7	136.69	157.86	NR	735.95	291.12	7446.53	NR	NT	58.95	103.29	272.25	696.12	43.67	220.75	1.23	47.31
8	154	200	1425	NT	435	33695	NT	NT	255	216	367	1467	139	482	63.8	48.3
9	162	232	1240	1150	660	28000	21200	155	117	327	480	1470	186	559	79.2	64.4
10	33.2	41.0	314.0	302.6	106.9	9653.0	7785.0	78.5	88.1	66.0	87.0	297.0	36.1	193.1	22.1	12.5
11	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
12	210	230	1900	1600	520	33000	26000	NT	110	320	480	1800	140	780	90	70
13	140.0	194.7	1452.6	1270.2	386.1	37368.0	30386.2	65.6	73.3	254.9	355.2	1233.4	124.1	420.7	62.7	49.9
14	167	218	1200	1123	354	44153	30854	258	202	289	383	1010	147	417	68.2	60.4
15	139	146	1360	1358	416	52000	46000	221	136	242	352	1150	116	436	43.1	47.0
16	141	152	1314	1314	456	32000	28000	223	143	255	376	1203	132	476	49.4	55.6
17	240	NT	1810	NT	NT	48000	NT	NT	280	290	430	1840	120	480	99	55
18	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
19	161	188	1760	1460	411	51300	37100	554	340	187	246	1274	100	355	72.8	65.2
20	140	170	1500	1200	370	38000	31000	83	93	250	330	1200	120	420	71	59
21	138	177	1210	NT	430	29000	NT	NT	130	185	341	1310	115	376	57.4	46.9
22	158	228	1156	1035	380	51082	37396	279	198	272	368	892	142	434	61.0	55.0
23	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
24	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
25	86.9	116.6	931	979	428.4	18960	15479	92.7	42.9	134	180.6	680.1	81.5	306.4	42.3	39
26	170	230	1600	1400	530	40000	30000	NT	220	270	410	1400	150	500	70	59
27	188.4	204.5	1432.9	1203.3	435.2	51219	40563	59.95	28.37	288.5	458	1371.2	153.8	495.4	64.354	56.798
28	163	200	1600	NT	465	33200	25200	NT	230	169	363	1685	136	520	53.6	51.3
29	157	196	1350	1190	597	27400	21500	73.7	71.5	259	371	1470	142	612	66.5	54.5
30	124.31	224.45	1572.02	NT	395.58	37279.26	30097.35	NT	152.19	266.44	239.95	1397.22	241.26	508.76	20.98	84.79
32	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
33	245	185	2720	1690	735	86435	70017	NT	112	415	602	2540	245	827	98.3	84.8
34	185	225	1680	1460	520	67500	47200	247	272	159	254	1070	141	165	54.4	49.3
35	354	347	2830	2380	1080	44400	33300	NT	272	265	359	1470	145	527	25.1	55

* A.V. = Assigned Value. Shaded cells are results which returned a questionable or unsatisfactory z-score.

Table 104 Summary of Participants' Results and Performance for Sample S1 (all values are in µg/kg)* (continued)

Lab. Code	PFUdA	PFDoA	PFTrDA	PFTeDA	PFOSA	N-MeFOSA	N-EtFOSA	N-MeFOSAA	N-EtFOSAA	N-MeFOSE	N-EtFOSE	4:2 FTS	6:2 FTS	8:2 FTS	10:2 FTS
A.V.	28.9	21.9	8.2	7.02	216	4.54	Not Set	Not Set	Not Set	3.89	0.627	Not Set	350	1060	24.7
1	25.45	15.60	6.38	6.85	218.81	4.52	0.34	0.59	0.31	NT	<1	0.43	440.87	1751.26	23.31
2	<50	<50	<50	<500	260	<10	<10	<2	<2	<10	<50	<1	440	1300	36
3	28	24	< 10	< 10	196	< 10	< 10	< 10	< 10	< 10	< 10	< 10	389	1203	NT
4	23.2	20.8	7.2	<12.2	157	<12.2	<12.2	<4.9	<4.9	<12.2	<12.2	<4.9	317	932	25.8
5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
6	39	61	NT	NT	3600	NT	NT	3.9	5.3	1.2	15	0.1	490	1600	NT
7	21.76	22.13	14.45	14.39	NT	NT	0.87	0.59	0.04	NT	0.36	0.06	227.60	567.03	NT
8	26.3	15.9	6.28	<12.5	187	<12.5	<5.0	<2.0	<2.0	<5.0	<5.0	<5.0	374	1148	26.2
9	29.7	25.1	10.6	8.04	234	4.76	<19.3	<193	<193	<19.3	<19.3	<193	261	524	14.0
10	5.6	4.1	<0.01	<0.01	20.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	74.8	223.3	23.3
11	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
12	40	30	10	<10	260	<20	<20	<20	<20	<40	<40	<20	430	1400	30
13	28.5	21.5	8.6	6.4	173.5	3.3	<1	<1	<1	4.0	<1	<1	344.2	1036.1	NT
14	31.3	20.8	6.85	6.27	258	6.58	0.22	<0.5	<0.5	4.68	0.99	0.33	196	170	20.2
15	28.9	21.5	10.4	9.32	212	4.22	0.280	26.4	<0.5	4.24	0.623	0.265	320	968	26.5
16	30.7	23.4	11.5	8.4	222	4.5	<0.5	29.2	<0.5	4.6	0.696	<0.5	360	1067	29
17	37	40	19	16	280	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
18	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
19	32.4	23.7	15.4	5.38	293	NT	NT	0.71	0.19	NT	NT	0.43	384	1260	NT
20	30	23	8.6	6.6	180	4.5	<2	<2	<2	<5	<5	<1	300	970	6.1
21	19.5	14.0	<5.0	<12.5	174	<12.5	<12.5	<5.0	<5.0	<12.5	<12.5	<5.0	362	953	24.0
22	27.0	22.0	5.73	5.91	224	6.25	<0.5	<0.5	<0.5	4.34	0.57	<0.5	189	156	23.1
23	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
24	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
25	20.5	13.7	3.84	1.85	116.7	18.6	0	0.95	NR	2.49	0.604	3.24	211.3	604.5	12.34
26	32	23	8	<50	240	<10	<10	<2	<2	<10	<50	<1	360	1200	29
27	29.04	22.096	7.9525	5.427	492.912	8.172	0.26	<0.1	<0.1	3.527	0.639	0.353	318.4	1444	0.557
28	29.2	20.6	6.4	2.8	188	4.4	<1.2	1.5	<0.5	3.1	4.25	<0.5	358	857	20.6
29	29.4	21.1	9.06	7.26	185	NT	NT	3.48	6.62	NT	NT	0.403	327	866	21.7
30	52.84	42.01	14.85	7.34	266.11	8.29	0.67	<0.5	<0.5	NT	NT	<0.5	385.09	1535.02	65.67
32	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
33	63.6	28.2	6.84	8.94	346	4.38	< 2.35	< 2.35	< 2.35	6.43	< 4.70	< 2.35	477	929	46
34	29.8	22.1	10.1	6.42	101	3.84	0.3	0.851	0.266	NT	NT	<0.20	461	1380	22.4
35	71.3	25.7	<10	<10	197	NT	NT	NT	NT	NT	NT	<10	777	1110	NT

* A.V. = Assigned Value. Shaded cells are results which returned a questionable or unsatisfactory z-score.

Table 105 Summary of Participants' Results and Performance for Sample S2 (all values are in µg/kg)*

Lab. Code	PFBS	PFPeS	PFHxS	PFHxS_L	PFHpS	PFOS	PFOS_L	PFNS	PFDS	PFBA	PFPeA	PFHxA	PFOA
A.V.	8.88	53.0	5.36	5.29	19.2	3.65	2.48	2.59	26.1	21.2	16.8	12.6	7.82
1	11.87	55.79	10.37	9.9	23.48	79.3	56.15	2.58	28.35	30.17	19.18	16.70	9.61
2	9.0	58	5.2	5.2	21	3.4	2.1	NT	27	23	18	13	8.1
3	9.8	62	6.0	6.0	22	4.8	3.6	3.0	30	22	17	12	8.3
4	8.0	30.0	4.6	NT	17.8	2.9	2.6	3.1	23.9	20.0	15.4	12	7.3
5	8.7	NT	6.4	NT	NT	5.9	NT	NT	NT	NT	NT	17	11
6	7.1	NT	2.0	NT	18	2.0	NT	5.2	NT	20	15	13	NT
7	11.52	52.48	NR	5.09	21.16	62.27	NR	NT	29.37	11.44	24.59	8.87	6.28
8	8.27	53.7	4.98	NT	18.8	3.64	NT	NT	25.7	19.7	17.5	13.4	8.38
9	8.86	57.2	6.29	6.29	21.3	14.0	8.14	3.04	30.6	22.5	16.6	13.2	10.2
10	1.54	9.31	0.87	0.87	3.44	0.68	0.45	0.51	6.83	4.72	3.25	2.20	1.72
11	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
12	10	60	5.6	5.5	18	4.1	2.8	NT	24	27	17	14	9.6
13	7.7	55.7	5.1	5.1	18.0	2.5	2.5	2.3	26.8	22.4	17.8	13.9	8.5
14	9.28	49.5	5.29	5.29	20	4.1	2.7	2.3	26.7	21.9	18.5	12.6	7.7
15	7.14	43.9	4.75	4.62	18.9	2.95	2.13	2.55	28.6	20.5	17.1	11.5	6.82
16	7.44	47.15	4.8	4.69	17.66	2.66	1.99	2.71	26.67	21.08	15.87	11.21	7.11
17	10	NT	6.5	NT	NT	5.1	NT	NT	34	26	20	17	7.9
18	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
19	10.5	62.4	7.41	7.26	21.5	7.49	4.61	1.92	17.8	26.3	11.3	12.3	7.02
20	8.4	54	5.2	5.1	19	4	2.9	2.9	29	23	17	13	8.5
21	8.5	48.6	4.8	NT	18.1	3.2	NT	NT	23.7	16	15.7	11.7	6.3
22	8.21	46.6	5.45	5.45	18.2	4.40	2.85	2.85	25.5	20.8	16.0	11.4	7.33
23	NT	NT	NT	NT	NT	4.05	NT	NT	NT	NT	NT	NT	8.10
24	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
25	9.67	23.54	1.91	1.78	8.62	1.12	0.68	1.12	42.9	11.73	9.67	7.24	4.44
26	9.3	60	5.5	5.4	20	3.5	2.2	NT	31	25	19	14	8.9
27	9.608	53.75	5.091	5.045	17.96	3.937	2.698	2.356	19.67	19.50	16.32	11.41	7.282
28	9.7	56.2	5.1	NT	17.4	3.2	2.3	NT	26.7	12.6	18.7	13.8	7.4
29	8.57	52	4.95	4.92	18.3	3.26	2.14	2.05	16.6	19.6	15.5	12.1	7.90
30	7.36	83.24	8.23	NT	27.41	7.76	5.64	NT	52.25	19.55	10.06	10.1	6.1
32	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
33	13.2	58.4	6.11	6.11	18.1	5.62	4.11	NT	34.4	42.8	27.4	20	14.5
34	7.09	46.9	4.48	4.48	15.6	3.97	2.55	2.55	19.1	20.1	15.6	11.2	6.92
35	7.6	39.6	4.83	4.83	18.4	3.47	2.25	NT	20.6	22.5	16.5	13.2	8.39

* A.V. = Assigned Value. Shaded cells are results which returned a questionable or unsatisfactory z-score.

Table 105 Summary of Participants' Results and Performance for Sample S2 (all values are in µg/kg)* (continued)

Lab. Code	PFNA	PFDA	PFUdA	PFDoA	PFTrDA	PFTeDA	GenX	ADONA	9Cl-PF3ONS	PFOSA	N-EtFOSE	6:2 FTS	8:2 FTS
A.V.	39.5	90.6	76.2	14.0	39.5	26.0	31.1	60.1	62.7	8.21	6.36	13.2	4.64
1	45.33	118.14	97.49	16.50	51.72	33.1	NT	5.47	NT	8.44	0.69	14.91	6.57
2	41	93	84	15	39	30	NT	NT	NT	9	8	14	4.9
3	40	81	71	14	34	26	NT	NT	NT	8.7	5.9	14	5.2
4	37.6	80.7	62.4	13.1	33.9	24.8	NT	NT	NT	8.6	5.3	12.6	4.3
5	52	130	NT	NT	NT	NT	NT	NT	NT	NT	NT	16	5
6	46	110	99	34	NT	NT	NT	NT	NT	120	< 0.05	11	5.7
7	27.20	62.71	42.34	16.39	34.72	27.48	NT	NT	NT	NT	1.19	21.08	3.25
8	42.4	83.9	83.2	12.7	43.2	24.7	NT	NT	NT	7.88	6.33	14.4	5.14
9	43.1	96.3	79.3	14.9	45.7	26.4	34.1	87.4	78.9	9.75	3.87	11.8	<37.8
10	7.71	19.34	16.43	2.08	1.51	4.98	8.43	14.44	NT	0.56	0.35	2.48	0.79
11	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
12	40	110	69	12	32	23	3.6	8.9	7.8	8.3	6.7	14	6.1
13	41.4	98.0	76.9	14.6	45.1	27.5	35.0	NT	NT	7.7	4.9	14.1	4.7
14	42.5	71.0	82.5	15.1	35.9	30.5	36.7	51.2	66.3	9.28	7.2	17.2	5.27
15	35.5	78.1	63.5	13.1	38.5	25.6	37.2	63.4	62.1	7.65	7.11	13.5	3.95
16	37.02	83.46	67.62	12.23	37.88	24.08	26.89	68.21	67.99	7.85	6.43	12.42	4.07
17	49	93	79	20	65	43	NT	NT	NT	13	NT	NT	NT
18	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
19	39.3	92.6	77.8	12.8	34.2	23.3	26.0	53.1	53.2	7.32	NT	11.1	3.73
20	44	100	83	15	45	28	NT	NT	NT	7.8	<5	15	4.8
21	37.0	86.0	69.6	11.7	35.0	19.8	NT	NT	NT	8.0	5.8	13.0	5.0
22	37.1	83.2	75.8	13.9	38.0	25.9	35.84	58.47	70.06	8.58	6.54	14.5	5.69
23	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
24	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
25	22.8	51.4	41.7	7.63	22.4	10.2	18.3	35.8	32.3	3.85	2.61	7.51	2.08
26	46	110	97	15	40	30	NT	NT	NT	9	8	14	5.2
27	34.24	81.11	62.96	12.42	17.937	20.86	29.85	65.44	60.70	8.009	4.362	11.65	3.711
28	31.5	89.4	74.9	15.6	43.2	19.5	NT	NT	NT	7.8	6.4	11.2	4.0
29	36.9	95.7	67.3	13.3	40.7	27.9	24.9	70.5	58.8	7.88	NT	12.2	4.57
30	38.54	92.51	96.87	15.58	49.97	28.34	71.38	56	110	16.47	NT	10.49	3.78
32	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
33	76.4	180	176	22.2	47.4	41.9	NT	NT	NT	12.2	8.51	21.4	8.25
34	31.4	75.5	56.3	13.2	41.000	24.1	34.1	68.9	NT	6.98	NT	27.9	3.20
35	40.5	100	103	14.7	36.3	12.5	NT	NT	NT	6.61	NT	13.8	4.17

* A.V. = Assigned Value. Shaded cells are results which returned a questionable or unsatisfactory z-score.

Table 106 Summary of Participants' Results and Performance for Sample S3 (all values are in µg/L)*

Lab. Code	PFBS	PFPeS	PFHxS	PFHxS_L	PFHpS	PFOS	PFOS_L	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	6:2 FTS	8:2 FTS
A.V.	0.520	0.504	4.19	3.77	0.254	4.73	2.11	0.391	0.698	1.70	0.250	0.503	0.0120	Not Set	0.0726	Not Set
1	0.62	0.44	4.82	4.12	0.23	6.04	2.41	0.44	0.52	1.69	0.27	0.50	0.0087	<0.01	0.09	<0.025
2	0.58	0.57	4.3	3.7	0.35	5.1	2.0	0.44	0.73	2.0	0.32	0.53	0.016	0.003	0.079	0.003
3	0.49	0.44	4.1	3.5	0.19	4.1	1.9	0.39	0.71	1.5	0.24	0.44	< 0.025	< 0.025	0.073	< 0.1
4	0.65	0.47	3.16	NT	0.25	3.68	2.69	0.2	0.64	1.64	0.18	0.4	<0.02	<0.02	0.06	<0.05
5	0.36	NT	3.7	NT	NT	7.3	NT	NT	NT	1.7	0.19	0.46	<0.08	NT	<0.06	<0.08
6	0.66	NT	1.8	NT	NT	2.8	NT	0.41	1.0	1.4	0.14	NT	NT	NT	0.07	0.002
7	0.280	0.343	NR	3.260	0.189	8.341	NR	0.049	0.071	1.346	0.069	0.713	0.014	0.001	0.085	NR
8	0.69	0.72	4.59	NT	0.254	5.005	NT	0.417	0.743	1.704	0.251	0.461	0.015	<0.005	0.06	<0.01
9	0.463	0.508	3.95	3.38	0.226	4.53	1.96	0.399	0.646	1.74	0.260	0.420	0.0138	0.00260	<0.474	<0.190
10	0.52	0.53	4.81	4.30	0.29	5.99	2.74	3.91	1.48	2.02	0.31	0.68	<0.005	<0.005	0.08	<0.005
11	0.584	0.565	2.195	1.941	0.133	2.564	1.535	0.079	0.748	0.525	0.246	0.450	0.007	NR	NT	NT
12	0.60	0.42	5.0	4.1	0.21	6.2	3.4	0.29	0.83	1.8	0.15	0.72	<0.05	<0.05	<0.2	<0.2
13	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
14	0.47	0.66	5.67	5.19	0.55	6.71	3.05	0.50	1.12	1.75	0.29	0.60	0.01	< 0.01	0.08	< 0.01
15	0.415	0.463	3.76	3.42	0.197	2.99	2.12	0.315	0.715	1.42	0.215	0.462	0.0112	0.00200	0.0505	0.00200
16	0.43	0.428	3.668	3.42	0.204	3.245	2.202	0.347	0.597	1.56	0.232	0.443	0.011	0.002	0.06	<0.01
17	1.5	NT	4.6	NT	NT	5.3	NT	0.48	0.92	1.8	0.3	0.73	NT	NT	NT	NT
18	0.58	0.414	NR	3.653	0.211	3.852	2.085	0.394	0.701	1.576	0.233	0.468	0.012	NR	0.062	NR
19	0.517	0.894	5.871	4.730	0.208	25.7	5.67	0.596	0.805	2.07	0.242	0.467	0.015	0.015	0.090	<0.002
20	0.45	0.44	3.2	2.7	0.19	3.1	1.6	0.53	0.65	1.2	0.25	0.44	0.013	<0.01	0.067	<0.01
21	0.49	0.50	3.81	NT	0.27	4.92	NT	0.4	0.73	1.47	0.26	0.52	<0.02	<0.02	0.08	<0.05
22	0.455	0.660	3.90	3.48761	0.497	5.49	1.97558	0.364	0.747	1.57	0.262	0.500	0.011	< 0.01	0.073	<0.05
23	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
24	0.51	0.40	NT	4.35	0.35	NT	2.35	0.43	0.68	1.83	0.22	0.44	0.012	0.005	0.067	<0.005
25	0.413	0.216	1.822	1.519	0.117	2.184	1.072	0.244	0.431	0.791	0.136	0.27	0.008	0.27	0.039	0.003
26	0.53	0.59	4.9	4.4	0.37	5.8	2.3	0.44	0.85	1.9	0.31	0.56	0.020	0.002	0.084	0.004
27	0.5065	0.506	4.033	3.3825	0.406	4.2105	1.725	0.3415	0.687	1.827	0.281	0.5425	0.0143	0.004	0.0717	0.0027
28	0.77	0.64	4.9	NT	0.36	5.78	2.35	0.35	0.73	2.02	0.27	0.53	<0.02	<0.02	<0.05	<0.05
29	0.493	0.48	3.72	3.39	0.223	4.91	2.08	0.336	0.659	1.72	0.258	0.521	0.0134	0.00319	0.0681	0.00548
30	0.42	0.541	2.87	NT	0.221	3.002	1.347	0.675	0.43	1.756	0.089	0.534	0.01	<0.005	0.342	0.008
32	0.7	NT	4.2	NT	NT	5.1	NT	0.5	0.6	1.6	<0.3	0.5	<0.3	<0.3	<0.1	<0.3
33	0.145	0.596	6.38	4.76	0.585	10.9	4.17	0.626	1.37	2.47	0.417	0.708	< 0.017	< 0.017	0.0958	< 0.033
34	0.461	0.473	3.63	3.00	0.253	5.56	2.02	0.353	0.624	1.50	0.292	0.410	0.0120	<0.0100	0.158	<0.0100
35	0.16	0.375	5.34	4.29	0.388	4.74	2.13	<2	0.12	1.58	0.27	0.47	<0.05	<0.05	0.188	<0.10

* A.V. = Assigned Value. Shaded cells are results which returned a questionable or unsatisfactory z-score.

Table 107 Summary of Participants' Results and Performance for Sample S4 (all values are in µg/L)*

Lab. Code	PFBS	PFPeS	PFHxS	PFHxS_L	PFHpS	PFOS	PFOS_L	PFNS	PFDS	PFBA	PFPeA	PFHxA
A.V.	0.0531	0.0475	0.0531	0.0531	0.0884	0.0250	0.0171	Not Set	0.0273	0.0742	0.0359	0.0158
1	0.0530	0.0400	0.0574	0.0566	0.0690	0.0350	0.0250	<0.0250	0.0150	0.0650	0.0430	0.0150
2	0.055	0.054	0.056	0.055	0.099	0.026	0.015	NT	0.024	0.087	0.046	0.017
3	0.054	0.047	0.055	0.055	0.087	0.023	0.017	NR	NR	0.095	0.037	0.016
4	0.044	0.038	0.042	NT	0.083	0.021	0.018	<0.005	0.025	0.079	0.035	0.015
5	0.05	NT	0.05	NT	NT	0.03	NT	NT	NT	NT	NT	0.019
6	0.055	NT	0.025	NT	NT	0.014	NT	NT	NT	0.070	0.029	0.014
7	0.043	0.040	NR	0.035	0.075	0.014	NR	NT	0.016	0.072	0.004	0.012
8	0.059	0.051	0.057	NT	0.102	0.026	NT	NT	0.031	0.086	0.039	0.017
9	0.0511	0.0493	0.0508	0.0508	0.0880	0.0360	0.0241	0.00302	0.0332	0.0744	0.0345	0.0160
10	0.050	0.041	0.051	0.051	0.083	0.033	0.019	<0.005	0.043	0.148	0.041	0.025
11	0.067	0.040	0.087	0.084	0.072	0.043	0.032	NR	NR	0.069	0.028	0.009
12	0.058	0.035	0.049	0.048	0.088	0.028	0.020	NT	0.046	0.0077	0.041	0.016
13	0.0476	0.0397	0.0468	0.0468	0.0755	0.0199	0.0141	0.0029	0.0299	0.0713	0.0349	0.0146
14	0.05	0.06	0.07	0.07	0.11	0.03	0.02	< 0.01	0.04	0.07	0.04	0.02
15	0.0414	0.0480	0.0440	0.0430	0.0680	0.0231	0.0201	<0.01	0.0231	0.0590	0.0302	0.0142
16	0.044	0.044	0.047	0.046	0.071	0.0162	0.0145	<0.01	0.026	0.062	0.029	0.014
17	0.088	NT	0.12	NT	NT	0.088	NT	NT	0.019	0.12	0.038	0.032
18	0.059	0.046	NR	0.056	0.089	0.019	0.014	NR	0.009	0.073	0.038	0.017
19	0.057	0.054	0.130	0.085	0.103	2.788	0.515	0.004	0.030	0.143	0.015	0.032
20	0.053	0.048	0.052	0.052	0.088	0.024	<0.02	<0.01	0.027	0.081	0.037	0.016
21	0.06	0.046	0.052	NT	0.093	0.024	NT	NT	0.036	0.069	0.037	0.013
22	0.049	0.043	0.052	0.052	0.095	0.026	0.016	<0.01	<0.01	0.068	0.033	0.015
23	NT	NT	NT	NT	NT	0.0314	NT	NT	NT	NT	NT	NT
24	0.051	0.043	NT	0.062	0.15	NT	0.017	<0.005	0.034	0.084	0.037	0.019
25	0.027	0.023	0.028	0.028	0.045	0.012	0.009	0.002	0.017	0.043	0.022	0.009
26	0.063	0.059	0.066	0.065	0.11	0.027	0.014	NT	0.028	0.086	0.042	0.018
27	0.065	0.057	0.067	0.065	0.109	0.029	0.018	<0.002	0.028	0.092	0.039	0.019
28	0.054	0.056	0.060	NT	0.093	0.027	0.017	NT	0.030	<0.1	0.040	<0.02
29	0.0547	0.0486	0.0536	0.0533	0.0951	0.0241	0.0159	0.00346	0.0341	0.0714	0.0341	0.0168
30	0.059	0.043	0.049	NT	0.069	0.019	0.013	NT	0.01	0.176	0.032	0.016
32	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
33	0.0832	0.0639	0.0694	0.0687	0.133	0.0441	0.0245	NT	0.0271	0.133	0.0916	0.0243
34	0.0407	0.0387	0.0447	0.0447	0.0742	0.0238	0.0134	<0.0100	0.0267	0.0633	0.03	0.013
35	0.093	0.07	0.23	0.23	0.11	<0.05	<0.05	NT	<0.05	0.081	<0.05	<0.05

* A.V. = Assigned Value. Shaded cells are results which returned a questionable or unsatisfactory z-score.

Table 107 Summary of Participants' Results and Performance for Sample S4 (all values are in µg/L) (continued) *

Lab. Code	PFHpA	PFOA	PFNA	PFDA	PFUdA	PFTeDA	GenX	ADONA	9Cl-PF3ONS	PFOSA	6:2 FTS	8:2 FTS
A.V.	0.0304	0.0443	0.134	0.0306	0.0597	Not Set	0.091	0.0695	0.112	0.090	0.0275	0.0741
1	0.0320	0.0410	0.0980	0.0240	0.0400	<0.0250	NT	0.051	NT	0.2855	0.024	0.053
2	0.040	0.045	0.15	0.034	0.078	0.14	NT	NT	NT	0.10	0.028	0.080
3	0.033	0.047	0.14	0.027	0.046	NR	NT	NT	NT	0.084	0.028	0.081
4	0.029	0.039	0.127	0.027	0.050	0.124	NT	NT	NT	0.082	0.026	0.072
5	0.03	0.04	0.14	NT	NT	NT	NT	NT	NT	NT	<0.03	<0.04
6	0.032	NT	NT	NT	NT	NT	NT	NT	NT	NT	0.028	0.020
7	0.020	0.037	0.108	0.026	0.029	0.028	NT	NT	NT	NT	0.012	0.093
8	0.032	0.046	0.140	0.030	0.057	0.109	NT	NT	NT	0.101	0.032	0.072
9	0.0349	0.0421	0.138	0.0285	0.0583	0.131	0.0899	0.0709	0.100	0.116	0.0260	0.0715
10	0.032	0.144	0.132	0.029	0.052	0.136	0.156	0.084	NT	0.040	0.034	0.059
11	0.022	0.041	0.129	0.030	0.065	0.090	NT	NT	NT	0.132	NT	NT
12	0.027	0.050	0.15	0.037	0.077	0.14	NT	NT	NT	0.097	0.027	0.078
13	0.0253	0.0391	0.1134	0.0290	0.0625	0.1038	0.0964	NT	NT	0.0765	0.0252	0.0685
14	0.03	0.05	0.15	0.04	0.08	0.09	0.13	0.11	0.17	0.10	0.03	0.07
15	0.0203	0.0312	0.114	0.0335	0.0366	0.0111	0.0715	0.0569	0.106	0.0822	0.0210	0.0742
16	0.026	0.037	0.116	0.023	0.04	0.015	0.08	0.062	0.109	0.059	0.023	0.05
17	0.044	0.071	0.18	0.047	0.090	NT	NT	NT	NT	0.024	NT	NT
18	0.023	0.043	0.129	0.029	0.045	0.032	NR	0.065	0.083	0.065	0.028	0.066
19	0.034	0.051	0.147	0.039	0.066	0.136	0.095	0.071	0.121	0.092	0.038	0.103
20	0.036	0.044	0.145	0.034	0.059	0.1	NT	NT	NT	0.086	0.032	0.072
21	0.032	0.045	0.135	0.031	0.069	0.119	NT	NT	NT	0.100	0.028	0.069
22	0.029	0.039	0.135	0.029	0.051	0.045	0.114	0.073	0.149	0.077	<0.05	0.066
23	NT	0.0529	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
24	0.034	0.047	0.11	0.032	0.058	0.077	NT	NT	NT	0.069	0.030	0.075
25	0.017	0.024	0.074	0.017	0.033	0.032	0.049	0.034	0.055	0.043	0.014	0.03
26	0.033	0.054	0.16	0.034	0.084	0.13	NT	NT	NT	0.11	0.029	0.094
27	0.035	0.054	0.160	0.036	0.069	0.118	0.115	0.080	0.121	0.113	0.029	0.067
28	0.031	0.047	0.142	0.034	0.061	0.104	NT	NT	NT	0.110	<0.05	0.082
29	0.0329	0.0481	0.145	0.0337	0.077	0.136	0.0728	0.0739	0.116	0.096	0.0267	0.0853
30	0.028	0.064	0.142	0.03	0.046	<0.005	0.093	NT	NT	0.066	0.027	0.083
32	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
33	0.0425	0.0776	0.198	0.0492	0.0868	0.0541	NT	NT	NT	0.141	0.0459	0.0807
34	0.0262	0.035	0.114	0.0267	0.0576	0.0948	0.0834	0.0736	NT	0.0737	0.0238	0.0645
35	<0.05	0.049	0.1	<0.05	0.068	<0.10	NT	NT	NT	<2	0.061	0.078

* A.V. = Assigned Value. Shaded cells are results which returned a questionable or unsatisfactory z-score.

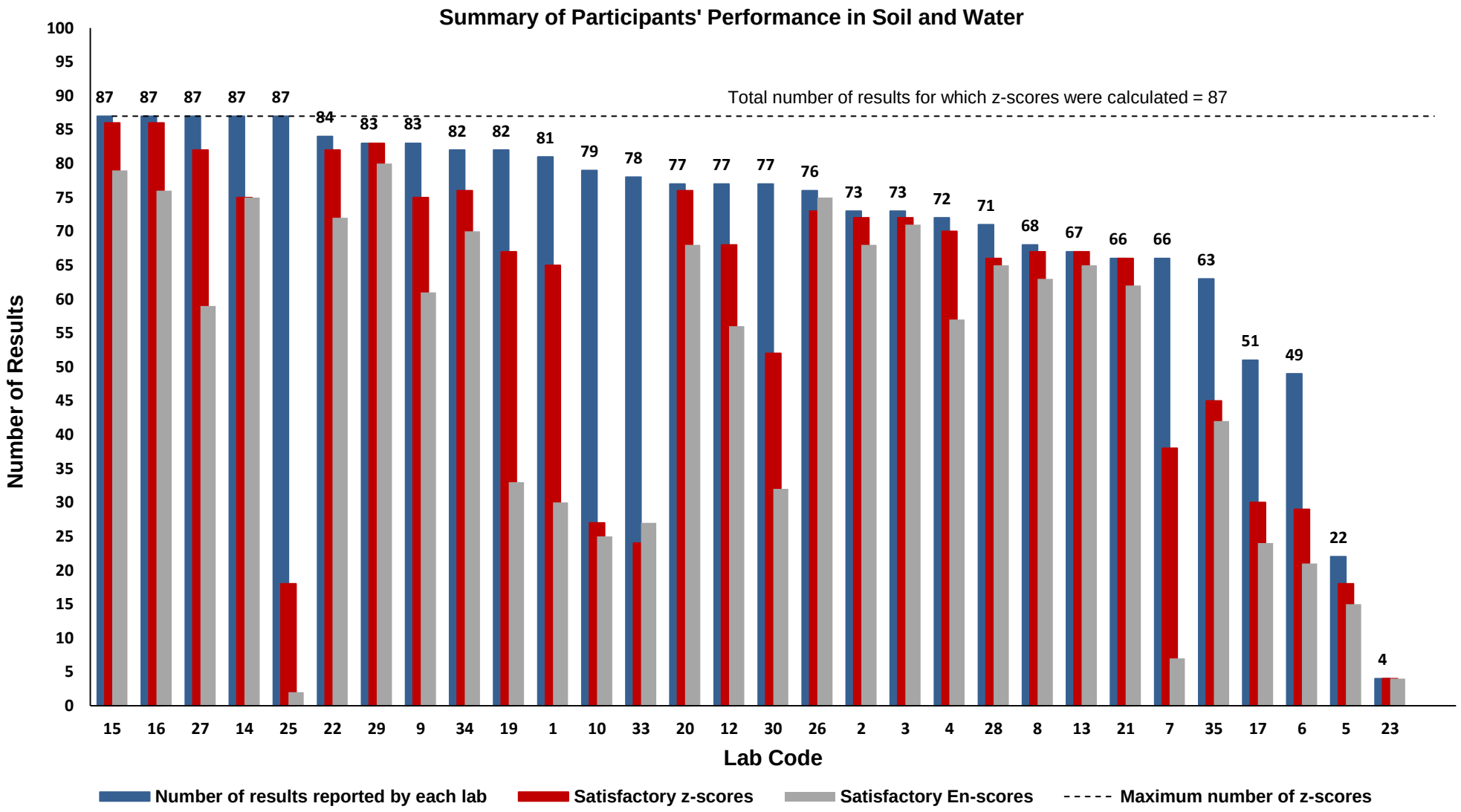


Figure 105 Summary of Participants' Performance in Soil and Water

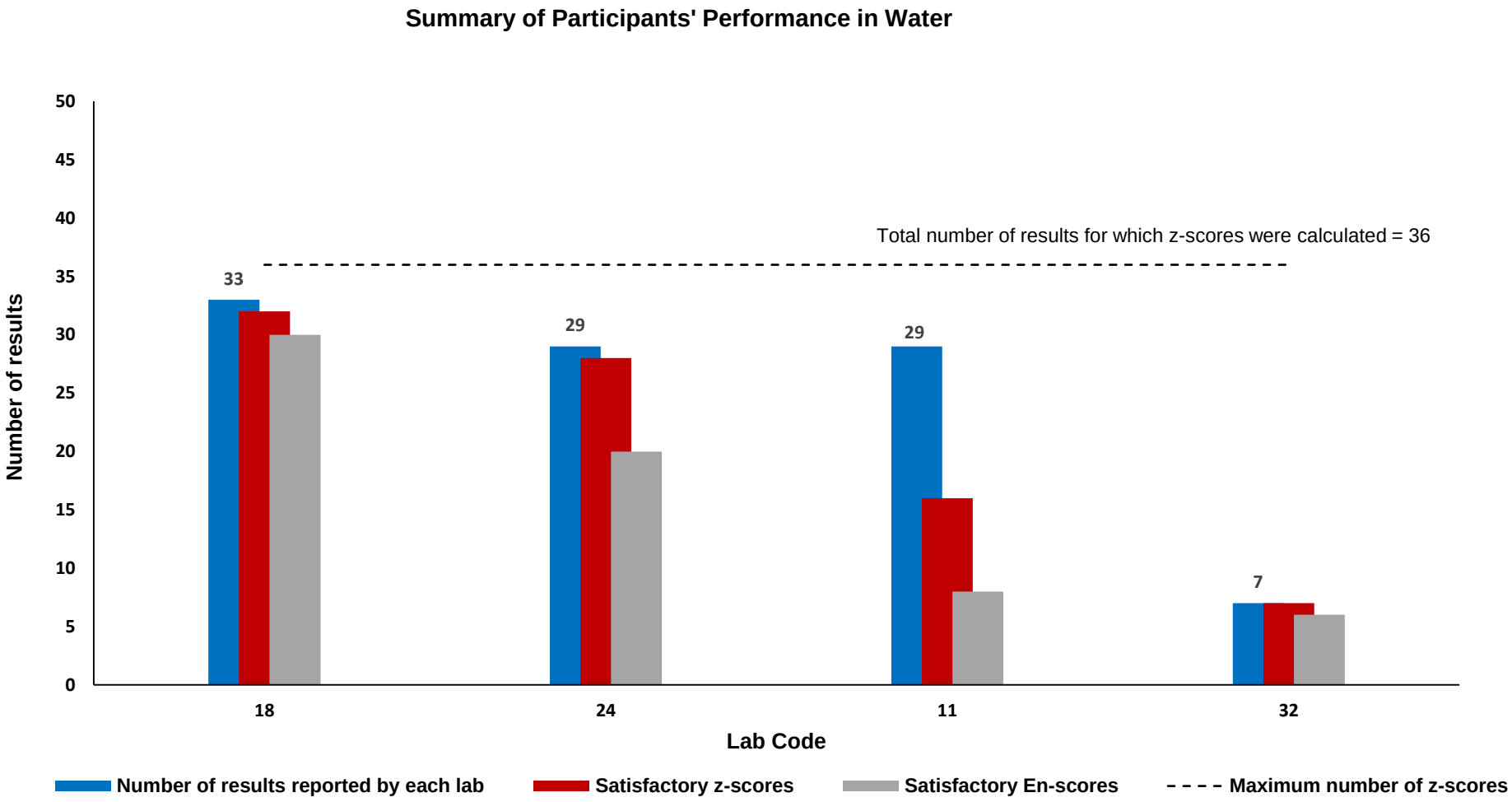


Figure 106 Summary of Participants' Performance in Water

6.7 Participants' Results and Analytical Methods for PFAS in Soil

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

In general, PFAS measurements in S1 presented more difficulty to participants than in S2. The results reported by participants in S1 were more variable than those reported in S2.

Extraction

Sample S1 was contaminated soil, whereas Sample S2 was soil fortified for 26 individual PFAS components. Analyte mass fraction in S1 was between 0.652 µg/kg and 1480 µg/kg (with PFOS at 68700 µg/kg), while concentration in S2 was between 2.53 µg/kg and 90 µg/kg. Of 29 participants who reported results for both soil samples 25 used the same sample size for extraction.

Participants used a wide variety of sample sizes. Plots of participants' performance in S1 and S2 versus the amount of sample taken for analysis are presented in Figures 107 and 108. Results from a sample size of 0.02 g to 0.2 g in S1 and from a sample size of 0.02 g to 0.5 g in S2 were biased low or high. Caution should be exercised when a small sample size is taken for analysis as this might not be representative of the whole sample.

Two laboratories shook/tumbled their samples for 3 hours and further sonicated them for 12 hours. One participant sonicated their samples twice for 1 minute each time (Figure 109).

Methanol and base modified methanol were the preferred extraction reagents. Although PFAS results were generally compatible with each other, discrepancies were found between the results produced by methods which involved methanol or base modified methanol as extraction solvent and those produced by the other extraction solvents, especially in the spiked soil sample S2 (Figure 110).

Participants used a wide variety of extraction procedures based on SLE or SPE extraction techniques: alkaline digestion, QuEChERS, Soxhlet, ion-paring, or accelerated solvent extraction. The use of mass-labeled standards played a significant role in correcting the difference between these in-house analytical methods. Most results produced were compatible with each other (Figure 111).

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

Laboratory 34 reported using a LSE extraction based on the method developed by Berger and Haukaus, where the sample is extracted with a methanol- ammonium acetate mixture by vortex mixing and sonication. Due to the polar solvent mixture used the method is known to give low recoveries for less polar PFASs.[10]

Laboratory 19 used accelerated solvent extraction or pressurised liquid extraction (PLE); an automated method characterised by a short extraction time and potential to combine extraction and clean-up within the extraction cell. This method is recommended for highly contaminated samples, as the PTFE tubing used can make a considerable contribution to PFCAs in blanks.[11 to 15]

Laboratories 8, 21 and 28 used the IPE method of Hansen et al. This method is based on ion-paring of the ionic PFASs with TBA, followed by LSE extraction with MTBE. Three repetitive extractions are recommended for complete extraction. The method is known to

produce variable results due to absence of the clean up step.[16] This may cause enhancement or suppression of the electrosptay ionization.

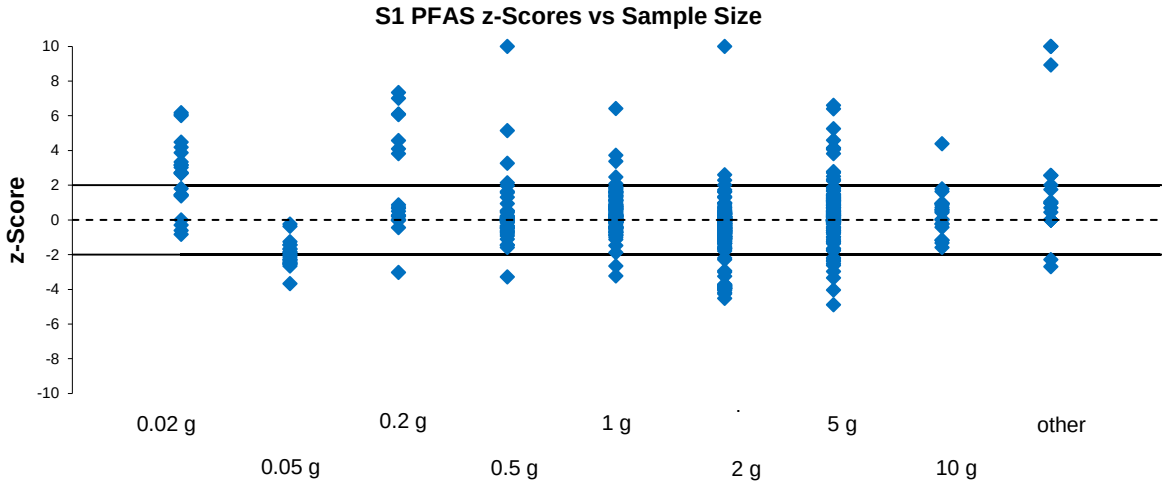
Clean-up of the crude extracts is an important step in the removal of matrix constituents that may interfere in instrumental determination. Matrix effects have been known to be one of the main causes of variability in results. Most participants used SPE with C18, GCB or WAX phases, or dispersive graphitized carbon. Two laboratories used filtration to remove solids from the extract, and Laboratory 7 did not clean up after extraction. There was no correlation evident between participants' reported results for PFAS and the clean-up procedure used.

Instrumental Technique

With the exception of two participants, all laboratories reported using LC-MSMS (QQQ) for PFAS measurements. Laboratories 15 and 16 used Orbitrap. Most LC-MSMS users used a C18 based column (2.1 mm x 50 mm, 1.8 µm).

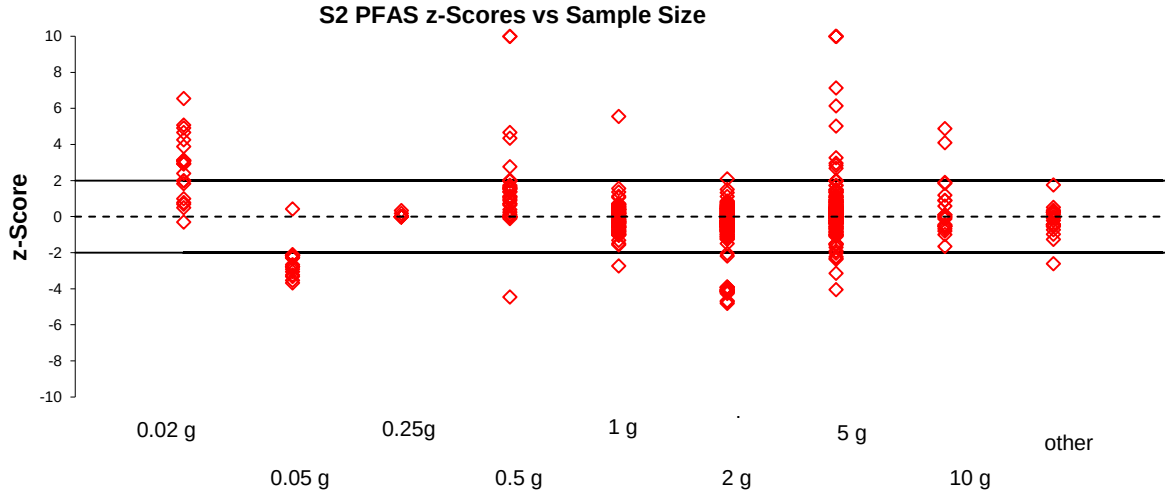
All, but five participants reported using a delay column.

To quantify S1, Laboratories 2, 4, 16, and 21 reported diluting the sample before analysis, while laboratories 6, 7, 8, 12, 13 17, 19, 20, 26 and 34 reported diluting both samples before analysis. Laboratory 27 also used smaller injection volumes for S1.



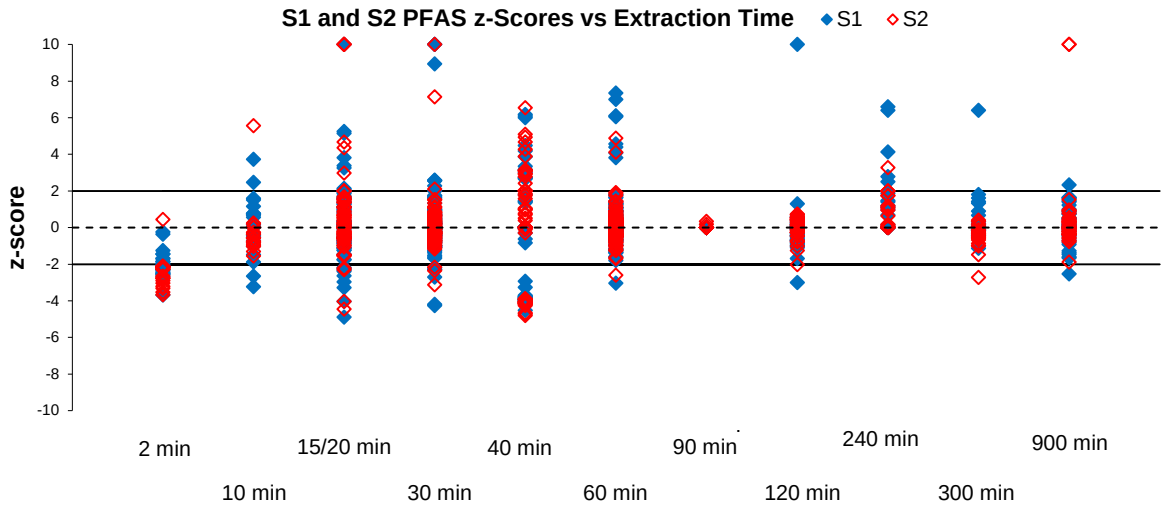
Scores greater than 10 have been plotted as 10.

Figure 107 Participants' Performance in S1 vs Sample Size



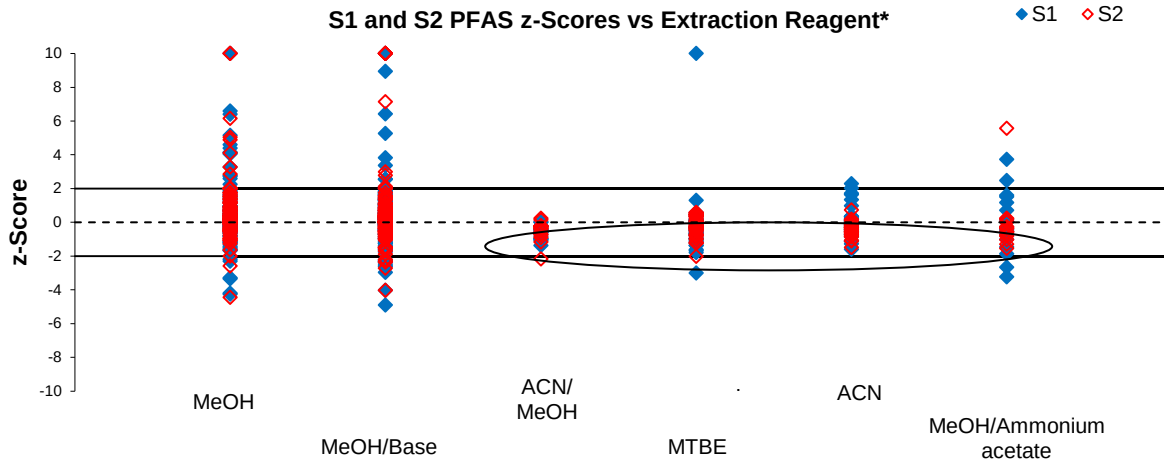
Scores greater than 10 have been plotted as 10.

Figure 108 Participants' PFAS Performance in S2 vs Sample Size



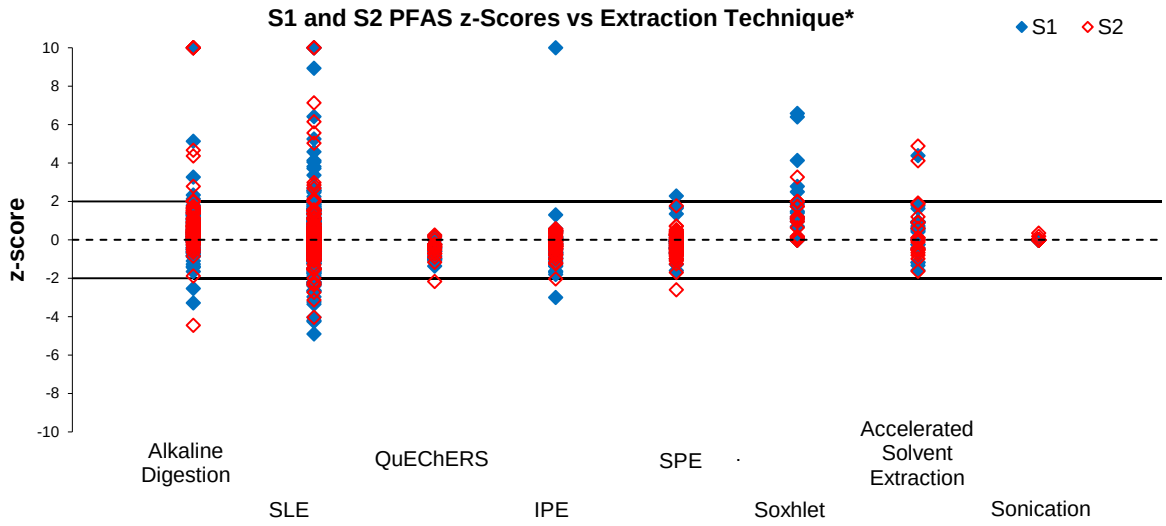
Scores greater than 10 have been plotted as 10.

Figure 109 Participants' Performance in S1 and S2 vs Extraction Time



*Results from Laboratories 10, 25, 33 and 35 were excluded. Scores greater than 10 have been plotted as 10. Marked with an oval on the chart are the results produced by the 'other' extraction reagent.

Figure 110 Participants' Performance in S1 and S2 vs. Extraction Reagent

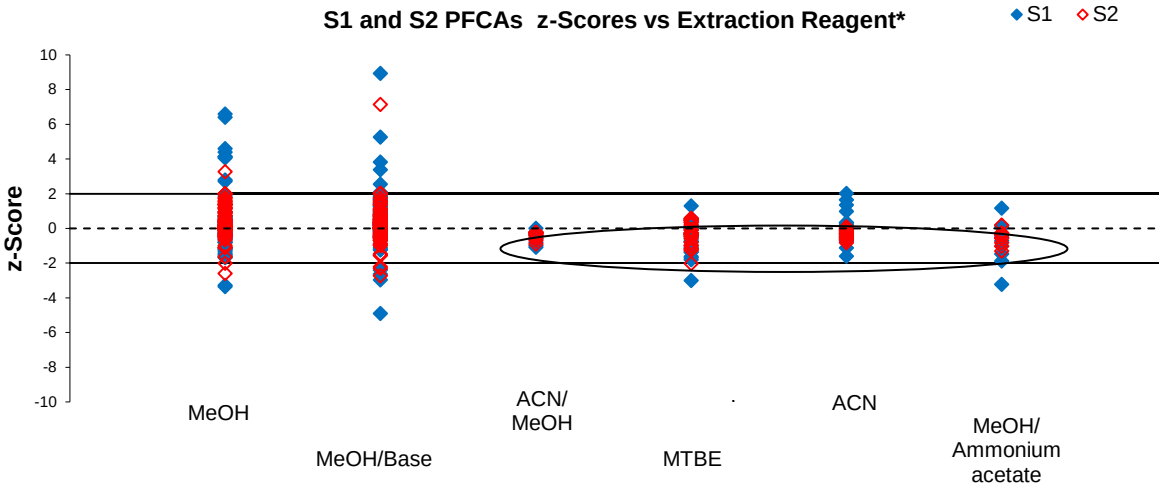


*Results from Laboratories 10, 25, 33 and 35 were excluded. Scores greater than 10 have been plotted as 10.

Figure 111 Participants' Performance in S1 and S2 vs Technique

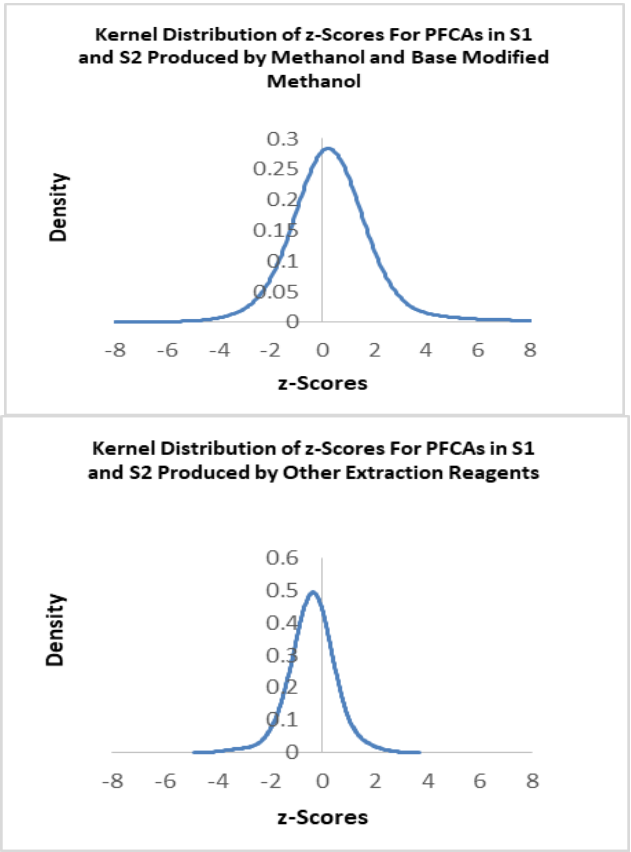
6.7.1 Individual PFCA Analytes in Soil

The results reported by participants for PFCAs in S1 and S2 were generally compatible with each other. The between laboratory coefficient of variation was between 15% and 24% for PFCAs results reported in S1 and between 12% and 21% for PFCAs results reported in the spiked soil sample S2. PFPeA and PFTrDA in S1 followed by PFHxA in S1 and PFUdA in S2 were the analytes with the largest coefficient of variation ranging from 21% to 24%.



*Results from Laboratories 10, 25, 33 and 35 were excluded. Scores greater than 10 have been plotted as 10. Marked with an oval on the chart are the results produced by the 'other' extraction reagent.

Figure 112 Participants' Performance in S1 and S2 vs Extraction Reagent

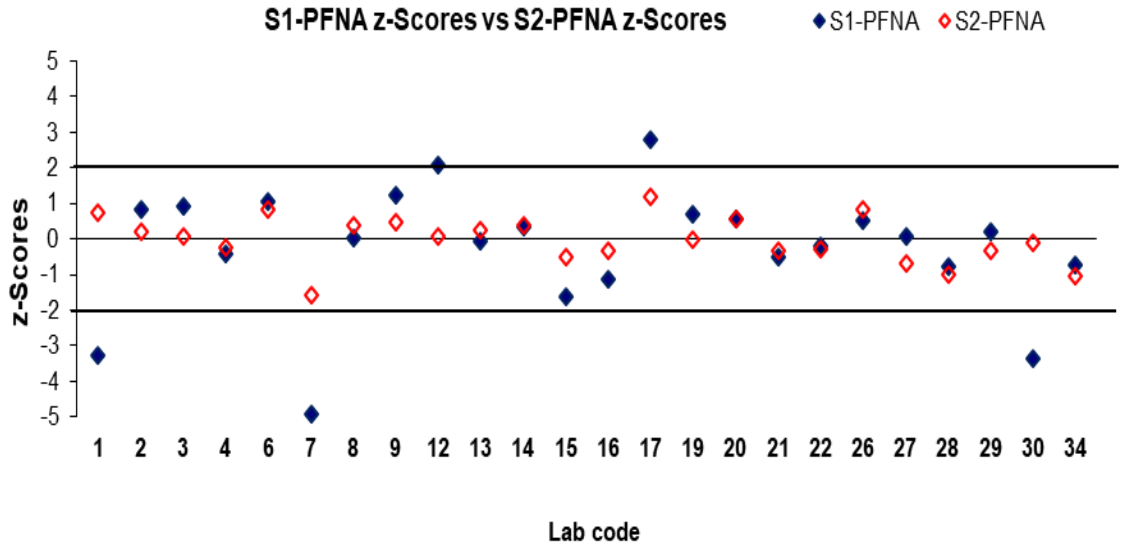


*Results from Laboratories 10, 25, 33 and 35 were excluded. Scores greater than 10 have been plotted as 10.

Figure 113 Kernel Distrinution of z-Scores for PFCAs in S1and S2

Although the PFCAs results were found in general to be compatible, discrepancies were found between the results produced by the methods which involved methanol or methanol/base as extraction solvent and those produced by the other extraction solvents (Figure 112). A distribution of the performance from the two sets of results is presented in (Figure 113). The limited number of results reported for each perfluorocarboxylic acid hampered our attempts to identify if there is any relationship between the length of the perfluorocarboxylic acid chain and the extraction agent used.

PFNA PFOS level in S1 was 37900 µg/kg and in S2 was 3.65 µg/kg. Matrix effects from the high level PFOS may explain the variability of PFNA results in S1 when compared to S2.



*Results from Laboratories 10, 25, 33 and 35 were excluded. Scores greater than 10 have been plotted as 10.

Figure 114 S1-PFNA z-Scures vs S2-PFNS z-Scores

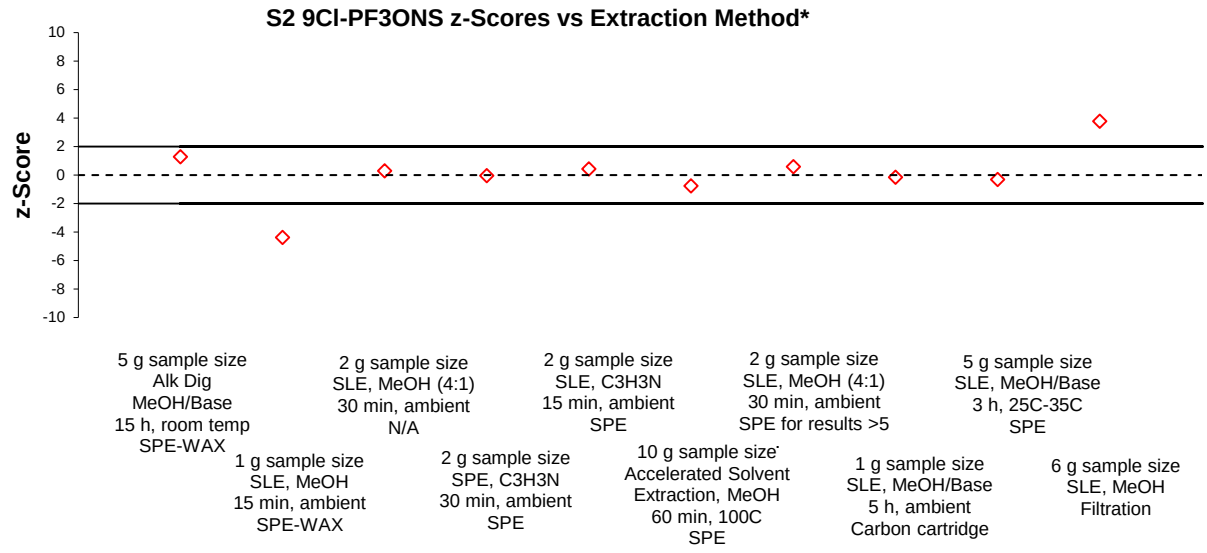
6.7.2 Individual PFECA and PFESA Analytes in Soil

ADONA and GenX A limited number of participants reported results for ADONA and GenX in S2 (14) and most of them performed well; the between laboratory CV for these tests was 16% and 20% respectively, smaller than the CV predicted by Thomson and Horwitz.

The same standard solution was used to spike GenX in S2 as for S4. While the results reported for GenX in S2 were low, 39% of the spiked value the results reported for S4 were 91% of the spiked value. Losess during PT sample preparation or low extraction efficiency due to the high organic content of the soil material used for Sample S2 preparation might explain the low recovery.

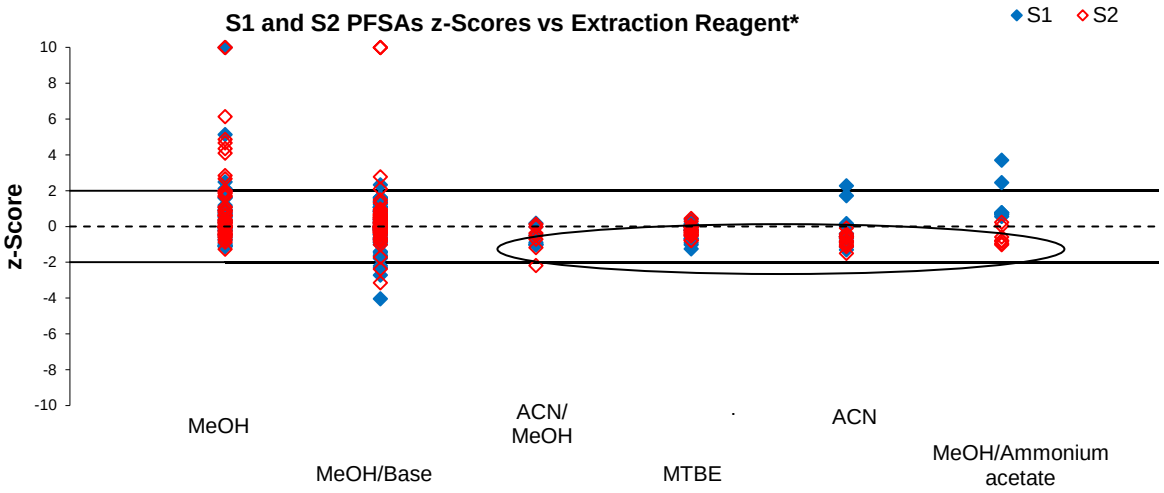
9Cl-PF3ONS This was the first time this analyte was included in a PT study. Of 30 participants who reported results in the soil samples, 11 reported results for 9Cl-PF3ONS and 8 performed satisfactorily.

Plots of participants performance for 9Cl-PF3ONS in S2 versus the extraction method used are presented in Figure 115.



*Laboratory 25 excluded

Figure 115 S2 9Cl-PF3ONS z-Scores vs. Methos



*Results from Laboratories 10, 25, 33 and 35 were excluded. Scores greater than 10 have been plotted as 10. Marked with an oval on the chart are the results produced by the 'other' extraction reagent.

Figure 116 Participants' Performance in S1 and S2 vs Extraction Reagent

6.7.3 Individual PFSA Analytes in Soil

As for PFCAs although the PFSA results produced by methods involving extraction reagents other than methanol and based modified methanol appear to have a low biased, very few of them returned unsatisfactory z-scores (Figure 116).

PFNS and PFDS No assigned value could be set for PFNS and PFDS in S1 because the results reported for these analytes were not compatible. Two major modes were noticed in the distribution of these results. The extraction methods that involved base modified methanol as extraction solvent produced the majority of the low results for these analytes. Figure 117

Sample S2 was spiked soil. The results reported by participants for PFNS and PFDS in this sample were compatible and the between laboratory coefficient of variation was 16% and 19% respectively, which was lower than the CV predicted by Thomson and Horwitz of 22%.

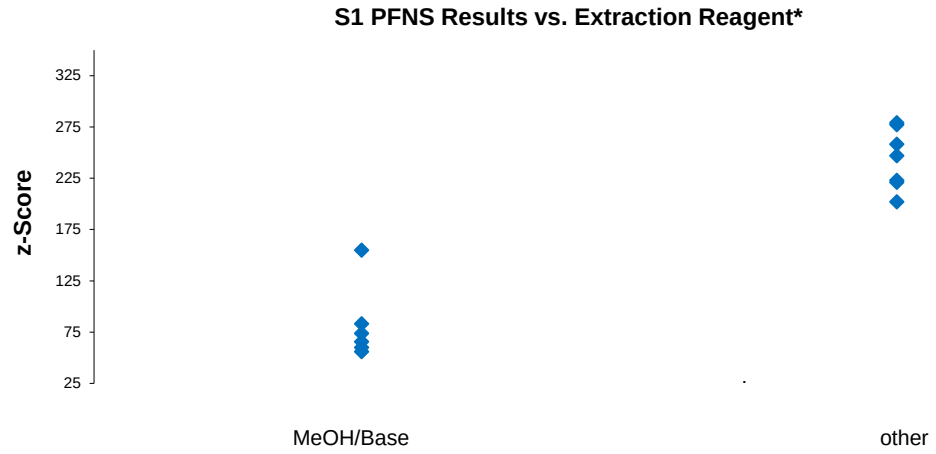


Figure 117 Participants' Results versus Extraction Regime

*The results reported by Laboratories 6, 10, 19, 25, 33 and 35 not included.

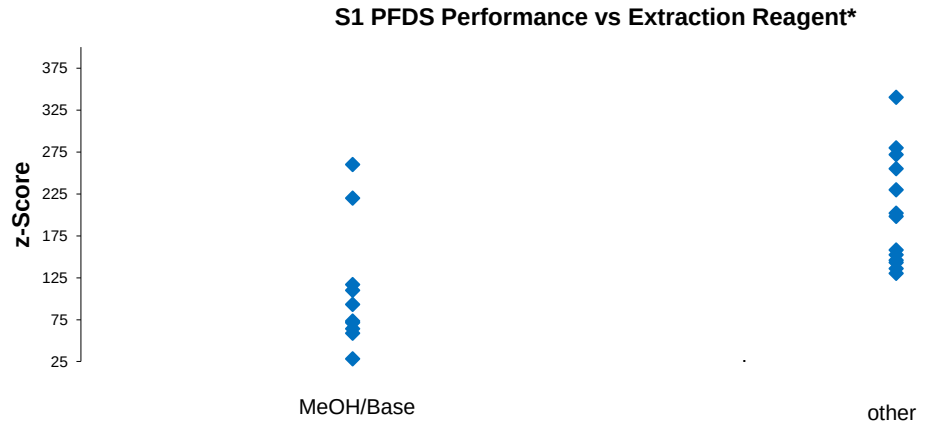


Figure 118 Participants' Results versus Extraction Regime

*The results reported by Laboratories 10, 25, 33 and 35 not included.

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

No substantial difference was expected between the PFHxS total results and PFHxS linear results as the contribution from the branched isomers to the total PFHxS results is insignificant. 19 participants reported results for both PFHxS total and linear in S1, and 20 in S2. All reported results for the both isomers were similar with the exception of 4. Calculation errors may explain some of these discrepancies.

PFOS_L spike value was 2.34 µg/kg, while for total PFOS it was 4.20 µg/kg. The expected ratio of PFOS_L vs total PFOS was 56%. The ratio from the set assigned values for PFOS_L and PFOS was 68%. Figure 119 presents bar chart with ratios of PFOS_L results vs PFOS total results as reported by participants who reported results for both tests.

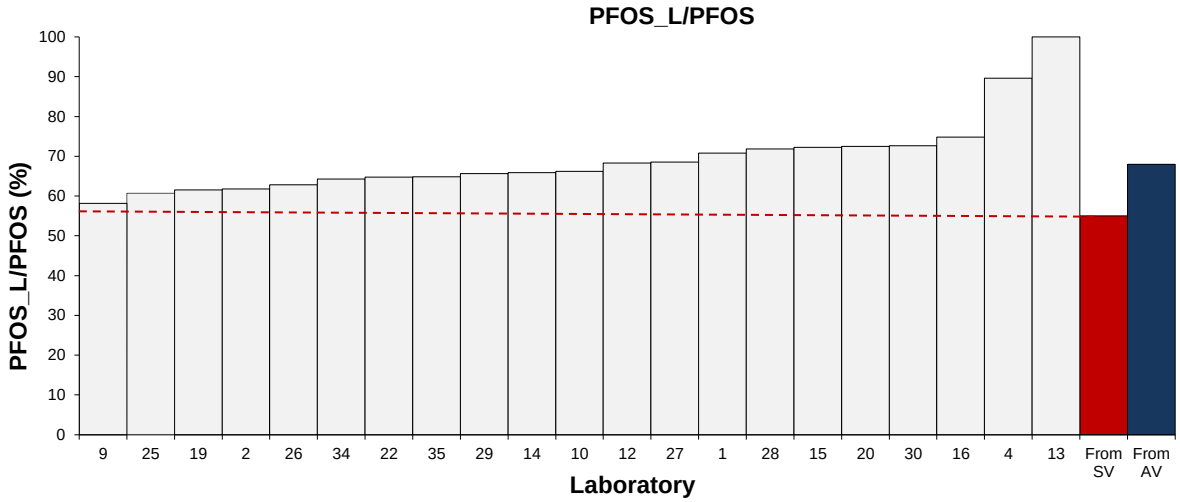


Figure 119 Bar Charts PFOS_L/PFOS

The results reported by Laboratory 1 for PFHxS total and linear and PFOS total and linear in S2 were higher than the assigned value by the same factor of 2 and 20 respectively.

6.7.4 Individual PFAA Precursors Analytes in Soil

There was no correlation evident between participants' reported results for PFOSA, N-EtFOSE, 6:2 FTS and 8:2FTS in S1 and S2, and the analytical method used.

N-Et-FOSA, N-MeFOSAA, N-EtFOSAA and 4:2FTS levels in S1 were below the reporting level of most participants. No assigned value was set for these analytes. However, participants may still compare their reported results for these elements with the robust average of participants' results. Descriptive statistics for these analytes are presented in Chapter 6.

6:2 FTS and 8:2FTS presented analytical difficulty to participating laboratories. The between laboratory CV for these analytes was high, at 27% and 28% respectively. Bias caused by isotopically labelled standard may explain the large variation. Due to natural abundance of ^{34}S the native telomere sulfonates can produce a small contribution to the $^{13}C_2$ labeled telomere sulfonate isotope dilution analogue. [17]

6.8 Participants' Results and Analytical Methods for PFAS in Water

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

In general, PFAS measurements in S3 presented more difficulty to participants than in S4. The between laboratory coefficient of variation was between 14% and 69% for PFAS results reported in S3, and between 13% and 51% for PFAS results reported in the spiked water sample S4.

Extraction

Sample S3 was contaminated water, whereas Sample S4 was autoclaved tap water fortified for 24 individual PFAS components. Analyte concentration in S3 was between 0.012 µg/L and
4.19 µg/L (with PFOS at 4.73 µg/L), while concentration in S4 was between 0.0158 µg/L and 0.134 µg/L. Of 31 participants who reported results for both water samples. 26 used the same sample size for extraction.

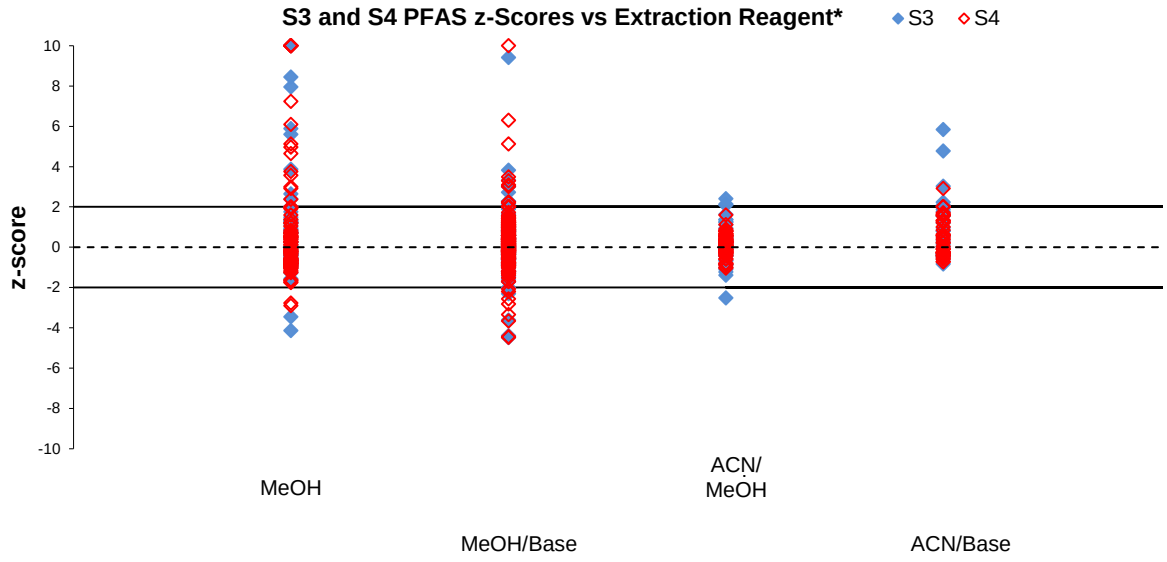
In order to avoid adsorption on the wall of the container, participants were instructed to use the entire contents of the bottle for analysis. Only 3 followed this instruction however, with the remaining participants taking a sub-sample. Laboratory 3 reported using 100 mL of sample; they may have sampled from both containers provided.

Although participants reported whether or not they rinsed the bottles, this might not actually mean that they rinsed the sample container but may have instead rinsed the container used for extraction. This information was therefore not included in our analysis of the testing methods, as it might be misleading.

Methanol and methanol/base were the preferred extraction solvents. There was no correlation evident between participants' reported results for PFAS and the solvent used (Figure 120).

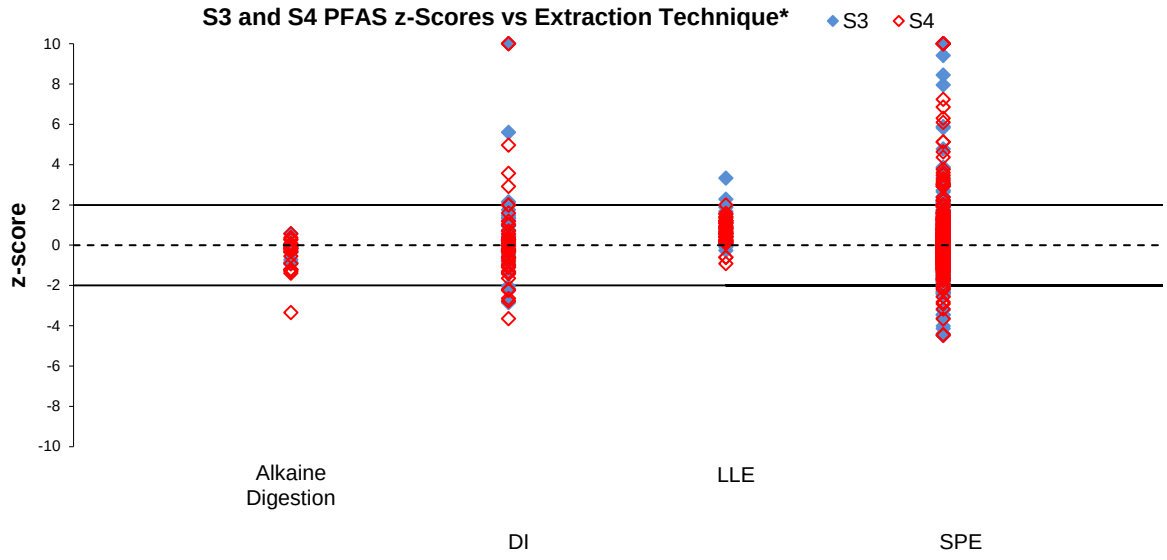
Most laboratories chose to enrich the test samples using SPE. Two laboratories used LLE, one used alkaline digestion and 3 reported using direct injection without sample enrichment. The majority of the results produced by these methods were compatible (Figure 121).

The most popular method used for measurements of PFAS water samples S3 and S4 was a SPE extraction procedure which involved a sample size of 50 mL, methanol or methanol base as extraction solvent, and no clean-up step.



*Laboratories 25 and 33 excluded. Scores greater than 10 have been plotted as 10.

Figure 120 S3 and S4 Performance vs Extraction Reagent



*Laboratories 25 and 33 excluded. Scores greater than 10 have been plotted as 10.

Figure 121 S3 and S4 Performance vs Extraction Technique

Instrumental Technique

With the exception of three participants, all laboratories reported using LC-MSMS(QQQ) for PFAS measurements. Laboratories 11, 15 and 16 used Orbitrap. Most LC-MSMS users used a C18-based column and all but 3 reported using a delay column.

To quantify S3 and S4, Laboratory 25 reported that "sample extract was diluted across a range to allow for expected analyte range".

Due to the limited amount of data and the variety of analytical methods used, no significant trends in extraction and sample preparation were identified.

6.8.1 Individual PFCA Analytes in Water

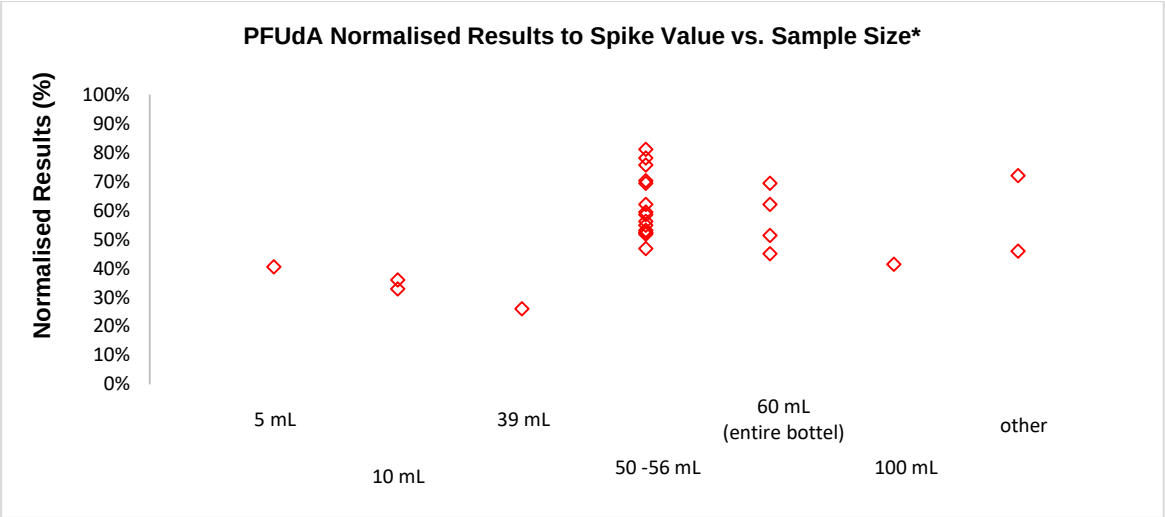
Measurements of some PFCAs in S3 and S4 challenged participants' techniques. The between -laboratory coefficient of variation was between 14% and 64% for PFCAs results reported in S3 and between 15% and 51% for PFCAs results reported in S4.

PFNA The PFNA results in S3 were approximately 30% more variable than in S4. The level of PFOS in S3 was 4.73 µg/L and 0.025 µg/L in S4. Matrix effects from the high level PFOS in S3 and may explain this discrepancy.

PFDA level in S3 was below the reporting limit of most participants. Only 11 laboratories reported results for this test; the reported results were too variable (CV of 64%) and no assigned value was set.

PFUdA The assigned value for PFUdA was 54% of the spiked value. Adsorbtion to the surface of the sample container during PT sample preparation and/or during analysis may explain this discrepancy. Previous studies in water samples found permanent adsorptions of long chain PFCAs(>C10), PFOSA and NEtFOSA to the sample container surface and of PFOS and PFOA in acidified water. [18 - 21]

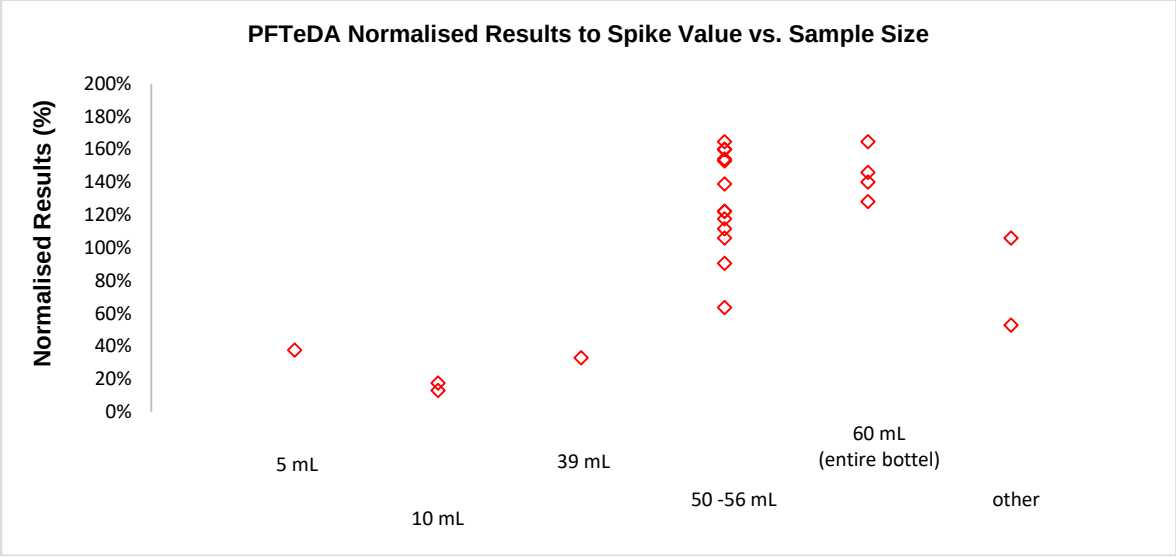
Plots of participants' results (normalised against the spike value) versus testing method are presented in Figure 122. Most of the participants who used for analysis the entire or almost entire content of the container (50 mL to 60 mL) recovered more than 54% of the spiked PFUdA in water.



*Laboratories 25 and 33 excluded

Figure 122 PFUdA Results Normalised to Spiked Value versus Sample Volume

PFTeDA was also identified from previous experience and literatures as being an analyte which may potentially be adsorbed to the wall of the container during sample preparation. [18-22] This analyte was spiked directly into the final bottles rather than during the bulk sample preparation in order to prevent losses during the preparation procedure. The robust average was 109% of the spike value. However, no assigned value could be set for this test because the results were not compatible with each other (CV of 51%). Plots of participants' results for PFTeDA in S4 normalised against the spike concentration versus testing method are presented in Figure 123. There is a correlation beteween the participants who used the entire or almost entire sample container and high recoveries of PFTeDA from the spiked water sample.



*Laboratories 25 and 33 excluded

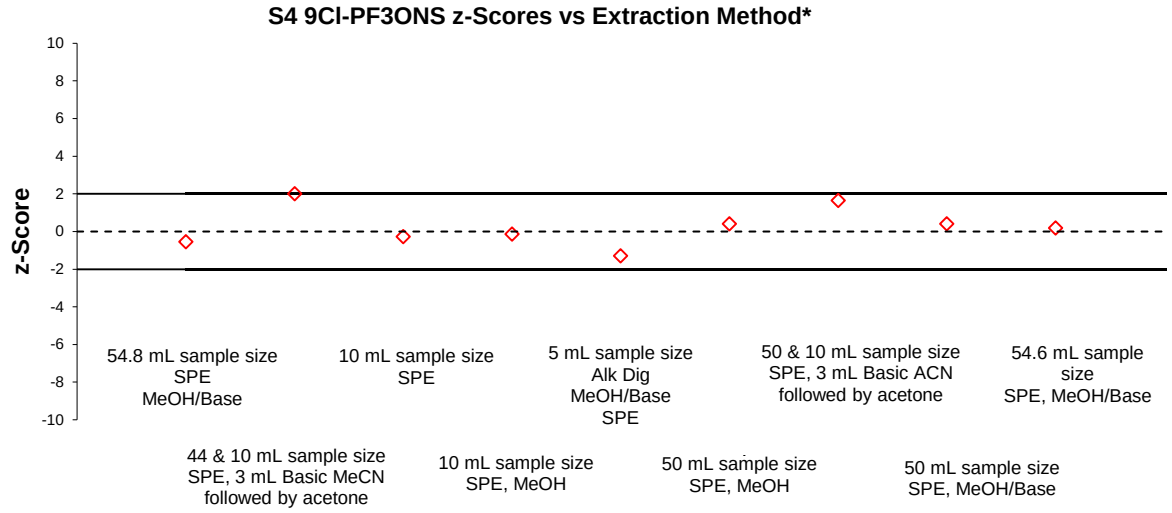
Figure 123 PFTeDA Results Normalised to Spiked Value versus Sample Volume

6.8.2 Individual PFECA and PFESA Analytes in Water

A limited number of participants provided results for PFECA and PFESA analytes in water. 13 laboratories reported results for ADONA and GenX and 10 for 9Cl-PF3ONS; most of these laboratories performed satisfactorily.

9Cl-PF3ONS This was the first time that 9Cl-PF3ONS was included in a PT study. Plots of participants performance for 9Cl-PF3ONS in S4 versus the extraction method used are

presented in
Figure 124.

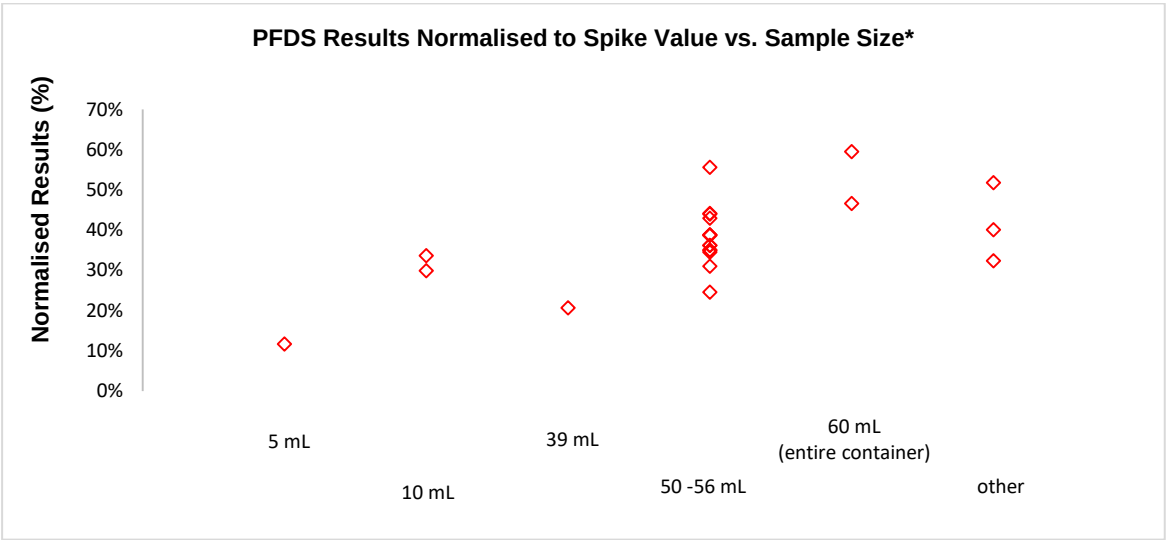


*Laboratory 25 excluded

Figure 124 S4 9Cl-PF3ONS z-Scores vs. Methods

6.8.3 Individual PFSA Analyte in Water Commentary

PFDS robust average in S4 was 35% of the spiked value. Similar low recoveries were also observed for PFDS in water in previous PT studies and as in these studies, the reported results were compatible with each other. This is an indication that PFDS may have been lost during the preparation of PT test samples prior to sample dispatch.



*Laboratories 25 and 33 xcluded

Figure 125 PFDS Results Normalised to Spiked Value versus Sample Volume

Figure 124 shows the normalised PFDS results (against the spiked concentration) versus the amount of sample taken for analysis for each sample. Participants used a variety of methods for extraction. No correlation between results and method was evident

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

Twenty participants reported results for both total and linear PFHxS in S3 and 21 in S4. The ratios of PFOS_L versus total PFOS in S3 were between 75% and 92% while in S4 all reported results for both isomers were similar with the exception of one.

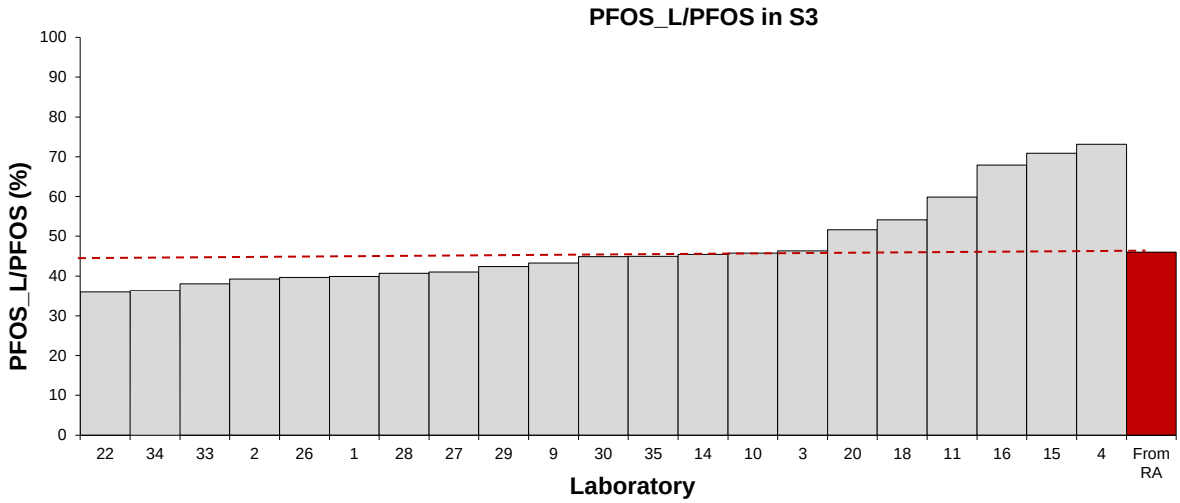


Figure 126 Bar Charts of PFOS_L/PFOS in S3

Twenty-one laboratories reported results for the two PFOS isomers in S3. The robust average of these results (outliers excluded) was 4.57 µg/L for total PFOS and 2.10 µg/L for linear PFOS, with the ratio PFOS_L versus total PFOS being 46%. Figure 126 presents bar charts of PFOS_L results vs total PFOS results as reported by participants

PFOS_L spike value in S4 was 0.0182 µg/L, while for total PFOS it was 0.0326 µg/L. The expected ratio of PFOS_L vs total PFOS was 56%. The ratio of the robust average of participants' results was 67%. Bar charts of PFOS_L results versus PFOS total results as reported by participants are presented in Figure 127.

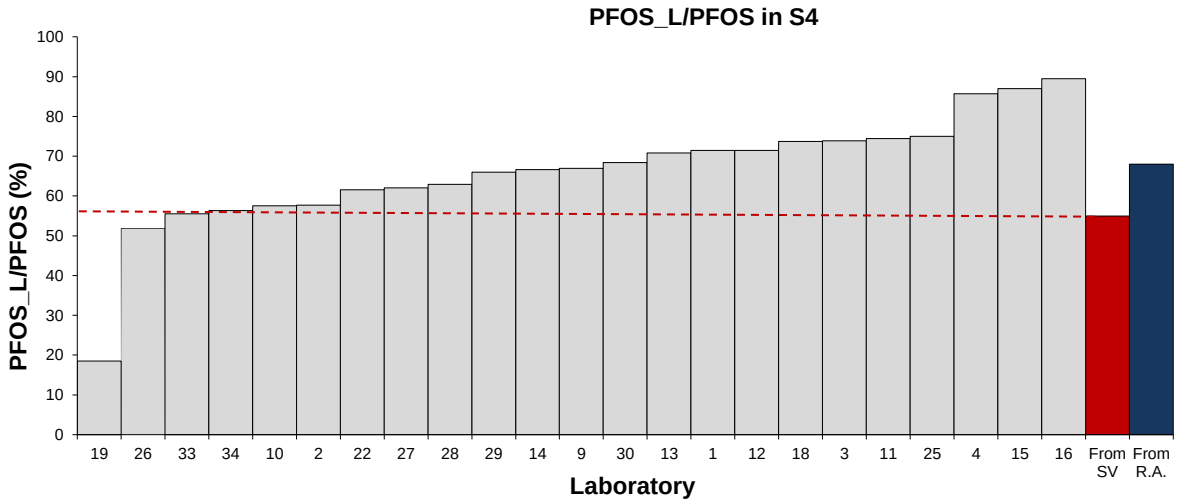


Figure 127 Bar Charts PFOS_L/PFOS in S4

PFNS spike value was below the reporting level of most participants, 0.0048µg/L. Only 5 results were reported for this test and all were compatible with each other.

6.8.4 Individual PFAA Precursors Analytes in Water

8:2 FTS levels in S3 were below the reporting level of most participants. No assigned value was set for this test. Descriptive statistics for this analyte elements are presented in Chapter 6.

PFOSA As for PFTeDA, PFOSA was identified as being an analyte which may potentially adsorb to the container wall during sample preparation.[20, 23] This analyte was added directly into the final bottles rather than during bulk sample preparation to mitigate loss during preparation. This sample preparation was successful as the assigned value for PFOSA was 90% of the spiked value and the reported results were compatible with each other with a between laboratory CV of 22%, which is similar to that predicted by Thomson and Harwitz.

6.9 Effects of Sample Matrix

Samples S1 and S2 were soil and Samples S3 and S4 were water. Spiked water Sample S4 had the lowest percentage ofnumerical results for which z-scores were calculated, which may be due to the low level of some analytes in this sample (below the LOR of some participants). Sample S1 had the lowest percentage of satisfactory z-scores, possibly due to the matrix effects caused by the high-level PFOS present in this sample (Table 108).

PFOS in all matrices presented analytical difficulty to participanting laboratories. It had a large number of unsatisfactory z-scores across all 4 samples.

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	Incurred	750	604 (81%)	487	81
S2 Soil	Spiked	780	651 (83%)	535	82
S3 Water	Incurred	420	396 (94%)	328	78
S4 Water	Spiked	748	587 (78%)	505	86

6.10 False Negatives

Appendix 4 presents false negative results – an analyte present in the sample for which a participant tested for, but did not report a numerical result (e.g. laboratories reporting a '<' or NR result when the assigned and spiked value was higher than the participants' reporting limit, or participants that did not report any value).

6.11 Comparison with Previous PFAS in Soil and Water

In the first study conducted by NMI for PFAS analytes in soil and water AQA 15-03, participants were asked to report results for total and linear PFOS and PFOA only. 11 laboratories enrolled and 10 reported results. The lack of mass labelled linear and branched standards was the main problem encountered by participants. Since then, a large number of high-quality standards and labelled standards have become available and so more analytes were added each year to the follow-up PT studies. Laboratories have developed methods for the analysis of a wide spectrum of PFAS contaminants and in general the results reported were compatible, showing that the mass-labeled standards are capable of correcting for the differences between these methods. A summary of participation and reported results rates in PFAS in soil and water over the last 6 studies (2015 to 2020) is presented in Figure 128.

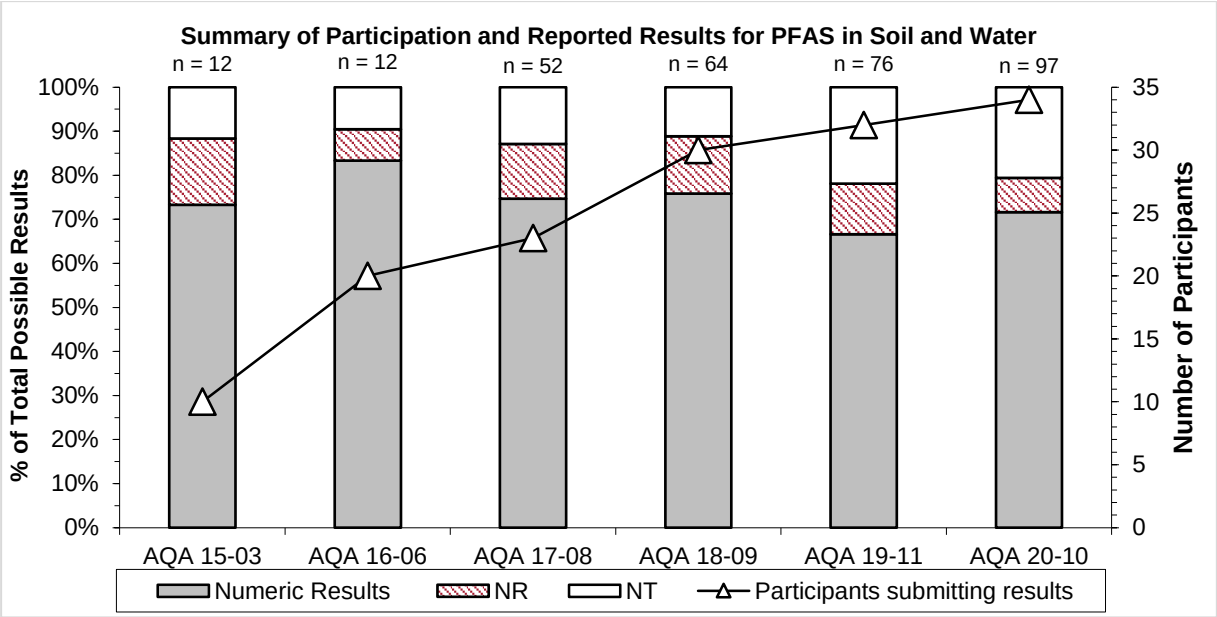


Figure 128 Summary of Participation and Reported Results for PFAS in Soil and Water PT Studies (n = number of spiked analytes).

AQA 20-10 is the sixth NMI proficiency test of PFAS analytes in soil and water. For all analytes, the same fixed target standard deviation was used in the present study as in the previous studies. This allowed for a comparison of participants' performance over time and provided a benchmark for progressive improvement. Participants' performance in the measurement of PFAS analytes in soil and water over time is presented in Figure 129.

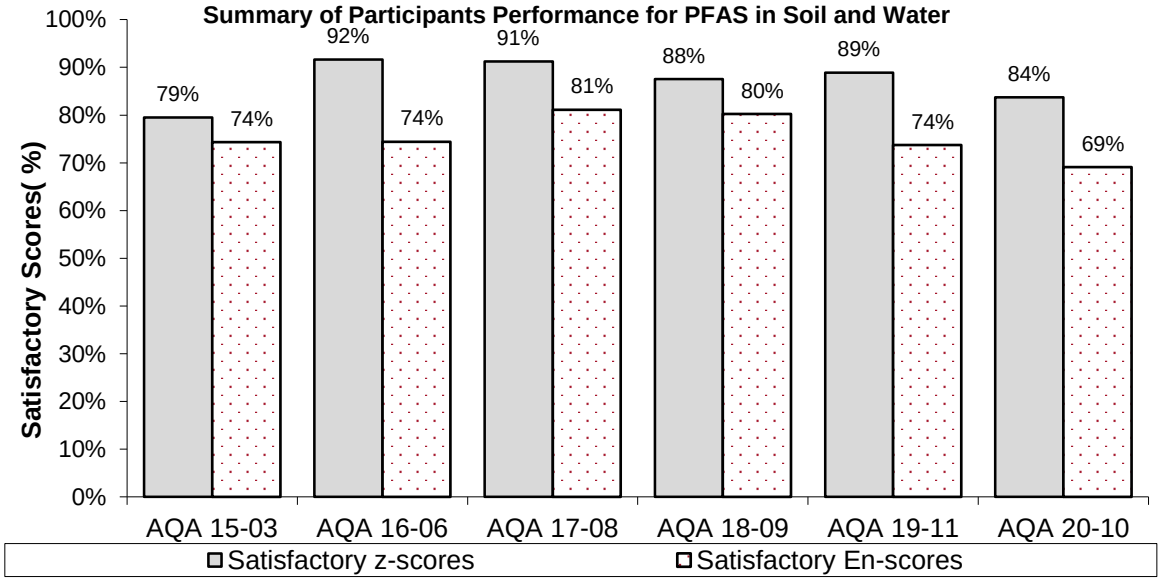


Figure 129 Summary of Participants' Performance for PFAS in Biota and Food PT Studies

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

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APPENDIX 1 – SAMPLE PREPARATION

A1.1 Sample Preparation

Sample S1: Contaminated and uncontaminated soils were separately dried and sieved through a 850 µm sieve and collected on a 355µm sieve. 192 g of the contaminated soil and 1729 g of the uncontaminated soil were mixed for 3 hours using a V-mixer. The soil was divided into 20 – 25 g portions using a Retsch rotary divider, packed into labelled Greiner tubes.

Sample S2: 1318 g of dried and sieved uncontaminated soil was placed in a 3 L round bottom flask. A slurry was produced by adding acetone. The slurry was spiked with analyte solutions prepared in methanol. The slurry was placed on the Rotavap, and the acetone was evaporated off with a slight vacuum and the heater being set at no more than 40°C. The dry soil was divided into 20 – 25 g portions using a Retsch rotary divider, packed into labelled Greiner tubes.

Sample S3: Contaminated water was filtered through an ADVANTEC GB140 glass fibre filter paper. The filtered contaminated water was autoclaved, and sediment present was left to settle out over a period of days. The contaminated water was filtered again through an ADVANTEC GB140 glass fibre filter paper, and the final mass of the water was 5238 g. The water was dispensed into labelled 60 mL HDPE bottles using a peristaltic pump.

Sample S4: 6667 g of autoclaved tap water was spiked with analyte solutions prepared in methanol (20 analytes). The spiked water was stirred using an IKA stirrer for approximately 4 hours, and dispensed into labelled 65 mL HDPE bottles using a peristaltic pump. Each bottle was then spiked with a composite solution containing PFTeDA and PFOSA.

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

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

A2.1 Robust Average and Associated Uncertainty

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

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

where:

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

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

A worked example is set out below in Table 109.

Table 109 Uncertainty Estimate for PFBS in Sample S1

No. results (p)	25
Robust Average	160 µg/kg
$S_{rob\ av}$	28 µg/kg
$u_{rob\ av}$	7 µg/kg
k	2
$U_{rob\ av}$	14 µg/kg

Therefore, the robust average for PFBS in Sample S1 is **160 ± 14 µg/kg**.

A2.2 z-Score and E_n-Score Calculations

For each participant's result, a z-score and E_n-score are calculated according to Equations 2 and 3 respectively (see page 12).

A worked example is set out below in Table 110.

Table 110 z-Score and E_n-Score for Sample S1 PFBS Result Reported by Laboratory 3

Participant Result (µg/kg)	Assigned Value (µg/kg)	Target Standard Deviation	z-Score	E_n-Score
169 ± 19	160 ± 14	20% as PCV, or: 0.2 × 160 = 32 µg/kg	z-Score = $\frac{169-160}{32}$ = 0.28	E_n-Score = $\frac{169-160}{\sqrt{19^2+14^2}}$ = 0.38

APPENDIX 3 – ADDITIONAL ANALYTES

Table 111 Additional Analytes

Lab. Code	Sample	Analyte	Result (µg/kg)	Uncertainty (µg/kg)	Recovery (%)
1	S1	ADONA	158.82	4.01	NR
	S2	PFHpA	0.80	0.09	83
		N-EtFOSA	1.10	0.13	NR
	S3	N-EtFOSA	0.20	0.03	NR
		ADONA	0.65	0.05	NR
	S4	N-EtFOSA	0.1160	0.0110	NR
2	S2	PFHpA	0.5	0.4	99
		N-EtFOSA	2	2	87
	S3	N-MeFOSAA	0.003	0.002	48
3	S2	N-EtFOSA	1.1	0.25	102
4	S2	PFHpA	0.4	0.1	77.4
		N-EtFOSA	0.9	0.24	94.1
5	S2	PFHpA	0.5	0.3	65
6	S2	PFHpA	0.6	0.08	NR
		N-MeFOSAA	0.2	0.04	NR
7	S2	PFHpA	0.68	0.06	NR
		N-EtFOSA	3.55	1.64	NR
		N-MeFOSAA	0.24	0.07	NR
	S4	N-MeFOSAA	0.006	0.001	NR
9	S1	9Cl-PF3ONS	3.23	0.6	76
	S2	PFHpA	0.847	0.14	94
		N-EtFOSA	0.920	0.18	56
10	S2	PFHpA	0.10	0.04	65
		N-EtFOSA	0.25	0.08	NR
12	S2	PFHpA	1.5	0.7	116
		N-EtFOSA	1.6	0.7	71
	S4	N-MeFOSA	0.013	0.005	140
14	S2	PFHpA	0.5	0.1	85
		N-EtFOSA	1.64	0.5	84
15	S2	PFHpA	0.361	0.108	76
		N-EtFOSA	1.15	0.345	72
		N-MeFOSE	0.862	0.431	82
	S3	PFOSA	0.00200	0.0200	81
16	S2	PFHpA	0.38	0.1	NR
		N-EtFOSA	1.26	0.32	NR
17	S2	PFHpA	0.65	0.16	NR
	S3	PFOSA	0.015	0.005	NR
19	S2	PFHpA	0.43	0.03	80

Lab. Code	Sample	Analyte	Result (µg/kg)	Uncertainty (µg/kg)	Recovery (%)
	S3	PFNS	0.028	0.009	96
		PFDS	0.044	0.010	96
		PFUdA	0.014	0.002	100
		PFDoA	0.018	0.003	96
		PFTrDA	0.054	0.015	114
		PFTeDA	0.037	0.007	114
		N-MeFOSAA	0.003	0.001	91
	S4	PFDoA	0.003	0.002	97
		PFTrDA	0.002	0.002	119
22	S2	PFHpA	0.45	0.1	84
		N-EtFOSA	1.59	0.5	110
25	S1	9Cl-PF3ONS	0.066	0.005	NR
	S2	PFHpA	0.27	0.02	96.3
		N-MeFOSA	21.9	2.47	85.6
		N-EtFOSA	0.54	0.07	90.9
		N-MeFOSAA	0.038	0.004	99.3
	S3	N-MeFOSAA	0.001	0.001	100.3
	S4	N-MeFOSA	0.008	0.0023	74
26	S2	PFHpA	0.5	0.3	98
	S3	N-MeFOSAA	0.002	0.002	60
27	S2	PFHpA	0.459	0.045	74.5
		N-EtFOSA	1.092	0.146	10.5
	S3	PFOSA	0.0037	0.0017	75.8
28	S2	PFHpA	0.4	0.1	88
		N-EtFOSA	1.6	0.5	75
	S3	4:2 FTS	0.07	0.01	193
29	S2	PFHpA	0.536	0.1608	80
	S3	N-EtFOSAA	0.00883	0.002649	72
		GenX	0.00557	0.001671	117
30	S2	PFHpA	0.31	0.09858	49.9
		N-EtFOSA	3.54	NR	49.9
33	S4	N-MeFOSA	0.0955	0.02865	2.97
		N-EtFOSA	0.228	0.0684	1.73
34	S2	PFHpA	0.486	0.1215	77
		N-EtFOSA	1.35	0.3375	20

APPENDIX 4 – FALSE NEGATIVES

Table 112 False Negatives

Lab. Code	Sample	Analyte	Assigned Value (µg/kg)	Spiked Value (µg/kg)	Reported Result (µg/kg)
1	S4	PFTeDA	Not Set	0.0850	<0.0250
3	S4	PFNS	Not Set	0.0048	NR
		PFDS	0.0273	0.0773	NR
		PFTeDA	Not Set	0.0850	NR
5	S1	PFBS	160	Not Spiked	NR
		PFPeS	197	Not Spiked	NR
		PFHxS	1480	Not Spiked	NR
		PFHxS_L	1310	Not Spiked	NR
		PFHpS	450	Not Spiked	NR
		PFOS	38700	Not Spiked	NR
		PFOS_L	31600	Not Spiked	NR
		PFBA	255	Not Spiked	NR
		PFPeA	361	Not Spiked	NR
		PFHxA	1340	Not Spiked	NR
		PFHpA	136	Not Spiked	NR
		PFOA	466	Not Spiked	NR
		PFNA	63.6	Not Spiked	NR
		PFDA	55.0	Not Spiked	NR
		PFUdA	28.9	Not Spiked	NR
		PFDoA	21.9	Not Spiked	NR
		PFTrDA	8.2	Not Spiked	NR
		PFTeDA	7.02	Not Spiked	NR
		PFOSA	216	Not Spiked	NR
		N-MeFOSA	4.54	Not Spiked	NR
		N-MeFOSE	3.89	Not Spiked	NR
		N-EtFOSE	0.652	Not Spiked	NR
		6:2 FTS	350	Not Spiked	NR
		8:2 FTS	1060	Not Spiked	NR
		10:2 FTS	23.7	Not Spiked	NR
	S4	8:2 FTS	0.0741	0.0957	<0.04
6	S2	N-EtFOSE	6.22	10.1	< 0.05
7	S1	PFHxS	1480	Not Spiked	NR
		PFOS_L	31600	Not Spiked	NR
	S2	PFHxS	5.36	5.41	NR
		PFOS_L	2.53	2.34	NR
	S3	PFHxS	4.19	Not Spiked	NR
		PFOS_L	2.11	Not Spiked	NR
	S4	PFHxS	0.0531	0.0551	NR
		PFOS_L	0.0171	0.0182	NR
10	S1	PFTrDA	8.2	Not Spiked	<0.01

Lab. Code	Sample	Analyte	Assigned Value (µg/kg)	Spiked Value (µg/kg)	Reported Result (µg/kg)
		PFTeDA	7.02	Not Spiked	<0.01
		N-MeFOSA	4.54	Not Spiked	<0.02
		N-MeFOSE	3.89	Not Spiked	<0.02
		N-EtFOSE	0.652	Not Spiked	<0.02
	S3	PFNA	0.012	Not Spiked	<0.005
11	S4	PFNS	Not Set	0.0048	NR
		PFDS	0.0273	0.0773	NR
18	S3	PFHxS	4.19	Not Spiked	NR
	S4	PFHxS	0.0531	0.0551	NR
		PFNS	Not Set	0.0048	NR
		GenX	0.091	0.0999	NR
20	S2	N-EtFOSE	6.22	10.1	<5
21	S1	PFTrDA	8.2	Not Spiked	<5.0
22	S4	PFDS	0.0273	0.0773	<0.01
23	S2	PFBS	8.88	10.0	NR
		PFPeS	53.0	56.6	NR
		PFHxS	5.36	5.41	NR
		PFHxS_L	5.29	5.33	NR
		PFHpS	19.2	20.1	NR
		PFOS_L	2.53	2.34	NR
		PFNS	2.59	3.31	NR
		PFDS	26.1	29.1	NR
		PFBA	21.2	25.1	NR
		PFPeA	16.8	20.1	NR
		PFHxA	12.6	11.6	NR
		PFNA	39.5	46.9	NR
		PFDA	90.6	100	NR
		PFUdA	76.2	80.0	NR
		PFDoA	14.0	15.0	NR
		PFTrDA	39.5	50.0	NR
		PFTeDA	26.0	30.1	NR
		PFOSA	8.21	10.1	NR
		N-EtFOSE	6.22	10.1	NR
		6:2 FTS	13.2	14.2	NR
		8:2 FTS	4.64	4.79	NR
		GenX	31.1	80.0	NR
		ADONA	60.1	75.4	NR
		9Cl-PF3ONS	62.7	74.6	NR
	S3	PFBS	0.520	Not Spiked	NR
		PFPeS	0.504	Not Spiked	NR
		PFHxS	4.19	Not Spiked	NR
		PFHxS_L	3.77	Not Spiked	NR
		PFHpS	0.254	Not Spiked	NR

Lab. Code	Sample	Analyte	Assigned Value (µg/kg)	Spiked Value (µg/kg)	Reported Result (µg/kg)
		PFOS	4.73	Not Spiked	NR
		PFOS_L	2.11	Not Spiked	NR
		PFBA	0.403	Not Spiked	NR
		PFPeA	0.698	Not Spiked	NR
		PFHxA	1.70	Not Spiked	NR
		PFHpA	0.250	Not Spiked	NR
		PFOA	0.503	Not Spiked	NR
		PFNA	0.0120	Not Spiked	NR
		6:2 FTS	0.0726	Not Spiked	NR
	S4	PFBS	0.0531	0.0612	NR
		PFPeS	0.0475	0.0472	NR
		PFHxS	0.0531	0.0551	NR
		PFHxS_L	0.0531	0.0542	NR
		PFHpS	0.0884	0.100	NR
		PFOS_L	0.0171	0.0182	NR
		PFNS	Not Set	0.0048	NR
		PFDS	0.0273	0.0773	NR
		PFBA	0.0742	0.0892	NR
		PFPeA	0.0359	0.0400	NR
		PFHxA	0.0158	0.0150	NR
		PFHpA	0.0304	0.0295	NR
		PFNA	0.134	0.152	NR
		PFDA	0.0306	0.0404	NR
		PFUdA	0.0597	0.111	NR
		PFTeDA	Not Set	0.0850	NR
		PFOSA	0.090	0.106	NR
		6:2 FTS	0.0275	0.0284	NR
		8:2 FTS	0.0741	0.0957	NR
		GenX	0.091	0.0999	NR
		ADONA	0.0695	0.0753	NR
		9Cl-PF3ONS	0.112	0.140	NR
27	S4	PFNS	Not Set	0.0048	<0.002
28	S3	6:2 FTS	0.0726	0	<0.05
30	S4	PFTeDA	Not Set	0.0850	<0.005

APPENDIX 5 – PARTICIPANTS' TEST METHODS FOR SOIL SAMPLES

Participants' methods for soil samples are presented in Tables 113 to 151.

Table 113 Participant Methodology – Extraction

Lab. Code	S1 Sample Weight (g)	S2 Sample Weight (g)	Sample Pre-treatment	Extraction Technique	Extraction Solvent	Extraction Process	Extraction Temperature	Extraction Time	Extraction Clean Up
1	0.5	0.5	Homogenisation	Alkaline Digestion	MeOH	Sonication	Room T	20 minute	Carbon clean up
2	5	5	Homogenisation	Alkaline Digestion	Basified MeOH	Sonication / shaking	Room	60 mins	Envicarb if needed
3	1.0	2.0	NA	Solid-Liquid Extraction (SLE)	200mM NaOH, MeOH	Vortex, shaking	Room temperature	30 min	dSPE (graphitised carbon)
4	2	2	Homogenisation	QuEChERS	Acetonitrile/ Methanol	Shaking	Ambient	30min	Active carbon SPE
5	0.5	0.5	Homogenisation	Alkaline Digestion	Ammonium hydroxide in methanol	Sonication	Room temperature	2 x 20 minutes	Carbon SPE
6	0.5g-5g	5	Homogenisation	Solid-Liquid Extraction (SLE)	1% NH4OH in Methanol	Sonication	Room	30 min	
7	5	5	Homogenisation	Solid-Liquid Extraction (SLE)	MeoH 1% NH4OH	Sonication	50degree celcius	20 mins	Filtration
8	2	2	Homogenisation	SLE with Ion-pairing	MTBE	Shaking	Ambient	2 x 30min	
9	5.18	5.29	Homogenisation	Alkaline Digestion	KOH/Methanol		Room temperature	3 hour shake, 12 hour sonication bath	SPE (WAX 150mg/6cc)
10	2.01	1.99		Liquid-Liquid Extraction (LLE)	1% ammonia in methanol	Vortex and sonication	20	40 min	EnviCarb
11									

Lab. Code	S1 Sample Weight (g)	S2 Sample Weight (g)	Sample Pre-treatment	Extraction Technique	Extraction Solvent	Extraction Process	Extraction Temperature	Extraction Time	Extraction Clean Up
12	1	1	pH Adjustment	Solid-Liquid Extraction (SLE)	Methanol	Sonication	ambient	15 minutes	SPE - WAX
13	5	5	None	Solid Phase Extraction (SPE)	1% ammonia in methanol	Shaking and Sonication	Ambient	1 hour	CGB SPE
14	2	2	Homogenisation	Solid-Liquid Extraction (SLE)	4:1 MeOH:WATER	Tumbling	Ambient	30 mins	N/A
15	2	2	Homogenisation	Solid Phase Extraction (SPE)	Acetonitrile	Shaking	Room Temperature	30 mins	SPE
16	2	2	Homogenisation	Solid-Liquid Extraction (SLE)	ACN	Shaking	Room	20 Minutes	C18
17	5	5	Homogenisation	Soxhlet	Methanol	Boiling	Boiling point	4h	no
18									
19	10.04	10.04		Accelerated Solvent Extraction	Methanol	Drip	100 degrees	1 h	SPE
20	1	1	Homogenisation	Alkaline Digestion	KOH in methanol solution	Tumbling	room temp	2	NA
21	2	2	Homogenisation	SLE with Ion-pairing	MTBE	Shaking	Ambient	2 x 30min	
22	2	2	Homogenisation	Solid-Liquid Extraction (SLE)	4:1 MeOH:Water	Tumbling	Ambient	30mins	SPE for results >5
23		0.25	Homogenisation	Sonication	Methanol	Sonication	Room temp	30 min x 3 times	Solid Phase Extraction (SPE)
24									
25	0.0501	0.0502	pH Adjustment	Solid Phase Extraction (SPE)	Methanol	Sonication	Ambient	1 minute x2	SPE WAX

Lab. Code	S1 Sample Weight (g)	S2 Sample Weight (g)	Sample Pre-treatment	Extraction Technique	Extraction Solvent	Extraction Process	Extraction Temperature	Extraction Time	Extraction Clean Up
26	5	5	Homogenisation	Alkaline Digestion	Basified MeOH	Sonication / shaking	Room	60 mins	Envicarb if needed
27	1	1	Homogenisation	Solid-Liquid Extraction (SLE)	Ammonium hydroxide in methanol (1%)	Vortex, sonication, centrifugation, blow down, clean up	Room temperature (~22oC)	5 h	Carbon cartridge
28	2	2	Homogenisation	Ion Pair Extraction (IPE)	MTbE	Shaking	Room Temperature	120 minutes	None
29	0.52	5.01		Solid-Liquid Extraction (SLE)	Basic Methanol	Tumble and Sonication	Tumble-RT; Sonication-est 25-35 C	Tumble-3hr; Sonication-12hr	Solvent exchange to water and SPE
30	5	5	Homogenisation	Solid-Liquid Extraction (SLE)	Methanol	Sonication			Filtration
32									
33	0.02	0.02	Homogenisation	Liquid-Liquid Extraction (LLE)	Methanol	Sonication	40°C	2x20 min	activate carbon
34	1.0594	1.0632	-	Solid-Liquid Extraction (SLE)	Methanol + 400 mM ammonium acetate	Vortex + Sonication	roomtemperature	10 minutes	SPE
35	0,05g-0,2g	0,2g-1g	Homogenisation	Solid Phase Extraction (SPE)	Methanol	Shaking	20°C	1h	SPE

Table 114 Participant Methodology – Extraction Additional Information

Lab. Code	Extraction Additional Information
6	Solvent exchange to MQ water
9	Combination of Shaker/Sonication for extraction

Lab. Code	Extraction Additional Information
19	Both ASE and SPE used Methanol
34	the SLE will be repeat 2 times

Table 115 Participant Methodology – Instrumental Technique and Analysis

Lab. Code	Instrument	Guard Column	Instrument Column	Dilution Factor	Delay Column?	Blank Correction?	Standard Method?
1	LC-MSMS or LC-QQQ	C18	C18, 100*2.1, 3ul		Yes	No	
2	LC-MSMS or LC-QQQ	Pre-column Filter 0.2µm	ACE Excel 1.7 SuperC18 50 x 2.1 mm id	For S1, yes. 1 in 100 minimum.	Yes	No	No. In-house
3	LC-MSMS or LC-QQQ	NA	Zorbax XDB-C18, 100 mm x 2.1 mm, 1.8µm	NA	Yes	No	No
4	LC-MSMS or LC-QQQ	C18 2.2um, 3 x 30mm	C18 1.6um, 2 x 50mm	S1 - x100, x1000	Yes	No	In house
5	LC-MSMS or LC-QQQ	Nil	Shimadzu Shim-pack XR-ODS III (1.6 µm , 50 mm x 2.0 mm)	No	Yes	No	No
6	LC-MSMS or LC-QQQ		C18 2.0mmx50mm(1.6um)	100 and 1000	Yes	No	Yes
7	LC-MSMS or LC-QQQ	Zorbax Eclipse Plus c18, 4.6x12.5mmx5-micron	Zorbax Eclipse Plus c18, 3.0x50mmx1.8um	x10	Yes	No	N/A
8	LC-MSMS or LC-QQQ		C18 1.6um, 2 x 50mm	x100, x1000	Yes	No	In house
9	LC-MSMS or LC-QQQ		C18 10cm x 3.0 mm x 3 um	No	Yes	No	No
10	LC-MSMS or LC-QQQ	Eclipse Plus c18 4.6 x 50mmx 3.5um	Eclipse Plus C18 50 x 3.0 x 1.8um		Yes	No	
11							
12	LC-MSMS or LC-QQQ	nil, in-line filter only	C18 50mm x 2mm	yes, 2x dilution to get sample into 50/50	Yes	No	No

Lab. Code	Instrument	Guard Column	Instrument Column	Dilution Factor	Delay Column?	Blank Correction?	Standard Method?
				Methanol/Water			
13	LC-MSMS or LC-QQQ	None	Reverse phase, 100mm × 2.1mm	YES, five fold dilution	Yes	No	No
14	LC-MSMS or LC-QQQ	UHPLC guard column; AU; InfinityLabPoroshell 120; EC-C18; 4.6 mm; 4 um	LC column; AU; Poroshell 120 HPH C18; 2.1x50 mm; 2.7 um; narrow bore	NO	Yes	No	Isotope dilutions
15	Orbitrap	C18	C18		Yes	No	
16	Orbitrap	C18	C18	Yes. For S1 Multiple level dilution. DF10;20;50; 100;200	Yes	Yes	
17	LC-MSMS or LC-QQQ	no	biphenyl, 150mm	end volume 10ml, 100ml, 1000ml	no	no	ISO/TC 147/SC 2N 0914
18							
19	LC-MSMS or LC-QQQ	C8 5 cm x 2.1 mm x 2.7 µm	C18 HALO 15 cm x 2.1 mm x 2.7 µm	S1: 1000x dilution, S2: 10x dilution	Yes	No	EPA 537.1, EPA 8238, DoD QSM 3.2 Table B-15
20	LC-MSMS or LC-QQQ	NA	C18 1.7 um, 2.1 x 50mm	2	No	No	EPA draft sludge method
21	LC-MSMS or LC-QQQ	C18 2.2um, 3 x 30mm	C18 1.6um, 2 x 50mm	S1 - x100, x1000 S2 - x20	Yes	No	In house

Lab. Code	Instrument	Guard Column	Instrument Column	Dilution Factor	Delay Column?	Blank Correction?	Standard Method?
22	LC-MSMS or LC-QQQ	UHPLC guard column; AU; InfinityLabPoroshell 120; E C-C18; 4.6 mm; 4 um	LC column; AU; Poroshell 120 HPH C18; 2.1x50 mm; 2.7 um; narrow bore	NO	Yes	No	Isotope dilutions
23	LC-MSMS or LC-QQQ	C8, 2.1 x 12.5mm, 5 micron	C8, 3.0 x 100mm, 3.5 micron	No	No	No	NA
24							
25	LC-MSMS or LC-QQQ		C18 2mm x 50mm	No	Yes	No	
26	LC-MSMS or LC-QQQ	Pre-column Filter 0.2µm	C18 50mm x 2.1mm x 1.8µm	The dilution factors for sample S1 and S2 are 100 and 10 respectively.	Yes	No	No. In-house
27	LC-MSMS or LC-QQQ	Evo C18 2 x 2.1mm	Evo C18 2.6 u 100x2.1 mm	No	Yes	No	No
28	LC-MSMS or LC-QQQ	nil	C18 1.6µm, 2.0mm x 50mm	No	Yes	No	
29	LC-MSMS or LC-QQQ	C-18 5um, 4 x 10mm	C-18 3um, 3 x 100 mm		Yes	No	Modified EPA Method 537
30	LC-MSMS or LC-QQQ		BEH C18 50 mm x 2.1 mm x 1.7 µm		No	No	
32							
33	LC-MSMS or LC-QQQ		Nucleodur Sphinx RP C18, isis 3µm		Yes	No	
34	LC-MSMS or LC-QQQ	ACQUITY UPLC BEH C18 VanGuard Pre-column, 130Å, 1.7 µm, 2.1 mm X 5 mm	ACQUITY UPLC BEH C18 Column, 130Å, 1.7 µm, 2.1 mm X 100 mm	Yes and No, different for each component from 1 to 10 000	Yes	No	
35	LC-MSMS or LC-QQQ	Phenomenex 4µmx2.0mm	Phenomenex 150x2mm 4µm	No	No	No	DIN 38407-14

Table 116 Participant Methodology – Labelled Standards

Lab. Code	Labelled Standard Source	Recovery Correction?	Labelled Standards Additional Information
1			
2	Wellington	Yes	
3	Wellington Laboratory	Yes	
4	Wellington Laboratories	Yes	
5	Wellington	Yes	
6	Wellington	No	
7	Wellington Laboratries	No	
8	Wellington Laboratories	Yes	
9	Wellington	Yes	
10	wellington labs	No	
11			
12	Wellington	Yes	
13	Wellington	Yes	
14	Wellington Laboratories	Yes	
15	Wellington	Yes	
16	Wellington	Yes	Results corrected by ISTD added before instrumentation
17	Campro Scientific (Wellington)	yes	
18			
19	Wellington	Yes	
20	Wellington	Yes	
21	Wellington Laboratories	Yes	
22	Wellington Laboratories	Yes	
23	CIL and Wellington	No	

24			
25	Wellington	Yes where applicable	
26	Wellington	Yes	
27	Wellington	Yes	
28	Wellington Laboratories	Yes	
29	Wellington Laboratories	Yes	
30	Wellington		
32			
33	Wellington	Yes	
34	Wellington	Yes	
35	Wellington	Yes	

Table 117 Labelled Standards for PFBS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C3-PFBS	n/a
3	M3PFBS	NA
4	13C3-PFBS	
5	13C3-PFBS	13C8-PFOS
6	18O2 PFHxS	
7		
8	13C3-PFBS	
9	13C3 PFBS	
10	13C3-PFBS	
12	M3PFBS	Nil
13	No	YES
14	13C3-PFBS	
15	PFBS-13C3	PFOS-13C8
16	PFOS-13C8	PFBS-13C3
17		
19	MPFBS	
20	M3PFBS	MPFDA
21	13C3-PFBS	
22	13C3-PFBS	
23		
25	M3PFBS	MPFHxS
26	13C3-PFBS	
27	13C3-PFBS	13C3-PFHxS
28	13C3-PFBS	
29	13C3 PFBS	13C2 PFOA
30	13C4-PFOA	
33	13C3 PFBS	13C4 PFOA
34	180-PFHxS	
35		

Table 118 Labelled Standards for PFPeS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	18O2-PFHxS	n/a
3	M5PFHxA	NA
4	16O2-PFHxS	
5		
6	18O2 PFHxS	
7		
8	16O2-PFHxS	
9	13C3 PFBS	
10	13C3-PFHxS	
12	M3PFHxS	Nil
13	No	YES
14		
15	PFHxS-18O2	PFOS-13C8
16	PFOS-13C8	PFOS-C4
17		
19	MPFBS	
20	M3PFBS	MPFDA
21	16O2-PFHxS	
22		
23		
25		MPFHxS
26	18O2-PFHxS	
27	18O2-PFHxS	13C3-PFHxS
28	16O2-PFHxS	
29	18O2 PFHxS	13C2 PFOA
30	13C4-PFOA	
33	13C3 PFBS	13C4 PFOA
34	180-PFHxS	
35		

Table 119 Labelled Standards for PFHxS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	18O2-PFHxS	n/a
3	M3PFHxS	NA
4	16O2-PFHxS	
5	18O2-PFHxS	13C8-PFOS
6	18O2PFHxS ISTD	
7		
8	16O2-PFHxS	
9	18O2 PFHxS	
10	13C3-PFHxS	
12	M3PFHxS	Nil
13	No	YES
14	18O2-PFHxS	
15	PFHxS-18O2	PFOS-13C8
16	PFOS-13C8	PFHxS-18O2
17		yes
19	M3PFHxS	
20	M3PFHxS	MPFDA
21	16O2-PFHxS	
22	18O2-PFHxS	
23		
25	M3PFHxS	MPFHxS
26	18O2-PFHxS	
27	18O2-PFHxS	13C3-PFHxS
28	16O2-PFHxS	
29	18O2 PFHxS	13C2 PFOA
30	13C4-PFOA	
33	18O2 PFHxS	13C4 PFOA
34	180-PFHxS	
35		

Table 120 Labelled Standards for PFHxS (linear)

Lab. Code	Before Extraction	Before Instrument Analysis
1	Yes	
2	18O2-PFHxS	n/a
3	M3PFHxS	NA
4	16O2-PFHxS	
5		
6	18O2PFHxS ISTD	
7		
8	--	
9	18O2 PFHxS	
10	13C3-PFHxS	
12	M3PFHxS	Nil
13	No	YES
14	18O2-PFHxS	
15	PFHxS-18O2	PFOS-13C8
16	PFOS-13C8	PFHxS-18O2
17		
19	M3PFHxS	
20	M3PFHxS	MPFDA
21	16O2-PFHxS	
22	18O2-PFHxS	
23		
25	M3PFHxS	M8PFOS
26	18O2-PFHxS	
27	18O2-PFHxS	13C3-PFHxS
28		
29	18O2 PFHxS	13C2 PFOA
30	13C4-PFOA	
33	18O2 PFHxS	13C4 PFOA
34	180-PFHxS	
35		

Table 121 Labelled Standards for PFHpS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C4-PFOS	n/a
3	M3PFHxS	NA
4	13C8-PFOS	
5		
6	18O2PFHxS ISTD	
7		
8	13C8-PFOS	
9	18O2 PFHxS	
10	13C8-PFOS	
12	M3PFHxS	Nil
13	No	YES
14		
15	PFOS-13C4	PFOS-13C8
16	PFOS-13C8	PFOS-C4
17		
19	M3PFHxS	
20	M3PFHxS	MPFDA
21	13C8-PFOS	
22		
23		
25		M8PFOS
26	13C4-PFOS	
27	18O2-PFHxS	13C3-PFHxS
28	13C8-PFOS	
29	13C4 PFOS	13C2 PFOA
30	13C4-PFOA	
33	18O2 PFHxS	13C4 PFOA
34	180-PFHxS	
35		

Table 122 Labelled Standards for PFOS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C4-PFOS	n/a
3	M8PFOS	NA
4	13C8-PFOS	
5	13C4-PFOS	13C8-PFOS
6	13C4 PFOS ISTD	
7		
8	13C8-PFOS	
9	13C4 PFOS	
10	13C8-PFOS	
12	M8PFOS	Nil
13	No	YES
14	13C8-PFOS	
15	PFOS-13C4	PFOS-13C8
16	PFOS-13C8	PFOS-C4
17		yes
19	M8PFOS	
20	M8PFOS	MPFOS
21	13C8-PFOS	
22	13C8-PFOS	
23	[13C4]-PFOS	[13C4]-PFOS
25	MPFOS	M8PFOS
26	13C4-PFOS	
27	13C4-PFOS	13C8-PFOS
28	13C8-PFOS	
29	13C4 PFOS	13C2 PFOA
30	13C4-PFOA	
33	13C4 PFOS	13C4 PFOA
34	13C-PFOS	
35		

Table 123 Labelled Standards for PFOS (linear)

Lab. Code	Before Extraction	Before Instrument Analysis
1	Yes	
2	13C4-PFOS	n/a
3	M8PFOS	NA
4	13C8-PFOS	
5		
6	13C4 PFOS ISTD	
7	Yes	
8	--	
9	13C4 PFOS	
10	13C8-PFOS	
12	M8PFOS	Nil
13	No	YES
14	13C8-PFOS	
15	PFOS-13C4	PFOS-13C8
16	PFOS-13C8	PFOS-C4
17		
19	MPFOS	
20	M8PFOS	MPFOS
21	13C8-PFOS	
22	13C8-PFOS	
23		
25	MPFOS	M8PFOS
26	13C4-PFOS	
27	13C4-PFOS	13C8-PFOS
28		
29	13C4 PFOS	13C2 PFOA
30	13C4-PFOA	
33	13C4 PFOS	13C4 PFOA
34	13C-PFOS	
35	x	

Table 124 Labelled Standards for PFNS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Not Tested	n/a
3	M8PFOS	NA
4	13C8-PFOS	
5		
6	13C4 PFOS ISTD	
7		
8	--	
9	13C4 PFOS	
10	13C8-PFOS	
12	NT	Nil
13	No	YES
14		
15	PFOS-13C4	PFOS-13C8
16	PFOS-13C8	PFBS-13C3
17		
19	MPFOS	
20	M8PFOS	MPFOS
21	13C8-PFOS	
22		
23		
25		
26	Not Tested	
27	13C4-PFOS	13C8-PFOS
28		
29	13C4 PFOS	13C2 PFOA
30		
33	NT	NT
34	13C-PFOS	
35		

Table 125 Labelled Standards for PFDS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C4-PFOS	n/a
3	M8PFOS	NA
4	13C8-PFOS	
5		
6	13C4 PFOS ISTD	
7		
8	13C8-PFOS	
9	13C4 PFOS	
10	13C8-PFOS	
12	M8PFOS	Nil
13	No	YES
14		
15	6:2 FTS-13C2	PFOS-13C8
16	PFOS-13C8	PFBA-13C4
17		
19	MPFOS	MPFOS
20	M8PFOS	MPFOS
21	13C8-PFOS	
22		
23		
25		
26	13C4-PFOS	
27	13C4-PFOS	13C8-PFOS
28	13C8-PFOS	
29	13C4 PFOS	13C2 PFOA
30	13C4-PFOA	
33	13C2 PFUnA	13C4 PFOA
34	13C-PFOS	
35		

Table 126 Labelled Standards for PFBA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C4-PFBA	n/a
3	M4PFBA	NA
4	13C4-PFBA	
5		
6	13C4 PFBA ISTD	
7		Yes
8	13C4-PFBA	
9	13C2 PFHxA	
10	13C4-PFBA	
12	M4PFBA	Nil
13	No	YES
14	13C4-PFBA	
15	PFBA-13C4	PFOS-13C8
16	PFOS-13C8	PFBA-13C4
17		yes
19	M4PFBA	M3PFBA
20	MPFBA	M3PFBA
21	13C4-PFBA	
22	13C4-PFBA	
23		
25	MPFBA	M2PFOA
26	13C4-PFBA	
27	13C4-PFBA	13C3-PFBA
28	13C4-PFBA	
29	13C4 PFBA	13C2 PFOA
30	13C4-PFOA	
33	13C4 PFBA	13C4 PFOA
34	13C-PFBA	
35	x	

Table 127 Labelled Standards for PFPeA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C3-PFPeA	n/a
3	M5PFPeA	NA
4	13C5-PFPeA	
5		
6	13C4 PFBA ISTD	
7		
8	13C5-PFPeA	
9	13C4 PFHpA	
10	13C5-PFPeA	
12	M5PFPeA	Nil
13	No	YES
14	13C5-PFPeA	
15	PFPeA-13C3	PFOS-13C8
16	PFOS-13C8	PFPeA-13C3
17		
19	M5PFPeA	
20	M5PFPeA	M3PFBA
21	13C5-PFPeA	
22	13C5-PFPeA	
23		
25	M5PFPeA	M2PFOA
26	13C3-PFPeA	
27	13C4-PFPeA	13C5 -PFPeA
28	13C5-PFPeA	
29	13C5 PFPeA	13C2 PFOA
30	13C4-PFOA	
33	13C5 PFPeA	13C4 PFOA
34	13C-PFPeA	
35		

Table 128 Labelled Standards for PFHxA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C2-PFHxA	n/a
3	M5PFHxA	NA
4	13C5-PFHxA	
5	13C2-PFHxA	13C8-PFOA
6	13C2 PFHxA ISTD	
7		
8	13C5-PFHxA	
9	13C2 PFHxA	
10	13C5-PFHxA	
12	M6PFHxA	Nil
13	No	YES
14	13C2-PFHXA	
15	PFHxA-13C2	PFOS-13C8
16	PFOS-13C8	PFHxA=13C2
17		yes
19	M5PFHxA	
20	M5PFHxA	M3PFBA
21	13C5-PFHxA	
22	13C2-PFHXA	
23		
25	M5PFHxA	M2PFOA
26	13C2-PFHxA	
27	13C2-PFHxA	13C5 -PFPeA
28	13C5-PFHxA	
29	13C2 PFHxA	13C2 PFOA
30	13C4-PFOA	
33	13C12 PFHxA	13C4 PFOA
34	13C-PFHxA	
35	x	

Table 129 Labelled Standards for PFHpA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C4-PFHpA	n/a
3	MPFHpA	NA
4	13C4-PFHpA	
5	13C4-PFHpA	13C8-PFOA
6	13C4 PFOA	
7		
8	13C4-PFHpA	
9	13C4 PFHpA	
10	13C4-PFHpA	
12	M4PFHpA	Nil
13	No	YES
14	13C4-PFHpA	
15	PFHpA-13C4	PFOS-13C8
16	PFOS-13C8	PFHpA-13C4
17		
19	M4PFHpA	
20	M4PFHpA	M3PFBA
21	13C4-PFHpA	
22	13C4-PFHpA	
23		
25	M4PFHpA	M2PFOA
26	13C4-PFHpA	
27	13C3-PFHpA	13C8-PFOA
28	13C4-PFHpA	
29	13C4 PFHpA	13C2 PFOA
30	13C4-PFOA	
33	13C4 PFHpA	13C4 PFOA
34	13C-PFHxA	
35		

Table 130 Labelled Standards for PFOA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C4-PFOA	n/a
3	M8PFOA	NA
4	13C4-PFOA	
5	13C4-PFOA	13C8-PFOA
6	13C4 PFOA	
7	Yes	
8	13C4-PFOA	
9	13C4 PFOA	
10	13C8-PFOA	
12	M8PFOA	Nil
13	No	YES
14	13C8-PFOA	
15	PFOA-13C4	PFOS-13C8
16	PFOS-13C8	PFOA-13C4
17		yes
19	M8PFOA	M2PFOA
20	M8PFOA	M2PFOA
21	13C4-PFOA	
22	13C8-PFOA	
23	[13C4]-PFOA	[13C4]-PFOA
25	M8PFOA	M2PFOA
26	13C4-PFOA	
27	13C4-PFOA	13C8-PFOA
28	13C4-PFOA	
29	13C4 PFOA	13C2 PFOA
30	13C4-PFOA	
33	13C8 PFOA	13C4 PFOA
34	13C-PFOA	
35	x	

Table 131 Labelled Standards for PFNA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C5-PFNA	n/a
3	M9PFNA	NA
4	13C5-PFNA	
5	13C5-PFNA	13C8-PFOA
6	13C5 PFNA ISTD	
7		Yes
8	13C5-PFNA	
9	13C5 PFNA	
10	13C9-PFNA	
12	M9PFNA	Nil
13	No	YES
14	13C5-PFNA	
15	PFNA-13C5	PFOS-13C8
16	PFOS-13C8	PFNA-13C5
17		yes
19	M9PFNA	
20	M9PFNA	M2PFOA
21	13C5-PFNA	
22	13C5-PFNA	
23		
25	M9PFNA	M2PFOA
26	13C5-PFNA	
27	13C5-PFNA	13C8-PFOA
28	13C5-PFNA	
29	13C5 PFNA	13C2 PFOA
30	13C4-PFOA	
33	13C5 PFNA	13C4 PFOA
34	13C-PFNA	
35		

Table 132 Labelled Standards for PFDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C2-PFDA	n/a
3	M6PFDA	NA
4	13C6-PFDA	
5	13C2-PFDA	13C8-PFOA
6	13C2 PFDA ISTD	
7		Yes
8	13C6-PFDA	
9	13C2 PFDA	
10	13C6-PFDA	
12	M6PFDA	Nil
13	No	YES
14	13C6-PFDA	
15	PFDA-13C2	PFOS-13C8
16	PFOS-13C8	PFDA-13C2
17		yes
19	M6PFDA	MPFDA
20	M6PFDA	MPFDA
21	13C6-PFDA	
22	13C6-PFDA	
23		
25	M6PFDA	MPFDA
26	13C2-PFDA	
27	13C2-PFDA	13C8-PFOA
28	13C6-PFDA	
29	13C2 PFDA	13C2 PFOA
30	13C4-PFOA	
33	13C2 PFDA	13C4 PFOA
34	13C-PFDA	
35	x	

Table 133 Labelled Standards for PFUdA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C2-PFUdA	n/a
3	M7PFUnDA	NA
4	13C2-PFUnDA	
5		
6	13C2 PFUdA ISTD	
7		
8	13C2-PFUnDA	
9	13C2 PFUnA	
10	13C7-PFUdA	
12	M7PFUdA	Nil
13	No	YES
14	13C2-PFUnA	
15	PFUnDA-13C2	PFOS-13C8
16	PFOS-13C8	PFUNDA-13C2
17		yes
19	M7PFUdA	
20	M7PFUdA	MPFDA
21	13C2-PFUnDA	
22	13C2-PFUnA	
23		
25	M7PFUdA	MPFDA
26	13C2-PFUdA	
27	13C2-PFUdA	13C8-PFOA
28	13C2-PFUnDA	
29	13C2 PFUdA	13C2 PFOA
30	13C4-PFOA	
33	13C2 PFUnA	13C4 PFOA
34	13C-PFUnDA	
35		

Table 134 Labelled Standards for PFDoA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C2-PFDoDA	n/a
3	MPFDoDA	NA
4	13C2-PFDoDA	
5		
6	13C2 PFDoUA ISTD	
7		Yes
8	13C2-PFDoDA	
9	13C2 PFDoA	
10	13C2-PFDoA	
12	M2PFDoA	Nil
13	No	YES
14	13C2-PFDoA	
15	PFDoDA-13C2	PFOS-13C8
16	PFOS-13C8	PFDoDA-13C2
17		yes
19	M2PFDoA	
20	MPFDoA	MPFDA
21	13C2-PFDoDA	
22	13C2-PFDoA	
23		
25	MPFDoA	MPFDA
26	13C2-PFDoDA	
27	13C2-PFDoA	13C8-PFOA
28	13C2-PFDoDA	
29	13C2 PFDoA	13C2 PFOA
30	13C4-PFOA	
33	13C2 PFDoA	13C4 PFOA
34	13C-PFDoA	
35	x	

Table 135 Labelled Standards for PFTrDA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C2-PFTeDA	n/a
3	MPFDoDA	NA
4	13C2-PFDoDA	
5		
6	13C4 PFOA	
7		
8	13C2-PFDoDA	
9	13C2 PFDoA	
10	13C2-PFTeDA	
12	M2PFDoA	Nil
13	No	YES
14		
15	PFDoDA-13C2	PFOS-13C8
16	PFOS-13C8	PFTeDA-13C2
17		
19	M2PFTeDA	
20	MPFDoA	MPFDA
21	13C2-PFDoDA	
22		
23		
25		MPFDA
26	13C2-PFTeDA	
27	13C2-PFDoA	13C8-PFOA
28	13C2-PFTeDA	
29	13C2 PFDoA	13C2 PFOA
30	13C4-PFOA	
33	13C2 PFTeDA	13C4 PFOA
34	13C-PFDoA	
35		

Table 136 Labelled Standards for PFTeDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	Yes	
2	13C2-PFTeDA	n/a
3	MPFTeDA	NA
4	13C2-PFTeDA	
5		
6	13C4 PFOA	
7		
8	13C2-PFTeDA	
9	13C2 PFTeDA	
10	13C2-PFTeDA	
12	M2PFTeDA	Nil
13	No	YES
14	13C2-PFTeDA	
15	PFTeDA-13C2	PFOS-13C8
16	PFOS-13C8	PFTeDA-13C2
17		
19	M2PFTeDA	
20	M2PFTeDA	MPFDA
21	13C2-PFTeDA	
22	13C2-PFTeDA	
23		
25		MPFDA
26	13C2-PFTeDA	
27	13C2-PFTeDA	13C8-PFOA
28	13C2-PFTeDA	
29	13C2 PFTeDA	13C2 PFOA
30	13C4-PFOA	
33	13C2 PFTeDA	13C4 PFOA
34	13C-PFTeDA	
35		

Table 137 Labelled Standards for PFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C8-FOSA	n/a
3	MPFOSA	NA
4	13C8-FOSA	
5		
6	D5-EtFOSAA-M	
7		
8	13C8-FOSA	
9	13C8 PFOSA	
10	d3-N-MeFOSA	
12	M8PFOSA	Nil
13	No	YES
14	13C8-FOSA	
15	FOSA-13C8	PFOS-13C8
16	PFOS-13C8	FOSA-13C8
17		
19	M8PFOSA	
20	M8FOSA-I	MPFOS
21	13C8-FOSA	
22	13C8-FOSA	
23		
25	M8FOSA	d7-N-MeFOSE
26	13C8-FOSA	
27	13C8-FOSA	none
28	13C8-FOSA	
29	13C8 FOSA	13C2 PFOA
30	13C4-PFOA	
33	13C8 PFOSA	13C4 PFOA
34	13C-PFOSA	
35		

Table 138 Labelled Standards for N-MeFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	D3-M PFOSA	n/a
3	d-NMeFOSA-M	NA
4	d3-MeFOSA	
5		
6	D5-EtFOSAA-M	
7		
8	d3-MeFOSA	
9	d-N-MeFOSA-M	
10	d3-N-MeFOSA	
12	D3N-MeFOSAA	Nil
13	No	YES
14	d3-MeFOSA	
15	MeFOSA-D3	PFOS-13C8
16	PFOS-13C8	MeFOSA-D3
17		
19	NT	
20	d-N-MeFOSA-M	MPFOS
21	d3-MeFOSA	
22	d3-MeFOSA	
23		
25	d-N-MeFOSA	d7-N-MeFOSE
26	D3-M PFOSA	
27	D3-N-Me FOSA	none
28	d3-MeFOSA	
29	NT	
30	13C4-PFOA	
33	d3-MeFOSA	13C4 PFOA
34	13C-PFOSA	
35		

Table 139 Labelled Standards for N-EtFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	D5-E PFOSA	n/a
3	d-NEtFOSA-M	NA
4	d5-EtFOSA	
5		
6	D5-EtFOSAA-M	
7		Yes
8	d5-EtFOSA	
9	d-N-EtFOSA-M	
10	d5-N-EtFOSA	
12	D3N-MeFOSAA	Nil
13	No	YES
14	d5-EtFOSA	
15	EtFOSA-D5	PFOS-13C8
16	PFOS-13C8	EtFOSA-D5
17		
19	NT	
20	d-N-EtFOSA-M	MPFOS
21	d5-EtFOSA	
22	d5-EtFOSA	
23		
25	d-N-Et-FOSA	d7-N-MeFOSE
26	D5-E PFOSA	
27	D5-N-Et FOSA	none
28	d5-EtFOSA	
29	NT	
30	13C4-PFOA	
33	d5-EtFOSA	13C4 PFOA
34	13C-PFOSA	
35		

Table 140 Labelled Standards for N-MeFOSAA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	D3-Me-FOSAA	n/a
3	d3-NMeFOSAA	NA
4	d3-MeFOSAA	
5		
6	D5-EtFOSAA-M	
7		
8	d3-MeFOSAA	
9	d3-NMeFOSAA	
10	d3-N-MeFOSAA	
12	D3N-MeFOSAA	Nil
13	No	YES
14	d3-N-MeFOSAA	
15	MeFOSAA-D3	PFOS-13C8
16	PFOS-13C8	MeFOSAA-D3
17		
19	d3-NMeFOSAA	
20	d3-N-MeFOSAA	MPFOS
21	d3-MeFOSAA	
22	d3-N-MeFOSAA	
23		
25	d3-N-MeFOSAA	d7-N-MeFOSE
26	D3-Me-FOSAA	
27	D3-N-Me FOSAA	none
28	d3-MeFOSAA	
29	d3-NMeFOSAA	13C2 PFOA
30	13C4-PFOA	
33	d5-EtFOSA	13C4 PFOA
34	d3-N-MeFOSAA	
35		

Table 141 Labelled Standards for N-EtFOSAA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	D5-Et-FOSAA	n/a
3	d5-NEtFOSAA	NA
4	d5-EtFOSAA	
5		
6	D5-EtFOSAA-M	
7		Yes
8	d5-EtFOSAA	
9	d7-NEtFOSAA	
10	d5-N-EtFOSAA	
12	D3N-MeFOSAA	Nil
13	No	YES
14	d5-N-EtFOSAA	
15	EtFOSAA-D5	PFOS-13C8
16	PFOS-13C8	EtFOSAA-D5
17		
19	d5-NEtFOSAA	
20	d5-N-EtFOSAA	MPFOS
21	d5-EtFOSAA	
22	d5-N-EtFOSAA	
23		
25	d5-N-EtFOSAA	d7-N-MeFOSE
26	D5-Et-FOSAA	
27	D5-N-Et FOSAA	none
28	d5-EtFOSAA	
29	d5-NEtFOSAA	13C2 PFOA
30	13C4-PFOA	
33	d5-N-EtFOSAA	13C4 PFOA
34	d3-N-MeFOSAA	
35		

Table 142 Labelled Standards for N-MeFOSE

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	D7-Me-FOSE	n/a
3	d7-NMeFOSE-M	NA
4	d7-MeFOSE	
5		
6	D5-EtFOSAA-M	
7		
8	d7-MeFOSE	
9	d7-N-MeFOSE-M	
10	d9-N-EtFOSE	
12	D3N-MeFOSAA	Nil
13	No	YES
14	d7-MeFOSE	
15	MeFOSE-D7	PFOS-13C8
16	PFOS-13C8	MeFOSE-D3
17		
19	NT	
20	d7-N-MeFOSE-M	MPFOS
21	d7-MeFOSE	
22	d7-MeFOSE	
23		
25		d7-N-MeFOSE
26	D7-Me-FOSE	
27	D7-N-Me FOSE	none
28	d7-MeFOSE	
29	NT	
30		
33	d7-MeFOSE	13C4 PFOA
34		
35		

Table 143 Labelled Standards for N-EtFOSE

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	D9-Et-FOSE	n/a
3	d9-NEtFOSE-M	NA
4	d3EtFOSE	
5		
6	D5-EtFOSAA-M	
7		
8	d3EtFOSE	
9	d9-N-EtFOSE-M	
10	d9-N-EtFOSE	
12	D3N-MeFOSAA	Nil
13	No	YES
14	d9-EtFOSE	
15	EtFOSE-D9	PFOS-13C8
16	PFOS-13C8	EtFOSE-D9
17		
19	NT	
20	d9-N-EtFOSE-M	MPFOS
21	d3EtFOSE	
22	d9-EtFOSE	
23		
25	d9-N-EtFOSE	d7-N-MeFOSE
26	D9-Et-FOSE	
27	D9-N-Et FOSE	none
28	d3-EtFOSE	
29	NT	
30		
33	d9-EtFOSE	13C4 PFOA
34		
35		

Table 144 Labelled Standards for 4:2 FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C2 4:2-FTS	n/a
3	M4:2 FTS	NA
4	13C2-4:2 FTS	
5		
6	13C4 12C6 6:2FTS ISTD	
7		
8	13C2-4:2 FTS	
9	M2-4:2 FTS	
10	13C2-4:2FTS	
12	M2-4:2 FTS	Nil
13	No	YES
14	13C2-42FTS	
15	4:2 FTS-13C2	PFOS-13C8
16	PFOS-13C8	4:2 FTS-13C2
17		
19	M4:2FTS	
20	M2-4:2 FTS	MPFOS
21	13C2-4:2 FTS	
22	13C2-42FTS	
23		
25		M2-4,2FTS
26	13C2 4:2-FTS	
27	13C2-4:2 FTS	none
28	13C2-4:2 FTS	
29	M2-4:2 FTS	13C2 PFOA
30	13C4-PFOA	
33	13C2-4:2 FTS	13C4 PFOA
34	M2-6:2FTS	
35		

Table 145 Labelled Standards for 6:2 FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C2,12C6 6:2-FTS	n/a
3	M6:2 FTS	NA
4	13C2-6:2 FTS	
5	13C2-6:2 FTS	13C8-PFOS
6	13C4 12C6 6:2FTS ISTD	
7		Yes
8	13C2-6:2 FTS	
9	M2-6:2 FTS	
10	13C2-6:2FTS	
12	M2-6:2 FTS	Nil
13	No	YES
14	13C2-62FTS	
15	PFOS-13C8	
16	PFOS-13C8	6:2 FTS-13C2
17		
19	M6:2FTS	
20	M2-6:2 FTS	MPFOS
21	13C2-6:2 FTS	
22	13C2-62FTS	
23		
25	M2-6,2FTS	M2-4,2FTS
26	13C2,12C6 6:2-FTS	
27	13C2-6:2 FTS	none
28	13C2-6:2 FTS	
29	M2-6:2 FTS	13C2 PFOA
30	13C4-PFOA	
33	13C2 6:2 FTS	13C4 PFOA
34	M2-6:2FTS	
35		

Table 146 Labelled Standards for 8:2 FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C2 8:2-FTS	n/a
3	M8:2 FTS	NA
4	13C2-8:2 FTS	
5	13C2-8:2 FTS	13C8-PFOS
6	13C4 12C6 6:2FTS ISTD	
7		
8	13C2-8:2 FTS	
9	M2-8:2 FTS	
10	13C2-8:2FTS	
12	M2-8:2 FTS	Nil
13	No	YES
14	13C2-82FTS	
15	8:2 FTS-13C2	PFOS-13C8
16	PFOS-13C8	8:2 FTS-13C2
17		
19	M8:2FTS	
20	M2-8:2 FTS	MPFOS
21	13C2-8:2 FTS	
22	13C2-82FTS	
23		
25		M2-4,2FTS
26	13C2 8:2-FTS	
27	13C2-8:2 FTS	none
28	13C2-8:2 FTS	
29	M2-8:2 FTS	13C2 PFOA
30	13C4-PFOA	
33	13C 8:2 FTS	13C4 PFOA
34	M2-6:2FTS	
35		

Table 147 Labelled Standards for 10:2 FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C2 8:2-FTS	n/a
3	NT	NA
4	13C2-8:2 FTS	
5		
6	13C4 12C6 6:2FTS ISTD	
7		
8	13C2-8:2 FTS	
9	M2-8:2 FTS	
10	13C2-8:2FTS	
12	M2-8:2 FTS	Nil
13	NT	NT
14	13C2d4 10:2 FTS	
15	10:2 FTS-13C2-D4	PFOS-13C8
16	PFOS-13C8	10:2 FTS -13C2-D4
17		
19	NT	
20	M2-8:2 FTS	MPFOS
21	13C2-8:2 FTS	
22	13C2d4 10:2 FTS	
23		
25		M2-4,2FTS
26	13C2 8:2-FTS	
27	13C2-8:2 FTS	none
28	13C2-8:2 FTS	
29	M2-8:2 FTS	13C2 PFOA
30	13C4-PFOA	
33	13C 8:2 FTS	13C4 PFOA
34	M2-6:2FTS	
35		

Table 148 Labelled Standards for GenX

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Not Tested	n/a
3	NT	NA
4	--	
5		
6		
7		
8	--	
9	13C3 HFPO-DA	
10	13C3-GenX	
12	M8PFOA	Nil
13	No	YES
14	13C3-GenX (MHFPA)	
15	HFPO-DA-13C3	PFOS-13C8
16	PFOS-13C8	PFHxS-18O2
17		
19	M3HFPODA	
20	NT	NT
21	--	
22		
23		
25	M3-HFPO	M2PFOA
26	Not Tested	
27	13C3-GenX	none
28		
29	13C3 HFPO-DA	13C2 PFOA
30	13C4-PFOA	
33	NT	NT
34	M3HFPO-DA	
35		

Table 149 Labelled Standards for ADONA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Not Tested	n/a
3	NT	NA
4	--	
5		
6		
7		
8	--	
9	13C4 PFOS	
10	13C3-GenX	
12	M8PFOA	Nil
13	NT	NT
14		
15	PFHxS-18O2	PFOS-13C8
16	PFOS-13C8	PFOA-13C4
17		
19	M9PFNA	
20	NT	NT
21	--	
22		
23		
25		M2PFOA
26	Not Tested	
27	13C3-PFHpA	13C8-PFOA
28		
29	13C4 PFOS	13C2 PFOA
30	13C4-PFOA	
33	NT	NT
34	M3HFPO-DA	
35		

Table 150 Labelled Standards for 9Cl-PF3ONS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Not Tested	n/a
3	NT	NA
4	--	
5		
6		
7		
8	--	
9	13C4 PFOS	
10		
12	M8PFOS	Nil
13	NT	NT
14		
15	PFNA-13C5	PFOS-13C8
16	PFOS-13C8	FOSA-13C8
17		
19	MPFOS	
20	NT	NT
21	--	
22		
23		
25		M8PFOS
26	Not Tested	
27	13C4-PFOS	13C8-PFOS
28		
29	13C4 PFOS	13C2 PFOA
30	13C4-PFOA	
33	NT	NT
34		
35		

Table 151 Participant Methodology – Additional Information

Lab. Code	Sample	Additional Information
7	S1	Recovery of labelled standard was not reported for this sample
9	All	Standard practice for laboratories utilizing US EPA's SW-846 document.
	S1	Sample Prepared 17 Oct 2020, analyzed 20 Oct 2020. Sample required a 100x dilution with no refortification of labelled standards added prior to extraction for most parameters. A complex dilution with refortification of labelled standards added prior to extraction was required for quantitation of PFOS. A serial dilution equivalent to 0.15uL of the extract diluted to 1500 uL was performed.
	S2	Sample Prepared 17 Oct 2020, analyzed 20 Oct 2020. Sample was analyzed at a 20x dilution with no refortification of labelled standards added prior to extraction.
16	S1	Results reported as total. S1 Contains other isomers expect PFOS and PFHxS:1) PFNS (Linear): 79 ± 21µg/kg; 2) FOSA (Linear): 188.2 ± 51µg/kg;The Isomers were confirmed.
	S2	Results reported as total. S2 Soil contain other isomers expect PFOS and PHFxS: 1) PFOSA (linear): 7.6 µg/kg; 2) EtFOSA (Linear): 1.12 µg/kg; 3) EtFOSE (Linear): 5.95 µg/kg. The Isomers were confirmed.
26	S1	Sample required dilution due to presence of numerous elevated PFAS analytes. Reporting limits have been raised accordingly. The recovery of Extracted Internal Standards could not be reported as they have been diluted outside of the analytical range. All linear and branched present have been reported although some branched peaks are not confirmed by traceable standards.
27	S1	For S1, samples were either diluted (10 000x for PFOS) or analysed with a smaller injection volume (0.5 ul or 0.1 ul) in instances where concentration exceeded the highest calibration standard (100 ppb). PFNS and PFDS showed clusters of interfering peaks in chromatogram, which was resolved with 100 x dilution, however only linear isomers could be quantified. N-EtFOSE, PFTrDA and PFTeDA were identified in 2 of the 3 replicates. PFOS calculated recovery was strongly affected by matrix suppression. Calculated recovery of the FTS was inflated by natural abundance of 13C2-6:2 FTS and 13C2-8:2 FTS in the sample
29	All	Standard practice for laboratories utilizing US EPA's SW-846 document.
	S1	Low recoveries of IDAs 13C4 PFOS and 13C5 PFNA are due to ion suppression effects in the MS source caused by the extremely high levels of PFOS in the undiluted extracts. Affected analytes are PFHpS, PFNS, PFDS, ADONA and 9Cl-PF3ONS.
32	All	NATA accreditaion only for trade waste
	S4	Not accreditied for clean Water

APPENDIX 6 – PARTICIPANTS' TEST METHODS FOR WATER SAMPLES

Participants' methods for water samples are presented in Tables 152 to 190.

Table 152 Participant Methodology for Water Samples – Extraction

Lab. Code	S3 Sample Volume (mL)	S4 Sample Volume (mL)	Bottle Rinsed	Sample Pre-treatment	Extraction Technique	Extraction Solvent	Extraction Process	Extraction Temperature	Extraction Time	Extraction Clean Up
1			No		Direct Injection					
2	50	50	Yes	pH Adjustment	Liquid Liquid (LLE) and Direct Injection	Basified MeOH elution	SPE	Room	60 mins	
3*	1	100	No	NA	Solid Phase Extraction (SPE)	NA	NA	NA	NA	S4 SPE (OASIS WAX)
4	Entire container (~60mL)	Entire container (~60mL)	Yes	pH Adjustment	Solid Phase Extraction (SPE)	Acetonitrile/ Methanol	SPE	Ambient	Approximately 1 hour	No
5	50	50	No	Nil	Solid Phase Extraction (SPE)	Ammonium hydroxide in methanol	SPE	Room temperature	N/A	Nil
6	50mL	50mL	No	Homogenisation	Direct Injection		Vortex	Room		
7	39 mL	39 mL	Yes	N/A	Solid Phase Extraction (SPE)	Methanol 1% NH4OH	Vortex	25 degrees	30 mins	Filtration
8	Entire container (~60mL)	Entire container (~60mL)	Yes	pH Adjustment	Solid Phase Extraction (SPE)	Acetonitrile/ Methanol	SPE	Ambient	Approximately 1 hour	No
9	52.7	54.8	Yes	None	Solid Phase Extraction (SPE)	NH4OH/ Methanol		Room		None
10	50	50	Yes	Homogenisation	Direct Injection	dilute methanol				none

Lab. Code	S3 Sample Volume (mL)	S4 Sample Volume (mL)	Bottle Rinsed	Sample Pre-treatment	Extraction Technique	Extraction Solvent	Extraction Process	Extraction Temperature	Extraction Time	Extraction Clean Up
11*	30	56	No	Homogenisation	Solid Phase Extraction (SPE)			Room temperature (20ºC)	2-3 h	Oasis WAX 3cc
12	0.5	60	Yes	Homogenisation	Solid Phase Extraction (SPE)	Methanol with 0.3% ammonia	NA	ambient	NA	SPE-WAX
13	50	50	Yes	None	Solid Phase Extraction (SPE)	0.3% ammonia in methanol	SPE	Ambient	N/A	SPE
14	42 & 10	44 & 10	Yes	Homogenisation	Solid Phase Extraction (SPE)	3mL Basic MeCN followed by 2mL Acetone	combination	Ambient	N/A	SPE
15	10	10			Solid Phase Extraction (SPE)			Room Temperature		SPE
16	10	10	Yes	Homogenisation	Solid Phase Extraction (SPE)	MeOH		Room	NA.	NA.
17	50	50	Yes	pH Adjustment	Solid Phase Extraction (SPE)	MeOH, NH3	Solid Phase Extraction (SPE)	RT	drop by drop	no
18	5	5	Yes	Homogenisation	Alkaline Digestion	NaOH-methanol	Shaking	RT	16h	SPE
19	50	50	Yes	No	Solid Phase Extraction (SPE)	Methanol	None	25 degrees C	1 hour	Evaporation
20	52.4	54.7	Yes	pH Adjustment	Solid Phase Extraction (SPE)	Ammonia in methanol solution		Room temp		

Lab. Code	S3 Sample Volume (mL)	S4 Sample Volume (mL)	Bottle Rinsed	Sample Pre-treatment	Extraction Technique	Extraction Solvent	Extraction Process	Extraction Temperature	Extraction Time	Extraction Clean Up
21	Entire container (~60mL)	Entire container (~60mL)	Yes	pH Adjustment	Solid Phase Extraction (SPE)	Acetonitrile/ Methanol	SPE	Ambient	Approximately 1 hour	No
22	50mL & 10mL	50mL & 10mL	Yes	Homogenisation	Solid Phase Extraction (SPE)	3mL Basic ACN followed by 2mL Acetone		Ambient	N/A	SPE
23		25	Yes	Homogenisation	NA	NA	NA	Room temp	NA	Solid Phase Extraction (SPE)
24	52	53	Yes	pH Adjustment	Solid Phase Extraction (SPE)	1% NH3 in Methanol		Ambient		
25*	20	54.8337	Yes	pH Adjustment	Solid Phase Extraction (SPE)	Methanol	Shaking	Ambient	1 minute	SPE WAX
26	50	50	Yes	pH Adjustment	Liquid Liquid (LLE) and Direct Injection	Basified MeOH elution	SPE	Room	60 mins	
27*	50	50	Yes	Homogenisation	Solid Phase Extraction (SPE)	Ammonium hydroxide in methanol (2%)	Sonication, SPE (Strata X-AW) extraction, blow down	Room temperature (~22 oC)	6 h	
28	52	54	Yes	pH Adjustment	Solid Phase Extraction (SPE)	Acetonitrile / Methanol	SPE	Room Temperature	60 minutes	None
29	53.3	54.6	Yes		Solid Phase Extraction (SPE)	Basic Methanol		RT	~30 minutes loading time	

Lab. Code	S3 Sample Volume (mL)	S4 Sample Volume (mL)	Bottle Rinsed	Sample Pre-treatment	Extraction Technique	Extraction Solvent	Extraction Process	Extraction Temperature	Extraction Time	Extraction Clean Up
30	25	25	Yes	Homogenisation	Solid Phase Extraction (SPE)					
33	10	50		pH Adjustment	Solid Phase Extraction (SPE)	Methanol-Ammonia	Vortex			HR-XAW
34	52.7000	54.9618	Yes	-	Solid Phase Extraction (SPE)	Methanol				
35	2ml-10ml	5ml-10ml	No		Solid Phase Extraction (SPE)	Methanol		20°C		Solid Phase Extraction (SPE)

*Additional Information in Table 151.

Table 153 Participant Methodology for Water Samples – Extraction Additional Information

Lab. Code	Extraction Additional Information
3	Only sample S4 extracted by SPE.
11	Samples were spiked with surrogate internal standard and left to homogenize for 30 min. Then, the water was loaded onto SPE cartridges, dryed and eluted with 4 mL of methanol (0.1% NH4OH). Then, the eluate was dryed near to dryness under N2 current and reconstituted in water:methanol (9:1)
25	Sample extract was diluted across a range to allow for expected analyte range.
27	S3 and S4 were extracted using the same method.

Table 154 Participant Methodology for Water Samples – Instrumental Technique and Analysis

Lab. Code	Instrument	Guard Column	Instrument Column	Dilution Factor	Delay Column?	Blank Correction?	Standard Method?
1	LC-MSMS or LC-QQQ	C18	C18, 100*2.1, 3ul		Yes	No	
2	LC-MSMS or LC-QQQ	Pre-column Filter 0.2µm	ACE Excel 1.7 SuperC18 50 x 2.1 mm id	No	Yes	No	No. In-house
3	LC-MSMS or LC-QQQ	NA	Zorbax XDB-C18, 100 mm x 2.1 mm, 1.8µm	NA	Yes	No	No
4	LC-MSMS or LC-QQQ	C18 2.2um, 3 x 30mm	C18 1.6um, 2 x 50mm		Yes	No	In house
5	LC-MSMS or LC-QQQ	Nil	Shimadzu Shim-pack XR-ODS III (1.6 µm , 50 mm x 2.0 mm)	No	Yes	No	No
6	LC-MSMS or LC-QQQ		C18 2.0mmx50mm(1.6um)		Yes	No	
7	LC-MSMS or LC-QQQ	Zorbax Eclipse Plus c18, 4.6x12.5mmx5-micron	Zorbax Eclipse Plus c18, 3.0x50mmx1.8um	x2	Yes	No	N/A
8	LC-MSMS or LC-QQQ		C18 1.6um, 2 x 50mm	x100, x1000	Yes	No	In house
9	LC-MSMS or LC-QQQ		C18 10cm x 3.0 mm x 3 um	No	Yes	No	No
10	LC-MSMS or LC-QQQ	Eclipse Plus c18 4.6 x 50mmx 3.5um	Eclipse Plus C18 50 x 3.0 x 1.8um	2	Yes	No	
11	Orbitrap	Not used	ACQUITY UPLC BEH C18 (2.1 x 50 mm; 1.7 um)	Yes for some samples, 2/10	No	No	
12	LC-MSMS or LC-QQQ	nil, in-line filter only	C18 50mm x 2mm	yes, 2x dilution to get sample into 50/50 Methanol/ Water	Yes	No	No
13	LC-MSMS or LC-QQQ	None	reverse phase, 100mm × 2.1mm	No	Yes	No	No

Lab. Code	Instrument	Guard Column	Instrument Column	Dilution Factor	Delay Column?	Blank Correction?	Standard Method?
14	LC-MSMS or LC-QQQ	UHPLC guard column; AU; InfinityLabPoroshell 120; EC-C18; 4.6 mm; 4 um	LC column; AU; Poroshell 120 HPH C18; 2.1x50 mm; 2.7 um; narrow bore	No	Yes	No	Isotope dilutions
15	Orbitrap	C18	C18		Yes	No	
16	Orbitrap	C18	C18	No	Yes	Yes	
17	LC-MSMS or LC-QQQ	no	biphenyl, 150 mm	no	no	yes	DIN 38407 F42
18	LC-MSMS or LC-QQQ	PFP 5mm×2.1mm×1.8µm	PFP 150mm×2.1mm×1.8µm	No	Yes	Yes	
19	LC-MSMS or LC-QQQ	C8 5 cm x 2.1 mm x 2.7 µm	C18 HALO 15 cm x 2.1 mm x 2.7 µm	S3: 10x dilution	Yes	No	EPA 537.1, EPA 8238, DoD QSM 3.2 Table B-15
20	LC-MSMS or LC-QQQ	NA	C18 1.7 um, 2.1 x 50mm	No	No	No	EPA 537
21	LC-MSMS or LC-QQQ	C18 2.2um, 3 x 30mm	C18 1.6um, 2 x 50mm	S3 - x1, x10	Yes	No	In house
22	LC-MSMS or LC-QQQ	UHPLC guard column; AU; InfinityLabPoroshell 120; EC-C18; 4.6 mm; 4 um	LC column; AU; Poroshell 120 HPH C18; 2.1x50 mm; 2.7 um; narrow bore	No	Yes	No	Isotope dilutions
23	LC-MSMS or LC-QQQ	C8, 2.1 x 12.5mm, 5 micron	C8, 3.0 x 100mm, 3.5 micron	No	No	No	NA
24	LC-MSMS or LC-QQQ	C18	C18	No	Yes	No	USEPA 537
25	LC-MSMS or LC-QQQ		C18 2mm x 50mm	No	Yes	No	
26	LC-MSMS or LC-QQQ	Pre-column Filter 0.2µm	C18 50mm x 2.1mm x 1.8µm	No	Yes	No	No. In-house
27	LC-MSMS or LC-QQQ	Evo C18 2 x 2.1mm	Evo C18 2.6 u 100x2.1	No	Yes	No	No
28	LC-MSMS or LC-QQQ	nil	C18 1.6µm, 2.0mm x 50mm	No	Yes	No	

Lab. Code	Instrument	Guard Column	Instrument Column	Dilution Factor	Delay Column?	Blank Correction?	Standard Method?
29	LC-MSMS or LC-QQQ	C-18 5um, 4 x 10mm	C-18 3um, 3 x 100 mm		Yes	No	Modified EPA Method 537
30	LC-MSMS or LC-QQQ		BEH C18 50 mm x 2.1 mm x 1.7 µm		No	No	
33	LC-MSMS or LC-QQQ		Nucleodur Sphinx RP C18, isis 3µm		Yes	No	
34	LC-MSMS or LC-QQQ	ACQUITY UPLC BEH C18 VanGuard Pre-column, 130Å, 1.7 µm, 2.1 mm X 5 mm	ACQUITY UPLC BEH C18 Column, 130Å, 1.7 µm, 2.1 mm X 100 mm	Yes and No, different for each component from 1 to 10	Yes	No	
35	LC-MSMS or LC-QQQ	Phenomenex 4µmx2.0mm	Phenomenex 150x2mm 4µm	No	No	No	DIN 38407-42

Table 155 Participant Methodology for Water Samples – Labelled Standards

Lab. Code	Labelled Standard Source	Recovery Correction?	Labelled Standards Additional Information
2	Wellington	Yes	
3	Wellington Laboratory	Yes	
4	Wellington Laboratories	Yes	
5	Wellington	Yes	
6	Wellington	No	
7	Wellington Laboratries	No	
8	Wellington Laboratories	Yes	
9	Wellington	Yes	
10	Wellington labs	No	

Lab. Code	Labelled Standard Source	Recovery Correction?	Labelled Standards Additional Information
12	Wellington	Yes	
13	Wellington	Yes	
14	Wellington Laboratories	Yes	
15	Wellington	Yes	
16	Wellington	Yes	Results corrected by ISTD added before extraction
17	Campro Scientific (Wellington)	yes	
18	Wellington	No	
19	Wellington	Yes	
20	Wellington	Yes	
21	Wellington Laboratories	Yes	
22	Wellington Laboratories	Yes	
23	CIL and Wellington	No	
24	Wellington	No	
25	Wellington	Yes where applicable	
26	Wellington	Yes	
27	Wellington	Yes	
28	Wellington Laboratories	Yes	
29	Wellington Laboratories	Yes	
30	Wellington		
33	Wellington	Yes	
34	Wellington	Yes	
35	Wellington	Yes	

Table 156 Labelled Standards for PFBS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C3-PFBS	n/a
3	M3PFBS	NA
4	13C3-PFBS	
5	13C3-PFBS	13C8-PFOS
6		18O2 PFHxS
7		
8	13C3-PFBS	
9	13C3 PFBS	
10	13C3-PFBS	
11	x	
12	M3PFBS	Nil
13	YES	No
14	13C3-PFBS	
15	PFBS-13C3	PFOS-13C8
16	PFBS-13C3	PFOS-13C8
17		
18	13C3-PFBS	
19	MPFBS	
20	M3PFBS	MPFDA
21	13C3-PFBS	
22	13C3-PFBS	
23		
24		M3PFBS
25	M3PFBS	MPFHxS
26	13C3-PFBS	n/a
27	13C3-PFBS	13C3-PFHxS
28	13C3-PFBS	
29	13C3 PFBS	13C2 PFOA
30	18O2-PFHS	
32		
33	13C3 PFBS	13C4 PFOA
34	180-PFHxS	
35		

Table 157 Labelled Standards for PFPeS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	18O2-PFHxS	n/a
3	M5PFHxA	NA
4	16O2-PFHxS	
5		
6		18O2 PFHxS
7		
8	16O2-PFHxS	
9	13C3 PFBS	
10	13C3-PFHxS	
11		
12	M3PFHxS	Nil
13	YES	No
14		
15	PFHxS-18O2	PFOS-13C8
16	PFOS-C4	PFOS-13C8
17		
18	13C3-PFBS	
19	MPFBS	
20	M3PFBS	MPFDA
21	16O2-PFHxS	
22		
23		
24		
25		MPFHxS
26	18O2-PFHxS	n/a
27	18O2-PFHxS	13C3-PFHxS
28	16O2-PFHxS	
29	18O2 PFHxS	13C2 PFOA
30	13C-PFOA	
32		
33	13C3 PFBS	13C4 PFOA
34	180-PFHxS	
35		

Table 158 Labelled Standards for PFHxS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	18O2-PFHxS	n/a
3	M3PFHxS	NA
4	16O2-PFHxS	
5	18O2-PFHxS	13C8-PFOS
6		18O2PFHxS ISTD
7		
8	16O2-PFHxS	
9	18O2 PFHxS	
10	13C3-PFHxS	
11		
12	M3PFHxS	Nil
13	YES	No
14	18O2-PFHxS	
15	PFHxS-18O2	PFOS-13C8
16	PFHxS-18O2	PFOS-13C8
17	yes	
18	13C3-PFHxS	
19	M3PFHxS	
20	M3PFHxS	MPFDA
21	16O2-PFHxS	
22	18O2-PFHxS	
23		
24		
25	M3PFHxS	MPFHxS
26	18O2-PFHxS	n/a
27	18O2-PFHxS	13C3-PFHxS
28	16O2-PFHxS	
29	18O2 PFHxS	13C2 PFOA
30	18O2-PFHS	
32		
33	18O2 PFHxS	13C4 PFOA
34	180-PFHxS	
35		

Table 159 Labelled Standards for PFHxS (linear)

Lab. Code	Before Extraction	Before Instrument Analysis
1	Yes	
2	18O2-PFHxS	n/a
3	M3PFHxS	NA
4	16O2-PFHxS	
5		
6		18O2PFHxS ISTD
7		
8	--	
9	18O2 PFHxS	
10	13C3-PFHxS	
11	x	
12	M3PFHxS	Nil
13	YES	No
14	18O2-PFHxS	
15	PFHxS-18O2	PFOS-13C8
16	PFHxS-18O2	PFOS-13C8
17		
18	13C3-PFHxS	
19	M3PFHxS	
20	M3PFHxS	MPFDA
21	16O2-PFHxS	
22	18O2-PFHxS	
23		
24		M3PFHxS
25	M3PFHxS	M8PFOS
26	18O2-PFHxS	n/a
27	18O2-PFHxS	13C3-PFHxS
28		
29	18O2 PFHxS	13C2 PFOA
30		
32		
33	18O2 PFHxS	13C4 PFOA
34	180-PFHxS	
35		

Table 160 Labelled Standards for PFHpS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C4-PFOS	n/a
3	M3PFHxS	NA
4	13C8-PFOS	
5		
6		18O2PFHxS ISTD
7		
8	13C8-PFOS	
9	18O2 PFHxS	
10	13C8-PFOS	
11		
12	M3PFHxS	Nil
13	YES	No
14		
15	PFOS-13C4	PFOS-13C8
16	PFOS-C4	PFOS-13C8
17		
18	13C3-PFHxS	
19	M3PFHxS	
20	M3PFHxS	MPFDA
21	13C8-PFOS	
22		
23		
24		
25		M8PFOS
26	13C4-PFOS	n/a
27	18O2-PFHxS	13C3-PFHxS
28	13C8-PFOS	
29	13C4 PFOS	13C2 PFOA
30	13C-PFOA	
32		
33	18O2 PFHxS	13C4 PFOA
34	180-PFHxS	
35		

Table 161 Labelled Standards for PFOS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C4-PFOS	n/a
3	M8PFOS	NA
4	13C8-PFOS	
5	13C4-PFOS	13C8-PFOS
6		13C4 PFOS ISTD
7		
8	13C8-PFOS	
9	13C4 PFOS	
10	13C8-PFOS	
11		
12	M8PFOS	Nil
13	YES	No
14	13C8-PFOS	
15	PFOS-13C4	PFOS-13C8
16	PFOS-C4	PFOS-13C8
17	yes	
18	13C8-PFOS	
19	M8PFOS	
20	M8PFOS	MPFOS
21	13C8-PFOS	
22	13C8-PFOS	
23	[13C4]-PFOS	[13C4]-PFOS
24		
25	MPFOS	M8PFOS
26	13C4-PFOS	n/a
27	13C4-PFOS	13C8-PFOS
28	13C8-PFOS	
29	13C4 PFOS	13C2 PFOA
30	13C4-PFOS	
32		
33	13C4 PFOS	13C4 PFOA
34	13C-PFOS	
35		

Table 162 Labelled Standards for PFOS (linear)

Lab. Code	Before Extraction	Before Instrument Analysis
1	Yes	
2	13C4-PFOS	n/a
3	M8PFOS	NA
4	13C8-PFOS	
5		
6		13C4 PFOS ISTD
7	Yes	
8	--	
9	13C4 PFOS	
10	13C8-PFOS	
11	x	
12	M8PFOS	Nil
13	YES	No
14	13C8-PFOS	
15	PFOS-13C4	PFOS-13C8
16	PFOS-C4	PFOS-13C8
17		
18	13C8-PFOS	
19	MPFOS	
20	M8PFOS	MPFOS
21	13C8-PFOS	
22	13C8-PFOS	
23		
24	MPFOS	M8PFOS
25	MPFOS	M8PFOS
26	13C4-PFOS	n/a
27	13C4-PFOS	13C8-PFOS
28		
29	13C4 PFOS	13C2 PFOA
30	13C4-PFOS	
32		
33	13C4 PFOS	13C4 PFOA
34	13C-PFOS	
35	x	

Table 163 Labelled Standards for PFNS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Not Tested	n/a
3	M8PFOS	NA
4	13C8-PFOS	
5		
6		13C4 PFOS ISTD
7		
8	--	
9	13C4 PFOS	
10	13C8-PFOS	
11		
12	NT	Nil
13	YES	No
14		
15	PFOS-13C4	PFOS-13C8
16	PFBS-13C3	PFOS-13C8
17		
18	13C8-PFOS	
19	MPFOS	
20	M8PFOS	MPFOS
21	13C8-PFOS	
22		
23		
24		
25		M8PFOS
26	Not Tested	n/a
27	13C4-PFOS	13C8-PFOS
28		
29	13C4 PFOS	13C2 PFOA
30		
32		
33	NT	NT
34	13C-PFOS	
35		

Table 164 Labelled Standards for PFDS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C4-PFOS	n/a
3	M8PFOS	NA
4	13C8-PFOS	
5		
6		13C4 PFOS ISTD
7		
8	13C8-PFOS	
9	13C4 PFOS	
10	13C8-PFOS	
11		
12	M8PFOS	Nil
13	YES	No
14		
15	6:2 FTS-13C2	PFOS-13C8
16	PFBA-13C4	PFOS-13C8
17		
18	13C8-PFOS	
19	MPFOS	MPFOS
20	M8PFOS	MPFOS
21	13C8-PFOS	
22		
23		
24		
25		M8PFOS
26	13C4-PFOS	n/a
27	13C4-PFOS	13C8-PFOS
28	13C8-PFOS	
29	13C4 PFOS	13C2 PFOA
30	13C4-PFOS	
32		
33	13C2 PFUnA	13C4 PFOA
34	13C-PFOS	
35		

Table 165 Labelled Standards for PFBA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C4-PFBA	n/a
3	M4PFBA	NA
4	13C4-PFBA	
5		
6		13C4 PFBA ISTD
7		Yes
8	13C4-PFBA	
9	13C2 PFHxA	
10	13C4-PFBA	
11	x	
12	M4PFBA	Nil
13	YES	No
14	13C4-PFBA	
15	PFBA-13C4	PFOS-13C8
16	PFBA-13C4	PFOS-13C8
17	yes	
18	13C4-PFBA	
19	M4PFBA	M3PFBA
20	MPFBA	M3PFBA
21	13C4-PFBA	
22	13C4-PFBA	
23		
24	M3PFBA	MPFBA
25	MPFBA	M2PFOA
26	13C4-PFBA	n/a
27	13C4-PFBA	13C3-PFBA
28	13C4-PFBA	
29	13C4 PFBA	13C2 PFOA
30	13C-PFOA	
32		
33	13C4 PFBA	13C4 PFOA
34	13C-PFBA	
35	x	

Table 166 Labelled Standards for PFPeA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C3-PFPeA	n/a
3	M5PFPeA	NA
4	13C5-PFPeA	
5		
6		13C4 PFBA ISTD
7		
8	13C5-PFPeA	
9	13C4 PFHpA	
10	13C5-PFPeA	
11	x	
12	M5PFPeA	Nil
13	YES	No
14	13C5-PFPeA	
15	PFPeA-13C3	PFOS-13C8
16	PFPeA-13C3	PFOS-13C8
17		
18	13C5-PFPeA	
19	M5PFPeA	
20	M5PFPeA	M3PFBA
21	13C5-PFPeA	
22	13C5-PFPeA	
23		
24		M5PFPeA
25	M5PFPeA	M2PFOA
26	13C3-PFPeA	n/a
27	13C4-PFPeA	13C5 -PFPeA
28	13C5-PFPeA	
29	13C5 PFPeA	13C2 PFOA
30	13C2-PFHA	
32		
33	13C5 PFPeA	13C4 PFOA
34	13C-PFPeA	
35		

Table 167 Labelled Standards for PFHxA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C2-PFHxA	n/a
3	M5PFHxA	NA
4	13C5-PFHxA	
5	13C2-PFHxA	13C8-PFOA
6		13C2 PFHxA ISTD
7		
8	13C5-PFHxA	
9	13C2 PFHxA	
10	13C5-PFHxA	
11	x	
12	M6PFHxA	Nil
13	YES	No
14	13C2-PFHXA	
15	PFHxA-13C2	PFOS-13C8
16	PFHxA=13C2	PFOS-13C8
17	yes	
18	13C5-PFHxA	
19	M5PFHxA	
20	M5PFHxA	M3PFBA
21	13C5-PFHxA	
22	13C2-PFHXA	
23		
24		M5PFHxA
25	M5PFHxA	M2PFOA
26	13C2-PFHxA	n/a
27	13C2-PFHxA	13C5 -PFPeA
28	13C5-PFHxA	
29	13C2 PFHxA	13C2 PFOA
30	13C2-PFHA	
32		
33	13C12 PFHxA	13C4 PFOA
34	13C-PFHxA	
35	x	

Table 168 Labelled Standards for PFHpA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C4-PFHpA	n/a
3	MPFHpA	NA
4	13C4-PFHpA	
5	13C4-PFHpA	13C8-PFOA
6		13C4 PFOA
7		
8	13C4-PFHpA	
9	13C4 PFHpA	
10	13C4-PFHpA	
11	x	
12	M4PFHpA	Nil
13	YES	No
14	13C4-PFHpA	
15	PFHpA-13C4	PFOS-13C8
16	PFHpA-13C4	PFOS-13C8
17		
18	13C4-PFHpA	
19	M4PFHpA	
20	M4PFHpA	M3PFBA
21	13C4-PFHpA	
22	13C4-PFHpA	
23		
24		M4PFHpA
25	M4PFHpA	M2PFOA
26	13C4-PFHpA	n/a
27	13C3-PFHpA	13C8-PFOA
28	13C4-PFHpA	
29	13C4 PFHpA	13C2 PFOA
30	13C-PFOA	
32		
33	13C4 PFHpA	13C4 PFOA
34	13C-PFHxA	
35		

Table 169 Labelled Standards for PFOA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C4-PFOA	n/a
3	M8PFOA	NA
4	13C4-PFOA	
5	13C4-PFOA	13C8-PFOA
6		13C4 PFOA
7	Yes	
8	13C4-PFOA	
9	13C4 PFOA	
10	13C8-PFOA	
11	x	
12	M8PFOA	Nil
13	YES	No
14	13C8-PFOA	
15	PFOA-13C4	PFOS-13C8
16	PFOA-13C4	PFOS-13C8
17	yes	
18	13C8-PFOA	
19	M8PFOA	M2PFOA
20	M8PFOA	M2PFOA
21	13C4-PFOA	
22	13C8-PFOA	
23	[13C4]-PFOA	[13C4]-PFOA
24	M2PFOA	M8PFOA
25	M8PFOA	M2PFOA
26	13C4-PFOA	n/a
27	13C4-PFOA	13C8-PFOA
28	13C4-PFOA	
29	13C4 PFOA	13C2 PFOA
30	13C-PFOA	
32		
33	13C8 PFOA	13C4 PFOA
34	13C-PFOA	
35	x	

Table 170 Labelled Standards for PFNA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C5-PFNA	n/a
3	M9PFNA	NA
4	13C5-PFNA	
5	13C5-PFNA	13C8-PFOA
6		13C5 PFNA ISTD
7		Yes
8	13C5-PFNA	
9	13C5 PFNA	
10	13C9-PFNA	
11	x	
12	M9PFNA	Nil
13	YES	No
14	13C5-PFNA	
15	PFNA-13C5	PFOS-13C8
16	PFNA-13C5	PFOS-13C8
17	yes	
18	13C9-PFNA	
19	M9PFNA	
20	M9PFNA	M2PFOA
21	13C5-PFNA	
22	13C5-PFNA	
23		
24		M9PFNA
25	M9PFNA	M2PFOA
26	13C5-PFNA	n/a
27	13C5-PFNA	13C8-PFOA
28	13C5-PFNA	
29	13C5 PFNA	13C2 PFOA
30	13C5-PFNA	
32		
33	13C5 PFNA	13C4 PFOA
34	13C-PFNA	
35		

Table 171 Labelled Standards for PFDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C2-PFDA	n/a
3	M6PFDA	NA
4	13C6-PFDA	
5	13C2-PFDA	13C8-PFOA
6		13C2 PFDA ISTD
7		Yes
8	13C6-PFDA	
9	13C2 PFDA	
10	13C6-PFDA	
11	x	
12	M6PFDA	Nil
13	YES	No
14	13C6-PFDA	
15	PFDA-13C2	PFOS-13C8
16	PFDA-13C2	PFOS-13C8
17	yes	
18	13C6-PFDA	
19	M6PFDA	MPFDA
20	M6PFDA	MPFDA
21	13C6-PFDA	
22	13C6-PFDA	
23		
24	MPFDA	M6PFDA
25	M6PFDA	MPFDA
26	13C2-PFDA	n/a
27	13C2-PFDA	13C8-PFOA
28	13C6-PFDA	
29	13C2 PFDA	13C2 PFOA
30	13C2-PFDA	
32		
33	13C2 PFDA	13C4 PFOA
34	13C-PFDA	
35	x	

Table 172 Labelled Standards for PFUdA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C2-PFUdA	n/a
3	M7PFUnDA	NA
4	13C2-PFUnDA	
5		
6		13C2 PFUdA ISTD
7		
8	13C2-PFUnDA	
9	13C2 PFUnA	
10	13C7-PFUdA	
11	x	
12	M7PFUdA	Nil
13	YES	No
14	13C2-PFUnA	
15	PFUnDA-13C2	PFOS-13C8
16	PFUNDA-13C2	PFOS-13C8
17	yes	
18	13C7-PFUnA	
19	M7PFUdA	
20	M7PFUdA	MPFDA
21	13C2-PFUnDA	
22	13C2-PFUnA	
23		
24		M7PFUdA
25	M7PFUdA	MPFDA
26	13C2-PFUdA	n/a
27	13C2-PFUdA	13C8-PFOA
28	13C2-PFUnDA	
29	13C2 PFUdA	13C2 PFOA
30	13C7-PFµDA	
32		
33	13C2 PFUnA	13C4 PFOA
34	13C-PFUnDA	
35		

Table 173 Labelled Standards for PFDoA

Lab. Code	Before Extraction	Before Instrument Analysis
1	yes	
2	13C2-PFDoDA	n/a
3	MPFDoDA	NA
4	13C2-PFDoDA	
5		
6		13C2 PFDoUA ISTD
7		Yes
8	13C2-PFDoDA	
9	13C2 PFDoA	
10	13C2-PFDoA	
11	x	
12	M2PFDoA	Nil
13	YES	No
14	13C2-PFDoA	
15	PFDoDA-13C2	PFOS-13C8
16	PFDoDA-13C2	PFOS-13C8
17	yes	
18	13C2-PFDoA	
19	M2PFDoA	
20	MPFDoA	MPFDA
21	13C2-PFDoDA	
22	13C2-PFDoA	
23		
24		MPFDoA
25	MPFDoA	MPFDA
26	13C2-PFDoDA	n/a
27	13C2-PFDoA	13C8-PFOA
28	13C2-PFDoDA	
29	13C2 PFDoA	13C2 PFOA
30	13C2-PFDoA	
32		
33	13C2 PFDoA	13C4 PFOA
34	13C-PFDoA	
35	x	

Table 174 Labelled Standards for PFTrDA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C2-PFTeDA	n/a
3	MPFDoDA	NA
4	13C2-PFDoDA	
5		
6		13C4 PFOA
7		
8	13C2-PFDoDA	
9	13C2 PFDoA	
10	13C2-PFTeDA	
11	x	
12	M2PFDoA	Nil
13	YES	No
14		
15	PFDoDA-13C2	PFOS-13C8
16	PFTeDA-13C2	PFOS-13C8
17		
18	13C2-PFDoA	
19	M2PFTeDA	
20	MPFDoA	MPFDA
21	13C2-PFDoDA	
22		
23		
24		
25		MPFDA
26	13C2-PFTeDA	n/a
27	13C2-PFDoA	13C8-PFOA
28	13C2-PFTeDA	
29	13C2 PFDoA	13C2 PFOA
30	13C7-PFμDA	
32		
33	13C2 PFTeDA	13C4 PFOA
34	13C-PFDoA	
35		

Table 175 Labelled Standards for PFTeDA

Lab. Code	Before Extraction	Before Instrument Analysis
1	Yes	
2	13C2-PFTeDA	n/a
3	MPFTeDA	NA
4	13C2-PFTeDA	
5		
6		13C4 PFOA
7		
8	13C2-PFTeDA	
9	13C2 PFTeDA	
10	13C2-PFTeDA	
11	x	
12	M2PFTeDA	Nil
13	YES	No
14	13C2-PFTeDA	
15	PFTeDA-13C2	PFOS-13C8
16	PFTeDA-13C2	PFOS-13C8
17		
18	13C2-PFTeDA	
19	M2PFTeDA	
20	M2PFTeDA	MPFDA
21	13C2-PFTeDA	
22	13C2-PFTeDA	
23		
24		M2PFTeDA
25		MPFDA
26	13C2-PFTeDA	n/a
27	13C2-PFTeDA	13C8-PFOA
28	13C2-PFTeDA	
29	13C2 PFTeDA	13C2 PFOA
30	13C7-PFμDA	
32		
33	13C2 PFTeDA	13C4 PFOA
34	13C-PFTeDA	
35		

Table 176 Labelled Standards for PFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C8-FOSA	n/a
3	MPFOSA	NA
4	13C8-FOSA	
5		
6		D5-EtFOSAA-M
7		
8	13C8-FOSA	
9	13C8 PFOSA	
10	d3-N-MeFOSA	
11	x	
12	M8PFOSA	Nil
13	YES	No
14	13C8-FOSA	
15	FOSA-13C8	PFOS-13C8
16	FOSA-13C8	PFOS-13C8
17		
18	13C8-FOSA	
19	M8PFOSA	
20	M8FOSA-I	MPFOS
21	13C8-FOSA	
22	13C8-FOSA	
23		
24		M8-FOSA
25	M8FOSA	d7-N-MeFOSE
26	13C8-FOSA	n/a
27	13C8-FOSA	none
28	13C8-FOSA	
29	13C8 FOSA	13C2 PFOA
30	13C8-FOSA	
32		
33	13C8 PFOSA	13C4 PFOA
34	13C-PFOSA	
35		

Table 177 Labelled Standards for N-MeFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	D3-M PFOSA	n/a
3	d-NMeFOSA-M	NA
4	d3-MeFOSA	
5		
6		D5-EtFOSAA-M
7		
8	d3-MeFOSA	
9	d-N-MeFOSA-M	
10	d3-N-MeFOSA	
11		
12	D3N-MeFOSAA	Nil
13	YES	No
14	d3-MeFOSA	
15	MeFOSA-D3	PFOS-13C8
16	MeFOSA-D3	PFOS-13C8
17		
18		
19	NT	
20	d-N-MeFOSA-M	MPFOS
21	d3-MeFOSA	
22	d3-MeFOSA	
23		
24		d-N-MeFOSA
25	d-N-MeFOSA	d7-N-MeFOSE
26	D3-M PFOSA	n/a
27	D3-N-Me FOSA	none
28	d3-MeFOSA	
29	NT	
30	13C-PFOA	
32		
33	d3-MeFOSA	13C4 PFOA
34	13C-PFOSA	
35		

Table 178 Labelled Standards for N-EtFOSA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	D5-E PFOSA	n/a
3	d-NEtFOSA-M	NA
4	d5-EtFOSA	
5		
6		D5-EtFOSAA-M
7		Yes
8	d5-EtFOSA	
9	d-N-EtFOSA-M	
10	d5-N-EtFOSA	
11		
12	D3N-MeFOSAA	Nil
13	YES	No
14	d5-EtFOSA	
15	EtFOSA-D5	PFOS-13C8
16	EtFOSA-D5	PFOS-13C8
17		
18		
19	NT	
20	d-N-EtFOSA-M	MPFOS
21	d5-EtFOSA	
22	d5-EtFOSA	
23		
24		d-N-EtFOSA
25	d-N-Et-FOSA	d7-N-MeFOSE
26	D5-E PFOSA	n/a
27	D5-N-Et FOSA	none
28	d5-EtFOSA	
29	NT	
30	13C-PFOA	
32		
33	d5-EtFOSA	13C4 PFOA
34	13C-PFOSA	
35		

Table 179 Labelled Standards for N-MeFOSAA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	D3-Me-FOSAA	n/a
3	d3-NMeFOSAA	NA
4	d3-MeFOSAA	
5		
6		D5-EtFOSAA-M
7		
8	d3-MeFOSAA	
9	d3-NMeFOSAA	
10	d3-N-MeFOSAA	
11		
12	D3N-MeFOSAA	Nil
13	YES	No
14	d3-N-MeFOSAA	
15	MeFOSAA-D3	PFOS-13C8
16	MeFOSAA-D3	PFOS-13C8
17		
18		
19	d3-NMeFOSAA	
20	d3-N-MeFOSAA	MPFOS
21	d3-MeFOSAA	
22	d3-N-MeFOSAA	
23		
24		d3-N-MeFOSAA
25	d3-N-MeFOSAA	d7-N-MeFOSE
26	D3-Me-FOSAA	n/a
27	D3-N-Me FOSAA	none
28	d3-MeFOSAA	
29	d3-NMeFOSAA	13C2 PFOA
30	13C-PFOA	
32		
33	d5-EtFOSA	13C4 PFOA
34	d3-N-MeFOSAA	
35		

Table 180 Labelled Standards for N-EtFOSAA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	D5-Et-FOSAA	n/a
3	d5-NEtFOSAA	NA
4	d5-EtFOSAA	
5		
6		D5-EtFOSAA-M
7		Yes
8	d5-EtFOSAA	
9	d7-NEtFOSAA	
10	d5-N-EtFOSAA	
11		
12	D3N-MeFOSAA	Nil
13	YES	No
14	d5-N-EtFOSAA	
15	EtFOSAA-D5	PFOS-13C8
16	EtFOSAA-D5	PFOS-13C8
17		
18		
19	d5-NEtFOSAA	
20	d5-N-EtFOSAA	MPFOS
21	d5-EtFOSAA	
22	d5-N-EtFOSAA	
23		
24		d5-N-EtFOSAA
25	d5-N-EtFOSAA	d7-N-MeFOSE
26	D5-Et-FOSAA	n/a
27	D5-N-Et FOSAA	none
28	d5-EtFOSAA	
29	d5-NEtFOSAA	13C2 PFOA
30	13C-PFOA	
32		
33	d5-N-EtFOSAA	13C4 PFOA
34	d3-N-MeFOSAA	
35		

Table 181 Labelled Standards for N-MeFOSE

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	D7-Me-FOSE	n/a
3	d7-NMeFOSE-M	NA
4	d7-MeFOSE	
5		
6		D5-EtFOSAA-M
7		
8	d7-MeFOSE	
9	d7-N-MeFOSE-M	
10	d9-N-EtFOSE	
11		
12	D3N-MeFOSAA	Nil
13	YES	No
14	d7-MeFOSE	
15	MeFOSE-D7	PFOS-13C8
16	MeFOSE-D3	PFOS-13C8
17		
18		
19	NT	
20	d7-N-MeFOSE-M	MPFOS
21	d7-MeFOSE	
22	d7-MeFOSE	
23		
24		d7-N-MeFOSE
25		d7-N-MeFOSE
26	D7-Me-FOSE	n/a
27	D7-N-Me FOSE	none
28	d7-MeFOSE	
29	NT	
30		
32		
33	d7-MeFOSE	13C4 PFOA
34		
35		

Table 182 Labelled Standards for N-EtFOSE

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	D9-Et-FOSE	n/a
3	d9-NEtFOSE-M	NA
4	d3EtFOSE	
5		
6		D5-EtFOSAA-M
7		
8	d3EtFOSE	
9	d9-N-EtFOSE-M	
10	d9-N-EtFOSE	
11		
12	D3N-MeFOSAA	Nil
13	YES	No
14	d9-EtFOSE	
15	EtFOSE-D9	PFOS-13C8
16	EtFOSE-D9	PFOS-13C8
17		
18		
19	NT	
20	d9-N-EtFOSE-M	MPFOS
21	d3EtFOSE	
22	d9-EtFOSE	
23		
24		d9-N-EtFOSE
25	d9-N-EtFOSE	d7-N-MeFOSE
26	D9-Et-FOSE	n/a
27	D9-N-Et FOSE	none
28	d3-EtFOSE	
29	NT	
30		
32		
33	d9-EtFOSE	13C4 PFOA
34		
35		

Table 183 Labelled Standards for 4:2 FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C2 4:2-FTS	n/a
3	M4:2 FTS	NA
4	13C2-4:2 FTS	
5		
6		13C4 12C6 6:2FTS ISTD
7		
8	13C2-4:2 FTS	
9	M2-4:2 FTS	
10	13C2-4:2FTS	
11		
12	M2-4:2 FTS	Nil
13	YES	No
14	13C2-42FTS	
15	4:2 FTS-13C2	PFOS-13C8
16	4:2 FTS-13C2	PFOS-13C8
17		
18	13C2-4:2FTS	
19	M4:2FTS	
20	M2-4:2 FTS	MPFOS
21	13C2-4:2 FTS	
22	13C2-42FTS	
23		
24		M2-4:2FTS
25		M2-4,2FTS
26	13C2 4:2-FTS	n/a
27	13C2-4:2 FTS	none
28	13C2-4:2 FTS	
29	M2-4:2 FTS	13C2 PFOA
30	13C-PFOA	
32		
33	13C2-4:2 FTS	13C4 PFOA
34	M2-6:2FTS	
35		

Table 184 Labelled Standards for 6:2 FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C2,12C6 6:2-FTS	n/a
3	M6:2 FTS	NA
4	13C2-6:2 FTS	
5	13C2-6:2 FTS	13C8-PFOS
6		13C4 12C6 6:2FTS ISTD
7		Yes
8	13C2-6:2 FTS	
9	M2-6:2 FTS	
10	13C2-6:2FTS	
11		
12	M2-6:2 FTS	Nil
13	YES	No
14	13C2-62FTS	
15	PFOS-13C8	
16	6:2 FTS-13C2	PFOS-13C8
17		
18	13C2-6:2FTS	
19	M6:2FTS	
20	M2-6:2 FTS	MPFOS
21	13C2-6:2 FTS	
22	13C2-62FTS	
23		
24		M2-6:2FTS
25	M2-6,2FTS	M2-4,2FTS
26	13C2,12C6 6:2-FTS	n/a
27	13C2-6:2 FTS	none
28	13C2-6:2 FTS	
29	M2-6:2 FTS	13C2 PFOA
30	13C-PFOA	
32		
33	13C2 6:2 FTS	13C4 PFOA
34	M2-6:2FTS	
35		

Table 185 Labelled Standards for 8:2 FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C2 8:2-FTS	n/a
3	M8:2 FTS	NA
4	13C2-8:2 FTS	
5	13C2-8:2 FTS	13C8-PFOS
6		13C4 12C6 6:2FTS ISTD
7		
8	13C2-8:2 FTS	
9	M2-8:2 FTS	
10	13C2-8:2FTS	
11		
12	M2-8:2 FTS	Nil
13	YES	No
14	13C2-82FTS	
15	8:2 FTS-13C2	PFOS-13C8
16	8:2 FTS-13C2	PFOS-13C8
17		
18	13C2-8:2FTS	
19	M8:2FTS	
20	M2-8:2 FTS	MPFOS
21	13C2-8:2 FTS	
22	13C2-82FTS	
23		
24		M2-8:2FTS
25		M2-4,2FTS
26	13C2 8:2-FTS	n/a
27	13C2-8:2 FTS	none
28	13C2-8:2 FTS	
29	M2-8:2 FTS	13C2 PFOA
30	13C-PFOA	
32		
33	13C 8:2 FTS	13C4 PFOA
34	M2-6:2FTS	
35		

Table 186 Labelled Standards for 10:2 FTS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	13C2 8:2-FTS	n/a
3	NT	NA
4	13C2-8:2 FTS	
5		
6		13C4 12C6 6:2FTS ISTD
7		
8	13C2-8:2 FTS	
9	M2-8:2 FTS	
10	13C2-8:2FTS	
11		
12	M2-8:2 FTS	Nil
13	NT	NT
14	13C2d4 10:2 FTS	
15	10:2 FTS-13C2-D4	PFOS-13C8
16	10:2 FTS -13C2-D4	PFOS-13C8
17		
18	13C2-8:2FTS	
19	NT	
20	M2-8:2 FTS	MPFOS
21	13C2-8:2 FTS	
22	13C2d4 10:2 FTS	
23		
24		
25		M2-4,2FTS
26	13C2 8:2-FTS	n/a
27	13C2-8:2 FTS	none
28	13C2-8:2 FTS	
29	M2-8:2 FTS	13C2 PFOA
30	13C-PFOA	
32		
33	13C 8:2 FTS	13C4 PFOA
34	M2-6:2FTS	
35		

Table 187 Labelled Standards for GenX

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Not Tested	n/a
3	NT	NA
4	--	
5		
6		
7		
8	--	
9	13C3 HFPO-DA	
10	13C3-GenX	
11		
12	M8PFOA	Nil
13	YES	No
14	13C3-GenX (MHFPA)	
15	HFPO-DA-13C3	PFOS-13C8
16	PFHxS-18O2	PFOS-13C8
17		
18		
19	M3HFPODA	
20	NT	NT
21	--	
22		
23		
24		
25	M3-HFPO	M2PFOA
26	Not Tested	n/a
27	13C3-GenX	none
28		
29	13C3 HFPO-DA	13C2 PFOA
30	13C-PFOA	
32		
33	NT	NT
34	M3HFPO-DA	
35		

Table 188 Labelled Standards for ADONA

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Not Tested	n/a
3	NT	NA
4	--	
5		
6		
7		
8	--	
9	13C4 PFOS	
10	13C3-GenX	
11		
12	M8PFOA	Nil
13	NT	NT
14		
15	PFHxS-18O2	PFOS-13C8
16	PFOA-13C4	PFOS-13C8
17		
18	13C8-PFOA	
19	M9PFNA	
20	NT	NT
21	--	
22		
23		
24		
25		M2PFOA
26	Not Tested	n/a
27	13C3-PFHpA	13C8-PFOA
28		
29	13C4 PFOS	13C2 PFOA
30	13C-PFOA	
32		
33	NT	NT
34	M3HFPO-DA	
35		

Table 189 Labelled Standards for 9Cl-PF3ONS

Lab. Code	Before Extraction	Before Instrument Analysis
1		
2	Not Tested	n/a
3	NT	NA
4	--	
5		
6		
7		
8	--	
9	13C4 PFOS	
10		
11		
12	M8PFOS	Nil
13	NT	NT
14		
15	PFNA-13C5	PFOS-13C8
16	FOSA-13C8	PFOS-13C8
17		
18	13C8-PFOS	
19	MPFOS	
20	NT	NT
21	--	
22		
23		
24		
25		M8PFOS
26	Not Tested	n/a
27	13C4-PFOS	13C8-PFOS
28		
29	13C4 PFOS	13C2 PFOA
30	13C-PFOA	
32		
33	NT	NT
34		
35		

Table 190 Participant Methodology for Water Samples – Additional Information

Lab. Code	Sample	Additional Information
3	S4	PFNS, PFDS, PFTrDA and PFTeDA are not reported (NR) because of a poor recovery of our QC sample
9	S3	Sample Prepared 16 Oct 2020, analyzed 19 Oct 2020. PFHxS, PFOS, 4:2FTS, 6:2 FTS, and 8:2 FTS reported from a 20x dilution with no refortification of the labelled standards added prior to extraction. Remaining parameters are reported from analysis of an undiluted extract
	S4	Sample Prepared 16 Oct 2020, analyzed 19 Oct 2020. All parameters are reported from analysis of an undiluted extract
13	S3	Sediment block SPE cartridge
14	S3	Sample high in sediments
16	S3 and S4	Results corrected by ISTD added before extraction
27	S3	PFBS, PFPeS, PFHxS, PFOS, PFBA, PFHxA, PFOA were quantified using a direct injection sample. Other analytes were quantified using SPE extract
32	S3 and S4	NATA accreditaion only for trade waste
	S4	Not accreditied for clean Water

APPENDIX 7 – ACRONYMS AND ABBREVIATIONS

10:2 FTS	1H, 1H, 2H, 2H-perfluorododecane sulfonate
4:2 FTS	1H, 1H, 2H, 2H-perfluorohexane sulfonate
6:2 FTS	1H, 1H, 2H, 2H-perfluorooctane sulfonate
8:2 FTS	1H, 1H, 2H, 2H-perfluorodecane sulfonate
9C1-PF3ONS	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid
ACN	Acetonitrile
ADONA	Ammonium 4,8-dioxa-3H-perfluorononanoate
Alk Dig	Alkaline Digestion
ASE	Accelerated Solvent Extraction
ASLP	Australian Standard Leaching Protocol
AQA	Analytical and Quality Assurance
AV	Assigned Value
CRM	Certified Reference Material
CV	Coefficient of Variation
EPA	Environment Protection Authority
EtFOSA	N-Ethyl perfluorooctane sulfonamide
EtFOSAA	N-Ethyl perfluorooctane sulfonamido acetic acid
EtFOSE	N-Ethyl perfluorooctane sulfonamidoethanol
FOSA	Perfluoro-1-octanesulfonamide
GenX	Ammonium 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy) propanoate
GUM	Guide for Uncertainty Measurement
HV	Homogeneity Value
IPE	Ion Pair Extraction
ISO	International Standards Organisation
LC	Liquid Chromatography
LC-MSMS	Liquid Chromatography with Tandem Mass Spectrometry
LCS	Laboratory Control Sample
LLE	Liquid-Liquid Extraction
LOR	Limit of Reporting
LSE	Liquid-Solid Extraction
Max	Maximum value in a set of results
Md	Median
MeFOSA	N-Methyl perfluorooctane sulfonamide
MeFOSAA	N-Methyl perfluorooctane sulfonamidoacetic acid
MeFOSE	N-Methyl perfluorooctane sulfonamidoethanol
MeOH	Methanol
MeOH/Base	Base modified methanol
Min	Minimum value in a set of results

MS	Mass Spectrometry
MTBE	Methyl tert-butyl ether
NMI	National Measurement Institute (of Australia)
NR	Not Reported
NT	Not Tested
PCV	Performance Coefficient of Variation
PFAA	Perfluoroalkyl acids
PFAS	Per- and poly fluorinated alkyl substances
PFBA	Perfluoro-n-butanoic acid
PFBS	Potassium perfluoro-1-butanesulfonate
PFCA	Perfluorinated carboxylic acids
PFDA	Perfluoro-n-decanoic acid
PFDoA	Perfluorododecanoic acid
PFDS	Perfluorodecane sulfonate
PFECA	Perfluoroalkyl ether carboxylic acid
PFESA	Polyfluorinated ether sulfonic acid
PFHpA	Perfluoro-n-heptanoic acid
PFHpS	Perfluoroheptane sulfonate
PFHxA	Perfluoro-n-hexanoic acid
PFHxS	Potassium perfluorohexanesulfonate
PFHxS_L	Potassium perfluorohexanesulfonate linear
PFNA	Perfluoro-n-nonanoic acid
PFNS	Perfluorononane sulfonate
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PFOS_L	Perfluorooctane sulfonate linear
PFOSA	Perfluoro-1-octanesulfonamide
PFPeA	Perfluoro-n-pentanoic acid
PFPeS	Perfluoropentane sulfonate
PFSA	Perfluorosulfonic acid
PFTeDA	Perfluorotetradecanoic acid
PFTrDA	Perfluorotridecanoic acid
PFUdA	Perfluoroundecanoic acid
PLE	Pressurised Liquid Extraction
PT	Proficiency Test
PTFE	Polytetrafluoroethylene
Q	Quadrupole mass analyser
QQQ	Triple Quadrupole (mass spectrometry)
QuEChERS	Quick, Easy, Cheap, Effective, Rugged and Safe extraction method
RA	Robust Average

RM	Reference Material
Robust CV	Robust Coefficient of Variation
Robust SD	Robust Standard Deviation
SD	Standard Deviation
SLE	Solid-Liquid Extraction
SV	Spiked or formulated concentration of a PT sample (Spike Value)
SPE	Solid Phase Extraction
SS	Spiked Samples
Target SD	Target standard deviation
TBA	Tert-butanol
TCLP	Toxicity characteristic leaching procedure
US EPA	United States Environmental Protection Agency

END OF REPORT