



# EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025

EURL-PT-POP\_2501-FF

## FOOD

### Final Report

### PFAS

(Report Version 1.0)

13 February 2026



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## Summary

|                         |                                                                                                                                                                                                                                                                 |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test sample             | <b>FOOD:</b> Fish Fillet [2501-FF]                                                                                                                                                                                                                              |
| Analytes of interest    | <p><b>PFAS</b> (PFOS, PFOA, PFNA, PFHxS, Sum of PFOS, PFOA, PFNA, PFHxS)</p> <p><b>Mandatory</b> for NRLs:</p> <p><b>Optional</b> for NRLs: <b>Other PFASs</b> (perfluoroalkylcarboxylic acids, perfluoroalkylsulfonic acids, perfluoroalkane sulfonamides)</p> |
| Methods                 | Any kind of method                                                                                                                                                                                                                                              |
| Participants            | NRLs, OFLs, other official laboratories, commercial laboratories performing the analysis of samples taken by food business operators                                                                                                                            |
| Statistical evaluation  | ISO 13528:2022 [1], IUPAC Protocol [2]                                                                                                                                                                                                                          |
| Report of final results | 13 February 2026 (Version 1.0)                                                                                                                                                                                                                                  |
| Publication             | EURL POPs reserves all rights to publish and present the anonymised results of the interlaboratory study in scientific journals and/or during conferences.                                                                                                      |

## 1. Structure of the ILS, test material and analytes

This proficiency test (PT) on the determination of **PCDD/Fs**, **PCBs**, **PBDEs**, **HBCDDs** and **PFAS** in **Fish Fillet** was organized by the EURL for halogenated POPs in Feed and Food to be performed between January and April 2025. The objective was to assess analytical performance of laboratories and interlaboratory comparability of results from analyses of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in one sample of **Fish Fillet**.

**National Reference Laboratories (NRLs)** for halogenated POPs in Feed and Food from EU member states were requested to participate as part of their work programme for 2025. NRLs were invited to encourage the participation of Official Laboratories (OFLs) from their member states as part of their duties following Article 101 of regulation (EU) 2017/625 of the European Parliament and of the Council of 15 March 2017. Furthermore, participation of OFLs allowed the extension of the data basis for calculation of assigned values and evaluation of results.

First results were discussed by representatives of European Commission, NRLs and the EURL at the EURL/NRL workshop in May 2025 in Barcelona, Spain.

### 1.1. Samples and coding

The test sample was prepared from regular market food. It was **not fortified** with analytes of interest.

|                    |                               |
|--------------------|-------------------------------|
| <b>Fish Fillet</b> | <b>Sample no. 2501-FF-xxx</b> |
|--------------------|-------------------------------|

Each participant received about **125 g** of the test sample as a fully preserved canned product.

## 1.2. Analytes of interest

NRLs for halogenated POPs in feed and food were requested to determine the following parameters:

### ■ PFASs

- Total perfluorooctane sulfonic acid (total PFOS<sup>1</sup>), perfluorooctanoic acid (PFOA), perfluorononanoic acid (PFNA), perfluorohexane sulfonic acid (PFHxS)
- Sum of total PFOS<sup>1</sup>, PFOA, PFNA, PFHxS

NRLs for halogenated POPs in feed and food are encouraged to determine the following additional parameters for PFASs:

### ■ Optional PFASs

- **Perfluoroalkylsulfonic acids (PFSA)s**: perfluorobutanesulfonic acid (PFBS), perfluoropentanesulfonic acid (PFPeS), perfluoroheptanesulfonic acid (PFHpS), linear perfluorooctanesulfonic acid (L-PFOS), branched perfluorooctanesulfonic acids (br-PFOS), perfluorononanesulfonic acid (PFNS), perfluorodecanesulfonic acid (PFDS), perfluoroundecane sulfonic acid (PFUnDS), perfluorododecane sulfonic acid (PFDoDS), perfluorotridecane sulfonic acid (PFTrDS)
- **Perfluoroalkylcarboxylic acids (PFCAs)**: perfluorobutanoic acid (PFBA), perfluoropentanoic acid (PFPeA), perfluoroheptanoic acid (PFHpA), perfluorodecanoic acid (PFDA), perfluoroundecanoic acid (PFUnDA), perfluorododecanoic acid (PFDoDA), perfluorotridecanoic acid (PFTrDA), perfluorotetradecanoic acid (PFTeDA)
- Perfluorooctane sulphonamide (**FOSA**)
- 2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid (**DONA**)
- 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid (**GenX**)
- Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate (major component of **F-53B**)
- Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate (minor component of **F-53B**)
- 1-Propanaminium, N,N-dimethyl-N-oxide-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide (**Capstone A**)
- 1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide (**Capstone B**)

## 1.3. Methods

Any kinds of detection and quantification methods could be applied.

<sup>1</sup> Total PFOS: sum of linear and branched stereoisomers, whether they are chromatographically separated or not

#### 1.4. Coding of laboratories and confidentiality

The identity of participating laboratories will be kept confidential.

For NRLs of EU member states, the suggested “protocol for management of underperformance in comparative testing or lack of collaboration of National Reference Laboratories (NRLs)” will be followed. The confidentiality of NRLs will be kept according to this protocol.

For OFLs of EU member states cooperating with NRL, the respective NRLs will inform the EURL for halogenated POPs about the participating OFLs and will receive the respective laboratory codes, invoices for participation fee and certificates of participation of the OFLs

#### 1.5. Results of PFAS

Laboratories should:

- use their own reference standards for identification and quantification,
- report results for each analyte,
- report the limit of quantification (LOQ), at least for each non-quantified analyte,
- give method information and
- give information about the accreditation of the laboratory according to ISO/IEC 17025 (*for metrological traceability of consensus values of participants used as assigned values*).

Results had to be reported in **µg/kg wet weight (w. w.)**.

## 2. Participating laboratories

This proficiency test was open for participation of:

- National Reference Laboratories (NRLs) of EU member states
- National Reference Laboratories of other European countries
- Official laboratories

**79** laboratories registered for this proficiency test. For PFAS, 55 sets of results were reported, respectively. One laboratory submitted two sets of data.

**Table 1:** Participating laboratories

| Participating laboratories             | Region          | No. all participants | No. participants for PFAS |
|----------------------------------------|-----------------|----------------------|---------------------------|
| <b>National Reference Laboratories</b> | European Union  | 24                   | 17                        |
|                                        | Other Countries | 3                    | 3                         |
| <b>Official Laboratories</b>           | European Union  | 52                   | 35                        |
|                                        | <b>Total</b>    | <b>79</b>            | <b>55</b>                 |

## 2.1. Number of reported results

**Table 2:** Reported results for individual PFCAs for Fish Fillet (2501-FF) of all laboratories

| Analyte                     | Abbreviation | 2501-FF |
|-----------------------------|--------------|---------|
| Perfluorobutanoic acid      | (PFBA)       | 35      |
| Perfluoropentanoic acid     | (PFPeA)      | 38      |
| Perfluorohexanoic acid      | (PFHxA)      | 43      |
| Perfluoroheptanoic acid     | (PFHpA)      | 46      |
| Perfluorooctanoic acid      | (PFOA)       | 56      |
| Perfluorononanoic acid      | (PFNA)       | 56      |
| Perfluorodecanoic acid      | (PFDA)       | 48      |
| Perfluoroundecanoic acid    | (PFUnDA)     | 46      |
| Perfluorododecanoic acid    | (PFDoDA)     | 46      |
| Perfluorotridecanoic acid   | (PFTTrDA)    | 38      |
| Perfluorotetradecanoic acid | (PFTeDA)     | 39      |

**Table 3:** Reported results for individual PFSA for Fish Fillet (2501-FF) of all laboratories

| Analyte                                                 | Abbreviation | 2501-FF |
|---------------------------------------------------------|--------------|---------|
| Perfluorobutanesulfonic acid                            | (PFBS)       | 43      |
| Perfluoropentanesulfonic acid                           | (PFPeS)      | 36      |
| Perfluorohexanesulfonic acid                            | (PFHxS)      | 56      |
| Perfluoroheptanesulfonic acid                           | (PFHpS)      | 42      |
| Linear Perfluorooctanesulfonic acid                     | (L-PFOS)     | 44      |
| Sum of branched Perfluorooctanesulfonic acid            | (br-PFOS)    | 40      |
| Sum of branched and linear Perfluorooctanesulfonic acid | (total PFOS) | 55      |
| Perfluorononanesulfonic acid                            | (PFNS)       | 37      |
| Perfluorodecanesulfonic acid                            | (PFDS)       | 41      |

|                                        |          |    |
|----------------------------------------|----------|----|
| <b>Perfluoroundecanesulfonic acid</b>  | (PFUnDS) | 23 |
| <b>Perfluorododecanesulfonic acid</b>  | (PFDoDS) | 29 |
| <b>Perfluorotridecanesulfonic acid</b> | (PFTrDS) | 19 |

**Table 4:** Reported results for PFAS sum parameters for Fish Fillet (2501-FF) of all laboratories

| Analyte                                                   | Abbreviation | 2501-FF |
|-----------------------------------------------------------|--------------|---------|
| <b>Sum of Total-PFOS, PFOA, PFNA, PFHxS (upper bound)</b> | -            | 53      |
| <b>Sum of Total-PFOS, PFOA, PFNA, PFHxS (lower bound)</b> | -            | 53      |

**Table 5:** Reported results for other PFAS for Fish Fillet (2501-FF) of all laboratories

| Analyte                                                                                                                               | Abbreviation               | 2501-FF |
|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------|
| <b>Perfluorooctane sulphonamide</b>                                                                                                   | (FOSA)                     | 18      |
| <b>2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid</b>                                           | (DONA)                     | 24      |
| <b>2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid</b>                                                                      | (GenX)                     | 26      |
| <b>Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate</b>                                                                       | (major component of F-53B) | 21      |
| <b>Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate</b>                                                                      | (minor component of F-53B) | 19      |
| <b>1-Propanaminium, N,N-dimethyl-N-oxide-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide</b>           | (Capstone A)               | 1       |
| <b>1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide</b> | (Capstone B)               | 2       |

## 2.2. Accreditation

**Table 6:** Reported accreditation according to ISO/IEC 17025 by participants for PFAS

| Fish Fillet      | PFAS |
|------------------|------|
| Accreditation    | 42   |
| No accreditation | 13   |

## 2.3. Detection methods

Any kind of chromatographic separation and detection methods could be applied for analysis. Most of the participating laboratories applied ultra- or high-performance liquid chromatography (U/HPLC) as separation method combined with low resolution tandem mass spectrometry (MS/MS) as detection method. High resolution mass spectrometry (Orbitrap HRMS) was also applied as detection method.

## 3. Test for sufficient homogeneity

The test for sufficient homogeneity was performed according to ISO 13528:2020 [1] and the International Harmonized Protocol for the Proficiency Testing of Analytical Chemistry Laboratories [2]. Therefore, 10 portions of the test samples 2501-FF were analyzed in duplicate for individual substances. The test materials showed sufficient homogeneity for PFAS in this proficiency test. all three analyte groups. The stability check applying room temperature storage was performed for PCDD/Fs and PCBs according to ISO 13528:2022 [1]. The test material showed sufficient stability for PCDD/Fs and PCBs this proficiency test (see Final Report for PCDD/Fs and PCBs) and could also be concluded for PFAS due to similar physico-chemical properties.

## 4. Determination of the assigned value

Statistical evaluation of the PT results was performed by the EURL for halogenated POPs in feed and food according to ISO 13528:2022 [1] and the International Harmonized Protocol for the Proficiency Testing of Analytical Chemistry Laboratories [2].

The determination of the assigned value was performed according [1] by estimating of the assigned value as the consensus of participants' results (using only results of physico-chemical methods). The Huber robust mean was taken as assigned value after excluding extreme outliers (outside the range of  $\pm 50\%$  of the median of all reported results) and examination of the distribution of the remaining results using histogram and Kernel density estimation, if necessary.



Assigned values were calculated for individual PFAS compounds, and sum parameters (including limits of quantification (LOQs)), if possible. Additionally, the median of all values was calculated. For individual substances (including LOQs) assigned values were only calculated according to the above-mentioned procedure, if more than 2/3 of all results are above the LOQ and less than 1/3 of all results (including LOQs) are outside the range of  $\pm 50\%$  of the median of all reported results. Levels for individual congeners are only taken for evaluation and calculation if these levels are equal to or above the LOQ; otherwise, the LOQ will be taken instead.

Assigned values were calculated for

- perfluoroalkylcarboxylic acids: PFNA, PFDA, PFUnDA, PFDoDA, PFTrDA, PFTeDA
- perfluoroalkylsulfonic acids: L-PFOS, br-PFOS, total PFOS
- the sum parameter 'sum of total-PFOS, PFOA, PFNA, PFHxS' in the test sample "Fish Fillet" (2501-FF).

For the other analytes of interest assigned values could not be calculated.

Since there are no traceable reference values available, the assigned values in this PT were calculated based on the Huber robust mean of the participants' results. Therefore, the assigned values are only traceable to the results of the participants. Additionally, the results of all participants reporting results and the results of participants having accreditation according to ISO/IEC 17025 were compared for PFOA, PFHxS, total PFOS and for the sum parameter sum of total-PFOS, PFOA, PFNA, PFHxS (ub and lb). 42 of 55 reporting laboratories were accredited according to ISO/IEC 17025 for PFAS in feed. No significant differences between the assigned values calculated for both data sets for PFAS were observed for the analytes (Table 7).

**Table 7:** Comparison of assigned values for 2501-FF for all participants and participants with reported accreditation according to ISO/IEC 17025 for PFAS

| Sum parameters | Assigned value<br>All participants | Assigned value<br>ISO/IEC 17025 accreditation | Deviation |
|----------------|------------------------------------|-----------------------------------------------|-----------|
|                | $\mu\text{g/kg wet weight}$        |                                               | %         |
| PFNA           | 0.0846                             | 0.0844                                        | < 1       |
| PFDA           | 0.469                              | 0.470                                         | < 1       |
| PFUnDA         | 0.240                              | 0.241                                         | < 1       |
| PFDoDA         | 0.394                              | 0.391                                         | 1         |
| PFTrDA         | 0.196                              | 0.192                                         | 2         |

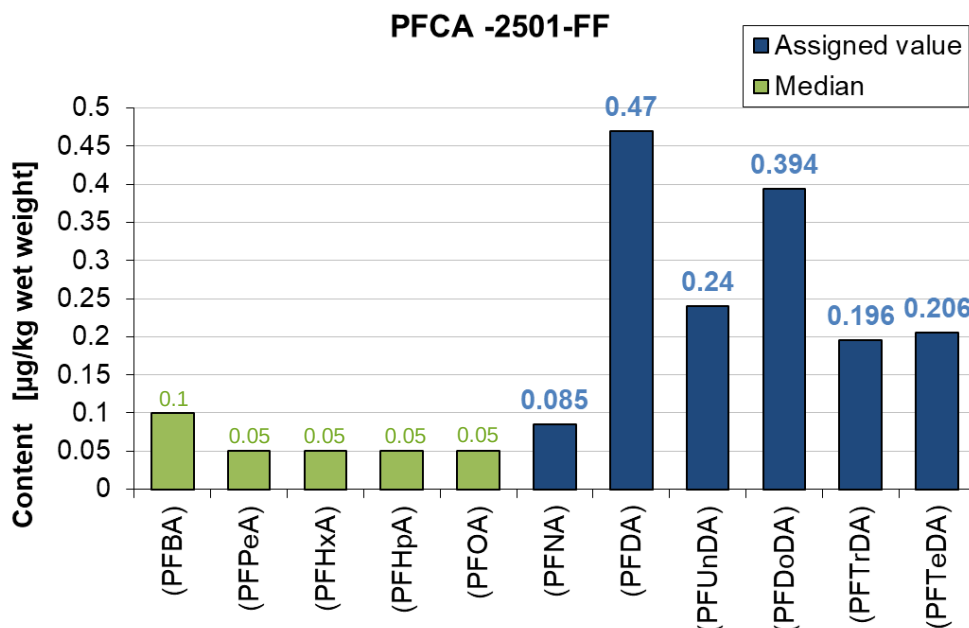
|                                           |       |       |     |
|-------------------------------------------|-------|-------|-----|
| PFTeDA                                    | 0.206 | 0.209 | 1   |
| L-PFOS                                    | 6.26  | 6.25  | < 1 |
| br-PFOS                                   | 0.160 | 0.153 | 4   |
| Total PFOS                                | 6.40  | 6.44  | 1   |
| Sum of total PFOS, PFOA, PFNA, PFHxS (ub) | 6.67  | 6.75  | 1   |
| Sum of total PFOS, PFOA, PFNA, PFHxS (lb) | 6.58  | 6.64  | 1   |

#### 4.1. Assigned values of individual substances

The assigned values for the test sample 2501-FF were calculated as consensus of participants' results for individual PFAS, taking into account the calculation criteria described above (Table 8 and 9, Figure 1 and 2; tabular summary see annex 1).

**Table 8:** Assigned values for Perfluoroalkylcarboxylic acids (rounded to three significant figures)

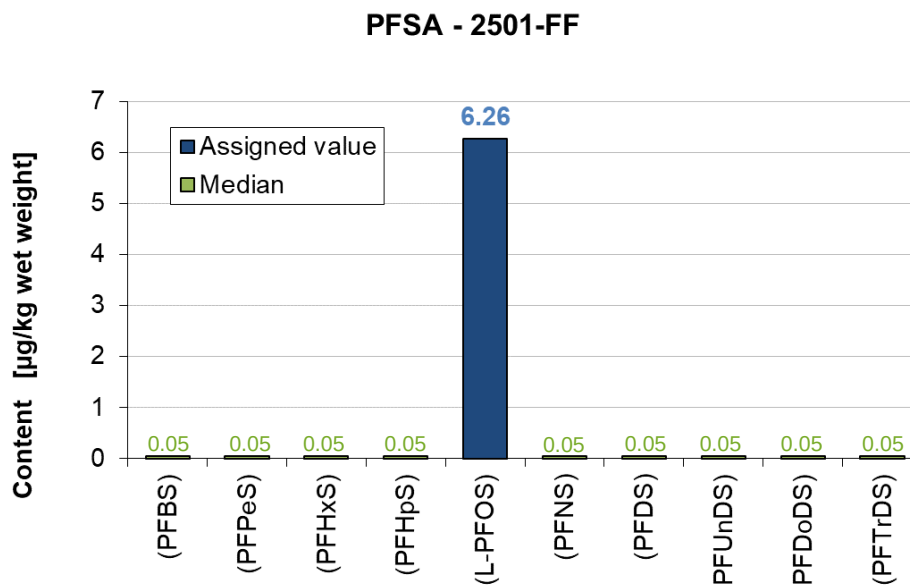
| Fish Fillet (2501-FF) | Assigned value PFCAs<br>µg/kg wet weight |
|-----------------------|------------------------------------------|
| PFNA                  | 0.0846                                   |
| PFDA                  | 0.469                                    |
| PFUnDA                | 0.240                                    |
| PFDoDA                | 0.394                                    |
| PFTTrDA               | 0.196                                    |
| PFTeDA                | 0.206                                    |



**Figure 1:** Assigned values (blue) and median values (green) for PFCAs individual substances for Fish Fillet (2501-FF) [µg/kg wet weight]

**Table 9:** Assigned values for Perfluoroalkylsulfonic acids (rounded to three significant figures)

| Fish Fillet (2501-FF) | Assigned value PFSA<br>µg/kg product (12% moisture content) |
|-----------------------|-------------------------------------------------------------|
| <b>L-PFOS</b>         | 6.26                                                        |
| <b>br-PFOS</b>        | 0.160                                                       |
| <b>Total PFOS</b>     | 6.40                                                        |



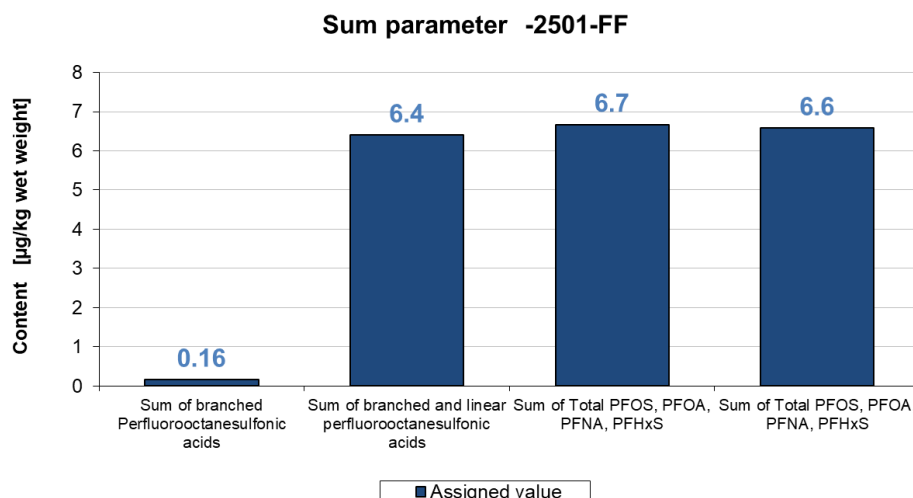
**Figure 2:** Assigned values (blue) and median values (green) for PFSA individual substances for Fish Fillet (2501-FF) [µg/kg wet weight]

## 4.2. Assigned values of sum parameter

The assigned values for the test sample 2501-FF were calculated as consensus of participants' results for sum parameters, taking into account the calculation criteria described above (Table 10, Figure 3; tabular summary see annex 1).

**Table 10:** Assigned values for sum parameters (rounded to three significant figures)

| Fish Fillet (2501-FF)                     | Assigned value<br>µg/kg wet weight |
|-------------------------------------------|------------------------------------|
| Sum of Total PFOS, PFOA, PFNA, PFHxS (ub) | 6.67                               |
| Sum of Total PFOS, PFOA, PFNA, PFHxS (lb) | 6.58                               |



**Figure 3:** Assigned values for sum parameters of branched and linear PFOS and sum of total-PFOS, PFOA, PFNA and PFHxS for Fish Fillet (2501-FF) [µg/kg wet weight]

## 5. Scoring of results – Z-scores

For evaluation of results, the z-scores were calculated according to the following formula:

$$z = \frac{(x - x_a)}{\sigma_{p_{rel}} * x_a}$$

$x$ : participant's result

$x_a$ : assigned value

$\sigma_{p_{rel}}$ : relative fitness-for-purpose-based "standard deviation for proficiency assessment"

For individual PFAS substances and sum parameters, the relative standard deviation for proficiency assessment  $\sigma_{p_{rel}}$  is defined as 20 %.

Z-scores for individual substances and sum parameters were only calculated and reported if levels for these congeners are equal to or above the LOQ. Otherwise, no z-scores will be given.

Interpretation of z-scores:

|                            |                                            |
|----------------------------|--------------------------------------------|
| $ z\text{-score}  \leq 2$  | satisfactory performance                   |
| $2 <  z\text{-score}  < 3$ | questionable performance (warning signal)  |
| $ z\text{-score}  \geq 3$  | unsatisfactory performance (action signal) |

## 5.1. Participants' z-scores of individual substances

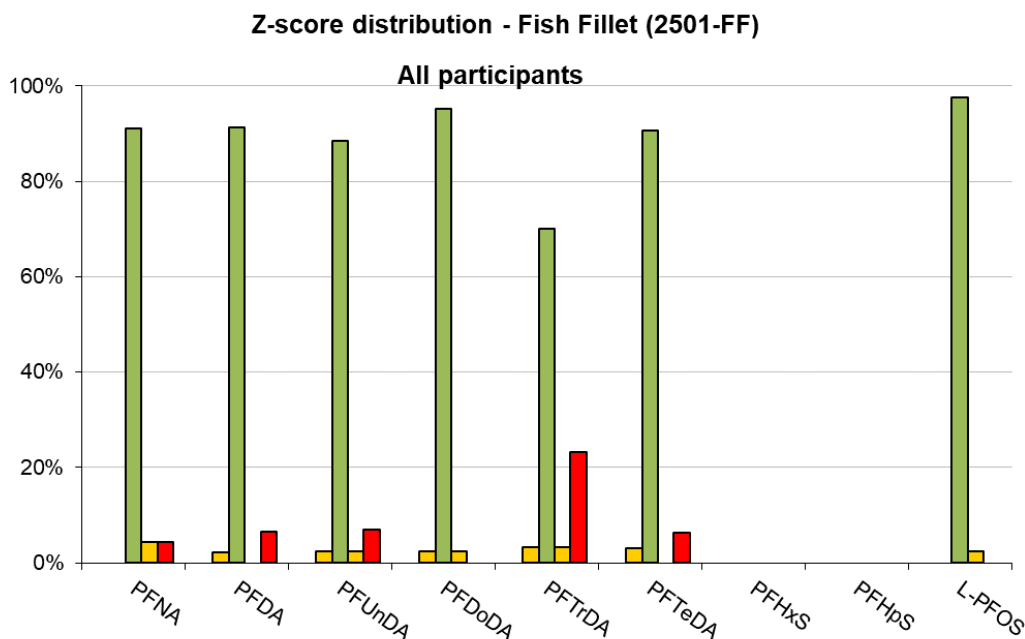
Z-scores for individual substances were calculated (Table 11 and 12, Figure 4 and 5; tabular summary see annex 3).

**Table 11:** Distribution of participants' z-scores for PFCAs for Fish Fillet (2501-FF)

| Percentage of participants' results<br>PFCAs | $ z\text{-score}  \leq 2$ | $2 <  z\text{-score}  < 3$ | $ z\text{-score}  \geq 3$ |
|----------------------------------------------|---------------------------|----------------------------|---------------------------|
| <b>PFNA</b>                                  | 91%                       | 4%                         | 4%                        |
| <b>PFDA</b>                                  | 91%                       | 2%                         | 6%                        |
| <b>PFUnDA</b>                                | 89%                       | 5%                         | 7%                        |
| <b>PFDoDA</b>                                | 95%                       | 5%                         | 0%                        |
| <b>PFTTrDA</b>                               | 71%                       | 6%                         | 23%                       |
| <b>PFTeDA</b>                                | 91%                       | 3%                         | 6%                        |

**Table 12:** Distribution of participants' z-scores for PFSA for Fish Fillet (2501-FF)

| Percentage of participants' results<br>PFSA | $ z\text{-score}  \leq 2$ | $2 <  z\text{-score}  < 3$ | $ z\text{-score}  \geq 3$ |
|---------------------------------------------|---------------------------|----------------------------|---------------------------|
| <b>L-PFOS</b>                               | 95%                       | 5%                         | 0%                        |
| <b>br-PFOS</b>                              | 67%                       | 8%                         | 25%                       |
| <b>Total PFOS</b>                           | 96%                       | 2%                         | 2%                        |



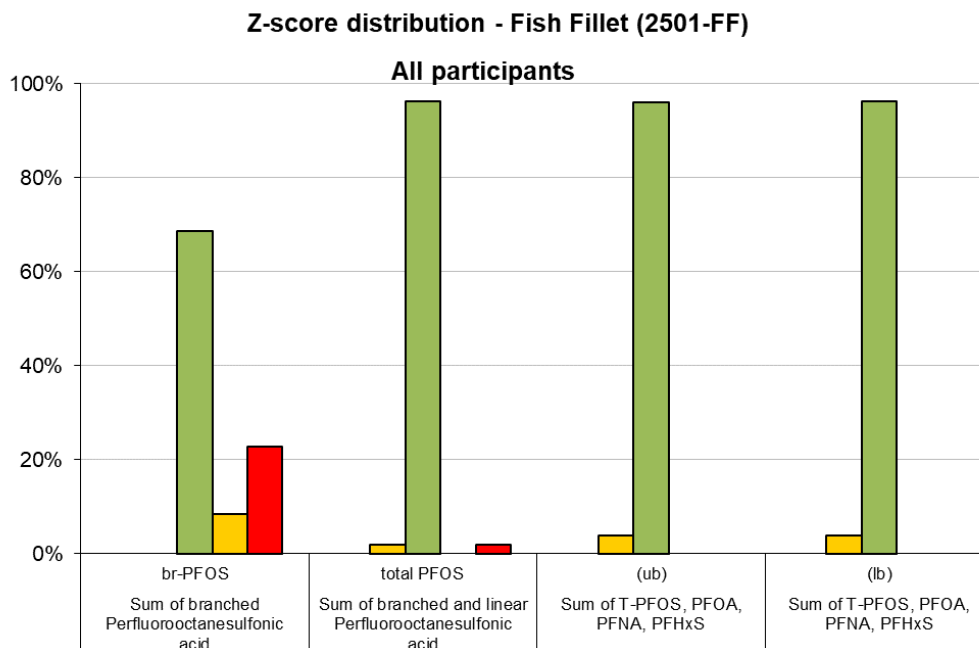
**Figure 4:** Distribution of participants' z-scores for individual PFCAs and L-PFOS for Fish Fillet (2501-FF) [Green bars:  $-2 \leq \text{z-score} \leq 2$ , orange bars:  $-3 < \text{z-score} < -2$ ,  $2 < \text{z-score} < 3$ , red bars:  $\text{z-score} \leq -3$ ,  $\text{z-score} \geq 3$ ]

## 5.2. Participants' z-scores of sum parameters

Z-scores for sum parameters were calculated (Table 13, Figure 6; tabular summary see annex 3).

**Table 13:** Distribution of participants' z-scores for sum parameters for Fish Fillet (2501-FF)

| Percentage of participants' results<br>Sum parameters | $ \text{z-score}  \leq 2$ | $2 <  \text{z-score}  < 3$ | $ \text{z-score}  \geq 3$ |
|-------------------------------------------------------|---------------------------|----------------------------|---------------------------|
| Sum of Total PFOS, PFOA, PFNA, PFHxS (ub)             | 96%                       | 4%                         | 0%                        |
| Sum of Total PFOS, PFOA, PFNA, PFHxS (lb)             | 96%                       | 4%                         | 0%                        |



**Figure 6:** Distribution of participants' z-scores for sum parameters for Fish Fillet (2501-FF) [Green bars:  $-2 \leq z\text{-score} \leq 2$ , orange bars:  $-3 < z\text{-score} < -2$ ,  $2 < z\text{-score} < 3$ , red bars:  $z\text{-score} \leq -3$ ,  $z\text{-score} \geq 3$ ]

## 6. Participants' feedback

A questionnaire for feedback from participants of this EURL proficiency test was available as online survey between 16 April 2025 and 30 May 2025. The survey was anonymous, but participants could also give their laboratory name. The identity of the laboratories is kept confidential. The survey included several questions related to different topics (participants' information, organization of the proficiency test, PT test samples and evaluation of results and summary of data) and a possibility to include comments and further suggestions. In total, 10 laboratories (13 % of all PT participants) replied to this survey.

**Table 14:** Participating laboratories in the feedback survey

| Type of laboratory                    | Answers |
|---------------------------------------|---------|
| National Reference Laboratory (NRL)   | 3       |
| Official Laboratory (OFL)             | 6       |
| Commercial laboratory                 | 1       |
| Other (e.g. research and development) | 0       |
| No Answer                             | 0       |



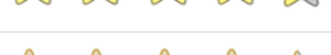
## General aspects

How satisfied are you with the organization of this proficiency test in general? Please rate the parts below according to your experience, with 0 stars meaning "no opinion" and 5 stars meaning "full satisfaction".

|                             |                                                                                   |
|-----------------------------|-----------------------------------------------------------------------------------|
| <b>Announcement</b>         |  |
| <b>Instructions</b>         |  |
| <b>Sample shipment</b>      |  |
| <b>Reporting of results</b> |  |
| <b>Preliminary report</b>   |  |

## Specific aspects of this proficiency test

We would like to know a bit more about specific aspects of this proficiency test. Please rate the aspects below according to your experience, with 0 stars meaning "no opinion" and 5 stars meaning "full satisfaction".

|                                                                                                                     |                                                                                       |
|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Was all necessary information for participation and performance of the PT provided in an understandable way?        |  |
| Was the time frame acceptable?                                                                                      |  |
| Was the handling of EUSurvey as webtool for reporting and source of instructions manageable?                        |  |
| Was the evaluation of participant's results and the information in the preliminary report clear and comprehensible? |  |

Was the selected sample adequate for the goal to assess analytical performance of laboratories in relevant matrices?

|                               |                                                                                     |
|-------------------------------|-------------------------------------------------------------------------------------|
| <b>Choice of matrix</b>       |  |
| <b>Level of contamination</b> |  |

Comments (each from one lab):

- Levels of some analyte groups too low; EURL POPs: It was commercially available fish and not spiked to have a naturally contaminated sample. PCBs were in the appropriate range of the ML/AL.

- It would be very helpful if the assigned values and, where applicable, other relevant reference data were additionally provided in the form of an Excel file. This would greatly facilitate the evaluation and further processing of the results. EURL POPs: Unfortunately, Excel sheets are not compatible with accreditation requirements and quality control system.
- We suggest a publication organized by laboratory and not in tabular form; EURL POPs: Unfortunately, at the time being that is not an option to convert our assessment system and reporting system in that way
- Overall, it's an excellent PT. For its improvement, we suggest duplicate sample testing and repeatability calculation: EURL POPs: we do that in special interlaboratory studies for newer analyte groups but so far it is not planned for the proficiency tests
- Good work on getting the preliminary reports out so fast!

## 7. Quality control

The Deutsche Akkreditierungsstelle GmbH attests that the provider of proficiency testing Chemisches und Veterinäruntersuchungsamt Freiburg, EU Reference Laboratory (EURL) for halogenated persistent organic pollutants (POPs) in feed and food is competent under the terms of DIN EN ISO/IEC 17043:2010 to carry out proficiency testing in the testing field of determination of halogenated persistent organic pollutants (POPs) in food and feed (Accreditation number: D-EP-18625-01-00).

All homogeneity and stability testing are performed under accreditation according to DIN EN ISO/IEC 17025:2018.

## 8. Results of participants

An overview of the PFASs results for the PT test sample Fish Fillet (2501-FF) are given in the following annexes. Laboratories are coded according to the laboratory codes sent after registration.

Complaints regarding the PT organisation, data evaluation and assessment of laboratories performance can be addressed directly to [eurl-pops@cvuafr.bwl.de](mailto:eurl-pops@cvuafr.bwl.de).

## 9. References

- [1] ISO 13528:2022, Statistical methods for use in proficiency testing by interlaboratory comparisons, International Organization for Standardization
- [2] M. Thompson, S.L.R. Ellison, R. Wood: The International Harmonized Protocol For The Proficiency Testing Of Analytical Chemistry Laboratories, Pure Appl. Chem., Vol. 78, No. 1, pp. 145-196, 2006.

## 10. Annex

| Fish Fillet – 2501-FF |                                                                                               |
|-----------------------|-----------------------------------------------------------------------------------------------|
| 1                     | Assigned values – PFCAs, PFSAAs and sum parameters                                            |
| 2                     | Participants' results – Tables – PFCAs, PFSAAs, sum parameters and other PFAS                 |
| 3                     | Participants' z-scores – Tables – PFCAs, PFSAAs and sum parameters                            |
| 4                     | Participants' z-scores – Charts – PFCAs, PFSAAs and sum parameters                            |
| 5                     | Test for sufficient homogeneity – PFCAs, PFSAAs                                               |
| 6                     | Overview participants' methods – Weighed sample, internal and recovery standards and comments |
| 7                     | Overview participants' methods – Extractions, clean-up and detection                          |
| 8                     | Overview participants' methods – Measurement uncertainty and Limit of Quantification          |

for halogenated POPs in Feed and Food  
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## **EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]**

EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food

13 February 2026

**Annex 1:** Assigned values of PFCAs, PFSA and sum of PFOS, PFOA, PFNA, PFHxS

### **Test sample - Fish Fillet (2501-FF)**

#### **Assigned values of individual substances and sum parameters**

Estimation of the assigned value as the consensus of participants' results

Assigned value = Huber robust mean after exclusion of extreme outliers



# EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]

EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

## Fish Fillet (2501-FF)

Perfluoroalkylcarboxylic acids (PFCAs) - Assigned values

| Analyte                              | Result<br>µg/kg<br>wet weight | Assigned value<br>[outliers removed] | Robust standard<br>deviation<br>[outliers removed] | Standard<br>uncertainty<br>[outliers removed] | No. of results<br>contributing to<br>assigned value | Median<br>[all values] |
|--------------------------------------|-------------------------------|--------------------------------------|----------------------------------------------------|-----------------------------------------------|-----------------------------------------------------|------------------------|
| Perfluorobutanoic acid (PFBA)        |                               |                                      |                                                    |                                               |                                                     | 0.100                  |
| Perfluoropentanoic acid (PFPeA)      |                               |                                      |                                                    |                                               |                                                     | 0.0500                 |
| Perfluorohexanoic acid (PFHxA)       |                               |                                      |                                                    |                                               |                                                     | 0.0500                 |
| Perfluoroheptanoic acid (PFHpA)      |                               |                                      |                                                    |                                               |                                                     | 0.0500                 |
| Perfluorooctanoic acid (PFOA)        |                               |                                      |                                                    |                                               |                                                     | 0.0500                 |
| Perfluorononanoic acid (PFNA)        |                               | 0.0846                               | 0.014                                              | 0.0026                                        | 47                                                  | 0.0831                 |
| Perfluorodecanoic acid (PFDA)        |                               | 0.469                                | 0.082                                              | 0.016                                         | 43                                                  | 0.465                  |
| Perfluoroundecanoic acid (PFUnDA)    |                               | 0.240                                | 0.035                                              | 0.0070                                        | 40                                                  | 0.240                  |
| Perfluorododecanoic acid (PFDoDA)    |                               | 0.394                                | 0.080                                              | 0.015                                         | 42                                                  | 0.388                  |
| Perfluorotridecanoic acid (PFTTrDA)  |                               | 0.196                                | 0.039                                              | 0.0094                                        | 26                                                  | 0.201                  |
| Perfluorotetradecanoic acid (PFTeDA) |                               | 0.206                                | 0.034                                              | 0.0077                                        | 31                                                  | 0.204                  |



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EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

## Fish Fillet (2501-FF)

Perfluoroalkylsulfonic acids (PFASs) - Assigned values

| Analyte                                                               | Result<br>µg/kg<br>wet weight | Assigned value<br>[outliers removed] | Robust standard<br>deviation<br>[outliers removed] | Standard<br>uncertainty<br>[outliers removed] | No. of results<br>contributing to<br>assigned value | Median<br>[all values] |
|-----------------------------------------------------------------------|-------------------------------|--------------------------------------|----------------------------------------------------|-----------------------------------------------|-----------------------------------------------------|------------------------|
| Perfluorobutanesulfonic acid (PFBS)                                   |                               |                                      |                                                    |                                               |                                                     | 0.0500                 |
| Perfluoropentanesulfonic acid (PFPeS)                                 |                               |                                      |                                                    |                                               |                                                     | 0.0500                 |
| Perfluorohexanesulfonic acid (PFHxS)                                  |                               |                                      |                                                    |                                               |                                                     | 0.0500                 |
| Perfluoroheptanesulfonic acid (PFHpS)                                 |                               |                                      |                                                    |                                               |                                                     | 0.0500                 |
| Linear Perfluorooctanesulfonic acid (L-PFOS)                          |                               | 6.26                                 | 0.72                                               | 0.14                                          | 41                                                  | 6.25                   |
| Sum of branched Perfluorooctanesulfonic acids (br-PFOS)               |                               | 0.160                                | 0.050                                              | 0.011                                         | 32                                                  | 0.173                  |
| Sum of branched and linear perfluorooctanesulfonic acids (total PFOS) |                               | 6.40                                 | 0.75                                               | 0.13                                          | 51                                                  | 6.50                   |
| Perfluorononanesulfonic acid (PFNS)                                   |                               |                                      |                                                    |                                               |                                                     | 0.0500                 |
| Perfluorodecanesulfonic acid (PFDS)                                   |                               |                                      |                                                    |                                               |                                                     | 0.0500                 |
| Perfluoroundecane sulfonic acid (PFUnDS)                              |                               |                                      |                                                    |                                               |                                                     | 0.0500                 |
| Perfluorododecane sulfonic acid (PFDoDS)                              |                               |                                      |                                                    |                                               |                                                     | 0.0500                 |
| Perfluorotridecane sulfonic acid (PFTriDS)                            |                               |                                      |                                                    |                                               |                                                     | 0.0500                 |



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EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

**Fish Fillet (2501-FF)**

Sum of PFOS, PFOA, PFNA, PFHxS - Assigned values

| Analyte                                   | Result<br>µg/kg<br>wet weight | Assigned value<br>[outliers removed] | Robust standard<br>deviation<br>[outliers removed] | Standard<br>uncertainty<br>[outliers removed] | No. of results<br>contributing to<br>assigned value | Median<br>[all values] |
|-------------------------------------------|-------------------------------|--------------------------------------|----------------------------------------------------|-----------------------------------------------|-----------------------------------------------------|------------------------|
| Sum of total PFOS, PFOA, PFNA, PFHxS (ub) |                               | 6.67                                 | 0.89                                               | 0.16                                          | 49                                                  | 6.70                   |
| Sum of total PFOS, PFOA, PFNA, PFHxS (lb) |                               | 6.58                                 | 0.76                                               | 0.13                                          | 50                                                  | 6.63                   |



# EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]

EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

## Fish Fillet (2501-FF)

Other PFAS - Assigned values

| Analyte                                                                                                                                     | Result<br>µg/kg<br>wet weight | Assigned value<br>[outliers removed] | Robust standard<br>deviation<br>[outliers removed] | Standard<br>uncertainty<br>[outliers removed] | No. of results<br>contributing to<br>assigned value | Median<br>[all values] |
|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------------------------------------|----------------------------------------------------|-----------------------------------------------|-----------------------------------------------------|------------------------|
| Perfluorooctane sulphonamide (FOSA)                                                                                                         |                               |                                      |                                                    |                                               |                                                     | 0.0905                 |
| 2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid (DONA)                                                 |                               |                                      |                                                    |                                               |                                                     | 0.0500                 |
| 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid (GenX)                                                                            |                               |                                      |                                                    |                                               |                                                     | 0.100                  |
| Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate (major component of F-53B)                                                         |                               |                                      |                                                    |                                               |                                                     | 0.0485                 |
| Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate (minor component of F-53B)                                                        |                               |                                      |                                                    |                                               |                                                     | 0.0375                 |
| 1-Propanaminium, N,N-dimethyl-N-oxide-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide (Capstone A)           |                               |                                      |                                                    |                                               |                                                     | 0.200                  |
| 1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide (Capstone B) |                               |                                      |                                                    |                                               |                                                     | 0.350                  |





**EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]**

EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food

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**Annex 2:** Participants' results of PFCAs, PFSA, sum of PFOS, PFOA, PFNA, PFHxS and other PFAS

**Test sample - Fish Fillet (2501-FF)**

\* Modified/additional results reported after distribution of preliminary results to all participating laboratories

Fish Fillet (2501-FF)  
Perfluoroalkylcarboxylic acids (PFCAs) - Results

| LC  | Sample  | Result<br>µg/kg<br>wet weight | Perfluorobutanoic<br>acid<br>(PFBA) | Perfluoropentanoic<br>acid<br>(PFPeA) | Perfluorohexanoic<br>acid<br>(PFHxA) | Perfluoroheptanoic<br>acid<br>(PFHpA) | Perfluorooctanoic<br>acid<br>(PFOA) | Perfluorononanoic<br>acid<br>(PFNA) | Perfluorodecanoic<br>acid<br>(PFDA) | Perfluoroundecanoic<br>acid<br>(PFUnDA) | Perfluorododecanoic<br>acid<br>(PFDoDA) | Perfluorotridecanoic<br>acid<br>(PFTrDA) | Perfluorotetradecanoic<br>acid<br>(PFTeDA) |
|-----|---------|-------------------------------|-------------------------------------|---------------------------------------|--------------------------------------|---------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------------------------|-----------------------------------------|------------------------------------------|--------------------------------------------|
| 2   | 2501-FF |                               | < 0.5                               | < 0.2                                 | < 0.2                                | < 0.1                                 | < 0.1                               | < 0.1                               | 0.62                                | 0.22                                    | 0.33                                    | 0.15                                     | 0.25                                       |
| 3   | 2501-FF |                               | < 0.1                               | 0.09                                  | 0.07                                 | 0.06                                  | 0.031                               | 0.092                               | 0.525                               | 0.265                                   | 0.408                                   | 0.191                                    | 0.186                                      |
| 4   | 2501-FF |                               |                                     |                                       |                                      |                                       | 0.0267                              | 0.0742                              |                                     |                                         |                                         |                                          |                                            |
| 5   | 2501-FF |                               | < 0.05                              | < 0.05                                | < 0.05                               | < 0.05                                | < 0.05                              | 0.0831                              | 0.461                               | 0.235                                   | 0.387                                   | 0.208                                    | 0.202                                      |
| 6   | 2501-FF |                               | < 0.2                               | < 0.2                                 | < 0.2                                | < 0.2                                 | < 0.2                               | 0.547                               | 0.27                                | 0.447                                   | 0.241                                   | 0.264                                    | 0.264                                      |
| 8   | 2501-FF |                               | < 0.2                               | < 0.2                                 | < 0.2                                | < 0.2                                 | < 0.2                               | 0.5                                 | 0.25                                | 0.57                                    | 0.57                                    | < 0.2                                    | 0.26                                       |
| 9   | 2501-FF |                               | < 0.1                               | < 0.05                                | < 0.05                               | < 0.015                               | 0.031                               | 0.083                               | 0.48                                | 0.24                                    | 0.41                                    | 0.23                                     | 0.16                                       |
| 10  | 2501-FF |                               |                                     |                                       | < 0.05                               |                                       | 0.033                               | 0.086                               | 0.471                               | 0.226                                   | 0.344                                   | 0.19                                     | 0.208                                      |
| 12  | 2501-FF |                               |                                     |                                       |                                      |                                       | < 0.1                               | < 0.1                               |                                     |                                         |                                         |                                          |                                            |
| 13  | 2501-FF |                               | 0.0913                              | 0.0221                                | < 0.01                               | < 0.01                                | < 0.05                              | 0.0737                              | 0.391                               | 0.197                                   | 0.346                                   | 0.154                                    | 0.17                                       |
| 15  | 2501-FF |                               |                                     |                                       |                                      | < 0.05                                | < 0.05                              | 0.094                               | 0.57                                | 0.29                                    | 0.51                                    |                                          | < 0.25                                     |
| 16  | 2501-FF |                               |                                     |                                       | < 0.045                              | < 0.056                               | 0.032                               | 0.075                               | 0.452                               | 0.249                                   | 0.396                                   |                                          |                                            |
| 17  | 2501-FF |                               | < 0.05                              | < 0.05                                | 0.042                                | < 0.03                                | 0.078                               | 0.103                               | 0.902                               | 0.667                                   |                                         |                                          |                                            |
| 19  | 2501-FF |                               |                                     | < 0.15                                | < 0.03                               | < 0.02                                | < 0.02                              | < 0.02                              | 0.495                               | 0.249                                   | 0.467                                   | < 0.03                                   | < 0.04                                     |
| 22  | 2501-FF |                               |                                     |                                       |                                      |                                       |                                     |                                     |                                     |                                         |                                         |                                          |                                            |
| 24  | 2501-FF |                               | 0.06                                |                                       |                                      |                                       | 0.1                                 | 0.14                                | 0.87                                |                                         |                                         |                                          |                                            |
| 28  | 2501-FF |                               | < 0.2                               | < 0.01                                | < 0.01                               | < 0.01                                | 0.028                               | 0.07                                | 0.39                                | 0.19                                    | 0.31                                    | 0.16                                     | 0.16                                       |
| 29  | 2501-FF |                               | < 0.25                              | < 0.05                                | < 0.05                               | < 0.05                                | < 0.05                              | 0.083                               | 0.47                                | 0.26                                    | 0.4                                     | 0.22                                     | 0.23                                       |
| 30  | 2501-FF |                               |                                     | < 0.1                                 | < 0.1                                | < 0.1                                 | < 0.1                               | 0.12                                | 0.51                                | 0.49                                    | 0.4                                     | 0.32                                     | < 0.1                                      |
| 31  | 2501-FF |                               | < 0.05                              | < 0.025                               | < 0.1                                | < 0.025                               | < 0.05                              | 0.083                               | 0.393                               | 0.257                                   | 0.388                                   | 0.21                                     | 0.197                                      |
| 37  | 2501-FF |                               |                                     | < 0.4                                 | < 0.2                                | < 0.1                                 | < 0.1                               | < 0.1                               | 0.451                               | 0.203                                   | 0.407                                   | 0.247                                    | 0.191                                      |
| 39  | 2501-FF |                               | 1.14                                | 0.17                                  | < 0.1                                | < 0.1                                 | 0.13                                | 0.15                                | 0.61                                | 0.35                                    | 0.55                                    | 0.33                                     | 0.37                                       |
| 41  | 2501-FF |                               |                                     |                                       |                                      |                                       | 0.04                                | 0.1                                 |                                     |                                         |                                         |                                          |                                            |
| 42  | 2501-FF |                               | < 0.03                              | < 0.03                                | < 0.03                               | < 0.02                                | 0.023                               | 0.062                               | 0.33                                | 0.17                                    | 0.31                                    | 0.14                                     | 0.17                                       |
| 43  | 2501-FF |                               | < 0.4                               | < 0.05                                | < 0.2                                | < 0.05                                | < 0.2                               | 0.084                               | 0.502                               | 0.256                                   | 0.423                                   | 0.177                                    | 0.204                                      |
| 44  | 2501-FF |                               |                                     | < 0.5                                 | < 0.5                                | < 0.2                                 | < 0.2                               | < 0.5                               | 0.52                                | 0.22                                    | < 0.5                                   | < 0.5                                    | < 0.5                                      |
| 47  | 2501-FF |                               |                                     |                                       |                                      |                                       | < 0.05                              | 0.05                                |                                     |                                         |                                         |                                          |                                            |
| 51  | 2501-FF |                               | 0.026                               | < 0.02                                | 0.025                                | < 0.01                                | 0.027                               | 0.074                               | 0.427                               | 0.211                                   | 0.274                                   | 0.211                                    | 0.17                                       |
| 53  | 2501-FF |                               | < 0.5                               | < 0.05                                | < 0.01                               | < 0.01                                | < 0.02                              | 0.071                               | 0.464                               | 0.224                                   | 0.39                                    | 0.201                                    | 0.183                                      |
| 54  | 2501-FF |                               | < 0.05                              | < 0.05                                | < 0.05                               | < 0.05                                | < 0.05                              | 0.0664                              | 0.367                               | 0.193                                   | 0.304                                   |                                          | 0.173                                      |
| 55  | 2501-FF |                               | 0.444                               | < 0.1                                 | < 0.1                                | < 0.1                                 | < 0.1                               | < 0.1                               | 0.566                               | 0.277                                   | 0.463                                   | < 0.2                                    | 0.214                                      |
| 58  | 2501-FF |                               |                                     |                                       | < 0.05                               | < 0.05                                | < 0.05                              | 0.078                               | 0.441                               | 0.224                                   | 0.379                                   |                                          | 0.193                                      |
| 59  | 2501-FF |                               |                                     |                                       |                                      |                                       | 0.0398                              | 0.0895                              |                                     |                                         |                                         |                                          |                                            |
| 61  | 2501-FF |                               | < 0.1                               | < 0.1                                 | < 0.1                                | < 0.1                                 | 0.038                               | 0.124                               | 0.579                               | 0.317                                   | 0.492                                   | 0.192                                    | 0.248                                      |
| 62  | 2501-FF |                               | < 0.05                              | < 0.05                                | < 0.05                               | < 0.05                                | 0.5                                 | 0.088                               | 0.41                                | 0.24                                    | 0.37                                    | 0.5                                      |                                            |
| 66  | 2501-FF |                               | < 10                                | < 0.1                                 | < 0.05                               | < 0.05                                | < 0.05                              | 0.0703                              | 0.444                               | 0.238                                   | 0.375                                   | 0.385                                    |                                            |
| 67  | 2501-FF |                               |                                     |                                       | < 0.1                                | < 0.1                                 | < 0.1                               | 0.1                                 | 0.55                                | 0.3                                     | 0.49                                    | 0.32                                     | 0.26                                       |
| 69  | 2501-FF |                               |                                     |                                       |                                      |                                       | < 0.1                               | 0.107                               |                                     |                                         |                                         |                                          |                                            |
| 70  | 2501-FF |                               | < 0.1                               | < 0.1                                 | < 0.1                                | < 0.1                                 | < 0.06                              | 0.095                               | 0.491                               | 0.227                                   | < 0.1                                   | < 0.1                                    | < 0.1                                      |
| 72  | 2501-FF |                               |                                     |                                       |                                      | 0.00578                               | 0.0302                              | 0.0761                              | 0.453                               | 0.237                                   | 0.378                                   |                                          | 0.211                                      |
| 73  | 2501-FF |                               | < 0.05                              | < 0.05                                | < 0.05                               | < 0.01                                | 0.0299                              | 0.0787                              | 0.448                               | 0.222                                   | 0.378                                   | 0.359                                    | 0.204                                      |
| 74  | 2501-FF |                               | < 0.067                             | < 0.067                               | < 0.067                              | < 0.067                               | < 0.067                             | 0.075                               | 0.747                               | < 0.667                                 | < 0.667                                 |                                          |                                            |
| 75  | 2501-FF |                               | < 0.1                               | < 0.02                                | < 0.02                               | < 0.02                                | 0.035                               | 0.082                               | 0.47                                | 0.237                                   | 0.407                                   | 0.286                                    | 0.21                                       |
| 76  | 2501-FF |                               | < 10                                | < 0.2                                 | < 0.2                                | < 0.2                                 | < 0.2                               | < 0.2                               | 0.371                               | 0.448                                   | 0.312                                   | < 0.2                                    | 0.203                                      |
| 77  | 2501-FF |                               |                                     |                                       |                                      |                                       | 0.106                               | 0.0755                              |                                     |                                         |                                         |                                          |                                            |
| 79  | 2501-FF |                               |                                     |                                       | < 0.05                               | < 0.05                                | < 0.05                              | 0.071                               | 0.429                               | 0.254                                   | 0.416                                   | 0.211                                    | 0.345                                      |
| 81  | 2501-FF |                               | < 0.01                              | 0.015                                 | < 0.05                               | < 0.05                                | 0.04                                | 0.1                                 | 0.577                               | 0.266                                   | 0.265                                   | 0.132                                    |                                            |
| 85  | 2501-FF |                               | < 0.17                              | < 0.12                                | < 0.02                               | < 0.02                                | < 0.1                               | 0.074                               | 0.426                               | 0.199                                   | 0.366                                   | < 0.17                                   | 0.205                                      |
| 86  | 2501-FF |                               | < 0.1                               | < 0.05                                | < 0.03                               | < 0.03                                | < 0.03                              | 0.083                               | 0.44                                | 0.22                                    | 0.36                                    | 0.17                                     | 0.19                                       |
| 87  | 2501-FF |                               |                                     |                                       |                                      |                                       | < 0.05                              | 0.076                               |                                     |                                         |                                         |                                          |                                            |
| 89  | 2501-FF |                               |                                     |                                       |                                      | 0.021                                 | 0.042                               | 0.072                               | 0.329                               |                                         | 0.283                                   |                                          |                                            |
| 93  | 2501-FF |                               | < 0.05                              | < 0.05                                | < 0.05                               | < 0.05                                | < 0.05                              | 0.08                                | < 0.05                              | < 0.05                                  | < 0.05                                  |                                          |                                            |
| 97  | 2501-FF |                               | < 0.2                               | < 0.005                               | < 0.005                              | < 0.005                               | 0.022                               | 0.078                               | 0.36                                | 0.24                                    | 0.36                                    | 0.1                                      | 0.176                                      |
| 99  | 2501-FF |                               | < 0.5                               | < 0.01                                | < 0.01                               | < 0.01                                | 0.0367                              | 0.0963                              | 0.569                               | 0.266                                   | 0.439                                   | 0.263                                    | 0.228                                      |
| 101 | 2501-FF |                               | < 0.5                               | < 0.01                                | < 0.01                               | < 0.01                                | 0.0376                              | 0.0779                              | 0.465                               | 0.25                                    | 0.504                                   | 0.239                                    | < 0.01                                     |
| 67A | 2501-FF |                               |                                     |                                       | < 0.1                                | < 0.1                                 | < 0.1                               | 0.11                                | 0.54                                | 0.31                                    | 0.46                                    | 0.38                                     | 0.23                                       |
| 71B | 2501-FF |                               | < 0.1                               | < 0.1                                 | < 0.1                                | < 0.1                                 | < 0.1                               | < 0.1                               | 0.263                               | 0.134                                   | 0.213                                   | 0.167                                    | 0.113                                      |
| 30* | 2501-FF |                               |                                     | < 0.1                                 | < 0.1                                | < 0.1                                 | < 0.1                               | 0.12                                | 0.51                                | 0.24                                    | 0.4                                     | 0.32                                     | < 0.1                                      |

Fish Fillet (2501-FF)  
Perfluoroalkylsulfonic acids (PFSA)s - Results

| LC  | Sample  | Result<br>µg/kg<br>wet weight | Perfluorobutanesulfonic<br>acid<br>(PFBS) | Perfluoropentanesulfon<br>ic<br>acid<br>(PFPeS) | Perfluorohexanesulfonic<br>acid<br>(PFHxS) | Perfluoroheptanesulfonic<br>acid<br>(PFHpS) | Linear Perfluorooctanesulfonic<br>acid<br>(L-PFOS) | Sum of branched<br>Perfluorooctanesulfonic<br>acid<br>(br-PFOS) | Sum of branched and linear<br>Perfluorooctanesulfonic<br>acid<br>(total PFOS) | Perfluorononane-<br>sulfonic acid<br>(PFNS) | Perfluorodecane-<br>sulfonic acid<br>(PFDS) | Perfluoroundecane-<br>sulfonic acid<br>(PFUnDS) | Perfluorododecane-<br>sulfonic acid<br>(PFDoDS) | Perfluorotridecane-<br>sulfonic acid<br>(PFTrDS) |
|-----|---------|-------------------------------|-------------------------------------------|-------------------------------------------------|--------------------------------------------|---------------------------------------------|----------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------|---------------------------------------------|-------------------------------------------------|-------------------------------------------------|--------------------------------------------------|
| 2   | 2501-FF |                               | < 0.1                                     | < 0.1                                           | < 0.1                                      | < 0.1                                       | 5.6                                                | 0.12                                                            | 5.7                                                                           | < 0.1                                       | < 0.1                                       | < 0.1                                           | < 0.1                                           | < 0.1                                            |
| 3   | 2501-FF |                               | < 0.01                                    | < 0.01                                          | 0.042                                      | 0.013                                       | 6.39                                               | 0.287                                                           | 6.68                                                                          | 0.04                                        | 0.09                                        | < 0.01                                          | < 0.01                                          | < 0.01                                           |
| 4   | 2501-FF |                               |                                           |                                                 | 0.0341                                     |                                             |                                                    |                                                                 | 6.49                                                                          |                                             |                                             |                                                 |                                                 |                                                  |
| 5   | 2501-FF |                               | < 0.05                                    | < 0.05                                          | 0.063                                      | < 0.05                                      | 6.4                                                | 0.156                                                           | 6.55                                                                          | < 0.05                                      | < 0.05                                      | < 0.05                                          |                                                 |                                                  |
| 6   | 2501-FF |                               | < 0.2                                     | < 0.2                                           | < 0.2                                      | < 0.2                                       | 7.08                                               | < 0.2                                                           | 7.14                                                                          | < 0.2                                       | < 0.2                                       | < 0.2                                           | < 0.2                                           | < 0.2                                            |
| 8   | 2501-FF |                               | < 0.2                                     | < 0.2                                           | < 0.2                                      | < 0.2                                       |                                                    |                                                                 | 6.61                                                                          | < 0.2                                       | < 0.2                                       |                                                 |                                                 |                                                  |
| 9   | 2501-FF |                               | < 0.015                                   | < 0.015                                         | 0.045                                      | < 0.015                                     | 6.25                                               | 0.65                                                            | 6.9                                                                           | < 0.05                                      | < 0.05                                      | < 0.05                                          | < 0.05                                          | < 0.1                                            |
| 10  | 2501-FF |                               | < 0.0044                                  | < 0.0048                                        | 0.038                                      | < 0.095                                     | 6.15                                               | 0.41                                                            | 6.56                                                                          | 0.009                                       | < 0.0096                                    | < 0.048                                         | < 0.049                                         | < 0.049                                          |
| 12  | 2501-FF |                               |                                           |                                                 | < 0.1                                      |                                             |                                                    |                                                                 | 6.35                                                                          |                                             |                                             |                                                 |                                                 |                                                  |
| 13  | 2501-FF |                               | < 0.01                                    | < 0.01                                          | 0.026                                      | < 0.01                                      | 5.4                                                | 0.1                                                             | 5.5                                                                           | < 0.01                                      | < 0.01                                      |                                                 | < 0.5                                           |                                                  |
| 15  | 2501-FF |                               |                                           |                                                 | < 0.046                                    | < 0.048                                     | 7.1                                                | 0.17                                                            | 7.27                                                                          | < 0.241                                     | < 0.024                                     |                                                 |                                                 |                                                  |
| 16  | 2501-FF |                               | < 0.018                                   | < 0.02                                          | 0.032                                      | 0.012                                       | 5.66                                               | 0.14                                                            | 5.8                                                                           |                                             |                                             |                                                 |                                                 |                                                  |
| 17  | 2501-FF |                               | < 0.02                                    | < 0.02                                          | 0.049                                      | < 0.02                                      |                                                    |                                                                 |                                                                               | 6.84                                        | < 0.02                                      | < 0.02                                          | < 0.04                                          | < 0.05                                           |
| 19  | 2501-FF |                               | < 0.03                                    |                                                 | < 0.04                                     |                                             | 7.26                                               |                                                                 |                                                                               |                                             | < 0.05                                      |                                                 |                                                 |                                                  |
| 22  | 2501-FF |                               |                                           |                                                 |                                            |                                             |                                                    |                                                                 | 7.4                                                                           |                                             |                                             |                                                 |                                                 |                                                  |
| 24  | 2501-FF |                               |                                           |                                                 | 0.05                                       |                                             | 9.88                                               | 0.6                                                             | 10.5                                                                          |                                             |                                             |                                                 |                                                 |                                                  |
| 28  | 2501-FF |                               | < 0.01                                    | < 0.01                                          | 0.039                                      | < 0.01                                      | 5.4                                                | 0.12                                                            | 5.6                                                                           | < 0.01                                      | < 0.01                                      |                                                 | < 0.01                                          |                                                  |
| 29  | 2501-FF |                               | < 0.05                                    | < 0.05                                          | < 0.05                                     | < 0.05                                      | 6.2                                                | 0.36                                                            | 6.5                                                                           | < 0.05                                      | < 0.05                                      | < 0.05                                          | < 0.05                                          | < 0.05                                           |
| 30  | 2501-FF |                               | < 0.1                                     | < 0.1                                           | < 0.1                                      | < 0.1                                       | 6.25                                               | 0.12                                                            | 6.37                                                                          | < 0.1                                       | < 0.1                                       | < 0.1                                           |                                                 |                                                  |
| 31  | 2501-FF |                               | < 0.025                                   | < 0.05                                          | 0.034                                      | < 0.025                                     | 6.25                                               | 0.258                                                           | 6.51                                                                          | < 0.025                                     | < 0.025                                     | < 0.025                                         | < 0.025                                         |                                                  |
| 37  | 2501-FF |                               | < 0.05                                    |                                                 | 0.0337                                     | < 0.025                                     | 5.7                                                | 0.248                                                           | 5.95                                                                          |                                             | < 0.05                                      |                                                 |                                                 |                                                  |
| 39  | 2501-FF |                               | < 0.1                                     |                                                 | 0.12                                       | < 0.1                                       | 8.62                                               |                                                                 |                                                                               |                                             | < 0.1                                       |                                                 |                                                 |                                                  |
| 41  | 2501-FF |                               |                                           |                                                 | 0.05                                       |                                             | 6.07                                               | 0.48                                                            | 6.55                                                                          |                                             |                                             |                                                 |                                                 |                                                  |
| 42  | 2501-FF |                               | < 0.02                                    |                                                 | 0.022                                      | < 0.02                                      | 4.92                                               | 0.21                                                            | 5.13                                                                          |                                             | < 0.02                                      |                                                 |                                                 |                                                  |
| 43  | 2501-FF |                               | < 0.05                                    | < 0.05                                          | < 0.05                                     | < 0.05                                      | 6.74                                               |                                                                 | 6.96                                                                          | < 0.2                                       | < 0.2                                       |                                                 |                                                 |                                                  |
| 44  | 2501-FF |                               | < 0.1                                     | < 0.1                                           | < 0.1                                      | < 0.1                                       |                                                    |                                                                 | 6.9                                                                           | < 0.1                                       | < 0.1                                       | < 0.2                                           | < 0.5                                           |                                                  |
| 47  | 2501-FF |                               |                                           |                                                 | < 0.1                                      |                                             |                                                    |                                                                 | 3.83                                                                          |                                             |                                             |                                                 |                                                 |                                                  |
| 51  | 2501-FF |                               | < 0.01                                    | < 0.01                                          | 0.038                                      | 0.01                                        | 6.1                                                | 0.155                                                           | 6.26                                                                          | < 0.01                                      | < 0.01                                      | < 0.02                                          | < 0.02                                          | < 0.05                                           |
| 53  | 2501-FF |                               | < 0.01                                    | < 0.01                                          | 0.044                                      | < 0.01                                      | 6.22                                               | 0.112                                                           | 6.33                                                                          | < 0.01                                      | < 0.01                                      |                                                 | < 0.01                                          |                                                  |
| 54  | 2501-FF |                               | < 0.05                                    |                                                 | 0.05                                       |                                             | 5.75                                               | 1.02                                                            | 6.77                                                                          |                                             |                                             |                                                 |                                                 |                                                  |
| 55  | 2501-FF |                               | < 0.1                                     | < 0.1                                           | < 0.1                                      | < 0.1                                       | 6.96                                               | < 0.1                                                           | 6.96                                                                          | < 0.1                                       | < 0.1                                       | < 0.1                                           | < 0.1                                           | < 0.2                                            |
| 58  | 2501-FF |                               |                                           |                                                 | < 0.05                                     | < 0.05                                      | 5.61                                               | 0.127                                                           | 5.74                                                                          |                                             |                                             |                                                 |                                                 |                                                  |
| 59  | 2501-FF |                               |                                           |                                                 | 0.0462                                     |                                             | 5.66                                               | 0.244                                                           | 5.9                                                                           |                                             |                                             |                                                 |                                                 |                                                  |
| 61  | 2501-FF |                               | < 0.1                                     | < 0.1                                           | 0.079                                      | 0.043                                       |                                                    |                                                                 | 8.45                                                                          | < 0.1                                       | < 0.1                                       | < 0.1                                           | < 0.1                                           | < 0.1                                            |
| 62  | 2501-FF |                               | < 0.05                                    | < 0.05                                          | < 0.05                                     | < 0.05                                      | 5.4                                                | 0.19                                                            | 5.59                                                                          | < 0.05                                      | < 0.05                                      | < 0.05                                          | < 0.05                                          | < 0.05                                           |
| 66  | 2501-FF |                               | < 0.05                                    | < 0.05                                          | < 0.05                                     | < 0.05                                      | 6.52                                               | 0.139                                                           | 6.84                                                                          | < 0.05                                      | < 0.05                                      | < 0.05                                          | < 0.05                                          | < 0.05                                           |
| 67  | 2501-FF |                               | < 0.1                                     | < 0.1                                           | < 0.1                                      | < 0.1                                       | 6.76                                               | 0.14                                                            | 6.9                                                                           | < 0.1                                       | < 0.1                                       |                                                 | < 0.1                                           |                                                  |
| 69  | 2501-FF |                               |                                           |                                                 | 0.044                                      |                                             |                                                    |                                                                 | 8.36                                                                          |                                             |                                             |                                                 |                                                 |                                                  |
| 70  | 2501-FF |                               | < 0.1                                     | < 0.1                                           | 0.037                                      | < 0.1                                       | 8.6                                                | 0.278                                                           | 8.88                                                                          | < 0.1                                       | < 0.1                                       | < 0.1                                           | < 0.1                                           | < 0.1                                            |
| 72  | 2501-FF |                               |                                           |                                                 | 0.0313                                     |                                             | 6.27                                               | 0.175                                                           | 6.45                                                                          | 0.00346                                     | 0.00716                                     |                                                 |                                                 |                                                  |
| 73  | 2501-FF |                               | < 0.01                                    | < 0.01                                          | 0.0342                                     | 0.0117                                      | 5.04                                               | 0.131                                                           | 5.17                                                                          | < 0.01                                      | < 0.01                                      | < 0.01                                          | < 0.01                                          | < 0.05                                           |
| 74  | 2501-FF |                               | < 0.067                                   | < 0.067                                         | < 0.067                                    | < 0.067                                     | 6.42                                               |                                                                 | 6.61                                                                          | < 0.133                                     |                                             |                                                 |                                                 |                                                  |
| 75  | 2501-FF |                               | < 0.02                                    | < 0.02                                          | 0.037                                      | < 0.02                                      | 6.63                                               | 0.173                                                           | 6.81                                                                          | < 0.02                                      | < 0.02                                      |                                                 | < 0.05                                          |                                                  |
| 76  | 2501-FF |                               | < 0.2                                     | < 0.2                                           | < 0.2                                      | < 0.2                                       | 7.04                                               | < 0.2                                                           | 7.24                                                                          | < 0.2                                       | < 0.2                                       | < 0.2                                           | < 0.2                                           | < 0.2                                            |
| 77  | 2501-FF |                               |                                           |                                                 | 0.0401                                     |                                             |                                                    |                                                                 | 5.96                                                                          |                                             |                                             |                                                 |                                                 |                                                  |
| 79  | 2501-FF |                               | < 0.05                                    | < 0.05                                          | < 0.05                                     | < 0.05                                      | 5.76                                               | 0.123                                                           | 5.88                                                                          | < 0.1                                       | < 0.1                                       |                                                 | < 0.1                                           |                                                  |
| 81  | 2501-FF |                               | < 0.01                                    | < 0.01                                          | 0.04                                       | 0.011                                       |                                                    |                                                                 | 5.62                                                                          | < 0.05                                      | < 0.01                                      |                                                 |                                                 |                                                  |
| 85  | 2501-FF |                               | < 0.05                                    |                                                 | 0.0352                                     | < 0.03                                      | 6.58                                               | 0.178                                                           | 6.69                                                                          |                                             | < 0.03                                      |                                                 | < 0.08                                          |                                                  |
| 86  | 2501-FF |                               | < 0.05                                    | < 0.05                                          | < 0.05                                     | < 0.05                                      | 5.8                                                | 0.21                                                            | 6                                                                             | < 0.05                                      | < 0.1                                       |                                                 |                                                 |                                                  |
| 87  | 2501-FF |                               |                                           |                                                 | 0.051                                      |                                             |                                                    |                                                                 | 5.68                                                                          |                                             |                                             |                                                 |                                                 |                                                  |
| 89  | 2501-FF |                               |                                           |                                                 | 0.054                                      |                                             |                                                    |                                                                 | 5.14                                                                          |                                             |                                             |                                                 |                                                 |                                                  |
| 93  | 2501-FF |                               |                                           |                                                 | < 0.05                                     |                                             | 6.5                                                | 0.1                                                             | 6.6                                                                           |                                             |                                             |                                                 |                                                 |                                                  |
| 97  | 2501-FF |                               | < 0.005                                   | < 0.005                                         | 0.041                                      | 0.015                                       | 5.51                                               | 0.25                                                            | 5.76                                                                          | 0.005                                       | 0.01                                        | < 0.005                                         | < 0.005                                         | < 0.005                                          |
| 99  | 2501-FF |                               | < 0.01                                    | < 0.01                                          | 0.0387                                     | 0.0102                                      | 6                                                  | 0.198                                                           | 6.2                                                                           | < 0.01                                      | < 0.01                                      | < 0.01                                          | < 0.01                                          | < 0.01                                           |
| 101 | 2501-FF |                               | < 0.01                                    | < 0.01                                          | 0.0397                                     | 0.0154                                      | 8.33                                               | 0.143                                                           | 8.47                                                                          | < 0.01                                      | < 0.01                                      | < 0.01                                          | < 0.01                                          | < 0.01                                           |
| 67A | 2501-FF |                               | < 0.1                                     | < 0.1                                           | < 0.1                                      | < 0.1                                       | 6.98                                               | 0.14                                                            | 7.13                                                                          | < 0.1                                       | < 0.1                                       |                                                 | < 0.1                                           |                                                  |
| 71B | 2501-FF |                               | < 0.1                                     | < 0.1                                           | < 0.1                                      | < 0.1                                       | 2.74                                               | < 0.1                                                           | 2.77                                                                          | < 0.1                                       | < 0.1                                       | < 0.1                                           | < 0.1                                           | < 0.1                                            |
| 30* | 2501-FF |                               | < 0.1                                     | < 0.1                                           | < 0.1                                      | < 0.1                                       | 6.25                                               | 0.12                                                            | 6.37                                                                          | < 0.1                                       | < 0.1                                       | < 0.1                                           |                                                 |                                                  |



EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]  
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Fish Fillet (2501-FF)  
Sum of PFOS, PFOA, PFNA, PFHxS - Results

| LC  | Sample  | Result              | Sum of total-PFOS, PFOA, PFNA, PFHxS | Sum of total-PFOS, PFOA, PFNA, PFHxS |
|-----|---------|---------------------|--------------------------------------|--------------------------------------|
|     |         | µg/kg<br>wet weight | (ub)                                 | (lb)                                 |
| 2   | 2501-FF |                     | 5.7                                  | 6                                    |
| 3   | 2501-FF |                     | 6.85                                 | 6.85                                 |
| 4   | 2501-FF |                     | 6.63                                 | 6.63                                 |
| 5   | 2501-FF |                     | 6.7                                  | 6.75                                 |
| 6   | 2501-FF |                     | 7.74                                 | 7.14                                 |
| 8   | 2501-FF |                     |                                      |                                      |
| 9   | 2501-FF |                     | 7.06                                 | 7.06                                 |
| 10  | 2501-FF |                     | 6.72                                 | 6.72                                 |
| 12  | 2501-FF |                     |                                      | 6.35                                 |
| 13  | 2501-FF |                     | 5.65                                 | 5.6                                  |
| 15  | 2501-FF |                     | 7.46                                 | 7.36                                 |
| 16  | 2501-FF |                     | 5.94                                 | 5.94                                 |
| 17  | 2501-FF |                     | 7.08                                 | 7.08                                 |
| 19  | 2501-FF |                     | 7.26                                 | 7.34                                 |
| 22  | 2501-FF |                     |                                      |                                      |
| 24  | 2501-FF |                     |                                      |                                      |
| 28  | 2501-FF |                     | 5.7                                  | 5.7                                  |
| 29  | 2501-FF |                     | 6.7                                  | 6.6                                  |
| 30  | 2501-FF |                     | 6.69                                 | 6.5                                  |
| 31  | 2501-FF |                     | 6.68                                 | 6.63                                 |
| 37  | 2501-FF |                     | 5.98                                 | 5.98                                 |
| 39  | 2501-FF |                     | 9.02                                 | 9.02                                 |
| 41  | 2501-FF |                     | 6.75                                 | 6.75                                 |
| 42  | 2501-FF |                     | 5.24                                 | 5.24                                 |
| 43  | 2501-FF |                     | 7.29                                 | 7.14                                 |
| 44  | 2501-FF |                     | 7.7                                  | 6.9                                  |
| 47  | 2501-FF |                     | 3.88                                 | 3.88                                 |
| 51  | 2501-FF |                     | 6.4                                  | 6.4                                  |
| 53  | 2501-FF |                     | 6.47                                 | 6.45                                 |
| 54  | 2501-FF |                     | 6.94                                 | 6.89                                 |
| 55  | 2501-FF |                     | 7.41                                 | 7.41                                 |
| 58  | 2501-FF |                     | 5.82                                 |                                      |
| 59  | 2501-FF |                     | 6.08                                 | 6.08                                 |
| 61  | 2501-FF |                     | 8.69                                 | 8.69                                 |
| 62  | 2501-FF |                     | 6.23                                 | 6.18                                 |
| 66  | 2501-FF |                     | 7.01                                 | 6.91                                 |
| 67  | 2501-FF |                     | 7.2                                  | 7                                    |
| 69  | 2501-FF |                     | 8.61                                 | 8.51                                 |
| 70  | 2501-FF |                     | 9.07                                 | 9.01                                 |
| 72  | 2501-FF |                     | 6.59                                 | 6.59                                 |
| 73  | 2501-FF |                     | 5.31                                 | 5.31                                 |
| 74  | 2501-FF |                     | 6.82                                 | 6.69                                 |
| 75  | 2501-FF |                     | 6.96                                 | 6.96                                 |
| 76  | 2501-FF |                     | 7.56                                 | 7.36                                 |
| 77  | 2501-FF |                     | 6.18                                 | 6.18                                 |
| 79  | 2501-FF |                     | 6.05                                 | 5.95                                 |
| 81  | 2501-FF |                     |                                      | 5.8                                  |
| 85  | 2501-FF |                     | 6.9                                  | 6.8                                  |
| 86  | 2501-FF |                     | 6.2                                  | 6.1                                  |
| 87  | 2501-FF |                     | 5.86                                 | 5.81                                 |
| 89  | 2501-FF |                     | 5.31                                 | 5.31                                 |
| 93  | 2501-FF |                     | 6.8                                  | 6.7                                  |
| 97  | 2501-FF |                     | 5.9                                  | 5.9                                  |
| 99  | 2501-FF |                     | 6.37                                 | 6.37                                 |
| 101 | 2501-FF |                     | 8.63                                 | 8.63                                 |
| 67A | 2501-FF |                     | 7.4                                  | 7.2                                  |
| 71B | 2501-FF |                     | 2.82                                 | 2.77                                 |
| 30* | 2501-FF |                     | 6.69                                 | 6.5                                  |



EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]  
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Fish Fillet (2501-FF)  
Other PFAS - Results

| LC  | Sample  | Result           | Perfluorooctane sulphonamide | 2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid | 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid | Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate | Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate | 1-Propanaminium, N,N-dimethyl-N-oxide-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide | 1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hvdroxide |
|-----|---------|------------------|------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|     |         | µg/kg wet weight | FOSA                         | DONA                                                                                 | GenX                                                      | (major component of F-53B)                               | (minor component of F-53B)                                | Capstone A                                                                                                           | Capstone B                                                                                                                     |
| 2   | 2501-FF |                  |                              | < 0.1                                                                                | < 0.1                                                     | < 0.1                                                    | < 0.1                                                     |                                                                                                                      |                                                                                                                                |
| 3   | 2501-FF |                  | 0.056                        | < 0.01                                                                               | < 0.1                                                     | < 0.01                                                   | < 0.01                                                    |                                                                                                                      |                                                                                                                                |
| 4   | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 5   | 2501-FF |                  | 0.081                        | < 0.05                                                                               | < 0.05                                                    | < 0.05                                                   | < 0.25                                                    |                                                                                                                      |                                                                                                                                |
| 6   | 2501-FF |                  | < 0.2                        | < 0.2                                                                                | < 0.2                                                     | < 0.2                                                    | < 0.2                                                     |                                                                                                                      |                                                                                                                                |
| 8   | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 9   | 2501-FF |                  |                              | < 0.015                                                                              | < 0.1                                                     | < 0.015                                                  | < 0.05                                                    |                                                                                                                      |                                                                                                                                |
| 10  | 2501-FF |                  |                              |                                                                                      | < 0.01                                                    |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 12  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 13  | 2501-FF |                  | 0.0572                       | < 0.5                                                                                | < 0.5                                                     | < 0.05                                                   | < 0.05                                                    |                                                                                                                      |                                                                                                                                |
| 15  | 2501-FF |                  | < 2.5                        | < 2.4                                                                                |                                                           | < 0.047                                                  |                                                           |                                                                                                                      |                                                                                                                                |
| 16  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 17  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 19  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 22  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 24  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 28  | 2501-FF |                  | 0.051                        | < 0.02                                                                               | < 0.2                                                     | < 0.02                                                   | < 0.02                                                    |                                                                                                                      |                                                                                                                                |
| 29  | 2501-FF |                  | 0.08                         | < 0.05                                                                               | < 0.05                                                    | < 0.05                                                   | < 0.05                                                    |                                                                                                                      |                                                                                                                                |
| 30  | 2501-FF |                  | < 0.1                        | < 0.4                                                                                | < 0.4                                                     |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 31  | 2501-FF |                  | 0.067                        | < 0.025                                                                              | < 0.025                                                   | < 0.025                                                  | < 0.025                                                   |                                                                                                                      | < 0.5                                                                                                                          |
| 37  | 2501-FF |                  |                              | < 0.2                                                                                | < 0.1                                                     |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 39  | 2501-FF |                  | 0.16                         |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 41  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 42  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 43  | 2501-FF |                  |                              | < 0.05                                                                               | < 0.05                                                    | < 0.05                                                   | < 0.05                                                    |                                                                                                                      |                                                                                                                                |
| 44  | 2501-FF |                  | < 0.5                        |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 47  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 51  | 2501-FF |                  |                              | < 0.03                                                                               | < 0.01                                                    | < 0.01                                                   | < 0.01                                                    |                                                                                                                      |                                                                                                                                |
| 53  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 54  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 55  | 2501-FF |                  | < 0.1                        | < 0.1                                                                                | < 0.1                                                     | < 0.1                                                    | < 0.1                                                     | < 0.2                                                                                                                | < 0.2                                                                                                                          |
| 58  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 59  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 61  | 2501-FF |                  | 1.2                          |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 62  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 66  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 67  | 2501-FF |                  |                              |                                                                                      | < 0.1                                                     |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 69  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 70  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 72  | 2501-FF |                  | 0.0651                       |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 73  | 2501-FF |                  |                              | < 0.01                                                                               | < 0.01                                                    | < 0.01                                                   | < 0.01                                                    |                                                                                                                      |                                                                                                                                |
| 74  | 2501-FF |                  | < 0.267                      |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 75  | 2501-FF |                  | 0.067                        | < 0.02                                                                               | < 0.1                                                     | < 0.02                                                   | < 0.02                                                    |                                                                                                                      |                                                                                                                                |
| 76  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 77  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 79  | 2501-FF |                  |                              | < 0.1                                                                                | < 0.1                                                     | < 0.1                                                    | < 0.1                                                     |                                                                                                                      |                                                                                                                                |
| 81  | 2501-FF |                  | 0.02                         |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 85  | 2501-FF |                  |                              | < 0.04                                                                               | < 0.38                                                    |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 86  | 2501-FF |                  |                              | < 0.1                                                                                | < 0.1                                                     | < 0.1                                                    |                                                           |                                                                                                                      |                                                                                                                                |
| 87  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 89  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 93  | 2501-FF |                  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 97  | 2501-FF |                  |                              | < 0.005                                                                              | < 0.005                                                   | < 0.005                                                  | < 0.005                                                   |                                                                                                                      |                                                                                                                                |
| 99  | 2501-FF |                  |                              | < 0.01                                                                               | < 0.01                                                    | < 0.01                                                   | < 0.01                                                    |                                                                                                                      |                                                                                                                                |
| 101 | 2501-FF |                  |                              | < 0.01                                                                               | < 0.01                                                    | < 0.01                                                   | < 0.01                                                    |                                                                                                                      |                                                                                                                                |
| 67A | 2501-FF |                  |                              |                                                                                      | < 0.1                                                     |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 71B | 2501-FF |                  | < 0.1                        | < 0.1                                                                                | < 0.1                                                     | < 0.1                                                    | < 0.1                                                     |                                                                                                                      |                                                                                                                                |
| 30* | 2501-FF |                  | < 0.1                        | < 0.4                                                                                | < 0.4                                                     |                                                          |                                                           |                                                                                                                      |                                                                                                                                |



## EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]

EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food

13 February 2026

**Annex 3:** Participants' z-scores of PFCAs, PFSA's and sum of PFOS, PFOA, PFNA, PFHxS

### Test sample - Fish Fillet (2501-FF)

#### Z-scores of individual substances and sum parameters

##### Calculation of z-score on basis of assigned value

$$z = (x - x_a) / x_a \cdot \sigma_{\text{prel}}$$

$x_a$ : assigned value

$x$ : participant's result

$\sigma_{\text{prel}}$ : fitness-for-purpose-based relative standard deviation for proficiency assessment

20%: Evaluated individual substances and sum parameters

\* Modified/additional results reported after distribution of preliminary results to all participating laboratories



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EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Fish Fillet (2501-FF)  
Perfluoroalkylcarboxylic acids (PFCAs) - Z-scores

| LC  | Sample  | Z-score<br>[σ <sub>p</sub> = 20 %] | Perfluorobutanoic<br>acid<br>(PFBA) | Perfluoropentanoic<br>acid<br>(PFPeA) | Perfluorohexanoic<br>acid<br>(PFHxA) | Perfluoroheptanoic<br>acid<br>(PFHpA) | Perfluorooctanoic<br>acid<br>(PFOA) | Perfluorononanoic<br>acid<br>(PFNA) | Perfluorodecanoic<br>acid<br>(PFDA) | Perfluoroundecanoic<br>acid<br>(PFUnDA) | Perfluorododecanoic<br>acid<br>(PFDoDA) | Perfluorotridecanoic<br>acid<br>(PFTrDA) | Perfluorotetradecanoic<br>acid<br>(PFTeDA) |
|-----|---------|------------------------------------|-------------------------------------|---------------------------------------|--------------------------------------|---------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------------------------|-----------------------------------------|------------------------------------------|--------------------------------------------|
| 2   | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     |                                     | 1.6                                 | -0.4                                    | -0.8                                    | -1.2                                     | 1.1                                        |
| 3   | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 0.4                                 | 0.6                                 | 0.5                                     | 0.2                                     | -0.1                                     | -0.5                                       |
| 4   | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.6                                |                                     |                                         |                                         |                                          |                                            |
| 5   | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.1                                | -0.1                                | -0.1                                    | -0.1                                    | 0.3                                      | -0.1                                       |
| 6   | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 0.8                                 | 0.6                                 | 0.6                                     | 0.7                                     | 1.1                                      | 1.4                                        |
| 8   | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 0.3                                 | 0.2                                 | 0.2                                     | 2.2                                     |                                          | 1.3                                        |
| 9   | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.1                                | 0.1                                 | 0.0                                     | 0.2                                     | 0.9                                      | -1.1                                       |
| 10  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 0.1                                 | 0.0                                 | -0.3                                    | -0.6                                    | -0.2                                     | 0.0                                        |
| 12  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     |                                     |                                     |                                         |                                         |                                          |                                            |
| 13  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.6                                | -0.8                                | -0.9                                    | -0.6                                    | -1.1                                     | -0.9                                       |
| 15  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 0.6                                 | 1.1                                 | 1.0                                     | 1.5                                     |                                          |                                            |
| 16  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.6                                | -0.2                                | 0.2                                     | 0.0                                     |                                          |                                            |
| 17  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 1.1                                 | 4.6                                 | 8.9                                     |                                         |                                          |                                            |
| 19  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     |                                     | 0.3                                 | 0.2                                     | 0.9                                     |                                          |                                            |
| 22  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     |                                     |                                     |                                         |                                         |                                          |                                            |
| 24  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 3.3                                 | 4.3                                 |                                         |                                         |                                          |                                            |
| 28  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.9                                | -0.8                                | -1.0                                    | -1.1                                    | -0.9                                     | -1.1                                       |
| 29  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.1                                | 0.0                                 | 0.4                                     | 0.1                                     | 0.6                                      | 0.6                                        |
| 30  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 2.1                                 | 0.4                                 | 5.2                                     | 0.1                                     | 3.2                                      |                                            |
| 31  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.1                                | -0.8                                | 0.4                                     | -0.1                                    | 0.4                                      | -0.2                                       |
| 37  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     |                                     | -0.2                                | -0.8                                    | 0.2                                     | 1.3                                      | -0.4                                       |
| 39  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 3.9                                 | 1.5                                 | 2.3                                     | 2.0                                     | 3.4                                      | 4.0                                        |
| 41  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 0.9                                 |                                     |                                         |                                         |                                          |                                            |
| 42  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -1.3                                | -1.5                                | -1.5                                    | -1.1                                    | -1.4                                     | -0.9                                       |
| 43  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 0.0                                 | 0.4                                 | 0.3                                     | 0.4                                     | -0.5                                     | 0.0                                        |
| 44  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     |                                     | 0.5                                 | -0.4                                    |                                         |                                          |                                            |
| 47  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -2.0                                |                                     |                                         |                                         |                                          |                                            |
| 51  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.6                                | -0.4                                | -0.6                                    | -1.5                                    | 0.4                                      | -0.9                                       |
| 53  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.8                                | -0.1                                | -0.3                                    | -0.1                                    | 0.1                                      | -0.6                                       |
| 54  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -1.1                                | -1.1                                | -1.0                                    | -1.1                                    |                                          | -0.8                                       |
| 55  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     |                                     | 1.0                                 | 0.8                                     | 0.9                                     |                                          | 0.2                                        |
| 58  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.4                                | -0.3                                | -0.3                                    | -0.2                                    |                                          | -0.3                                       |
| 59  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 0.3                                 |                                     |                                         |                                         |                                          |                                            |
| 61  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 2.3                                 | 1.2                                 | 1.6                                     | 1.2                                     | -0.1                                     | 1.0                                        |
| 62  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 0.2                                 | -0.6                                | 0.0                                     | -0.3                                    | 7.8                                      |                                            |
| 66  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.8                                | -0.3                                | 0.0                                     | -0.2                                    | 4.8                                      |                                            |
| 67  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 0.9                                 | 0.9                                 | 1.3                                     | 1.2                                     | 3.2                                      | 1.3                                        |
| 69  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 1.3                                 |                                     |                                         |                                         |                                          |                                            |
| 70  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 0.6                                 | 0.2                                 | -0.3                                    |                                         |                                          |                                            |
| 72  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.5                                | -0.2                                | -0.1                                    | -0.2                                    |                                          | 0.1                                        |
| 73  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.3                                | -0.2                                | -0.4                                    | -0.2                                    | 4.2                                      | 0.0                                        |
| 74  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.6                                | 3.0                                 |                                         |                                         |                                          |                                            |
| 75  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.2                                | 0.0                                 | -0.1                                    | 0.2                                     | 2.3                                      | 0.1                                        |
| 76  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     |                                     | -1.0                                | 4.3                                     | -1.0                                    |                                          | -0.1                                       |
| 77  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.5                                |                                     |                                         |                                         |                                          |                                            |
| 79  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.8                                | -0.4                                | 0.3                                     | 0.3                                     | 0.4                                      | 3.4                                        |
| 81  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 0.9                                 | 1.2                                 | 0.5                                     | -1.6                                    | -1.6                                     |                                            |
| 85  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.6                                | -0.5                                | -0.9                                    | -0.4                                    |                                          | 0.0                                        |
| 86  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.1                                | -0.3                                | -0.4                                    | -0.4                                    | -0.7                                     | -0.4                                       |
| 87  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.5                                |                                     |                                         |                                         |                                          |                                            |
| 89  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.7                                | -1.5                                |                                         | -1.4                                    |                                          |                                            |
| 93  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.3                                |                                     |                                         |                                         |                                          |                                            |
| 97  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.4                                | -1.2                                | 0.0                                     | -0.4                                    | -2.4                                     | -0.7                                       |
| 99  | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 0.7                                 | 1.1                                 | 0.5                                     | 0.6                                     | 1.7                                      | 0.5                                        |
| 101 | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | -0.4                                | 0.0                                 | 0.2                                     | 1.4                                     | 1.1                                      |                                            |
| 67A | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 1.5                                 | 0.8                                 | 1.5                                     | 0.8                                     | 4.7                                      | 0.6                                        |
| 71B | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     |                                     | -2.2                                | -2.2                                    | -2.3                                    | -0.7                                     | -2.3                                       |
| 30* | 2501-FF |                                    |                                     |                                       |                                      |                                       |                                     | 2.1                                 | 0.4                                 | 0.0                                     | 0.1                                     | 3.2                                      |                                            |





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EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Fish Fillet (2501-FF)  
Perfluoroalkylsulfonic acids (PFSAs) - Z-scores

| LC | Sample  | Z-score<br>[σ <sub>p</sub> = 20 %] | Perfluorobutanesulfonic acid<br>(PFBS) | Perfluoropentanesulfonic acid<br>(PFPeS) | Perfluorohexanesulfonic acid<br>(PFHxS) | Perfluoroheptanesulfonic acid<br>(PFHpS) | Linear Perfluorooctanesulfonic acid<br>(L-PFOS) | Sum of branched Perfluorooctanesulfonic acid<br>(br-PFOS) | Sum of branched and linear Perfluorooctanesulfonic acid<br>(total PFOS) | Perfluorononane- sulfonic acid<br>(PFNS) | Perfluorodecane- sulfonic acid<br>(PFDS) | Perfluoroundecane- sulfonic acid<br>(PFUnDS) | Perfluorododecane- sulfonic acid<br>(PFDoDS) | Perfluorotridecane- sulfonic acid<br>(PFTrDS) |
|----|---------|------------------------------------|----------------------------------------|------------------------------------------|-----------------------------------------|------------------------------------------|-------------------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------|------------------------------------------|----------------------------------------------|----------------------------------------------|-----------------------------------------------|
| 2  | 2501-FF |                                    |                                        |                                          |                                         |                                          | -0.5                                            | -1.3                                                      | -0.5                                                                    |                                          |                                          |                                              |                                              |                                               |
| 3  | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.1                                             | 4.0                                                       | 0.2                                                                     |                                          |                                          |                                              |                                              |                                               |
| 4  | 2501-FF |                                    |                                        |                                          |                                         |                                          |                                                 |                                                           | 0.1                                                                     |                                          |                                          |                                              |                                              |                                               |
| 5  | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.1                                             | -0.1                                                      | 0.1                                                                     |                                          |                                          |                                              |                                              |                                               |
| 6  | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.7                                             |                                                           | 0.6                                                                     |                                          |                                          |                                              |                                              |                                               |
| 8  | 2501-FF |                                    |                                        |                                          |                                         |                                          |                                                 |                                                           | 0.2                                                                     |                                          |                                          |                                              |                                              |                                               |
| 9  | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.0                                             | 15.3                                                      | 0.4                                                                     |                                          |                                          |                                              |                                              |                                               |
| 10 | 2501-FF |                                    |                                        |                                          |                                         |                                          | -0.1                                            | 7.8                                                       | 0.1                                                                     |                                          |                                          |                                              |                                              |                                               |
| 12 | 2501-FF |                                    |                                        |                                          |                                         |                                          |                                                 |                                                           | 0.0                                                                     |                                          |                                          |                                              |                                              |                                               |
| 13 | 2501-FF |                                    |                                        |                                          |                                         |                                          | -0.7                                            | -1.9                                                      | -0.7                                                                    |                                          |                                          |                                              |                                              |                                               |
| 15 | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.7                                             | 0.3                                                       | 0.7                                                                     |                                          |                                          |                                              |                                              |                                               |
| 16 | 2501-FF |                                    |                                        |                                          |                                         |                                          | -0.5                                            | -0.6                                                      | -0.5                                                                    |                                          |                                          |                                              |                                              |                                               |
| 17 | 2501-FF |                                    |                                        |                                          |                                         |                                          |                                                 |                                                           |                                                                         |                                          |                                          |                                              |                                              |                                               |
| 19 | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.8                                             |                                                           |                                                                         |                                          |                                          |                                              |                                              |                                               |
| 22 | 2501-FF |                                    |                                        |                                          |                                         |                                          |                                                 |                                                           | 0.8                                                                     |                                          |                                          |                                              |                                              |                                               |
| 24 | 2501-FF |                                    |                                        |                                          |                                         |                                          | 2.9                                             | 13.8                                                      | 3.2                                                                     |                                          |                                          |                                              |                                              |                                               |
| 28 | 2501-FF |                                    |                                        |                                          |                                         |                                          | -0.7                                            | -1.3                                                      | -0.6                                                                    |                                          |                                          |                                              |                                              |                                               |
| 29 | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.0                                             | 6.3                                                       | 0.1                                                                     |                                          |                                          |                                              |                                              |                                               |
| 30 | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.0                                             | -1.3                                                      | 0.0                                                                     |                                          |                                          |                                              |                                              |                                               |
| 31 | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.0                                             | 3.1                                                       | 0.1                                                                     |                                          |                                          |                                              |                                              |                                               |
| 37 | 2501-FF |                                    |                                        |                                          |                                         |                                          | -0.4                                            | 2.8                                                       | -0.4                                                                    |                                          |                                          |                                              |                                              |                                               |
| 39 | 2501-FF |                                    |                                        |                                          |                                         |                                          | 1.9                                             |                                                           |                                                                         |                                          |                                          |                                              |                                              |                                               |
| 41 | 2501-FF |                                    |                                        |                                          |                                         |                                          | -0.2                                            | 10.0                                                      | 0.1                                                                     |                                          |                                          |                                              |                                              |                                               |
| 42 | 2501-FF |                                    |                                        |                                          |                                         |                                          | -1.1                                            | 1.6                                                       | -1.0                                                                    |                                          |                                          |                                              |                                              |                                               |
| 43 | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.4                                             |                                                           | 0.4                                                                     |                                          |                                          |                                              |                                              |                                               |
| 44 | 2501-FF |                                    |                                        |                                          |                                         |                                          |                                                 |                                                           | 0.4                                                                     |                                          |                                          |                                              |                                              |                                               |
| 47 | 2501-FF |                                    |                                        |                                          |                                         |                                          |                                                 |                                                           | -2.0                                                                    |                                          |                                          |                                              |                                              |                                               |
| 51 | 2501-FF |                                    |                                        |                                          |                                         |                                          | -0.1                                            | -0.2                                                      | -0.1                                                                    |                                          |                                          |                                              |                                              |                                               |
| 53 | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.0                                             | -1.5                                                      | -0.1                                                                    |                                          |                                          |                                              |                                              |                                               |
| 54 | 2501-FF |                                    |                                        |                                          |                                         |                                          | -0.4                                            | 26.9                                                      | 0.3                                                                     |                                          |                                          |                                              |                                              |                                               |
| 55 | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.6                                             |                                                           | 0.4                                                                     |                                          |                                          |                                              |                                              |                                               |
| 58 | 2501-FF |                                    |                                        |                                          |                                         |                                          | -0.5                                            | -1.0                                                      | -0.5                                                                    |                                          |                                          |                                              |                                              |                                               |
| 59 | 2501-FF |                                    |                                        |                                          |                                         |                                          | -0.5                                            | 2.6                                                       | -0.4                                                                    |                                          |                                          |                                              |                                              |                                               |
| 61 | 2501-FF |                                    |                                        |                                          |                                         |                                          |                                                 |                                                           | 1.6                                                                     |                                          |                                          |                                              |                                              |                                               |
| 62 | 2501-FF |                                    |                                        |                                          |                                         |                                          | -0.7                                            | 0.9                                                       | -0.6                                                                    |                                          |                                          |                                              |                                              |                                               |
| 66 | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.2                                             | -0.7                                                      | 0.3                                                                     |                                          |                                          |                                              |                                              |                                               |
| 67 | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.4                                             | -0.6                                                      | 0.4                                                                     |                                          |                                          |                                              |                                              |                                               |
| 69 | 2501-FF |                                    |                                        |                                          |                                         |                                          |                                                 |                                                           | 1.5                                                                     |                                          |                                          |                                              |                                              |                                               |
| 70 | 2501-FF |                                    |                                        |                                          |                                         |                                          | 1.9                                             | 3.7                                                       | 1.9                                                                     |                                          |                                          |                                              |                                              |                                               |
| 72 | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.0                                             | 0.5                                                       | 0.0                                                                     |                                          |                                          |                                              |                                              |                                               |
| 73 | 2501-FF |                                    |                                        |                                          |                                         |                                          | -1.0                                            | -0.9                                                      | -1.0                                                                    |                                          |                                          |                                              |                                              |                                               |
| 74 | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.1                                             |                                                           | 0.2                                                                     |                                          |                                          |                                              |                                              |                                               |
| 75 | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.3                                             | 0.4                                                       | 0.3                                                                     |                                          |                                          |                                              |                                              |                                               |
| 76 | 2501-FF |                                    |                                        |                                          |                                         |                                          | 0.6                                             |                                                           | 0.7                                                                     |                                          |                                          |                                              |                                              |                                               |
| 77 | 2501-FF |                                    |                                        |                                          |                                         |                                          |                                                 |                                                           | -0.3                                                                    |                                          |                                          |                                              |                                              |                                               |
| 79 | 2501-FF |                                    |                                        |                                          |                                         |                                          | -0.4                                            | -1.2                                                      | -0.4                                                                    |                                          |                                          |                                              |                                              |                                               |
| 81 | 2501-FF |                                    |                                        |                                          |                                         |                                          |                                                 |                                                           | -0.6                                                                    |                                          |                                          |                                              |                                              |                                               |
| 85 |         |                                    |                                        |                                          |                                         |                                          |                                                 |                                                           |                                                                         |                                          |                                          |                                              |                                              |                                               |





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EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Fish Fillet (2501-FF)  
Sum of Total PFOS, PFOA, PFNA, PFHxS - Z-scores

| LC  | Sample  | Z-score<br>[σ <sub>p</sub> = 20 %] | Sum of Total PFOS, PFOA, PFNA,<br>PFHxS<br>(ub) | Sum of Total PFOS, PFOA, PFNA,<br>PFHxS<br>(lb) |
|-----|---------|------------------------------------|-------------------------------------------------|-------------------------------------------------|
| 2   | 2501-FF |                                    | -0.7                                            | -0.4                                            |
| 3   | 2501-FF |                                    | 0.1                                             | 0.2                                             |
| 4   | 2501-FF |                                    | 0.0                                             | 0.0                                             |
| 5   | 2501-FF |                                    | 0.0                                             | 0.1                                             |
| 6   | 2501-FF |                                    | 0.8                                             | 0.4                                             |
| 8   | 2501-FF |                                    |                                                 |                                                 |
| 9   | 2501-FF |                                    | 0.3                                             | 0.4                                             |
| 10  | 2501-FF |                                    | 0.0                                             | 0.1                                             |
| 12  | 2501-FF |                                    |                                                 | -0.2                                            |
| 13  | 2501-FF |                                    | -0.8                                            | -0.7                                            |
| 15  | 2501-FF |                                    | 0.6                                             | 0.6                                             |
| 16  | 2501-FF |                                    | -0.5                                            | -0.5                                            |
| 17  | 2501-FF |                                    | 0.3                                             | 0.4                                             |
| 19  | 2501-FF |                                    | 0.4                                             | 0.6                                             |
| 22  | 2501-FF |                                    |                                                 |                                                 |
| 24  | 2501-FF |                                    |                                                 |                                                 |
| 28  | 2501-FF |                                    | -0.7                                            | -0.7                                            |
| 29  | 2501-FF |                                    | 0.0                                             | 0.0                                             |
| 30  | 2501-FF |                                    | 0.0                                             | -0.1                                            |
| 31  | 2501-FF |                                    | 0.0                                             | 0.0                                             |
| 37  | 2501-FF |                                    | -0.5                                            | -0.5                                            |
| 39  | 2501-FF |                                    | 1.8                                             | 1.9                                             |
| 41  | 2501-FF |                                    | 0.1                                             | 0.1                                             |
| 42  | 2501-FF |                                    | -1.1                                            | -1.0                                            |
| 43  | 2501-FF |                                    | 0.5                                             | 0.4                                             |
| 44  | 2501-FF |                                    | 0.8                                             | 0.2                                             |
| 47  | 2501-FF |                                    | -2.1                                            | -2.1                                            |
| 51  | 2501-FF |                                    | -0.2                                            | -0.1                                            |
| 53  | 2501-FF |                                    | -0.1                                            | -0.1                                            |
| 54  | 2501-FF |                                    | 0.2                                             | 0.2                                             |
| 55  | 2501-FF |                                    | 0.6                                             | 0.6                                             |
| 58  | 2501-FF |                                    | -0.6                                            |                                                 |
| 59  | 2501-FF |                                    | -0.4                                            | -0.4                                            |
| 61  | 2501-FF |                                    | 1.5                                             | 1.6                                             |
| 62  | 2501-FF |                                    | -0.3                                            | -0.3                                            |
| 66  | 2501-FF |                                    | 0.3                                             | 0.3                                             |
| 67  | 2501-FF |                                    | 0.4                                             | 0.3                                             |
| 69  | 2501-FF |                                    | 1.5                                             | 1.5                                             |
| 70  | 2501-FF |                                    | 1.8                                             | 1.8                                             |
| 72  | 2501-FF |                                    | -0.1                                            | 0.0                                             |
| 73  | 2501-FF |                                    | -1.0                                            | -1.0                                            |
| 74  | 2501-FF |                                    | 0.1                                             | 0.1                                             |
| 75  | 2501-FF |                                    | 0.2                                             | 0.3                                             |
| 76  | 2501-FF |                                    | 0.7                                             | 0.6                                             |
| 77  | 2501-FF |                                    | -0.4                                            | -0.3                                            |
| 79  | 2501-FF |                                    | -0.5                                            | -0.5                                            |
| 81  | 2501-FF |                                    |                                                 | -0.6                                            |
| 85  | 2501-FF |                                    | 0.2                                             | 0.2                                             |
| 86  | 2501-FF |                                    | -0.4                                            | -0.4                                            |
| 87  | 2501-FF |                                    | -0.6                                            | -0.6                                            |
| 89  | 2501-FF |                                    | -1.0                                            | -1.0                                            |
| 93  | 2501-FF |                                    | 0.1                                             | 0.1                                             |
| 97  | 2501-FF |                                    | -0.6                                            | -0.5                                            |
| 99  | 2501-FF |                                    | -0.2                                            | -0.2                                            |
| 101 | 2501-FF |                                    | 1.5                                             | 1.6                                             |
| 67A | 2501-FF |                                    | 0.5                                             | 0.5                                             |
| 71B | 2501-FF |                                    | -2.9                                            | -2.9                                            |
| 30* | 2501-FF |                                    | 0.0                                             | -0.1                                            |



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EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Fish Fillet (2501-FF)  
Other PFAS - Z-scores

| LC | Sample  | Z-score<br>[σ <sub>p</sub> = 20 %] | Perfluorooctane sulphonamide<br><br>FOSA | 2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid<br>DONA | 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid<br>GenX | Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate<br><br>(major component of F-53B) | Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate<br><br>(minor component of F-53B) | 1-Propanaminium, N,N-dimethyl-N-oxide-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hvdroxide<br>Capstone A | 1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonvylamino]-, Capstone B |
|----|---------|------------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| 2  | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 3  | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 4  | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 5  | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 6  | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 8  | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 9  | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 10 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 12 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 13 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 15 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 16 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 17 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 19 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 22 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 24 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 28 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 29 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 30 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 31 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 37 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 39 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 41 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 42 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 43 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 44 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 47 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 51 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 53 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 54 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 55 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 58 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 59 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 61 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 62 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 66 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 67 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 69 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 70 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 72 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 73 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 74 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 75 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 76 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 77 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 79 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 81 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 85 | 2501-FF |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |
| 86 |         |                                    |                                          |                                                                                              |                                                                   |                                                                                            |                                                                                             |                                                                                                                                    |                                                                                                                                 |



## EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]

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**Annex 4:** Participants' z-scores of PFCAs, PFSAAs and sum of PFOS, PFOA, PFNA, PFHxS - charts

### Test sample - Fish Fillet (2501-FF)

#### Z-scores of individual substances and sum parameters

##### Calculation of z-score on basis of assigned value

$$z = (x - x_a) / x_a \cdot \sigma_{\text{prel}}$$

$x_a$ : assigned value

$x$ : participant's result

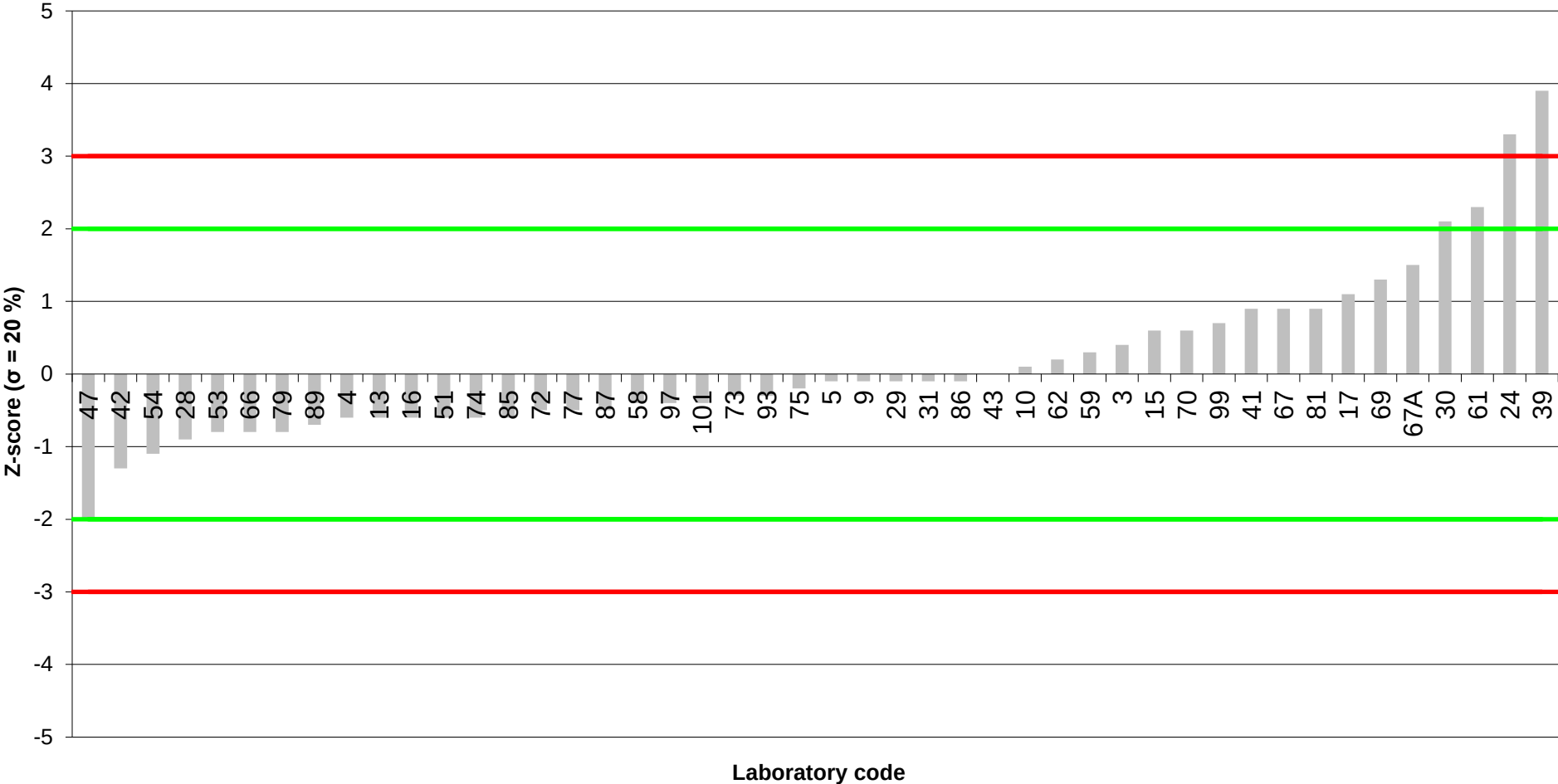
$\sigma_{\text{prel}}$ : fitness-for-purpose-based relative standard deviation for proficiency assessment

20%: Evaluated individual substances and sum parameters

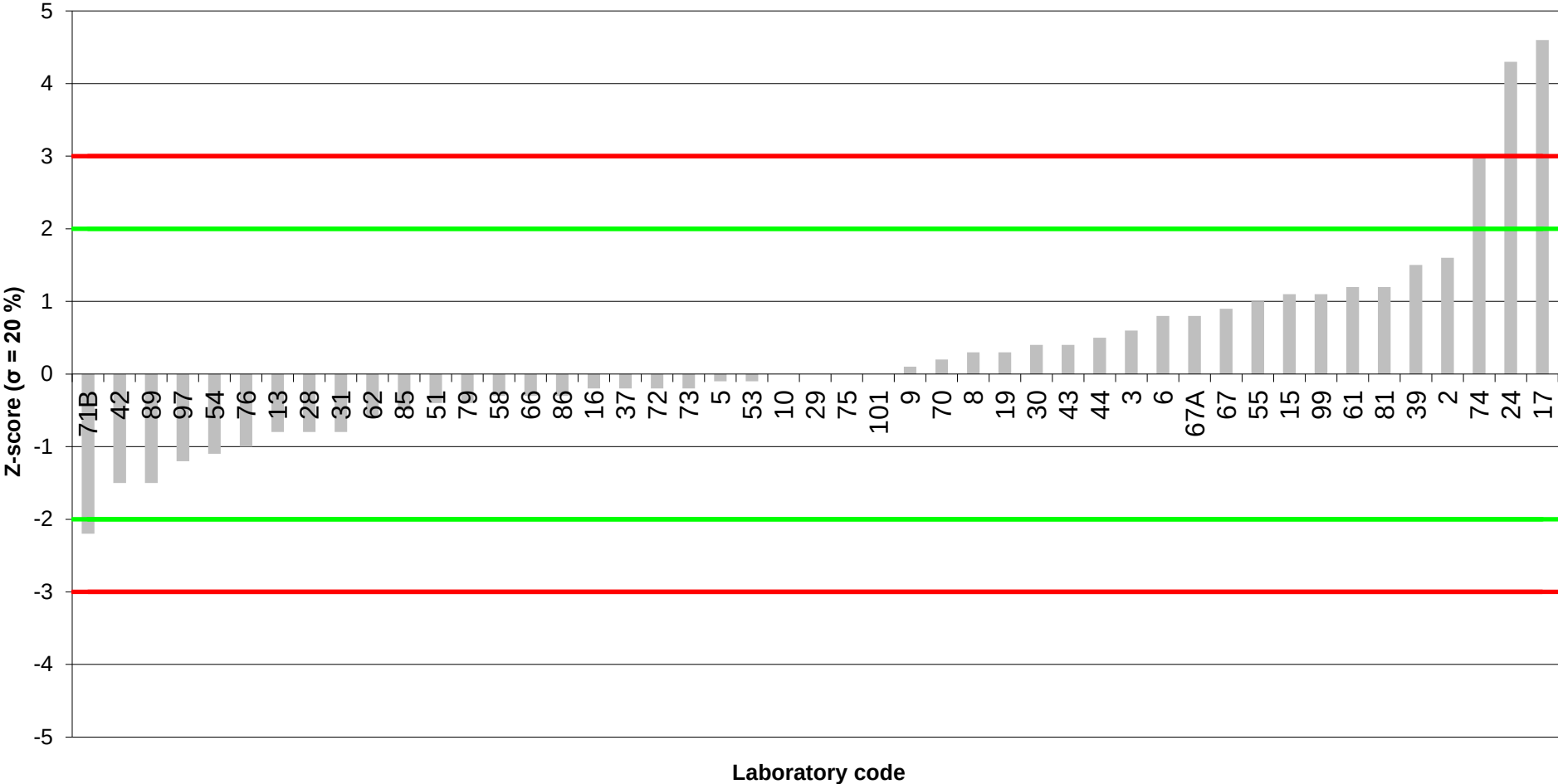
± 2 z-scores: —————

± 3 z-scores: —————

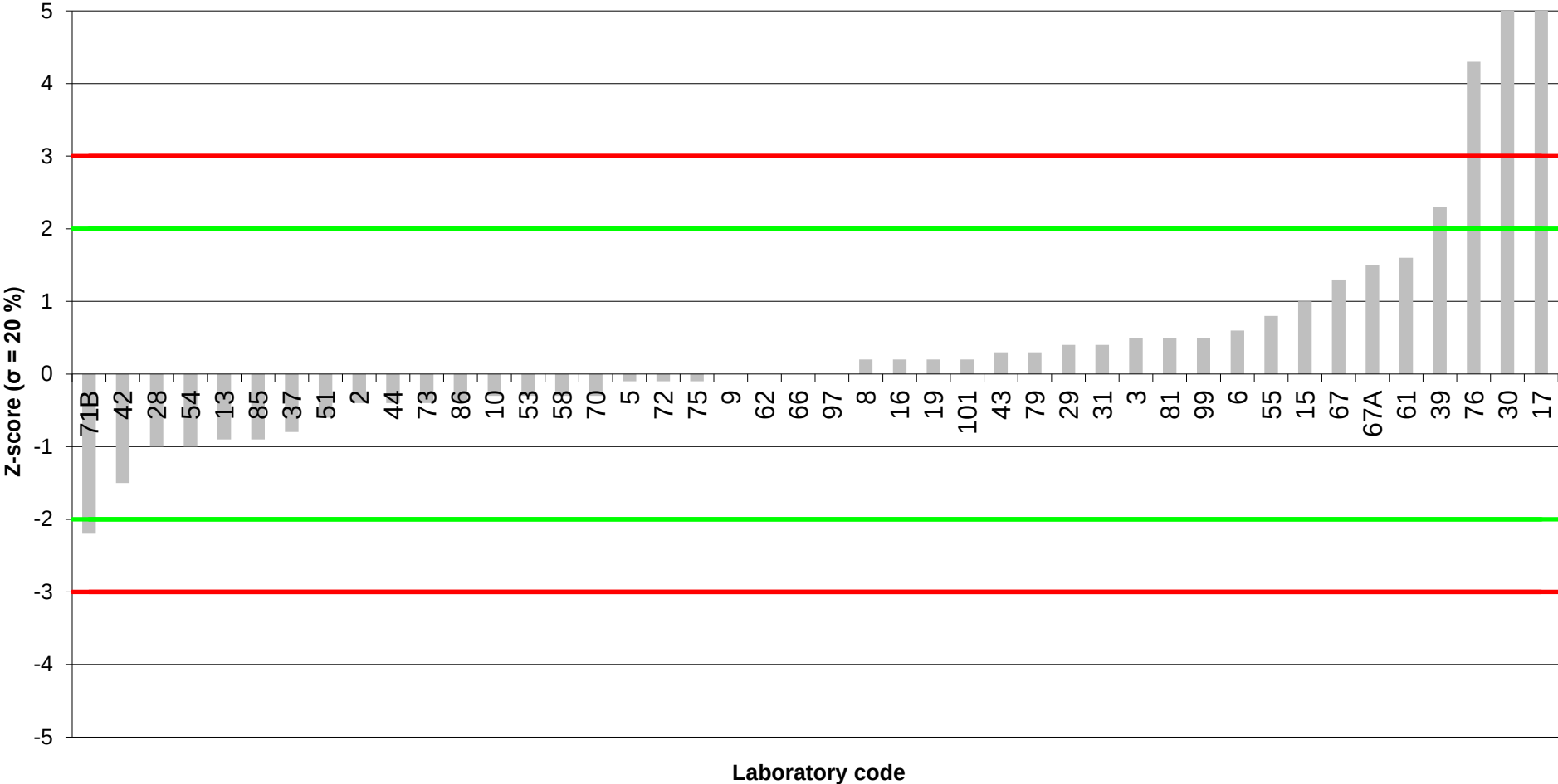
**Fish Fillet (2501-FF)**  
**Perfluorononanoic acid**  
Assigned value: 0.0846 µg/kg wet weight



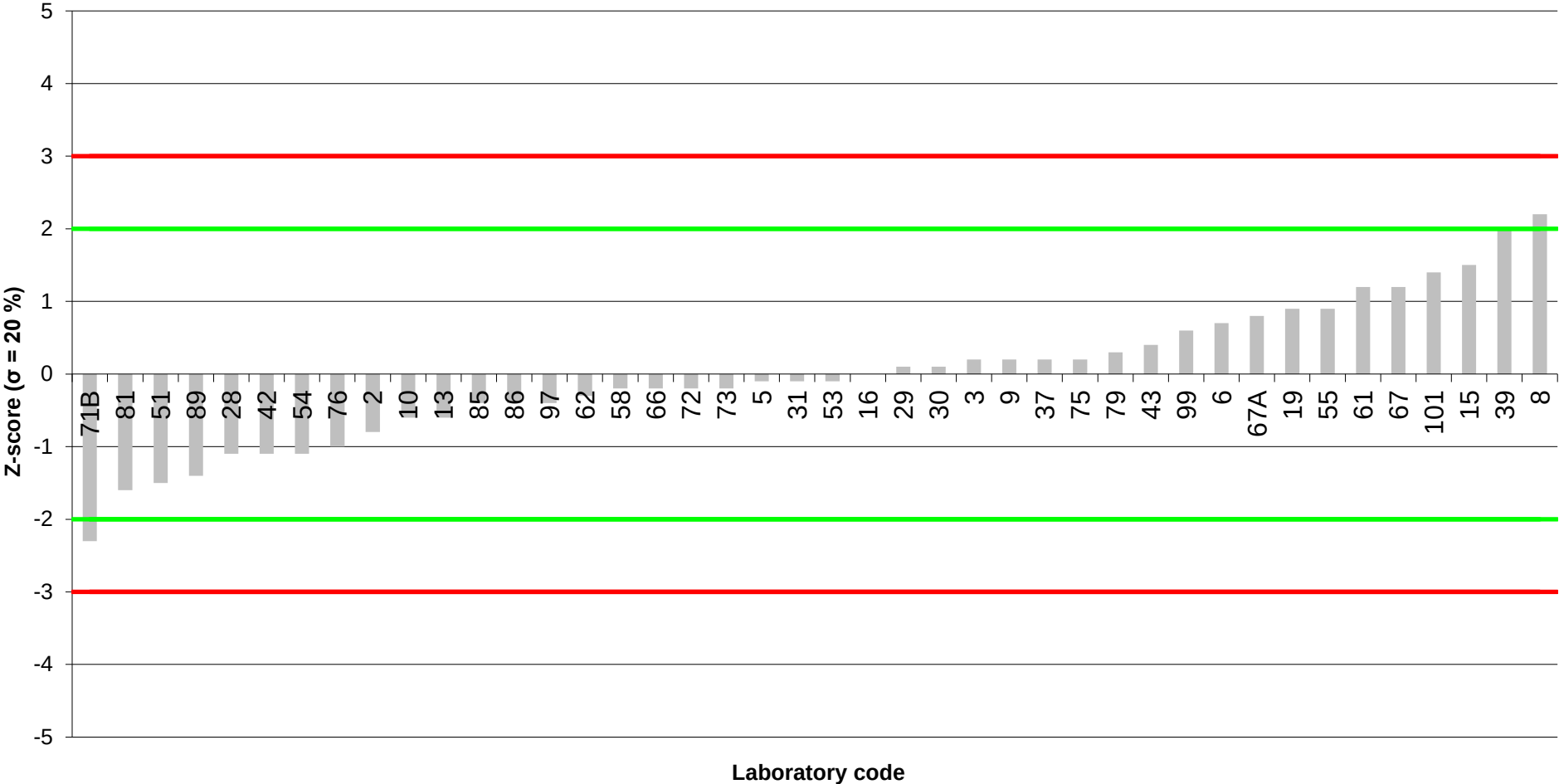
**Fish Fillet (2501-FF)**  
**Perfluorodecanoic acid**  
Assigned value: 0.469 µg/kg wet weight



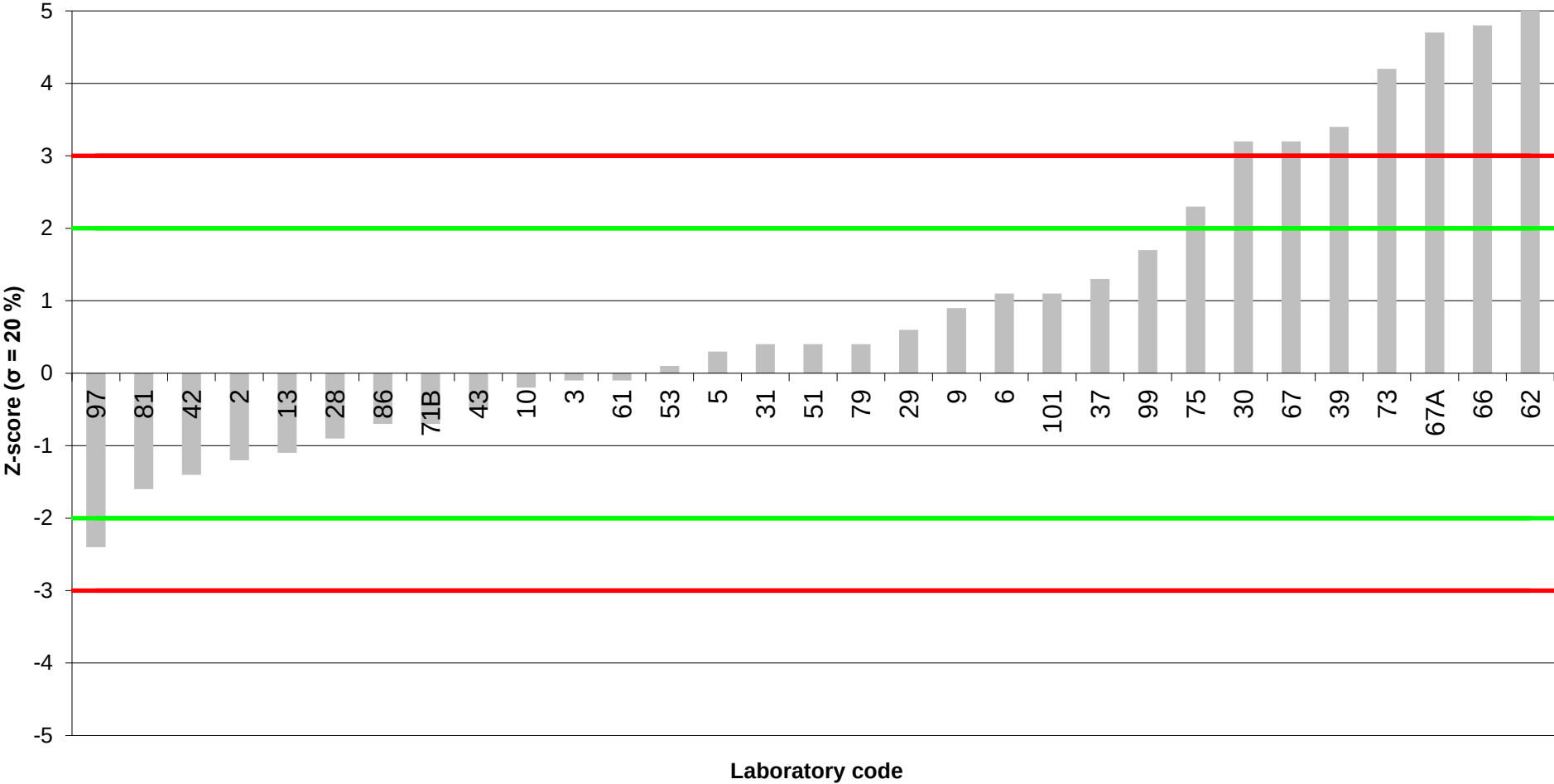
**Fish Fillet (2501-FF)**  
**Perfluoroundecanoic acid**  
Assigned value: 0.240 µg/kg wet weight



**Fish Fillet (2501-FF)**  
**Perfluorododecanoic acid**  
Assigned value: 0.394 µg/kg wet weight

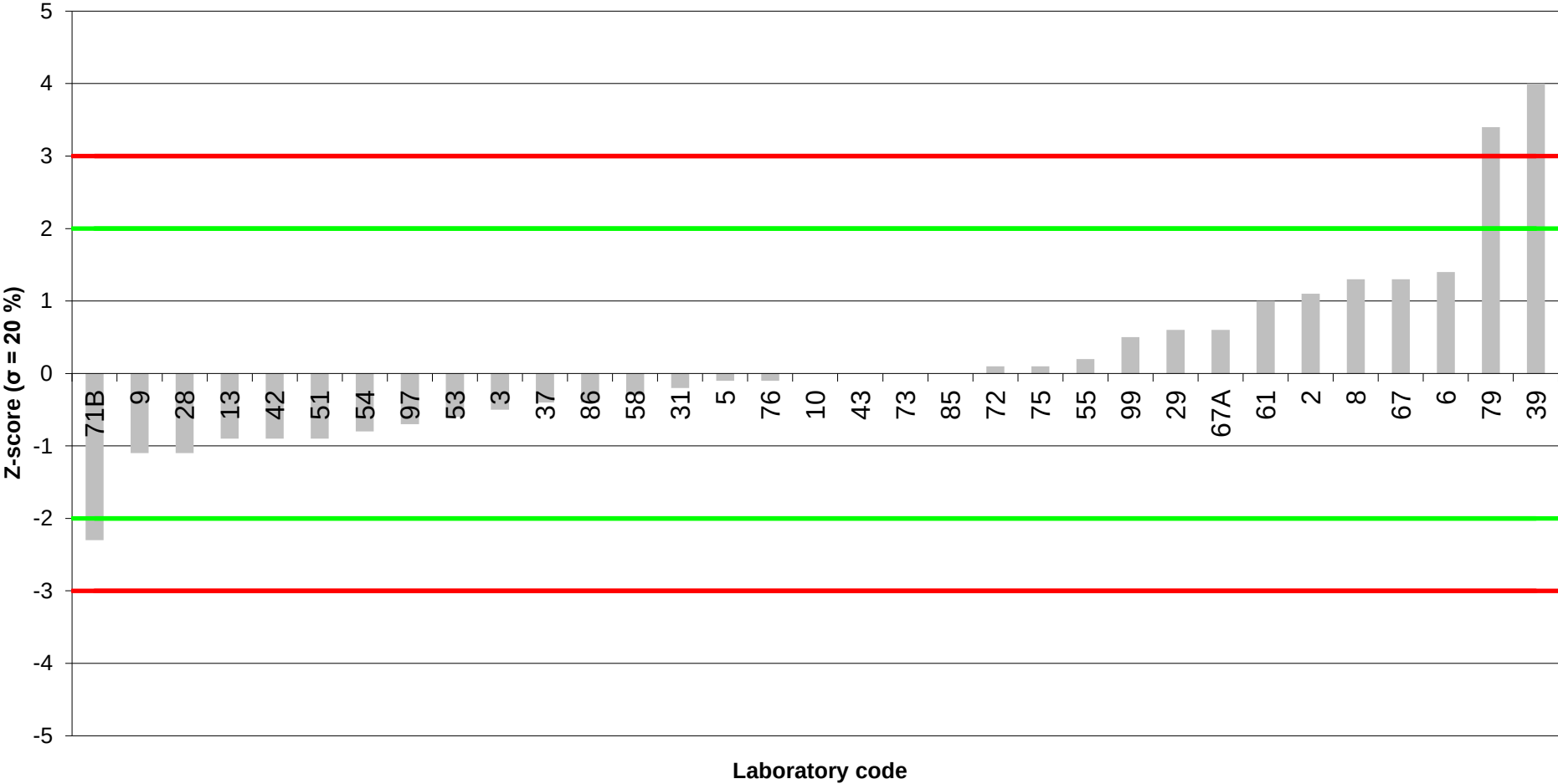


**Fish Fillet (2501-FF)**  
**Perfluorotridecanoic acid**  
Assigned value: 0.196 µg/kg wet weight

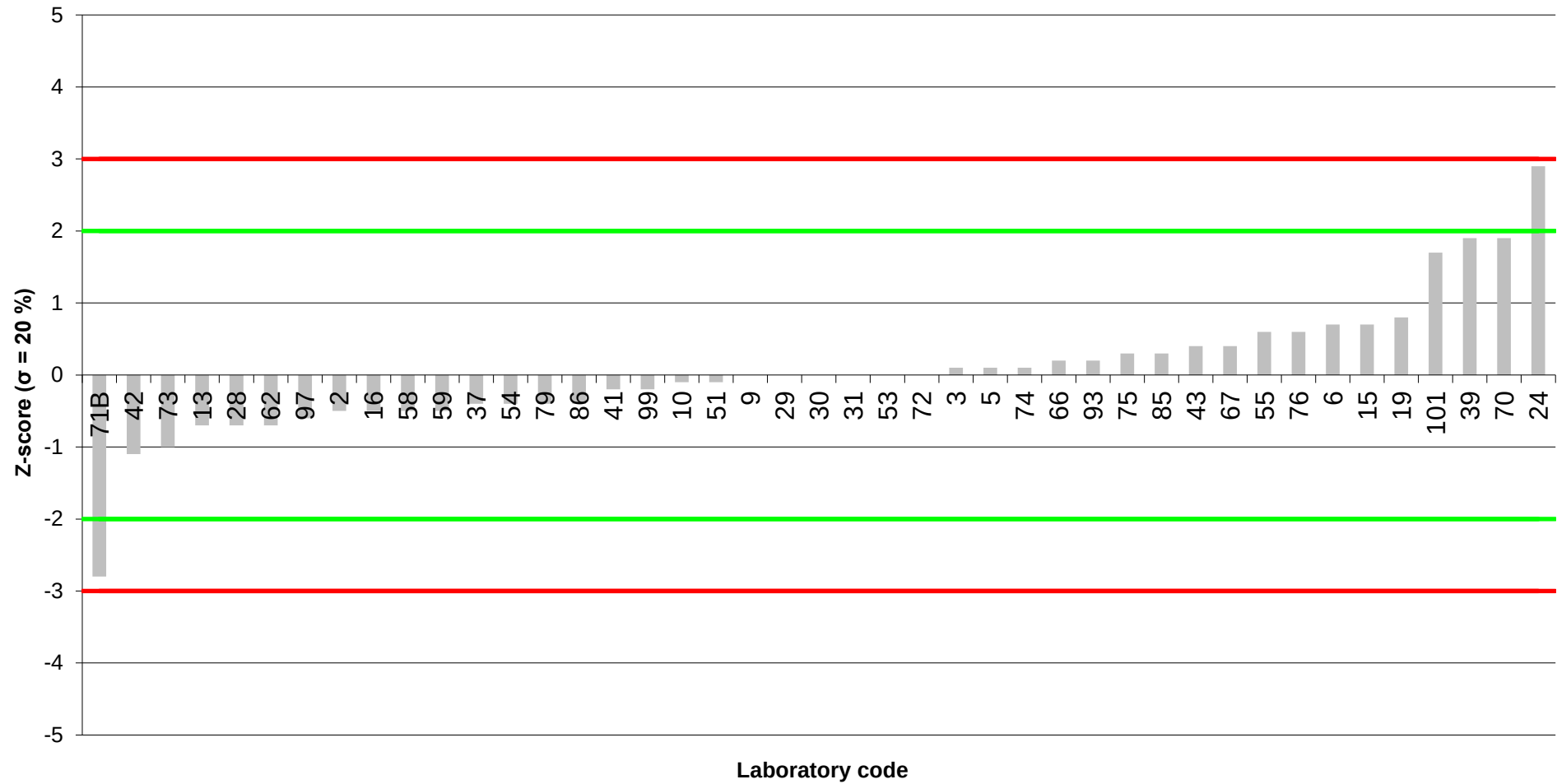




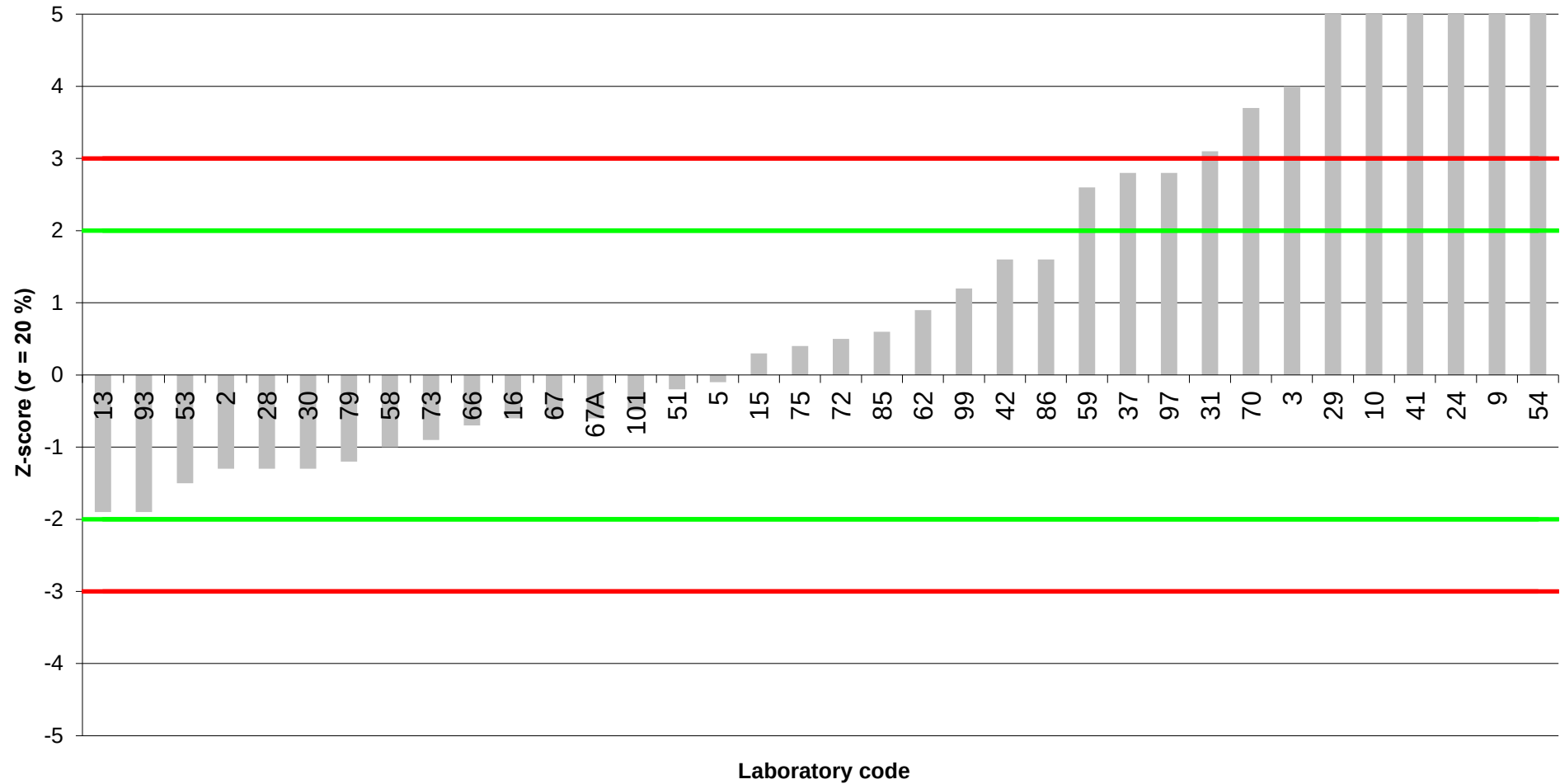
**Fish Fillet (2501-FF)**  
**Perfluorotetradecanoic acid**  
Assigned value: 0.206 µg/kg wet weight



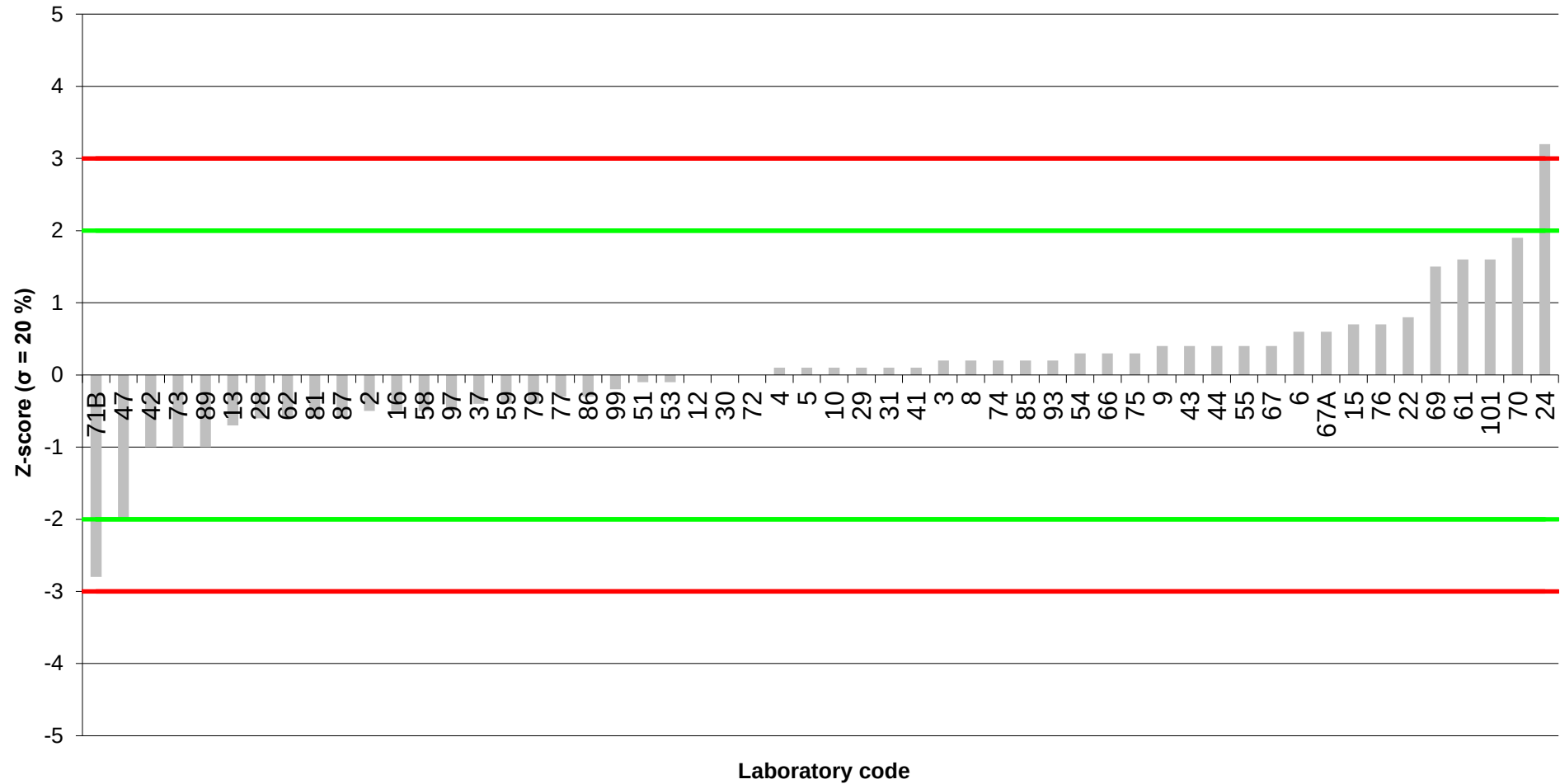
**Fish Fillet (2501-FF)**  
**Linear Perfluorooctanesulfonic acid**  
Assigned value: 6.26 µg/kg wet weight



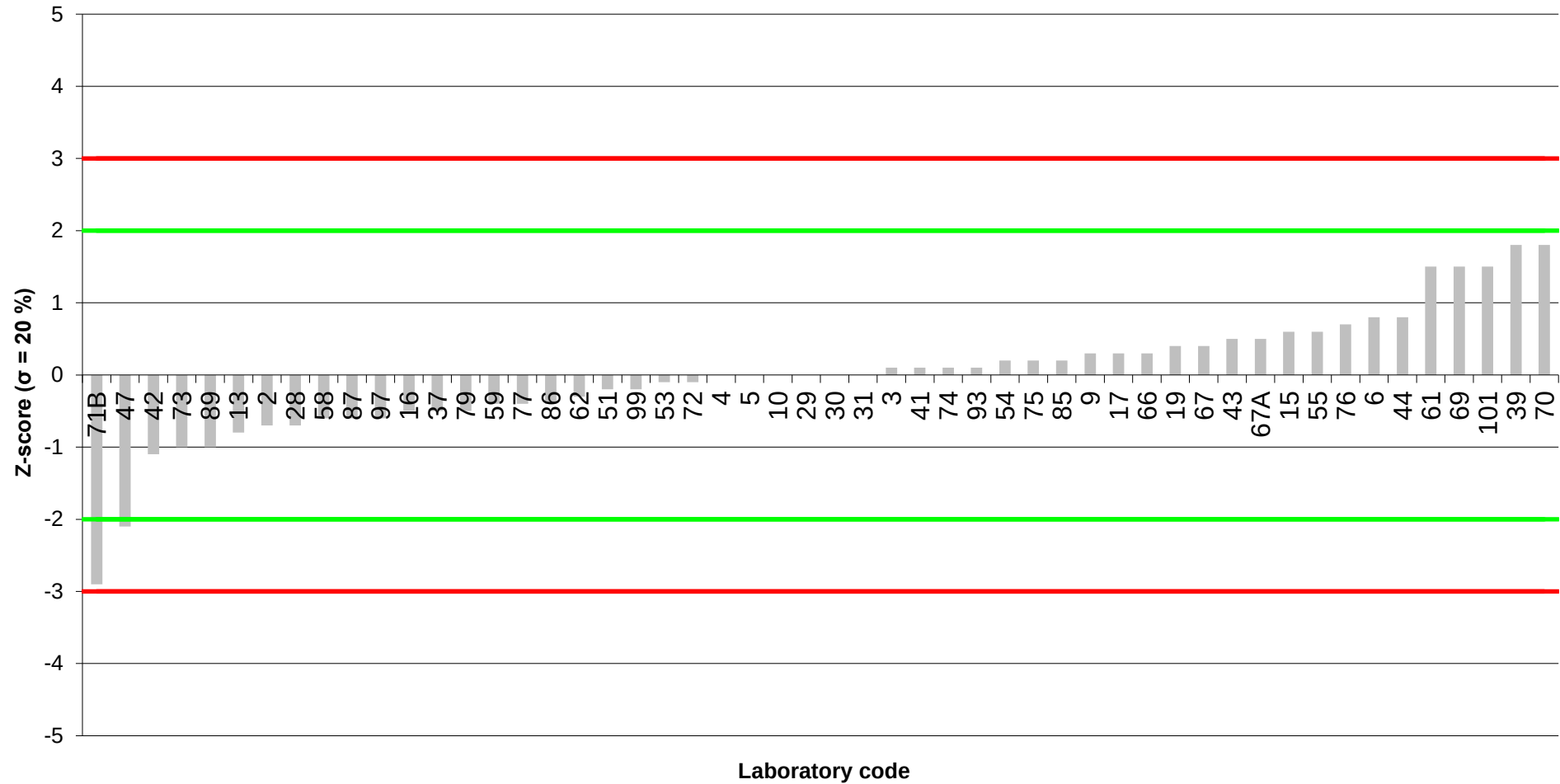
**Fish Fillet (2501-FF)**  
**Sum of branched Perfluorooctanesulfonic acid**  
Assigned value: 0.160 µg/kg wet weight



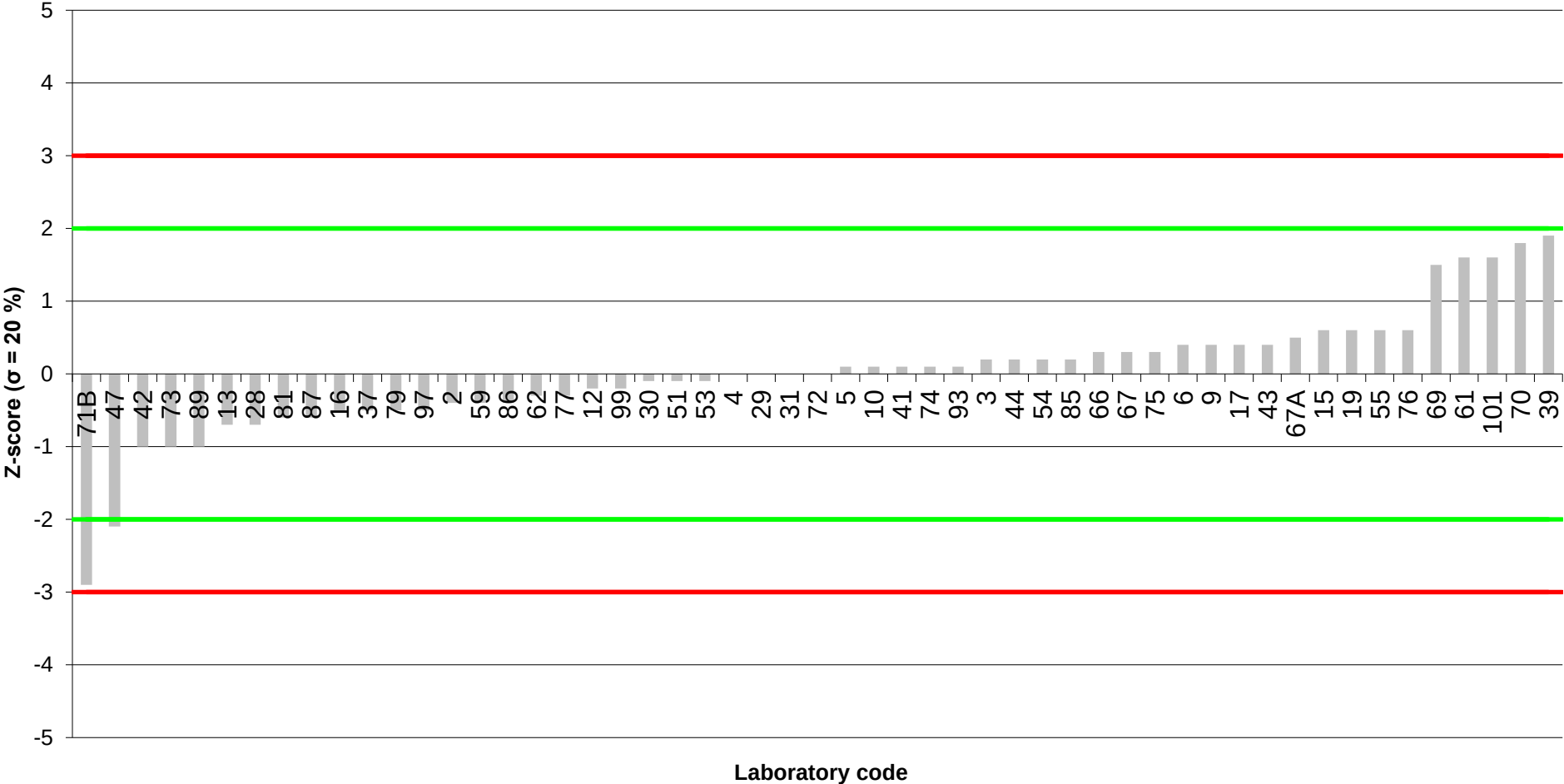
**Fish Fillet (2501-FF)**  
**Sum of branched and linear Perfluorooctanesulfonic acid**  
Assigned value: 6.40 µg/kg wet weight



**Fish Fillet (2501-FF)**  
**Sum of total PFOS, PFOA, PFNA, PFHxS (ub)**  
Assigned value: 6.67 µg/kg wet weight



**Fish Fillet (2501-FF)**  
**Sum of total PFOS, PFOA, PFNA, PFHxS (lb)**  
Assigned value: 6.58 µg/kg wet weight





**EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]**

EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food

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**Annex 5:** Test for sufficient homogeneity and stability for PFCAs, PFSAAs and sum of PFOS, PFOA, PFNA, PFHxS

**Test sample - Fish Fillet (2501-FF)**



# EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]

EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food

## Fish Fillet (2501-FF)

PFCAs, PFSAAs - Homogeneity test - Data

| Analyte    | Result<br>µg/kg wet weight | Mean<br>(n = 10, duplicate analysis) | Median<br>(n = 10, duplicate analysis) | Relative standard deviation<br>[%] |
|------------|----------------------------|--------------------------------------|----------------------------------------|------------------------------------|
| PFNA       |                            | 0.0794                               | 0.0791                                 | 5%                                 |
| PFDA       |                            | 0.393                                | 0.403                                  | 6%                                 |
| PFUnDA     |                            | 0.189                                | 0.190                                  | 3%                                 |
| PFDoDA     |                            | 0.338                                | 0.342                                  | 4%                                 |
| PFTTrDA    |                            | 0.209                                | 0.212                                  | 5%                                 |
| PFTTeDA    |                            | 0.170                                | 0.168                                  | 6%                                 |
| PFHxS      |                            | 0.0331                               | 0.0331                                 | 9%                                 |
| br-PFOS    |                            | 0.129                                | 0.128                                  | 7%                                 |
| L-PFOS     |                            | 5.42                                 | 5.39                                   | 4%                                 |
| Total-PFOS |                            | 5.55                                 | 5.53                                   | 4%                                 |
| FOSA       |                            | 0.0676                               | 0.0681                                 | 18%                                |



# EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]

EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food

## Fish Fillet (2501-FF)

Selected compounds - Homogeneity test - Data

| Sample                                                      | Replicate | Result<br>µg/kg wet weight | PFDA                                | L-PFOS                              | PFDoDA                              |
|-------------------------------------------------------------|-----------|----------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 34                                                          | 1         |                            | 0.411                               | 5.45                                | 0.336                               |
|                                                             | 2         |                            | 0.412                               | 5.39                                | 0.334                               |
| 74                                                          | 1         |                            | 0.406                               | 5.47                                | 0.326                               |
|                                                             | 2         |                            | 0.369                               | 5.54                                | 0.346                               |
| 100                                                         | 1         |                            | 0.416                               | 5.21                                | 0.356                               |
|                                                             | 2         |                            | 0.410                               | 5.03                                | 0.343                               |
| 111                                                         | 1         |                            | 0.400                               | 5.49                                | 0.352                               |
|                                                             | 2         |                            | 0.373                               | 5.25                                | 0.316                               |
| 114                                                         | 1         |                            | 0.412                               | 5.36                                | 0.347                               |
|                                                             | 2         |                            | 0.360                               | 5.83                                | 0.347                               |
| 120                                                         | 1         |                            | 0.391                               | 5.34                                | 0.325                               |
|                                                             | 2         |                            | 0.409                               | 5.36                                | 0.312                               |
| 139                                                         | 1         |                            | 0.427                               | 5.56                                | 0.346                               |
|                                                             | 2         |                            | 0.359                               | 5.39                                | 0.338                               |
| 167                                                         | 1         |                            | 0.375                               | 5.49                                | 0.349                               |
|                                                             | 2         |                            | 0.415                               | 5.20                                | 0.352                               |
| 192                                                         | 1         |                            | 0.361                               | 5.59                                | 0.331                               |
|                                                             | 2         |                            | 0.369                               | 5.09                                | 0.350                               |
| 200                                                         | 1         |                            | 0.416                               | 5.98                                | 0.342                               |
|                                                             | 2         |                            | 0.370                               | 5.40                                | 0.313                               |
| <b>Cochran's C-test</b>                                     |           |                            |                                     |                                     |                                     |
| C                                                           |           |                            | 0.346                               | 0.327                               | 0.392                               |
| C <sub>critical</sub> (α = 0.05, m = 2, n = 10)             |           |                            | 0.602                               | 0.602                               | 0.602                               |
| C <sub>critical</sub> (α = 0.01, m = 2, n = 10)             |           |                            | 0.718                               | 0.718                               | 0.718                               |
| C < C <sub>critical</sub>                                   |           |                            | yes                                 | yes                                 | yes                                 |
| Outliers                                                    |           |                            | no evidence for analytical outliers | no evidence for analytical outliers | no evidence for analytical outliers |
| <b>Homogeneity test</b>                                     |           |                            |                                     |                                     |                                     |
| General average $\bar{x}$                                   |           |                            | 0.393                               | 5.422                               | 0.3381                              |
| Standard deviation of sample averages $s_x$                 |           |                            | 0.014                               | 0.157                               | 0.0102                              |
| Within-sample standard deviation $s_w$                      |           |                            | 0.026                               | 0.225                               | 0.0129                              |
| Between-sample standard deviation $s_s$                     |           |                            | 0.000                               | 0.000                               | 0.005                               |
| Standard deviation for proficiency assessment $\sigma_{PT}$ |           |                            | 0.08                                | 1.08                                | 0.068                               |
| $s_s / \sigma_{PT}$                                         |           |                            | 0.000                               | 0.000                               | 0.068                               |
| Test for homogeneity ( $s_s \leq 0.3 \sigma_{PT}$ )         |           |                            | passed                              | passed                              | passed                              |

EURL-PT-POP\_2501-FF

Report Version 1.0 - PFAS



**EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]**

EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food

13 February 2026

**Annex 6:** Participants' methods for PFAS - Weighed sample, internal and recovery standards and comments

**Test sample - Fish Fillet (2501-FF)**

Fish Fillet (2501-FF)  
Methods Perfluoroalkylcarboxylic acids (PFCAs), Perfluoroalkylsulfonic acids (PFSAs) and Other PFAS - Weighed sample and internal standards

| LC  | Sample  | Weighed sample<br>[g] | Use of isotope-labelled internal standards for ... |                                               |                                        | Other internal standards                                                                                                                                                                                                                                                | Use of recovery / injection standard(s)<br>(yes/no)          | Matrix calibration<br>(yes/no) |
|-----|---------|-----------------------|----------------------------------------------------|-----------------------------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|--------------------------------|
|     |         |                       | PFCAs (yes/no)                                     | PFSAs (yes/no)                                | Other PFAS(yes/no)                     |                                                                                                                                                                                                                                                                         |                                                              |                                |
| 2   | 2501-FF | 1                     | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | yes                                                          | no                             |
| 3   | 2501-FF | 2                     | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | no                                                           | yes                            |
| 4   | 2501-FF | 5                     | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | yes                                                          | no                             |
| 5   | 2501-FF | 2                     | yes                                                | yes                                           | yes                                    | 13C8-FOSA, d3-N-MeFOSAA, d5-N-EtFOSAA, 13C2-4:2 FTS, 13C2-6:2 FTS, 13C2-8:2 FTS, 13C3-HFPO-DA                                                                                                                                                                           | no                                                           | no                             |
| 6   | 2501-FF | 5                     | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | no                                                           | no                             |
| 8   | 2501-FF | 5                     | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | no                                                           | no                             |
| 9   | 2501-FF | 5                     | yes : MPFAC-24ES from Wellington Laboratories      | yes : MPFAC-24ES from Wellington Laboratories | M3HFPO-DA from Wellington Laboratories |                                                                                                                                                                                                                                                                         | yes : MPFAC-C-IS from Wellington Laboratories                | no                             |
| 10  | 2501-FF | 2                     |                                                    | yes                                           | yes                                    | 13C3-HFPO-DA                                                                                                                                                                                                                                                            | yes                                                          | no                             |
| 12  | 2501-FF | 5                     | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | yes                                                          | yes                            |
| 13  | 2501-FF | 2                     | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | no                                                           | no                             |
| 15  | 2501-FF | 2                     | yes                                                | yes                                           | yes                                    | MPFAC-24ES from Wellington-labs (includes PFCA and PFSA and others)                                                                                                                                                                                                     | no                                                           | no                             |
| 16  | 2501-FF | 1.8                   | yes                                                | yes                                           |                                        |                                                                                                                                                                                                                                                                         | yes                                                          | no                             |
| 17  | 2501-FF | 1                     | yes                                                | yes                                           | yes                                    | FTS                                                                                                                                                                                                                                                                     | yes                                                          | no                             |
| 19  | 2501-FF | 1                     | yes                                                | yes                                           |                                        |                                                                                                                                                                                                                                                                         | no                                                           | no                             |
| 22  | 2501-FF | 0.5                   | no                                                 | yes                                           | no                                     | no                                                                                                                                                                                                                                                                      | yes                                                          | no                             |
| 24  | 2501-FF | 2                     | yes                                                | yes                                           |                                        |                                                                                                                                                                                                                                                                         |                                                              |                                |
| 28  | 2501-FF | 2                     | YES                                                | YES                                           | YES                                    | PFOSA-13C8; HFPO-DA-13C3                                                                                                                                                                                                                                                | YES                                                          | NO                             |
| 29  | 2501-FF | 2                     | yes                                                | yes                                           | yes (without F-53B and Dona)           |                                                                                                                                                                                                                                                                         | Use of recovery (yes)                                        | no                             |
| 30  | 2501-FF | 5                     | Yes                                                | Yes                                           | Yes                                    |                                                                                                                                                                                                                                                                         | Yes                                                          | No                             |
| 31  | 2501-FF | 5                     | yes                                                | yes                                           | yes                                    | no                                                                                                                                                                                                                                                                      | yes                                                          | no                             |
| 37  | 2501-FF | 1                     | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | yes                                                          | yes                            |
| 39  | 2501-FF | 5g                    | Yes                                                | Yes                                           | Yes                                    | M5PFHxA (Perfluoro-n-(1,2,3,4,6-13C5) Hexanoic acid), M3PFHxS (Sodium perfluor-1-(1,2,3-13C3)Hexane sulfonate), M8PFOA (perfluoro-n-(13C8) octanoic acid), M8PFOS (Sodium perfluoro-1-(1,2,3,4-13C4) octanesulfonate), MPFDoDA (Perfluoro-n-(1,2-13C2) dodecanoic acid) | No                                                           | No                             |
| 41  | 2501-FF | 3.15                  | Yes                                                | Yes                                           | No                                     |                                                                                                                                                                                                                                                                         | No                                                           | No                             |
| 42  | 2501-FF | 1.9                   | yes                                                | yes                                           |                                        |                                                                                                                                                                                                                                                                         | no                                                           | yes                            |
| 43  | 2501-FF | 0.5 / 1 / 2           | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | yes                                                          | no                             |
| 44  | 2501-FF | 1                     | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | yes                                                          | no                             |
| 47  | 2501-FF | 3.08                  | yes                                                | yes                                           | no                                     |                                                                                                                                                                                                                                                                         | yes                                                          | no                             |
| 51  | 2501-FF | 3.4 g ww              | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | yes                                                          | no                             |
| 53  | 2501-FF | 5                     | yes                                                | yes                                           | -                                      | no                                                                                                                                                                                                                                                                      | yes                                                          | no                             |
| 54  | 2501-FF | 2                     | yes                                                | yes                                           |                                        |                                                                                                                                                                                                                                                                         | yes                                                          | no                             |
| 55  | 2501-FF | 1 g and 0.5 g         | yes                                                | yes                                           | yes                                    | no                                                                                                                                                                                                                                                                      | no                                                           | no                             |
| 58  | 2501-FF | 2                     | Yes - Wellington MPFAC-C-ES                        | Yes - Wellington MPFAC-C-ES                   |                                        | Wellington M2:6:2FTS                                                                                                                                                                                                                                                    | Yes - Wellington MPFAC-HIF-IS                                | NO                             |
| 59  | 2501-FF | 1                     | yes                                                | yes                                           | no                                     |                                                                                                                                                                                                                                                                         | no                                                           | no                             |
| 61  | 2501-FF | 0.5 g                 | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | no                                                           | no                             |
| 62  | 2501-FF |                       |                                                    |                                               |                                        |                                                                                                                                                                                                                                                                         |                                                              |                                |
| 66  | 2501-FF | 2                     | yes                                                | yes                                           | no                                     |                                                                                                                                                                                                                                                                         | only for analytes without isotope-labelled internal standard | no                             |
| 67  | 2501-FF | 2                     | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | no                                                           | yes                            |
| 69  | 2501-FF | 1                     | yes                                                | yes                                           |                                        |                                                                                                                                                                                                                                                                         | yes                                                          | no                             |
| 70  | 2501-FF | 2                     | Yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | no                                                           | no                             |
| 72  | 2501-FF | 5                     | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | yes                                                          | no                             |
| 73  | 2501-FF | 1                     | yes                                                | yes                                           | yes                                    | GenX13C3, PFUnDA13C2                                                                                                                                                                                                                                                    | no                                                           | no                             |
| 74  | 2501-FF | 5                     | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | no                                                           | yes                            |
| 75  | 2501-FF | 5                     | yes                                                | yes                                           | yes                                    | yes (GenX, FOSA)                                                                                                                                                                                                                                                        | yes                                                          | no                             |
| 76  | 2501-FF | 1                     | yes                                                | yes                                           |                                        |                                                                                                                                                                                                                                                                         | no                                                           | no                             |
| 77  | 2501-FF | 5.0                   | yes                                                | yes                                           |                                        |                                                                                                                                                                                                                                                                         | no                                                           | no                             |
| 79  | 2501-FF | 3.00                  | yes                                                | yes                                           | no                                     |                                                                                                                                                                                                                                                                         | yes                                                          | no                             |
| 81  | 2501-FF | 15.0                  | YES                                                | YES                                           | YES                                    |                                                                                                                                                                                                                                                                         | NO                                                           | YES                            |
| 85  | 2501-FF | 2                     | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | yes                                                          | no                             |
| 86  | 2501-FF | 2                     | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | yes/no                                                       | no                             |
| 87  | 2501-FF | 5                     | yes                                                | yes                                           | no                                     | no                                                                                                                                                                                                                                                                      | no                                                           | no                             |
| 89  | 2501-FF | 5                     | yes                                                | yes                                           |                                        |                                                                                                                                                                                                                                                                         | yes                                                          | no                             |
| 93  | 2501-FF | 5                     | yes                                                | yes                                           |                                        |                                                                                                                                                                                                                                                                         | no                                                           | no                             |
| 97  | 2501-FF | 1.03                  | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | no                                                           | no                             |
| 99  | 2501-FF | 1                     | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | yes                                                          | no                             |
| 101 | 2501-FF | 3.7                   | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | yes                                                          | no                             |
| 67A | 2501-FF | 2                     | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | no                                                           | yes                            |
| 71B | 2501-FF | 2                     | yes                                                | yes                                           | yes                                    |                                                                                                                                                                                                                                                                         | no                                                           | no                             |



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EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Fish Fillet (2501-FF)  
Methods Perfluoroalkylcarboxylic acids (PFCAs) - Internal Standards

| LC  | Sample  | Perfluorobutanoic acid<br>(PFBA)                          | Perfluoropentanoic acid<br>(PFPeA)                         | Perfluorohexanoic acid<br>(PFHxA)                                   | Perfluoroheptanoic acid<br>(PFHpA)                                  | Perfluorooctanoic acid<br>(PFOA)                          | Perfluorononanoic acid<br>(PFNA)                          | Perfluorodecanoic acid<br>(PFDA)                                        | Perfluoroundecanoic acid<br>(PFUnDA)                                      | Perfluorododecanoic acid<br>(PFDoDA)                            | Perfluorotridecanoic acid<br>(PFTriDA)                      | Perfluorotetradecanoic acid<br>(PFTeDA)                            |
|-----|---------|-----------------------------------------------------------|------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------|
| 2   | 2501-FF | PFBA-13C4                                                 | PFPeA-13C3                                                 | PFHxA-13C2                                                          | PFHpA-13C7                                                          | PFOA-13C4                                                 | PFNA-13C5                                                 | PFDA-13C2                                                               | PFUnDA-13C2                                                               | PFDoDA-13C2                                                     | PFDoDA-13C2                                                 | PFTeDA-13C2                                                        |
| 3   | 2501-FF | 13C4-PFBA                                                 | 13C5-PFPeA                                                 | 13C5-PFHxA                                                          | 13C4-PFHpA                                                          | 13C8-PFOA                                                 | 13C9-PFNA                                                 | 13C6-PFDA                                                               | 13C7-PFUDa                                                                | 13C2-PFDoA                                                      | 13C2-PFTeDA                                                 | 13C2-PFTeDA                                                        |
| 4   | 2501-FF |                                                           |                                                            |                                                                     |                                                                     | 13C8-PFOA                                                 | 13C5-PFNA                                                 |                                                                         |                                                                           |                                                                 |                                                             |                                                                    |
| 5   | 2501-FF | 13C4-PFBA                                                 | 13C5-PFPeA                                                 | 13C5-PFHxA                                                          | 13C4-PFHpA                                                          | 13C8-PFOA                                                 | 13C9-PFNA                                                 | 13C6-PFDA                                                               | 13C7-PFUnDA                                                               | 13C2-PFDoDA                                                     | 13C2-PFTriDA                                                | 13C2-PFTeDA                                                        |
| 6   | 2501-FF | MPFBA                                                     | M5PFPeA                                                    | 13C2-PFHA                                                           | M4PFHpA                                                             | 13C2-PFOA                                                 | 13C3-PFNA                                                 | 13C2-PFDA                                                               | 13C2-PFuDA                                                                | 13C2-PFDoA                                                      | 13C2-PFDoA                                                  | M2PFTeDA                                                           |
| 8   | 2501-FF | Perfluoro-n-( <sup>13</sup> C <sub>4</sub> )butanoic acid | Perfluoro-n-( <sup>13</sup> C <sub>5</sub> )pentanoic acid | Perfluoro-n-(1,2,3,4,6- <sup>13</sup> C <sub>5</sub> )hexanoic acid | Perfluoro-n-(1,2,3,4,6- <sup>13</sup> C <sub>5</sub> )hexanoic acid | Perfluoro-n-( <sup>13</sup> C <sub>8</sub> )octanoic acid | Perfluoro-n-( <sup>13</sup> C <sub>9</sub> )nonanoic acid | Perfluoro-n-(1,2,3,4,5,6- <sup>13</sup> C <sub>6</sub> )undecanoic acid | Perfluoro-n-(1,2,3,4,5,6,7- <sup>13</sup> C <sub>7</sub> )undecanoic acid | Perfluoro-n-(1,2- <sup>13</sup> C <sub>2</sub> )dodecanoic acid | Perfluoro tridecanoic acid ( <sup>13</sup> C <sub>2</sub> ) | Perfluoro-n-(1,2- <sup>13</sup> C <sub>2</sub> )tetradecanoic acid |
| 9   | 2501-FF | MPFBA                                                     | MPFPeA                                                     | MPFHxA                                                              | MPFHpA                                                              | MPFOA                                                     | MPFNA                                                     | MPFDA                                                                   | MPFUnDA                                                                   | MPFDoDA                                                         | MPFDoDA/MPFTeDA                                             | MPFTeDA                                                            |
| 10  | 2501-FF |                                                           |                                                            | 13C5-PFHxA                                                          |                                                                     | 13C8-PFOA                                                 | 13C9-PFNA                                                 | 13C2-PFDA                                                               |                                                                           | 13C2-PFDoA                                                      |                                                             |                                                                    |
| 12  | 2501-FF |                                                           |                                                            |                                                                     |                                                                     | PFOA-13C4                                                 | PFNA-13C5                                                 | 13C6-PFDA                                                               | 13C7-PFUnDA                                                               | 13C2-PFDoDA                                                     | 13C2-PFTeDA                                                 | 13C2-PFTeDA                                                        |
| 13  | 2501-FF | MPFBA                                                     | MPFPeA                                                     | MPFHxA                                                              | MPFHpA                                                              | MPFOA                                                     | MPFNA                                                     | MPFDA                                                                   | MPFUnDA                                                                   | MPFDoDA                                                         | MPFTeDA                                                     | MPFTeDA                                                            |
| 15  | 2501-FF |                                                           |                                                            |                                                                     | M4PFHpA                                                             | M8PFOA                                                    | M9PFNA                                                    | M6PFDA                                                                  | M7PFUnDA                                                                  | MPFDoDA                                                         |                                                             | M2PFTeDA                                                           |
| 16  | 2501-FF |                                                           |                                                            | Perfluoro-n-[1,2,3,4,6-13C12] hexanoic acid                         | Perfluoro-n-[1,2,3,4-13C12] heptanoic acid                          | Perfluoro-n-[1,2,3,4-13C12] octanoic acid                 | Perfluoro-n-[1,2,3,4,5-13C12] nonanoic acid               | Perfluoro-n-[1,2-13C12] decanoic acid                                   | Perfluoro-n-[1,2,3,4,5,6,7-113C12]undecanoic acid                         | Perfluoro-n-[1,2-13C12] dodecanoic acid                         |                                                             |                                                                    |
| 17  | 2501-FF | MPFBA                                                     | MPFPeA                                                     | MPFHxA                                                              | MPFHpA                                                              | MPFOA                                                     | MPFNA                                                     | MPFDA                                                                   | MPFUnDA                                                                   |                                                                 |                                                             |                                                                    |
| 19  | 2501-FF |                                                           | M5PFPeA                                                    | MPFHxA                                                              | MPFOA                                                               |                                                           |                                                           | MPFDA                                                                   |                                                                           | MPFDoDA                                                         | MPFDoDA                                                     | MPFDoDA                                                            |
| 22  | 2501-FF |                                                           |                                                            |                                                                     |                                                                     |                                                           |                                                           |                                                                         |                                                                           |                                                                 |                                                             |                                                                    |
| 24  | 2501-FF | PFOA C13                                                  |                                                            |                                                                     |                                                                     | PFOA C13                                                  | PFOA C13                                                  | PFOA C13                                                                |                                                                           |                                                                 |                                                             |                                                                    |
| 28  | 2501-FF | PFBA-13C4                                                 | PFPeA-13C5                                                 | PFHxA-13C5                                                          | PFHpA-13C4                                                          | PFOA-13C8                                                 | PFNA-13C9                                                 | PFDA-13C6                                                               | PFUnA -13C7                                                               | PFDoA -13C2                                                     | PFDoA -13C2/PFTeDA-13C2 (mean value)                        | PFTeDA-13C2                                                        |
| 29  | 2501-FF | PFBA 13C4                                                 | PFPeA 13C5                                                 | PFHxA 13C2                                                          | PFHpA 13C7                                                          | PFOA 13C4                                                 | PFNA 13C5                                                 | PFDA 13C2                                                               | PFUnDA 13C2                                                               | PFDoA 13C2                                                      | PFTriDA 13C2                                                | PFTeDA 13C2                                                        |
| 30  | 2501-FF |                                                           | PFPeA-13C5                                                 | PFHxA-13C5                                                          | PFHpA--13C4                                                         | PFOA-13C8                                                 | PFNA-13C9                                                 | PFDA-13C6                                                               | PFUnDA-13C7                                                               | PFDoDA-13C2                                                     | PFTeDA-13C2                                                 | PFTeDA-13C2                                                        |
| 31  | 2501-FF | Perfluoro-n-(1,2,3,4-13C4)butansäure                      | Perfluoro-n-(13C5)pentansäure                              | Perfluoro-n-(1,2,3,4,6-13C5)hexansäure                              | Perfluoro-n-[1,2,3,4-13C4]heptansäure                               | Perfluoro-n-(13C8)octansäure                              | Perfluoro-n-(13C9)nonansäure                              | Perfluoro-n-(1,2,3,4,5,6-13C6)decansäure                                | Perfluoro-n-(1,2,3,4,5,6,7-13C7)undecansäure                              | Perfluoro-n-(1,2-13C2)dodecansäure                              | Perfluoro-n-(1,2-13C2)dodecansäure                          | Perfluoro-n-(13C2)tetradecansäure                                  |
| 37  | 2501-FF |                                                           | 13C-PFPeA                                                  | 13C-PFHxA                                                           | 13C-PFHpA                                                           | 13C-PFOA                                                  | 13C-PFNA                                                  | 13C-PFDA                                                                | 13C-PFUnDA                                                                | 13C-PFDoDA                                                      | 13C-PFDoDA                                                  | 13C-PFTeDA                                                         |
| 39  | 2501-FF | M5PFHxA (Perfluoro-n-(1,2,3,4,6-13C5) Hexanoic acid)      | M5PFHxA (Perfluoro-n-(1,2,3,4,6-13C5) Hexanoic acid)       | M5PFHxA (Perfluoro-n-(1,2,3,4,6-13C5) Hexanoic acid)                | M5PFHxA (Perfluoro-n-(1,2,3,4,6-13C5) Hexanoic acid)                | M8PFOA (perfluoro-n-(13C8) octanoic acid)                 | M8PFOA (perfluoro-n-(13C8) octanoic acid)                 | M8PFOA (perfluoro-n-(13C8) octanoic acid)                               | M8PFOA (perfluoro-n-(13C8) octanoic acid)                                 | MPFDoDA (Perfluoro-n-(1,2-13C2) dodecanoic acid)                | MPFDoDA (Perfluoro-n-(1,2-13C2) dodecanoic acid)            | MPFDoDA (Perfluoro-n-(1,2-13C2) dodecanoic acid)                   |
| 41  | 2501-FF |                                                           |                                                            |                                                                     |                                                                     | 13C8-PFOA                                                 | 13C9-PFNA                                                 |                                                                         |                                                                           |                                                                 |                                                             |                                                                    |
| 42  | 2501-FF | PFBA-13C4                                                 | PFPeA-13C5                                                 | PFHxA-13C5                                                          | PFHpA-13C2                                                          | PFOA-13C8                                                 | PFNA-13C9                                                 | PFDA-13C6                                                               | PFUnDA-13C7                                                               | PFDoDA-13C2                                                     | PFDoDA-13C2                                                 | PFTeDA-13C2                                                        |
| 43  | 2501-FF | 13C4-PFBA                                                 | 13C5-PFPeA                                                 | 13C5-PFHxA                                                          | 13C4-PFHpA                                                          | 13C5-PFOA                                                 | 13C9-PFNA                                                 | 13C7-PFDA                                                               | 13C7-PFUnDA                                                               | 13C2-PFDoDA                                                     | 13C2-PFDoDA                                                 | 13C2-PFTeDA                                                        |
| 44  | 2501-FF |                                                           | M5-PFPeA                                                   | M5-PFHxA                                                            | M4-PFHpA                                                            | M8-PFOA                                                   | M9-PFNA                                                   | M6-PFDA                                                                 | M7-PFUnDA                                                                 | M2-PFDoDA                                                       | M2-PFDoDA                                                   | M2-PFTeDA                                                          |
| 47  | 2501-FF |                                                           |                                                            |                                                                     |                                                                     | PFOA isotope-labelled                                     | PFNA isotope-labelled                                     |                                                                         |                                                                           |                                                                 |                                                             |                                                                    |
| 51  | 2501-FF | M13C4 PFBA                                                | M13C3 PFPeA                                                | M13C2 PFHxA                                                         | M13C4 PFHpA                                                         | M13C4 PFOA                                                | M13C5 PFNA                                                | M13C2 PFDA                                                              | M13C2 PFUnDA                                                              | M13C2 PFDoDA                                                    | M13C2 PFDoDA                                                | M13C2 PFTeDA                                                       |
| 53  | 2501-FF | 13C4-PFBA                                                 | 13C5-PFPeA                                                 | 1,2,3,4,6-13C5-PFHxA                                                | 1,2,3,4-13C4-PFHpA                                                  | 13C8-PFOA                                                 | 13C9-PFNA                                                 | 1,2,3,4,5,6-13C6-PFDA                                                   | 1,2,3,4,5,6,7-13C7-PFUnDA                                                 | 1,2-13C2-PFDoDa                                                 | 1,2-13C2-PFDoDa                                             | 1,2-13C2-PFTeDA                                                    |
| 54  | 2501-FF |                                                           | M5PFPeA                                                    | M5PFHxA                                                             | M4PFHpA                                                             | M8PFOA                                                    | M9PFNA                                                    | M6PFDA                                                                  | M7PFUDa                                                                   | MPFDoA                                                          | M2PFTeDA                                                    |                                                                    |
| 55  | 2501-FF | 13C-PFBA                                                  | 13C-PFPeA                                                  | 13C-PFHxA                                                           | 13C-PFHxA                                                           | 13C-PFOA                                                  | 13C-PFNA                                                  | 13C-PFDA                                                                | 13C-PFUDa                                                                 | 13C-PFDoA                                                       | 13C-PFDoA                                                   | 13C-PFTeDA                                                         |
| 58  | 2501-FF |                                                           |                                                            | 13C-PFHxA                                                           | 13C-PFHxA                                                           | 13C-PFOA                                                  | 13C-PFNA                                                  | 13C-PFDA                                                                | 13C-PFUnDA                                                                | 13C-PFDoA                                                       |                                                             | 13C-PFTeDA                                                         |
| 59  | 2501-FF |                                                           |                                                            |                                                                     |                                                                     | 13C PFOA                                                  | 13C PFNA                                                  |                                                                         |                                                                           |                                                                 |                                                             |                                                                    |
| 61  | 2501-FF | 13C-PFBA                                                  | 13C-PFPeA                                                  | 13C-PFHxA                                                           | 13C-PFHpA                                                           | 13C-PFOA                                                  | 13C-PFNA                                                  | 13C-PFDA                                                                | 13C-PFUnDA                                                                | 13C-PFDoDA                                                      | 13C-PFDoDA                                                  | 13C-PFTeDA                                                         |
| 62  | 2501-FF |                                                           |                                                            |                                                                     |                                                                     |                                                           |                                                           |                                                                         |                                                                           |                                                                 |                                                             |                                                                    |
| 66  | 2501-FF | 13C4-PFBA                                                 | 13C5-PFPeA                                                 | 13C5-PFHxA                                                          | 13C4-PFHpA                                                          | 13C8-PFOA                                                 | 13C9-PFNA                                                 | 13C6-PFDA                                                               | 13C7-PFUnDA                                                               | 13C2-PFDoDA                                                     |                                                             |                                                                    |
| 67  | 2501-FF |                                                           |                                                            | 13C5-PFHxA                                                          | 13C4-PFHpA                                                          | 13C8-PFOA                                                 | 13C9-PFNA                                                 | 13C2-PFDA                                                               | 13C7-PFUDa                                                                | 13C2-PFDoA                                                      | 13C2-PFTeDA                                                 | 13C2-PFTeDA                                                        |
| 69  | 2501-FF |                                                           |                                                            |                                                                     |                                                                     | 13C4 - PFOA                                               | 13C9 - PFNA                                               |                                                                         |                                                                           |                                                                 |                                                             |                                                                    |
| 70  | 2501-FF |                                                           |                                                            |                                                                     |                                                                     | 13C8 PFOA                                                 | 13C9 PFNA                                                 |                                                                         |                                                                           |                                                                 |                                                             |                                                                    |
| 72  | 2501-FF |                                                           |                                                            |                                                                     | 13C-PFHpA                                                           | 13C-PFOA                                                  | 13C-PFNA                                                  | 13C-PFDA                                                                | 13C-PFUnDA                                                                | 13C-PFDoDA                                                      |                                                             | 13C-PFTeDA                                                         |
| 73  | 2501-FF | PFBA 13C4                                                 | PFPeA 13C3                                                 | PFHxA 13C2                                                          | PFHpA 13C4                                                          | PFOA 13C4                                                 | PFNA 13C5                                                 | PFDA 13C2                                                               | PFUnDA 13C2                                                               | PFDoDA 13C2                                                     | PFTeDA 13C2                                                 | PFTeDA 13C2                                                        |
| 74  | 2501-FF | M5PFPeA                                                   | M5PFPeA                                                    | M5PFPeA                                                             | MPFOA                                                               | MPFOA                                                     | MPFNA                                                     | M7PFUnDA                                                                | M7PFUnDA                                                                  | MPFDoDA                                                         |                                                             |                                                                    |
| 75  | 2501-FF | PFBA                                                      | PFPeA                                                      | PFHxA                                                               | PFHpA                                                               | PFOA                                                      | PFNA                                                      | PFDA                                                                    | PFUnDA                                                                    | PFDoDA                                                          | PFDoDA                                                      | PFTeDA                                                             |
| 76  | 2501-FF | PFBA-13C4                                                 | PFPeA-13C3                                                 | PFHxA-13C2                                                          | PFHpA-13C4                                                          | PFOA-13C4                                                 | PFNA-13C5                                                 | PFDA-13C2                                                               | PFDoDA-13C2                                                               | PFDoDA-13C2                                                     | PFDoDA-13C2                                                 | PFTeDA-13C2                                                        |
| 77  | 2501-FF |                                                           |                                                            |                                                                     |                                                                     | 13C8-PFOA                                                 | 13C9-PFNA                                                 |                                                                         |                                                                           |                                                                 |                                                             |                                                                    |
| 79  | 2501-FF |                                                           |                                                            |                                                                     | M4PFHpA                                                             | M8PFOA                                                    | M9PFNA                                                    | M6PFDA                                                                  | M7PFUnDA                                                                  | MPFDoA                                                          | MPFDoA                                                      | M2PFTeDA                                                           |
| 81  | 2501-FF | 13C-PFBA                                                  | 13C-PFPeA                                                  | 13C-PFHxA                                                           | 13C-PFHpA                                                           | 13C-PFOA                                                  | 13C-PFNA                                                  | 13C-PFDA                                                                | 13C-PFUnDA                                                                | 13C-PFDoDA                                                      |                                                             |                                                                    |
| 85  | 2501-FF | 13C4-PFBA                                                 | 13C5-PFPeA                                                 | 13C5-PFHxA                                                          | 13C4-PFHpA                                                          | 13C8-PFOA                                                 | 13C9-PFNA                                                 | 13C6-PFDA                                                               | 13C7-PFUnDA                                                               | 13C2-PFDoA                                                      | 13C2-PFTeA                                                  | 13C2-PFTeA                                                         |
| 86  | 2501-FF | PFBA-13C2                                                 | PFPeA-13C5                                                 | PFHxA-13C2                                                          | PFOA-13C4                                                           | PFOA-13C4                                                 | PFNA-13C5                                                 | PFDA-13C2                                                               | PFUnDA-13C2                                                               | PFDoDA-13C2                                                     | PFTeDA-13C2                                                 | PFTeDA-13C2                                                        |
| 87  | 2501-FF |                                                           |                                                            |                                                                     |                                                                     | Perfluoro-n(13C8)octanoicacid (M8-PFOA)                   | Perfluoro-n(13C9)nonanoicacid (M9-PFNA)                   |                                                                         |                                                                           |                                                                 |                                                             |                                                                    |
| 89  | 2501-FF |                                                           |                                                            |                                                                     | M4PFHpA                                                             | MPFOA                                                     | MPFNA                                                     | MPFDA                                                                   |                                                                           | MPFDoDA                                                         |                                                             |                                                                    |
| 93  | 2501-FF | perfluoro-n[13C4] butanoic acid                           | perfluoro-n[13C5] pentanoic acid                           | luoro-n- [1,2,3,4,6-13C5] hexanoic acid                             | uoro-n-[1,2,3,4, -13C4] heptanoic acid                              | perfluoro-n[13C8] octanoic acid                           | perfluoro-n[13C9] nonanoic acid                           | perfluoro-n-[1,2,3,4,5,6-13C6] decanoic acid                            | perfluoro-n-[1,2,3,4,5,6,7-13C7] undecanoic acid                          | perfluoro-n-[1,2-13C2] dodecanoic acid                          |                                                             |                                                                    |
| 97  | 2501-FF | PFBA 13C4                                                 | PFPeA 13C5                                                 | PFHxA 13C5                                                          | PFHpA 13C4                                                          | PFOA 13C8                                                 | PFNA 13C9                                                 | PFDA 13C6                                                               | PFUnDA 13C7                                                               | PFDoDA 13C2                                                     | PFDoDA 13C2                                                 | PFTeDA 13C2                                                        |
| 99  | 2501-FF | PFBA13C3                                                  | PFPeA13C3                                                  | PFHxA13C2                                                           | PFHpA13C4                                                           | PFOA13C4                                                  | PFNA13C5                                                  | PFDA13C2                                                                | PFUnDA13C2                                                                | PFDoDA13C2                                                      | PFTeDA13C2                                                  | PFTeDA13C2                                                         |
| 101 | 2501-FF | 13C3-PFBA                                                 | 13C5-PFPeA                                                 | 13C6-PFHxA                                                          | 13C7-PFHpA                                                          | 13C8-PFOA                                                 | 13C9-PFNA                                                 | 13C9-PFDA                                                               | 13C9-PFUnDA                                                               | 13C12-PFDoDA                                                    | 13C12-PFDoDA                                                | 13C2-PFTeDA                                                        |
| 67A | 2501-FF |                                                           |                                                            | 13C5-PFHxA                                                          | 13C4-PFHpA                                                          | 13C8-PFOA                                                 | 13C9-PFNA                                                 | 13C2-PFDA                                                               | 13C7-PFUDa                                                                | 13C2-PFDoA                                                      | 13C2-PFTeDA                                                 | 13C2-PFTeDA                                                        |
| 71B | 2501-FF | M3PFBA                                                    | M3PFPeA                                                    | PFHxA-13C2                                                          | M4PFHpA                                                             | PFOA-13C4                                                 | PFNA-13C5                                                 | PFDA-13C2                                                               | PFUDa-13C2                                                                | PFDoA-13C2                                                      | M2PFTeDA                                                    | M2PFTeDA                                                           |

| LC  | Sample  | Perfluorobutanoic acid<br>(PFBA) | Perfluoropentanoic acid<br>(PFPeA) | Perfluorohexanoic acid<br>(PFHxA)          | Perfluoroheptanoic acid<br>(PFHpA)         | Perfluorooctanoic acid<br>(PFOA)           | Perfluorononanoic acid<br>(PFNA)           | Perfluorodecanoic acid<br>(PFDA)           | Perfluoroundecanoic acid<br>(PFUnDA)       | Perfluorododecanoic acid<br>(PFDoDA)       | Perfluorotridecanoic acid<br>(PFTriDA) | Perfluorotetradecanoic acid<br>(PFTeDA) |
|-----|---------|----------------------------------|------------------------------------|--------------------------------------------|--------------------------------------------|--------------------------------------------|--------------------------------------------|--------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------|-----------------------------------------|
| 2   | 2501-FF | PFOS-13C8                        | PFOS-13C8                          | PFOS-13C8                                  | PFOS-13C8                                  | PFOS-13C8                                  | PFOS-13C8                                  | PFOS-13C8                                  | PFOS-13C8                                  | PFOS-13C8                                  | PFOS-13C8                              | PFOS-13C8                               |
| 3   | 2501-FF | No                               | No                                 | No                                         | No                                         | No                                         | No                                         | No                                         | No                                         | No                                         | No                                     | No                                      |
| 4   | 2501-FF |                                  |                                    |                                            |                                            | 13C4-PFOA                                  | 13C4-PFOA                                  |                                            |                                            |                                            |                                        |                                         |
| 5   | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 6   | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 8   | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 9   | 2501-FF | M3PFBA-inj                       | M3PFBA-inj                         | M3PFBA-inj                                 | M3PFBA-inj                                 | M2PFOA-inj                                 | M2PFOA-inj                                 | MPFDA-inj                                  | MPFDA-inj                                  | MPFDA-inj                                  | MPFDA-inj                              | MPFDA-inj                               |
| 10  | 2501-FF |                                  |                                    | 13C2-PFHxA                                 |                                            | 13C2-PFHxA                                 | 13C5-PFNA                                  | 13C5-PFNA                                  | 13C5-PFNA                                  | 13C5-PFNA                                  | 13C5-PFNA                              | 13C5-PFNA                               |
| 12  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 13  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 15  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 16  | 2501-FF |                                  |                                    | Sodium perfluoro-<br>[13C8]octanesulfonate | Sodium perfluoro-<br>[13C8]octanesulfonate | Sodium perfluoro-<br>[13C8]octanesulfonate | Sodium perfluoro-<br>[13C8]octanesulfonate | Sodium perfluoro-<br>[13C8]octanesulfonate | Sodium perfluoro-<br>[13C8]octanesulfonate | Sodium perfluoro-<br>[13C8]octanesulfonate |                                        |                                         |
| 17  | 2501-FF | 0.74                             | 0.77                               | 0.77                                       | 0.8034                                     | 0.75                                       | 72.45                                      | 69.82                                      | 57.00                                      |                                            |                                        |                                         |
| 19  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 22  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 24  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 28  | 2501-FF | PFOS-13C4                        | PFOS-13C4                          | PFOS-13C4                                  | PFOS-13C4                                  | PFOS-13C4                                  | PFOS-13C4                                  | PFOS-13C4                                  | PFOS-13C4                                  | PFOS-13C4                                  | PFOS-13C4                              | PFOS-13C4                               |
| 29  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 30  | 2501-FF |                                  | PFOA-13C2                          | PFOA-13C2                                  | PFOA-13C2                                  | PFOA-13C2                                  | PFOA-13C2                                  | PFDA-13C2                                  | PFDA-13C2                                  | PFDA-13C2                                  | PFDA-13C3                              | PFDA-13C3                               |
| 31  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 37  | 2501-FF |                                  | PFOA - M8                          | PFOA - M8                                  | PFOA - M8                                  | PFOA - M8                                  | PFOA - M8                                  | PFOA - M8                                  | PFOA - M8                                  | PFOA - M8                                  | PFOA - M8                              | PFOA - M8                               |
| 39  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 41  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 42  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 43  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 44  | 2501-FF |                                  | M2-PFOA                            | M2-PFOA                                    | M2-PFOA                                    | M2-PFOA                                    | M2-PFDA                                    | M2-PFDA                                    | M2-PFDA                                    | M2-PFDA                                    | M2-PFDA                                | M2-PFDA                                 |
| 47  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 51  | 2501-FF | M13C8 PFOS                       | M13C8 PFOS                         | M13C8 PFOS                                 | M13C8 PFOS                                 | M13C8 PFOS                                 | M13C8 PFOS                                 | M13C8 PFOS                                 | M13C8 PFOS                                 | M13C8 PFOS                                 | M13C8 PFOS                             | M13C8 PFOS                              |
| 53  | 2501-FF | 2,3,4-13C3PFBA                   | 2,3,4-13C3PFBA                     | 1,2-13C2-PFOA                              | 1,2-13C2-PFOA                              | 1,2-13C2-PFOA                              | 1,2-13C2-PFOA                              | 1,2-13C2-PFDA                              | 1,2-13C2-PFDA                              | 1,2-13C2-PFDA                              | 1,2-13C2-PFDA                          | 1,2-13C2-PFDA                           |
| 54  | 2501-FF |                                  |                                    |                                            |                                            | M2PFOA                                     |                                            | MPFDA                                      |                                            |                                            |                                        |                                         |
| 55  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 58  | 2501-FF |                                  |                                    | RS-M2PFHxA                                 | RS-M4PFOA                                  | RS-M4PFOA                                  | RS-M5PFNA                                  | RS-M2PFDA                                  | RS-M2PFDA                                  | RS-M2PFDA                                  |                                        | RS-M2PFDA                               |
| 59  | 2501-FF |                                  |                                    |                                            |                                            | none                                       | none                                       |                                            |                                            |                                            |                                        |                                         |
| 61  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 62  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 66  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            | PFTriDA                                |                                         |
| 67  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 69  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 70  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 72  | 2501-FF |                                  |                                    |                                            | MPFOA                                      | MPFOA                                      | MPFDA                                      | MPFDA                                      | MPFDA                                      | MPFDA                                      |                                        | MPFDA                                   |
| 73  | 2501-FF | PFOS 13C8                        | PFOS 13C8                          | PFOS 13C8                                  | PFOS 13C8                                  | PFOS 13C8                                  | PFOS 13C8                                  | PFOS 13C8                                  | PFOS 13C8                                  | PFOS 13C8                                  | PFOS 13C8                              | PFOS 13C8                               |
| 74  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 75  | 2501-FF | PFBA                             | PFBA                               | PFBA                                       | PFOA                                       | PFOA                                       | PFOA                                       | PFDA                                       | PFDA                                       | PFDA                                       | PFDA                                   | PFDA                                    |
| 76  | 2501-FF | none                             | none                               | none                                       | none                                       | none                                       | none                                       | none                                       | none                                       | none                                       | none                                   | none                                    |
| 77  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 79  | 2501-FF |                                  |                                    | MPFHxA                                     | MPFOA                                      | MPFOA                                      | MPFNA                                      | MPFDA                                      | MPFDA                                      | MPFDA                                      | MPFDA                                  | MPFDA                                   |
| 81  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 85  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 86  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 87  | 2501-FF |                                  |                                    |                                            |                                            | none                                       | none                                       |                                            |                                            |                                            |                                        |                                         |
| 89  | 2501-FF |                                  |                                    |                                            | own Material                               | own Material                               | own Material                               | own Material                               |                                            | own Material                               |                                        |                                         |
| 93  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 97  | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 99  | 2501-FF | PFOS13C8                         | PFOS13C8                           | PFOS13C8                                   | PFOS13C8                                   | PFOS13C8                                   | PFOS13C8                                   | PFOS13C8                                   | PFOS13C8                                   | PFOS13C8                                   | PFOS13C8                               | PFOS13C8                                |
| 101 | 2501-FF | 13C4-PFOS                        | 13C4-PFOS                          | 13C4-PFOS                                  | 13C4-PFOS                                  | 13C4-PFOS                                  | 13C4-PFOS                                  | 13C4-PFOS                                  | 13C4-PFOS                                  | 13C4-PFOS                                  | 13C4-PFOS                              | 13C4-PFOS                               |
| 67A | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |
| 71B | 2501-FF |                                  |                                    |                                            |                                            |                                            |                                            |                                            |                                            |                                            |                                        |                                         |

| LC  | Sample  | Perfluorobutanoic acid<br>(PFBA)                                     | Perfluoropentanoic acid<br>(PFPeA)                                   | Perfluorohexanoic acid<br>(PFHxA) | Perfluoroheptanoic acid<br>(PFHpA) | Perfluorooctanoic acid<br>(PFOA)              | Perfluorononanoic acid<br>(PFNA)              | Perfluorodecanoic acid<br>(PFDA) | Perfluoroundecanoic acid<br>(PFUnDA) | Perfluorododecanoic acid<br>(PFDoDA) | Perfluorotridecanoic acid<br>(PFTrDA)             | Perfluorotetradecanoic acid<br>(PFTeDA) |
|-----|---------|----------------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------|------------------------------------|-----------------------------------------------|-----------------------------------------------|----------------------------------|--------------------------------------|--------------------------------------|---------------------------------------------------|-----------------------------------------|
| 2   | 2501-FF | only one MS/MS transition                                            | only one MS/MS transition                                            |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 3   | 2501-FF | HRMS                                                                 | HRMS                                                                 |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 4   | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 5   | 2501-FF | no confirmation                                                      | no confirmation                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 6   | 2501-FF | One MS/MS transition was used for identification; MU: not determined | One MS/MS transition was used for identification; MU: not determined | MU: not determined                | MU: not determined                 |                                               |                                               | MU: not determined               | MU: not determined                   | MU: not determined                   | MU: not determined                                | MU: not determined                      |
| 8   | 2501-FF | 1 MS/MS transition                                                   | 1 MS/MS transition                                                   |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 9   | 2501-FF | Qualitative confirmation by HRMS                                     | Qualitative confirmation by HRMS                                     |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 10  | 2501-FF | Not Analyzed                                                         | Not Analyzed                                                         |                                   | Not Analyzed                       |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 12  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 13  | 2501-FF | only one MS/MS transition used                                       | only one MS/MS transition used                                       |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 15  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 16  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 17  | 2501-FF | Confirmed by HRMS                                                    | Confirmed by HRMS                                                    |                                   |                                    |                                               |                                               |                                  |                                      | Not analyzed                         | Not analyzed                                      | Not analyzed                            |
| 19  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 22  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 24  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 28  | 2501-FF | confirmed by a second chromatographic separation                     | confirmed by a second chromatographic separation                     |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 29  | 2501-FF | Only on MS/MS                                                        | Only on MS/MS                                                        |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 30  | 2501-FF | Not anayzed                                                          | only one MS/MS transition                                            |                                   |                                    | Sum of Linear and Branched Isomers            | Sum of Linear and Branched Isomers            |                                  |                                      |                                      |                                                   |                                         |
| 31  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 37  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 39  | 2501-FF |                                                                      |                                                                      | Below our LOQ                     | Below our LOQ                      |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 41  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 42  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 43  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 44  | 2501-FF | Not analysed                                                         | Quantification on full scan MS1, confirmation on fragment ion, MS2   |                                   |                                    | < LQ                                          |                                               |                                  |                                      |                                      |                                                   |                                         |
| 47  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 51  | 2501-FF | 216,9 > 171,9 , not confirmed by HRMS                                | 265,9 > 221,9 , not confirmed by HRMS                                |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 53  | 2501-FF | Only on MS/MS transintion, confirmation with Raptor-Colum            | Only on MS/MS transintion, confirmation with Raptor-Colum            |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 54  | 2501-FF |                                                                      | not validated, 263 -> 219                                            |                                   |                                    |                                               |                                               |                                  |                                      | not validated                        |                                                   | not validated                           |
| 55  | 2501-FF | 1 MS/MS transition                                                   | 1 MS/MS transition                                                   |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 58  | 2501-FF | no conf ion                                                          | no conf ion                                                          |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 59  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 61  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 62  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 66  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 67  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 69  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 70  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 72  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      | analyte detected, but quantification not possible |                                         |
| 73  | 2501-FF | Only one MS/MS transition                                            | Only one MS/MS transition                                            |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 74  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 75  | 2501-FF | Identification and quantification were performed by HRMS             | Identification and quantification were performed by HRMS             |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 76  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 77  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 79  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 81  | 2501-FF | only one MS/MS transition                                            | only one MS/MS transition                                            |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 85  | 2501-FF | only one MS/MS transition                                            | only one MS/MS transition                                            |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 86  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 87  | 2501-FF |                                                                      |                                                                      |                                   |                                    | Determination of recovery via spiking on fish | Determination of recovery via spiking on fish |                                  |                                      |                                      |                                                   |                                         |
| 89  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 93  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 97  | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 99  | 2501-FF |                                                                      | MS/MS                                                                |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 101 | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 67A | 2501-FF |                                                                      |                                                                      |                                   |                                    |                                               |                                               |                                  |                                      |                                      |                                                   |                                         |
| 71B | 2501-FF | result <0,10; only one transition 213/169                            | result <0,10                                                         | result <0,10                      | result <0,10                       | result <0,10                                  | result <0,10                                  |                                  |                                      |                                      |                                                   |                                         |



EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]

EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Fish Fillet (2501-FF)  
Methods Perfluoroalkylsulfonic acids (PFSAs) - Internal Standards

| LC  | Sample  | Perfluorobutanesulfonic acid                                             | Perfluoropentanesulfonic acid                                            | Perfluorohexanesulfonic acid                                             | Perfluoroheptanesulfonic acid                                      | Linear Perfluorooctanesulfonic acid                        | Sum of branched PFOS acids                                | Total-Perfluorooctanesulfonic acids                                | Perfluorononanesulfonic acid                                       | Perfluorodecanesulfonic acid                                       | Perfluoroundecane- sulfonic acid            | Perfluorododecane- sulfonic acid             | Perfluorotridecane- sulfonic acid            |
|-----|---------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------|----------------------------------------------|----------------------------------------------|
|     |         | (PFBS)                                                                   | (PFPeS)                                                                  | (PFHxS)                                                                  | (PFHpS)                                                            | (L-PFOS)                                                   | (br-PFOS)                                                 | (total PFOS)                                                       | (PFNS)                                                             | (PFDS)                                                             | (PFUnDS)                                    | (PFDoDS)                                     | (PFTrDS)                                     |
| 2   | 2501-FF | PFBS-13C4                                                                | PFHxS-18O2                                                               | PFHxS-18O2                                                               | PFOS-13C4                                                          | PFOS-13C4                                                  | PFOS-13C4                                                 |                                                                    | PFOS-13C4                                                          | PFOS-13C4                                                          | PFDODA-13C2                                 | PFTeDA-13C2                                  | PFTeDA-13C2                                  |
| 3   | 2501-FF | 13C3-L-PFBS                                                              | 13C3-L-PFHxS                                                             | 13C3-L-PFHxS                                                             | 13C3-L-PFHxS                                                       | 13C8-L-PFOS                                                | 13C8-L-PFOS                                               |                                                                    | 13C6-PFDA                                                          | 13C7-PFUdA                                                         | 13C2-PFTeDA                                 | 13C7-PFUdA                                   | 13C2-PFTeDA                                  |
| 4   | 2501-FF |                                                                          |                                                                          | 18O2-PFHxS                                                               |                                                                    |                                                            |                                                           |                                                                    | 13C4-PFOS                                                          |                                                                    |                                             |                                              |                                              |
| 5   | 2501-FF | 13C3-PFBS                                                                | 13C3-PFPeS                                                               | 13C3-PFHxS                                                               | 13C3-PFHpS                                                         | 13C8-PFOS                                                  | 13C8-PFOS                                                 |                                                                    | 13C3-PFNS                                                          | 13C3-PFDS                                                          | 13C3-PFUnDS                                 | 13C3-PFUnDS                                  | 13C3-PFTrDS                                  |
| 6   | 2501-FF | M3PFBS                                                                   | 18O-PFHS                                                                 | 18O-PFHS                                                                 | 18O-PFHS                                                           | 13C4-PFOS                                                  | 13C4-PFOS                                                 |                                                                    | 13C4-PFOS                                                          | 13C4-PFOS                                                          | 13C4-PFOS                                   | 13C4-PFOS                                    | 13C4-PFOS                                    |
| 8   | 2501-FF | Sodium perfluoro-1-(2,3,4- <sup>13</sup> C <sub>3</sub> )butanesulfonate | Sodium perfluoro-1-(1,2,3- <sup>13</sup> C <sub>3</sub> )hexanesulfonate | Sodium perfluoro-1-(1,2,3- <sup>13</sup> C <sub>3</sub> )hexanesulfonate | Sodium perfluoro-1-( <sup>13</sup> C <sub>8</sub> )octanesulfonate |                                                            |                                                           | Sodium perfluoro-1-( <sup>13</sup> C <sub>8</sub> )octanesulfonate | Sodium perfluoro-1-( <sup>13</sup> C <sub>8</sub> )octanesulfonate | Sodium perfluoro-1-( <sup>13</sup> C <sub>8</sub> )octanesulfonate |                                             |                                              |                                              |
| 9   | 2501-FF | MPFBS                                                                    | MPFHxS                                                                   | MPFHxS                                                                   | MPFHxS                                                             | MPFOS                                                      | MPFOS                                                     |                                                                    | MPFHxS                                                             | MPFUnDA                                                            |                                             | MPFDoDA/MPFTeDA                              | MPFTeDA                                      |
| 10  | 2501-FF | 13C3-PFBS                                                                | 13C3-PFHxS                                                               | 13C3-PFHxS                                                               | 13C3-PFHxS                                                         | 13C8-PFOS                                                  | 13C8-PFOS                                                 |                                                                    | 13C8-PFOS                                                          | 13C8-PFOS                                                          | 13C2-PFTeDA                                 |                                              | 13C2-PFTeDA                                  |
| 12  | 2501-FF |                                                                          |                                                                          | PFHxS-13C3                                                               |                                                                    |                                                            |                                                           |                                                                    | PFOS-13C4                                                          |                                                                    |                                             |                                              |                                              |
| 13  | 2501-FF | MPFBS                                                                    | MPFHxS                                                                   | MPFHxS                                                                   | MPFHxS                                                             | MPFOS                                                      | MPFOS                                                     |                                                                    | MPFHxS                                                             | MPFOS                                                              |                                             | MPFDoDA                                      |                                              |
| 15  | 2501-FF |                                                                          |                                                                          | M3PFHxS                                                                  | M9PFNA                                                             | M8PFOS                                                     | M8PFOS                                                    |                                                                    | M7PFUnDA                                                           | MPFDoDA                                                            |                                             |                                              |                                              |
| 16  | 2501-FF | sodium perfluoro-1-[2,3,4-13C12] butanesulfonate                         | sodium perfluoro-1-hexane[18O2]sulfonate                                 | sodium perfluoro-1-hexane[18O2]sulfonate                                 | sodium perfluoro-1-hexane[18O2]sulfonate                           | Sodium perfluoro-1-[1,2,3,4-13C12] octanesulfonate.        | Sodium perfluoro-1-[1,2,3,4-13C12] octanesulfonate.       | Sodium perfluoro-1-[1,2,3,4-13C12] octanesulfonate.                |                                                                    |                                                                    |                                             |                                              |                                              |
| 17  | 2501-FF |                                                                          | PFBS                                                                     | PFPeS                                                                    | PFHxS                                                              |                                                            |                                                           |                                                                    | MPFOS                                                              | PFNS                                                               | PFDS                                        | PFUnDS                                       | PFDoDS                                       |
| 19  | 2501-FF | MPFBS                                                                    |                                                                          | MPFHxS                                                                   |                                                                    | MPFOS                                                      |                                                           |                                                                    |                                                                    | MPFOS                                                              |                                             |                                              |                                              |
| 22  | 2501-FF |                                                                          |                                                                          |                                                                          |                                                                    |                                                            |                                                           | 13C4-PFOS                                                          |                                                                    |                                                                    |                                             |                                              |                                              |
| 24  | 2501-FF |                                                                          |                                                                          | PFOS C13                                                                 |                                                                    | PFOS C13                                                   | PFOS C13                                                  | PFOS C13                                                           |                                                                    |                                                                    |                                             |                                              |                                              |
| 28  | 2501-FF | PFBS-13C3                                                                | PFHxS-13C3                                                               | PFHxS-13C3                                                               | PFHxS-13C3                                                         | PFOS-13C8                                                  | PFOS-13C8                                                 |                                                                    | PFOS-13C8                                                          | PFDA-13C6                                                          |                                             | PFDoA -13C2                                  |                                              |
| 29  | 2501-FF | PFBS 13C3                                                                | PFHxS 13C3                                                               | PFHxS 18O2                                                               | PFHpS 13C3                                                         | PFOS 13C4                                                  | PFOS 13C4                                                 | PFOS 13C4                                                          | PFNS 13C3                                                          | PFDS 13C3                                                          | PFUnDS 13C3                                 |                                              | PFTrDS 13C4                                  |
| 30  | 2501-FF | PFBS-13C3                                                                | PHHxS-13C3                                                               | PFHxS-13C3                                                               | PFOS-13C8                                                          | PFOS-13C8                                                  | PFOS-13C8                                                 | PFOS-13C8                                                          | PFOS-13C8                                                          | PFOS-13C8                                                          | PFOS-13C8                                   |                                              |                                              |
| 31  | 2501-FF | Perfluoro-n-(2,3,4-13C3)butansulfonsäure (Na.salz) (M3PFBS)              | Perfluoro-n-(1,2,3,4,6-13C5)hexansäure (M5PFHxA)                         | Perfluoro-1-(2,3,4-13C3)hexansulfonsäure (Na.salz) (M3PFHxS)             | Perfluoro-n-(13C8)octansäure (M8PFOA)                              | Perfluoro-n-(13C8)octansulfonsäure (Natriumsalz) (M8PFOS)  | Perfluoro-n-(13C8)octansulfonsäure (Natriumsalz) (M8PFOS) | Perfluoro-n-(13C8)octansulfonsäure (Natriumsalz) (M8PFOS)          | Perfluoro-n-(1,2,3,4,5,6-13C6)decansäure (M6PFDA)                  | Perfluoro-n-(1,2-13C2)dodecansäure (MPFDoA)                        | Perfluoro-n-(1,2-13C2)dodecansäure (MPFDoA) | Perfluoro-n-(13C2)tetradecansäure (M2PFTeDA) | Perfluoro-n-(13C2)tetradecansäure (M2PFTeDA) |
| 37  | 2501-FF | 13C-PFBS                                                                 |                                                                          | 18O-PFHxS                                                                |                                                                    | 13C-PFOS 80                                                |                                                           | 13C-PFOS 80                                                        |                                                                    |                                                                    |                                             |                                              |                                              |
| 39  | 2501-FF | M3PFHxS (Sodium perfluor-1-(1,2,3-13C3)Hexane sulfonate)                 |                                                                          | M3PFHxS (Sodium perfluor-1-(1,2,3-13C3)Hexane sulfonate)                 | M3PFHxS (Sodium perfluor-1-(1,2,3-13C3)Hexane sulfonate)           | M8PFOS (Sodium perfluoro-1-(1,2,3,4-13C4) octanesulfonate) |                                                           |                                                                    |                                                                    | M8PFOA (perfluoro-n-(13C8) octanoic acid)                          |                                             |                                              |                                              |
| 41  | 2501-FF |                                                                          |                                                                          | 13C3-PFHxS                                                               |                                                                    | 13C8-PFOS                                                  | 13C8-PFOS                                                 |                                                                    |                                                                    |                                                                    |                                             |                                              |                                              |
| 42  | 2501-FF | PFBS-13C3                                                                |                                                                          | PFHxS-13C3                                                               | PFOS-13C8                                                          | PFOS-13C8                                                  | PFOS-13C8                                                 |                                                                    |                                                                    | PFOS-13C8                                                          |                                             |                                              |                                              |
| 43  | 2501-FF | 13C3-PFBS                                                                | 13C3-PFHxS                                                               | 13C3-PFHxS                                                               | 13C8-PFOS                                                          |                                                            |                                                           |                                                                    | 13C8-PFOS                                                          | 13C8-PFOS                                                          |                                             |                                              |                                              |
| 44  | 2501-FF | M3-PFBS                                                                  | M3-PFHxS                                                                 | M3-PFHxS                                                                 | M3-PFHxS                                                           |                                                            |                                                           |                                                                    | M8-PFOS                                                            | M8-PFOS                                                            | M8-PFOS                                     | M8-PFOS                                      |                                              |
| 47  | 2501-FF |                                                                          |                                                                          | PFHxS isotope-labelled                                                   |                                                                    |                                                            |                                                           | PFOS isotope-labelled                                              |                                                                    |                                                                    |                                             |                                              |                                              |
| 51  | 2501-FF | M13C3 PFBS                                                               | M13C3 PFBS                                                               | M18O2 PFHxS                                                              | M18O2 PFHxS                                                        | M13C4 PFOS                                                 | M13C4 PFOS                                                | M13C4 PFOS                                                         | M13C4 PFOS                                                         | M13C2 PFDA                                                         | M13C2 PFDoDA                                | M13C2 PFDoDA                                 | M13C2 PFTeDA                                 |
| 53  | 2501-FF | 2,3,4-13C3-PFBS                                                          | 1,2,3-13C3-PFHxS                                                         | 1,2,3-13C3-PFHxS                                                         | 1,2,3-13C3-PFHxS                                                   | 13C8-PFOS                                                  | 13C8-PFOS                                                 | 13C8-PFOS                                                          | 13C8-PFOS                                                          | 13C8-PFOS                                                          |                                             |                                              |                                              |
| 54  | 2501-FF | M3PFBS                                                                   |                                                                          | M3PFHxS                                                                  |                                                                    | M8PFOS                                                     | M8PFOS                                                    | M8PFOS                                                             |                                                                    |                                                                    |                                             |                                              |                                              |
| 55  | 2501-FF | 18O-PFHxS                                                                | 18O-PFHxS                                                                | 18O-PFHxS                                                                | 18O-PFHxS                                                          | 13C-PFOS                                                   | 13C-PFOS                                                  | 13C-PFOS                                                           | 13C-PFOS                                                           | 13C-PFOS                                                           | 13C-PFOS                                    | 13C-PFOS                                     | 13C-PFOS                                     |
| 58  | 2501-FF |                                                                          |                                                                          | 13CPFHxS                                                                 | 13C-PFOS                                                           | 13C-PFOS                                                   | 13C-PFOS                                                  | 13C-PFOS                                                           |                                                                    |                                                                    |                                             |                                              |                                              |
| 59  | 2501-FF |                                                                          |                                                                          | 13C PFHxS                                                                |                                                                    | 13C L-PFOS                                                 | 13C L-PFOS                                                | 13C L-PFOS                                                         |                                                                    |                                                                    |                                             |                                              |                                              |
| 61  | 2501-FF | 13C-PFBS                                                                 | 13C-PFOS                                                                 | 13C-PFHxS                                                                | 13C-PFOS                                                           |                                                            |                                                           |                                                                    | 13C-PFOS                                                           | 13C-PFDoDA                                                         | 13C-PFDoDA                                  | 13C-PFDoDA                                   | 13C-PFDoDA                                   |
| 62  | 2501-FF |                                                                          |                                                                          |                                                                          |                                                                    |                                                            |                                                           |                                                                    |                                                                    |                                                                    |                                             |                                              |                                              |
| 66  | 2501-FF | 13C3-PFBS                                                                |                                                                          | 13C3-PFHxS                                                               |                                                                    | 13C8-PFOS                                                  |                                                           | 13C8-PFOS                                                          |                                                                    |                                                                    |                                             |                                              |                                              |
| 67  | 2501-FF | 13C3-PFBS                                                                | 13C3-PFBS                                                                | 13C3-PFHxS                                                               | 13C3-PFHxS                                                         | 13C8-PFOS                                                  | 13C8-PFOS                                                 |                                                                    | 13C8-PFOS                                                          | 13C2-PFDA                                                          |                                             | 13C2-PFDA                                    |                                              |
| 69  | 2501-FF |                                                                          |                                                                          | 13C3 - PFHxS                                                             |                                                                    |                                                            |                                                           | 13C4 - PFOS                                                        |                                                                    |                                                                    |                                             |                                              |                                              |
| 70  | 2501-FF |                                                                          |                                                                          | 13C3 PFHxS                                                               |                                                                    | 13C8 PFOS                                                  | 13C8 PFOS                                                 |                                                                    |                                                                    |                                                                    |                                             |                                              |                                              |
| 72  | 2501-FF |                                                                          |                                                                          | 13C-PFHxS                                                                |                                                                    | 13C-PFOS                                                   | 13C-PFOS                                                  |                                                                    | 13C-PFOS                                                           | 13C-PFOS                                                           |                                             |                                              |                                              |
| 73  | 2501-FF | PFBS 13C3                                                                | PFHxA 13C2                                                               | PFHxS 18O2                                                               | PFHxS 18O2                                                         | PFOS 13C4                                                  | PFOS 13C4                                                 | PFOS 13C4                                                          | PFUnDA 13C2                                                        | PFDODA 13C2                                                        | PFUnDA 13C2                                 | PFTeDA 13C2                                  | PFTeDA 13C2                                  |
| 74  | 2501-FF | M3PFHxS                                                                  | M3PFHxS                                                                  | M3PFHxS                                                                  | M3PFHxS                                                            | MPFOS                                                      |                                                           | MPFOS                                                              | M7PFUdA                                                            |                                                                    |                                             |                                              |                                              |
| 75  | 2501-FF | PFBS                                                                     | PFBS                                                                     | PFHxS                                                                    | PFHxS                                                              | PFOS                                                       |                                                           | PFOS                                                               | PFOS                                                               | PFOS                                                               |                                             | PFOS                                         |                                              |
| 76  | 2501-FF | PFBS-13C3                                                                | PFBS-13C3                                                                | PFHxS-18O2                                                               | PFHxS-18O2                                                         | PFOS-13C4                                                  | PFOS-13C4                                                 | PFOS-13C4                                                          | PFOS-13C4                                                          | PFOS-13C8                                                          |                                             |                                              |                                              |
| 77  | 2501-FF |                                                                          |                                                                          | 13C6-PFHxS                                                               |                                                                    |                                                            |                                                           | 13C8-PFOS                                                          |                                                                    |                                                                    |                                             |                                              |                                              |
| 79  | 2501-FF | M3PFBS                                                                   | M3PFHxS                                                                  | M3PFHxS                                                                  | M8PFOS                                                             | M8PFOS                                                     | M8PFOS                                                    | M8PFOS                                                             | M8PFOS                                                             | M8PFOS                                                             |                                             | M8PFOS                                       |                                              |
| 81  | 2501-FF | 13C-PFBS                                                                 |                                                                          | 13C-PFHxS                                                                |                                                                    |                                                            |                                                           | 13C-PFOS                                                           |                                                                    |                                                                    |                                             |                                              |                                              |
| 85  | 2501-FF | 13C3-PFBS                                                                |                                                                          | 13C3-PFHxS                                                               | 13C8-PFOS                                                          | 13C8-PFOS                                                  | 13C8-PFOS                                                 | 13C8-PFOS                                                          |                                                                    | 13C7-PFUnDA                                                        |                                             | 13C2-PFTeA                                   |                                              |
| 86  | 2501-FF | PFBS-13C3                                                                |                                                                          | PFHxS-18O2                                                               | PFOS-13C4                                                          | PFOS-13C4                                                  | PFOS-13C4                                                 |                                                                    | PFOS-13C4                                                          | PFOS-13C4                                                          |                                             |                                              |                                              |
| 87  | 2501-FF |                                                                          |                                                                          | Perfluoro-1[1,2,3-(13C3)]hexansulfonat                                   |                                                                    |                                                            |                                                           | Perfluoro(13C8)octansulfonat                                       |                                                                    |                                                                    |                                             |                                              |                                              |
| 89  | 2501-FF |                                                                          |                                                                          | MPFHxS                                                                   |                                                                    |                                                            |                                                           | M8PFOS                                                             |                                                                    |                                                                    |                                             |                                              |                                              |
| 93  | 2501-FF |                                                                          |                                                                          | perfluoro-1- [2,3,4-13C3] butans                                         |                                                                    | um perfluoro-1-[13C8] octansolf                            | sodium perfluoro-1-[13C8] octanesulfonate                 | sodium perfluoro-1-[13C8] octanesulfonate                          |                                                                    |                                                                    |                                             |                                              |                                              |
| 97  | 2501-FF | PFBS 13C3                                                                | PFHxA 13C5                                                               | PFHxS 13C3                                                               | PFOA 13C8                                                          | PFOS 13C8                                                  | PFOS 13C8                                                 | PFOS 13C8                                                          | PFDA 13C6                                                          | PFUnDA 13C7                                                        | PFDODA 13C2                                 | PFTeDA 13C2                                  | PFTeDA 13C2                                  |
| 99  | 2501-FF | PFBS13C3                                                                 | PFBS13C3                                                                 | PFHxS18O2                                                                | PFHxS18O2                                                          | PFOS13C4                                                   | PFOS13C4                                                  | PFOS13C4                                                           | PFDA13C2                                                           | PFDA13C2                                                           | PFUnDA13C2                                  | PFTeDA13C2                                   | PFTeDA13C2                                   |
| 101 | 2501-FF | 13C4-PFBS                                                                | 13C4-PFBS                                                                | 13C6-PFHxS                                                               | 13C8-PFOS                                                          | 13C8-PFOS                                                  | 13C8-PFOS                                                 | 13C8-PFOS                                                          | 13C8-PFOS                                                          | 13C8-PFOS                                                          | 13C8-PFOS                                   | 13C8-PFOS                                    | 13C8-PFOS                                    |
| 67A | 2501-FF | 13C3-PFBS                                                                | 13C3-PFBS                                                                | 13C3-PFHxS                                                               | 13C3-PFHxS                                                         | 13C8-PFOS                                                  | 13C8-PFOS                                                 |                                                                    | 13C8-PFOS                                                          | 13C2-PFDA                                                          |                                             | 13C2-PFDA                                    |                                              |
| 71B | 2501-FF | M3PFBS                                                                   | M3PFBS                                                                   | PFHxS-18O2                                                               | PFHxS-18O2                                                         |                                                            |                                                           | PFOS ISTD                                                          | PFOS ISTD                                                          | PFOS ISTD                                                          | PFOS ISTD                                   | PFOS ISTD                                    | PFOS ISTD                                    |





EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]

EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Fish Fillet (2501-FF)  
Methods Perfluoroalkylsulfonic acids (PFSAs) - Recovery Standards

| LC  | Sample  | Perfluorobutanesulfonic acid<br>(PFBS) | Perfluoropentanesulfonic acid<br>(PFPeS) | Perfluorohexanesulfonic acid<br>(PFHxS) | Perfluoroheptanesulfonic acid<br>(PFHpS) | Linear Perfluorooctanesulfonic acid<br>(L-PFOS) | Sum of branched PFOS acids<br>(br-PFOS) | Total-Perfluorooctanesulfonic acids<br>(total PFOS) | Perfluorononanesulfonic acid<br>(PFNS) | Perfluorodecanesulfonic acid<br>(PFDS) | Perfluoroundecane- sulfonic acid<br>(PFUnDS) | Perfluorododecane- sulfonic acid<br>(PFDoDS) | Perfluorotridecane- sulfonic acid<br>(PFTrDS) |
|-----|---------|----------------------------------------|------------------------------------------|-----------------------------------------|------------------------------------------|-------------------------------------------------|-----------------------------------------|-----------------------------------------------------|----------------------------------------|----------------------------------------|----------------------------------------------|----------------------------------------------|-----------------------------------------------|
| 2   | 2501-FF | PFOS-13C8                              | PFOS-13C8                                | PFOS-13C8                               | PFOS-13C8                                | PFOS-13C8                                       | PFOS-13C8                               | No                                                  | PFOS-13C8                              | PFOS-13C8                              | PFOS-13C8                                    | PFOS-13C8                                    | PFOS-13C8                                     |
| 3   | 2501-FF | No                                     | No                                       | No                                      | No                                       | No                                              | No                                      | No                                                  | No                                     | No                                     | No                                           | No                                           | No                                            |
| 4   | 2501-FF |                                        |                                          | 13C4-PFOA                               |                                          |                                                 |                                         | 13C4-PFOA                                           |                                        |                                        |                                              |                                              |                                               |
| 5   | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 6   | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 8   | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 9   | 2501-FF | M3PFBA-inj                             | M3PFBA-inj                               | M3PFBA-inj                              | M3PFBA-inj                               | MPFOS-inj                                       | MPFOS-inj                               | MPFOS-inj                                           | M3PFBA-inj                             | MPFDA-inj                              | MPFDA-inj                                    | MPFDA-inj                                    | MPFDA-inj                                     |
| 10  | 2501-FF | 13C2-PFHxA                             | 13C2-PFHxA                               | 13C2-PFHxA                              | 13C2-PFHxA                               | 13C2-PFHxA                                      | 13C2-PFHxA                              | 13C2-PFHxA                                          | 13C5-PFNA                              | 13C5-PFNA                              | 13C5-PFNA                                    | 13C5-PFNA                                    | 13C5-PFNA                                     |
| 12  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 13  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 15  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 16  | 2501-FF | Sodium perfluoro-[13C8]octanesulfonate | Sodium perfluoro-[13C8]octanesulfonate   | Sodium perfluoro-[13C8]octanesulfonate  | Sodium perfluoro-[13C8]octanesulfonate   | Sodium perfluoro-[13C8]octanesulfonate          | Sodium perfluoro-[13C8]octanesulfonate  | Sodium perfluoro-[13C8]octanesulfonate              |                                        |                                        |                                              |                                              |                                               |
| 17  | 2501-FF |                                        | 0.79                                     | 0.81                                    | 0.8225                                   |                                                 |                                         |                                                     | 0.95                                   | 0.87                                   | 0.92                                         | 0.85                                         | 0.83                                          |
| 19  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         | 13C8-PFOS                                           |                                        |                                        |                                              |                                              |                                               |
| 22  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 24  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 28  | 2501-FF | PFOS-13C4                              | PFOS-13C4                                | PFOS-13C4                               | PFOS-13C4                                | PFOS-13C4                                       | PFOS-13C4                               |                                                     | PFOS-13C4                              | PFOS-13C4                              |                                              | PFOS-13C4                                    |                                               |
| 29  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 30  | 2501-FF | PFOS-13C3                              | PFOS-13C3                                | PFOS-13C3                               | PFOS-13C3                                | PFOS-13C3                                       | PFOS-13C3                               | PFOS-13C3                                           | PFOS-13C3                              | PFOS-13C3                              | PFOS-13C3                                    |                                              |                                               |
| 31  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 37  | 2501-FF | PFOA - M8                              |                                          | PFOA - M8                               | PFOA - M8                                | PFOS - M8                                       | PFOS - M8                               | PFOS - M8                                           |                                        | PFOA - M8                              |                                              |                                              |                                               |
| 39  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 41  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 42  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 43  | 2501-FF |                                        |                                          | 13O2-PFHxS                              |                                          | 13C4-PFOS                                       |                                         | 13C4-PFOS                                           |                                        |                                        |                                              |                                              |                                               |
| 44  | 2501-FF | M4-PFOS                                | M4-PFOS                                  | M4-PFOS                                 | M4-PFOS                                  |                                                 |                                         | M4-PFOS                                             | M4-PFOS                                | M4-PFOS                                | M4-PFOS                                      | M4-PFOS                                      | M4-PFOS                                       |
| 47  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 51  | 2501-FF | M13C8 PFOS                             | M13C8 PFOS                               | M13C8 PFOS                              | M13C8 PFOS                               | M13C8 PFOS                                      | M13C8 PFOS                              | M13C8 PFOS                                          | M13C8 PFOS                             | M13C8 PFOS                             | M13C8 PFOS                                   | M13C8 PFOS                                   | M13C8 PFOS                                    |
| 53  | 2501-FF | 1,2,3,4-13C4-PFOS                      | 1,2,3,4-13C4-PFOS                        | 1,2,3,4-13C4-PFOS                       | 1,2,3,4-13C4-PFOS                        | 1,2,3,4-13C4-PFOS                               | 1,2,3,4-13C4-PFOS                       | 1,2,3,4-13C4-PFOS                                   | 1,2,3,4-13C4-PFOS                      | 1,2,3,4-13C4-PFOS                      | 1,2,3,4-13C4-PFOS                            | 1,2,3,4-13C4-PFOS                            | 1,2,3,4-13C4-PFOS                             |
| 54  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 55  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 58  | 2501-FF |                                        |                                          | RS-M4PFHxS                              | RS-M4PFOS                                | RS-M4PFOS                                       | RS-M4PFOS                               | RS-M4PFOS                                           |                                        |                                        |                                              |                                              |                                               |
| 59  | 2501-FF |                                        |                                          | none                                    |                                          | none                                            | none                                    | none                                                |                                        |                                        |                                              |                                              |                                               |
| 61  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 62  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 66  | 2501-FF |                                        | PFPeS                                    |                                         | PFHpS                                    |                                                 |                                         |                                                     | PFNS                                   | PFDS                                   | PFUnDS                                       | PFDoDS                                       | PFTrDS                                        |
| 67  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 69  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 70  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 72  | 2501-FF |                                        |                                          | MPFOA                                   |                                          | MPFOS                                           | MPFOS                                   | MPFOS                                               | MPFOS                                  | MPFOS                                  | MPFOS                                        | MPFOS                                        | MPFOS                                         |
| 73  | 2501-FF | PFOS 13C8                              | PFOS 13C8                                | PFOS 13C8                               | PFOS 13C8                                | PFOS 13C8                                       | PFOS 13C8                               | PFOS 13C8                                           | PFOS 13C8                              | PFOS 13C8                              | PFOS 13C8                                    | PFOS 13C8                                    | PFOS 13C8                                     |
| 74  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 75  | 2501-FF | PFOS                                   | PFOS                                     | PFOS                                    | PFOS                                     | PFOS                                            |                                         | PFOS                                                | PFOS                                   | PFOS                                   |                                              | PFOS                                         | PFOS                                          |
| 76  | 2501-FF | none                                   | none                                     | none                                    | none                                     | none                                            | none                                    | none                                                | none                                   | none                                   | none                                         | none                                         | none                                          |
| 77  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 79  | 2501-FF | MPFHxS                                 | MPFHxS                                   | MPFHxS                                  | MPFHxS                                   | MPFOS                                           | MPFOS                                   | MPFOS                                               | MPFOS                                  | MPFOS                                  |                                              | MPFOS                                        |                                               |
| 81  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 85  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 86  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 87  | 2501-FF |                                        |                                          | none                                    |                                          |                                                 |                                         | none                                                |                                        |                                        |                                              |                                              |                                               |
| 89  | 2501-FF |                                        |                                          | own Material                            |                                          |                                                 |                                         | own Material                                        |                                        |                                        |                                              |                                              |                                               |
| 93  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 97  | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 99  | 2501-FF | PFOS13C8                               | PFOS13C8                                 | PFOS13C8                                | PFOS13C8                                 | PFOS13C8                                        | PFOS13C8                                | PFOS13C8                                            | PFOS13C8                               | PFOS13C8                               | PFOS13C8                                     | PFOS13C8                                     | PFOS13C8                                      |
| 101 | 2501-FF | 13C4-PFOS                              | 13C4-PFOS                                | 13C4-PFOS                               | 13C4-PFOS                                | 13C4-PFOS                                       | 13C4-PFOS                               | 13C4-PFOS                                           | 13C4-PFOS                              | 13C4-PFOS                              | 13C4-PFOS                                    | 13C4-PFOS                                    | 13C4-PFOS                                     |
| 67A | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |
| 71B | 2501-FF |                                        |                                          |                                         |                                          |                                                 |                                         |                                                     |                                        |                                        |                                              |                                              |                                               |



| LC | Sample  | Perfluorobutanesulfonic acid<br>(PFBS) | Perfluoropentanesulfonic acid<br>(PFPeS) | Perfluorohexanesulfonic acid<br>(PFHxS)                   | Perfluoroheptanesulfonic acid<br>(PFHpS) | Linear Perfluorooctanesulfonic acid<br>(L-PFOS) | Sum of branched PFOS acids<br>(br-PFOS)                                                                                                                                                                                           | Total-Perfluorooctanesulfonic acids<br>(total PFOS)                                                                                      | Perfluorononanesulfonic acid<br>(PFNS) | Perfluorodecanesulfonic acid<br>(PFDS) | Perfluoroundecane-sulfonic acid<br>(PFUnDS) | Perfluorododecane-sulfonic acid<br>(PFDoDS) | Perfluorotridecane- sulfonic acid<br>(PFTrDS) |
|----|---------|----------------------------------------|------------------------------------------|-----------------------------------------------------------|------------------------------------------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------|---------------------------------------------|---------------------------------------------|-----------------------------------------------|
| 2  | 2501-FF |                                        |                                          |                                                           |                                          |                                                 | quantification against L-PFOS                                                                                                                                                                                                     | and average of the 2 MS/MS transitions 499>80 and 499>99                                                                                 |                                        |                                        |                                             |                                             |                                               |
| 3  | 2501-FF |                                        |                                          |                                                           |                                          |                                                 | L-PFOS                                                                                                                                                                                                                            | L-PFOS                                                                                                                                   |                                        |                                        |                                             |                                             |                                               |
| 4  | 2501-FF |                                        |                                          |                                                           |                                          |                                                 |                                                                                                                                                                                                                                   |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 5  | 2501-FF |                                        |                                          |                                                           |                                          | L-PFOS standard; 499->80                        | L-PFOS standard; mean 499->80 and 499->99                                                                                                                                                                                         | L-PFOS standard                                                                                                                          |                                        |                                        |                                             | qualitativ screening                        | qualitativ screening                          |
| 6  | 2501-FF | MU: not determined                     | MU: not determined                       |                                                           | MU: not determined                       |                                                 | Branched PFOS is determined by subtracting linear PFOS from total PFOS. Transition 499 > 99 used for quantification 499 > 80 was used for Qualification.                                                                          |                                                                                                                                          | MU: not determined                     | MU: not determined                     | MU: not determined                          | MU: not determined                          | MU: not determined                            |
| 8  | 2501-FF |                                        |                                          |                                                           |                                          |                                                 |                                                                                                                                                                                                                                   | 489.9>80                                                                                                                                 |                                        |                                        |                                             |                                             |                                               |
| 9  | 2501-FF |                                        |                                          |                                                           |                                          |                                                 | br-PFOSK, average of trans 79,95 & 89,95                                                                                                                                                                                          | br-PFOSK, average of trans 79,95 & 89,96                                                                                                 |                                        |                                        |                                             |                                             |                                               |
| 10 | 2501-FF |                                        |                                          |                                                           |                                          | L-PFOS, SUM of both mass transitions            | substraction total PFOS - L-PFOS                                                                                                                                                                                                  | L-PFOS, SUM of both mass transitions                                                                                                     | total PFNS                             | <LOQ                                   |                                             |                                             |                                               |
| 12 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 |                                                                                                                                                                                                                                   |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 13 | 2501-FF |                                        |                                          |                                                           | detected concentration: 0.0091 µg/kg     |                                                 | L-PFOS und Mittelwert aus 499->80 und 499-->99                                                                                                                                                                                    |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 15 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 |                                                                                                                                                                                                                                   |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 16 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 | Br-PFOS based on the calibration curve of sum of branched isomers using the MS transition m/z 499 - 80                                                                                                                            |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 17 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 |                                                                                                                                                                                                                                   | only total PFOS measured                                                                                                                 | only total PFOS measured               |                                        |                                             |                                             |                                               |
| 19 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 |                                                                                                                                                                                                                                   | Quan: 499-->80; Qual 499-->90                                                                                                            |                                        |                                        |                                             |                                             |                                               |
| 22 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 |                                                                                                                                                                                                                                   |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 24 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 |                                                                                                                                                                                                                                   |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 28 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 |                                                                                                                                                                                                                                   |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 29 | 2501-FF |                                        |                                          |                                                           |                                          | MRM 499->80, only L-PFOS quantitated            | L-PFOS; transition: 499>80 MRM 499->80 (Calibrated with L-PFOS Cal-Std), Total PFOS (Sum of all Peaks quantitated) - L-PFOS (only L-PFOS quantitated)= Assay br-PFOS (Difference calculation)                                     | MRM 499->80, Sum of all Peaks quantitated                                                                                                |                                        |                                        |                                             |                                             |                                               |
| 30 | 2501-FF |                                        |                                          | Sum of Linear and Branched Isomeres                       |                                          |                                                 | br-PFOS, 498,9>80,1 498,9>99,1                                                                                                                                                                                                    | 498,9>80,1 498,9>99,1                                                                                                                    |                                        |                                        |                                             | not analized                                | not analized                                  |
| 31 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 | L-PFOS was used to quantify (MS/MS transition 499/80)                                                                                                                                                                             | L-PFOS was used to quantify (MS/MS transition 499/80)                                                                                    |                                        |                                        |                                             |                                             |                                               |
| 37 | 2501-FF |                                        | not part of our scope                    |                                                           |                                          |                                                 | not part of our scope                                                                                                                                                                                                             | not part of our scope                                                                                                                    | not part of our scope                  |                                        | not part of our scope                       | not part of our scope                       | not part of our scope                         |
| 39 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 | Quantification with L-PFOS                                                                                                                                                                                                        | Transitions 499>99, 507>99                                                                                                               |                                        |                                        |                                             |                                             |                                               |
| 41 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 |                                                                                                                                                                                                                                   |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 42 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 |                                                                                                                                                                                                                                   |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 43 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 |                                                                                                                                                                                                                                   | L-PFOS, 499>80                                                                                                                           |                                        |                                        |                                             |                                             |                                               |
| 44 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 |                                                                                                                                                                                                                                   | Chromatographic overlap between Br- and L-PFOS. Quantified together using L-PFOS and full scan m/z 498,9302. Confirmed using m/z 98.9558 |                                        |                                        |                                             |                                             | Not analysed                                  |
| 47 | 2501-FF |                                        |                                          | < LQ                                                      |                                          |                                                 |                                                                                                                                                                                                                                   |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 51 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 | Average of Quantmer (498,9 > 80) and Qualifier (498,9 > 99) values, determinated with L-PFOS calibration ("Av L" approach from the Comparative Study on the Determination of linear, branched, and total PFOS) in Pork Liver 2023 |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 53 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 | linear, branched, and total PFOS quantification with L-PFOS, mean of MS/MS transition 99 and 80                                                                                                                                   | quantification with L-PFOS, mean of MS/MS transition 99 and 80                                                                           |                                        |                                        | not analyzed                                |                                             | not analyzed                                  |
| 54 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 | L-PFOS: 499 -> 80                                                                                                                                                                                                                 | L-PFOS: 499 -> 80                                                                                                                        |                                        |                                        |                                             |                                             |                                               |
| 55 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 | L-PFOS: 499>80.0                                                                                                                                                                                                                  | L-PFOS: 499>80.0                                                                                                                         |                                        |                                        |                                             |                                             |                                               |
| 58 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 | Br-PFOS used Transitions 498.9>98.9 & 498.9>79.8                                                                                                                                                                                  |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 59 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 |                                                                                                                                                                                                                                   |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 61 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 |                                                                                                                                                                                                                                   |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 62 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 |                                                                                                                                                                                                                                   |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 66 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 | only inidcative approximation since br-PFOS content in reference standard is not certified. L-PFOS used for approximation assuming same ionisation. HRMS m/z 498.9302 with fragments 98.9558 and 79.9563                          |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 67 | 2501-FF |                                        |                                          |                                                           |                                          | 499.0-99.0                                      | L-PFOS for quantification, Br-PFOS for identification; 499.0-99.0                                                                                                                                                                 |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 69 | 2501-FF |                                        |                                          | commonly used LOQ - 0.1 in this case tried to reach lower |                                          |                                                 |                                                                                                                                                                                                                                   |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 70 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 | Br-PFOSK 499-169                                                                                                                                                                                                                  | Br-PFOSK 499-169                                                                                                                         |                                        |                                        |                                             |                                             |                                               |
| 72 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 | L-PFOS; average m/z 80 and m/z 99                                                                                                                                                                                                 | m/z 80 L-PFOS + average m/z 80 and m/z 99 br-PFOS                                                                                        |                                        |                                        |                                             |                                             |                                               |
| 73 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 | cf comments - Method PFAS                                                                                                                                                                                                         |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 74 | 2501-FF |                                        |                                          |                                                           |                                          |                                                 |                                                                                                                                                                                                                                   |                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |

| LC  | Sample  |  | Perfluorobutanesulfonic acid<br>(PFBS) | Perfluoropentanesulfonic acid<br>(PFPeS) | Perfluorohexanesulfonic acid<br>(PFHxS)       | Perfluoroheptanesulfonic acid<br>(PFHpS) | Linear Perfluorooctanesulfonic acid<br>(L-PFOS)                                                                                                           | Sum of branched PFOS acids<br>(br-PFOS)                                         | Total-Perfluorooctanesulfonic acids<br>(total PFOS)                                                                                                      | Perfluorononanesulfonic acid<br>(PFNS) | Perfluorodecanesulfonic acid<br>(PFDS) | Perfluoroundecane-sulfonic acid<br>(PFUnDS) | Perfluorododecane-sulfonic acid<br>(PFDoDS) | Perfluorotridecane- sulfonic acid<br>(PFTrDS) |
|-----|---------|--|----------------------------------------|------------------------------------------|-----------------------------------------------|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------|---------------------------------------------|---------------------------------------------|-----------------------------------------------|
| 75  | 2501-FF |  |                                        |                                          |                                               |                                          | A 5-point calibration curve was built-up using linear-PFOS and labelled linear-PFOS. The calculated RF was applied to quantify linear-PFOS in the samole. | branched-PFOS was calculated as difference between total-PFOS and linear-PFOS   | A 5-point calibration curve was built-up using linear-PFOS and labelled linear-PFOS. The calculated RF was applied to quantify total-PFOS in the sample. |                                        |                                        |                                             |                                             |                                               |
| 76  | 2501-FF |  |                                        |                                          |                                               |                                          |                                                                                                                                                           | quantified with L-PFOS and Transition 499 --> 80                                | quantified with L-PFOS and Transition 499 --> 80                                                                                                         |                                        |                                        |                                             |                                             |                                               |
| 77  | 2501-FF |  |                                        |                                          |                                               |                                          |                                                                                                                                                           |                                                                                 |                                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 79  | 2501-FF |  |                                        |                                          |                                               |                                          | 499->80 m/z                                                                                                                                               | Branched PFOS was determined using branched standards on 499->80 m/z transition | Linear and branched PFOS were determined separately using the appropriate standards and summed.                                                          |                                        |                                        |                                             |                                             |                                               |
| 81  | 2501-FF |  |                                        |                                          |                                               |                                          |                                                                                                                                                           |                                                                                 |                                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 85  | 2501-FF |  |                                        |                                          |                                               |                                          |                                                                                                                                                           | Mean of 499.0-99.1 and 499-80.1 L-PFOS; 499 > 80                                | 499.0-99.1                                                                                                                                               |                                        |                                        |                                             |                                             |                                               |
| 86  | 2501-FF |  |                                        |                                          |                                               |                                          |                                                                                                                                                           |                                                                                 |                                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 87  | 2501-FF |  |                                        |                                          | Determination of recovery via spiking on fish |                                          |                                                                                                                                                           |                                                                                 | Determination of recovery via spiking on fish                                                                                                            |                                        |                                        |                                             |                                             |                                               |
| 89  | 2501-FF |  |                                        |                                          |                                               |                                          |                                                                                                                                                           |                                                                                 |                                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 93  | 2501-FF |  |                                        |                                          |                                               |                                          |                                                                                                                                                           |                                                                                 |                                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 97  | 2501-FF |  |                                        |                                          |                                               |                                          |                                                                                                                                                           |                                                                                 |                                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 99  | 2501-FF |  |                                        |                                          |                                               |                                          |                                                                                                                                                           | 499>80.0                                                                        | 499>99.1                                                                                                                                                 |                                        |                                        |                                             |                                             |                                               |
| 101 | 2501-FF |  |                                        |                                          |                                               |                                          |                                                                                                                                                           |                                                                                 |                                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 67A | 2501-FF |  |                                        |                                          |                                               |                                          | 499.0-99.0                                                                                                                                                | L-PFOS for quantification, Br-PFOS for identification; 499.0-99.0               |                                                                                                                                                          |                                        |                                        |                                             |                                             |                                               |
| 71B | 2501-FF |  | result <0,10                           | result <0,10                             | result <0,10                                  | result <0,10                             | linear PFOS; transition 499/99                                                                                                                            | linear PFOS; transition 499/99                                                  | linear PFOS; transition 499/99                                                                                                                           | result <0,10                           | result <0,10                           | result <0,10                                | result <0,10                                | result <0,10                                  |

Fish Fillet (2501-FF)  
Methods Sum of PFOS, PFOA, PFNA, PFHxS - Comments

| LC  | Sample  | Sum of total-PFOS, PFOA, PFNA, PFHxS                 |                                                      |
|-----|---------|------------------------------------------------------|------------------------------------------------------|
|     |         | (ub)                                                 | (lb)                                                 |
| 2   | 2501-FF |                                                      |                                                      |
| 3   | 2501-FF |                                                      |                                                      |
| 4   | 2501-FF |                                                      |                                                      |
| 5   | 2501-FF |                                                      |                                                      |
| 6   | 2501-FF |                                                      |                                                      |
| 8   | 2501-FF |                                                      |                                                      |
| 9   | 2501-FF |                                                      |                                                      |
| 10  | 2501-FF |                                                      |                                                      |
| 12  | 2501-FF |                                                      | Reg (EU) 2023/915                                    |
| 13  | 2501-FF |                                                      |                                                      |
| 15  | 2501-FF |                                                      |                                                      |
| 16  | 2501-FF |                                                      |                                                      |
| 17  | 2501-FF | All the analytes were at quantifiable concentrations | All the analytes were at quantifiable concentrations |
| 19  | 2501-FF | Total PFOS is only linear PFOS                       | Total PFOS is only linear PFOS                       |
| 22  | 2501-FF |                                                      |                                                      |
| 24  | 2501-FF |                                                      |                                                      |
| 28  | 2501-FF |                                                      |                                                      |
| 29  | 2501-FF |                                                      |                                                      |
| 30  | 2501-FF |                                                      |                                                      |
| 31  | 2501-FF |                                                      |                                                      |
| 37  | 2501-FF |                                                      |                                                      |
| 39  | 2501-FF |                                                      |                                                      |
| 41  | 2501-FF |                                                      |                                                      |
| 42  | 2501-FF |                                                      |                                                      |
| 43  | 2501-FF |                                                      |                                                      |
| 44  | 2501-FF |                                                      |                                                      |
| 47  | 2501-FF |                                                      |                                                      |
| 51  | 2501-FF |                                                      |                                                      |
| 53  | 2501-FF |                                                      |                                                      |
| 54  | 2501-FF |                                                      |                                                      |
| 55  | 2501-FF |                                                      |                                                      |
| 58  | 2501-FF |                                                      |                                                      |
| 59  | 2501-FF |                                                      |                                                      |
| 61  | 2501-FF |                                                      |                                                      |
| 62  | 2501-FF |                                                      |                                                      |
| 66  | 2501-FF |                                                      |                                                      |
| 67  | 2501-FF |                                                      |                                                      |
| 69  | 2501-FF |                                                      |                                                      |
| 70  | 2501-FF |                                                      |                                                      |
| 72  | 2501-FF |                                                      |                                                      |
| 73  | 2501-FF |                                                      |                                                      |
| 74  | 2501-FF |                                                      |                                                      |
| 75  | 2501-FF |                                                      |                                                      |
| 76  | 2501-FF |                                                      |                                                      |
| 77  | 2501-FF |                                                      |                                                      |
| 79  | 2501-FF |                                                      |                                                      |
| 81  | 2501-FF |                                                      |                                                      |
| 85  | 2501-FF |                                                      |                                                      |
| 86  | 2501-FF |                                                      |                                                      |
| 87  | 2501-FF |                                                      |                                                      |
| 89  | 2501-FF |                                                      |                                                      |
| 93  | 2501-FF |                                                      |                                                      |
| 97  | 2501-FF |                                                      |                                                      |
| 99  | 2501-FF |                                                      |                                                      |
| 101 | 2501-FF |                                                      |                                                      |
| 67A | 2501-FF |                                                      |                                                      |
| 71B | 2501-FF |                                                      |                                                      |



EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]

EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Fish Fillet (2501-FF)

Methods Other PFAS - Internal Standards

| LC  | Sample  | Perfluorooctane sulphonamide               | 2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid | 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid                                | Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate  | Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate | 1-Propanaminium, N,N-dimethyl-N-oxide-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide | 1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide |
|-----|---------|--------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|     |         | FOSA                                       | DONA                                                                                 | GenX                                                                                     | (major component of F-53B)                                | (minor component of F-53B)                                | Capstone A                                                                                                           | Capstone B                                                                                                                     |
| 2   | 2501-FF |                                            | GenX-13C3                                                                            | GenX-13C3                                                                                | PFOS-13C4                                                 | PFOS-13C4                                                 |                                                                                                                      |                                                                                                                                |
| 3   | 2501-FF | M8FOSA-I                                   | 13C5-PFHxA                                                                           | 13C3-M3HFPO-DA                                                                           | 13C7-PFUdA                                                | 13C7-PFUdA                                                |                                                                                                                      |                                                                                                                                |
| 4   | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 5   | 2501-FF | 13C8-FOSA                                  | 13C4-PFHpA                                                                           | 13C3-HFPO-DA                                                                             | 13C8-PFOS                                                 | 13C8-PFOS                                                 |                                                                                                                      |                                                                                                                                |
| 6   | 2501-FF | 13C8-FOSA                                  | 13C-GENX                                                                             | 13C-GENX                                                                                 | 13C4-PFOS                                                 | 13C4-PFOS                                                 |                                                                                                                      |                                                                                                                                |
| 8   | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 9   | 2501-FF |                                            | MPFOA                                                                                | MHFPO-DA                                                                                 | MPFOS                                                     | MPFOS                                                     |                                                                                                                      |                                                                                                                                |
| 10  | 2501-FF |                                            | 13C3-HFPO-DA                                                                         | 13C3-HFPO-DA                                                                             |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 12  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 13  | 2501-FF | MFOSA                                      | MPFOA                                                                                | MPFOS                                                                                    | MPFOS                                                     | MPFOS                                                     |                                                                                                                      |                                                                                                                                |
| 15  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 16  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 17  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 19  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 22  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 24  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 28  | 2501-FF | PFOSA-13C8                                 |                                                                                      | HFPO-DA-13C3                                                                             |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 29  | 2501-FF | PFOSA 13C8                                 |                                                                                      | GenX 13C3                                                                                |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 30  | 2501-FF | 13C8-FOSA                                  | 13C3-GenX                                                                            | 13C3-GenX                                                                                |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 31  | 2501-FF | Perfluoro-n-(13C8)octansulfonamid (M8FOSA) | Perfluoro-4,8-dioxa-3H-nonansäure-13C2-Carboxyl Ammoniumsalz                         | 2,3,3,3-Tetrafluoro-2(1,1,2,2,3,3,3-heptafluoropropoxy)-13C3-prpranoic acid (M3HFPO- DA) | Perfluoro-n-(13C8)octansulfonsäure (Natriumsalz) (M8PFOS) | Perfluoro-n-(1,2-13C2)dodecansäure (MPFDoA)               |                                                                                                                      | Perfluoro-1-(2,3,4-13C3)hexansulfonsäure (Na.salz) (M3PFHxS)                                                                   |
| 37  | 2501-FF |                                            | 13C-PFHpA                                                                            | 13C-GenX                                                                                 |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 39  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 41  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 42  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 43  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 44  | 2501-FF | M8-FOSA                                    |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 47  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 51  | 2501-FF |                                            | M13C3 GenX                                                                           | M13C3 GenX                                                                               | M13C4 PFOS                                                | M13C2 PFDA                                                |                                                                                                                      |                                                                                                                                |
| 53  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 54  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 55  | 2501-FF | 13C-FOSA                                   | 13C-HFPO-DA/Gen-X                                                                    | 13C-HFPO-DA/Gen-X                                                                        | 13C-PFOS                                                  | 13C-PFOS                                                  | 13C-PFOS                                                                                                             | 13C-PFOS                                                                                                                       |
| 58  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 59  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 61  | 2501-FF | 13C-FOSA                                   |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 62  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 66  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 67  | 2501-FF |                                            |                                                                                      | 13C3 PFBS                                                                                |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 69  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 70  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 72  | 2501-FF | 13C-PFOSA                                  |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 73  | 2501-FF |                                            | PFHpA 13C4                                                                           | GenX 13C3                                                                                | PFDA 13C2                                                 | PFDoDA 13C2                                               |                                                                                                                      |                                                                                                                                |
| 74  | 2501-FF | M8FOSA                                     |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 75  | 2501-FF | FOSA                                       | PFHpA                                                                                | GenX                                                                                     | PFOS                                                      | PFOS                                                      |                                                                                                                      |                                                                                                                                |
| 76  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 77  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 79  | 2501-FF |                                            | MPFHpA                                                                               | MPFHxA                                                                                   | M9PFNA                                                    | M9PFNA                                                    |                                                                                                                      |                                                                                                                                |
| 81  | 2501-FF | 13C-FOSA                                   |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 85  | 2501-FF |                                            | 13C4-PFHpA                                                                           | 13C3-HFPO-DA                                                                             |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 86  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 87  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 89  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 93  | 2501-FF |                                            |                                                                                      |                                                                                          |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 97  | 2501-FF |                                            | PFHpA 13C4                                                                           | GEN X 13C3                                                                               | PFDA 13C6                                                 | PFUnDA 13C7                                               |                                                                                                                      |                                                                                                                                |
| 99  | 2501-FF |                                            | GenX13C3                                                                             | GenX13C3                                                                                 | PFNA13C5                                                  | PFDA13C2                                                  |                                                                                                                      |                                                                                                                                |
| 101 | 2501-FF |                                            | 13C3-GenX                                                                            | 13C3-GenX                                                                                | 13C3-GenX                                                 | 13C3-GenX                                                 |                                                                                                                      |                                                                                                                                |
| 67A | 2501-FF |                                            |                                                                                      | 13C3 PFBS                                                                                |                                                           |                                                           |                                                                                                                      |                                                                                                                                |
| 71B | 2501-FF | PFOS ISTD                                  | M3HFPO-DA                                                                            | M4PFHpA                                                                                  | PFOS ISTD                                                 | PFOS ISTD                                                 |                                                                                                                      |                                                                                                                                |

| LC  | Sample  |  | Perfluorooctane sulphonamide | 2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid | 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid | Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate | Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate | 1-Propanaminium, N,N-dimethyl-N-oxide-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide | 1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide |
|-----|---------|--|------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|     |         |  | FOSA                         | DONA                                                                                 | GenX                                                      | (major component of F-53B)                               | (minor component of F-53B)                                | Capstone A                                                                                                           | Capstone B                                                                                                                     |
| 2   | 2501-FF |  |                              | PFOS-13C8                                                                            | PFOS-13C8                                                 | PFOS-13C8                                                | PFOS-13C8                                                 |                                                                                                                      |                                                                                                                                |
| 3   | 2501-FF |  | NO                           | NO                                                                                   | NO                                                        | NO                                                       | NO                                                        |                                                                                                                      |                                                                                                                                |
| 4   | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 5   | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 6   | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 8   | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 9   | 2501-FF |  |                              | M2PFOA-inj                                                                           | M3PFBA-inj                                                | MPFOS-inj                                                | MPFOS-inj                                                 |                                                                                                                      |                                                                                                                                |
| 10  | 2501-FF |  |                              |                                                                                      | 13C5-PFNA                                                 |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 12  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 13  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 15  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 16  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 17  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 19  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 22  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 24  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 28  | 2501-FF |  | PFOS-13C4                    | PFOS-13C4                                                                            | PFOS-13C4                                                 | PFOS-13C4                                                | PFOS-13C4                                                 |                                                                                                                      |                                                                                                                                |
| 29  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 30  | 2501-FF |  | 13C4-PFOS                    | 13C4-PFOS                                                                            | 13C4-PFOS                                                 |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 31  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 37  | 2501-FF |  |                              | PFOA - M8                                                                            | PFOA - M8                                                 |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 39  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 41  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 42  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 43  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 44  | 2501-FF |  | M2-PFDA                      |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 47  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 51  | 2501-FF |  |                              | M13C8 PFOS                                                                           | M13C8 PFOS                                                | M13C8 PFOS                                               | M13C8 PFOS                                                |                                                                                                                      |                                                                                                                                |
| 53  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 54  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 55  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 58  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 59  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 61  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 62  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 66  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 67  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 69  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 70  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 72  | 2501-FF |  | MPFOA                        |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 73  | 2501-FF |  |                              | PFOS 13C8                                                                            | PFOS 13C8                                                 | PFOS 13C8                                                | PFOS 13C8                                                 |                                                                                                                      |                                                                                                                                |
| 74  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 75  | 2501-FF |  | PFOS                         | PFOA                                                                                 | PFOA                                                      | PFOS                                                     | PFOS                                                      |                                                                                                                      |                                                                                                                                |
| 76  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 77  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 79  | 2501-FF |  |                              | MPFNA                                                                                | MPFNA                                                     | MPFNA                                                    | MPFNA                                                     |                                                                                                                      |                                                                                                                                |
| 81  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 85  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 86  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 87  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 89  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 93  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 97  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 99  | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 101 | 2501-FF |  |                              | 13C4-PFOS                                                                            | 13C4-PFOS                                                 | 13C4-PFOS                                                | 13C4-PFOS                                                 |                                                                                                                      |                                                                                                                                |
| 67A | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 71B | 2501-FF |  |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |

| LC  | Sample  | Perfluorooctane sulphonamide        | 2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid | 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid | Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate | Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate | 1-Propanaminium, N,N-dimethyl-N-oxide-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide | 1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide |
|-----|---------|-------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|     |         | FOSA                                | DONA                                                                                 | GenX                                                      | (major component of F-53B)                               | (minor component of F-53B)                                | Capstone A                                                                                                           | Capstone B                                                                                                                     |
| 2   | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 3   | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 4   | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 5   | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           | not in the measuring method                                                                                          | not in the measuring method                                                                                                    |
| 6   | 2501-FF | MU: not determined                  | MU: not determined                                                                   | MU: not determined                                        | MU: not determined                                       | MU: not determined                                        |                                                                                                                      |                                                                                                                                |
| 8   | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 9   | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 10  | 2501-FF | Not Analyzed                        | Only qualitativ                                                                      |                                                           | Only qualitativ                                          | Only qualitativ                                           | Not Analyzed                                                                                                         | Not Analyzed                                                                                                                   |
| 12  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 13  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 15  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 16  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 17  | 2501-FF | not analyzed                        | not analyzed                                                                         | not analyzed                                              | not analyzed                                             | not analyzed                                              | not analyzed                                                                                                         | not analyzed                                                                                                                   |
| 19  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 22  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 24  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 28  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 29  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 30  | 2501-FF | Sum of Linear and Branched Isomeres |                                                                                      |                                                           | not analized                                             | not analyzed                                              | not analyzed                                                                                                         | not analyzed                                                                                                                   |
| 31  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 37  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 39  | 2501-FF |                                     | not part of our scope                                                                | not part of our scope                                     | not part of our scope                                    | not part of our scope                                     | not part of our scope                                                                                                | not part of our scope                                                                                                          |
| 41  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 42  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 43  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 44  | 2501-FF |                                     | Not analysed                                                                         | Not analysed                                              | Not analysed                                             | Not analysed                                              | Not analysed                                                                                                         | Not analysed                                                                                                                   |
| 47  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 51  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 53  | 2501-FF | not analyzed                        | not analyzed                                                                         | not analyzed                                              | not analyzed                                             | not analyzed                                              | not analyzed                                                                                                         | not analyzed                                                                                                                   |
| 54  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 55  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 58  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 59  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 61  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 62  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 66  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 67  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 69  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 70  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 72  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 73  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 74  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 75  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 76  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 77  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 79  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 81  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 85  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 86  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 87  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 89  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 93  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 97  | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 99  | 2501-FF | not analysed                        |                                                                                      |                                                           |                                                          |                                                           | not analysed                                                                                                         | not analysed                                                                                                                   |
| 101 | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 67A | 2501-FF |                                     |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 71B | 2501-FF | result <0,10                        | result <0,10                                                                         | result <0,10                                              | result <0,10                                             | result <0,10                                              |                                                                                                                      |                                                                                                                                |





**EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]**

EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food

13 February 2026

**Annex 7:** Participants' methods for PFAS - Extraction, clean-up and detection

**Test sample - Fish Fillet (2501-FF)**



EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]  
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Fish Fillet (2501-FF)  
Methods Perfluoroalkylcarboxylic acids (PFCAs), Perfluoroalkylsulfonic acids (PFASs) and Other PFAS - Pre-treatment and extraction

| LC Sample |         | Pre-treatment and extraction                                                                                          |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
|-----------|---------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--|
| 2         | 2501-FF | Pre-treatment and extraction following French NRL method (LABERCA/PFAS-ma.1.03) :                                     | drying sample (if not dry)                                                                                                   | extraction with methanol/KOH                                                                                       |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 3         | 2501-FF | Two extractions with acetonitrile                                                                                     |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 4         | 2501-FF | Quechers-Extraction                                                                                                   |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 5         | 2501-FF | 2 g sample is mixed with ISTD and extracted twice with 5 mL acetonitrile                                              |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 6         | 2501-FF | homogenized sample is weighed and spiked with internal standard. Left alone for 15 minutes                            | Solvents and quecher salt is added.                                                                                          |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 8         | 2501-FF | Quechers                                                                                                              |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 9         | 2501-FF | Quechers extraction using Water, Acetonitrile, NaCl and MgSO4 salts.                                                  | After centrifugation, organic phase is taken for clean-up steps.                                                             |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 10        | 2501-FF | solid liquid extraction with 20 mL 0.1 % NH3 in acetonitrile                                                          |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 12        | 2501-FF | hydrolysis and solvent extraction                                                                                     |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 13        | 2501-FF | 10 ml acetonitrile                                                                                                    |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 15        | 2501-FF | Sample were homogenized upon arrival and put in freezer (-20 C) until extraction.                                     | 2 g sample was weighed in, in a plastic tube and spiked with 50 µL of internalstandard (c = 0,001 µg/mL).                    | Double extraction with 2 x 5 mL of acetonitrile. Vigorously shaking 5 min. Ultrasonic bath 15 min. Centrifugation. | Supernatant was transferred to a new plastic tube (the same) after each extraction.                                                                                                                |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 16        | 2501-FF | Extraction using 10 ml of methanol/potassium hydroxide for 17 hours.                                                  |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 17        | 2501-FF | 1) sample introduction into 50 ml PP tubes and spiking with 10 µL mix surrogate IS and left to equilibrium for 20 min | 2) Addition of 10 ml of Methanol with 10 mM of NaOH and homogenization for 5 min in USAE                                     | 3) Orbital digestion (120 rpm, 2h)                                                                                 | 4) centrifugation (2000 rpm, 10 min)                                                                                                                                                               | 5) supernatant transferred to 50 ml PP new tubes                                                 | 6) Evaporation till 2 ml under nitrogen current | 7) Re-dilution in 45 ml of HPLC water, homogenization in vortex                                   |                                                                                                            |                                                                 |  |
| 19        | 2501-FF | Duplicate extraction with 5 mL acetonitrile                                                                           | Sonification, 15 min                                                                                                         | Centrifugation                                                                                                     |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 22        | 2501-FF | homogenisation, drying                                                                                                | extraction method EPA 1633                                                                                                   |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 24        | 2501-FF |                                                                                                                       |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 28        | 2501-FF | DOUBLE EXTRACTION WITH ACETONITRILE                                                                                   |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 29        | 2501-FF | ACN Extraction (2x), vortex and centrifuge.                                                                           | Sampling of the 2 extracts.                                                                                                  |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 30        | 2501-FF | extraction with NaOH 0,05M in methanol                                                                                |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 31        | 2501-FF | Pre-treatment: -                                                                                                      |                                                                                                                              | Extraction method: extraction according to a modified version of the QueChERS method:                              | 5g sample, addition of 10 ml water and 10 ml ACN , ultrasonic extraction, and shaking after addition of Citrat-Extraction-Tube (CET) for QueChERS, centrifugation, SPE-clean up of the supernatant |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 37        | 2501-FF | Extraction with MeOH and formic acid                                                                                  | Head-over-head + centrifuge                                                                                                  | Dilution with MilliQ                                                                                               |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 39        | 2501-FF | Weigh 5 ± 0.01 grams of the sample into a 50 ml centrifuge tube, add 100 µl of Internal Standard.                     | Add 10 ml Acetonitrile with 5% Formic acid, Add 10 ml HPLC-Water, Shake the colomix for 2 minutes.                           | Add 6.5 grams of QueChERS salt, Shake in the colomix for 4 minutes.Centrifuge at 10000 rpm for 4 minutes           |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 41        | 2501-FF | After the addition of internal standards the sample was extracted with acetonitrile.                                  |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 42        | 2501-FF | Extracted with acetonitrile                                                                                           |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 43        | 2501-FF | Sample + 10 mL H2O + 10 mL ACN                                                                                        | 60 min ultrasonic extraction (shaking by hand every 15 min)                                                                  | Cooling down to room temp                                                                                          | Addition of 4 g MgSO4, 1 g NaCl, 250 mg carbon                                                                                                                                                     | Shaking by hand rapidly                                                                          | Centrifugation                                  |                                                                                                   |                                                                                                            |                                                                 |  |
| 44        | 2501-FF | Homogenisation, spiking with internal standard.                                                                       | Extraction with methanol using ultrasonic bath                                                                               | Sentrifugation, filtration, water addition                                                                         |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 47        | 2501-FF | Ion pairing extraction in water + Na2CO3 + tetrabutylammonium and Methyl tert-butyl ether (MTBE)                      |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 51        | 2501-FF | Sample is dry                                                                                                         | 1g of dry sample is extracted with 15 ml MeOH/KOH 0.01M during 16 hours                                                      | Evaporate 5ml of supernatant until 1ml, dilute with 4ml of water                                                   |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 53        | 2501-FF | 5 g sample (wet weight) in polypropylen tubes                                                                         | addition of internal standard (50 µl á 100 ng/ml)                                                                            | addition of 10 ml ACN - extraction 5 min shaker and 5 min ultrasonic                                               | addition of 1 ml NaOH (1M) - extraction 15 min shaker and 15 min ultrasonic                                                                                                                        | phase separation with 0,5 g NaCl - extraction 5 min shaker and 5 min ultrasonic - centrifugation | organic phase in new polypropylen tube          | addition of 10 ml ACN to sample - extraction 15 min shaker and 15 min ultrasonic - centrifugation | combine organic phase from second extraction with organic phase from first extraction in polypropylen tube | addition of 10 µl formic acid (98%) to raw extract (pH ca. 5-6) |  |
| 54        | 2501-FF | adding of internal standards to the weighed sample (2g).                                                              | extraction with 2x 5 mL acetonitrile, 20 sec Vortex, 15 min ultrasonic bath (40 °C), centrifugation and combine the extracts |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 55        | 2501-FF | extraction with 1% NH3 in ACN, evaporation and dilution in acetate buffer                                             |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 58        | 2501-FF | Addition of internal std                                                                                              | Alkaline digestion                                                                                                           | Ext in Acetonitrile - shake and sonicate x 2                                                                       |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 59        | 2501-FF | 1ml 200mM NaOH was added to the sample                                                                                | after that internal standards were added and the sample was thoroughly mixed.                                                | Extraction was done with 5 ml MeOH and the mixture was shaken for 2 min, followed by 30min ultrasound.             | after that, the sample was centrifuged and the supernatant was acidified with 4M HCl followed by shaking for 2 min.                                                                                | After addition of 12ml water the sample was processed to clean up stage.                         |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 61        | 2501-FF |                                                                                                                       | Addition of internal standards                                                                                               | Extraction Acetonitrile Water (50:50; v/v)                                                                         | QueChERS Mix                                                                                                                                                                                       |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 62        | 2501-FF |                                                                                                                       |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 66        | 2501-FF | Extraction with basic methanol                                                                                        |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 67        | 2501-FF | QueChERS NaCl:MgSO4 (1:4), acetonitrile and water                                                                     |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 69        | 2501-FF | 1 g of sample                                                                                                         | addition of internal standards + standard addition                                                                           | extraction with water : acetonitrile 1:1 (10 + 10 ml)                                                              | vortex, shaking, vortex, shaking head over head                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 70        | 2501-FF | Extraction with ACN                                                                                                   |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 72        | 2501-FF | # addition of 5 mL dest. water to 5 g                                                                                 | # extraction with 10 mL ACN and 60 µL HCl (6 MOL), shaking (20 min) and ultrasonication (20 min)                             | # addition of 4 g MgSO4 and 1 g NaCl                                                                               | # 15 min centrifugation, transfer of organic layer to 15 mL tube                                                                                                                                   | # evaporation to 1 mL using nitrogen (50 °C), add 1 mL ACN                                       | # addition of 8 mL 25mM NH4Ac buffer (pH = 6)   | # centrifugation and transfer to SPE cartridge                                                    |                                                                                                            |                                                                 |  |
| 73        | 2501-FF | Pre-treatment includes a grinding, freeze-drying and supplementation step.                                            | Extraction involves the use of a methanol solution containing potassium hydroxide.                                           |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 74        | 2501-FF | Sonication with 5 mL acetonitrile and centrifuge (twice)                                                              |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 75        | 2501-FF | Addition of 5 mL water and 10 mL acetonitrile. Sample was shaken for 15 min.                                          | QueChERS extraction packet was added to the extract and shaken again.                                                        |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 76        | 2501-FF | Adding ISTD                                                                                                           | Adding 20 mL methanol                                                                                                        | Shaking for 15 min                                                                                                 | Extract for 60 min with ultra sonic                                                                                                                                                                | Centrifugate for 15 min                                                                          |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 77        | 2501-FF | Ultrasound assisted extraction with 2 mL of 0.2 M NaOH and 15 mL of acetonitrile                                      | Centrifugation (3500 rpm, 10 min, room temp.)                                                                                |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 79        | 2501-FF | Sample was blended in a mortar and pestle before extraction                                                           | 3g weighed into tubes and spiked with 50 µL of 10 ng/mL internal standard (MPFAC-24ES)                                       | 5 mL of acetonitrile added to samples, vortexed, sonicated for 15 min and centrifuged                              | extraction was repeated with another 5 mL aliquot of acetonitrile and supernatants combined                                                                                                        |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 81        | 2501-FF | QUECHERS                                                                                                              |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 85        | 2501-FF | Extraction with methanol                                                                                              |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 86        | 2501-FF | ultrasonic extraction using acetonitrile                                                                              |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 87        | 2501-FF | 5 g PT-Material + isotope-labelled internal standard (2,5 g PT-Material for PFOS)                                     | Extraction with 0.1 % ammonia in acetonitrile (mixing, shaking for two hours, centrifugation, remove supernatant)            |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 89        | 2501-FF | Homogenisation, followed by acetonitrile extraction with a disperser                                                  |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 93        | 2501-FF | 5 grams reconstituted with 10 ml of water                                                                             | extraction with 10 ml of Acetonitrile                                                                                        | salting out with Quechers Extraction EN method                                                                     |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 97        | 2501-FF | Méthanol + KOH                                                                                                        |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 99        | 2501-FF | lyophilisation de l'échantillon                                                                                       | extraction solide/liquide avec methanol hydroxide de potassium                                                               |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 101       | 2501-FF | QueChERS NaCl:MgSO4 (1:4), acetonitrile and water                                                                     |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 67A       | 2501-FF |                                                                                                                       |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |
| 71B       | 2501-FF | extraction: 2x 5 ml acetonitrile, 10 min. ultrasonic bath, centrifugation 5 min./ 5000 rpm                            |                                                                                                                              |                                                                                                                    |                                                                                                                                                                                                    |                                                                                                  |                                                 |                                                                                                   |                                                                                                            |                                                                 |  |





EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]  
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Fish Fillet (2501-FF)  
Methods Perfluoroalkylcarboxylic acids (PFCA)s, Perfluoroalkylsulfonic acids (PFSA)s and Other PFAS - Clean-up

| LC  | Sample  | Clean-up                                                                                                                                                                                                    |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
|-----|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 2   | 2501-FF | Clean-up following French NRL method (LABERCA/PFAS-tma.1.03) : Weak anionic exchange (WAX) SPE plus graphitized carbon black (Envicarb)                                                                     | First clean-up SPE Chromabond PFAS                                                                            | Second clean-up SPE ENVI Carb                                                                 |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 3   | 2501-FF | SPE Cleanup                                                                                                                                                                                                 |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 4   | 2501-FF | Add dSPE mixture (2.0 g MgSO4, 0.5 g NaCl, 0.01 g C18, 0.10 g ENVI-Carb) to the combined extract                                                                                                            | and shake vigorously.                                                                                         | Centrifuge, transfer supernatant into a new tube and evaporate to dryness under N2 at 40°C.   | Dissolve the residue in 500 µL eluent (300 µL methanol and 200 µL milliQ water).                         | Centrifuge using Spin-X or filter through a PET syringe filter.                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 5   | 2501-FF | sample is shaken and centrifuged. Than brought onto a dSPE tube                                                                                                                                             | sample is shaken and centrifuged again and put into an autosampler vial that is vortexed again then measured. |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 6   | 2501-FF | d-SPE                                                                                                                                                                                                       |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 8   | 2501-FF | Purification on SPE Envicarb                                                                                                                                                                                | Evaporation to 10 ml                                                                                          | Mix with water and pH adapted to 3                                                            | Purification on SPE Agilent polymeric weak anion exchange 500mg                                          | Evaporation to 0.1 ml, recovery standards added and MeOH/H2O added for total volume of 0.5ml                                                                           | Injection in Polypropylene vial                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 9   | 2501-FF | automated solid-phase extraction with a SPE with a combination                                                                                                                                              | of Strata-GCB (250 mg Top) and Strata-X-AW (100 mq Bottom)                                                    |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 10  | 2501-FF | PSA                                                                                                                                                                                                         |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 12  | 2501-FF | d-SPE C18 and ENVI-carb                                                                                                                                                                                     |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 13  | 2501-FF |                                                                                                                                                                                                             |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 15  | 2501-FF | 0,1 g Graphitized carbon black, 0,1 g C18, 2 g MgSO4, 0,5 g NaCl added to the extract.                                                                                                                      | Vigorously shaking 1 min. Centrifugation.                                                                     | Transfer supernatant to new plastic tube. Evaporate over a stream of nitrogen at 40C.         | Redissolve in 0,5 mL of 50% methanol/H2O. Filter through cellulose acetate spin filter (centrifugation). | Transfer filtrate to plastic vial with plastic cap for LC-MS/MS analysis.                                                                                              |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 16  | 2501-FF | Solid phase extractions (SPE) cartridge Oasis WAX (150 mg, 6 ml) (Waters Corp., USA) and 1) Pre-conditioning of Oasis WAX 3cc with: 2 x 2.5 ml of Methanol and 2 x 2.5 ml of water under gravity conditions | ENVI Carb Solid Phase (500 mg, 6 mL) (Supelco, USA) were used.                                                |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 17  | 2501-FF | Freezing of sample cleanup method EPA 1633                                                                                                                                                                  | 2) Sample loading under vacuum conditions                                                                     | 3) dryness under vacuum                                                                       | 4) Elution with 2 x 2.5 ml of methanol 0.1% NH4OH                                                        | 5) Evaporation under nitrogen stream till 0.5 ml                                                                                                                       | 6) Transfer to LC vial equipped with inserto and further evaporation till dryness under nitrogen stream           | 7) Reconstitution in 0.1 ml of methanol:water (1:9)                                    | 8) Dilution 1/2 before injection because of matrix problems                |                                                                           |                                                                           |
| 19  | 2501-FF |                                                                                                                                                                                                             | Dispersive SPE (MgSO4, NaCl, C18, ENVI-carb)                                                                  |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 22  | 2501-FF |                                                                                                                                                                                                             |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 24  | 2501-FF |                                                                                                                                                                                                             |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 28  | 2501-FF | SPE CLEAN-UP WITH STRATA X-AW 200 mg - dSPE-Envicarb 80mg                                                                                                                                                   |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 29  | 2501-FF | 2.7g Quechers (2g MgSO4/ 0.5g NaCl, 0.10g C18, 0.10 g Carbon)                                                                                                                                               | Mixing, centrifuge, evaporate with N2 (40°C) to dryness.                                                      | Dissolve in MeOH 60%/ Filtration syringe filter                                               | elution with methanol 5% ammonia                                                                         | evaporated on water bath at 50°C with nitrogen                                                                                                                         |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 30  | 2501-FF | SPE Oasis-WAX 200mg +50 mg GCB purification of the extracts using a mixed-mode weak anion-exchange sorbent combined with GCB SPE- tube (Strata PFAS)                                                        | sample in water pH<6                                                                                          | washing with formic acid in water 1%                                                          |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 31  | 2501-FF | (WAX/GCB); 200 mg / 50 mg in a 6 mL Tube)                                                                                                                                                                   | SPE- condition: 4 ml 0.3% NH4OH/MeOH, 6 ml water                                                              | load: sample (8ml extract diluted with about 22 ml water (30 ml final volume))                | wash: 2x 4 ml water                                                                                      | elute: 8 ml 0,3% NH4OH/MeOH                                                                                                                                            | solvent evaporation to 100 µl water                                                                               | addition of 100 µl ACN/MeOH-mix (10/90)                                                | sample measured in ACN-MeOH-H2O mix                                        |                                                                           |                                                                           |
| 37  | 2501-FF | SPE Strata-X-AW Polymeric WAX (200mg/6mL, 33µm, Phenomenex)                                                                                                                                                 | Condition: MeOH + 0.04M HCl in water                                                                          | Add: sample                                                                                   | Wash: 25 mM sodium acetate buffer and 0.04M HCl in MeOH                                                  | Elute: NH4OH in ACN                                                                                                                                                    |                                                                                                                   | Evaporate, re-dissolve in ACN, 20 mM ammonium acetate in water and injection standard. |                                                                            |                                                                           |                                                                           |
| 39  | 2501-FF | Add 7 ml of the extract to the dSPE tube (GCB, PSA, mangesiumsulfat )                                                                                                                                       | Shake in the Colomix for 2 minutes.Centrifuge at 4500 rpm for 6 minutes.                                      | Evaporate 3 ml of the extract to 0.3 ml at 55 degrees Celsius.                                | Shake the extract in the vortex for 2 minutes, Transfer the sample to the vial.                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 41  | 2501-FF | Clean-up was performed by dSPE with C18 following the modified QUECHERS protocol.                                                                                                                           |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 42  | 2501-FF | Cleaned with Envicarb                                                                                                                                                                                       |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 43  | 2501-FF | SPE using Oasis WAX 6 cc, 150 mg Sorbent, 30 µm particle size                                                                                                                                               | Conditioning with 4 mL 0.1% NH3 in MeOH, 4 mL MeOH, 4 mL 25 mM CH3COONH4 in H2O (pH 4 using acetic acid)      | 6 mL extract + 4 mL H2O                                                                       | Washing with 4 mL H2O, 4 mL Acetone/ACN (50/50), 4 mL MeOH                                               | Elution with 2x 1.5 mL 0.1% NH3 in MeOH                                                                                                                                | Keeper (ethylene glycole, 50 µL) was used during evaporation                                                      | Reconstitution with MeOH/H2O (50/50)                                                   |                                                                            |                                                                           |                                                                           |
| 44  | 2501-FF | SPE, Oasis WAX, Automated on ASPEC.                                                                                                                                                                         |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 47  | 2501-FF | WAX SPE clean up                                                                                                                                                                                            |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 51  | 2501-FF | first purification on cartridge SPE Chromabond PFAS                                                                                                                                                         | second purification on cartridge SPE Envi carb 500mg                                                          |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 53  | 2501-FF | freeze out raw extract (-20°C, > 2h) - centrifugation                                                                                                                                                       | d-SPE with 900 mg MgSO4 and 250 mg ENVI-Carb (graphitized carbon black)                                       | evaporate extract to 0.3 ml (Buchi Syncore Plus Analyt)                                       | transfer evaporated extract to centrifugation-tube (eppendorf-tube)                                      | addition of recovery standard (50µl á 100 ng/ml)                                                                                                                       | fill up extract with acid MeOH (0,3% formic acid) to 1 ml (volume is also used for rinsing the evaporation tubes) |                                                                                        |                                                                            |                                                                           |                                                                           |
| 54  | 2501-FF | adding of dSPE-Salt (2 g MgSO4, 0,5 g NaCl, 0,1 g C18, 0,1 g GCB)                                                                                                                                           | shaking and centrifugation (10 min, 3500 rpm)                                                                 | supernatant was transferred into 15 mL centrifuge test tube                                   | evaporation to dryness in N2-Stream (40 °C)                                                              | addition of recovery standard (50 µL) and MeOH (200 µL) and 250 µL mobile Phase A (H2O, 2 mmol ammoniumacetate, 0,1 % acetic acid), then vortex and transfer into vial |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 55  | 2501-FF | SPE with Oasis WAX                                                                                                                                                                                          | evaporation and dissolve in MeOH/water                                                                        |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 58  | 2501-FF | 2D SPE - OASIS WAX + STRATA GCB via ASPEC                                                                                                                                                                   | Evaporation and reconstitution                                                                                | Addition of recovery std.                                                                     |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 59  | 2501-FF | WAX columns were first conditioned with NH4OH in methanol and with water.                                                                                                                                   | After sample load, the analytes were eluted with 4 ml MeOH and 4ml 0.1% NH4OH in methanol.                    |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 61  | 2501-FF | SPE for organic supernatant                                                                                                                                                                                 | Evaporation                                                                                                   | Reconstitution in 250 µL MeOH Water (50:50; v/v)                                              |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 62  | 2501-FF |                                                                                                                                                                                                             |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 66  | 2501-FF | Centrifugation                                                                                                                                                                                              | SPE Clean up (weak anion exchange)                                                                            |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 67  | 2501-FF | DSPE (C18+ graphitised carbon)                                                                                                                                                                              |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 69  | 2501-FF | addition of 4 g MgSO4 + 1 g NaCl - quick shaking + then head over head shaking for 5 mins                                                                                                                   | Centrifugation (4000 rpm, 10 min)                                                                             | 5 ml of acetonitrile layer transferred to new 15 ml centrifuge test-tube                      | addition of 150 mg MgSO4 + 50 mg PSA - shaking, vortex                                                   | Centrifugation (4000 rpm, 10 min)                                                                                                                                      | 2.5 ml of supernatant transferred to the new 15 ml centrifuge test-tube                                           | addition of 12 ml water                                                                | vakuum SPE - Strata X-AW 200 mg 33 um Polymeric Weak Anion                 | 4 ml placed to nitrogen concentrator (60°C, ca 2-3h) till one drop remain | dissolved in 500 ul of MeOH - vortex - centrifugation - transfer to vials |
| 70  | 2501-FF | SPE GCB/WAX                                                                                                                                                                                                 |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 72  | 2501-FF | # manual and automated SPE (Phromochrom SPE-03)                                                                                                                                                             | # SPE (Strata X-AW, 200 mg)                                                                                   | # GCB 250 mg                                                                                  | # elution using 3 x 3 mL 1% ammonia in methanol                                                          | # evaporation to dryness under nitrogen stream (50 °C)                                                                                                                 | # addition of recovery standard and MeOH/ 1% formic acid: final volume of 500 uL                                  | # freeze over night and syringe filtration (PES 0,2 um)                                |                                                                            |                                                                           |                                                                           |
| 73  | 2501-FF | Clean-up on 2 SPE cartridges: CHROMABOND PFAS and ENVI-Carb                                                                                                                                                 | CHROMABOND :                                                                                                  | - Column Conditioning: Prepare column with methanol/NH4OH, methanol, and water.               | - Sample Application: Apply sample onto cartridge and pass through column.                               | - Column Washing: Rinse column with ammonium acetate and methanol.                                                                                                     | - ENVI-Carb :                                                                                                     | - Column Conditioning: Prepare column with methanol.                                   | - Sample Application: Apply sample onto cartridge and pass through column. | - Column Washing: Rinse column with glacial acetic acid and methanol.     |                                                                           |
| 74  | 2501-FF | Dispersive SPE (900MgSO4/450PSA/300C18/50GCB) + evaporate                                                                                                                                                   | Final volumes = 400uL                                                                                         |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 75  | 2501-FF | 8 mL of the extract was purified using the dispersive solid-phase extraction (dSPE) method (dSPE Q-sep QuEChERS; 15 mL)                                                                                     | After manually shaking for one minute and centrifugation,                                                     | 4 mL of the purified extract was evaporated to dryness under a nitrogen stream and            | dissolved in the recovery standard solution.                                                             |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 76  | 2501-FF | Clean up with Strata X SPE                                                                                                                                                                                  | Elution wit 0.1 % NH4OH in methanol                                                                           | Adding 5 uL glycerol to eluate                                                                | evaporate t dryness                                                                                      | reconstitute in LC Eluents (90/10)                                                                                                                                     |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 77  | 2501-FF | Freeze out (-80 degrees Celsius), centrifugation (4700 rpm, 10 min, room temp.)                                                                                                                             | An aliquot diluted with ~200 mL Milli-Q grade water and neutralized with formic acid                          | Clean up with solid phase extraction (Strata X-AW 200 mg/3mL)                                 | Wash 2% formic acid, methanol                                                                            | Elution with 1% NH4OH in MeOH.MTBE (1-9),                                                                                                                              | Evaporation under N2 in water bath (40 degrees celsius), reconstitution in 100 ul MeOH                            |                                                                                        |                                                                            |                                                                           |                                                                           |
| 79  | 2501-FF | Clean-up of combined supernatants by dSPE (2 g MgSO4, 0.5 g NaCl, 0.1 g ENVI-carb, 0.1 g C18 powder)                                                                                                        | Shaken vigorously for 1 min                                                                                   | Centrifuged at 4000 rpm for 15 min                                                            | Supernatant evaporated to dryness under nitrogen at 50°C                                                 | Reconstituted with mobile phase (450 uL) and injection standard added (50 uL, MPFAC-HiF-IS 10 mL/mL)                                                                   | Sonicated for 15 min, transferred to 1 mL microcentrifuge tube                                                    | Centrifuged at 15000 rpm for 5 min                                                     | Supernatant analysed                                                       |                                                                           |                                                                           |
| 81  | 2501-FF | QUECHERS                                                                                                                                                                                                    |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 85  | 2501-FF | Clean up with Strata X-AW                                                                                                                                                                                   |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 86  | 2501-FF | decreasing using n-hexane                                                                                                                                                                                   | dispersive SPE using activated carbon                                                                         |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 87  | 2501-FF | Automated SPE:                                                                                                                                                                                              | Clean-up with ENVI-Carb                                                                                       | Clean-up with STRATA-X AW                                                                     | Concentration the solution in a stream of nitrogen                                                       |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 89  | 2501-FF | extract is evaporated until dryness, degreasing by n-Hexane, transfer of analytes to a solution of dSPE (150mg PSA - 900mg MgSO4 - 150mg C18 EC)                                                            | acetonitrile/5mM ammonium acetate 90/10                                                                       |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 93  | 2501-FF |                                                                                                                                                                                                             |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 97  | 2501-FF | SPE Chromabond PFAS                                                                                                                                                                                         | SPE Envicarb                                                                                                  |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 99  | 2501-FF | purification sur SPE Chromabond PFAS                                                                                                                                                                        | purification sur SPE ENVI carb                                                                                |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 101 | 2501-FF |                                                                                                                                                                                                             |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 67A | 2501-FF | DSPE (C18+ graphitised carbon)                                                                                                                                                                              |                                                                                                               |                                                                                               |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |
| 71B | 2501-FF | extract cleaning: 2 g MgSO4, 0.5g NaCl, 0.1 g C18, 0.1 g activated carbon, centrifugation 5 min./ 5000 rpm                                                                                                  | evaporation to dryness: N2, 45°C                                                                              | dissolv. in 250 ul of MeOH, vortex, 10 min. ultrasonic bath, centrifugation 5 min./ 15000 rpm |                                                                                                          |                                                                                                                                                                        |                                                                                                                   |                                                                                        |                                                                            |                                                                           |                                                                           |



EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]  
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Fish Fillet (2501-FF)  
Methods Perfluoroalkylcarboxylic acids (PFCAs), Perfluoroalkylsulfonic acids (PFSA) and Other PFAS - Chromatographic separation and detection

| LC  | Sample  | Chromatographic separation and detection                                                                                                         |                                                                                                                                                                        |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
|-----|---------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-----------------------|
| 2   | 2501-FF | System : UHPLC/MS/MS                                                                                                                             | Analytical column : C18 reversed-phase                                                                                                                                 | Mobile phase : 2 mM ammonium acetate / acetonitrile in elution gradient mode                                                      | MS type : triple quadrupole                                                                                 | Ionization mode : ESI negative                                                                            |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 3   | 2501-FF | Reverse phase separation using XB column (100 x 2.1 mm, 3 µm- Phenomenex).                                                                       | Mobile phases: water and MeOH both containing 5 mM of ammonium acetate                                                                                                 | Acquisition: LC-Q-Orbitrap system using FullSIM                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 4   | 2501-FF | Measurement: HPLC                                                                                                                                | Injection method: standard                                                                                                                                             | Scan mode (ESI-) and dd-MS2                                                                                                       |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 5   | 2501-FF | Agilent INFINITY II HPLC-System                                                                                                                  | Delay-Column ZORBAX Eclipse Plus C18, 4.6 × 30 mm, 3,5 µm                                                                                                              | Column ACQUITY Premier BEH C18, 2.1 × 100 mm, 1,7 µm                                                                              | Stationary phase: C18-Phase                                                                                 | Detector: MS/MS                                                                                           | Scan mode: MRM                                                                                                  |                                                                                                                                                                                                |                                                                                                        | Triple Quad 6495C with Agilent Jet Stream Source                                                  | dMRM-Method           |
| 6   | 2501-FF | samples are measured on an Waters XEVO TQ Absolute with unisprav                                                                                 | using an Acquity UPLC C18 2.1 x 100 mm; 1,7 µm column                                                                                                                  | MRM/US negative                                                                                                                   | Eluent A: 10 mM Ammoniumacetate / Acetonitrile (90:10, v/v); Eluent B: Methanol / Acetonitrile (60:40, v/v) | Gradient: 0 (90:10) -> 0.01 (60:40) -> 10 (25:75) -> 15 (5:95) -> 16 (5:95) -> 16.1 (90:10) -> 20 (90:10) | Columnn temperature: 40 °C , flow rate: 0.3 mL/min, injection volume: 10 µL , sampler temperature: 10 °C        |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 8   | 2501-FF | LC-MS/MS                                                                                                                                         |                                                                                                                                                                        |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 9   | 2501-FF | Injection on Xevo TQ Absolute 2, ESI-                                                                                                            | Mobile phase A : Water - acetate ammonium 20 mM/Methanol 96/4 v/v                                                                                                      | Mobile phase B : Methanol/ Water - acetate ammonium 20 mM 96/4 v/v                                                                | Run time : 13 minutes                                                                                       | Column : Acquity UPLC BEH C18 1,7 µm                                                                      |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 10  | 2501-FF | LC-MS/MS                                                                                                                                         | Analytical column: Acquity UPLC BEH C18, 150 x 3.0 mm, 2.7 µm                                                                                                          | Trap column: Phenomenex Luna Omega 5 µm PS C18, 50 x 3.0 mm                                                                       | HPLC gradient (Mobile phase A 2 mM ammonium acetate in water, 5 % acetonitrile,                             | mobile phase B: acetonitrile/ methanol 60/40 v/v)                                                         |                                                                                                                 | Detection Triple quadrupole (ESI negative)                                                                                                                                                     | dynamic multiple reaction monitoring                                                                   |                                                                                                   |                       |
| 12  | 2501-FF | LC-MS/MS                                                                                                                                         |                                                                                                                                                                        |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 13  | 2501-FF | LC-MS/MS reversed phase chromatography                                                                                                           |                                                                                                                                                                        |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 15  | 2501-FF | Analytical Column: Waters ACQUITY Premier BEH Shield RP18 Column, 1,7 µm, 2.1 x 100 mm                                                           | Pre-column: Acquity HSS T3, 2,1x50mm, 1,8 µm                                                                                                                           | Isolator column: 2,1x50mm                                                                                                         | Mobile phase A: H2O + 10 mM ammonium acetate                                                                | Mobile Phase B: Methanol/acetonitrile 70/30 + 10 mM ammonium acetate.                                     | Instrument: Waters Xevo TQ-Absolute using ESI in negative ion mode (ESI-)                                       | Gradient: Start 60/40 A/B. Ramp up to 70% B in 10 min. From 70 - 90% B in 5 min and keep at 90% for 2 minutes. From 90 - 00%B in 2 min followed by re-equilibration back to 60/40 A/B in 1 min | Flow: 0,3 ml/min; injection volume: 10µl                                                               | Desolvation temp: 450 C; Desolvation gas 1000 L/hr; Cone: 150 L/hr; Nebuliser: 5 bar.             |                       |
| 16  | 2501-FF | Mobile phases:20 mM ammonium acetate aqueous solution and methanol                                                                               | Flow rate was 0.6 mL/min, and the injection volume of 10 µL.                                                                                                           | Gemini C18 chromatographic column (3 µm, 50 x 2.0 mm).                                                                            | Detection:LC-MS/MS using a Sciex 7500 system operated in the negative electrospray ionization               |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 17  | 2501-FF | Column: Hypersil GOLD PFP 50 x 3 (3 µm)                                                                                                          | Mobile phases: water 20mM NH4Ac / methanol 20 mM NH4Ac                                                                                                                 | Injection volume: 10 ul                                                                                                           | Gradient conditions during 13 min                                                                           | Ionisation: ESI negative                                                                                  | Analysér: QExactive; full scan (100 - 1000 Da) at 70,000 FWHM; Data dependant scan of the most intense ions     |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 19  | 2501-FF | HPLC-column (retention): Luna Omega Polar C18 (1.6 µm, 100*2.1 mm)                                                                               | HPLC-column (analytical): Acquity CSH C18 (1.7 µm, 100*2.1 mm)                                                                                                         | Gradient with Methanol and Ammoniumacetate (2 mM)                                                                                 | MS/MS detection                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 22  | 2501-FF | method EPA 1633                                                                                                                                  |                                                                                                                                                                        |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 24  | 2501-FF |                                                                                                                                                  |                                                                                                                                                                        |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 28  | 2501-FF | CHROMATOGRAPHIC COLUMN: Phenomenex luna omega PS, C18 1.6 µm (100 x 2.1 mm)                                                                      | INJECTION MODE: PARTIAL LOOOP                                                                                                                                          | INJECTION VOLUME: 20 microL                                                                                                       | MOBILE PHASE: A) ACN; B) AMMONIUM ACETATE 2mM in H2O                                                        | FLOW: gradient from 0.1- 0.20 mL/min                                                                      | DETECTION: LC-MS/MS                                                                                             | SOURCE: ESI                                                                                                                                                                                    |                                                                                                        |                                                                                                   |                       |
| 29  | 2501-FF | Eluent A: 2mM NH4-acetat in 95/5 Water/ Methanol                                                                                                 | Eluent B: 2mM NH4-acetat in 50/50 Methanol/ ACN                                                                                                                        | System: Waters Xevo TQ XSI/ UPLC I Class Plus                                                                                     | Column: Waters Acquity UPLC BEH C18                                                                         |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 30  | 2501-FF | HPLC-MS/MS, column BEH C18 100x2.1mm*1.7µm.                                                                                                      | mobile phase water/methanol with ammonium acetate                                                                                                                      |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 31  | 2501-FF | LC-MS/MS, reversed phase, column combination: Synergi Fusion RP, 4µm, 80 Å, 150 x 2 + Synergi Hydro RP, 4 µm, 80 Å, 75 x 2, MRM measurement.     | mobile phase 1: 100 % water + 5mM ammonium acetate                                                                                                                     | mobile phase 2: 100 % MeOH + 5mM ammonium acetate                                                                                 |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 37  | 2501-FF | LC-MS/MS                                                                                                                                         |                                                                                                                                                                        |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 39  | 2501-FF | Determination for PFAS in Fish by means of the Liquid Chromatography Mas Spectrometry (LC-MS/MS).                                                | Analytical Column: ZORBAX Eclipse Plus C18 RRHD (50mm 2.1mm 1.8µm)                                                                                                     | Agilent UPLC 1290 infinity II, Agilent MS 6470 Triple Quad                                                                        |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 41  | 2501-FF | Sample extracts were analyzed by LC-MS/MS with ESI operating in negative mode. HPLC equipped with a C18 column was coupled to triple quadrupole. |                                                                                                                                                                        |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 42  | 2501-FF | LC-MS/MS                                                                                                                                         |                                                                                                                                                                        |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 43  | 2501-FF | HPLC-MS/MS (Dynamic MRM, ESI- with an Agilent 6470 mass spec)                                                                                    | Waters xBridge BEH C18 2.5 µm 2.1 x 150 mm using an Agilent UHPLC                                                                                                      | Channel A: 100 % Water with 2 mM CH3COONH4                                                                                        | Channel B: 40 % ACN/60 % MeOH                                                                               | 2 min 90 % Channel A                                                                                      | 9 min 15 % Channel A                                                                                            | 12 min 2 % Channel A                                                                                                                                                                           | 15 min 2 % Channel A                                                                                   | 15.1 min 90 % Channel A                                                                           | 20 min 90 % Channel A |
| 44  | 2501-FF | LC-HRMS Orbitrap.                                                                                                                                | Separation on C18, mobile phases H2O and MeOH with 2 Mm Ammonium acetate.                                                                                              | HRMS full scan - PRM experiment, negative H-ESI. Quantification on full scan MS1, confirming with MS2 fragment                    |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 47  | 2501-FF | C18 HPLC column separation and ESI-MS/MS detection                                                                                               |                                                                                                                                                                        |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 51  | 2501-FF | Hypersil Gold (100 x 2.1 mm) 1.9 µm                                                                                                              | LC-(ESI)-MS/MS - Agilent 6495C                                                                                                                                         |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 53  | 2501-FF | LC-MMS (Agilent 6495) with pre-column and column Poroshell EC-C18                                                                                | LC-MS/MS ist equipped with online-SPE (Gerstel) - PFAS-enrichment on WAX-cartridges, washing for matrixreduction, concentrated elution from WAX-cartridges in LC-MS/MS | Delay-Column PFC Delay Column                                                                                                     | Poroshell EC-C18; Eluent A 0,1% formic acid in water / Eluent B 0,25% NH3 and 0,05% formic acid in methanol | calibration in solevent (MeOH)                                                                            | detection analytes and internal standards with dMRM                                                             | quantification about response ratios of analytes/internal standards                                                                                                                            | calculation recovery about response ratio of internal standards/recovery standards (calibration =100%) |                                                                                                   |                       |
| 54  | 2501-FF | Agilent 6495 LC/TQ, 1290 Infinity                                                                                                                | MRM-Mode                                                                                                                                                               | ESI-                                                                                                                              | Injection volume 10 µl                                                                                      | separation column: Poroshell 120, C18, 2,7µm, 2,1x150mm; delay column: Poroshell 120 C18, 2,1um. 3.0x50mm | mobile phase A (H20, 2 mmol ammoniumacetate, 0,1 % acetic acid), mobile phase B (40 % acetonitrile in methanol) |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 55  | 2501-FF | C18 column with A: 2 mM NH4OAc in water and B- 2 mM NH4OAc in MeOH                                                                               |                                                                                                                                                                        | MS/MS detection                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 58  | 2501-FF | The detection/confirmation is done by LCMSMS in MRM detection mode                                                                               | The concentration of each analyte is calculated using the isotope dilution technique                                                                                   | The percent recoveries of the isotope dilution analogues are calculated using the integrated peak areas of the recoverv standards | Quantitation is performed using a solvent curve & a stored calibration may be used                          | LC - ACQUITY UPLC I-Class with PFC kit                                                                    | Column - ACQUITY CSH Phenyl hexyl 1.7µm, 2.1 x 100 mm                                                           | Injection vol 30 µL                                                                                                                                                                            | MPA - 95.5 Water: methanol + 2mM ammonium acetate, MPB - Methanol + 2 mM ammonium acetate              | MS - Xevo TQ-XS, ESI -                                                                            |                       |
| 59  | 2501-FF | Luna Omega Polar 100x2.1mm, 3um column, orecolumn Polar C18 4x2mm                                                                                | mobile phase A 10mM NH4OH                                                                                                                                              | mobile phase B 10mM nH4OH in methanol                                                                                             | flow 0.3 ml/min                                                                                             | injection volume 40 ul                                                                                    |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 61  | 2501-FF |                                                                                                                                                  | Chromatographic separation:                                                                                                                                            | Column C18 Polar Phenomenex                                                                                                       | Gradient: 2 mmol Ammonium acetate in Water; 2 mmol Ammonium acetate in Methanol                             | Flow: 0,25 mL/min                                                                                         |                                                                                                                 | Detection:                                                                                                                                                                                     | Unispray ionization                                                                                    | Water Xevo TQ XS                                                                                  |                       |
| 62  | 2501-FF |                                                                                                                                                  |                                                                                                                                                                        |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 66  | 2501-FF | Analytical columnne: Waters Acquity HSS T3 C18 (2.1 mm * 100 mm, 1.8 um)                                                                         | Delay columnne: Waters Acquity BEH C18 (2.1 mm * 50 mm, 1.7 um)                                                                                                        | Mobile phase: 20 mmol NH4COOH in Water:ACN                                                                                        |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 67  | 2501-FF | Delay column: COLUMN C 18 (2.1 × 50 mm)                                                                                                          | UHPLC column: Phenomenex Luna Omega PS C18 100 A° (100 x 2.1 mm - 1.6 um)                                                                                              | Mobile Phases: ammonium acetate 2mM and acetonitrile                                                                              |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 69  | 2501-FF | delay column: HALO PFAS Delay (50 x 3.0 mm, 2.7 um, 160 Å)                                                                                       | analytical column: Atlantis T3 (30 x 2.1 mm, 3 um)                                                                                                                     | MP: A - 2 mM Ammonium Acetate in MeOH                                                                                             | MP: B - 2 mM Ammonium Acetate in water                                                                      | injection of 10 ul                                                                                        | temperature of column: 30 °C                                                                                    | gradient elution                                                                                                                                                                               | LC-MS/MS detection (MRM) - 2 transitions                                                               | ESI negative                                                                                      |                       |
| 70  | 2501-FF | Positive Surface C18 column                                                                                                                      |                                                                                                                                                                        |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 72  | 2501-FF | Agilent InfinityLab Poroshell 120 2.7 µm column, EC-C18, 2,1 x 150 mm                                                                            | Delay column: Agilent InfinityLab Poroshell 120 EC-C18, 3,0 x 50 mm, 2,7 µm LC-Säule                                                                                   | mobile phase A: 2 mmol/L ammonium acetate + 0,1 % acetic acid                                                                     | mobile phase B: methanol/acetonitrile 60:40 v v                                                             | Flow: 0,25 mL/min                                                                                         | 0-0,5 min: 20% B; 0,5-2 min to 55% B, 2-10 min to 80% B, 10-13 min to 98% B hold until 17,5 min,                | 17,5-18,5 min to 20% B                                                                                                                                                                         | Injection volume: 10 µL                                                                                | MS/MS: 6495 B; resolution: unit to unit                                                           |                       |
| 73  | 2501-FF | UPLC ACQUITY PREMIER chromatographic system (Waters)                                                                                             | Column: Acquity Premier HSST3 1.8µm VanGuard FIT 2.1x100 mm                                                                                                            | Trap column: Atlantis Premier BEH C18 AX 5 µm 2.1x100 mm                                                                          | Tandem Mass Spectrometry on Xevo TQ Absolute in negative electrospray ionization mode (source Unispravl)    | Water and methanol mobile phases buffered with 2mM ammonium acetate                                       |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 74  | 2501-FF | UHPLC-HRMS (Qorbitrap)                                                                                                                           | Chromatographic column: Poroshell 2.7 µm 120 EC-C18 (150 x 3.0 mm)                                                                                                     | Mobile phase: H2O (5mM ammonic acetate) : MeOH                                                                                    |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 75  | 2501-FF | Chromatographic column: Luna Omega PS C18 (1.6 um 2.1x 100 mm)                                                                                   | Mobile phase: (A) Water 10 mM of ammonium acetate (B) Methanol:Acetonitrile (1:1)                                                                                      | LC-HRMS (ESI-)                                                                                                                    |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 76  | 2501-FF | Use of autosampler programm                                                                                                                      | Use of delay column between pump and autosampler (C18, XBridge, 50 x 2.1 mm, 3,5 µm)                                                                                   | Eluent A: 2 mM ammoniumacetat and 5% acetonitril                                                                                  | Eluent B: acetonitril/methanol (60/40, v/v)                                                                 | Flow: 0.25 mL/min                                                                                         | Column temperature: 50°C                                                                                        | Injection volume: 20 µL                                                                                                                                                                        | Column: C18, XBridge, 150 x 2.1 mm, 3,5 µm                                                             | Gradient: 0 min: 70%A, 9 min: 25% A, 12 min: 5% A, 15 min: 2% A, 19,5 min: 2% A, 20,5 min: 90% A. | 24 min: 90% A         |
| 77  | 2501-FF | LC-OrbitrapMS : Ultimate 3000 UHPLC with Q-Exactive Orbitrap                                                                                     | Column: Kinetex C18 1.7 um x 50 mm x 3 mm                                                                                                                              | Mobile phase A: 10 mM NH4FA in H2O/CAN (9:1)                                                                                      | Mobile phase B: MeOH/ACN (1:1)                                                                              | Mode: PRM at 17500 FWHM resolution                                                                        |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 79  | 2501-FF | Thermo Vanquish LC with Thermo PFC free conversion kit and Thermo TSQ Altis MS                                                                   | Delay column: Thermo Hypersil Gold C8 50 x 4.6 mm, 1.9 µm                                                                                                              | Analytical column: Raptor C18 50 x 3.0 mm, 2.7 um                                                                                 | Mobile phases: 5 mM ammonium acetate in water, and ACN gradient, 0.3 mL/min                                 | MS parameters: H-ESI, ion transfer tube temp 325°C, vaporizer temp 300°C, sheath gas 50 Arb,              | auxiliary gas 10 Arb, sweep gas 1 Arb, ion spray voltage -2500 V                                                |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 81  | 2501-FF | LC-MS/MS                                                                                                                                         |                                                                                                                                                                        |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 85  | 2501-FF | Separation on C18-reversed-phase with the usage of a binarv solvent gradient                                                                     | Detection: MS/MS (dynamic MRM)                                                                                                                                         |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 86  | 2501-FF | seperation on reversed phase C18                                                                                                                 | detection in multiple reaction monitoring mode (ESI neq)                                                                                                               |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 87  | 2501-FF | LC-MS/MS                                                                                                                                         | column: Poroshell 120 EC-C18 (3,0 x 150 mm, particle size: 2,7 um)                                                                                                     | precolumn: Poroshell 120 EC-C18 (3,0 x 50 mm, 2,7 um)                                                                             | detection: MRM (multiple reaction monitoring)                                                               |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 89  | 2501-FF | Eluent A: 5mM ammonium acetate, Eluent B: acetonitrile/5mM ammonium acetate 90/10                                                                | Column: Phenomenex Luna Omega 1,6 µm PS C18 100A                                                                                                                       | Injection: 10 µL                                                                                                                  | Flow: 550 µL/min                                                                                            | Oven: 40°C                                                                                                | Detection by MS/MS with a Sciex Qtrap 6500+                                                                     |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 93  | 2501-FF | mobile phase A: water 10mM Ammonium Acetate                                                                                                      | mobile phase B: Methanol/ Acetonitrile (80/20) 10mM Ammonium Acetate                                                                                                   | Column: LC Acquity BEH Shield RP18 1,7µm                                                                                          |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 97  | 2501-FF | LCMSMS                                                                                                                                           |                                                                                                                                                                        |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 99  | 2501-FF | LC-MS/MS xevo TOXS waters unisprav néaqtif                                                                                                       | colonne de pieceage AX                                                                                                                                                 | colonne HSST3 2.1*100mm                                                                                                           | 10 µl injectés                                                                                              | run 16 min                                                                                                |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 101 | 2501-FF |                                                                                                                                                  |                                                                                                                                                                        |                                                                                                                                   |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 67A | 2501-FF | Delay column: COLUMN C 18 (2.1 × 50 mm)                                                                                                          | UHPLC column: Phenomenex Luna Omega PS C18 100 A° (100 x 2.1 mm - 1.6 um)                                                                                              | Mobile Phases: ammonium acetate 2mM and acetonitrile                                                                              |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |
| 71B | 2501-FF | A: 5mM NH4Ac in water, B: MeOH, column: Poroshell 120 EC-C18, delay column: Poroshell 120 EC-C18                                                 | MS: TSQ Endura triple quadrupole, MRM, only one ion transition for: PFBA, PFPeA, 9CI-PF3ONS and                                                                        | 11CI-PF3OUdS                                                                                                                      |                                                                                                             |                                                                                                           |                                                                                                                 |                                                                                                                                                                                                |                                                                                                        |                                                                                                   |                       |



**EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]**

EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food

13 February 2026

**Annex 8:** Participants' methods for PFAS - Measurement uncertainty and Limit of Quantification

**Test sample - Fish Fillet (2501-FF)**

**Fish Fillet (2501-FF)**  
Methods Perfluoroalkylcarboxylic acids (PFCAs), Perfluoroalkylsulfonic acids (PFSA) and Other PFAS - LOQ determination, measurement uncertainty calculation and additional information

| LC  | Sample  | Limit of quantification (LOQ) approach                                                                                                                                                   | Measurement Uncertainty (MU) approach                                                                                                                                                                                                                                                                                                                                                                                       | Additional Information                                                                                                                                                                                                                                                                                                                                                          |
|-----|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2   | 2501-FF |                                                                                                                                                                                          | According to Horwitz-Thompson equation                                                                                                                                                                                                                                                                                                                                                                                      | Accreditation only for PFOA, PFOS, PFHxS and PFNA                                                                                                                                                                                                                                                                                                                               |
| 3   | 2501-FF | According to EURL "Guidance Document on Analytical Parameters for the Determination of Per- and Polyfluoroalkyl Substances (PFAS) in Food and Feed" v.2.0 , 10 Sep 2024                  |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 4   | 2501-FF |                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 5   | 2501-FF | During validation of method: Lowest validated level (n=2x6)                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 6   | 2501-FF |                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 8   | 2501-FF |                                                                                                                                                                                          | U= k*u= square root [(CVrw2) + (bias)2]                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                 |
| 9   | 2501-FF | Lowest validated level of a similar procedure using Quecher extraction.                                                                                                                  | According to the Guidance Document                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                 |
| 10  | 2501-FF | Spiking Experiments according to the Guidance Document                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 12  | 2501-FF |                                                                                                                                                                                          | According EURL Guidance Document PFAS                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                 |
| 13  | 2501-FF | lowest validated level                                                                                                                                                                   | From validation data, reproducibility data from QC samples, and bias from proficiency testing.                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                 |
| 15  | 2501-FF | According to EURL-POPs PFAS guidance document.                                                                                                                                           | MU were estimated based on precision and truenes from fortyfication experiment                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                 |
| 16  | 2501-FF | LOD and LOQ were estimated based on analysis of 10 blank spiked samples                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 17  | 2501-FF | Spiking real blank matrix (which was previously extracted in order to eliminate all PFASs present).                                                                                      | Intralaboratory reproducibility and bias combined                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                 |
| 19  | 2501-FF | 6 times standarddeviation for egg samples spiked on a low concentration level (0,05 ng/g)                                                                                                | 50% (D.LGS.172/15)                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                 |
| 22  | 2501-FF | S/N                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                             | no                                                                                                                                                                                                                                                                                                                                                                              |
| 24  | 2501-FF |                                                                                                                                                                                          | From validation data including reproducibility and trueness contributions<br>Expanded measurement uncertainty (U)= measurement uncertainty (Uc) × 2, measurement uncertainty (Uc) calculated of Uncertainty of precision u(P) and Uncertainty of accuracy u(Rm), Including the additional consideration of the uncertainty of the calibration and QC solutions and by checking a control chart during various measurements. |                                                                                                                                                                                                                                                                                                                                                                                 |
| 28  | 2501-FF | Spiked samples at the LOQ                                                                                                                                                                | The measurement uncertainty was estimated only for the analyses regulated by EU Reg 2023/915 taken the root of the sum of the square of precision and the square of accuracy, samples added with standard                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                 |
| 29  | 2501-FF | Spiking LOQ during validation (3 different fish species, 3x spiking each at the LOQ on 2 different days)                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 30  | 2501-FF |                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 31  | 2501-FF | estimation of LOQ based on DIN 32645 and a spiked sample                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 37  | 2501-FF |                                                                                                                                                                                          | Measurement uncertainty was determined according to NEN 7777:2011 & SANTE/11312/2021, by measuring 10 duplicates of blank material spiked at 0.1 ug/kg and then calculated using the reproducibility, repeatability and the bias.                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                 |
| 39  | 2501-FF | LOQ was determined according to NEN 7777:2011 & SANTE/11312/2021, by measuring 10 duplicates of blank material spiked at the LOD (limit of detection)                                    |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 41  | 2501-FF | The LOQ was determined as the lowest validated level.                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 42  | 2501-FF | The lowest calibration curve point was used as LOQ                                                                                                                                       | Es gelten die extrapolierten Analysenspielräume des VDLUFA                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                 |
| 43  | 2501-FF | According to Guidance Document                                                                                                                                                           | According to PFAS guidance document; expanded uncertainty, coverage factor 2                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                 |
| 44  | 2501-FF | According to PFAS guidance document; lowest validated level approach                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 47  | 2501-FF |                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 51  | 2501-FF | blank value *3,3 or S/n=10                                                                                                                                                               | calculated, data from QC-samples, valdiation and PTs                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                 |
| 53  | 2501-FF | LOQ is lowest validated level                                                                                                                                                            | MU were estimated based on precision and trueness from fortification experiments including in validation process                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                 |
| 54  | 2501-FF | lowest validated level approach. Established by spiking samples and taking as the LOQ the lowest value which satisfied the validation criteria                                           | spiking experiments                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                 |
| 55  | 2501-FF | validation by spikings on LOQ level                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 58  | 2501-FF | LVL                                                                                                                                                                                      | MU was calculated taking into account within laboratory reproducibility and precision from fortification experiments.                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                 |
| 59  | 2501-FF | the LOQs were at first evaluated taking into account instrumental response and blanks. After that the LOQ was confirmed with fortification experiments.                                  | Measurement Uncertainty was calculated for certain analytes and rounded up for equalazation                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                 |
| 61  | 2501-FF | Signal to noise (1:5)                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 62  | 2501-FF |                                                                                                                                                                                          | expanded uncertainty of validation experiments                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                 |
| 66  | 2501-FF | According EURL Guidance Document: lowest validated level                                                                                                                                 | The expanded uncertainty for the sum parameter is calculated as the square root of the sum of squares of the individual absolute values of combined uncertainties                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                 |
| 67  | 2501-FF |                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                             | Operator B                                                                                                                                                                                                                                                                                                                                                                      |
| 69  | 2501-FF |                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 70  | 2501-FF |                                                                                                                                                                                          | top-down approach as discribed in the "Guidance document on measurment uncertainty for laboratories performing PCDD/F and PCB analysis", Sum parameter: U = square root of sum of squares of MU of indivitual PFAS                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                 |
| 72  | 2501-FF |                                                                                                                                                                                          | uncertainty from method validation including bias and precision                                                                                                                                                                                                                                                                                                                                                             | Interfering substance for PFHxS. The content was confirmed using a mixed mode column (Atlantis C18 AX 2.5µm 2.1*150mm)<br>Quantification of Branched PFOS : e,g L-PFOS used to quantify, using the average of quantification with 498,9 > 80,2 and quantification with 498,9 > 99,1                                                                                             |
| 73  | 2501-FF | LOQ was determined on spiked samples of fish in intermediate fidelity condition                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 74  | 2501-FF |                                                                                                                                                                                          | The expanded measurement uncertainties were obtained using a top-down approach as reported in the "Guidance document on measurement uncertainty for laboratories performing PCDD/F and PCB analysis using isotope dilution mass spectrometry – 2017". For the MU of the sum of four PFASs the RSS approach was used.                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                 |
| 75  | 2501-FF | The LOQ was estimated as the lowest concentration of the sample fortified with acceptable precision and trueness, by applying the complete analytical method and identification criteria |                                                                                                                                                                                                                                                                                                                                                                                                                             | We also detected trace level of FBSA (0,17 ppb) and FHxSA (0,061 ppb)                                                                                                                                                                                                                                                                                                           |
| 76  | 2501-FF |                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 77  | 2501-FF |                                                                                                                                                                                          | MU reported as 2 x coefficient of variation                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                 |
| 79  | 2501-FF |                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 81  | 2501-FF | ADDITION ON DIFFERENTS MATRIX                                                                                                                                                            | Nordtest-Approach                                                                                                                                                                                                                                                                                                                                                                                                           | Acreditation only for: PFOS; PFNA; PFHxS AND PFOA                                                                                                                                                                                                                                                                                                                               |
| 85  | 2501-FF | DIN 32645                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                             | Sample no.: 2501-FF-217                                                                                                                                                                                                                                                                                                                                                         |
| 86  | 2501-FF |                                                                                                                                                                                          | Estimation of MU: Determination of precision from validation data and spiking materials, Determination of trueness from validation data, spiking materials and a PT result                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                 |
| 87  | 2501-FF | According Guidance Document, Annex Table 7                                                                                                                                               | calculation according to NORDTEST- based on validation and quality control data                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 89  | 2501-FF | Estimation by s/n-ratio                                                                                                                                                                  | Horwitz -Thompson                                                                                                                                                                                                                                                                                                                                                                                                           | As we observed differences for the method performance in dependency of the matrix, we have validated the method for different matrices. We particularyl observe severe differences in the performance for fatty fish and lean fish, for which the method shows slightly poorer performance data (LOQs, measurement uncertaintv. recoverv). We here used the data for lean fish. |
| 93  | 2501-FF | lowest validation level                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                             | sample was concentrated 5 fold before analysis and reconstituted with mobile phase.                                                                                                                                                                                                                                                                                             |
| 97  | 2501-FF |                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 99  | 2501-FF |                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 101 | 2501-FF |                                                                                                                                                                                          | The expanded uncertainty for the sum parameter is calculated as the square root of the sum of squares of                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                 |
| 67A | 2501-FF |                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |
| 71B | 2501-FF |                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                 |

| LC  | Sample  | Perfluorobutanoic acid<br>(PFBA) | Perfluoropentanoic acid<br>(PFPeA) | Perfluorohexanoic acid<br>(PFHxA) | Perfluoroheptanoic acid<br>(PFHpA) | Perfluorooctanoic acid<br>(PFOA) | Perfluorononanoic acid<br>(PFNA) | Perfluorodecanoic acid<br>(PFDA) | Perfluoroun- decanoic acid<br>(PFUnDA) | Perfluorodo- decanoic acid<br>(PFDoDA) | Perfluorotri- decanoic acid<br>(PFTrDA) | Perfluorotetra- decanoic acid<br>(PFTeDA) |
|-----|---------|----------------------------------|------------------------------------|-----------------------------------|------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------------|----------------------------------------|-----------------------------------------|-------------------------------------------|
| 2   | 2501-FF |                                  |                                    |                                   |                                    |                                  |                                  | 50                               | 50                                     | 50                                     | 50                                      | 50                                        |
| 3   | 2501-FF | 44                               | 44                                 | 44                                | 44                                 | 44                               | 44                               | 44                               | 44                                     | 44                                     | 44                                      | 44                                        |
| 4   | 2501-FF |                                  |                                    |                                   |                                    | 30                               | 30                               |                                  |                                        |                                        |                                         |                                           |
| 5   | 2501-FF | 20                               | 20                                 | 20                                | 20                                 | 20                               | 20                               | 20                               | 20                                     | 20                                     | 50                                      | 20                                        |
| 6   | 2501-FF |                                  |                                    |                                   |                                    | 50                               | 50                               |                                  |                                        |                                        |                                         |                                           |
| 8   | 2501-FF | 20                               | 20                                 | 20                                | 20                                 | 20                               | 20                               | 20                               | 20                                     | 20                                     | 20                                      | 20                                        |
| 9   | 2501-FF | 30                               | 30                                 | 30                                | 30                                 | 30                               | 30                               | 30                               | 30                                     | 30                                     | 30                                      | 35                                        |
| 10  | 2501-FF |                                  |                                    | 25                                |                                    | 19                               | 23                               | 25                               | 34                                     | 24                                     | 33                                      | 20                                        |
| 12  | 2501-FF |                                  |                                    |                                   |                                    | 50                               | 50                               |                                  |                                        |                                        |                                         |                                           |
| 13  | 2501-FF | 30                               | 35                                 | 40                                | 20                                 | 20                               | 35                               | 40                               | 20                                     | 25                                     | 45                                      | 25                                        |
| 15  | 2501-FF |                                  |                                    |                                   | 21                                 | 18                               | 25                               | 24                               | 29                                     | 23                                     |                                         | 36                                        |
| 16  | 2501-FF |                                  |                                    | 13                                | 20                                 | 16                               | 13                               | 18                               | 26                                     | 25                                     |                                         |                                           |
| 17  | 2501-FF |                                  |                                    |                                   |                                    |                                  |                                  |                                  |                                        |                                        |                                         |                                           |
| 19  | 2501-FF |                                  |                                    |                                   |                                    |                                  |                                  | 8                                | 10                                     | 20                                     |                                         |                                           |
| 22  | 2501-FF |                                  |                                    |                                   |                                    |                                  |                                  |                                  |                                        |                                        |                                         |                                           |
| 24  | 2501-FF | 50                               |                                    |                                   |                                    | 50                               | 50                               | 50                               |                                        |                                        |                                         |                                           |
| 28  | 2501-FF | 42                               | 42                                 | 42                                | 42                                 | 42                               | 32                               | 32                               | 32                                     | 32                                     | 32                                      | 32                                        |
| 29  | 2501-FF | 25                               | 25                                 | 25                                | 25                                 | 25                               | 25                               | 25                               | 25                                     | 25                                     | 25                                      | 25                                        |
| 30  | 2501-FF |                                  |                                    |                                   |                                    | 31.2                             | 30.2                             |                                  |                                        |                                        |                                         |                                           |
| 31  | 2501-FF |                                  |                                    |                                   |                                    | 50                               | 50                               | 50                               | 50                                     | 50                                     | 50                                      | 50                                        |
| 37  | 2501-FF |                                  | 24                                 | 31                                | 25                                 | 9                                | 10                               | 20                               | 14                                     | 15                                     | 27                                      | 16                                        |
| 39  | 2501-FF | 34.7                             | 47.3                               | 31.2                              | 32.1                               | 21.6                             | 37.1                             | 40.2                             | 33.8                                   | 32.8                                   | 26.6                                    | 37.6                                      |
| 41  | 2501-FF |                                  |                                    |                                   |                                    |                                  |                                  |                                  |                                        |                                        |                                         |                                           |
| 42  | 2501-FF | 50                               | 50                                 | 50                                | 30                                 | 30                               | 30                               | 30                               | 30                                     | 30                                     | 50                                      | 40                                        |
| 43  | 2501-FF | 88                               | 88                                 | 88                                | 88                                 | 88                               | 88                               | 88                               | 88                                     | 88                                     | 88                                      | 88                                        |
| 44  | 2501-FF |                                  | 40                                 | 40                                | 40                                 | 40                               | 40                               | 50                               | 40                                     | 50                                     | 50                                      | 50                                        |
| 47  | 2501-FF |                                  |                                    |                                   |                                    | 47                               | 34                               |                                  |                                        |                                        |                                         |                                           |
| 51  | 2501-FF |                                  | 22                                 | 32                                | 21                                 | 32                               | 24                               | 22                               | 21                                     | 31                                     |                                         |                                           |
| 53  | 2501-FF | 30                               | 30                                 | 30                                | 30                                 | 30                               | 30                               | 30                               | 30                                     | 30                                     | 30                                      | 30                                        |
| 54  | 2501-FF | 50                               |                                    | 50                                | 50                                 | 43                               | 38                               | 50                               | 50                                     |                                        |                                         |                                           |
| 55  | 2501-FF | 21                               | 25                                 | 22                                | 21                                 | 24                               | 27                               | 31                               | 27                                     | 19                                     | 50                                      | 50                                        |
| 58  | 2501-FF |                                  |                                    | 35                                | 35                                 | 35                               | 35                               | 35                               | 35                                     | 35                                     |                                         | 50                                        |
| 59  | 2501-FF |                                  |                                    |                                   |                                    | 20                               | 20                               |                                  |                                        |                                        |                                         |                                           |
| 61  | 2501-FF | 60                               | 60                                 | 60                                | 60                                 | 60                               | 60                               | 60                               | 60                                     | 60                                     | 60                                      | 60                                        |
| 62  | 2501-FF |                                  |                                    |                                   |                                    |                                  |                                  |                                  |                                        |                                        |                                         |                                           |
| 66  | 2501-FF | 44                               | 20                                 | 20                                | 20                                 | 20                               | 20                               | 20                               | 20                                     | 20                                     | 20                                      |                                           |
| 67  | 2501-FF |                                  |                                    | 50                                | 50                                 | 50                               | 50                               | 50                               | 50                                     | 50                                     | 50                                      | 50                                        |
| 69  | 2501-FF |                                  |                                    |                                   |                                    | 18                               | 25                               |                                  |                                        |                                        |                                         |                                           |
| 70  | 2501-FF |                                  |                                    |                                   |                                    | 15                               | 15                               |                                  |                                        |                                        |                                         |                                           |
| 72  | 2501-FF |                                  |                                    |                                   | 17.84549129                        | 28.69141555                      | 22.47092814                      | 24.90327878                      | 18.40122547                            | 28.4362337                             |                                         | 21.74162113                               |
| 73  | 2501-FF | 20                               | 10                                 | 15                                | 10                                 | 10                               | 10                               | 10                               | 15                                     | 15                                     | 125                                     | 15                                        |
| 74  | 2501-FF |                                  |                                    |                                   |                                    |                                  |                                  |                                  |                                        |                                        |                                         |                                           |
| 75  | 2501-FF | 45                               | 30                                 | 31                                | 48                                 | 27                               | 43                               | 29                               | 27                                     | 39                                     | 27                                      | 32                                        |
| 76  | 2501-FF | 50                               | 50                                 | 50                                | 50                                 | 50                               | 50                               | 50                               | 50                                     | 50                                     | 50                                      | 50                                        |
| 77  | 2501-FF |                                  |                                    |                                   |                                    | 20                               | 20                               |                                  |                                        |                                        |                                         |                                           |
| 79  | 2501-FF |                                  |                                    |                                   |                                    |                                  | 28                               | 26                               | 34                                     | 16                                     | 18                                      | 29                                        |
| 81  | 2501-FF | 34                               | 37                                 | 33                                | 33                                 | 33                               | 35                               | 33                               | 37                                     | 35                                     | 37                                      |                                           |
| 85  | 2501-FF | 20                               | 10                                 | 10                                | 10                                 | 10                               | 10                               | 10                               | 10                                     | 10                                     | 20                                      | 10                                        |
| 86  | 2501-FF |                                  |                                    |                                   |                                    |                                  | 20                               | 25                               | 45                                     | 45                                     | 45                                      | 45                                        |
| 87  | 2501-FF |                                  |                                    |                                   |                                    | 40                               | 40                               |                                  |                                        |                                        |                                         |                                           |
| 89  | 2501-FF |                                  |                                    |                                   | 40                                 | 40                               | 50                               | 60                               |                                        | 70                                     |                                         |                                           |
| 93  | 2501-FF | 44                               | 44                                 | 44                                | 44                                 | 44                               | 44                               | 44                               | 44                                     | 44                                     |                                         |                                           |
| 97  | 2501-FF |                                  |                                    |                                   |                                    |                                  |                                  |                                  |                                        |                                        |                                         |                                           |
| 99  | 2501-FF | 40                               | 40                                 | 40                                | 40                                 | 40                               | 40                               | 40                               | 40                                     | 40                                     | 40                                      | 40                                        |
| 101 | 2501-FF | 25                               | 25                                 | 25                                | 25                                 | 25                               | 25                               | 25                               | 25                                     | 25                                     | 25                                      | 25                                        |
| 67A | 2501-FF |                                  |                                    | 50                                | 50                                 | 50                               | 50                               | 50                               | 50                                     | 50                                     | 50                                      | 50                                        |
| 71B | 2501-FF |                                  |                                    |                                   |                                    |                                  |                                  |                                  |                                        |                                        |                                         |                                           |

| LC  | Sample  | Perfluorobutanoic acid<br>(PFBA) | Perfluoropentanoic acid<br>(PFPeA) | Perfluorohexanoic acid<br>(PFHxA) | Perfluoroheptanoic acid<br>(PFHpA) | Perfluorooctanoic acid<br>(PFOA) | Perfluorononanoic acid<br>(PFNA) | Perfluorodecanoic acid<br>(PFDA) | Perfluoroun- decanoic acid<br>(PFUnDA) | Perfluorodo- decanoic acid<br>(PFDoDA) | Perfluorotri- decanoic acid<br>(PFTrDA) | Perfluorotetra- decanoic acid<br>(PFTeDA) |
|-----|---------|----------------------------------|------------------------------------|-----------------------------------|------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------------|----------------------------------------|-----------------------------------------|-------------------------------------------|
| 2   | 2501-FF | 0.5                              | 0.2                                | 0.2                               | 0.1                                | 0.1                              | 0.1                              | 0.1                              | 0.1                                    | 0.1                                    | 0.1                                     | 0.2                                       |
| 3   | 2501-FF | 0.1                              | 0.01                               | 0.01                              | 0.01                               | 0.01                             | 0.01                             | 0.01                             | 0.01                                   | 0.01                                   | 0.01                                    | 0.01                                      |
| 4   | 2501-FF |                                  |                                    |                                   |                                    | 0.01                             | 0.005                            |                                  |                                        |                                        |                                         |                                           |
| 5   | 2501-FF | 0.05                             | 0.05                               | 0.05                              | 0.05                               | 0.05                             | 0.05                             | 0.05                             | 0.05                                   | 0.05                                   | 0.05                                    | 0.05                                      |
| 6   | 2501-FF | 0.2                              | 0.2                                | 0.2                               | 0.2                                | 0.2                              | 0.2                              | 0.2                              | 0.2                                    | 0.2                                    | 0.2                                     | 0.2                                       |
| 8   | 2501-FF | 0.2                              | 0.2                                | 0.2                               | 0.2                                | 0.2                              | 0.2                              | 0.2                              | 0.2                                    | 0.2                                    | 0.2                                     | 0.2                                       |
| 9   | 2501-FF | 0.1                              | 0.05                               | 0.05                              | 0.015                              | 0.015                            | 0.015                            | 0.05                             | 0.015                                  | 0.05                                   | 0.05                                    | 0.05                                      |
| 10  | 2501-FF |                                  |                                    | 0.05                              |                                    | 0.005                            | 0.005                            | 0.005                            | 0.005                                  | 0.005                                  | 0.1                                     | 0.05                                      |
| 12  | 2501-FF |                                  |                                    |                                   |                                    | 0.1                              | 0.1                              |                                  |                                        |                                        |                                         |                                           |
| 13  | 2501-FF | 0.05                             | 0.01                               | 0.01                              | 0.01                               | 0.05                             | 0.01                             | 0.01                             | 0.05                                   | 0.05                                   | 0.1                                     | 0.05                                      |
| 15  | 2501-FF |                                  |                                    |                                   | 0.05                               | 0.05                             | 0.05                             | 0.05                             | 0.25                                   | 0.05                                   |                                         | 0.25                                      |
| 16  | 2501-FF |                                  |                                    | 0.045                             | 0.056                              | 0.03                             | 0.053                            | 0.054                            | 0.05                                   | 0.053                                  |                                         |                                           |
| 17  | 2501-FF | 0.05                             | 0.05                               | 0.02                              | 0.03                               | 0.02                             | 0.02                             | 0.02                             | 0.04                                   |                                        |                                         |                                           |
| 19  | 2501-FF |                                  | 0.15                               | 0.03                              | 0.02                               | 0.02                             | 0.02                             | 0.02                             | 0.02                                   | 0.02                                   | 0.03                                    | 0.04                                      |
| 22  | 2501-FF |                                  |                                    |                                   |                                    |                                  |                                  |                                  |                                        |                                        |                                         |                                           |
| 24  | 2501-FF |                                  |                                    |                                   |                                    |                                  |                                  |                                  |                                        |                                        |                                         |                                           |
| 28  | 2501-FF | 0.2                              | 0.01                               | 0.01                              | 0.01                               |                                  |                                  |                                  |                                        |                                        |                                         |                                           |
| 29  | 2501-FF | 0.25                             | 0.05                               | 0.05                              | 0.05                               | 0.05                             | 0.05                             | 0.05                             | 0.05                                   | 0.05                                   | 0.05                                    | 0.05                                      |
| 30  | 2501-FF |                                  | 0.1                                | 0.1                               | 0.1                                | 0.1                              | 0.1                              | 0.1                              | 0.1                                    | 0.1                                    | 0.1                                     | 0.1                                       |
| 31  | 2501-FF | 0.05                             | 0.025                              |                                   | 0.025                              | 0.05                             |                                  |                                  |                                        |                                        |                                         |                                           |
| 37  | 2501-FF |                                  | 0.4                                | 0.2                               | 0.1                                | 0.1                              | 0.1                              | 0.025                            | 0.025                                  | 0.025                                  | 0.1                                     | 0.025                                     |
| 39  | 2501-FF | 0.1                              | 0.1                                | 0.1                               | 0.1                                | 0.1                              | 0.1                              | 0.1                              | 0.1                                    | 0.1                                    | 0.1                                     | 0.1                                       |
| 41  | 2501-FF |                                  |                                    |                                   |                                    | 0.03                             | 0.03                             |                                  |                                        |                                        |                                         |                                           |
| 42  | 2501-FF | 0.03                             | 0.03                               | 0.03                              | 0.02                               |                                  |                                  |                                  |                                        |                                        |                                         |                                           |
| 43  | 2501-FF | 0.4                              | 0.05                               | 0.2                               | 0.05                               | 0.2                              | 0.05                             | 0.05                             | 0.05                                   | 0.05                                   | 0.05                                    | 0.05                                      |
| 44  | 2501-FF |                                  | 0.5                                | 0.5                               | 0.2                                | 0.2                              | 0.5                              | 0.1                              | 0.2                                    | 0.5                                    | 0.5                                     | 0.5                                       |
| 47  | 2501-FF |                                  |                                    |                                   |                                    | 0.05                             | 0.05                             |                                  |                                        |                                        |                                         |                                           |
| 51  | 2501-FF |                                  | 0.02                               |                                   | 0.01                               |                                  |                                  |                                  |                                        |                                        |                                         |                                           |
| 53  | 2501-FF | 0.5                              | 0.05                               | 0.01                              | 0.01                               | 0.02                             | 0.01                             | 0.01                             | 0.01                                   | 0.01                                   | 0.01                                    | 0.01                                      |
| 54  | 2501-FF | 0.05                             | 0.05                               | 0.05                              | 0.05                               | 0.05                             | 0.05                             | 0.05                             | 0.05                                   | 0.05                                   |                                         | 0.05                                      |
| 55  | 2501-FF |                                  | 0.1                                | 0.1                               | 0.1                                | 0.1                              | 0.1                              |                                  |                                        |                                        | 0.2                                     | 0.2                                       |
| 58  | 2501-FF |                                  |                                    | 0.05                              | 0.05                               | 0.05                             | 0.05                             | 0.05                             | 0.05                                   | 0.05                                   |                                         | 0.1                                       |
| 59  | 2501-FF |                                  |                                    |                                   |                                    | 0.01                             | 0.005                            |                                  |                                        |                                        |                                         |                                           |
| 61  | 2501-FF | 0.1                              | 0.1                                | 0.1                               | 0.1                                | 0.01                             | 0.01                             | 0.1                              | 0.1                                    | 0.1                                    | 0.1                                     | 0.1                                       |
| 62  | 2501-FF | 0.05                             | 0.05                               | 0.05                              | 0.05                               | 0.05                             | 0.05                             | 0.05                             | 0.05                                   | 0.05                                   | 0.05                                    |                                           |
| 66  | 2501-FF | 10                               | 0.1                                | 0.05                              | 0.05                               | 0.05                             | 0.05                             | 0.05                             | 0.05                                   | 0.05                                   | 0.1                                     |                                           |
| 67  | 2501-FF |                                  |                                    | 0.1                               | 0.1                                | 0.1                              | 0.1                              | 0.1                              | 0.1                                    | 0.1                                    | 0.1                                     | 0.1                                       |
| 69  | 2501-FF |                                  |                                    |                                   |                                    | 0.1                              | 0.1                              |                                  |                                        |                                        |                                         |                                           |
| 70  | 2501-FF | 0.1                              | 0.1                                | 0.1                               | 0.1                                | 0.06                             |                                  |                                  |                                        | 0.1                                    | 0.1                                     | 0.1                                       |
| 72  | 2501-FF |                                  |                                    |                                   |                                    |                                  |                                  |                                  |                                        |                                        |                                         |                                           |
| 73  | 2501-FF | 0.05                             | 0.05                               | 0.05                              | 0.01                               |                                  |                                  |                                  |                                        |                                        |                                         |                                           |
| 74  | 2501-FF | 0.067                            | 0.067                              | 0.067                             | 0.067                              | 0.067                            | 0.067                            | 0.267                            | 0.667                                  | 0.667                                  |                                         |                                           |
| 75  | 2501-FF | 0.1                              | 0.02                               | 0.02                              | 0.02                               | 0.02                             | 0.02                             | 0.02                             | 0.02                                   | 0.02                                   | 0.02                                    | 0.02                                      |
| 76  | 2501-FF | 10                               | 0.2                                | 0.2                               | 0.2                                | 0.2                              | 0.2                              | 0.2                              | 0.2                                    | 0.2                                    | 0.2                                     | 0.2                                       |
| 77  | 2501-FF |                                  |                                    |                                   |                                    | 0.01                             | 0.01                             |                                  |                                        |                                        |                                         |                                           |
| 79  | 2501-FF |                                  |                                    | 0.05                              | 0.05                               | 0.05                             | 0.05                             | 0.1                              | 0.1                                    | 0.1                                    | 0.1                                     | 0.1                                       |
| 81  | 2501-FF | 0.01                             | 0.01                               | 0.05                              | 0.05                               | 0.01                             | 0.01                             | 0.05                             | 0.05                                   | 0.05                                   | 0.05                                    |                                           |
| 85  | 2501-FF | 0.17                             | 0.12                               | 0.02                              | 0.02                               | 0.1                              | 0.02                             | 0.05                             | 0.06                                   | 0.05                                   | 0.17                                    | 0.18                                      |
| 86  | 2501-FF | 0.1                              | 0.05                               | 0.03                              | 0.03                               | 0.03                             | 0.04                             | 0.02                             | 0.05                                   | 0.05                                   | 0.05                                    | 0.05                                      |
| 87  | 2501-FF |                                  |                                    |                                   |                                    | 0.05                             | 0.05                             |                                  |                                        |                                        |                                         |                                           |
| 89  | 2501-FF |                                  |                                    |                                   | 0.003                              | 0.003                            | 0.003                            | 0.007                            |                                        | 0.023                                  |                                         |                                           |
| 93  | 2501-FF | 0.05                             | 0.05                               | 0.05                              | 0.05                               | 0.05                             | 0.05                             | 0.05                             | 0.05                                   | 0.05                                   |                                         |                                           |
| 97  | 2501-FF | 0.20                             | 0.01                               | 0.01                              | 0.005                              | 0.01                             | 0.005                            | 0.005                            | 0.005                                  | 0.005                                  | 0.005                                   | 0.005                                     |
| 99  | 2501-FF | 0.50                             | 0.01                               | 0.01                              | 0.01                               | 0.01                             | 0.01                             | 0.01                             | 0.01                                   | 0.01                                   | 0.01                                    | 0.01                                      |
| 101 | 2501-FF | 0.50                             | 0.01                               | 0.01                              | 0.01                               | 0.01                             | 0.01                             | 0.01                             | 0.01                                   | 0.01                                   | 0.01                                    | 0.01                                      |
| 67A | 2501-FF |                                  |                                    | 0.10                              | 0.1                                | 0.10                             | 0.1                              | 0.1                              | 0.1                                    | 0.1                                    | 0.1                                     | 0.1                                       |
| 71B | 2501-FF | 0.10                             | 0.10                               | 0.10                              | 0.1                                | 0.10                             | 0.1                              | 0.1                              | 0.1                                    | 0.1                                    | 0.1                                     | 0.1                                       |



| LC  | Sample  | Perfluorobutane- sulfonic acid | Perfluoropentane- sulfonic acid | Perfluorohexane- sulfonic acid | Perfluoroheptane- sulfonic acid | Linear Perfluorooctane- sulfonic acid | Sum of branched Perfluorooctane- sulfonic acids | Total-Perfluorooctane- sulfonic acids | Perfluorononane- sulfonic acid | Perfluorodecane- sulfonic acid | Perfluoroundecane- sulfonic acid | Perfluorododecane- sulfonic acid | Perfluorotridecane- sulfonic acid |
|-----|---------|--------------------------------|---------------------------------|--------------------------------|---------------------------------|---------------------------------------|-------------------------------------------------|---------------------------------------|--------------------------------|--------------------------------|----------------------------------|----------------------------------|-----------------------------------|
|     |         | (PFBS)                         | (PFPeS)                         | (PFHxS)                        | (PFHpS)                         | (L-PFOS)                              | (br-PFOS)                                       | (total PFOS)                          | (PFNS)                         | (PFDS)                         | (PFUnDS)                         | (PFDoDS)                         | (PFTrDS)                          |
| 2   | 2501-FF |                                |                                 |                                |                                 | 45                                    | 45                                              | 45                                    |                                |                                |                                  |                                  |                                   |
| 3   | 2501-FF | 44                             | 44                              | 44                             | 44                              | 44                                    | 44                                              | 44                                    | 44                             | 44                             | 44                               | 44                               | 44                                |
| 4   | 2501-FF |                                |                                 | 30                             |                                 |                                       |                                                 | 30                                    |                                |                                |                                  |                                  |                                   |
| 5   | 2501-FF | 20                             | 20                              | 20                             | 20                              | 20                                    | 20                                              | 20                                    | 20                             | 30                             | 30                               |                                  |                                   |
| 6   | 2501-FF |                                |                                 | 50                             |                                 | 50                                    | 50                                              | 50                                    |                                |                                |                                  |                                  |                                   |
| 8   | 2501-FF | 20                             | 20                              | 20                             | 20                              |                                       |                                                 | 20                                    | 20                             | 20                             |                                  |                                  |                                   |
| 9   | 2501-FF | 30                             | 30                              | 30                             | 30                              | 30                                    | 30                                              | 30                                    | 30                             | 45                             | 45                               | 60                               | 60                                |
| 10  | 2501-FF | 15                             | 28                              | 19                             | 35                              | 21                                    | 21                                              | 21                                    | 42                             | 24                             | 41                               | 50                               | 41                                |
| 12  | 2501-FF |                                |                                 | 50                             |                                 |                                       |                                                 | 50                                    |                                |                                |                                  |                                  |                                   |
| 13  | 2501-FF | 20                             | 35                              | 25                             | 35                              | 25                                    | 25                                              |                                       | 40                             | 40                             |                                  | 40                               |                                   |
| 15  | 2501-FF |                                |                                 | 25                             | 26                              | 24                                    | 19                                              | 21                                    | 24                             | 26                             |                                  |                                  |                                   |
| 16  | 2501-FF | 9                              | 19                              | 11                             | 17                              | 25                                    | 25                                              | 35                                    |                                |                                |                                  |                                  |                                   |
| 17  | 2501-FF |                                |                                 |                                |                                 |                                       |                                                 |                                       |                                |                                |                                  |                                  |                                   |
| 19  | 2501-FF |                                |                                 |                                |                                 | 10                                    |                                                 |                                       |                                |                                |                                  |                                  |                                   |
| 22  | 2501-FF |                                |                                 |                                |                                 |                                       |                                                 | 50                                    |                                |                                |                                  |                                  |                                   |
| 24  | 2501-FF |                                |                                 | 50                             |                                 | 50                                    | 50                                              | 50                                    |                                |                                |                                  |                                  |                                   |
| 28  | 2501-FF | 42                             | 42                              | 42                             | 42                              | 32                                    | 32                                              | 31                                    | 42                             | 42                             |                                  | 42                               |                                   |
| 29  | 2501-FF | 25                             | 25                              | 25                             | 25                              | 25                                    | 25                                              | 25                                    | 25                             | 25                             | 25                               | 25                               | 25                                |
| 30  | 2501-FF |                                |                                 | 32                             |                                 |                                       |                                                 | 34.7                                  |                                |                                |                                  |                                  |                                   |
| 31  | 2501-FF |                                | 50                              | 50                             |                                 | 50                                    | 50                                              | 50                                    |                                |                                |                                  |                                  |                                   |
| 37  | 2501-FF | 37                             |                                 | 12                             | 19                              | 30                                    | 30                                              | 30                                    |                                | 36                             |                                  |                                  |                                   |
| 39  | 2501-FF | 33.4                           |                                 | 32                             | 29.3                            |                                       |                                                 |                                       |                                | 43.6                           |                                  |                                  |                                   |
| 41  | 2501-FF |                                |                                 |                                |                                 |                                       |                                                 |                                       |                                |                                |                                  |                                  |                                   |
| 42  | 2501-FF | 40                             |                                 | 40                             | 40                              | 30                                    | 30                                              |                                       |                                | 50                             |                                  |                                  |                                   |
| 43  | 2501-FF | 88                             | 88                              | 88                             | 88                              | 88                                    |                                                 | 88                                    | 88                             | 88                             |                                  |                                  |                                   |
| 44  | 2501-FF | 50                             | 50                              | 40                             | 40                              |                                       |                                                 | 20                                    | 40                             | 40                             | 40                               | 40                               |                                   |
| 47  | 2501-FF |                                |                                 | 44                             |                                 |                                       |                                                 | 24                                    |                                |                                |                                  |                                  |                                   |
| 51  | 2501-FF | 30                             |                                 | 42                             |                                 | 32                                    |                                                 | 32                                    |                                |                                |                                  |                                  |                                   |
| 53  | 2501-FF | 30                             | 30                              | 30                             | 30                              | 30                                    | 30                                              | 30                                    | 30                             | 30                             |                                  | 30                               |                                   |
| 54  | 2501-FF | 50                             |                                 | 24                             |                                 | 23                                    | 23                                              | 23                                    |                                |                                |                                  |                                  |                                   |
| 55  | 2501-FF | 30                             | 26                              | 22                             | 50                              | 24                                    | 24                                              | 24                                    | 50                             | 50                             | 50                               | 50                               | 50                                |
| 58  | 2501-FF |                                |                                 | 35                             | 35                              | 35                                    | 35                                              | 35                                    |                                |                                |                                  |                                  |                                   |
| 59  | 2501-FF |                                |                                 | 20                             |                                 | 20                                    | 20                                              | 20                                    |                                |                                |                                  |                                  |                                   |
| 61  | 2501-FF | 60                             | 60                              | 60                             | 60                              | 60                                    | 60                                              | 60                                    | 60                             | 60                             | 60                               | 60                               | 60                                |
| 62  | 2501-FF |                                |                                 |                                |                                 |                                       |                                                 |                                       |                                |                                |                                  |                                  |                                   |
| 66  | 2501-FF | 20                             | 20                              | 20                             | 20                              |                                       |                                                 | 20                                    | 20                             | 20                             | 20                               | 20                               | 44                                |
| 67  | 2501-FF | 50                             | 50                              | 50                             | 50                              | 50                                    | 50                                              |                                       | 50                             | 50                             |                                  | 50                               |                                   |
| 69  | 2501-FF |                                |                                 | 15                             |                                 |                                       |                                                 | 16                                    |                                |                                |                                  |                                  |                                   |
| 70  | 2501-FF |                                |                                 | 15                             |                                 | 15                                    | 15                                              | 15                                    |                                |                                |                                  |                                  |                                   |
| 72  | 2501-FF |                                |                                 | 29.13121338                    |                                 | 25.12788056                           | 26.82263673                                     |                                       | 34                             | 23                             |                                  |                                  |                                   |
| 73  | 2501-FF | 25                             | 25                              | 15                             | 25                              | 15                                    | 15                                              | 15                                    | 35                             | 35                             | 90                               | 35                               | 85                                |
| 74  | 2501-FF |                                |                                 |                                |                                 |                                       |                                                 |                                       |                                |                                |                                  |                                  |                                   |
| 75  | 2501-FF | 29                             | 32                              | 33                             | 33                              | 27                                    |                                                 | 26                                    | 26                             | 31                             |                                  | 45                               |                                   |
| 76  | 2501-FF | 50                             | 50                              | 50                             | 50                              | 50                                    | 50                                              | 50                                    | 50                             | 50                             | 50                               | 50                               | 50                                |
| 77  | 2501-FF |                                |                                 | 20                             |                                 |                                       |                                                 | 20                                    |                                |                                |                                  |                                  |                                   |
| 79  | 2501-FF |                                |                                 |                                |                                 | 16                                    | 27                                              | 31                                    |                                |                                |                                  |                                  |                                   |
| 81  | 2501-FF | 35                             | 34                              | 35                             | 35                              |                                       |                                                 | 33                                    | 32                             | 35                             |                                  |                                  |                                   |
| 85  | 2501-FF | 20                             |                                 | 20                             | 20                              | 20                                    | 20                                              | 20                                    |                                | 20                             |                                  | 20                               |                                   |
| 86  | 2501-FF |                                |                                 |                                |                                 | 40                                    | 50                                              |                                       |                                |                                |                                  |                                  |                                   |
| 87  | 2501-FF |                                |                                 | 40                             |                                 |                                       |                                                 | 40                                    |                                |                                |                                  |                                  |                                   |
| 89  | 2501-FF |                                |                                 | 40                             |                                 |                                       |                                                 | 40                                    |                                |                                |                                  |                                  |                                   |
| 93  | 2501-FF |                                |                                 |                                |                                 |                                       |                                                 |                                       |                                |                                |                                  |                                  |                                   |
| 97  | 2501-FF |                                |                                 |                                |                                 |                                       |                                                 |                                       |                                |                                |                                  |                                  |                                   |
| 99  | 2501-FF | 40.00                          | 40.00                           | 40.00                          | 40                              | 40.00                                 | 40.00                                           | 40                                    | 40                             | 40                             | 40                               | 40                               | 40                                |
| 101 | 2501-FF | 25.00                          | 25.00                           | 25.00                          | 25                              | 25.00                                 | 25.00                                           | 25                                    | 25                             | 25                             | 25                               | 25                               | 25                                |
| 67A | 2501-FF | 50.00                          | 50.00                           | 50.00                          | 50                              | 50.00                                 | 50.00                                           |                                       | 50                             | 50                             |                                  | 50                               |                                   |
| 71B | 2501-FF |                                |                                 |                                |                                 |                                       |                                                 |                                       |                                |                                |                                  |                                  |                                   |



| LC  | Sample  | Perfluorobutane- sulfonic acid | Perfluoropentane- sulfonic acid | Perfluorohexane- sulfonic acid | Perfluoroheptane- sulfonic acid | Linear Perfluorooctane- sulfonic acid | Sum of branched Perfluorooctane- sulfonic acids | Total-Perfluorooctane- sulfonic acids | Perfluorononane- sulfonic acid | Perfluorodecane- sulfonic acid | Perfluoroundecane- sulfonic acid | Perfluorododecane- sulfonic acid | Perfluorotridecane- sulfonic acid |
|-----|---------|--------------------------------|---------------------------------|--------------------------------|---------------------------------|---------------------------------------|-------------------------------------------------|---------------------------------------|--------------------------------|--------------------------------|----------------------------------|----------------------------------|-----------------------------------|
|     |         | (PFBS)                         | (PFPeS)                         | (PFHxS)                        | (PFHpS)                         | (L-PFOS)                              | (br-PFOS)                                       | (total PFOS)                          | (PFNS)                         | (PFDS)                         | (PFUnDS)                         | (PFDoDS)                         | (PFTrDS)                          |
| 2   | 2501-FF | 0.1                            | 0.1                             | 0.1                            | 0.1                             | 0.1                                   | 0.1                                             |                                       | 0.1                            | 0.1                            | 0.1                              | 0.1                              | 0.1                               |
| 3   | 2501-FF | 0.01                           | 0.01                            | 0.01                           | 0.01                            | 0.01                                  | 0.01                                            | 0.01                                  | 0.01                           | 0.01                           | 0.01                             | 0.01                             | 0.01                              |
| 4   | 2501-FF |                                |                                 | 0.01                           |                                 |                                       |                                                 | 0.01                                  |                                |                                |                                  |                                  |                                   |
| 5   | 2501-FF | 0.05                           | 0.05                            | 0.05                           | 0.05                            | 0.05                                  | 0.05                                            | 0.05                                  | 0.05                           | 0.05                           | 0.05                             |                                  |                                   |
| 6   | 2501-FF | 0.2                            | 0.2                             | 0.2                            | 0.2                             | 0.2                                   | 0.2                                             | 0.2                                   | 0.2                            | 0.2                            | 0.2                              | 0.2                              | 0.2                               |
| 8   | 2501-FF | 0.2                            | 0.2                             | 0.2                            | 0.2                             |                                       |                                                 | 0.2                                   | 0.2                            | 0.2                            |                                  |                                  |                                   |
| 9   | 2501-FF | 0.015                          | 0.015                           | 0.015                          | 0.015                           | 0.015                                 |                                                 | 0.015                                 | 0.05                           | 0.05                           | 0.05                             | 0.05                             | 0.1                               |
| 10  | 2501-FF | 0.0044                         | 0.0048                          | 0.0047                         | 0.095                           | 0.0048                                | 0.0048                                          | 0.0048                                | 0.0048                         | 0.0096                         | 0.048                            | 0.049                            | 0.049                             |
| 12  | 2501-FF |                                |                                 | 0.1                            |                                 |                                       |                                                 | 0.1                                   |                                |                                |                                  |                                  |                                   |
| 13  | 2501-FF | 0.01                           | 0.01                            | 0.01                           | 0.01                            | 0.05                                  | 0.05                                            |                                       | 0.01                           | 0.01                           |                                  | 0.5                              |                                   |
| 15  | 2501-FF |                                |                                 | 0.046                          | 0.048                           | 0.037                                 | 0.049                                           |                                       | 0.241                          | 0.024                          |                                  |                                  |                                   |
| 16  | 2501-FF | 0.018                          | 0.02                            | 0.02                           | 0.011                           | 0.035                                 | 0.035                                           |                                       |                                |                                |                                  |                                  |                                   |
| 17  | 2501-FF |                                | 0.02                            | 0.02                           | 0.01                            |                                       |                                                 |                                       | 0.01                           | 0.02                           | 0.02                             | 0.04                             | 0.05                              |
| 19  | 2501-FF | 0.03                           |                                 | 0.04                           |                                 | 0.03                                  |                                                 |                                       |                                | 0.05                           |                                  |                                  |                                   |
| 22  | 2501-FF |                                |                                 |                                |                                 |                                       |                                                 | 1.3                                   |                                |                                |                                  |                                  |                                   |
| 24  | 2501-FF |                                |                                 |                                |                                 |                                       |                                                 |                                       |                                |                                |                                  |                                  |                                   |
| 28  | 2501-FF | 0.01                           | 0.01                            |                                | 0.01                            |                                       |                                                 |                                       | 0.01                           | 0.01                           |                                  | 0.01                             |                                   |
| 29  | 2501-FF | 0.05                           | 0.05                            | 0.05                           | 0.05                            | 0.05                                  | 0.05                                            | 0.05                                  | 0.05                           | 0.05                           | 0.05                             | 0.05                             | 0.05                              |
| 30  | 2501-FF | 0.1                            | 0.1                             | 0.1                            | 0.1                             |                                       |                                                 | 0.1                                   | 0.1                            | 0.1                            | 0.1                              |                                  |                                   |
| 31  | 2501-FF | 0.025                          | 0.05                            | 0.025                          | 0.025                           | 0.025                                 | 0.025                                           | 0.025                                 | 0.025                          | 0.025                          | 0.025                            | 0.025                            |                                   |
| 37  | 2501-FF | 0.05                           |                                 | 0.025                          | 0.025                           | 0.025                                 | 0.025                                           | 0.025                                 |                                | 0.05                           |                                  |                                  |                                   |
| 39  | 2501-FF | 0.1                            |                                 | 0.1                            | 0.1                             | 0.1                                   |                                                 |                                       |                                | 0.1                            |                                  |                                  |                                   |
| 41  | 2501-FF |                                |                                 | 0.03                           |                                 | 0.03                                  | 0.03                                            | 0.03                                  |                                |                                |                                  |                                  |                                   |
| 42  | 2501-FF | 0.02                           |                                 |                                | 0.02                            |                                       |                                                 |                                       |                                | 0.02                           |                                  |                                  |                                   |
| 43  | 2501-FF | 0.05                           | 0.05                            | 0.05                           | 0.05                            | 0.05                                  |                                                 | 0.05                                  | 0.2                            | 0.2                            |                                  |                                  |                                   |
| 44  | 2501-FF | 0.1                            | 0.1                             | 0.1                            | 0.1                             |                                       |                                                 | 0.1                                   | 0.1                            | 0.1                            | 0.2                              | 0.5                              |                                   |
| 47  | 2501-FF |                                |                                 | 0.1                            |                                 |                                       |                                                 | 0.1                                   |                                |                                |                                  |                                  |                                   |
| 51  | 2501-FF | 0.01                           | 0.01                            |                                |                                 |                                       |                                                 |                                       | 0.01                           | 0.01                           | 0.02                             | 0.02                             | 0.05                              |
| 53  | 2501-FF | 0.01                           | 0.01                            | 0.01                           | 0.01                            | 0.01                                  | 0.01                                            | 0.01                                  | 0.01                           | 0.01                           |                                  | 0.01                             |                                   |
| 54  | 2501-FF | 0.05                           |                                 | 0.05                           |                                 | 0.05                                  | 0.05                                            | 0.05                                  |                                |                                |                                  |                                  |                                   |
| 55  | 2501-FF | 0.1                            | 0.1                             | 0.1                            | 0.1                             |                                       | 0.1                                             |                                       | 0.1                            | 0.1                            | 0.1                              | 0.1                              | 0.2                               |
| 58  | 2501-FF |                                |                                 | 0.05                           | 0.05                            | 0.025                                 | 0.05                                            | 0.05                                  |                                |                                |                                  |                                  |                                   |
| 59  | 2501-FF |                                |                                 | 0.01                           |                                 | 0.01                                  | 0.01                                            | 0.01                                  |                                |                                |                                  |                                  |                                   |
| 61  | 2501-FF | 0.1                            | 0.1                             | 0.01                           | 0.01                            |                                       |                                                 | 0.01                                  | 0.1                            | 0.1                            | 0.1                              | 0.1                              | 0.1                               |
| 62  | 2501-FF | 0.05                           | 0.05                            | 0.05                           | 0.05                            | 0.05                                  | 0.05                                            | 0.1                                   | 0.05                           | 0.05                           | 0.05                             | 0.05                             | 0.05                              |
| 66  | 2501-FF | 0.05                           | 0.05                            | 0.05                           | 0.05                            | 0.05                                  | 0.05                                            | 0.05                                  | 0.05                           | 0.05                           | 0.05                             | 0.05                             | 0.05                              |
| 67  | 2501-FF | 0.1                            | 0.1                             | 0.1                            | 0.1                             | 0.1                                   | 0.1                                             | 0.1                                   | 0.1                            | 0.1                            |                                  | 0.1                              |                                   |
| 69  | 2501-FF |                                |                                 | 0.04                           |                                 |                                       |                                                 | 0.1                                   |                                |                                |                                  |                                  |                                   |
| 70  | 2501-FF | 0.1                            | 0.1                             |                                | 0.1                             |                                       |                                                 |                                       | 0.1                            | 0.1                            | 0.1                              | 0.1                              | 0.1                               |
| 72  | 2501-FF |                                |                                 |                                |                                 |                                       |                                                 |                                       |                                |                                |                                  |                                  |                                   |
| 73  | 2501-FF | 0.01                           | 0.01                            |                                |                                 |                                       |                                                 |                                       | 0.01                           | 0.01                           | 0.01                             | 0.01                             | 0.05                              |
| 74  | 2501-FF | 0.067                          | 0.067                           | 0.067                          | 0.067                           | 0.067                                 |                                                 | 0.067                                 | 0.133                          |                                |                                  |                                  |                                   |
| 75  | 2501-FF | 0.02                           | 0.02                            | 0.02                           | 0.02                            | 0.02                                  |                                                 | 0.02                                  | 0.02                           | 0.02                           |                                  | 0.05                             |                                   |
| 76  | 2501-FF | 0.2                            | 0.2                             | 0.2                            | 0.2                             | 0.2                                   | 0.2                                             | 0.2                                   | 0.2                            | 0.2                            | 0.2                              | 0.2                              | 0.2                               |
| 77  | 2501-FF |                                |                                 | 0.01                           |                                 |                                       |                                                 | 0.01                                  |                                |                                |                                  |                                  |                                   |
| 79  | 2501-FF | 0.05                           | 0.05                            | 0.05                           | 0.05                            | 0.08                                  | 0.1                                             | 0.08                                  | 0.1                            | 0.1                            |                                  | 0.1                              |                                   |
| 81  | 2501-FF | 0.01                           | 0.01                            | 0.01                           | 0.01                            |                                       |                                                 | 0.05                                  | 0.05                           | 0.01                           |                                  |                                  |                                   |
| 85  | 2501-FF | 0.05                           |                                 | 0.02                           | 0.03                            | 0.06                                  |                                                 |                                       |                                | 0.03                           |                                  | 0.08                             |                                   |
| 86  | 2501-FF | 0.05                           | 0.05                            | 0.05                           | 0.05                            | 0.05                                  | 0.05                                            |                                       | 0.05                           | 0.1                            |                                  |                                  |                                   |
| 87  | 2501-FF |                                |                                 | 0.05                           |                                 |                                       |                                                 | 0.05                                  |                                |                                |                                  |                                  |                                   |
| 89  | 2501-FF |                                |                                 | 0.001                          |                                 |                                       |                                                 | 0.012                                 |                                |                                |                                  |                                  |                                   |
| 93  | 2501-FF |                                |                                 | 0.05                           |                                 | 0.05                                  | 0.05                                            | 0.05                                  |                                |                                |                                  |                                  |                                   |
| 97  | 2501-FF | 0.005                          | 0.005                           | 0.005                          | 0.005                           | 0.005                                 | 0.005                                           | 0.005                                 | 0.005                          | 0.005                          | 0.005                            | 0.005                            | 0.005                             |
| 99  | 2501-FF | 0.01                           | 0.01                            | 0.01                           | 0.01                            | 0.01                                  | 0.01                                            | 0.01                                  | 0.01                           | 0.01                           | 0.01                             | 0.01                             | 0.01                              |
| 101 | 2501-FF | 0.01                           | 0.01                            | 0.01                           | 0.01                            | 0.01                                  | 0.01                                            | 0.01                                  | 0.01                           | 0.01                           | 0.01                             | 0.01                             | 0.01                              |
| 67A | 2501-FF | 0.1                            | 0.1                             | 0.1                            | 0.1                             | 0.1                                   | 0.1                                             | 0.1                                   | 0.1                            | 0.1                            |                                  | 0.1                              |                                   |
| 71B | 2501-FF | 0.1                            | 0.1                             | 0.1                            | 0.1                             | 0.1                                   | 0.1                                             | 0.1                                   | 0.1                            | 0.1                            | 0.1                              | 0.1                              | 0.1                               |





EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]  
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Fish Fillet (2501-FF)  
Methods Sum of PFOS, PFOA, PFNA, PFHxS - Measurement Uncertainty [%]

| LC  | Sample  | Sum of total-PFOS, PFOA, PFNA, PFHxS | Sum of total-PFOS, PFOA, PFNA, PFHxS |
|-----|---------|--------------------------------------|--------------------------------------|
|     |         | (ub)                                 | (lb)                                 |
| 2   | 2501-FF | 45                                   | 45                                   |
| 3   | 2501-FF | 41.1                                 | 41.1                                 |
| 4   | 2501-FF | 30                                   | 30                                   |
| 5   | 2501-FF | 20                                   | 20                                   |
| 6   | 2501-FF | 50                                   | 50                                   |
| 8   | 2501-FF |                                      |                                      |
| 9   | 2501-FF | 29                                   | 29                                   |
| 10  | 2501-FF | 20                                   | 20                                   |
| 12  | 2501-FF |                                      | 50                                   |
| 13  | 2501-FF | 24                                   | 25                                   |
| 15  | 2501-FF | 20                                   | 20                                   |
| 16  | 2501-FF | 42                                   | 42                                   |
| 17  | 2501-FF |                                      |                                      |
| 19  | 2501-FF | 11                                   | 11                                   |
| 22  | 2501-FF |                                      |                                      |
| 24  | 2501-FF |                                      |                                      |
| 28  | 2501-FF | 31                                   | 31                                   |
| 29  | 2501-FF | 25                                   | 25                                   |
| 30  | 2501-FF | 34.1                                 | 34.1                                 |
| 31  | 2501-FF | 50                                   | 50                                   |
| 37  | 2501-FF | 28                                   | 28                                   |
| 39  | 2501-FF |                                      |                                      |
| 41  | 2501-FF | 10                                   | 10                                   |
| 42  | 2501-FF |                                      |                                      |
| 43  | 2501-FF | 88                                   | 88                                   |
| 44  | 2501-FF | 18                                   | 20                                   |
| 47  | 2501-FF | 50                                   | 50                                   |
| 51  | 2501-FF | 0.34                                 | 0.34                                 |
| 53  | 2501-FF | 50                                   | 50                                   |
| 54  | 2501-FF | 30                                   | 30                                   |
| 55  | 2501-FF | 50                                   | 50                                   |
| 58  | 2501-FF | 35                                   | 35                                   |
| 59  | 2501-FF | 20                                   | 20                                   |
| 61  | 2501-FF | 60                                   | 60                                   |
| 62  | 2501-FF |                                      |                                      |
| 66  | 2501-FF | 40                                   | 40                                   |
| 67  | 2501-FF | 50                                   | 50                                   |
| 69  | 2501-FF | 38                                   | 38                                   |
| 70  | 2501-FF | 15                                   | 15                                   |
| 72  | 2501-FF | 23.94886707                          | 23.94886707                          |
| 73  | 2501-FF | 15                                   | 15                                   |
| 74  | 2501-FF |                                      |                                      |
| 75  | 2501-FF | 25                                   | 25                                   |
| 76  | 2501-FF | 50                                   | 50                                   |
| 77  | 2501-FF | 20                                   | 20                                   |
| 79  | 2501-FF | 30                                   | 30                                   |
| 81  | 2501-FF |                                      | 34                                   |
| 85  | 2501-FF | 20                                   | 20                                   |
| 86  | 2501-FF |                                      |                                      |
| 87  | 2501-FF | 40                                   | 40                                   |
| 89  | 2501-FF | 85                                   | 85                                   |
| 93  | 2501-FF | 44.00                                | 44.00                                |
| 97  | 2501-FF | 50.00                                |                                      |
| 99  | 2501-FF | 40.00                                | 40.00                                |
| 101 | 2501-FF | 25.00                                | 25.00                                |
| 67A | 2501-FF | 50.00                                | 50.00                                |
| 71B | 2501-FF |                                      |                                      |



EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Fish Fillet 2025 [EURL-PT-POP\_2501-FF]  
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Fish Fillet (2501-FF)  
Methods Other PFAS - Limit of detection (LOQ) in µg/kg wet weight

| LC  | Sample  | Perfluorooctane sulphonamide | 2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid | 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid | Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate | Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate | 1-Propanaminium, N,N-dimethyl-N-oxide-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide | 1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide |
|-----|---------|------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|     |         | FOSA                         | DONA                                                                                 | GenX                                                      | (major component of F-53B)                               | (minor component of F-53B)                                | Capstone A                                                                                                           | Capstone B                                                                                                                     |
| 2   | 2501-FF |                              | 0.10                                                                                 | 0.10                                                      | 0.10                                                     | 0.10                                                      |                                                                                                                      |                                                                                                                                |
| 3   | 2501-FF | 0.02                         | 0.01                                                                                 | 0.10                                                      | 0.01                                                     | 0.01                                                      |                                                                                                                      |                                                                                                                                |
| 4   | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 5   | 2501-FF | 0.05                         | 0.05                                                                                 | 0.05                                                      | 0.05                                                     | 0.25                                                      |                                                                                                                      |                                                                                                                                |
| 6   | 2501-FF | 0.20                         | 0.20                                                                                 | 0.20                                                      | 0.20                                                     | 0.20                                                      |                                                                                                                      |                                                                                                                                |
| 8   | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 9   | 2501-FF |                              | 0.02                                                                                 | 0.10                                                      | 0.02                                                     | 0.05                                                      |                                                                                                                      |                                                                                                                                |
| 10  | 2501-FF |                              |                                                                                      | 0.01                                                      |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 12  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 13  | 2501-FF | 0.01                         | 0.50                                                                                 | 0.50                                                      | 0.05                                                     | 0.05                                                      |                                                                                                                      |                                                                                                                                |
| 15  | 2501-FF | 2.50                         | 2.40                                                                                 |                                                           | 0.05                                                     |                                                           |                                                                                                                      |                                                                                                                                |
| 16  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 17  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 19  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 22  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 24  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 28  | 2501-FF |                              | 0.02                                                                                 | 0.20                                                      | 0.02                                                     | 0.02                                                      |                                                                                                                      |                                                                                                                                |
| 29  | 2501-FF | 0.05                         | 0.05                                                                                 | 0.05                                                      | 0.05                                                     | 0.05                                                      |                                                                                                                      |                                                                                                                                |
| 30  | 2501-FF | 0.10                         | 0.40                                                                                 | 0.40                                                      |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 31  | 2501-FF |                              | 0.03                                                                                 | 0.03                                                      | 0.03                                                     | 0.03                                                      |                                                                                                                      | 0.50                                                                                                                           |
| 37  | 2501-FF |                              | 0.20                                                                                 | 0.10                                                      |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 39  | 2501-FF | 0.10                         |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 41  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 42  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 43  | 2501-FF |                              | 0.05                                                                                 | 0.05                                                      | 0.05                                                     | 0.05                                                      |                                                                                                                      |                                                                                                                                |
| 44  | 2501-FF | 0.50                         |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 47  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 51  | 2501-FF |                              | 0.03                                                                                 | 0.01                                                      | 0.01                                                     | 0.01                                                      |                                                                                                                      |                                                                                                                                |
| 53  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 54  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 55  | 2501-FF | 0.10                         | 0.10                                                                                 | 0.10                                                      | 0.10                                                     | 0.10                                                      | 0.20                                                                                                                 | 0.20                                                                                                                           |
| 58  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 59  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 61  | 2501-FF | 1.00                         |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 62  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 66  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 67  | 2501-FF |                              |                                                                                      | 0.10                                                      |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 69  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 70  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 72  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 73  | 2501-FF |                              | 0.01                                                                                 | 0.01                                                      | 0.01                                                     | 0.01                                                      |                                                                                                                      |                                                                                                                                |
| 74  | 2501-FF | 0.27                         |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 75  | 2501-FF | 0.02                         | 0.02                                                                                 | 0.10                                                      | 0.02                                                     | 0.02                                                      |                                                                                                                      |                                                                                                                                |
| 76  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 77  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 79  | 2501-FF |                              | 0.10                                                                                 | 0.10                                                      | 0.10                                                     | 0.10                                                      |                                                                                                                      |                                                                                                                                |
| 81  | 2501-FF | 0.01                         |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 85  | 2501-FF |                              | 0.04                                                                                 | 0.38                                                      |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 86  | 2501-FF |                              | 0.10                                                                                 | 0.10                                                      | 0.10                                                     |                                                           |                                                                                                                      |                                                                                                                                |
| 87  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 89  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 93  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 97  | 2501-FF |                              | 0.01                                                                                 | 0.005                                                     | 0.01                                                     | 0.01                                                      |                                                                                                                      |                                                                                                                                |
| 99  | 2501-FF |                              | 0.01                                                                                 | 0.01                                                      | 0.01                                                     | 0.01                                                      |                                                                                                                      |                                                                                                                                |
| 101 | 2501-FF |                              | 0.01                                                                                 | 0.01                                                      | 0.01                                                     | 0.01                                                      |                                                                                                                      |                                                                                                                                |
| 67A | 2501-FF |                              |                                                                                      | 0.1                                                       |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 71B | 2501-FF | 0.10                         | 0.10                                                                                 | 0.1                                                       | 0.10                                                     | 0.10                                                      |                                                                                                                      |                                                                                                                                |

| LC  | Sample  | Perfluorooctane sulphonamide | 2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid | 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid | Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate | Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate | 1-Propanaminium, N,N-dimethyl-N-oxide-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide | 1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide |
|-----|---------|------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|     |         | FOSA                         | DONA                                                                                 | GenX                                                      | (major component of F-53B)                               | (minor component of F-53B)                                | Capstone A                                                                                                           | Capstone B                                                                                                                     |
| 2   | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 3   | 2501-FF | 44                           | 44                                                                                   | 44                                                        | 44                                                       | 44                                                        |                                                                                                                      |                                                                                                                                |
| 4   | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 5   | 2501-FF | 20                           | 30                                                                                   | 20                                                        | 30                                                       | 40                                                        |                                                                                                                      |                                                                                                                                |
| 6   | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 8   | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 9   | 2501-FF |                              | 30                                                                                   | 30                                                        | 30                                                       | 50                                                        |                                                                                                                      |                                                                                                                                |
| 10  | 2501-FF |                              |                                                                                      | 27                                                        |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 12  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 13  | 2501-FF | 40                           | 25                                                                                   | 35                                                        | 30                                                       | 30                                                        |                                                                                                                      |                                                                                                                                |
| 15  | 2501-FF | 23                           | 19                                                                                   |                                                           | 21                                                       |                                                           |                                                                                                                      |                                                                                                                                |
| 16  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 17  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 19  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 22  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 24  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 28  | 2501-FF | 44                           | 44                                                                                   | 44                                                        | 44                                                       | 44                                                        |                                                                                                                      |                                                                                                                                |
| 29  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 30  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 31  | 2501-FF | 50                           | 50                                                                                   | 50                                                        | 50                                                       | 50                                                        |                                                                                                                      | 50                                                                                                                             |
| 37  | 2501-FF |                              | 61                                                                                   | 19                                                        |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 39  | 2501-FF | 42.4                         |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 41  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 42  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 43  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 44  | 2501-FF | 40                           |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 47  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 51  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 53  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 54  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 55  | 2501-FF | 25                           | 47                                                                                   | 33                                                        | 31                                                       | 50                                                        | 50                                                                                                                   | 50                                                                                                                             |
| 58  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 59  | 2501-FF | 60                           |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 61  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 62  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 66  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 67  | 2501-FF |                              |                                                                                      | 50                                                        |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 69  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 70  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 72  | 2501-FF | 22.32919492                  |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 73  | 2501-FF |                              | 15                                                                                   | 10                                                        | 25                                                       | 30                                                        |                                                                                                                      |                                                                                                                                |
| 74  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 75  | 2501-FF | 26                           | 22                                                                                   | 21                                                        | 18                                                       | 22                                                        |                                                                                                                      |                                                                                                                                |
| 76  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 77  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 79  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 81  | 2501-FF | 35                           |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 85  | 2501-FF |                              | 10                                                                                   | 20                                                        |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 86  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 87  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 89  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 93  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 97  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 99  | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 101 | 2501-FF |                              | 30                                                                                   | 30                                                        | 30                                                       | 30                                                        |                                                                                                                      |                                                                                                                                |
| 67A | 2501-FF |                              |                                                                                      | 50                                                        |                                                          |                                                           |                                                                                                                      |                                                                                                                                |
| 71B | 2501-FF |                              |                                                                                      |                                                           |                                                          |                                                           |                                                                                                                      |                                                                                                                                |