EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024

EURL-PT-DPB_2402-BT

FEED

Report

PCDD/Fs and PCBs

(Report Version 1.0)

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Summary

Test sample	**FEED:** Bentonite [2402-BT]
Analytes of interest **Mandatory** for NRLs:	**PCDD/Fs** (17 2,3,7,8-substituted PCDD/Fs) **PCBs** (12 DL-PCBs, 6 NDL-PCBs)
Methods	**PCDD/Fs, DL-PCBs:** GC-HRMS, GC-MS/MS and alternative methods; Bioanalytical screening methods **NDL-PCBs:** Any kind of method
Participants	NRLs, OFLs, other official laboratories, commercial laboratories performing the analysis of samples taken by feed business operators
Statistical evaluation	ISO 13528:2022 [1], IUPAC Protocol [2]
Report of final results	25 August 2025 (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 and HBCDDs in **Bentonite** was organized by the EURL for halogenated POPs in Feed and Food to be performed between August and November 2024. The objective is to assess analytical performance of laboratories and interlaboratory comparability of results from analyses of PCDD/Fs, PCBs, PBDEs and HBCDDs in one sample of **Bentonite**.

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 2024. 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. **Other official laboratories** and **commercial laboratories** performing the analysis of samples taken by feed business operators were invited to participate in this proficiency test.

The evaluated results were discussed by representatives of European Commission, NRLs and the EURL at the EURL/NRL workshop on 26 and 27 November 2024.

1.1. Samples and coding

The test sample was prepared from contaminated feed and fortified with some analytes of interest using analytical standards or technical mixtures of PCBs, PBDEs and HBCDDs.

Bentonite	**Sample no. 2402-BT-xxx**

Each participant received about **90 g** of the test sample in a HDPE bottle.

1.2. Analytes of interest

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

- 17 2,3,7,8-substituted PCDD/Fs
- WHO-PCDD/F-TEQ (using WHO2005-TEF)
- 12 dioxin-like PCBs
- WHO-PCB-TEQ (using WHO2005-TEF)
- WHO-PCDD/F-PCB-TEQ (using WHO2005-TEF)
- Six non-dioxin-like PCBs (indicator PCBs): PCB 28, 52, 101, 138, 153, 180
- Sum of six non-dioxin-like PCBs (indicator PCBs)
- PCDD/F-PCB-BEQ, PCDD/F-BEQ and/or PCB-BEQ, if applicable (using bioanalytical screening methods)

1.3. Methods

One or more of the following **detection methods** could be applied:

- GC-HRMS-, GC-MS/MS-methods or other alternative methods for PCDD/Fs and dioxin-like PCBs
- Bioanalytical screening methods for PCDD/Fs and dioxin-like PCBs
- Any kind of method for non-dioxin-like PCBs, PBDEs and HBCDDs.

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 PCDD/Fs and PCBs

1.5.1. Results of PCDD/Fs and PCBs determined by physico-chemical methods (GC-HRMS, GC-MS/MS, GC-LRMS, GC-ECD, …)

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,
- report upper, middle and lower bound results for WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ, WHO-PCB-TEQ and sum of six indicator PCBs,
- report if sample exceeds respective EU maximum levels or action thresholds for WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ and/or WHO-PCB-TEQ or the maximum level for the sum of six non-dioxin-like PCBs beyond reasonable doubt taking into account the measurement uncertainty,
- report the measurement uncertainty, applied for checking of compliance, for WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ, WHO-PCB-TEQ and the sum of six indicator PCBs,
- 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 **ng/kg product, relative to a feed with a moisture content of 12 %** for PCDD/Fs and dioxin-like PCBs and in **µg/kg product, relative to a feed with a moisture content of 12 %** for indicator PCBs. TEQ-based results had to be calculated using the WHO-TEFs of 2005 [3].

1.5.2. Results of PCDD/Fs and PCBs determined by bioanalytical screening methods

Laboratories should

- use their own reference standards,
- report if the samples are suspected to be noncompliant with EU legal limits and confirmation is required,
- report PCDD/F and/or PCB results in BEQ, if applicable,
- report the reporting limit, maximum level / action threshold, which the evaluation is based on, and the bioassay cut-off, if applicable,
- give method information
- and give information about the accreditation of the laboratory according to ISO/IEC 17025.

Results have to be reported in **ng BEQ/kg, relative to a feed with a moisture content of 12 %**, for PCDD/Fs and dioxin-like PCBs.

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
- Commercial laboratories

93 laboratories registered for this proficiency test, whereof 81 reported results for at least one parameter.

Table 1: Participating laboratories

Participating laboratories	Region	No. of participants
National Reference Laboratories	European Union Other Countries	25 4
Official Laboratories	European Union Other European Countries Africa Americas Asia Oceania	41 - - 2 - -
Commercial Laboratories	European Union Other European Countries Africa Americas Asia Oceania	16 - - 4 - 1
	Total	**93**

2.1. Number of reported results

Table 2: Reported results for PCDD/F and PCB sum parameters and moisture content

Reported results	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum of six indicator PCBs	PCDD/F-PCB-BEQ [Bioanalytical screening methods]	Moisture content
All laboratories	67	69	68	75	7	80
NRLs	19	19	20	22	2	22

Table 3: Reported accreditation according to ISO/IEC 17025 by participants for PCDD/Fs and PCBs

Bentonite	PCDD/Fs, PCBs [Physico-chemical methods]	PCDD/Fs, PCBs [Bioanalytical screening methods]
yes	75	6
no	6	1

2.2. Detection methods

The following detection methods were applied:

- GC-HRMS-, GC-MS/MS-, GC-LRMS-methods for PCDD/Fs and non- ortho PCBs
- GC-HRMS-, GC-MS/MS-, GC-LRMS-, GC-ECD-methods for mono-ortho-PCBs and indicator PCBs
- Bioanalytical screening methods for PCDD/Fs and dioxin-like PCBs

Table 4: Overview of physico-chemical detection methods for PCDD/Fs and PCBs applied by participants

Detection methods	PCDD/Fs	non-ortho-PCBs	mono-ortho-PCBs	Indicator PCBs
HRMS	44	45	42	34
MS/MS	18	19	18	27
LRMS	3	2	2	4
ECD	-	-	-	3

3. Test for sufficient homogeneity and stability

The test for sufficient homogeneity was performed according to ISO 13528:2022 [1] and the International Harmonized Protocol for the Proficiency Testing of Analytical Chemistry Laboratories [2].

Therefore, 10 portions of the test samples 2402-BT were analyzed in duplicate for PCDD/Fs and PCBs. The test for sufficient homogeneity was performed for the sum parameters WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ, WHO-PCB-TEQ, the sum of six non-dioxin-like PCBs and individual congeners. The test materials showed sufficient homogeneity for this proficiency test. The stability check of the analytes of interest applying room temperature storage was performed according to ISO 13528:2022 [1]. The test material showed sufficient stability for this proficiency test.

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 ± 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 WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ, WHO-PCB-TEQ, the sum of six non-dioxin-like PCBs and individual PCDD/F and PCB congeners (including limits of quantification (LOQs)), if possible. Additionally, the median of all values is calculated.

For individual congeners (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 ± 50% of the median of all reported results. Levels for individual congeners are only used for evaluation and calculation if these levels are equal to or above the LOQ; otherwise, the LOQ is used instead.

Due to high variation of participants' results or the limited number of reported results above the LOQ, no assigned values could be calculated for:

- 1,2,3,7,8,9-HxCDF
- 1,2,3,4,7,8,9-HpCDF
- 1,2,3,4,6,7,8,9-OCDF
  PCB 169

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 these submitted results. Additionally, the results of all participants reporting results and the results of participants having accreditation according ISO/IEC 17025 were compared for PCDD/F and PCB sum parameters. No significant differences between the assigned values calculated for both data sets were observed (Table 5).

Table 5: Comparison of assigned values for all participants and participants with reported accreditation according to ISO/IEC 17025 for PCDD/F and PCB sum parameters in Bentonite 2402-BT

Sum parameters	Assigned value All participants	Assigned value ISO/IEC 17025 accreditation	Deviation
	ng/kg, µg/kg product (12 % moisture content)	ng/kg, µg/kg product (12 % moisture content)	%
WHO-PCDD/F-PCB-TEQ ub rep	0.821	0.826	<1
WHO-PCDD/F-TEQ ub rep	0.556	0.560	<1
WHO-PCB-TEQ ub rep	0.267	0.268	<1
Sum Indicator PCBs ub rep	6.69	6.70	<1

4.1. PCDD/Fs and PCBs – Sum parameters

The assigned values for the test sample 2402-BT were calculated as consensus of participants' results for the PCDD/F and PCB sum parameters, taking into account the calculation criteria described above.

Table 6: Assigned values for physico-chemical methods for PCDD/Fs and PCBs (rounded to three significant figures)

Test sample	WHO-PCDD/F-PCB-TEQ (ub)	WHO-PCDD/F-TEQ (ub)	WHO-PCB-TEQ (ub)	Sum Indicator PCBs (ub)
	ng/kg product (12 % moisture content)			µg/kg product (12 % moisture content)
Bentonite (2402-BT)	0.821	0.556	0.267	6.69

Table 7: Assigned values for PCDD/Fs and DL-PCBs for comparison with BEQ results of bioanalytical screening methods (rounded to two significant figures)

Test sample	WHO-PCDD/F-PCB-TEQ (ub)	WHO-PCDD/F-TEQ (ub)	WHO-PCB-TEQ (ub)
	ng/kg product (12 % moisture content)		
Bentonite (2402-BT)	0.82	0.56	0.27

4.2. PCDD/Fs and PCBs – Individual congeners

The assigned values for the test sample 2402-BT for individual congeners were calculated as a consensus of the participants' results, taking into account the calculation criteria described above. They are shown graphically in Figures 1a, 1b, 3, 4 and 5 (tabular summary see annex 1). Figures 2 and 6 display the contribution of the individual congeners to the WHO-PCDD/F-TEQ or the WHO-PCB-TEQ in this bentonite sample.

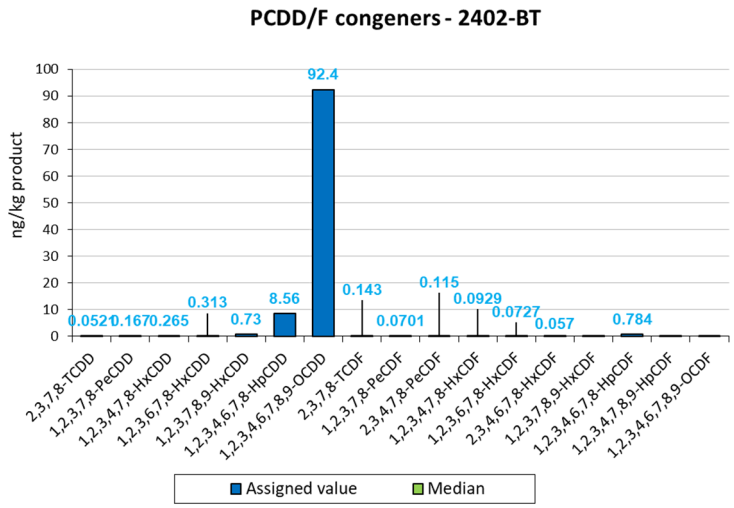

Figure 1a: Assigned values (blue) and median values (green) for PCDD/F congeners for Bentonite (2402-BT) [ng/kg product (12% moisture content)]

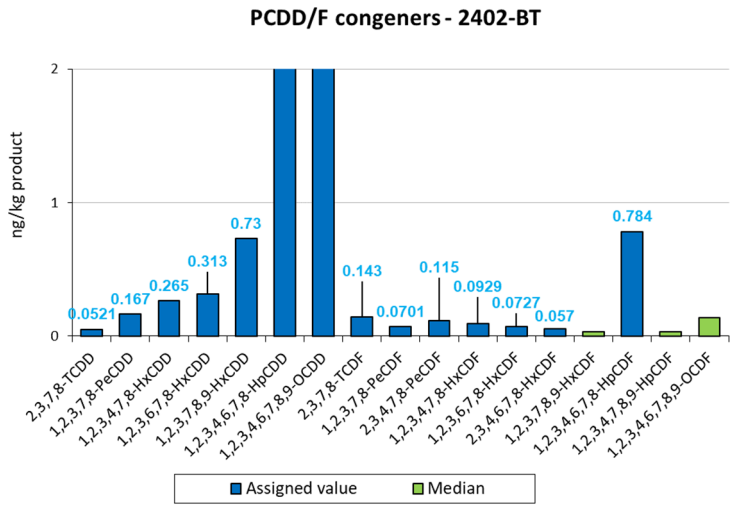

Figure 1b: Assigned values (blue) and median values (green) for PCDD/F congeners for Bentonite (2402-BT) [ng/kg product (12% moisture content)]; Y-axis adjusted for better display

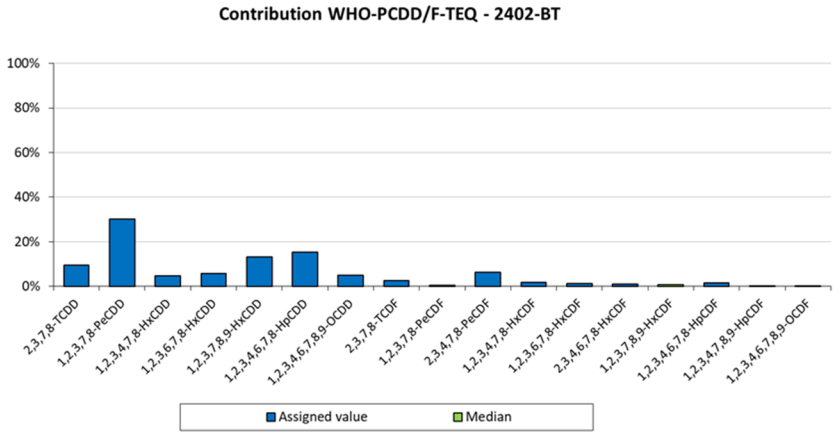

Figure 2: Contributions in % to WHO-PCDD/F-TEQ for PCDD/F assigned (blue) and median (green) values for Bentonite (2402-BT)

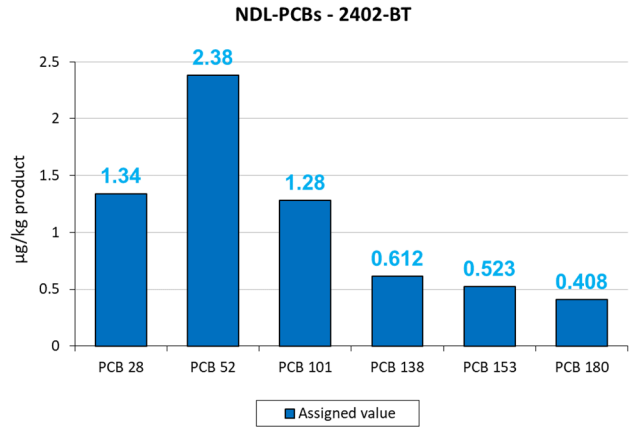

Figure 3: Assigned values (blue) for NDL-PCB congeners for Bentonite (2402-BT) [µg/kg product (12% moisture content)]

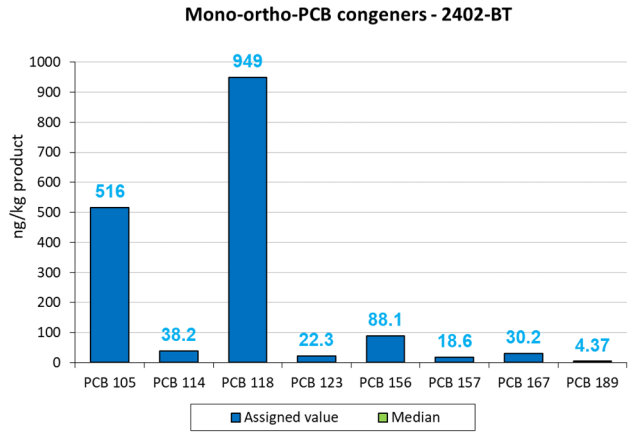

Figure 4: Assigned values (blue) for Mono-ortho-PCB congeners for Bentonite (2402-BT) [ng/kg product (12% moisture content)]

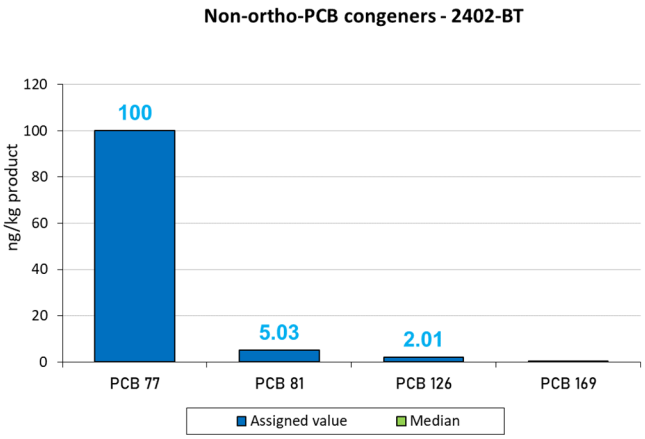

Figure 5: Assigned values (blue) and median values (green) for Non-ortho-PCB congeners for Bentonite (2402-BT) [ng/kg product (12% moisture content)]

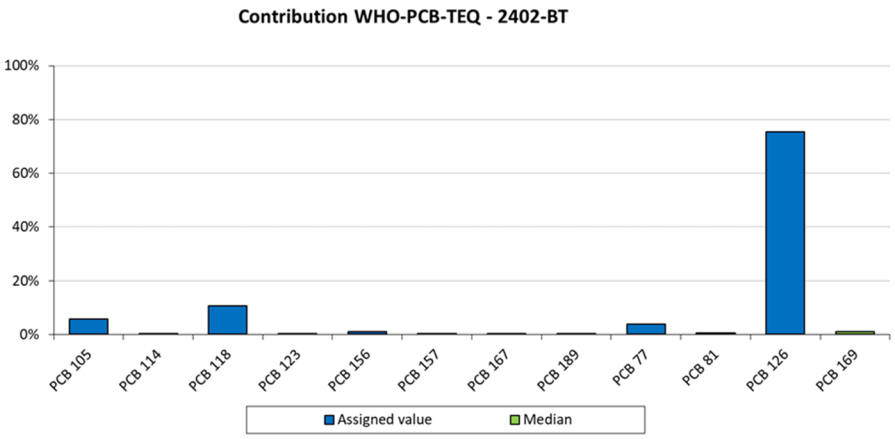

Figure 6: Contributions in % to WHO-PCB-TEQ for PCB assigned (blue) and median (green) values for Bentonite (2402-BT)

4.3. Moisture content

Since the legal maximum values and action thresholds for feed are based on a moisture content of 12 % in order to ensure comparability of feed samples, an assigned value was calculated as a consensus of the participants' results, taking into account the calculation criteria described above. A moisture content of 9.12 % was calculated for sample 2402-BT. The participants' results are shown in Figure 7a. The outliers occur because the moisture content was incorrectly reported as dry matter. Figure 7b displays the frequency distribution of participants' results for the moisture content.

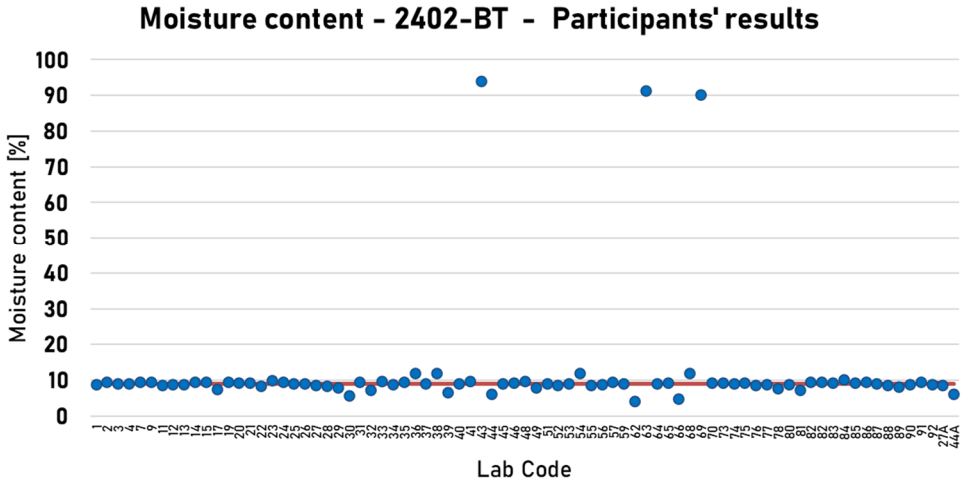

Figure 7a: Participant's results for the moisture content in % for Bentonite (2402-BT).

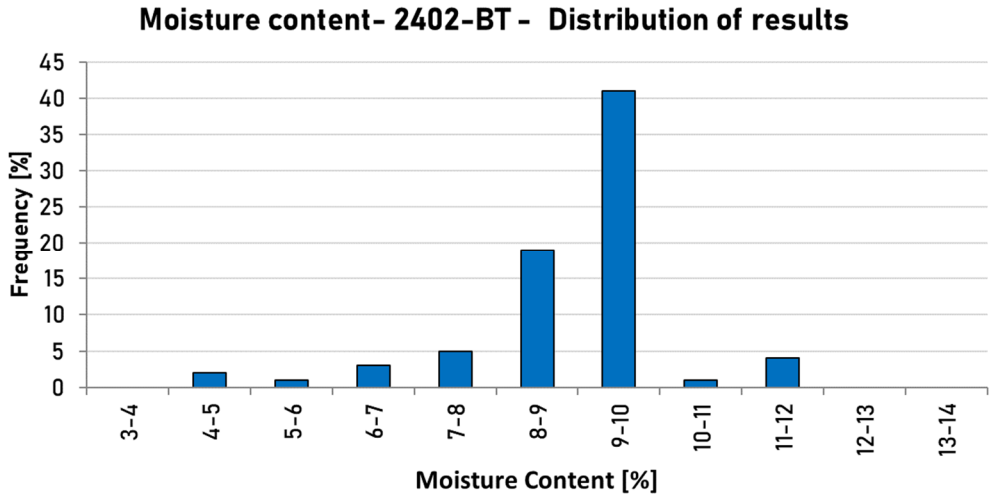

Figure 7b: Frequency of participant's results for the moisture content in % for Bentonite (2402-BT)

4.4. Comparison of assigned values with legal limits

Maximum levels and action thresholds for feed are defined in the Directive 2002/32/EC of the European Parliament and of the Council of 7 May 2002 on undesirable substances in animal feed (Annex I Section V and Annex II).

Table 8: Maximum levels and action thresholds for feed materials:

Undesirable Substances Bentonite		Maximum level	Action threshold
WHO-PCDD/F-PCB-TEQ	ng/kg product*	**1.0**	**-**
WHO-PCDD/F-TEQ	ng/kg product*	**0.75**	**0.5**
WHO-PCB-TEQ	ng/kg product*	**-**	**0.35**
Sum of 6 NDL PCBs (sum of PCB 28, 52, 101, 138, 153, 180)	µg/kg product*	**10**	**-**

* *relative to a feed with a moisture content of 12%*

For the Bentonite test sample 2402-BT the assigned values for the WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ, WHO-PCB-TEQ and the sum of 6 NDL PCBs were in the range of 0.5 to 4 of the respective ML or AL (Figure 8).

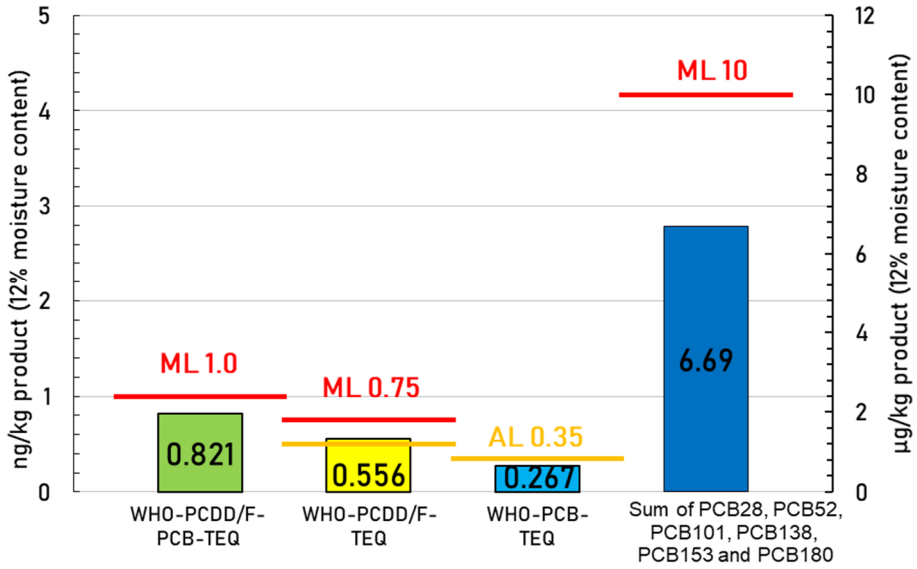

Figure 8: Comparison of the assigned values for sum parameters for Bentonite (2402-BT) with maximum levels (red lines) and action thresholds (yellow line) [ng/kg and µg/kg product (12% moisture content)

5. Scoring of results – Z-scores

5.1. Participants' results for physico-chemical methods

5.1.1. Z-scores

Criteria for successful participation of laboratories using physico-chemical methods were based on the evaluation of the results of the sum parameters WHO-PCDD/F-TEQ, WHO-PCB-TEQ, WHO-PCDD/F-PCB-TEQ and the sum of six non-dioxin-like PCBs and evaluated individual congeners. The criteria will be applicable for sum parameter concentrations in the range (about 0.5 to 4 times) of the level of interest (maximum level or action threshold).

For evaluation of results of physico-chemical methods 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 WHO-PCDD/F-TEQ, WHO-PCB-TEQ and WHO-PCDD/F-PCB-TEQ the relative standard deviation for proficiency assessment $\sigma_{p_{rel}}$ was defined as 10 %, for the sum of six non-dioxin-like PCBs (PCB 28, 52, 101, 138, 153, 180) as 15 % and for evaluated individual PCDD/F, PCB congeners as 20 %.

Z-scores for individual congeners 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:

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

5.1.2. PCDD/Fs and PCBs - Participants' z-scores

Tabular summaries of participants' results and z-scores can be found in annex 2 and 3.

Table 9: Distribution of all participants' and NRLs only z-scores for sum parameters

Bentonite (2402-BT)	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum of six indicator PCBs
all Participants				
|z-score| ≤ 2	76 %	75 %	80 %	90 %
2 < |z-score| < 3	12 %	6 %	4 %	5 %
|z-score| ≥ 3	12 %	19 %	16 %	5 %
NRLs				
|z-score| ≤ 2	79 %	70 %	85 %	87 %
2 < |z-score| < 3	5 %	5 %	-	9 %
|z-score| ≥ 3	16 %	25 %	15 %	4 %

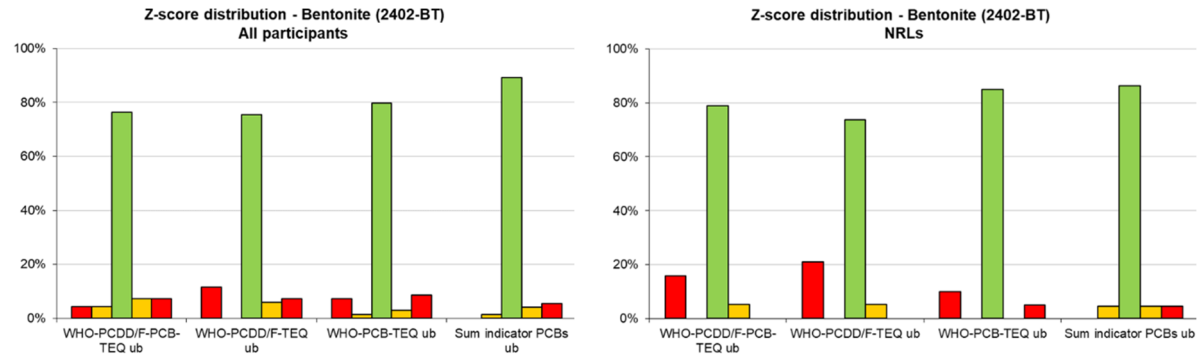

Figure 9: Distribution of all participants' z-scores and NRLs only for sum parameters for Bentonite (2402-BT)
[Green bars: -2 ≤ z-score ≤ 2, orange bars: -3 < z-score < -2, 2 < z-score < 3, red bars: z-score ≤ -3, z-score ≥ 3]

5.1.3. Comparison of reported and calculated sum parameters

In addition to the calculation of the sum parameters for reported individual PCDD/F and PCB congener values, the calculated sum parameters for PCDD/Fs and PCBs by the EURL were compared with the ones reported by each participant. As the reported sum parameters are decisive to compare the results with the legal limits, an incorrect calculation might lead to a wrong assessment of a sample. In case of a significant deviation of the reported sum parameter value from the (EURL) calculated one (deviation >10 %) the laboratory has therefore not successfully participated in the PT according to the positive scoring system (see 5.1.5).

Up to , 7% of the laboratories had differences > 10% between reported and calculated upper bound sum parameters for the WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ and the WHO-PCB-TEQ. This suggests that the calculation bases used by these laboratories may contain errors and should be checked (Table 10 and Figure 10).

Table 10: Difference between reported and calculated sum parameters for PCDD/Fs and PCBs for Bentonite (2402-BT) given in percentage of participants' results

Bentonite (2402-BT)	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum of six indicator PCBs
Deviation ≤ 10 %	94 %	93 %	93 %	97 %
Deviation > 10 %	6 %	7 %	7 %	3 %

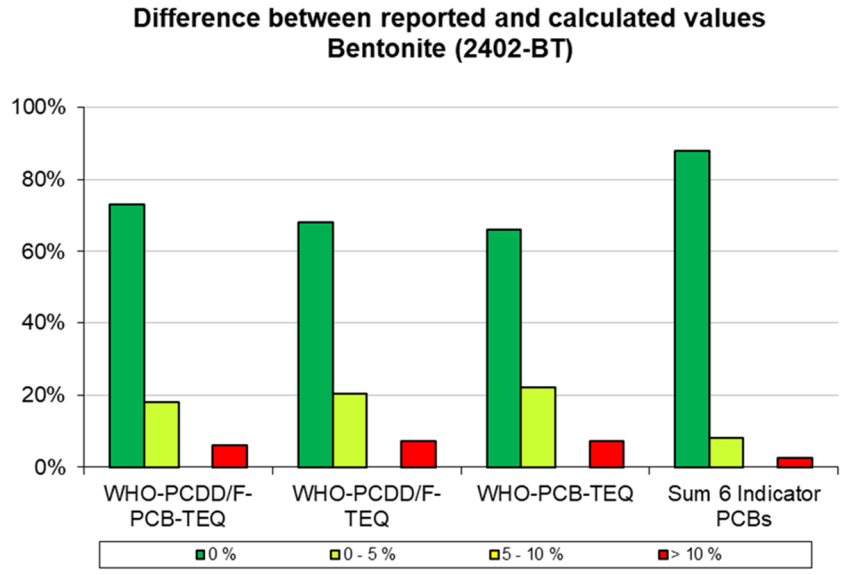

Figure 10: Difference between reported and calculated sum parameters for PCDD/Fs and PCBs [Green bars: 0 %, light green bars: 0-5 %, yellow bars: 5-10 %, red bars: > 10 %] for Bentonite (2402-BT) given in percentage of participants' results

5.1.4. Difference between upper and lower bound calculation

According to Commission Regulation (EC) No 152/2009 the difference between upper bound level and lower bound level shall not exceed 20 % for confirmation of exceedance of maximum level or in case of need of action thresholds for PCDD/Fs and DL-PCBs. For indicator PCBs the difference between upper bound and lower bound levels for the sum of six indicator PCBs

shall be ≤ 20 % at the level of interest. Participants with a larger deviation should review their analytical methods, especially with regard to sensitivity and limit of quantification.
For the test samples 2402-BT the assigned values for the sum parameters WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ and the sum of the 6 NDL-PCBs were below the respective maximum levels, but the assigned value for the WHO-PCDD/F-TEQ was above the action threshold.

No significant differences were found between the upper and lower bound calculations for any of the sum parameters for this contamination range in bentonite sample 2402-BT (Table 11 and Figure 11).

Table 11: Difference between upper and lower bound calculation for Bentonite (2402-BT) given in percentage of participants' results

Bentonite (2402-BT)	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum of six indicator PCBs
0 – 10 %*	90 %	91 %	90 %	96 %
10 – 20 %*	9 %	7 %	6 %	4 %
20 – 50 %*	-	-	4 %	-
> 50 %*	1 %	1 %	-	-

* Difference between upper and lower bound calculation

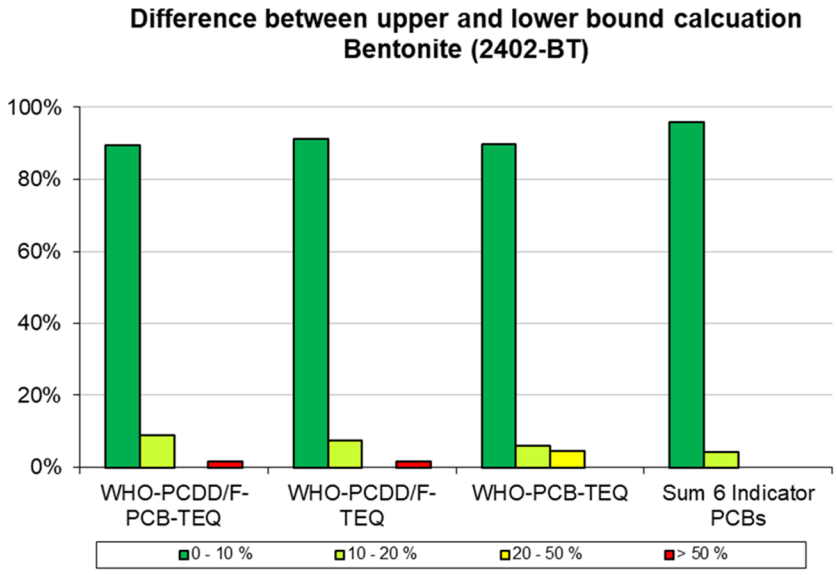

Figure 11: Difference between upper and lower bound calculation for Bentonite (2402-BT) given in percentage of participants' results [Green bars: 0 – 10 %, light green bars: 10 – 20 %, yellow bars: 20 – 50 %, red bars: > 50 %]

5.1.5. Positive scoring system

The "positive scoring system" gives one assessment for each PT sample covering all relevant PCDD/F and PCB sum parameters and congeners.

The total score for the positive scoring system was calculated according to the following general principles:

- Calculation of z-scores for sum parameters and evaluated individual congeners
- Calculation of the positive scores according to the following table:

Positive scoring system	I z-score I ≤ 2	2 < I z-score I < 3	I z-score I ≥ 3
Individual congeners	**Positive score**	**Positive score**	**Positive score**
Contribution to sum parameter* > 10 %	12	6	0
Contribution to sum parameter* 3-10 %	8	4	0
Contribution to sum parameter* < 3 %	6	3	0
Not evaluated congeners	0	0	0

* separately for the respective sum parameters WHO-PCDD/F-TEQ, WHO-PCB-TEQ and the sum of six non-dioxin-like PCBs

- Calculation of maximum achievable scores (I z-score I ≤ 2) for PCDD/F and DL-PCB and non-dioxin-like PCB congeners separately:

$$Maximum\ Score = \sum_{i=1}^{n} Max.Score_{(>10\%)i} + \sum_{i=1}^{m} Max.Score_{(3-10\%)i} + \sum_{i=1}^{p} Max.Score_{(<3\ \%)i}$$

- Calculation of the participant's scores for PCDD/F and DL-PCB and non-dioxin-like PCB congeners separately:

$$Participant's\ Score = \sum_{i=1}^{n} Score_{(>10\%)i} + \sum_{i=1}^{m} Score_{(3-10\%)i} + \sum_{i=1}^{p} Score_{(<3\ \%)i}$$

- Calculation of achieved scoring percentage for each participant:

$$Participant's\ Scoring\ Percentage = \frac{Participant's\ score}{Maximum\ score} \cdot 100$$

- Criteria for successful participation:

Sum parameters:	≤ 1 parameter with | z-score | > 2, no parameter with | z-score | ≥ 3
PCDD/F congeners:	≥ 75 % of maximum score
DL-PCB congeners:	≥ 75 % of maximum score
Non-dioxin-like PCB congeners:	≥ 75 % of maximum score
Difference between reported and calculated results for sum parameters	≤ 10 %

The assessment based on the positive scoring system is performed for each PT test sample. A laboratory participates successfully in a PT for PCDD/Fs and PCBs, if all above mentioned criteria for the reported analytes are met for each PT test sample.

Table 12: Successful participation rate according to positive scoring system for bentonite (2402-BT)

Scoring system	Successful participation		Reason for not successful participation			
Percentage of participants' results	yes	no	Only sum parameters	Sum parameters + individual congeners	Only individual congeners	Calculation of sum parameters
2402-BT	64 %	36 %	41 %	38 %	7 %	31 %

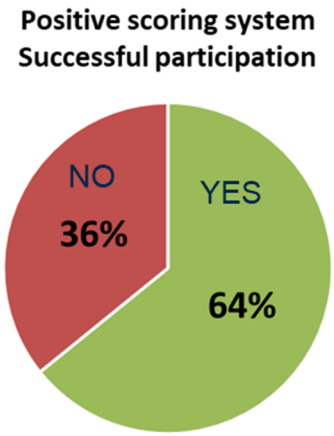

Figure 12: Successful participation rate according to the positive scoring system for Bentonite (2402-BT)

5.2. Participants' results for bioanalytical screening methods

According to Commission Regulation (EC) No 152/2009, "a screening method in principle classifies a sample as compliant or suspected to be non-compliant. For this, the calculated BEQ level is compared to the cut-off value […]. Samples below the cut-off value are declared compliant, samples equal or above the cut-off value as suspected to be non-compliant, requiring analysis by a confirmatory method".

Therefore, the main criterion for evaluation of results from bioanalytical screening methods is their ability to reliably identify compliant samples and samples suspected to be non-compliant with established legal limits.

For further evaluation of the performance of bioanalytical screening methods, bioassay-scores are applied: The reported BEQ-values derived from bioanalytical screening methods are compared with the WHO-TEQ assigned values calculated on basis of the results of physical-chemical methods for the concentration range of 0.5 to 2 times the level of interest.

Because bioanalytical screening methods focus mainly on distinguishing between compliant and potentially non-compliant samples, a direct comparison of bioassay-scores and z-scores is not possible. However, bioassay scores may serve as a tool to assess method performance within the scope of external quality control measures of the respective laboratory.

Bioassay-scores are calculated according to the following formula:

$$bioassay - score = \frac{(x - x_a)}{x_a * \sigma_{BArel}}$$

x: participant's result (BEQ from bioanalytical screening method)
x_a: assigned value (physical-chemical methods)
σ_{BArel}: relative bioassay target deviation (20%)

For PCDD/F-BEQ, PCB-BEQ and PCDD/F-PCB-BEQ the relative bioassay target deviation σ_{BArel} was defined as 20%.

5.2.1. Assessment of analytical results

As a consequence of the comparison of the assigned values of the test sample 2402-BT with legal limits, the assessment of the analytical results using bioanalytical screening methods should read "compliant with the maximum level for WHO-PCDD/F-PCB-TEQ and WHO-PCDD/F-TEQ", "suspected to be non-compliant with the action threshold for WHO-PCB-TEQ" and "compliant with the action threshold for WHO-PCDD/F-TEQ".

Table 13: Evaluation of assigned values for Bentonite

	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ
2402-BT	< ML	< ML	> AL	< AL

Seven laboratories reported results using CALUX bioassay for Total-BEQ and hereof five also for PCDD/F-BEQ and/or PCB-BEQ. Four laboratories suspected that the sample to be non-compliant with the ML for WHO-PCDD/F-PCB-TEQ, and two suspected it to be non-compliant with the ML for WHO-PCDD/F-TEQ, which are false positive reports. One laboratory reported that the sample complied with the AL for WHO-PCDD/F-TEQ. Since the assigned value was above the AL WHO-PCDD/F-TEQ, this was a false negative report, therefore this laboratory should review the applied method (Table 14).

Table 14: Participants' assessment of analytical results using bioanalytical screening methods for 2402-BT

Laboratories' assessment of analytical results	WHO-PCDD/F-PCB-TEQ Maximum level	WHO-PCDD/F-TEQ Maximum level	WHO-PCDD/F-TEQ Action threshold	WHO-PCB-TEQ Action threshold
Suspected to be non-compliant	4	2	2	2
Compliant	3	1	1	2

5.2.2. Participants' bioassay-scores

Concentrations for the WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ and the WHO-PCB-TEQ in the test sample 2402-BT are in the range (about 0.5 to 2 times) of the respective maximum levels.

Table 15: Distribution of participants' bioassay-scores for BEQ parameters for Bentonite (2402-BT)

Percentage of participants' results	PCDD/F-PCB-BEQ	PCDD/F-BEQ	PCB-BEQ
$\lvert$ **bioassay-score** $\rvert \leq 2$	86 %	100 %	50 %
$2 < \lvert$ **bioassay-score** $\rvert < 3$	-	-	-
$\lvert$ **bioassay-score** $\rvert \geq 3$	14 %	-	50 %

6. Participants' feedback

A questionnaire for feedback from participants of this EURL proficiency test was available as online survey between 18 November 2024 and 17 January 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, 3 laboratories replied to this survey.

Table 16: Participating laboratories in the feedback survey

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

General aspect

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".

Announcement 

Instructions 

Sample shipment 

Reporting of results 

Preliminary report 

Did the proficiency test meet expectations? 8 out of 10 rating points

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?

Choice of matrix	
Level of contamination	

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 was performed under accreditation according to DIN EN ISO/IEC 17025:2018.

8. Results of participants

An overview of the PCDD/F and PCB results for the PT test sample Bentonite (2402-BT) are given in the following annexes. Laboratories are coded according to the laboratory codes sent after registration.

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.

[3] M. van den Berg et al., The 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds. Toxicological Sciences 93(2), 223-241 (2006)

10. Annex

Bentonite – 2402-BT	
Annex-1	Assigned values – PCDD/F, PCB
Annex-2	Participants' results – Tables – PCDD/F, PCB
Annex-3	Participants' z-scores / bioassay-scores – Tables – PCDD/F, PCB
Annex-4	Participants' z-scores – Charts – PCDD/F, PCB
Annex-5	Scoring system – PCDD/F, PCB
Annex-6	Test for sufficient homogeneity – PCDD/F and PCB
Annex-7	Participants' methods – PCDD/F and PCB

EURL for halogenated POPs in Feed and Food
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Annex 1: Assigned values of PCDD/Fs and PCBs

Test sample - Bentonite (2402-BT)

Assigned values of sum parameters and individual congeners

Estimation of the assigned value as the consensus of participants' results
Assigned value = Huber robust mean after exlusion of extreme outliers

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Bentonite (2402-BT)
Sum parameters - Results

Analyte	Result ng/kg (12% moisture content)	**Assigned value** [outliers removed]	**Robust standard deviation** [outliers removed]	**Standard uncertainty** [outliers removed]	**No. of results contributing to assigned value**	**Median** [all values]
WHO-PCDD/F-PCB-TEQ upper bound rep		0.821	0.0824	0.013	62	0.822
WHO-PCDD/F-PCB-TEQ lower bound rep		0.798	0.0979	0.016	62	0.810
WHO-PCDD/F-PCB-TEQ upper bound cal		0.823	0.0864	0.014	59	0.822
WHO-PCDD/F-PCB-TEQ lower bound cal		0.793	0.110	0.018	61	0.798

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Bentonite (2402-BT)
PCDD/F - Assigned values

Analyte	Result ng/kg (12% moisture content)	**Assigned value** [outliers removed]	**Robust standard deviation** [outliers removed]	**Standard uncertainty** [outliers removed]	**No. of results contributing to assigned value**	**Median** [all values]
WHO-PCDD/F-TEQ upper bound rep		0.556	0.0629	0.0098	64	0.555
WHO-PCDD/F-TEQ lower bound rep		0.540	0.0704	0.011	64	0.546
WHO-PCDD/F-TEQ upper bound cal		0.554	0.0661	0.010	62	0.551
WHO-PCDD/F-TEQ lower bound cal		0.536	0.0776	0.012	63	0.543
2,3,7,8-TCDD		0.0521	0.0101	0.0017	57	0.0512
1,2,3,7,8-PeCDD		0.167	0.0232	0.0038	58	0.166
1,2,3,4,7,8-HxCDD		0.265	0.0413	0.0065	63	0.264
1,2,3,6,7,8-HxCDD		0.313	0.0461	0.0074	60	0.315
1,2,3,7,8,9-HxCDD		0.730	0.104	0.016	63	0.740
1,2,3,4,6,7,8-HpCDD		8.56	1.19	0.19	61	8.51
1,2,3,4,6,7,8,9-OCDD		92.4	16.6	2.6	61	92.6
2,3,7,8-TCDF		0.143	0.0252	0.0040	61	0.144
1,2,3,7,8-PeCDF		0.0701	0.0140	0.0023	58	0.0689
2,3,4,7,8-PeCDF		0.115	0.0198	0.0033	57	0.113
1,2,3,4,7,8-HxCDF		0.0929	0.0171	0.0028	59	0.0944
1,2,3,6,7,8-HxCDF		0.0727	0.0152	0.0025	57	0.0750
2,3,4,6,7,8-HxCDF		0.0570	0.0142	0.0024	54	0.0560
1,2,3,7,8,9-HxCDF						0.0320
1,2,3,4,6,7,8-HpCDF		0.784	0.137	0.022	60	0.770
1,2,3,4,7,8,9-HpCDF						0.0328
1,2,3,4,6,7,8,9-OCDF						0.140

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Bentonite (2402-BT)
Dioxin-like PCB - Assigned values

Analyte	Result ng/kg (12% moisture content)	**Assigned value** [outliers removed]	**Robust standard deviation** [outliers removed]	**Standard uncertainty** [outliers removed]	**No. of results contributing to assigned value**	**Median** [all values]
WHO-PCB-TEQ upper bound rep		0.267	0.0301	0.0047	65	0.274
WHO-PCB-TEQ lower bound rep		0.264	0.0317	0.0050	64	0.272
WHO-PCB-TEQ upper bound cal		0.270	0.0289	0.0046	63	0.278
WHO-PCB-TEQ lower bound cal		0.264	0.0314	0.0049	63	0.273
PCB 105		516	57.1	8.7	67	520
PCB 114		38.2	5.43	0.85	64	38.1
PCB 118		949	119	18	66	958
PCB 123		22.3	4.71	0.77	59	22.3
PCB 156		88.1	9.56	1.5	65	88.8
PCB 157		18.6	2.14	0.34	63	18.5
PCB 167		30.2	3.85	0.63	59	30.7
PCB 189		4.37	0.510	0.088	53	4.45
PCB 77		100	13.3	2.1	64	97.9
PCB 81		5.03	0.604	0.10	55	5.21
PCB 126		2.01	0.280	0.044	64	2.07
PCB 169						0.0931

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Bentonite (2402-BT)
Non dioxin-like PCB - Assigned values

Analyte	Result µg/kg (12% moisture content)	**Assigned value** [outliers removed]	**Robust standard deviation** [outliers removed]	**Standard uncertainty** [outliers removed]	**No. of results contributing to assigned value**	**Median** [all values]
Sum Indicator PCBs upper bound rep		6.69	0.812	0.12	68	6.68
Sum Indicator PCBs lower bound rep		6.61	0.829	0.13	67	6.59
Sum Indicator PCBs upper bound cal		6.71	0.820	0.13	66	6.73
Sum Indicator PCBs lower bound cal		6.64	0.842	0.13	66	6.57
PCB 28		1.34	0.187	0.031	57	1.39
PCB 52		2.38	0.273	0.042	65	2.43
PCB 101		1.28	0.181	0.028	65	1.29
PCB 138		0.612	0.0982	0.015	65	0.610
PCB 153		0.523	0.0689	0.011	64	0.523
PCB 180		0.408	0.0628	0.0098	64	0.410

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Bentonite (2402-BT)
WHO-TEQ - Assigned values - Bioanalytical screening methods

Analyte	Result ng BEQ/kg (12% moisture content)	**Assigned value** [outliers removed]	**Robust standard deviation** [outliers removed]	**Standard uncertainty** [outliers removed]	**No. of results contributing to assigned value**	**Median** [all values]
WHO-PCDD/F-PCB-TEQ ub rep		0.82	0.082	0.013	62	0.82
WHO-PCDD/F-TEQ ub rep		0.56	0.063	0.0098	64	0.56
WHO-PCB-TEQ ub rep		0.27	0.030	0.0047	65	0.27

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Bentonite (2402-BT)
Moisture content (PCDD/F, PCB) - Assigned value

Analyte	Result %	**Assigned value** [outliers removed]	**Robust standard deviation** [outliers removed]	**Standard uncertainty** [outliers removed]	**No. of results contributing to assigned value**	**Median** [all values]
Moisture content		9.12	0.647	0.093	75	9.20

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Annex 2: Participants' results of PCDD/Fs and PCBs

Test sample - Bentonite (2402-BT)

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

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Bentonite (2402-BT)
Sum parameters - Results

LC	Sample	Result ng/kg 12% moisture content	WHO-PCDD/F-PCB-TEQ reported upper bound	WHO-PCDD/F-PCB-TEQ reported lower bound	WHO-PCDD/F-PCB-TEQ calculated upper bound	WHO-PCDD/F-PCB-TEQ calculated lower bound	WHO-PCDD/F-TEQ reported upper bound	WHO-PCDD/F-TEQ reported lower bound	WHO-PCDD/F-TEQ calculated upper bound	WHO-PCDD/F-TEQ calculated lower bound	WHO-PCB-TEQ reported upper bound	WHO-PCB-TEQ reported lower bound	WHO-PCB-TEQ calculated upper bound	WHO-PCB-TEQ calculated lower bound	Result µg/kg 12% moisture content	Sum 6 Indicator PCBs reported upper bound	Sum 6 Indicator PCBs reported lower bound	Sum 6 Indicator PCBs calculated upper bound	Sum 6 Indicator PCBs calculated lower bound
1	2402-BT		0.829	0.823	0.831	0.822	0.549	0.543	0.549	0.543	0.28	0.28	0.282	0.279		6.83	6.83	6.83	6.83
2	2402-BT		0.81	0.81	0.804	0.804	0.53	0.53	0.527	0.527	0.28	0.28	0.277	0.277					
3	2402-BT		0.47	0.46	0.467	0.458	0.25	0.241	0.25	0.241	0.216	0.216	0.217	0.217		13.7	13.7	13.7	13.7
4	2402-BT		0.807	0.797	0.806	0.798	0.527	0.521	0.527	0.522	0.28	0.276	0.279	0.276		7.67	7.67	7.67	7.67
6	2402-BT																	60	0
7	2402-BT															6.74	5.74	6.74	5.74
8	2402-BT		0.787		0.79	0.68	0.507		0.509	0.423	0.279		0.281	0.257		8.1		8.39	7.39
9	2402-BT		1.48	0.62	1.34	0.515	1.2	0.35	1.06	0.242	0.28	0.27	0.282	0.273					
11	2402-BT		0.862	0.751	1.3	0.553	0.588	0.535	1.05	0.337	0.274	0.216	0.246	0.216		5.66	5.66	5.67	5.67
12	2402-BT		0.93	0.91	0.931	0.913	0.66	0.64	0.663	0.649	0.27	0.26	0.268	0.264		8.8	8.8	8.84	8.84
13	2402-BT		0.963	0.921	0.963	0.922	0.641	0.61	0.641	0.61	0.322	0.311	0.322	0.312		7.14	7.14	7.13	7.13
14	2402-BT															6.74	6.74	6.73	6.73
15	2402-BT		0.828	0.828	0.828	0.828	0.547	0.547	0.547	0.547	0.281	0.281	0.281	0.281					
16	2402-BT		0.88	0.867	0.879	0.867	0.586	0.58	0.585	0.58	0.209	0.287	0.294	0.287					
17	2402-BT		0.86	0.85	0.85	0.844	0.58	0.57	0.568	0.563	0.28	0.28	0.282	0.281		7	7	6.92	6.92
19	2402-BT																		
20	2402-BT		0.907	0.907	0.908	0.908	0.624	0.624	0.624	0.624	0.284	0.284	0.284	0.284		7.17	7.17	7.16	7.16
21	2402-BT		1.05	1	1.04	0.999	0.76	0.75	0.754	0.743	0.29	0.26	0.29	0.256		6.14	5.64	6.14	5.64
22	2402-BT		0.873	0.869	0.87	0.867	0.577	0.575	0.574	0.574	0.296	0.294	0.296	0.293		7.06	7.06	7.21	7.21
23	2402-BT		0.796	0.731	0.801	0.73	0.444	0.438	0.448	0.437	0.352	0.294	0.353	0.293		6.42	6.42	6.59	6.59
24	2402-BT		0.99	0.89	0.989	0.892	0.69	0.6	0.69	0.596	0.3	0.3	0.299	0.296		6.9	6.9	6.91	6.91
25	2402-BT		0.79	0.77	0.787	0.77	0.53	0.52	0.534	0.523	0.25	0.25	0.253	0.247		8.5	8.5	8.53	8.53
26	2402-BT		0.796	0.795	0.795	0.794	0.532	0.532	0.531	0.531	0.264	0.263	0.264	0.263		7.13	7.13	7.13	7.13
27	2402-BT															8.91	8.91	8.92	8.92
28	2402-BT		0.854	0.757	0.854	0.757	0.565	0.472	0.565	0.472	0.288	0.285	0.289	0.285		6.11	6.11	6.12	6.12
29	2402-BT		0.849	0.849	0.849	0.848	0.561	0.561	0.562	0.561	0.288	0.287	0.287	0.287		5.19	5.19	5.19	5.19
30	2402-BT		0.65	0.65	0.667	0.667	0.39	0.39	0.388	0.388	0.26	0.26	0.279	0.279		5.5	5.5	5.79	5.79
31	2402-BT		0.86	0.73	0.855	0.727	0.6	0.49	0.597	0.49	0.26	0.24	0.258	0.237					
32	2402-BT		0.856	0.854	0.856	0.855	0.577	0.577	0.577	0.577	0.279	0.278	0.279	0.278		6.77	6.77	6.76	6.76
33	2402-BT		1.01	1	1.01	1	0.705	0.696	0.706	0.697	0.307	0.307	0.307	0.307		7.61	7.61	7.61	7.61
34	2402-BT		0.856	0.856	0.856	0.856	0.596	0.596	0.596	0.596	0.26	0.26	0.26	0.26		5.84	5.84	5.84	5.84
35	2402-BT						0.302	0.293	0.302	0.293						8.2	8.2	8.2	8.2
36	2402-BT		2.98	2.98	2.99	2.99	0.612	0.612	0.625	0.625	2.36	2.36	2.36	2.36					
37	2402-BT		0.85	0.81	0.852	0.805	0.61	0.57	0.616	0.569	0.24	0.24	0.236	0.236		6.1	6.1	6.16	6.16
38	2402-BT																		
39	2402-BT		0.59	0.72	0.712	0.596	0.35	0.43	0.427	0.353	0.24	0.29	0.285	0.243		6.6	6.6	6.57	6.57
40	2402-BT		0.823	0.82	0.822	0.82	0.549	0.549	0.549	0.549	0.273	0.271	0.273	0.271		6.69	6.69	6.69	6.69
41	2402-BT															7.3	7.3	7.29	7.29
42	2402-BT		0.753	0.697	0.753	0.698	0.566	0.521	0.566	0.521	0.187	0.177	0.187	0.177		6.18	6.18	6.18	6.18
43	2402-BT		0.847	0.847	0.876	0.876	0.571	0.571	0.6	0.6	0.276	0.276	0.276	0.276		6.14	6.14	6.14	6.14
44	2402-BT		0.82	0.789	0.82	0.789	0.542	0.511	0.542	0.511	0.278	0.278	0.278	0.278		6.97	6.97	6.97	6.97
45	2402-BT										0.375	0.343	0.375	0.343		8	8	8	8
46	2402-BT		0.659	0.651	0.659	0.651	0.378	0.375	0.378	0.375	0.281	0.276	0.281	0.276		4.13	4.13	4.13	4.13
48	2402-BT		1.05	1.05	1.05	1.05	0.721	0.718	0.72	0.719	0.333	0.333	0.333	0.333					
49	2402-BT		0.753	0.682	0.753	0.682	0.49	0.427	0.492	0.427	0.261	0.255	0.261	0.255		6.42	6.42	6.42	6.42
51	2402-BT		0.784	0.783	0.784	0.783	0.53	0.53	0.53	0.53	0.254	0.253	0.254	0.253		5.95	5.95	5.95	5.95
52	2402-BT		0.857	0.824	0.857	0.824	0.567	0.535	0.567	0.535	0.289	0.289	0.29	0.289		6.46	6.46	6.45	6.45
53	2402-BT		0.813	0.812			0.546	0.545	0.546	0.545	0.267	0.267				7.15	7.15	7.15	7.15
54	2402-BT		25.1	25	25.1	25	23.7	23.6	23.7	23.6	1.4	1.4	1.4	1.4		56.6	56.6	56.6	56.6
55	2402-BT		0.81	0.81	0.811	0.811	0.53	0.53	0.528	0.528	0.28	0.28	0.283	0.283		6.42	6.42	6.42	6.42
56	2402-BT															5.99	5.99	5.99	5.99
57	2402-BT		0.815	0.763	0.813	0.761	0.598	0.55	0.596	0.547	0.217	0.213	0.217	0.214					
58	2402-BT		0.91	0.9	0.903	0.896	0.63	0.62	0.62	0.615	0.28	0.28	0.283	0.281		6.42	6.42	300	0
59	2402-BT															5.94	5.94	5.94	5.94
62	2402-BT		0.795	0.793	0.794	0.793	0.535	0.534	0.534	0.534	0.26	0.259	0.26	0.259		6.46	6.46	6.46	6.46
63	2402-BT		0.777	0.765	0.777	0.765	0.555	0.552	0.555	0.553	0.222	0.212	0.222	0.212		7.21	7.21	7.21	7.21
64	2402-BT		0.889	0.882	0.889	0.881	0.59	0.586	0.59	0.586	0.299	0.295	0.299	0.295		6.62	6.62	6.63	6.63
65	2402-BT		191	191	197	197	0.498	0.49	0.511	0.504	191	191	196	196		6.35	6.35	600	0
66	2402-BT		0.927	0.927	0.927	0.927	0.674	0.674	0.674	0.674	0.254	0.254	0.253	0.253		6.91	6.91	6.91	6.91
68	2402-BT		0.708	0.688	0.264	0.264	0.609	0.609	0.262	0.262	0.0995	0.079	0.00152	0.00152		22.2	21.7	22.2	21.7
69	2402-BT		0.853	0.859	0.86	0.852	0.579	0.583	0.582	0.579	0.273	0.277	0.278	0.273		7.69	7.69	7.7	7.7
70	2402-BT		0.833	0.828	0.833	0.827	0.555	0.553	0.555	0.553	0.278	0.274	0.278	0.274		6.91	6.91	6.91	6.91
71	2402-BT		0.795	0.795	0.796	0.796	0.55	0.55	0.551	0.551	0.245	0.245	0.245	0.245		4.89	4.89	4.89	4.89
72	2402-BT															600		600	0
73	2402-BT		0.998	0.994	0.999	0.994	0.699	0.695	0.7	0.695	0.299	0.299	0.299	0.299		6.57	6.57	6.57	6.57
74	2402-BT		0.821	0.819	0.822	0.819	0.547	0.547	0.547	0.547	0.275	0.272	0.275	0.272		6.71	6.71	6.71	6.71
75	2402-BT		0.24	0.21	0.215	0.208	0.081	0.072	0.0767	0.0724	0.16	0.14	0.138	0.136		5.97	5.97	5.97	5.97
76	2402-BT		0.619	0.61	0.618	0.61	0.334	0.326	0.334	0.326	0.285	0.284	0.284	0.284		6.52	6.52	6.52	6.52
77	2402-BT															5.85	5.85	5.86	5.86
78	2402-BT		0.972	0.968	0.972	0.968	0.585	0.581	0.585	0.581	0.387	0.387	0.387	0.387		7.82	7.82	7.82	7.82
80	2402-BT		0.667	0.622	0.667	0.622	0.481	0.477	0.481	0.478	0.186	0.145	0.186	0.144		4.65	3.76	4.65	3.76
81	2402-BT		0.753	0.676	0.754	0.675	0.484	0.443	0.485	0.443	0.269	0.232	0.269	0.232		6.66	5.66	6.66	5.66
82	2402-BT															6.25	6.25	6.24	6.24
83	2402-BT		0.76	0.75	0.762	0.753	0.54	0.53	0.535	0.529	0.23	0.22	0.227	0.224		8.8	8.8	8.81	8.81

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Bentonite (2402-BT)
Sum parameters - Results

LC	Sample	Result ng/kg 12% moisture content	WHO-PCDD/F-PCB-TEQ reported upper bound	WHO-PCDD/F-PCB-TEQ reported lower bound	WHO-PCDD/F-PCB-TEQ calculated upper bound	WHO-PCDD/F-PCB-TEQ calculated lower bound	WHO-PCDD/F-TEQ reported upper bound	WHO-PCDD/F-TEQ reported lower bound	WHO-PCDD/F-TEQ calculated upper bound	WHO-PCDD/F-TEQ calculated lower bound	WHO-PCB-TEQ reported upper bound	WHO-PCB-TEQ reported lower bound	WHO-PCB-TEQ calculated upper bound	WHO-PCB-TEQ calculated lower bound	Result µg/kg 12% moisture content	Sum 6 Indicator PCBs reported upper bound	Sum 6 Indicator PCBs reported lower bound	Sum 6 Indicator PCBs calculated upper bound	Sum 6 Indicator PCBs calculated lower bound
84	2402-BT		0.718	0.714	0.719	0.714	0.492	0.487	0.492	0.487	0.226	0.226	0.227	0.227		6.36	6.36	6.35	6.35
85	2402-BT		0.77	0.765	0.771	0.769	0.525	0.525	0.524	0.524	0.245	0.24	0.247	0.245		6.4	6.4	6.4	6.4
86	2402-BT		0.803	0.799	0.802	0.798	0.56	0.56	0.559	0.559	0.243	0.239	0.243	0.239		7.11	7.11	7.1	7.1
87	2402-BT		0.801	0.78	0.742	0.721	0.528	0.511	0.487	0.471	0.273	0.269	0.255	0.25		6.36	6.36	6.36	6.36
88	2402-BT		0.57	0.57	0.578	0.578	0.3	0.3	0.363	0.363	0.23	0.23	0.215	0.215		5.3	5.3	5.26	5.26
89	2402-BT		1.53	1.53	1.53	1.53	1.36	1.36	1.36	1.36	0.171	0.171	0.171	0.171		6.47	6.47	6.47	6.47
90	2402-BT		0.799	0.798	0.8	0.798	0.549	0.547	0.549	0.547	0.25	0.25	0.251	0.251					
91	2402-BT		0.761	0.746	0.76	0.746	0.503	0.499	0.502	0.499	0.258	0.247	0.258	0.247		8.41	8.41	8.42	8.42
92	2402-BT															7.34	6.84	7.34	6.84
27A	2402-BT															7.33	7.33	7.34	7.34
44A	2402-BT															7.12	7.12	7.12	7.12
82A	2402-BT															6.37	6.37	6.37	6.37
16*	2402-BT		0.88	0.867	0.879	0.867	0.586	0.58	0.585	0.58	0.294	0.287	0.294	0.287					
53*	2402-BT		0.813	0.812	0.813	0.812	0.546	0.545	0.546	0.545	0.267	0.267	0.267	0.267		7.15	7.15	7.15	7.15
88*	2402-BT		0.57	0.57	0.574	0.573	0.3	0.3	0.363	0.363	0.23	0.23	0.211	0.21		5.3	5.3	5.26	5.26

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Bentonite (2402-BT)
Assessment of analytical results, Measurement uncertainty

		Assessment of analytical results					Measurement uncertainty [%]			
LC	Sample	Exceeds maximum level for **WHO-PCDD/F-PCB-TEQ**	Exceeds maximum level for **WHO-PCDD/F-TEQ**	Exceeds action level for **WHO-PCDD/F-TEQ**	Exceeds action level for **WHO-PCB-TEQ**	Exceeds maximum level for **Sum 6 Indicator PCBs**	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum 6 Indicator PCBs
1	2402-BT						30	30	30	30
2	2402-BT						25	25	25	
3	2402-BT					X	24.17	22	10	10
4	2402-BT						30	30	30	25
6	2402-BT									
7	2402-BT									88
8	2402-BT						25	25	28	13
9	2402-BT	X	X	X			±15	±15	±15	
11	2402-BT			x			17	16	20	17
12	2402-BT			X			20	20	20	30
13	2402-BT			X			20	20	20	20
14	2402-BT									21.4
15	2402-BT						20	20	20	
16	2402-BT	-	-	-	-		25	25	25	
17	2402-BT						23	24	24	25
19	2402-BT									
20	2402-BT			X			15	15	15	15
21	2402-BT			X			26.6	26.1	28.1	25.9
22	2402-BT						20	20	20	30
23	2402-BT				x		10	10	15	20
24	2402-BT			X			25.02	24.38	31.53	18.21
25	2402-BT						25	35	30	20
26	2402-BT						30	30	30	30
27	2402-BT									15
28	2402-BT									
29	2402-BT						44	44	44	44
30	2402-BT						44	44	44	44
31	2402-BT			X			15	15	15	
32	2402-BT						20	20	20	20
33	2402-BT			x			20	20	20	20
34	2402-BT			X			19	20	17	23
35	2402-BT							29		24
36	2402-BT	x			X		15	15	14	
37	2402-BT						20	20		20
38	2402-BT									
39	2402-BT						8.2	8.2	6.6	3.3
40	2402-BT						21.3	21.3	20.8	30
41	2402-BT									31.2
42	2402-BT						20	20	20	20
43	2402-BT			X			15	15	15	20
44	2402-BT						20	20	20	20
45	2402-BT								12	15
46	2402-BT						17	25	17	6
48	2402-BT						38	38	38	
49	2402-BT						25	25	24	22
51	2402-BT						20	21	16	11
52	2402-BT						23.2	21.3	26.9	20.3
53	2402-BT						25	25	25	25
54	2402-BT	X	X	X	X	X				
55	2402-BT						22.3	22	22.8	20
56	2402-BT									14
57	2402-BT						20	20	20	
58	2402-BT						30	30	30	30
59	2402-BT									20
62	2402-BT						32	27	18	31
63	2402-BT			X			50.6	31.4	39.6	31.6
64	2402-BT			x			22.02	14.3	16.74	16.74
65	2402-BT	X			X		20	15	15	15
66	2402-BT			X			19.93	25	30	30
68	2402-BT			x		x	35	35	35	35
69	2402-BT			X			25	25	25	25
70	2402-BT						18.3	18	19	19
71	2402-BT						30	30	30	30
72	2402-BT									40
73	2402-BT			X			25	25	25	25
74	2402-BT						21.3	21.3	20.8	30
75	2402-BT						26	19	33	28
76	2402-BT						17.7	17.4	17.9	15.8
77	2402-BT									50
78	2402-BT				X		20	20	20	20
80	2402-BT						20.4	19.7	22.3	26.4
81	2402-BT						41	27.6	26.7	36.2
82	2402-BT									20
83	2402-BT			×			20	20	20	20

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
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Bentonite (2402-BT)
Assessment of analytical results, Measurement uncertainty

			Assessment of analytical results						**Measurement uncertainty [%]**			
LC	Sample		Exceeds maximum level for **WHO-PCDD/F-PCB-TEQ**	Exceeds maximum level for **WHO-PCDD/F-TEQ**	Exceeds action level for **WHO-PCDD/F-TEQ**	Exceeds action level for **WHO-PCB-TEQ**	Exceeds maximum level for **Sum 6 Indicator PCBs**		WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum 6 Indicator PCBs
84	2402-BT								9.78	9.92	12.15	12.27
85	2402-BT								20	20	20	25
86	2402-BT								26.3	33.9	33.3	
87	2402-BT				x				30	30	30	30
88	2402-BT								30	30	30	30
89	2402-BT		x	x	x				20	20	20	22
90	2402-BT								30	30	30	
91	2402-BT								41	31	26	31
92	2402-BT											50
27A	2402-BT											15
44A	2402-BT											30
82A	2402-BT											20

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Difference between upper bound (ub) - lower bound (lb) calculation, Comparison of reported and calculated sum parameters

LC	Sample	Difference between upper and lower bound calculation for reported sum parameters [%]				Difference between reported and calculated upper bound sum parameters [%]				Correct calculation	Difference between reported and calculated lower bound sum parameters [%]				Correct calculation
		WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum 6 Indicator PCBs	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum 6 Indicator PCBs	(deviation ≤ 10 %)	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum 6 Indicator PCBs	(deviation ≤ 10 %)
1	2402-BT	0.72	1.09	0.00	0	0	0	1	0	yes	0	0	0	0	yes
2	2402-BT	0	0	0		1	1	1		yes	1	1	1		yes
3	2402-BT	2	3.60	0.00	0	1	0	0	0	yes	0	0	0	0	yes
4	2402-BT	1.24	1.14	1.43	0	0	0	0	0	yes	0	0	0	0	yes
6	2402-BT														
7	2402-BT				15				0	yes				0	yes
8	2402-BT					0	0	1	3	yes					
9	2402-BT	58.11	70.83	4		10	13	1		no	20	45	1		no
11	2402-BT	13	9	21	0	34	44	11	0	no	36	59	0	0	no
12	2402-BT	2	3	4	0	0	0	1	0	yes	0	1	2	0	yes
13	2402-BT	4	5	3	0	0	0	0	0	yes	0	0	0	0	yes
14	2402-BT				0				0	yes				0	yes
15	2402-BT	0.00	0.00	0.00		0	0	0		yes	0	0	0		yes
16	2402-BT	1	1	-37		0	0	29		no	0	0	0		yes
17	2402-BT	1	2	0	0	1	2	1	1	yes	1	1	0	1	yes
19	2402-BT														
20	2402-BT	0	0	0	0	0	0	0	0	yes	0	0	0	0	yes
21	2402-BT	4.8	1	10	8	1	1	0	0	yes	0	1	2	0	yes
22	2402-BT	0.46	0.35	0.68	0	0	1	0	2	yes	0	0	0	2	yes
23	2402-BT	8	1	16	0	1	1	0	3	yes	0	0	0	3	yes
24	2402-BT	10	13	0	0	0	0	0	0	yes	0	1	1	0	yes
25	2402-BT	3	2	0	0	0	1	1	0	yes	0	1	1	0	yes
26	2402-BT	0.13	0.00	0	0	0	0	0	0	yes	0	0	0	0	yes
27	2402-BT				0				0	yes				0	yes
28	2402-BT	11.36	16.46	1.04	0	0	0	0	0	yes	0	0	0	0	yes
29	2402-BT	0	0	0	0	0	0	0	0	yes	0	0	0	0	yes
30	2402-BT	0	0	0	0	3	1	7	5	yes	3	1	7	5	yes
31	2402-BT	15	18	8		1	1	1		yes	0	0	1		yes
32	2402-BT	0.23	0.00	0.36	0	0	0	0	0	yes	0	0	0	0	yes
33	2402-BT	0.99	1.28	0	0	0	0	0	0	yes	0	0	0	0	yes
34	2402-BT	0	0	0	0	0	0	0	0	yes	0	0	0	0	yes
35	2402-BT		2.98		0		0		0	yes		0		0	yes
36	2402-BT	0	0	0		0	2	0		yes	0	2	0		yes
37	2402-BT	5	7	0	0	0	1	2	1	yes	1	0	2	1	yes
38	2402-BT														
39	2402-BT	-22	-23	-21	0	17	18	16	0	no	21	22	19	0	no
40	2402-BT	0	0	1	0	0	0	0	0	yes	0	0	0	0	yes
41	2402-BT				0				0	yes				0	yes
42	2402-BT	7	8	5	0	0	0	0	0	yes	0	0	0	0	yes
43	2402-BT	0	0	0	0	3	5	0	0	yes	3	5	0	0	yes
44	2402-BT	4	6	0	0	0	0	0	0	yes	0	0	0	0	yes
45	2402-BT			9	0			0	0	yes			0	0	yes
46	2402-BT	1.21	0.79	2	0	0	0	0	0	yes	0	0	0	0	yes
48	2402-BT	0.00	0.42	0		0	0	0		yes	0	0	0		yes
49	2402-BT	9.43	12.86	2.30	0	0	0	0	0	yes	0	0	0	0	yes
51	2402-BT	0.13	0.00	0	0	0	0	0	0	yes	0	0	0	0	yes
52	2402-BT	4	6	0	0	0	0	0	0	yes	0	0	0	0	yes
53	2402-BT	0	0	0	0		0		0	yes		0		0	yes
54	2402-BT	0	0	0	0	0	0	0	0	yes	0	0	0	0	yes
55	2402-BT	0	0	0	0	0	0	1	0	yes	0	0	1	0	yes
56	2402-BT				0				0	yes				0	yes
57	2402-BT	6.38	8	1.84		0	0	0		yes	0	1	0		yes
58	2402-BT	1.10	1.59	0	0	1	2	1	98	no	0	1	0		yes
59	2402-BT				0				0	yes				0	yes
62	2402-BT	0.25	0.19	0.38	0	0	0	0	0	yes	0	0	0	0	yes
63	2402-BT	2	1	5	0	0	0	0	0	yes	0	0	0	0	yes
64	2402-BT	1	1	1	0	0	0	0	0	yes	0	0	0	0	yes
65	2402-BT	0	2	0	0	3	3	3	99	no	3	3	3		yes
66	2402-BT	0	0.00	0	0	0	0	0	0	yes	0	0	0	0	yes
68	2402-BT	2.82	0.00	20.60	2	168	132	6446	0	no	161	132	5097	0	no
69	2402-BT	-0.70	-0.69	-1.47	0	1	1	2	0	yes	1	1	1	0	yes
70	2402-BT	0.60	0.36	1.44	0	0	0	0	0	yes	0	0	0	0	yes
71	2402-BT	0	0	0	0	0	0	0	0	yes	0	0	0	0	yes
72	2402-BT								0	yes					
73	2402-BT	0	1	0	0	0	0	0	0	yes	0	0	0	0	yes
74	2402-BT	0.24	0.00	1.09	0	0	0	0	0	yes	0	0	0	0	yes
75	2402-BT	12.50	11.11	13	0	12	6	16	0	no	1	1	3	0	yes
76	2402-BT	1.45	2.40	0.35	0	0	0	0	0	yes	0	0	0	0	yes
77	2402-BT				0				0	yes				0	yes
78	2402-BT	0	1	0	0	0	0	0	0	yes	0	0	0	0	yes
80	2402-BT	7	1	22	19	0	0	0	0	yes	0	0	1	0	yes
81	2402-BT	10.23	8.47	13.75	15	0	0	0	0	yes	0	0	0	0	yes
82	2402-BT				0				0	yes				0	yes
83	2402-BT	1.32	1.85	4.35	0	0	1	1	0	yes	0	0	2	0	yes

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Difference between upper bound (ub) - lower bound (lb) calculation, Comparison of reported and calculated sum parameters

LC	Sample		Difference between upper and lower bound calculation for reported sum parameters [%]					Difference between reported and calculated upper bound sum parameters [%]				Correct calculation		Difference between reported and calculated lower bound sum parameters [%]				Correct calculation
			WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum 6 Indicator PCBs		WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum 6 Indicator PCBs	(deviation ≤ 10 %)		WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum 6 Indicator PCBs	(deviation ≤ 10 %)
84	2402-BT		1	1	0	0		0	0	0	0	yes		0	0	0	0	yes
85	2402-BT		1	0	2	0		0	0	1	0	yes		1	0	2	0	yes
86	2402-BT		0	0	2	0		0	0	0	0	yes		0	0	0	0	yes
87	2402-BT		2.62	3.22	1.47	0		8	8	7	0	yes		8	8	8	0	yes
88	2402-BT		0	0	0	0		1	17	7	1	no		1	17	7	1	no
89	2402-BT		0	0	0	0		0	0	0	0	yes		0	0	0	0	yes
90	2402-BT		0	0	0			0	0	0		yes		0	0	0		yes
91	2402-BT		2	1	4	0		0	0	0	0	yes		0	0	0	0	yes
92	2402-BT					7					0	yes					0	yes
27A	2402-BT					0					0	yes					0	yes
44A	2402-BT					0					0	yes					0	yes
82A	2402-BT					0					0	yes					0	yes
16*	2402-BT		1.48	1	2			0	0	0		yes		0	0	0		yes
53*	2402-BT		0	0	0	0		0	0	0	0	yes		0	0	0	0	yes
88*	2402-BT		0	0	0	0		1	17	9	1	no		1	17	10	1	no

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
PCDD/F - Results

LC	Sample	Result ng/kg 12% moisture content	WHO-PCDD/F-TEQ reported upper bound	WHO-PCDD/F-TEQ reported lower bound	WHO-PCDD/F-TEQ calculated upper bound	WHO-PCDD/F-TEQ calculated lower bound	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	OCDF
1	2402-BT		0.549	0.543	0.549	0.543	0.0501	0.172	0.247	0.294	0.786	8.53	92.6	0.133	0.0616	0.108	0.0907	0.0647	0.0525	< 0.05	0.711	< 0.05	0.118
2	2402-BT		0.53	0.53	0.527	0.527	0.06	0.17	0.24	0.31	0.68	7.4	88	0.14	0.06	0.1	0.08	0.06	0.05	0.01	0.73	0.01	0.14
3	2402-BT		0.25	0.241	0.25	0.241	< 0.00969	0.0387	0.0387	0.0484	0.407	7.6	82.7	0.0291	0.0291	0.0775	0.0872	0.0291	0.0581	0.00969	0.62	0.00969	0.0291
4	2402-BT		0.527	0.521	0.527	0.522	0.0795	0.143	0.225	0.284	0.607	7.94	76.5	0.126	0.0818	0.128	0.0869	0.0851	0.0741	< 0.0502	0.708	< 0.0566	< 0.161
6	2402-BT																						
7	2402-BT																						
8	2402-BT		0.507		0.509	0.423	< 0.04	0.162	0.269	0.331	0.743	7.93	83.1	0.152	< 0.04	< 0.04	< 0.08	< 0.08	< 0.08	< 0.08	0.747	< 0.1	< 0.2
9	2402-BT		1.2	0.35	1.06	0.242	< 0.3	< 0.4	< 0.3	< 0.3	0.84	1.2	150	< 0.3	< 0.2	0.23	0.1	< 0.1	0.1	< 0.1	1.2	< 0.1	0.23
11	2402-BT		0.588	0.535	1.05	0.337	< 0.25	< 0.25	0.376	0.482	1.06	10.1	115	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	0.963	< 0.25	< 0.1
12	2402-BT		0.66	0.64	0.663	0.649	0.078	0.201	0.284	0.339	0.799	9	96.2	0.336	0.055	0.159	0.101	0.076	< 0.085	< 0.047	0.857	< 0.096	0.158
13	2402-BT		0.641	0.61	0.641	0.61	0.0592	0.201	0.266	0.315	0.849	10.4	101	0.154	< 0.097	0.131	0.1	0.0735	< 0.097	< 0.048	< 1.3	< 0.097	< 0.24
14	2402-BT																						
15	2402-BT		0.547	0.547	0.547	0.547	0.051	0.178	0.257	0.3	0.769	8.1	87	0.141	0.069	0.106	0.093	0.071	0.051	0.012	0.743	0.01	0.104
16	2402-BT		0.586	0.58	0.585	0.58	0.0577	0.165	0.289	0.375	0.737	9.66	99.2	0.176	0.0805	0.118	0.109	0.0854	0.0769	< 0.0477	0.846	< 0.0477	0.106
17	2402-BT		0.58	0.57	0.568	0.563	0.06	0.2	0.24	0.28	0.68	6.9	61	0.19	0.09	0.14	0.11	0.09	0.06	< 0.05	0.59	< 0.05	0.1
19	2402-BT																						
20	2402-BT		0.624	0.624	0.624	0.624	0.0593	0.163	0.284	0.363	0.867	9.58	106	0.194	0.157	0.157	0.154	0.116	0.0865	0.0455	1.05	0.0565	0.219
21	2402-BT		0.76	0.75	0.754	0.743	0.08	0.28	0.24	0.32	0.93	9.59	116	0.09	0.08	0.13	0.14	0.14	0.15	< 0.1	1.03	< 0.1	0.32
22	2402-BT		0.577	0.575	0.574	0.574	0.0603	0.177	0.268	0.311	0.805	9.07	104	0.137	0.0568	0.0988	0.084	0.0602	0.0625	0.0341	0.682	< 0.048	0.117
23	2402-BT		0.444	0.438	0.448	0.437	0.049	0.12	0.16	0.24	0.62	8.06	80.8	0.12	0.06	0.08	0.09	0.058	< 0.05	< 0.05	0.82	< 0.1	< 0.2
24	2402-BT		0.69	0.6	0.69	0.596	< 0.089	0.197	0.291	0.333	1.12	8.6	99.3	0.165	0.0841	0.182	0.105	0.0778	0.0773	< 0.0462	0.876	< 0.037	0.189
25	2402-BT		0.53	0.52	0.534	0.523	0.05	0.16	0.27	0.3	0.66	8.3	77	0.16	0.07	0.13	0.11	0.08	< 0.05	< 0.05	0.74	< 0.1	< 1
26	2402-BT		0.532	0.532	0.531	0.531	0.058	0.152	0.268	0.289	0.721	8.35	99.1	0.135	0.062	0.11	0.088	0.041	0.074	0.039	0.756	< 0.02	0.109
27	2402-BT																						
28	2402-BT		0.565	0.472	0.565	0.472	< 0.066	0.172	0.276	0.285	0.721	7.87	76.4	0.145	0.099	0.122	0.092	< 0.088	< 0.088	< 0.088	0.64	< 0.088	0.231
29	2402-BT		0.561	0.561	0.562	0.561	0.0511	0.181	0.289	0.35	0.641	8.59	101	0.16	0.0716	0.124	0.0822	0.0878	0.0464	< 0.00305	0.81	< 0.00448	0.135
30	2402-BT		0.39	0.39	0.388	0.388	0.035	0.01	0.27	0.25	0.58	7.3	67.1	0.11	0.055	0.1	0.75	0.055	0.069	0.018	0.77	0.017	0.099
31	2402-BT		0.6	0.49	0.597	0.49	< 0.05	0.17	0.3	0.34	0.74	8.46	102	0.15	< 0.25	0.11	0.1	< 0.1	< 0.1	< 0.25	0.84	< 0.25	< 7
32	2402-BT		0.577	0.577	0.577	0.577	0.0503	0.168	0.282	0.342	0.805	10.3	107	0.141	0.0689	0.108	0.0956	0.0756	0.04	0.00893	1.03	0.0183	0.144
33	2402-BT		0.705	0.696	0.706	0.697	0.0545	0.225	0.341	0.49	0.612	11.9	107	0.177	0.15	0.173	0.143	0.124	0.0951	< 0.0894	1.04	0.113	0.586
34	2402-BT		0.596	0.596	0.596	0.596	0.0544	0.195	0.307	0.381	0.765	9.16	92.2	0.163	0.0753	0.113	0.0916	0.0712	0.0399	0.0088	0.835	0.00979	0.135
35	2402-BT		0.302	0.293	0.302	0.293	0.201	0.056	0.301	< 0.01	< 0.01	0.553	2.31	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.025
36	2402-BT		0.612	0.612	0.625	0.625	0.0254	0.208	0.466	0.373	0.74	10.1	112	0.167	0.0935	0.126	0.113	0.0891	0.051	0.062	0.942	0.033	0.23
37	2402-BT		0.61	0.57	0.616	0.569	< 0.046	0.19	0.34	0.34	0.99	9.8	110	0.12	0.057	0.12	0.096	0.061	0.074	< 0.013	0.78	< 0.014	0.21
38	2402-BT																						
39	2402-BT		0.35	0.43	0.427	0.353	< 0.05	0.12	0.21	0.23	0.44	6.9	65	0.1	0.06	0.086	0.13	< 0.077	< 0.077	< 0.077	0.58	< 0.077	< 0.19
40	2402-BT		0.549	0.549	0.549	0.549	0.058	0.162	0.257	0.304	0.748	8.98	97.7	0.16	0.065	0.097	0.096	0.077	0.059	0.01	0.8	< 0.009	0.138
41	2402-BT																						
42	2402-BT		0.566	0.521	0.566	0.521	< 0.038	0.172	0.216	0.322	0.719	8.52	85	0.165	0.098	0.119	0.162	0.113	0.187	< 0.071	1	0.076	0.29
43	2402-BT		0.571	0.571	0.6	0.6	0.0608	0.208	0.243	0.332	0.797	8.87	87.1	0.137	0.0786	0.103	0.0996	0.078	0.0508	0.0159	0.769	0.0158	0.128
44	2402-BT		0.542	0.511	0.542	0.511	< 0.03	0.156	0.287	0.389	0.838	8.67	105	0.12	0.067	0.126	0.075	0.087	0.054	0.023	0.998	< 0.021	0.144
45	2402-BT																						
46	2402-BT		0.378	0.375	0.378	0.375	0.0477	0.136	0.178	0.213	0.417	3.64	20	0.125	0.0569	0.112	0.0573	0.062	0.0426	< 0.0278	0.383	< 0.0237	0.0561
48	2402-BT		0.721	0.718	0.72	0.719	0.071	0.265	0.361	0.405	0.83	9.53	93.8	0.168	0.089	0.138	0.126	0.098	0.078	< 0.013	0.893	< 0.007	0.214
49	2402-BT		0.49	0.427	0.492	0.427	< 0.05	0.165	0.189	0.225	0.573	7.04	71.9	0.132	0.628	0.085	0.0705	< 0.05	< 0.05	< 0.05	0.642	< 0.06	0.122
51	2402-BT		0.53	0.53	0.53	0.53	0.0529	0.149	0.247	0.318	0.759	8.51	99.8	0.136	0.0654	0.117	0.1	0.0641	0.0471	< 0.006	0.84	< 0.007	0.135
52	2402-BT		0.567	0.535	0.567	0.535	< 0.0316	0.157	0.311	0.368	0.807	10.5	104	0.145	0.0963	0.126	0.116	0.0822	0.0583	0.0271	0.952	0.0328	0.177
53	2402-BT		0.546	0.545	0.546	0.545	0.061	0.148	0.255	0.301	0.749	8.62	95.3	0.156	0.0728	0.127	0.125	0.086	0.065	< 0.01	0.728	0.022	0.12
54	2402-BT		23.7	23.6	23.7	23.6	< 0.1	5.41	8.92	13.4	19.3	26.6	6.6	< 0.2	7.39	30.4	8.07	11.5	11.1	10.8	14.6	12.3	15.8
55	2402-BT		0.53	0.53	0.528	0.528	0.052	0.163	0.28	0.34	0.78	7.68	73.2	0.13	0.058	0.11	0.082	0.061	0.05	0.011	0.583	0.012	0.14
56	2402-BT																						
57	2402-BT		0.598	0.55	0.596	0.547	< 0.038	0.173	0.239	0.285	0.884	7.73	82.3	0.268	0.068	0.197	0.156	0.117	0.073	< 0.089	0.905	< 0.132	< 0.173
58	2402-BT		0.63	0.62	0.62	0.615	0.05	0.22	0.34	0.33	0.82	8.8	84.3	0.17	0.08	0.11	0.09	0.07	0.06	< 0.05	0.79	< 0.05	0.12
59	2402-BT																						
62	2402-BT		0.535	0.534	0.534	0.534	0.0512	0.144	0.242	0.65	0.69	8.24	93.2	0.115	0.0787	0.0991	0.0864	0.0601	0.0446	< 0.0051	0.734	< 0.01	0.123
63	2402-BT		0.555	0.552	0.555	0.553	0.0491	0.166	0.264	0.289	0.764	9.69	115	0.131	0.0682	0.1	0.0922	0.07	0.0474	< 0.0248	0.824	< 0.0248	0.123
64	2402-BT		0.59	0.586	0.59	0.586	0.054	0.149	0.322	0.352	0.862	10.1	108	0.176	0.082	0.135	0.11	0.075	0.079	< 0.025	0.926	< 0.125	0.162
65	2402-BT		0.498	0.49	0.511	0.504	0.0538	0.158	0.251	0.29	0.696	7.14	85.4	0.128	0.062	0.0944	0.0903	0.0717	0.0525	< 0.05	0.689	< 0.2	< 2
66	2402-BT		0.674	0.674	0.674	0.674	0.0667	0.212	0.32	0.367	0.739	10.9	123	0.165	0.102	0.153	0.141	0.0925	0.069	0.0126	0.905	0.0271	0.204
68	2402-BT		0.609	0.609	0.262	0.262	0.0416	0.185	0.0192	0.0248	0.0547	0.0643	0.0237	0.0235	0.00457	0.0365	0.0535	0.0113	0.0434	0.00922	0.012	0.00142	0.000274
69	2402-BT		0.579	0.583	0.582	0.579	0.0532	0.171	0.297	0.363	0.759	9.63	110	0.146	0.0734	0.112	0.0946	0.077	0.071	< 0.0254	0.889	< 0.0248	0.144
70	2402-BT		0.555	0.553	0.555	0.553	0.0678	0.171	0.29	0.318	0.722	7.77	74.3	0.131	0.0749	0.111	0.107	0.0821	0.069	< 0.0119	0.711	< 0.0297	< 0.178
71	2402-BT		0.55	0.55	0.551	0.551	0.0477	0.162	0.263	0.352	0.782	9.29	92.8	0.155	0.0602	0.105	0.0897	0.0716	0.0512	0.0141	0.875	0.0154	0.126
72	2402-BT																						
73	2402-BT		0.699	0.695	0.7	0.695	0.068	0.291	0.311	0.349	0.718	7.73	91.5	0.184	0.087	0.126	0.078	0.107	0.078	< 0.044	0.825	0.019	0.204
74	2402-BT		0.547	0.547	0.547	0.547	0.06	0.164	0.256	0.298	0.742	8.69	94.9	0.153	0.063	0.097	0.094	0.075	0.056	0.01	0.78	< 0.009	0.143
75	2402-BT		0.081	0.072	0.0767	0.0724	< 0.004	0.027	0.015	0.032	0.033	0.34	0.97	0.13	0.017	0.049	0.017	0.016	< 0.003	0.015	0.059	0.0092	0.027
76	2402-BT		0.334	0.326	0.334	0.326	< 0.00733	0.157	0.127	0.202	0.308	2.52	14.9	0.144	0.0583	0.146	0.049	0.0456	0.0393	< 0.00251	0.225	< 0.00251	0.0222
77	2402-BT																						
78	2402-BT		0.585	0.581	0.585	0.581	0.062	0.159	0.288	0.4	0.806	9.65	109	0.159	0.0663	0.128	0.0657	0.0545	0.0515	< 0.03	0.815	< 0.05	< 0.1
80	2402-BT		0.481	0.477	0.481	0.478	0.0476	0.131	0.213	0.286	0.736	8.57	81.5	0.0985	0.0592	0.101	0.0669	0.0536	< 0.023	0.0518	0.611	< 0.093	< 0.693
81	2402-BT		0.484	0.443	0.485	0.443	0.045	0.114	0.292	0.256	0.602	8.38	114	0.115	0.057	0.104	< 0.1	< 0.1	< 0.1	< 0.1	0.706	< 0.1	< 0.2
82	2402-BT																						
83	2402-BT		0.54	0.53	0.535	0.529	0.07	0.17	0.22	0.27	0.7	6.2	56	0.16	0.06	0.16	0.09	0.06	0.05	< 0.05	0.57	< 0.05	< 0.1

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
PCDD/F - Results

LC	Sample	Result ng/kg 12% moisture content	WHO-PCDD/F-TEQ reported upper bound	WHO-PCDD/F-TEQ reported lower bound	WHO-PCDD/F-TEQ calculated upper bound	WHO-PCDD/F-TEQ calculated lower bound	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	OCDF
84	2402-BT		0.492	0.487	0.492	0.487	0.0286	0.154	0.258	0.326	0.766	8.45	102	0.114	0.0492	0.0536	0.0755	0.0586	0.0422	< 0.0455	0.745	< 0.0219	0.0987
85	2402-BT		0.525	0.525	0.524	0.524	0.05	0.15	0.25	0.315	0.72	9.1	110	0.12	0.075	0.105	0.057	0.058	0.046	0.019	0.74	< 0.024	0.103
86	2402-BT		0.56	0.56	0.559	0.559	0.05	0.19	0.22	0.28	0.62	7.42	82.6	0.32	0.077	0.14	0.096	0.071	0.056	0.019	0.72	< 0.0072	0.14
87	2402-BT		0.528	0.511	0.487	0.471	0.0495	0.149	0.228	0.281	0.632	6.74	74.5	0.131	0.0675	0.0992	0.0944	0.0721	< 0.05	< 0.1	0.685	< 0.1	< 0.3
88	2402-BT		0.3	0.3	0.363	0.363	0.038	0.09	0.18	0.24	0.54	6.3	62	0.11	0.049	0.078	0.064	0.048	0.0395	0.0086	0.58	0.0081	0.116
89	2402-BT		1.36	1.36	1.36	1.36	0.0334	0.277	0.136	0.572	0.566	38.6	1120	0.0739	0.0572	0.221	0.209	0.149	0.0352	0.121	6.61	0.169	3.06
90	2402-BT		0.549	0.547	0.549	0.547	0.066	0.178	0.247	0.3	0.746	7.35	76.9	0.132	0.065	0.116	0.09	0.07	0.051	< 0.013	0.627	< 0.008	0.112
91	2402-BT		0.503	0.499	0.502	0.499	0.0455	0.156	0.225	0.262	0.588	7.26	73.7	0.161	0.0813	0.156	0.114	0.0619	0.0548	< 0.032	0.672	< 0.039	0.122
92	2402-BT																						

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Dioxin-like PCB - Results

LC	Sample	Result ng/kg 12% moisture content	WHO-PCB-TEQ reported upper bound	WHO-PCB-TEQ reported lower bound	WHO-PCB-TEQ calculated upper bound	WHO-PCB-TEQ calculated lower bound	PCB 105	PCB 114	PCB 118	PCB 123	PCB 156	PCB 157	PCB 167	PCB 189	PCB 77	PCB 81	PCB 126	PCB 169
1	2402-BT		0.28	0.28	0.282	0.279	555	32.3	1000	25.5	102	20.7	32.9	4.36	96	5.14	2.15	< 0.1
2	2402-BT		0.28	0.28	0.277	0.277	531	39	1030	21	92	19	35	4.7	109	5.4	2.1	0.03
3	2402-BT		0.216	0.216	0.217	0.217	706	71.4	1270	147	128	21.8	40.3	5.36	65.3	3.78	1.36	0.0387
4	2402-BT		0.28	0.276	0.279	0.276	530	51.3	1020	21.1	89.1	19.3	31.8	4.44	98.8	5.99	2.11	< 0.126
6	2402-BT																	
7	2402-BT																	
8	2402-BT		0.279		0.281	0.257	514	44.4	909	19.6	83.2	18.3	25.5	4.18	94.1	5.4	1.97	< 0.8
9	2402-BT		0.28	0.27	0.282	0.273	520	42	950	16	81	17	29	4	120	5.6	2.1	< 0.3
11	2402-BT		0.274	0.216	0.246	0.216	413	34.7	821	23.2	77.8	17.2	20.6	< 5	95	4.45	1.63	< 1
12	2402-BT		0.27	0.26	0.268	0.264	557	39	1060	< 21	82.7	18	< 50	4.25	69.4	3.32	2.03	< 0.062
13	2402-BT		0.322	0.311	0.322	0.312	569	< 48	1120	< 48	94.4	19.1	33.9	< 9.7	117	< 9.7	2.45	< 0.15
14	2402-BT																	
15	2402-BT		0.281	0.281	0.281	0.281	572	44.4	1060	28.6	95.6	19.5	27.2	4.6	114	5.44	2.11	0.035
16	2402-BT		0.209	0.287	0.294	0.287	527	34.1	1010	20.1	77.4	16.7	29.4	3.42	104	5.4	2.23	< 0.239
17	2402-BT		0.28	0.28	0.282	0.281	450	40	780	17	81	19	29	4	68	4.9	2.3	< 0.05
19	2402-BT																	
20	2402-BT		0.284	0.284	0.284	0.284	588	47.4	1060	29.4	94.9	19.1	30.6	4.35	5.48	5.49	2.24	0.0411
21	2402-BT		0.29	0.26	0.29	0.256	463	38.1	854	21	< 100	16.8	27.1	< 10	95.4	13.7	2	< 1
22	2402-BT		0.296	0.294	0.296	0.293	571	42.1	1020	24.7	91.2	19.4	33.5	4.4	104	5.43	2.27	< 0.0961
23	2402-BT		0.352	0.294	0.353	0.293	603	65	1020	31	97	23	29	< 10	88	4.4	2.27	< 2
24	2402-BT		0.3	0.3	0.299	0.296	539	43.7	995	21.9	93.3	20.8	33.5	4.67	107	5.71	2.31	< 0.0846
25	2402-BT		0.25	0.25	0.253	0.247	476	48.6	860	17.8	81.3	15.9	27.6	3.9	93.6	4.6	1.9	< 0.2
26	2402-BT		0.264	0.263	0.264	0.263	524	34.1	958	20.6	97.8	17.8	36	5	104	5.2	2	< 0.05
27	2402-BT																	
28	2402-BT		0.288	0.285	0.289	0.285	508	37.6	905	22	87.5	18.2	29.4	4.68	116	5.68	2.23	< 0.132
29	2402-BT		0.288	0.287	0.287	0.287	630	35.6	1140	27.8	101	22.3	35.1	5.66	97.8	5.01	2.16	< 0.00769
30	2402-BT		0.26	0.26	0.279	0.279	503	36.5	868	20.5	86.8	18.4	30.6	4	90.5	4.6	2.2	0.037
31	2402-BT		0.26	0.24	0.258	0.237	454	< 40	838	< 40	76	< 40	< 40	< 40	90.4	4.22	1.86	< 0.5
32	2402-BT		0.279	0.278	0.279	0.278	532	37.4	1000	24.4	89.8	18.4	29.2	4.86	102	5.27	2.14	< 0.0545
33	2402-BT		0.307	0.307	0.307	0.307	577	41.6	1060	20.5	93	20.1	32.4	4.65	119	6.08	2.35	0.0812
34	2402-BT		0.26	0.26	0.26	0.26	438	35.9	781	24.2	80.8	18.5	28.9	4.2	95	4.48	2.05	0.0496
35	2402-BT																	
36	2402-BT		2.36	2.36	2.36	2.36	477	35.8	886	20.8	88.6	24.4	29.8	3.76	106	7.43	1.56	71.6
37	2402-BT		0.24	0.24	0.236	0.236	500	26	730	16	92	19	30	3.8	99	4.7	1.8	0.061
38	2402-BT																	
39	2402-BT		0.24	0.29	0.285	0.243	540	36	1000	23	91	19	32	4	110	< 20	1.8	< 1.2
40	2402-BT		0.273	0.271	0.273	0.271	497	36	899	25	92	21	31	5.6	98	5.19	2.11	< 0.09
41	2402-BT																	
42	2402-BT		0.187	0.177	0.187	0.177	486	29.3	892	36.8	83.4	15.5	33.9	4.02	84.7	12.5	1.17	< 0.342
43	2402-BT		0.276	0.276	0.276	0.276	496	39	990	19.7	85.9	17.6	31.6	4.07	96.7	5.21	2.13	0.0421
44	2402-BT		0.278	0.278	0.278	0.278	507	35.8	933	22.7	84.8	17.7	30	4.18	96	4.81	2.15	0.088
45	2402-BT		0.375	0.343	0.375	0.343	496	36.6	844	30.9	77.7	34.3	113	< 3.5	88.7	1.62	2.85	< 1.05
46	2402-BT		0.281	0.276	0.281	0.276	532	41	978	25.1	82.9	17.6	25.5	4.63	116	5.63	2.12	< 0.145
48	2402-BT		0.333	0.333	0.333	0.333	576	41.1	1020	107	92.6	20.7	37.6	28.9	121	16.3	2.32	0.88
49	2402-BT		0.261	0.255	0.261	0.255	493	36.3	850	31	83.5	18	56.6	7.36	99.9	5.02	1.96	< 0.2
51	2402-BT		0.254	0.253	0.254	0.253	538	39.8	973	22.9	99.1	18.1	30.7	4.36	101	5.05	1.9	< 0.032
52	2402-BT		0.289	0.289	0.29	0.289	538	43	1020	25.6	94.4	19.6	31.8	4.43	103	5.34	2.24	< 0.0221
53	2402-BT		0.267	0.267			516	38.2										
54	2402-BT		1.4	1.4	1.4	1.4	3350	599	8870	203	759	171	1430	61.9	38.5	10.8	3.79	18.5
55	2402-BT		0.28	0.28	0.283	0.283	528	38	957	20.9	92.1	17	31.5	4.45	94.2	5.24	2.2	0.032
56	2402-BT																	
57	2402-BT		0.217	0.213	0.217	0.214	611	36.4	1070	32.4	100	20.2	143	4.17	128	27.4	1.32	< 0.129
58	2402-BT		0.28	0.28	0.283	0.281	523	39.3	937	24.3	90.6	19.8	34.2	< 10	109	6.06	2.18	< 0.05
59	2402-BT																	
62	2402-BT		0.26	0.259	0.26	0.259	524	34.5	959	13.7	81.3	16.4	27	6.54	97.5	4.62	1.98	< 0.0354
63	2402-BT		0.222	0.212	0.222	0.212	567	42.2	1050	29.5	91	19	33.6	< 6.2	106	5.33	1.45	< 0.31
64	2402-BT		0.299	0.295	0.299	0.295	528	42.6	986	24.8	88.1	18.4	32.1	4.32	99.2	5.3	2.32	< 0.13
65	2402-BT		191	191	196	196	492	34.1	860	21.9	83.2	17.3	28.1	< 10	91.3	< 10	1960	< 1
66	2402-BT		0.254	0.254	0.253	0.253	435	32.4	830	19.9	106	19.6	38	12.6	93.2	5	1.96	0.0546
68	2402-BT		0.0995	0.079	0.00152	0.00152	0.0255	0.00168	0.0391	0.0000199	0.000596	0.000601	0.00086	0.000158	0.0105	0.000042	0.014	0.00399
69	2402-BT		0.273	0.277	0.278	0.273	619	49	1150	21.2	100	20.8	28.8	4.44	126	9.1	1.98	< 0.159
70	2402-BT		0.278	0.274	0.278	0.274	524	40.1	1030	25.4	83.2	20.9	33.1	4.53	118	4.84	2.08	< 0.119
71	2402-BT		0.245	0.245	0.245	0.245	488	40.3	914	16.1	76.3	16	29	4.33	110	5.21	1.84	0.045
72	2402-BT																	
73	2402-BT		0.299	0.299	0.299	0.299	666	54.9	1010	65.8	99.6	24.1	154	5.68	111	4.95	2.22	0.06
74	2402-BT		0.275	0.272	0.275	0.272	524	36	933	26	89	20	32	5.7	104	5.28	2.1	< 0.09
75	2402-BT		0.16	0.14	0.138	0.136	395	36.4	722	16.1	61.8	13	18.4	2.92	47	2.26	0.93	< 0.058
76	2402-BT		0.285	0.284	0.284	0.284	478	34.9	783	22.1	77.5	16.6	28.7	4.01	111	5.64	2.28	< 0.00859
77	2402-BT																	
78	2402-BT		0.387	0.387	0.387	0.387	697	64	1200	29.1	111	23.4	33.2	4.45	125	5.54	3.04	0.12
80	2402-BT		0.186	0.145	0.186	0.144	359	31.2	< 1100	< 17.2	76.8	16.3	24.7	4.67	< 64	3.27	1.28	< 0.05
81	2402-BT		0.269	0.232	0.269	0.232	508	32.4	1170	21.4	< 100	10.2	22.4	< 10	83.5	< 10	1.71	< 1
82	2402-BT																	
83	2402-BT		0.23	0.22	0.227	0.224	560	49	985	30	73	16	26	4	105	4.7	1.6	< 0.1

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Dioxin-like PCB - Results

LC	Sample	Result ng/kg 12% moisture content	WHO-PCB-TEQ reported upper bound	WHO-PCB-TEQ reported lower bound	WHO-PCB-TEQ calculated upper bound	WHO-PCB-TEQ calculated lower bound	PCB 105	PCB 114	PCB 118	PCB 123	PCB 156	PCB 157	PCB 167	PCB 189	PCB 77	PCB 81	PCB 126	PCB 169
84	2402-BT		0.226	0.226	0.227	0.227	501	36.5	820	19.3	85.7	17.1	30.1	4.44	104	5.44	1.68	0.0462
85	2402-BT		0.245	0.24	0.247	0.245	505	30	945	22.5	80	18	26.5	< 11.5	94.5	4.75	1.85	< 0.063
86	2402-BT		0.243	0.239	0.243	0.239	416	44.7	777	13.8	81.6	16.2	21.5	3.94	88.7	4.09	1.88	< 0.137
87	2402-BT		0.273	0.269	0.255	0.25	496	35.8	917	19.7	89	18.3	< 50	4.23	95.4	4.6	1.92	< 0.1
88	2402-BT		0.23	0.23	0.215	0.215	410	30	800	20	74	170	28	< 9.1	70	4.2	1.6	0.025
89	2402-BT		0.171	0.171	0.171	0.171	308	23.2	578	14.4	57.5	11.2	19.9	2.35	53.5	2.9	1.27	0.252
90	2402-BT		0.25	0.25	0.251	0.251	487	41.9	903	19.2	82.4	16.5	27.9	3.9	89.5	4.56	1.92	0.029
91	2402-BT		0.258	0.247	0.258	0.247	422	29.7	833	49.7	145	23.5	85.4	18.7	83.4	4.33	1.89	< 0.369
92	2402-BT																	
16*	2402-BT		0.294	0.287	0.294	0.287	527	34.1	1010	20.1	77.4	16.7	29.4	3.42	104	5.4	2.23	< 0.239
53*	2402-BT		0.267	0.267	0.267	0.267	516	38.2	925	25.4	131	22.2	50.5	17.4	102	5.29	2.02	0.0557
88*	2402-BT		0.23	0.23	0.215	0.215	410	30	800	20	74	170	28	< 9.1	70	4.2	1.6	0.025

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Non dioxin-like PCB - Results

LC	Sample	Result µg/kg 12% moisture content	Sum 6 Indicator PCBs reported upper bound	Sum 6 Indicator PCBs reported lower bound	Sum 6 Indicator PCBs calculated upper bound	Sum 6 Indicator PCBs calculated lower bound	PCB 28	PCB 52	PCB 101	PCB 138	PCB 153	PCB 180
1	2402-BT		6.83	6.83	6.83	6.83	1.47	2.57	1.29	0.568	0.519	0.412
2	2402-BT											
3	2402-BT		13.7	13.7	13.7	13.7	5.3	4.23	1.88	1.07	0.578	0.65
4	2402-BT		7.67	7.67	7.67	7.67	2.73	2.24	1.09	0.683	0.581	0.35
6	2402-BT				60	0	< 10	< 10	< 10	< 10	< 10	< 10
7	2402-BT		6.74	5.74	6.74	5.74	1.17	2.12	1.63	0.817	< 0.5	< 0.5
8	2402-BT		8.1		8.39	7.39	2.85	2.58	1.46	0.5	< 0.5	< 0.5
9	2402-BT											
11	2402-BT		5.66	5.66	5.67	5.67	0.934	2.14	1.14	0.568	0.53	0.356
12	2402-BT		8.8	8.8	8.84	8.84	1.6	3.11	2.17	0.76	0.71	0.49
13	2402-BT		7.14	7.14	7.13	7.13	1.6	2.56	1.4	0.621	0.51	0.437
14	2402-BT		6.74	6.74	6.73	6.73	1.32	2.38	1.22	0.74	0.67	0.4
15	2402-BT											
16	2402-BT											
17	2402-BT		7	7	6.92	6.92	1.7	2.4	1.3	0.6	0.52	0.4
19	2402-BT											
20	2402-BT		7.17	7.17	7.16	7.16	1.92	2.43	1.3	0.57	0.543	0.396
21	2402-BT		6.14	5.64	6.14	5.64	1.18	2.13	1.08	0.68	0.57	< 0.5
22	2402-BT		7.06	7.06	7.21	7.21	1.53	2.64	1.48	0.595	0.559	0.401
23	2402-BT		6.42	6.42	6.59	6.59	1.31	2.58	1.09	0.67	0.55	0.39
24	2402-BT		6.9	6.9	6.91	6.91	1.41	2.46	1.53	0.606	0.504	0.4
25	2402-BT		8.5	8.5	8.53	8.53	2.8	2.6	1.6	0.65	0.49	0.39
26	2402-BT		7.13	7.13	7.13	7.13	1.25	2.67	1.51	0.69	0.6	0.41
27	2402-BT		8.91	8.91	8.92	8.92	1.68	3.3	1.72	0.813	0.778	0.626
28	2402-BT		6.11	6.11	6.12	6.12	1.19	2.36	1.12	0.545	0.5	0.4
29	2402-BT		5.19	5.19	5.19	5.19	0.557	1.76	1.31	0.668	0.513	0.381
30	2402-BT		5.5	5.5	5.79	5.79	1	2.2	1.1	0.62	0.51	0.36
31	2402-BT											
32	2402-BT		6.77	6.77	6.76	6.76	1.34	2.63	1.3	0.566	0.523	0.402
33	2402-BT		7.61	7.61	7.61	7.61	2.1	2.56	1.29	0.512	0.72	0.426
34	2402-BT		5.84	5.84	5.84	5.84	1.2	2.04	1.1	0.511	0.632	0.354
35	2402-BT		8.2	8.2	8.2	8.2	2.9	2.3	1.2	0.75	0.73	0.32
36	2402-BT											
37	2402-BT		6.1	6.1	6.16	6.16	1.3	2.2	1.2	0.64	0.46	0.36
38	2402-BT											
39	2402-BT		6.6	6.6	6.57	6.57	1.3	2.6	1.2	0.54	0.49	0.44
40	2402-BT		6.69	6.69	6.69	6.69	1.45	2.46	1.3	0.55	0.5	0.43
41	2402-BT		7.3	7.3	7.29	7.29	1.45	2.68	1.4	0.64	0.62	0.5
42	2402-BT		6.18	6.18	6.18	6.18	1.41	2.26	1.24	0.414	0.481	0.376
43	2402-BT		6.14	6.14	6.14	6.14	1.33	2.36	1.11	0.508	0.458	0.371
44	2402-BT		6.97	6.97	6.97	6.97	1.61	2.45	1.31	0.63	0.561	0.408
45	2402-BT		8	8	8	8	1.43	3	1.71	0.727	0.629	0.499
46	2402-BT		4.13	4.13	4.13	4.13	0.872	1.58	0.743	0.353	0.314	0.268
48	2402-BT											
49	2402-BT		6.42	6.42	6.42	6.42	1.29	2.45	1.2	0.563	0.537	0.375
51	2402-BT		5.95	5.95	5.95	5.95	1.37	2.19	1.05	0.523	0.457	0.36
52	2402-BT		6.46	6.46	6.45	6.45	1.39	2.23	1.28	0.584	0.534	0.436
53	2402-BT		7.15	7.15	7.15	7.15	1.48	2.5	1.37	0.59	0.79	0.42
54	2402-BT		56.6	56.6	56.6	56.6	11.1	19.7	11.2	8.2	2.74	3.63
55	2402-BT		6.42	6.42	6.42	6.42	1.44	2.36	1.22	0.54	0.46	0.4
56	2402-BT		5.99	5.99	5.99	5.99	0.94	2.09	1.03	0.82	0.8	0.31
57	2402-BT											
58	2402-BT		6.42	6.42	300	0	< 50	< 50	< 50	< 50	< 50	< 50
59	2402-BT		5.94	5.94	5.94	5.94	1.21	2.16	1.16	0.61	0.47	0.33
62	2402-BT		6.46	6.46	6.46	6.46	1.41	2.29	1.21	0.581	0.53	0.438
63	2402-BT		7.21	7.21	7.21	7.21	1.34	2.9	1.36	0.642	0.553	0.414
64	2402-BT		6.62	6.62	6.63	6.63	1.26	2.37	1.29	0.673	0.539	0.493
65	2402-BT		6.35	6.35	600	0	< 100	< 100	< 100	< 100	< 100	< 100
66	2402-BT		6.91	6.91	6.91	6.91	1.19	2.53	1.09	0.735	0.709	0.656
68	2402-BT		22.2	21.7	22.2	21.7	9.1	8.36	2.5	0.932	0.841	< 0.5
69	2402-BT		7.69	7.69	7.7	7.7	1.32	2.66	1.82	0.798	0.613	0.484
70	2402-BT		6.91	6.91	6.91	6.91	1.42	2.67	1.26	0.63	0.516	0.412
71	2402-BT		4.89	4.89	4.89	4.89	1.26	1.71	0.849	0.404	0.35	0.314
72	2402-BT		600		600	0	< 100	< 100	< 100	< 100	< 100	< 100
73	2402-BT		6.57	6.57	6.57	6.57	1.28	1.11	2.63	0.73	0.35	0.47
74	2402-BT		6.71	6.71	6.71	6.71	1.48	2.5	1.25	0.55	0.52	0.41
75	2402-BT		5.97	5.97	5.97	5.97	1.42	1.91	1.14	0.71	0.52	0.27
76	2402-BT		6.52	6.52	6.52	6.52	1.14	2.55	1.26	0.589	0.556	0.423
77	2402-BT		5.85	5.85	5.86	5.86	1.02	1.92	1.44	0.687	0.431	0.357
78	2402-BT		7.82	7.82	7.82	7.82	1.68	2.74	1.53	0.792	0.572	0.507
80	2402-BT		4.65	3.76	4.65	3.76	1.04	1.63	< 0.885	0.414	0.322	0.358
81	2402-BT		6.66	5.66	6.66	5.66	2.32	1.36	1.39	0.59	< 0.5	< 0.5
82	2402-BT		6.25	6.25	6.24	6.24	1.31	2.32	1.23	0.528	0.478	0.378
83	2402-BT		8.8	8.8	8.81	8.81	3.5	2.6	1.3	0.54	0.46	0.41

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Non dioxin-like PCB - Results

LC	Sample	Result µg/kg 12% moisture content	Sum 6 Indicator PCBs reported upper bound	Sum 6 Indicator PCBs reported lower bound	Sum 6 Indicator PCBs calculated upper bound	Sum 6 Indicator PCBs calculated lower bound	PCB 28	PCB 52	PCB 101	PCB 138	PCB 153	PCB 180
84	2402-BT		6.36	6.36	6.35	6.35	1.18	2.43	1.29	0.584	0.484	0.386
85	2402-BT		6.4	6.4	6.4	6.4	1.35	2.4	1.25	0.565	0.445	0.385
86	2402-BT		7.11	7.11	7.1	7.1	2.19	2.15	1.28	0.6	0.49	0.39
87	2402-BT		6.36	6.36	6.36	6.36	1.29	2.35	1.28	0.554	0.493	0.394
88	2402-BT		5.3	5.3	5.26	5.26	1.1	2	0.98	0.45	0.41	0.32
89	2402-BT		6.47	6.47	6.47	6.47	1.36	2.3	1.19	0.586	0.566	0.467
90	2402-BT											
91	2402-BT		8.41	8.41	8.42	8.42	1.26	2.23	1.53	1.29	1.18	0.925
92	2402-BT		7.34	6.84	7.34	6.84	1.65	2.52	1.45	0.71	0.51	< 0.5
27A	2402-BT		7.33	7.33	7.34	7.34	1.48	2.69	1.46	0.591	0.657	0.46
44A	2402-BT		7.12	7.12	7.12	7.12	1.46	2.64	1.36	0.645	0.561	0.453
82A	2402-BT		6.37	6.37	6.37	6.37	1.32	2.36	1.28	0.535	0.475	0.398

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Bioanalytical screening methods - Results, Assessment of analytical results

LC	Sample	Result ng BEQ/kg 12% moisture content	PCDD/Fs + DL-PCBs	PCDD/Fs	DL-PCBs	Assessment of analytical results: Sample suspected to be noncompliant with … Maximum Level PCDD/Fs+DL-PCBs	Maximum Level PCDD/Fs	Action Level PCDD/Fs	Action Level DL-PCBs	Reporting Limit PCDD/Fs+ DL-PCBs	Reporting Limit PCDD/Fs	Reporting Limit DL-PCBs	Maximum Level on which evaluation is based on PCDD/Fs+ DL-PCBs	Maximum Level on which evaluation is based on PCDD/Fs	Maximum Level on which evaluation is based on DL-PCBs	Action Level on which evaluation is based on PCDD/Fs+ DL-PCBs	Action Level on which evaluation is based on PCDD/Fs	Action Level on which evaluation is based on DL-PCBs	Bioassay Cut-off Maximum Level PCDD/Fs+ DL-PCBs	Bioassay Cut-off Maximum Level PCDD/Fs	Bioassay Cut-off Action Level PCDD/Fs	Bioassay Cut-off Action Level DL-PCBs
19	2402-BT		0.82			no	yes	yes	yes	0.1			1.5	0.75			0.5	0.5	1	0.5	0.33	0.33
20	2402-BT		2.1			yes				0.3			1	0.75			0.5	0.35				
31	2402-BT		0.63			yes													0.5			
38	2402-BT		0.59	0.59	0	no	no	no	no	1.5	0.75	0.75		0.05			0.14					
53	2402-BT		0.92			yes				0.5												
56	2402-BT		0.55			no				0.17			1.25			0.85			0.83			
64	2402-BT		1.1	0.76	0.33	yes	yes	yes	yes	0.81	0.64		1	0.75			0.5	0.35	0.81	0.64	0.38	0.26

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Moisture content - Results

LC	Sample	Result %	Moisture content	Moisture content	Moisture content
			Physico-chemical methods	Bioanalytical methods	Mean
1	2402-BT		8.9		8.9
2	2402-BT		9.6		9.6
3	2402-BT		9.2		9.2
4	2402-BT		9.2		9.2
6	2402-BT				
7	2402-BT		9.5		9.5
8	2402-BT				
9	2402-BT		9.5		9.5
11	2402-BT			8.7	8.7
12	2402-BT		8.9		8.9
13	2402-BT		9.0		9.0
14	2402-BT		9.6		9.6
15	2402-BT		9.5		9.5
16	2402-BT				
17	2402-BT		7.5		7.5
19	2402-BT			9.5	9.5
20	2402-BT		9.4		9.4
21	2402-BT		9.4		9.4
22	2402-BT		8.4		8.4
23	2402-BT		10.0		10.0
24	2402-BT		9.5		9.5
25	2402-BT		9.2		9.2
26	2402-BT		9.2		9.2
27	2402-BT		8.6		8.6
28	2402-BT		8.5		8.5
29	2402-BT		8.0		8.0
30	2402-BT		5.9		5.9
31	2402-BT		9.7	9.7	9.7
32	2402-BT		7.4		7.4
33	2402-BT		9.7		9.7
34	2402-BT		9.0		9.0
35	2402-BT		9.7		9.7
36	2402-BT		12.0		12.0
37	2402-BT		9.2		9.2
38	2402-BT			12.0	12.0
39	2402-BT		6.7		6.7
40	2402-BT		9.2		9.2
41	2402-BT		9.9		9.9
42	2402-BT				
43	2402-BT		94.0		94.0
44	2402-BT		6.2		6.2
45	2402-BT		9.2		9.2
46	2402-BT		9.4		9.4
48	2402-BT		9.9		9.9
49	2402-BT		8.0		8.0
51	2402-BT		9.2		9.2
52	2402-BT		8.6		8.6
53	2402-BT		9.1	9.1	9.1
54	2402-BT		12.0		12.0
55	2402-BT		8.7		8.7
56	2402-BT		9.0	9.0	9.0
57	2402-BT		9.6		9.6
58	2402-BT				
59	2402-BT		9.2		9.2
62	2402-BT		4.3		4.3
63	2402-BT		91.3		91.3
64	2402-BT		9.2	9.2	9.2
65	2402-BT		9.4		9.4
66	2402-BT		4.9		4.9
68	2402-BT		12.0		12.0
69	2402-BT		90.3		90.3
70	2402-BT		9.4		9.4
71	2402-BT		0.0		0.0
72	2402-BT				
73	2402-BT		9.3		9.3
74	2402-BT		9.2		9.2
75	2402-BT		9.5		9.5
76	2402-BT		8.8		8.8
77	2402-BT		8.9		8.9
78	2402-BT		7.9		7.9
80	2402-BT		9.0		9.0
81	2402-BT		7.4		7.4
82	2402-BT		9.5		9.5
83	2402-BT		9.3		9.3

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Moisture content - Results

LC	Sample	Result %	Moisture content Physico-chemical methods	Moisture content Bioanalytical methods	Moisture content Mean
84	2402-BT		10.3		10.3
85	2402-BT		9.3		9.3
86	2402-BT		9.6		9.6
87	2402-BT		9.3		9.3
88	2402-BT		8.8		8.8
89	2402-BT		8.3		8.3
90	2402-BT		8.9		8.9
91	2402-BT		9.6		9.6
92	2402-BT		8.9		8.9
27A	2402-BT		8.6		8.6
44A	2402-BT		6.2		6.2
82A	2402-BT		9.5		9.5
16*	2402-BT		9.2		9.2

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food
25 August 2025

Annex 3: Participants' z-scores and bioassay-scores of PCDD/Fs and PCBs - Tables

Test sample - Bentonite (2402-BT)

Z-scores of sum parameters and individual results

Calculation of z-score on basis of assigned value

$$z = (x - x_a) / \sigma_p$$

x_a: assigned value
x: participant's result
σ_p: fitness-for-purpose-based standard deviation for proficiency assessment
10%: WHO-PCDD/F-TEQ, WHO-PCB-TEQ and WHO-PCDD/F-PCB-TEQ
15%: Sum of six indicator PCBs (PCB 28, 52, 101, 138, 153, 180)
20%: Evaluated individual PCDD/F and PCB congeners

Bioassay-scores of BEQ results

Calculation of bioassay-score on basis of assigned value from physical-chemical methods

$$\text{bioassay-score} = (x - x_a) / \sigma_{bioassay}$$

x_a: assigned value (pyhsical-chemical methods)
x: participant's result (BEQ from bioanalytical screening method)
$\sigma_{bioassay}$: bioassay target deviation
20%: PCDD/F-PCB-BEQ, PCDD/F-BEQ and PCB-BEQ

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

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Sum parameters - Z-scores

LC	Sample	Z-score [σ_p = 10 %]	WHO-PCDD/F-PCB-TEQ reported		WHO-PCDD/F-PCB-TEQ calculated		WHO-PCDD/F-TEQ reported		WHO-PCDD/F-TEQ calculated		WHO-PCB-TEQ reported		WHO-PCB-TEQ calculated		Z-score [σ_p = 15 %]	Sum Indicator PCBs reported		Sum Indicator PCBs calculated	
			upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound		upper bound	lower bound	upper bound	lower bound
1	2402-BT		0.1	0.3	0.1	0.4	-0.1	0.1	-0.1	0.1	0.5	0.6	0.4	0.6		0.1	0.2	0.1	0.2
2	2402-BT		-0.1	0.2	-0.2	0.1	-0.5	-0.2	-0.5	-0.2	0.5	0.6	0.3	0.5					
3	2402-BT		-4.3	-4.2	-4.3	-4.2	-5.5	-5.5	-5.5	-5.5	-1.9	-1.8	-2.0	-1.8		7.0	7.2	6.9	7.1
4	2402-BT		-0.2	0.0	-0.2	0.1	-0.5	-0.4	-0.5	-0.3	0.5	0.5	0.3	0.5		1.0	1.1	1.0	1.0
6	2402-BT																	52.9	-6.7
7	2402-BT															0.0	-0.9	0.0	-0.9
8	2402-BT		-0.4		-0.4	-1.4	-0.9		-0.8	-2.1	0.4		0.4	-0.3		1.4		1.7	0.8
9	2402-BT		8.0	-2.2	6.3	-3.5	11.6	-3.5	9.1	-5.5	0.5	0.2	0.4	0.3					
11	2402-BT		0.5	-0.6	5.8	-3.0	0.6	-0.1	9.0	-3.7	0.3	-1.8	-0.9	-1.8		-1.0	-1.0	-1.0	-1.0
12	2402-BT		1.3	1.4	1.3	1.5	1.9	1.9	2.0	2.1	0.1	-0.2	-0.1	0.0		2.1	2.2	2.1	2.2
13	2402-BT		1.7	1.5	1.7	1.6	1.5	1.3	1.6	1.4	2.1	1.8	1.9	1.8		0.4	0.5	0.4	0.5
14	2402-BT															0.0	0.1	0.0	0.1
15	2402-BT		0.1	0.4	0.1	0.4	-0.2	0.1	-0.1	0.2	0.5	0.6	0.4	0.6					
16	2402-BT		0.7	0.9	0.7	0.9	0.5	0.7	0.6	0.8	-2.2	0.9	0.9	0.9					
17	2402-BT		0.5	0.7	0.3	0.6	0.4	0.6	0.3	0.5	0.5	0.6	0.4	0.6		0.3	0.4	0.2	0.3
19	2402-BT																		
20	2402-BT		1.0	1.4	1.0	1.5	1.2	1.6	1.3	1.6	0.6	0.8	0.5	0.8		0.5	0.6	0.4	0.5
21	2402-BT		2.8	2.5	2.6	2.6	3.7	3.9	3.6	3.9	0.9	-0.2	0.7	-0.3		-0.5	-1.0	-0.6	-1.0
22	2402-BT		0.6	0.9	0.6	0.9	0.4	0.6	0.4	0.7	1.1	1.1	1.0	1.1		0.4	0.5	0.5	0.6
23	2402-BT		-0.3	-0.8	-0.3	-0.8	-2.0	-1.9	-1.9	-1.8	3.2	1.1	3.1	1.1		-0.3	-0.2	-0.1	-0.1
24	2402-BT		2.1	1.2	2.0	1.2	2.4	1.1	2.5	1.1	1.2	1.4	1.1	1.2		0.2	0.3	0.2	0.3
25	2402-BT		-0.4	-0.4	-0.4	-0.3	-0.5	-0.4	-0.4	-0.2	-0.6	-0.5	-0.6	-0.6		1.8	1.9	1.8	1.9
26	2402-BT		-0.3	0.0	-0.3	0.0	-0.4	-0.1	-0.4	-0.1	-0.1	0.0	-0.2	0.0		0.4	0.5	0.4	0.5
27	2402-BT															2.2	2.3	2.2	2.3
28	2402-BT		0.4	-0.5	0.4	-0.5	0.2	-1.3	0.2	-1.2	0.8	0.8	0.7	0.8		-0.6	-0.5	-0.6	-0.5
29	2402-BT		0.3	0.6	0.3	0.7	0.1	0.4	0.1	0.5	0.8	0.9	0.6	0.9		-1.5	-1.4	-1.5	-1.5
30	2402-BT		-2.1	-1.9	-1.9	-1.6	-3.0	-2.8	-3.0	-2.8	-0.3	-0.2	0.3	0.6		-1.2	-1.1	-0.9	-0.9
31	2402-BT		0.5	-0.9	0.4	-0.8	0.8	-0.9	0.8	-0.9	-0.3	-0.9	-0.4	-1.0					
32	2402-BT		0.4	0.7	0.4	0.8	0.4	0.7	0.4	0.8	0.4	0.5	0.3	0.5		0.1	0.2	0.0	0.1
33	2402-BT		2.3	2.5	2.3	2.6	2.7	2.9	2.7	3.0	1.5	1.6	1.4	1.6		0.9	1.0	0.9	1.0
34	2402-BT		0.4	0.7	0.4	0.8	0.7	1.0	0.8	1.1	-0.3	-0.2	-0.4	-0.2		-0.8	-0.8	-0.9	-0.8
35	2402-BT						-4.6	-4.6	-4.5	-4.5						1.5	1.6	1.5	1.6
36	2402-BT		26.3	27.3	26.3	27.7	1.0	1.3	1.3	1.7	78.4	79.4	77.4	79.4					
37	2402-BT		0.4	0.2	0.4	0.2	1.0	0.6	1.1	0.6	-1.0	-0.9	-1.3	-1.1		-0.6	-0.5	-0.5	-0.5
38	2402-BT																		
39	2402-BT		-2.8	-1.0	-1.3	-2.5	-3.7	-2.0	-2.3	-3.4	-1.0	1.0	0.6	-0.8		-0.1	0.0	-0.1	-0.1
40	2402-BT		0.0	0.3	0.0	0.3	-0.1	0.2	-0.1	0.2	0.2	0.3	0.1	0.3		0.0	0.1	0.0	0.1
41	2402-BT															0.6	0.7	0.6	0.7
42	2402-BT		-0.8	-1.3	-0.9	-1.2	0.2	-0.4	0.2	-0.3	-3.0	-3.3	-3.1	-3.3		-0.5	-0.4	-0.5	-0.5
43	2402-BT		0.3	0.6	0.6	1.0	0.3	0.6	0.8	1.2	0.3	0.5	0.2	0.5		-0.5	-0.5	-0.6	-0.5
44	2402-BT		0.0	-0.1	0.0	-0.1	-0.3	-0.5	-0.2	-0.5	0.4	0.5	0.3	0.5		0.3	0.4	0.3	0.3
45	2402-BT										4.0	3.0	3.9	3.0		1.3	1.4	1.3	1.4
46	2402-BT		-2.0	-1.8	-2.0	-1.8	-3.2	-3.1	-3.2	-3.0	0.5	0.5	0.4	0.5		-2.6	-2.5	-2.6	-2.5
48	2402-BT		2.8	3.2	2.8	3.2	3.0	3.3	3.0	3.4	2.5	2.6	2.3	2.6					
49	2402-BT		-0.8	-1.5	-0.9	-1.4	-1.2	-2.1	-1.1	-2.0	-0.2	-0.3	-0.3	-0.3		-0.3	-0.2	-0.3	-0.2
51	2402-BT		-0.5	-0.2	-0.5	-0.1	-0.5	-0.2	-0.4	-0.1	-0.5	-0.4	-0.6	-0.4		-0.7	-0.7	-0.8	-0.7
52	2402-BT		0.4	0.3	0.4	0.4	0.2	-0.1	0.2	0.0	0.8	0.9	0.7	0.9		-0.2	-0.2	-0.3	-0.2
53	2402-BT		-0.1	0.2			-0.2	0.1	-0.1	0.2	0.0	0.1				0.5	0.5	0.4	0.5
54	2402-BT		295.7	303.3	295.0	305.3	416.3	427.0	417.8	430.3	42.4	43.0	41.9	43.0		49.7	50.4	49.6	50.2
55	2402-BT		-0.1	0.2	-0.1	0.2	-0.5	-0.2	-0.5	-0.1	0.5	0.6	0.5	0.7		-0.3	-0.2	-0.3	-0.2
56	2402-BT															-0.7	-0.6	-0.7	-0.7
57	2402-BT		-0.1	-0.4	-0.1	-0.4	0.8	0.2	0.8	0.2	-1.9	-1.9	-2.0	-1.9					
58	2402-BT		1.1	1.3	1.0	1.3	1.3	1.5	1.2	1.5	0.5	0.6	0.5	0.6		-0.3	-0.2	291.4	-6.7
59	2402-BT															-0.7	-0.7	-0.8	-0.7
62	2402-BT		-0.3	-0.1	-0.4	0.0	-0.4	-0.1	-0.4	0.0	-0.3	-0.2	-0.4	-0.2		-0.2	-0.2	-0.2	-0.2
63	2402-BT		-0.5	-0.4	-0.6	-0.4	0.0	0.2	0.0	0.3	-1.7	-2.0	-1.8	-2.0		0.5	0.6	0.5	0.6
64	2402-BT		0.8	1.1	0.8	1.1	0.6	0.9	0.6	0.9	1.2	1.2	1.1	1.2		-0.1	0.0	-0.1	0.0
65	2402-BT		2316.4	2383.5	2383.7	2474.2	-1.0	-0.9	-0.8	-0.6	7143.6	7224.8	7249.3	7414.2		-0.3	-0.3	589.5	-6.7
66	2402-BT		1.3	1.6	1.3	1.7	2.1	2.5	2.2	2.6	-0.5	-0.4	-0.6	-0.4		0.2	0.3	0.2	0.3
68	2402-BT		-1.4	-1.4	-6.8	-6.7	1.0	1.3	-5.3	-5.1	-6.3	-7.0	-9.9	-9.9		15.5	15.2	15.4	15.1
69	2402-BT		0.4	0.8	0.4	0.7	0.4	0.8	0.5	0.8	0.2	0.5	0.3	0.3		1.0	1.1	1.0	1.1
70	2402-BT		0.1	0.4	0.1	0.4	0.0	0.2	0.0	0.3	0.4	0.4	0.3	0.4		0.2	0.3	0.2	0.3
71	2402-BT		-0.3	0.0	-0.3	0.0	-0.1	0.2	-0.1	0.3	-0.8	-0.7	-0.9	-0.7		-1.8	-1.7	-1.8	-1.8
72	2402-BT															591.2		589.5	-6.7
73	2402-BT		2.2	2.5	2.1	2.5	2.6	2.9	2.6	3.0	1.2	1.3	1.1	1.3		-0.1	0.0	-0.1	-0.1
74	2402-BT		0.0	0.3	0.0	0.3	-0.2	0.1	-0.1	0.2	0.3	0.3	0.2	0.3		0.0	0.1	0.0	0.1
75	2402-BT		-7.1	-7.4	-7.4	-7.4	-8.5	-8.7	-8.6	-8.6	-4.0	-4.7	-4.9	-4.8		-0.7	-0.6	-0.7	-0.7
76	2402-BT		-2.5	-2.4	-2.5	-2.3	-4.0	-4.0	-4.0	-3.9	0.7	0.8	0.5	0.8		-0.2	-0.1	-0.2	-0.1
77	2402-BT															-0.8	-0.8	-0.8	-0.8
78	2402-BT		1.8	2.1	1.8	2.2	0.5	0.8	0.6	0.8	4.5	4.7	4.3	4.7		1.1	1.2	1.1	1.2
80	2402-BT		-1.9	-2.2	-1.9	-2.2	-1.3	-1.2	-1.3	-1.1	-3.0	-4.5	-3.1	-4.5		-2.0	-2.9	-2.0	-2.9
81	2402-BT		-0.8	-1.5	-0.8	-1.5	-1.3	-1.8	-1.2	-1.7	0.1	-1.2	0.0	-1.2		0.0	-1.0	0.0	-1.0
82	2402-BT															-0.4	-0.4	-0.5	-0.4
83	2402-BT		-0.7	-0.6	-0.7	-0.5	-0.3	-0.2	-0.3	-0.1	-1.4	-1.7	-1.6	-1.5		2.1	2.2	2.1	2.2

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Sum parameters - Z-scores

LC	Sample	Z-score [σ_p = 10 %]	WHO-PCDD/F-PCB-TEQ reported		WHO-PCDD/F-PCB-TEQ calculated		WHO-PCDD/F-TEQ reported		WHO-PCDD/F-TEQ calculated		WHO-PCB-TEQ reported		WHO-PCB-TEQ calculated		Z-score [σ_p = 15 %]	Sum Indicator PCBs reported		Sum Indicator PCBs calculated	
			upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound		upper bound	lower bound	upper bound	lower bound
84	2402-BT		-1.3	-1.1	-1.3	-1.0	-1.2	-1.0	-1.1	-0.9	-1.5	-1.4	-1.6	-1.4		-0.3	-0.3	-0.4	-0.3
85	2402-BT		-0.6	-0.4	-0.6	-0.3	-0.6	-0.3	-0.5	-0.2	-0.8	-0.9	-0.9	-0.7		-0.3	-0.2	-0.3	-0.2
86	2402-BT		-0.2	0.0	-0.3	0.1	0.1	0.4	0.1	0.4	-0.9	-0.9	-1.0	-0.9		0.4	0.5	0.4	0.5
87	2402-BT		-0.2	-0.2	-1.0	-0.9	-0.5	-0.5	-1.2	-1.2	0.2	0.2	-0.6	-0.5		-0.3	-0.3	-0.3	-0.3
88	2402-BT		-3.1	-2.9	-3.0	-2.7	-4.6	-4.4	-3.4	-3.2	-1.4	-1.3	-2.0	-1.9		-1.4	-1.3	-1.4	-1.4
89	2402-BT		8.6	9.2	8.6	9.3	14.5	15.2	14.5	15.4	-3.6	-3.5	-3.7	-3.5		-0.2	-0.1	-0.2	-0.2
90	2402-BT		-0.3	0.0	-0.3	0.1	-0.1	0.1	-0.1	0.2	-0.6	-0.5	-0.7	-0.5					
91	2402-BT		-0.7	-0.7	-0.8	-0.6	-1.0	-0.8	-0.9	-0.7	-0.3	-0.6	-0.4	-0.6		1.7	1.8	1.7	1.8
92	2402-BT															0.6	0.2	0.6	0.2
27A	2402-BT															0.6	0.7	0.6	0.7
44A	2402-BT															0.4	0.5	0.4	0.5
82A	2402-BT															-0.3	-0.2	-0.3	-0.3
16*	2402-BT		0.7	0.9	0.7	0.9	0.5	0.7	0.6	0.8	1.0	0.9	0.9	0.9					
53*	2402-BT		-0.1	0.2	-0.1	0.2	-0.2	0.1	-0.1	0.2	0.0	0.1	-0.1	0.1		0.5	0.5	0.4	0.5
88*	2402-BT		-3.1	-2.9	-3.0	-2.8	-4.6	-4.4	-3.4	-3.2	-1.4	-1.3	-2.2	-2.0		-1.4	-1.3	-1.4	-1.4

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
PCDD/F - Z-scores

LC	Sample	Z-score [σ_p = 10 %]	WHO-PCDD/F-TEQ reported		WHO-PCDD/F-TEQ calculated		Z-score [σ_p = 20 %]	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF	1,2,3,4,6,7,8-HpCDF
			upper bound	lower bound	upper bound	lower bound															
1	2402-BT		-0.1	0.1	-0.1	0.1		-0.2	0.1	-0.3	-0.3	0.4	0.0	0.0	-0.3	-0.6	-0.3	-0.1	-0.6	-0.4	-0.5
2	2402-BT		-0.5	-0.2	-0.5	-0.2		0.8	0.1	-0.5	0.0	-0.3	-0.7	-0.2	-0.1	-0.7	-0.7	-0.7	-0.9	-0.6	-0.3
3	2402-BT		-5.5	-5.5	-5.5	-5.5			-3.8	-4.3	-4.2	-2.2	-0.6	-0.5	-4.0	-2.9	-1.6	-0.3	-3.0	0.1	-1.0
4	2402-BT		-0.5	-0.4	-0.5	-0.3		2.6	-0.7	-0.8	-0.5	-0.8	-0.4	-0.9	-0.6	0.8	0.6	-0.3	0.9	1.5	-0.5
6	2402-BT																				
7	2402-BT																				
8	2402-BT		-0.9		-0.8	-2.1			-0.1	0.1	0.3	0.1	-0.4	-0.5	0.3						-0.2
9	2402-BT		11.6	-3.5	9.1	-5.5						0.8	-4.3	3.1			5.0	0.4		3.8	2.7
11	2402-BT		0.6	-0.1	9.0	-3.7				2.1	2.7	2.3	0.9	1.2							1.1
12	2402-BT		1.9	1.9	2.0	2.1		2.5	1.0	0.4	0.4	0.5	0.3	0.2	6.7	-1.1	1.9	0.4	0.2		0.5
13	2402-BT		1.5	1.3	1.6	1.4		0.7	1.0	0.0	0.0	0.8	1.1	0.5	0.4		0.7	0.4	0.1		
14	2402-BT																				
15	2402-BT		-0.2	0.1	-0.1	0.2		-0.1	0.3	-0.2	-0.2	0.3	-0.3	-0.3	-0.1	-0.1	-0.4	0.0	-0.1	-0.5	-0.3
16	2402-BT		0.5	0.7	0.6	0.8		0.5	-0.1	0.5	1.0	0.0	0.6	0.4	1.2	0.7	0.1	0.9	0.9	1.7	0.4
17	2402-BT		0.4	0.6	0.3	0.5		0.8	1.0	-0.5	-0.5	-0.3	-1.0	-1.7	1.6	1.4	1.1	0.9	1.2	0.3	-1.2
19	2402-BT																				
20	2402-BT		1.2	1.6	1.3	1.6		0.7	-0.1	0.4	0.8	0.9	0.6	0.7	1.8	6.2	1.8	3.3	3.0	2.6	1.7
21	2402-BT		3.7	3.9	3.6	3.9		2.7	3.4	-0.5	0.1	1.4	0.6	1.3	-1.9	0.7	0.7	2.5	4.6	8.2	1.6
22	2402-BT		0.4	0.6	0.4	0.7		0.8	0.3	0.1	0.0	0.5	0.3	0.6	-0.2	-0.9	-0.7	-0.5	-0.9	0.5	-0.7
23	2402-BT		-2.0	-1.9	-1.9	-1.8		-0.3	-1.4	-2.0	-1.2	-0.8	-0.3	-0.6	-0.8	-0.7	-1.5	-0.2	-1.0		0.2
24	2402-BT		2.4	1.1	2.5	1.1			0.9	0.5	0.3	2.7	0.0	0.4	0.8	1.0	2.9	0.7	0.4	1.8	0.6
25	2402-BT		-0.5	-0.4	-0.4	-0.2		-0.2	-0.2	0.1	-0.2	-0.5	-0.2	-0.8	0.6	0.0	0.7	0.9	0.5		-0.3
26	2402-BT		-0.4	-0.1	-0.4	-0.1		0.6	-0.4	0.1	-0.4	-0.1	-0.1	0.4	-0.3	-0.6	-0.2	-0.3	-2.2	1.5	-0.2
27	2402-BT																				
28	2402-BT		0.2	-1.3	0.2	-1.2			0.1	0.2	-0.4	-0.1	-0.4	-0.9	0.1	2.1	0.3	0.0			-0.9
29	2402-BT		0.1	0.4	0.1	0.5		-0.1	0.4	0.5	0.6	-0.6	0.0	0.5	0.6	0.1	0.4	-0.6	1.0	-0.9	0.2
30	2402-BT		-3.0	-2.8	-3.0	-2.8		-1.6	-4.7	0.1	-1.0	-1.0	-0.7	-1.4	-1.2	-1.1	-0.7	35.4	-1.2	1.1	-0.1
31	2402-BT		0.8	-0.9	0.8	-0.9			0.1	0.7	0.4	0.1	-0.1	0.5	0.2		-0.2	0.4			0.4
32	2402-BT		0.4	0.7	0.4	0.8		-0.2	0.0	0.3	0.5	0.5	1.0	0.8	-0.1	-0.1	-0.3	0.1	0.2	-1.5	1.6
33	2402-BT		2.7	2.9	2.7	3.0		0.2	1.7	1.4	2.8	-0.8	2.0	0.8	1.2	5.7	2.5	2.7	3.5	3.3	1.6
34	2402-BT		0.7	1.0	0.8	1.1		0.2	0.8	0.8	1.1	0.2	0.4	0.0	0.7	0.4	-0.1	-0.1	-0.1	-1.5	0.3
35	2402-BT		-4.6	-4.6	-4.5	-4.5		14.3	-3.3	0.7			-4.7	-4.9							
36	2402-BT		1.0	1.3	1.3	1.7		-2.6	1.2	3.8	1.0	0.1	0.9	1.1	0.8	1.7	0.5	1.1	1.1	-0.5	1.0
37	2402-BT		1.0	0.6	1.1	0.6			0.7	1.4	0.4	1.8	0.7	1.0	-0.8	-0.9	0.2	0.2	-0.8	1.5	0.0
38	2402-BT																				
39	2402-BT		-3.7	-2.0	-2.3	-3.4			-1.4	-1.0	-1.3	-2.0	-1.0	-1.5	-1.5	-0.7	-1.3	2.0			-1.3
40	2402-BT		-0.1	0.2	-0.1	0.2		0.6	-0.1	-0.2	-0.1	0.1	0.2	0.3	0.6	-0.4	-0.8	0.2	0.3	0.2	0.1
41	2402-BT																				
42	2402-BT		0.2	-0.4	0.2	-0.3			0.1	-0.9	0.1	-0.1	0.0	-0.4	0.8	2.0	0.2	3.7	2.8	11.4	1.4
43	2402-BT		0.3	0.6	0.8	1.2		0.8	1.2	-0.4	0.3	0.5	0.2	-0.3	-0.2	0.6	-0.5	0.4	0.4	-0.5	-0.1
44	2402-BT		-0.3	-0.5	-0.2	-0.5			-0.3	0.4	1.2	0.7	0.1	0.7	-0.8	-0.2	0.5	-1.0	1.0	-0.3	1.4
45	2402-BT																				
46	2402-BT		-3.2	-3.1	-3.2	-3.0		-0.4	-0.9	-1.6	-1.6	-2.1	-2.9	-3.9	-0.6	-0.9	-0.1	-1.9	-0.7	-1.3	-2.6
48	2402-BT		3.0	3.3	3.0	3.4		1.8	2.9	1.8	1.5	0.7	0.6	0.1	0.9	1.3	1.0	1.8	1.7	1.8	0.7
49	2402-BT		-1.2	-2.1	-1.1	-2.0			-0.1	-1.4	-1.4	-1.1	-0.9	-1.1	-0.4	39.8	-1.3	-1.2			-0.9
51	2402-BT		-0.5	-0.2	-0.4	-0.1		0.1	-0.5	-0.3	0.1	0.2	0.0	0.4	-0.2	-0.3	0.1	0.4	-0.6	-0.9	0.4
52	2402-BT		0.2	-0.1	0.2	0.0			-0.3	0.9	0.9	0.5	1.1	0.6	0.1	1.9	0.5	1.2	0.7	0.1	1.1
53	2402-BT		-0.2	0.1	-0.1	0.2		0.9	-0.6	-0.2	-0.2	0.1	0.0	0.2	0.5	0.2	0.5	1.7	0.9	0.7	-0.4
54	2402-BT		416.3	427.0	417.8	430.3			157.0	163.3	209.1	127.2	10.5	-4.6		522.1	1316.7	429.3	785.9	968.7	88.1
55	2402-BT		-0.5	-0.2	-0.5	-0.1		0.0	-0.1	0.3	0.4	0.3	-0.5	-1.0	-0.5	-0.9	-0.2	-0.6	-0.8	-0.6	-1.3
56	2402-BT																				
57	2402-BT		0.8	0.2	0.8	0.2			0.2	-0.5	-0.4	1.1	-0.5	-0.5	4.4	-0.1	3.6	3.4	3.0	1.4	0.8
58	2402-BT		1.3	1.5	1.2	1.5		-0.2	1.6	1.4	0.3	0.6	0.1	-0.4	0.9	0.7	-0.2	-0.2	-0.2	0.3	0.0
59	2402-BT																				
62	2402-BT		-0.4	-0.1	-0.4	0.0		-0.1	-0.7	-0.4	5.4	-0.3	-0.2	0.0	-1.0	0.6	-0.7	-0.3	-0.9	-1.1	-0.3
63	2402-BT		0.0	0.2	0.0	0.3		-0.3	0.0	0.0	-0.4	0.2	0.7	1.2	-0.4	-0.1	-0.7	0.0	-0.2	-0.8	0.3
64	2402-BT		0.6	0.9	0.6	0.9		0.2	-0.5	1.1	0.6	0.9	0.9	0.8	1.2	0.8	0.9	0.9	0.2	1.9	0.9
65	2402-BT		-1.0	-0.9	-0.8	-0.6		0.2	-0.3	-0.3	-0.4	-0.2	-0.8	-0.4	-0.5	-0.6	-0.9	-0.1	-0.1	-0.4	-0.6
66	2402-BT		2.1	2.5	2.2	2.6		1.4	1.3	1.0	0.9	0.1	1.4	1.7	0.8	2.3	1.7	2.6	1.4	1.1	0.8
68	2402-BT		1.0	1.3	-5.3	-5.1		-1.0	0.5	-4.6	-4.6	-4.6	-5.0	-5.0	-4.2	-4.7	-3.4	-2.1	-4.2	-1.2	-4.9
69	2402-BT		0.4	0.8	0.5	0.8		0.1	0.1	0.6	0.8	0.2	0.6	1.0	0.1	0.2	-0.1	0.1	0.3	1.2	0.7
70	2402-BT		0.0	0.2	0.0	0.3		1.5	0.1	0.5	0.1	-0.1	-0.5	-1.0	-0.4	0.3	-0.2	0.8	0.6	1.1	-0.5
71	2402-BT		-0.1	0.2	-0.1	0.3		-0.4	-0.1	0.0	0.6	0.4	0.4	0.0	0.4	-0.7	-0.4	-0.2	-0.1	-0.5	0.6
72	2402-BT																				
73	2402-BT		2.6	2.9	2.6	3.0		1.5	3.7	0.9	0.6	-0.1	-0.5	0.0	1.4	1.2	0.5	-0.8	2.4	1.8	0.3
74	2402-BT		-0.2	0.1	-0.1	0.2		0.8	-0.1	-0.2	-0.2	0.1	0.1	0.1	0.3	-0.5	-0.8	0.1	0.2	-0.1	0.0
75	2402-BT		-8.5	-8.7	-8.6	-8.6			-4.2	-4.7	-4.5	-4.8	-4.8	-4.9	-0.5	-3.8	-2.9	-4.1	-3.9		-4.6
76	2402-BT		-4.0	-4.0	-4.0	-3.9			-0.3	-2.6	-1.8	-2.9	-3.5	-4.2	0.0	-0.8	1.3	-2.4	-1.9	-1.6	-3.6
77	2402-BT																				
78	2402-BT		0.5	0.8	0.6	0.8		1.0	-0.2	0.4	1.4	0.5	0.6	0.9	0.6	-0.3	0.6	-1.5	-1.3	-0.5	0.2
80	2402-BT		-1.3	-1.2	-1.3	-1.1		-0.4	-1.1	-1.0	-0.4	0.0	0.0	-0.6	-1.6	-0.8	-0.6	-1.4	-1.3		-1.1
81	2402-BT		-1.3	-1.8	-1.2	-1.7		-0.7	-1.6	0.5	-0.9	-0.9	-0.1	1.2	-1.0	-0.9	-0.5				-0.5
82	2402-BT																				
83	2402-BT		-0.3	-0.2	-0.3	-0.1		1.7	0.1	-0.8	-0.7	-0.2	-1.4	-2.0	0.6	-0.7	2.0	-0.2	-0.9	-0.6	-1.4

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
PCDD/F - Z-scores

LC	Sample	Z-score [σ_p = 10 %]	WHO-PCDD/F-TEQ reported		WHO-PCDD/F-TEQ calculated		Z-score [σ_p = 20 %]	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF	1,2,3,4,6,7,8-HpCDF
			upper bound	lower bound	upper bound	lower bound															
84	2402-BT		-1.2	-1.0	-1.1	-0.9		-2.3	-0.4	-0.1	0.2	0.2	-0.1	0.5	-1.0	-1.5	-2.7	-0.9	-1.0	-1.3	-0.2
85	2402-BT		-0.6	-0.3	-0.5	-0.2		-0.2	-0.5	-0.3	0.0	-0.1	0.3	1.0	-0.8	0.3	-0.4	-1.9	-1.0	-1.0	-0.3
86	2402-BT		0.1	0.4	0.1	0.4		-0.2	0.7	-0.8	-0.5	-0.8	-0.7	-0.5	6.2	0.5	1.1	0.2	-0.1	-0.1	-0.4
87	2402-BT		-0.5	-0.5	-1.2	-1.2		-0.2	-0.5	-0.7	-0.5	-0.7	-1.1	-1.0	-0.4	-0.2	-0.7	0.1	0.0		-0.6
88	2402-BT		-4.6	-4.4	-3.4	-3.2		-1.4	-2.3	-1.6	-1.2	-1.3	-1.3	-1.6	-1.2	-1.5	-1.6	-1.6	-1.7	-1.5	-1.3
89	2402-BT		14.5	15.2	14.5	15.4		-1.8	3.3	-2.4	4.1	-1.1	17.5	55.6	-2.4	-0.9	4.6	6.2	5.2	-1.9	37.2
90	2402-BT		-0.1	0.1	-0.1	0.2		1.3	0.3	-0.3	-0.2	0.1	-0.7	-0.8	-0.4	-0.4	0.0	-0.2	-0.2	-0.5	-1.0
91	2402-BT		-1.0	-0.8	-0.9	-0.7		-0.6	-0.3	-0.8	-0.8	-1.0	-0.8	-1.0	0.6	0.8	1.8	1.1	-0.7	-0.2	-0.7
92	2402-BT																				

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Dioxin-like PCB - Z-scores

LC	Sample	Z-score [σ_p = 10 %]	WHO-PCB-TEQ reported upper bound	WHO-PCB-TEQ reported lower bound	WHO-PCB-TEQ calculated upper bound	WHO-PCB-TEQ calculated lower bound	Z-score [σ_p = 20 %]	PCB 105	PCB 114	PCB 118	PCB 123	PCB 156	PCB 157	PCB 167	PCB 189	PCB 77	PCB 81	PCB 126
1	2402-BT		0.5	0.6	0.4	0.6		0.4	-0.8	0.3	0.7	0.8	0.6	0.4	0.0	-0.2	0.1	0.3
2	2402-BT		0.5	0.6	0.3	0.5		0.1	0.1	0.4	-0.3	0.2	0.1	0.8	0.4	0.5	0.4	0.2
3	2402-BT		-1.9	-1.8	-2.0	-1.8		1.8	4.3	1.7	28.0	2.3	0.9	1.7	1.1	-1.7	-1.2	-1.6
4	2402-BT		0.5	0.5	0.3	0.5		0.1	1.7	0.4	-0.3	0.1	0.2	0.3	0.1	-0.1	1.0	0.2
6	2402-BT																	
7	2402-BT																	
8	2402-BT		0.4		0.4	-0.3		0.0	0.8	-0.2	-0.6	-0.3	-0.1	-0.8	-0.2	-0.3	0.4	-0.1
9	2402-BT		0.5	0.2	0.4	0.3		0.0	0.5	0.0	-1.4	-0.4	-0.4	-0.2	-0.4	1.0	0.6	0.2
11	2402-BT		0.3	-1.8	-0.9	-1.8		-1.0	-0.5	-0.7	0.2	-0.6	-0.4	-1.6		-0.3	-0.6	-0.9
12	2402-BT		0.1	-0.2	-0.1	0.0		0.4	0.1	0.6		-0.3	-0.2		-0.1	-1.5	-1.7	0.0
13	2402-BT		2.1	1.8	1.9	1.8		0.5		0.9		0.4	0.1	0.6		0.9		1.1
14	2402-BT																	
15	2402-BT		0.5	0.6	0.4	0.6		0.5	0.8	0.6	1.4	0.4	0.2	-0.5	0.3	0.7	0.4	0.2
16	2402-BT		-2.2	0.9	0.9	0.9		0.1	-0.5	0.3	-0.5	-0.6	-0.5	-0.1	-1.1	0.2	0.4	0.5
17	2402-BT		0.5	0.6	0.4	0.6		-0.6	0.2	-0.9	-1.2	-0.4	0.1	-0.2	-0.4	-1.6	-0.1	0.7
19	2402-BT																	
20	2402-BT		0.6	0.8	0.5	0.8		0.7	1.2	0.6	1.6	0.4	0.1	0.1	0.0	-4.7	0.5	0.6
21	2402-BT		0.9	-0.2	0.7	-0.3		-0.5	0.0	-0.5	-0.3		-0.5	-0.5		-0.2	8.6	0.0
22	2402-BT		1.1	1.1	1.0	1.1		0.5	0.5	0.4	0.5	0.2	0.2	0.5	0.0	0.2	0.4	0.6
23	2402-BT		3.2	1.1	3.1	1.1		0.8	3.5	0.4	2.0	0.5	1.2	-0.2		-0.6	-0.6	0.6
24	2402-BT		1.2	1.4	1.1	1.2		0.2	0.7	0.2	-0.1	0.3	0.6	0.5	0.3	0.4	0.7	0.7
25	2402-BT		-0.6	-0.5	-0.6	-0.6		-0.4	1.4	-0.5	-1.0	-0.4	-0.7	-0.4	-0.5	-0.3	-0.4	-0.3
26	2402-BT		-0.1	0.0	-0.2	0.0		0.1	-0.5	0.0	-0.4	0.6	-0.2	1.0	0.7	0.2	0.2	0.0
27	2402-BT																	
28	2402-BT		0.8	0.8	0.7	0.8		-0.1	-0.1	-0.2	-0.1	0.0	-0.1	-0.1	0.4	0.8	0.6	0.5
29	2402-BT		0.8	0.9	0.6	0.9		1.1	-0.3	1.0	1.2	0.7	1.0	0.8	1.5	-0.1	0.0	0.4
30	2402-BT		-0.3	-0.2	0.3	0.6		-0.1	-0.2	-0.4	-0.4	-0.1	-0.1	0.1	-0.4	-0.5	-0.4	0.5
31	2402-BT		-0.3	-0.9	-0.4	-1.0		-0.6		-0.6		-0.7				-0.5	-0.8	-0.4
32	2402-BT		0.4	0.5	0.3	0.5		0.2	-0.1	0.3	0.5	0.1	-0.1	-0.2	0.6	0.1	0.2	0.3
33	2402-BT		1.5	1.6	1.4	1.6		0.6	0.4	0.6	-0.4	0.3	0.4	0.4	0.3	1.0	1.0	0.8
34	2402-BT		-0.3	-0.2	-0.4	-0.2		-0.8	-0.3	-0.9	0.4	-0.4	0.0	-0.2	-0.2	-0.3	-0.5	0.1
35	2402-BT																	
36	2402-BT		78.4	79.4	77.4	79.4		-0.4	-0.3	-0.3	-0.3	0.0	1.6	-0.1	-0.7	0.3	2.4	-1.1
37	2402-BT		-1.0	-0.9	-1.3	-1.1		-0.2	-1.6	-1.2	-1.4	0.2	0.1	0.0	-0.7	-0.1	-0.3	-0.5
38	2402-BT																	
39	2402-BT		-1.0	1.0	0.6	-0.8		0.2	-0.3	0.3	0.2	0.2	0.1	0.3	-0.4	0.5		-0.5
40	2402-BT		0.2	0.3	0.1	0.3		-0.2	-0.3	-0.3	0.6	0.2	0.6	0.1	1.4	-0.1	0.2	0.2
41	2402-BT																	
42	2402-BT		-3.0	-3.3	-3.1	-3.3		-0.3	-1.2	-0.3	3.3	-0.3	-0.8	0.6	-0.4	-0.8	7.4	-2.1
43	2402-BT		0.3	0.5	0.2	0.5		-0.2	0.1	0.2	-0.6	-0.1	-0.3	0.2	-0.3	-0.2	0.2	0.3
44	2402-BT		0.4	0.5	0.3	0.5		-0.1	-0.3	-0.1	0.1	-0.2	-0.2	0.0	-0.2	-0.2	-0.2	0.3
45	2402-BT		4.0	3.0	3.9	3.0		-0.2	-0.2	-0.6	1.9	-0.6	4.2	13.7		-0.6	-3.4	2.1
46	2402-BT		0.5	0.5	0.4	0.5		0.2	0.4	0.2	0.6	-0.3	-0.3	-0.8	0.3	0.8	0.6	0.3
48	2402-BT		2.5	2.6	2.3	2.6		0.6	0.4	0.4	19.0	0.3	0.6	1.2	28.1	1.1	11.2	0.8
49	2402-BT		-0.2	-0.3	-0.3	-0.3		-0.2	-0.2	-0.5	2.0	-0.3	-0.2	4.4	3.4	0.0	0.0	-0.1
51	2402-BT		-0.5	-0.4	-0.6	-0.4		0.2	0.2	0.1	0.1	0.6	-0.1	0.1	0.0	0.1	0.0	-0.3
52	2402-BT		0.8	0.9	0.7	0.9		0.2	0.6	0.4	0.7	0.4	0.3	0.3	0.1	0.2	0.3	0.6
53	2402-BT		0.0	0.1				0.0	0.0									
54	2402-BT		42.4	43.0	41.9	43.0		27.5	73.4	41.7	40.5	38.1	41.0	231.8	65.8	-3.1	5.7	4.4
55	2402-BT		0.5	0.6	0.5	0.7		0.1	0.0	0.0	-0.3	0.2	-0.4	0.2	0.1	-0.3	0.2	0.5
56	2402-BT																	
57	2402-BT		-1.9	-1.9	-2.0	-1.9		0.9	-0.2	0.6	2.3	0.7	0.4	18.7	-0.2	1.4	22.2	-1.7
58	2402-BT		0.5	0.6	0.5	0.6		0.1	0.1	-0.1	0.4	0.1	0.3	0.7		0.5	1.0	0.4
59	2402-BT																	
62	2402-BT		-0.3	-0.2	-0.4	-0.2		0.1	-0.5	0.1	-1.9	-0.4	-0.6	-0.5	2.5	-0.1	-0.4	-0.1
63	2402-BT		-1.7	-2.0	-1.8	-2.0		0.5	0.5	0.5	1.6	0.2	0.1	0.6		0.3	0.3	-1.4
64	2402-BT		1.2	1.2	1.1	1.2		0.1	0.6	0.2	0.6	0.0	-0.1	0.3	-0.1	0.0	0.3	0.8
65	2402-BT		7143.6	7224.8	7249.3	7414.2		-0.2	-0.5	-0.5	-0.1	-0.3	-0.3	-0.3		-0.4		4870.6
66	2402-BT		-0.5	-0.4	-0.6	-0.4		-0.8	-0.8	-0.6	-0.5	1.0	0.3	1.3	9.4	-0.3	0.0	-0.1
68	2402-BT		-6.3	-7.0	-9.9	-9.9		-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0
69	2402-BT		0.2	0.5	0.3	0.3		1.0	1.4	1.1	-0.2	0.7	0.6	-0.2	0.1	1.3	4.0	-0.1
70	2402-BT		0.4	0.4	0.3	0.4		0.1	0.2	0.4	0.7	-0.3	0.6	0.5	0.2	0.9	-0.2	0.2
71	2402-BT		-0.8	-0.7	-0.9	-0.7		-0.3	0.3	-0.2	-1.4	-0.7	-0.7	-0.2	0.0	0.5	0.2	-0.4
72	2402-BT																	
73	2402-BT		1.2	1.3	1.1	1.3		1.5	2.2	0.3	9.8	0.7	1.5	20.5	1.5	0.6	-0.1	0.5
74	2402-BT		0.3	0.3	0.2	0.3		0.1	-0.3	-0.1	0.8	0.1	0.4	0.3	1.5	0.2	0.2	0.2
75	2402-BT		-4.0	-4.7	-4.9	-4.8		-1.2	-0.2	-1.2	-1.4	-1.5	-1.5	-2.0	-1.7	-2.7	-2.8	-2.7
76	2402-BT		0.7	0.8	0.5	0.8		-0.4	-0.4	-0.9	0.0	-0.6	-0.5	-0.2	-0.4	0.6	0.6	0.7
77	2402-BT																	
78	2402-BT		4.5	4.7	4.3	4.7		1.8	3.4	1.3	1.5	1.3	1.3	0.5	0.1	1.3	0.5	2.6
80	2402-BT		-3.0	-4.5	-3.1	-4.5		-1.5	-0.9			-0.6	-0.6	-0.9	0.3		-1.7	-1.8
81	2402-BT		0.1	-1.2	0.0	-1.2		-0.1	-0.8	1.2	-0.2		-2.3	-1.3		-0.8		-0.7
82	2402-BT																	
83	2402-BT		-1.4	-1.7	-1.6	-1.5		0.4	1.4	0.2	1.7	-0.9	-0.7	-0.7	-0.4	0.3	-0.3	-1.0

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Dioxin-like PCB - Z-scores

LC	Sample	Z-score [σ_p = 10 %]	WHO-PCB-TEQ reported upper bound	WHO-PCB-TEQ reported lower bound	WHO-PCB-TEQ calculated upper bound	WHO-PCB-TEQ calculated lower bound	Z-score [σ_p = 20 %]	PCB 105	PCB 114	PCB 118	PCB 123	PCB 156	PCB 157	PCB 167	PCB 189	PCB 77	PCB 81	PCB 126
84	2402-BT		-1.5	-1.4	-1.6	-1.4		-0.1	-0.2	-0.7	-0.7	-0.1	-0.4	0.0	0.1	0.2	0.4	-0.8
85	2402-BT		-0.8	-0.9	-0.9	-0.7		-0.1	-1.1	0.0	0.0	-0.5	-0.2	-0.6		-0.3	-0.3	-0.4
86	2402-BT		-0.9	-0.9	-1.0	-0.9		-1.0	0.9	-0.9	-1.9	-0.4	-0.6	-1.4	-0.5	-0.6	-0.9	-0.3
87	2402-BT		0.2	0.2	-0.6	-0.5		-0.2	-0.3	-0.2	-0.6	0.1	-0.1		-0.2	-0.2	-0.4	-0.2
88	2402-BT		-1.4	-1.3	-2.0	-1.9		-1.0	-1.1	-0.8	-0.5	-0.8	40.7	-0.4		-1.5	-0.8	-1.0
89	2402-BT		-3.6	-3.5	-3.7	-3.5		-2.0	-2.0	-2.0	-1.8	-1.7	-2.0	-1.7	-2.3	-2.3	-2.1	-1.8
90	2402-BT		-0.6	-0.5	-0.7	-0.5		-0.3	0.5	-0.2	-0.7	-0.3	-0.6	-0.4	-0.5	-0.5	-0.5	-0.2
91	2402-BT		-0.3	-0.6	-0.4	-0.6		-0.9	-1.1	-0.6	6.1	3.2	1.3	9.1	16.4	-0.8	-0.7	-0.3
92	2402-BT																	
16*	2402-BT		1.0	0.9	0.9	0.9		0.1	-0.5	0.3	-0.5	-0.6	-0.5	-0.1	-1.1	0.2	0.4	0.5
53*	2402-BT		0.0	0.1	-0.1	0.1		0.0	0.0	-0.1	0.7	2.4	1.0	3.4	14.9	0.1	0.3	0.0
88*	2402-BT		-1.4	-1.3	-2.0	-1.9		-1.0	-1.1	-0.8	-0.5	-0.8	40.7	-0.4		-1.5	-0.8	-1.0

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Non dioxin-like PCB - Z-scores

LC	Sample	Z-score [σ_p = 15 %]	Sum Indicator PCBs reported upper bound	Sum Indicator PCBs reported lower bound	Sum Indicator PCBs calculated upper bound	Sum Indicator PCBs calculated lower bound	Z-score [σ_p = 20 %]	PCB 28	PCB 52	PCB 101	PCB 138	PCB 153	PCB 180
1	2402-BT		0.1	0.2	0.1	0.2		0.5	0.4	0.0	-0.4	0.0	0.0
2	2402-BT												
3	2402-BT		7.0	7.2	6.9	7.1		14.8	3.9	2.3	3.7	0.5	3.0
4	2402-BT		1.0	1.1	1.0	1.0		5.2	-0.3	-0.7	0.6	0.6	-0.7
6	2402-BT				52.9	-6.7							
7	2402-BT		0.0	-0.9	0.0	-0.9		-0.6	-0.5	1.4	1.7		
8	2402-BT		1.4		1.7	0.8		5.6	0.4	0.7	-0.9		
9	2402-BT												
11	2402-BT		-1.0	-1.0	-1.0	-1.0		-1.5	-0.5	-0.5	-0.4	0.1	-0.6
12	2402-BT		2	2	2	2		1.0	1.5	3.5	1	2	1.0
13	2402-BT		0.4	0.5	0.4	0.5		1.0	0.4	0.5	0.1	-0.1	0.4
14	2402-BT		0.0	0.1	0.0	0.1		-0.1	0.0	-0.2	1.0	1.4	-0.1
15	2402-BT												
16	2402-BT												
17	2402-BT		0.3	0.4	0.2	0.3		1.3	0.0	0.1	-0.1	0.0	-0.1
19	2402-BT												
20	2402-BT		0.5	0.6	0.4	0.5		2.2	0.1	0.1	-0.3	0.2	-0.1
21	2402-BT		-0.5	-1.0	-0.6	-1.0		-0.6	-0.5	-0.8	0.6	0.4	
22	2402-BT		0.4	0.5	0.5	0.6		0.7	0.5	0.8	-0.1	0.3	-0.1
23	2402-BT		-0.3	-0.2	-0.1	-0.1		-0.1	0.4	-0.7	0.5	0.3	-0.2
24	2402-BT		0.2	0.3	0.2	0.3		0.3	0.2	1.0	0.0	-0.2	-0.1
25	2402-BT		1.8	1.9	1.8	1.9		5.4	0.5	1.3	0.3	-0.3	-0.2
26	2402-BT		0.4	0.5	0.4	0.5		-0.3	0.6	0.9	0.6	0.7	0.0
27	2402-BT		2.2	2.3	2.2	2.3		1.3	1.9	1.7	1.6	2.4	2.7
28	2402-BT		-0.6	-0.5	-0.6	-0.5		-0.6	0.0	-0.6	-0.5	-0.2	-0.1
29	2402-BT		-1.5	-1.4	-1.5	-1.5		-2.9	-1.3	0.1	0.5	-0.1	-0.3
30	2402-BT		-1.2	-1.1	-0.9	-0.9		-1.3	-0.4	-0.7	0.1	-0.1	-0.6
31	2402-BT												
32	2402-BT		0.1	0.2	0.0	0.1		0.0	0.5	0.1	-0.4	0.0	-0.1
33	2402-BT		0.9	1.0	0.9	1.0		2.8	0.4	0.0	-0.8	1.9	0.2
34	2402-BT		-0.8	-0.8	-0.9	-0.8		-0.5	-0.7	-0.7	-0.8	1.0	-0.7
35	2402-BT		2	2	2	2		5.8	-0.2	-0.3	1.1	2.0	-1.1
36	2402-BT												
37	2402-BT		-0.6	-0.5	-0.5	-0.5		-0.1	-0.4	-0.3	0.2	-0.6	-0.6
38	2402-BT												
39	2402-BT		-0.1	0.0	-0.1	-0.1		-0.1	0.5	-0.3	-0.6	-0.3	0.4
40	2402-BT		0.0	0.1	0.0	0.1		0.4	0.2	0.1	-0.5	-0.2	0.3
41	2402-BT		0.6	0.7	0.6	0.7		0.4	0.6	0.5	0.2	0.9	1.1
42	2402-BT		-0.5	-0.4	-0.5	-0.5		0.3	-0.3	-0.2	-1.6	-0.4	-0.4
43	2402-BT		-0.5	-0.5	-0.6	-0.5		0.0	0.0	-0.7	-0.8	-0.6	-0.5
44	2402-BT		0.3	0.4	0.3	0.3		1.0	0.1	0.1	0.1	0.4	0.0
45	2402-BT		1.3	1.4	1.3	1.4		0.3	1.3	1.7	0.9	1.0	1.1
46	2402-BT		-2.6	-2.5	-2.6	-2.5		-1.7	-1.7	-2.1	-2.1	-2.0	-1.7
48	2402-BT												
49	2402-BT		-0.3	-0.2	-0.3	-0.2		-0.2	0.1	-0.3	-0.4	0.1	-0.4
51	2402-BT		-0.7	-0.7	-0.8	-0.7		0.1	-0.4	-0.9	-0.7	-0.6	-0.6
52	2402-BT		-0.2	-0.2	-0.3	-0.2		0.2	-0.3	0.0	-0.2	0.1	0.3
53	2402-BT		0.5	0.5	0.4	0.5		0.5	0.3	0.4	-0.2	2.6	0.1
54	2402-BT		49.7	50.4	49.6	50.2		36.4	36.4	38.8	62.0	21.2	39.5
55	2402-BT		-0.3	-0.2	-0.3	-0.2		0.4	0.0	-0.2	-0.6	-0.6	-0.1
56	2402-BT		-0.7	-0.6	-0.7	-0.7		-1.5	-0.6	-1.0	1.7	2.6	-1.2
57	2402-BT												
58	2402-BT		-0.3	-0.2	291.4	-6.7							
59	2402-BT		-0.7	-0.7	-0.8	-0.7		-0.5	-0.5	-0.5	0.0	-0.5	-1.0
62	2402-BT		-0.2	-0.2	-0.2	-0.2		0.3	-0.2	-0.3	-0.3	0.1	0.4
63	2402-BT		0.5	0.6	0.5	0.6		0.0	1.1	0.3	0.2	0.3	0.1
64	2402-BT		-0.1	0.0	-0.1	0.0		-0.3	0.0	0.0	0.5	0.2	1.0
65	2402-BT		-0.3	-0.3	589.5	-6.7							
66	2402-BT		0.2	0.3	0.2	0.3		-0.6	0.3	-0.7	1.0	1.8	3.0
68	2402-BT		15.5	15.2	15.4	15.1		29.0	12.6	4.8	2.6	3.0	
69	2402-BT		1.0	1.1	1.0	1.1		-0.1	0.6	2.1	1.5	0.9	0.9
70	2402-BT		0.2	0.3	0.2	0.3		0.3	0.6	-0.1	0.1	-0.1	0.0
71	2402-BT		-1.8	-1.7	-1.8	-1.8		-0.3	-1.4	-1.7	-1.7	-1.7	-1.2
72	2402-BT		591.2		589.5	-6.7							
73	2402-BT		-0.1	0.0	-0.1	-0.1		-0.2	-2.7	5.3	1.0	-1.7	0.8
74	2402-BT		0.0	0.1	0.0	0.1		0.5	0.3	-0.1	-0.5	0.0	0.0
75	2402-BT		-0.7	-0.6	-0.7	-0.7		0.3	-1.0	-0.5	0.8	0.0	-1.7
76	2402-BT		-0.2	-0.1	-0.2	-0.1		-0.7	0.4	-0.1	-0.2	0.3	0.2
77	2402-BT		-0.8	-0.8	-0.8	-0.8		-1.2	-1.0	0.6	0.6	-0.9	-0.6
78	2402-BT		1.1	1.2	1.1	1.2		1.3	0.8	1.0	1.5	0.5	1.2
80	2402-BT		-2.0	-2.9	-2.0	-2.9		-1.1	-1.6		-1.6	-1.9	-0.6
81	2402-BT		0.0	-1.0	0.0	-1.0		3.7	-2.1	0.4	-0.2		
82	2402-BT		-0.4	-0.4	-0.5	-0.4		-0.1	-0.1	-0.2	-0.7	-0.4	-0.4
83	2402-BT		2.1	2.2	2.1	2.2		8.1	0.5	0.1	-0.6	-0.6	0.0

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Non dioxin-like PCB - Z-scores

LC	Sample	Z-score [σ_p = 15 %]	Sum Indicator PCBs reported upper bound	Sum Indicator PCBs reported lower bound	Sum Indicator PCBs calculated upper bound	Sum Indicator PCBs calculated lower bound	Z-score [σ_p = 20 %]	PCB 28	PCB 52	PCB 101	PCB 138	PCB 153	PCB 180
84	2402-BT		-0.3	-0.3	-0.4	-0.3		-0.6	0.1	0.0	-0.2	-0.4	-0.3
85	2402-BT		-0.3	-0.2	-0.3	-0.2		0.0	0.0	-0.1	-0.4	-0.7	-0.3
86	2402-BT		0.4	0.5	0.4	0.5		3.2	-0.5	0.0	-0.1	-0.3	-0.2
87	2402-BT		-0.3	-0.3	-0.3	-0.3		-0.2	-0.1	0.0	-0.5	-0.3	-0.2
88	2402-BT		-1.4	-1.3	-1.4	-1.4		-0.9	-0.8	-1.2	-1.3	-1.1	-1.1
89	2402-BT		0	0	0	0		0	0	0	0	0	0.7
90	2402-BT												
91	2402-BT		1.7	1.8	1.7	1.8		-0.3	-0.3	1.0	5.5	6.3	6.3
92	2402-BT		0.6	0.2	0.6	0.2		1.2	0.3	0.7	0.8	-0.1	
27A	2402-BT		0.6	0.7	0.6	0.7		0.5	0.7	0.7	-0.2	1.3	0.6
44A	2402-BT		0.4	0.5	0.4	0.5		0.4	0.5	0.3	0.3	0.4	0.6
82A	2402-BT		-0.3	-0.2	-0.3	-0.3		-0.1	0.0	0.0	-0.6	-0.5	-0.1

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Bioanalytical screening methods - Bioassay-scores

LC	Sample	Bioassay-score [$\sigma_{bioassay}$ = 20 %]	PCDD/F + DL-PCB	PCDD/F	DL-PCB
19	2402-BT		0.0		
20	2402-BT		7.8		
31	2402-BT		-1.2		
38	2402-BT		-1.4	0.3	-5.0
53	2402-BT		0.6		
56	2402-BT		-1.6		
64	2402-BT		1.7	1.8	1.1

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Moisture content - Z-scores

LC	Sample	Z-score [σ_p = 10 %]	**Moisture content** Physico-chemical methods	**Moisture content** Bioanalytical methods	**Moisture content** Mean
1	2402-BT		-0.2		-0.2
2	2402-BT		0.5		0.5
3	2402-BT		0.0		0.0
4	2402-BT		0.1		0.1
6	2402-BT				
7	2402-BT		0.4		0.4
8	2402-BT				
9	2402-BT		0.5		0.5
11	2402-BT			-0.5	-0.5
12	2402-BT		-0.2		-0.2
13	2402-BT		-0.1		-0.1
14	2402-BT		0.6		0.6
15	2402-BT		0.4		0.4
16	2402-BT				
17	2402-BT		-1.8		-1.8
19	2402-BT			0.4	0.4
20	2402-BT		0.3		0.3
21	2402-BT		0.3		0.3
22	2402-BT		-0.8		-0.8
23	2402-BT		1.0		1.0
24	2402-BT		0.5		0.5
25	2402-BT		0.1		0.1
26	2402-BT		0.1		0.1
27	2402-BT		-0.6		-0.6
28	2402-BT		-0.7		-0.7
29	2402-BT		-1.2		-1.2
30	2402-BT		-3.5		-3.5
31	2402-BT		0.6	0.6	0.6
32	2402-BT		-1.9		-1.9
33	2402-BT		0.7		0.7
34	2402-BT		-0.2		-0.2
35	2402-BT		0.6		0.6
36	2402-BT		3.2		3.2
37	2402-BT		0.1		0.1
38	2402-BT			3.2	3.2
39	2402-BT		-2.7		-2.7
40	2402-BT		0.1		0.1
41	2402-BT		0.8		0.8
42	2402-BT				
43	2402-BT		93.1		93.1
44	2402-BT		-3.2		-3.2
45	2402-BT		0.1		0.1
46	2402-BT		0.3		0.3
48	2402-BT		0.9		0.9
49	2402-BT		-1.2		-1.2
51	2402-BT		0.1		0.1
52	2402-BT		-0.5		-0.5
53	2402-BT		0.0	0.0	0.0
54	2402-BT		3.2		3.2
55	2402-BT		-0.5		-0.5
56	2402-BT		-0.1	-0.1	-0.1
57	2402-BT		0.5		0.5
58	2402-BT				
59	2402-BT		0.1		0.1
62	2402-BT		-5.3		-5.3
63	2402-BT		90.1		90.1
64	2402-BT		0.1	0.1	0.1
65	2402-BT		0.3		0.3
66	2402-BT		-4.6		-4.6
68	2402-BT		3.2		3.2
69	2402-BT		89.0		89.0
70	2402-BT		0.3		0.3
71	2402-BT		-10.0		-10.0
72	2402-BT				
73	2402-BT		0.2		0.2
74	2402-BT		0.1		0.1
75	2402-BT		0.4		0.4
76	2402-BT		-0.4		-0.4
77	2402-BT		-0.3		-0.3
78	2402-BT		-1.3		-1.3
80	2402-BT		-0.1		-0.1
81	2402-BT		-1.9		-1.9
82	2402-BT		0.4		0.4
83	2402-BT		0.2		0.2

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Moisture content - Z-scores

LC	Sample	Z-score [σ_p = 10 %]	**Moisture content** Physico-chemical methods	**Moisture content** Bioanalytical methods	**Moisture content** Mean
84	2402-BT		1.3		1.3
85	2402-BT		0.2		0.2
86	2402-BT		0.5		0.5
87	2402-BT		0.1		0.1
88	2402-BT		-0.4		-0.4
89	2402-BT		-0.9		-0.9
90	2402-BT		-0.3		-0.3
91	2402-BT		0.5		0.5
92	2402-BT		-0.3		-0.3
27A	2402-BT		-0.6		-0.6
44A	2402-BT		-3.2		-3.2
82A	2402-BT		0.4		0.4
16*	2402-BT		0.1		0.1

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
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25 August 2025

Annex 4: Participants' z-scores of PCDD/Fs and PCBs - Charts

Test sample - Bentonite (2402-BT)

Z-scores of sum parameters and individual results

Calculation of z-score on basis of assigned value

$$z = (x - x_a) / \sigma_p$$

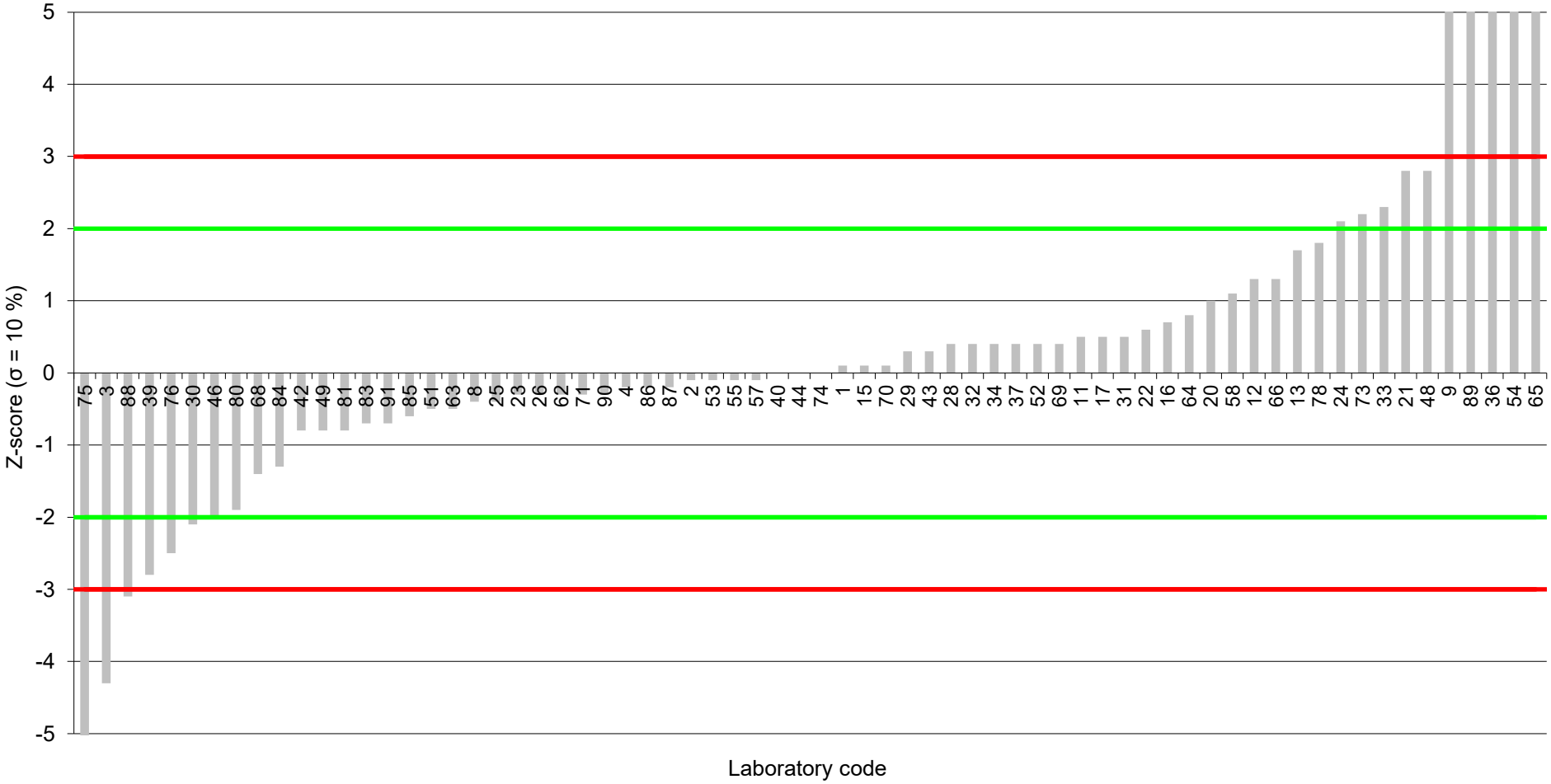
x_a: assigned value
x: participant's result
σ_p: fitness-for-purpose-based standard deviation for proficiency assessment
10%: WHO-PCDD/F-TEQ, WHO-PCB-TEQ and WHO-PCDD/F-PCB-TEQ
15%: Sum of six indicator PCBs (PCB 28, 52, 101, 138, 153, 180)
20%: Evaluated individual PCDD/F and PCB congeners

± 2 z-scores:
± 3 z-scores:

Bentonite (2402-BT)

WHO-PCDD/F-PCB-TEQ upper bound (reported)

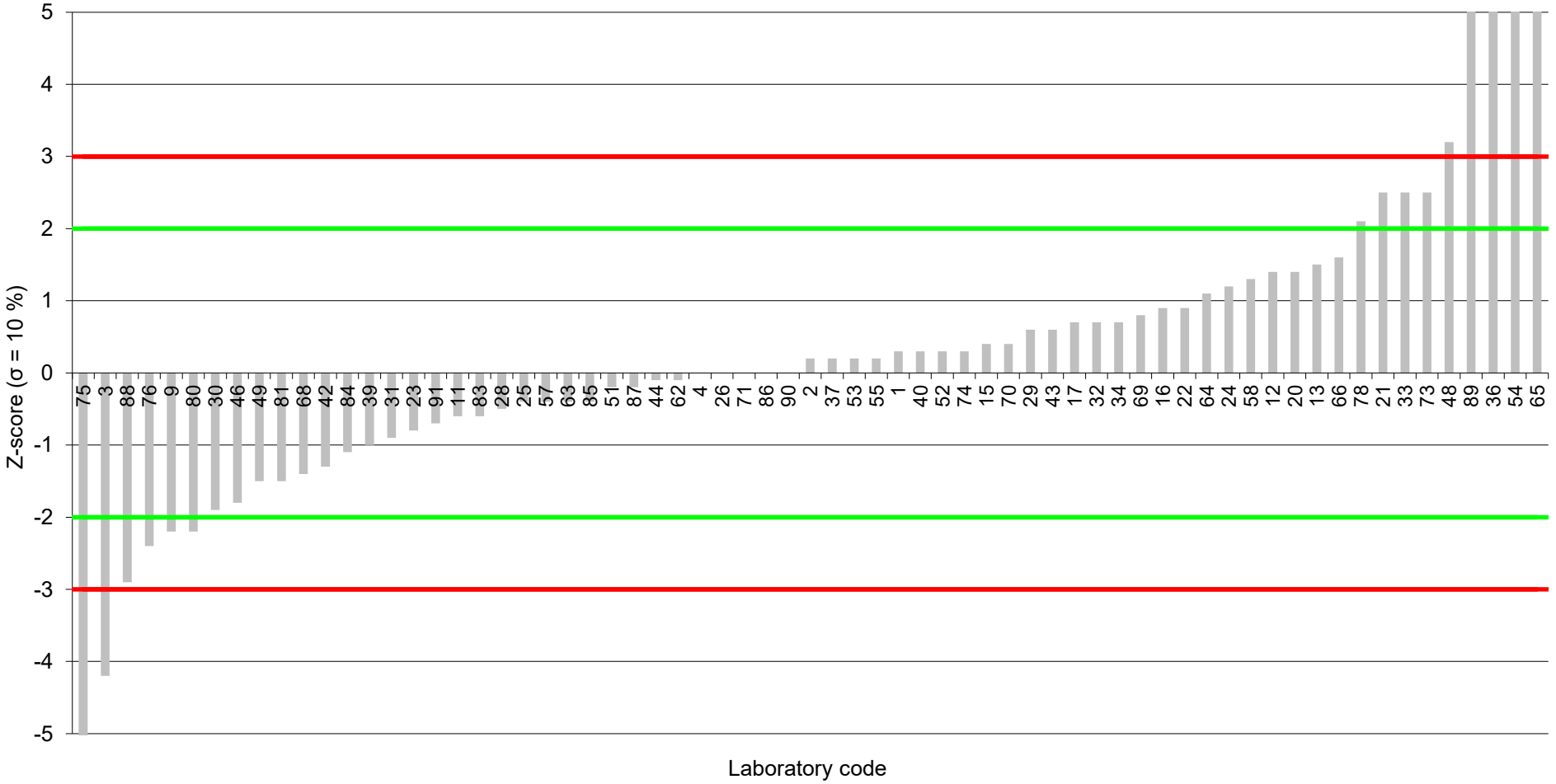
Assigned value: 0.821 ng/kg (12% moisture content)



Bentonite (2402-BT)

WHO-PCDD/F-PCB-TEQ lower bound (reported)

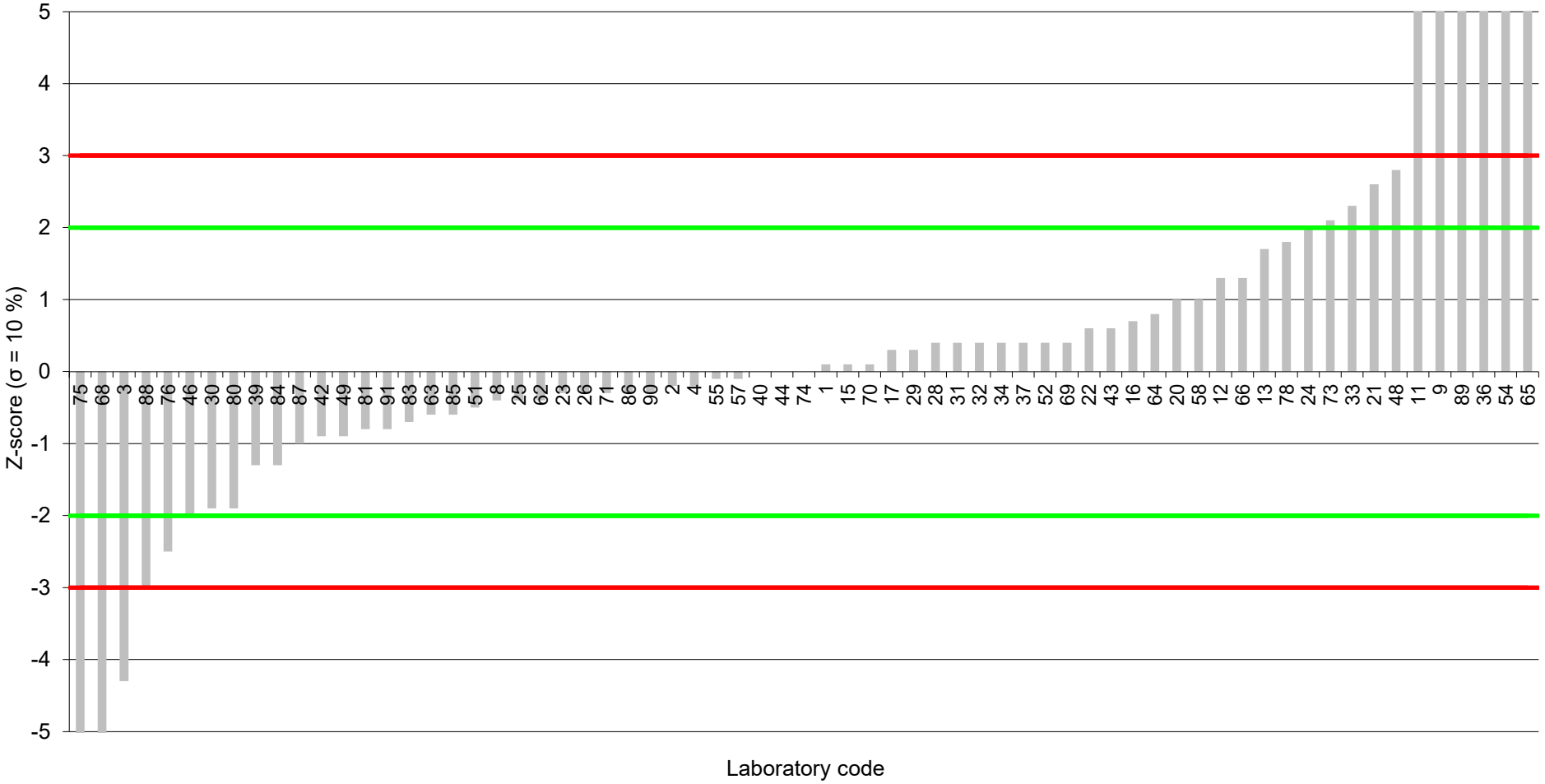
Assigned value: 0.798 ng/kg (12% moisture content)



Bentonite (2402-BT)

WHO-PCDD/F-PCB-TEQ upper bound (calculated)

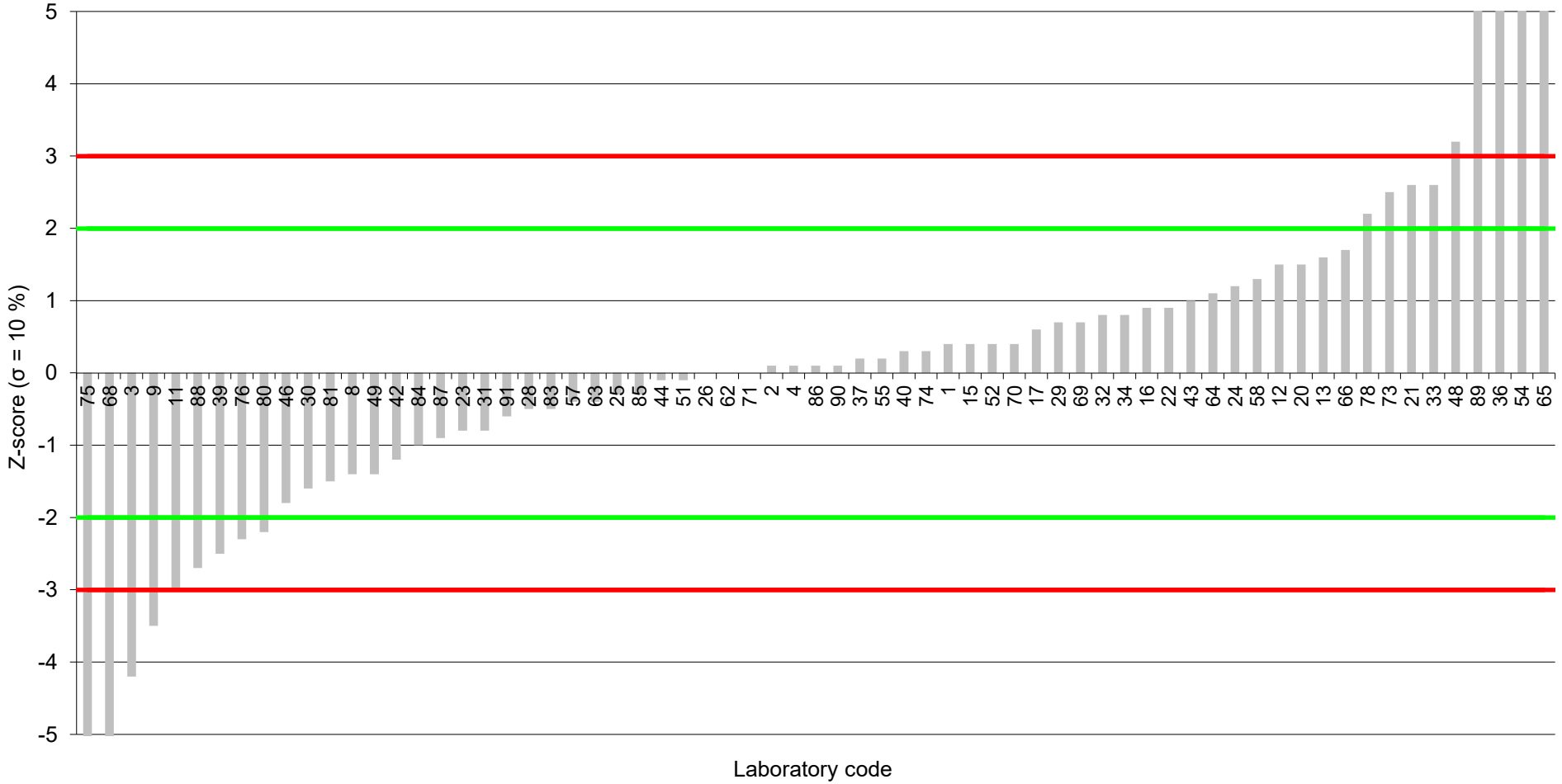
Assigned value: 0.823 ng/kg (12% moisture content)



Bentonite (2402-BT)

WHO-PCDD/F-PCB-TEQ lower bound (calculated)

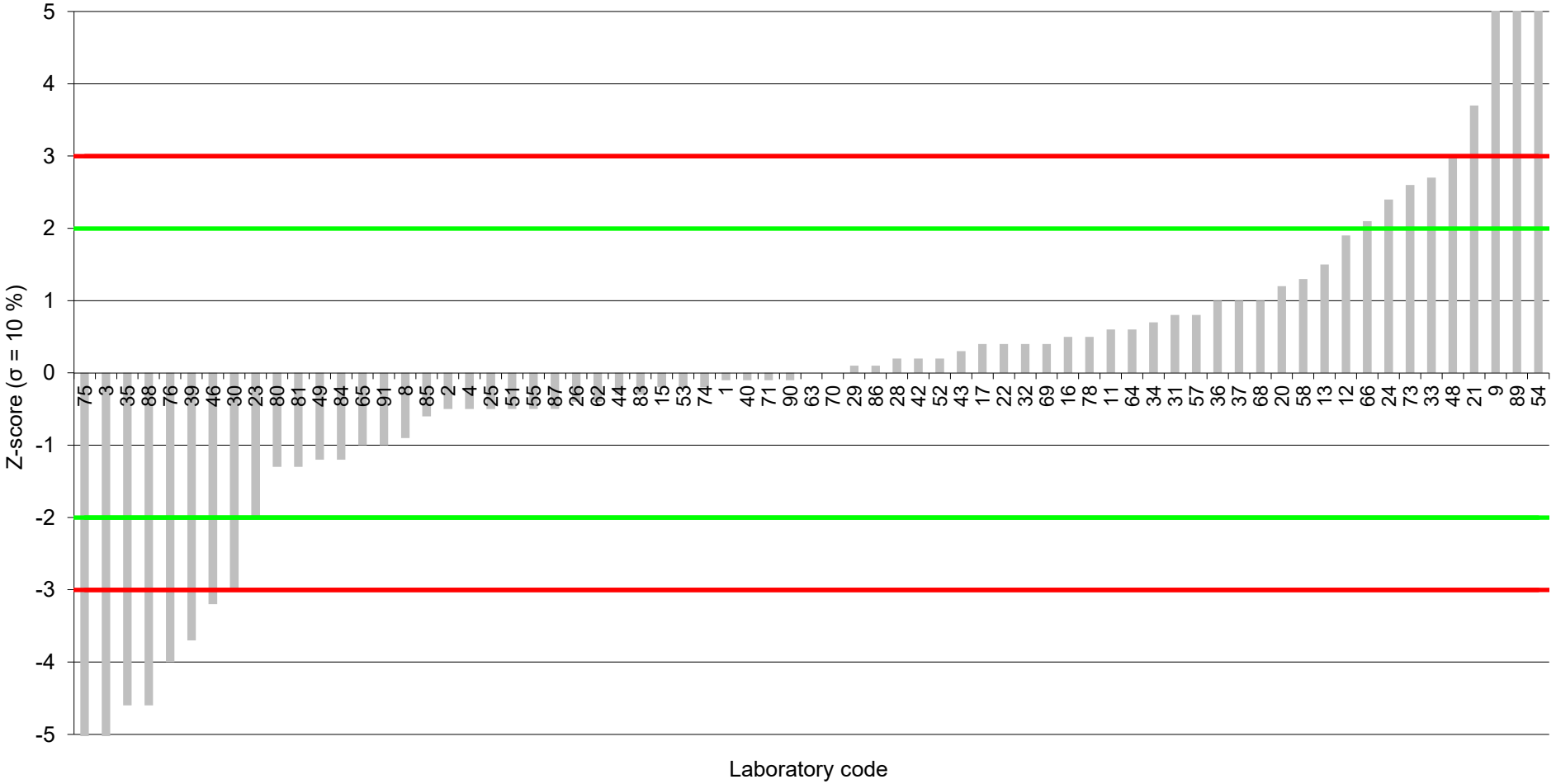
Assigned value: 0.793 ng/kg (12% moisture content)



Bentonite (2402-BT)

WHO-PCDD/F-TEQ upper bound (reported)

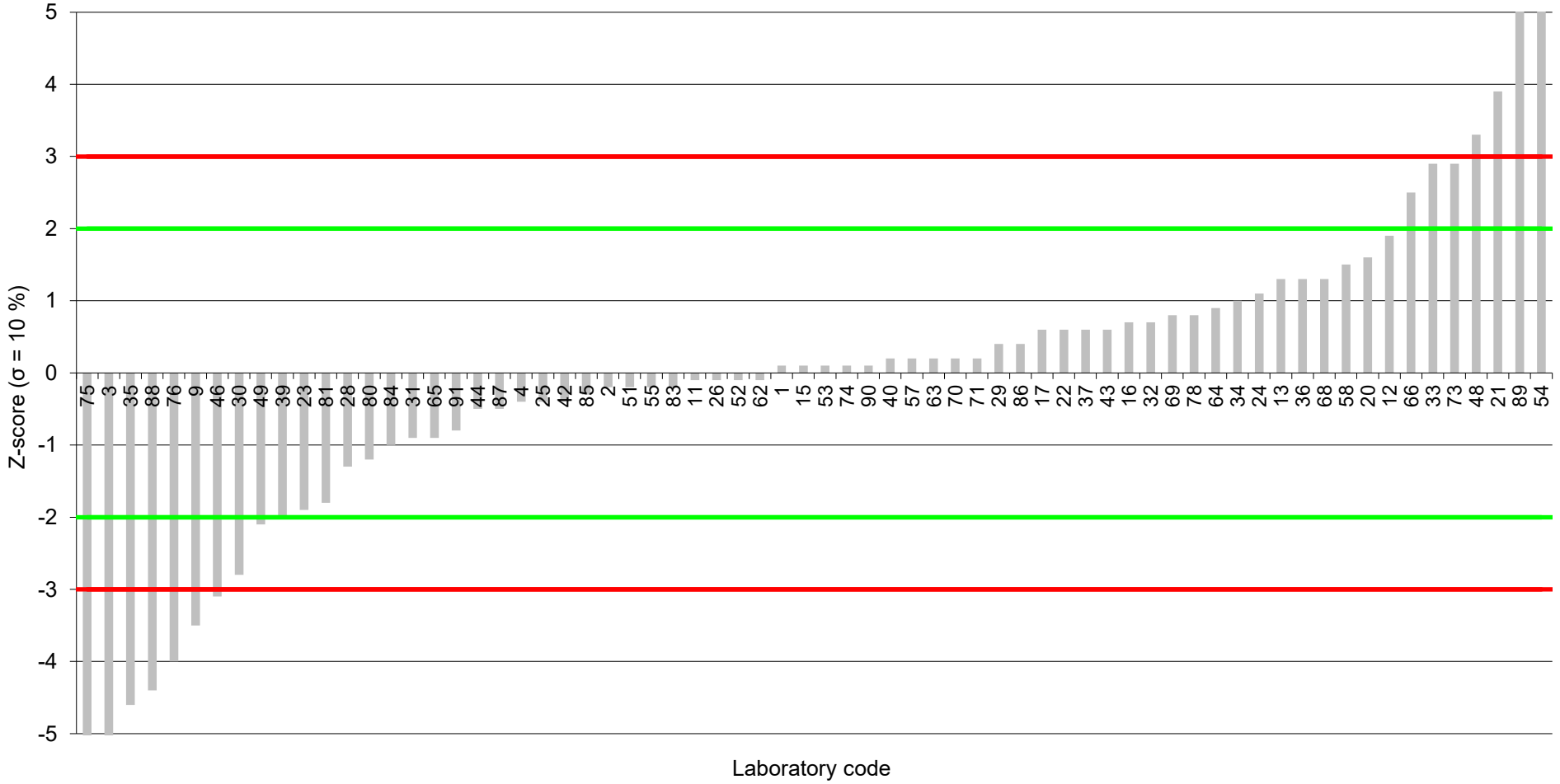
Assigned value: 0.556 ng/kg (12% moisture content)



Bentonite (2402-BT)

WHO-PCDD/F-TEQ lower bound (reported)

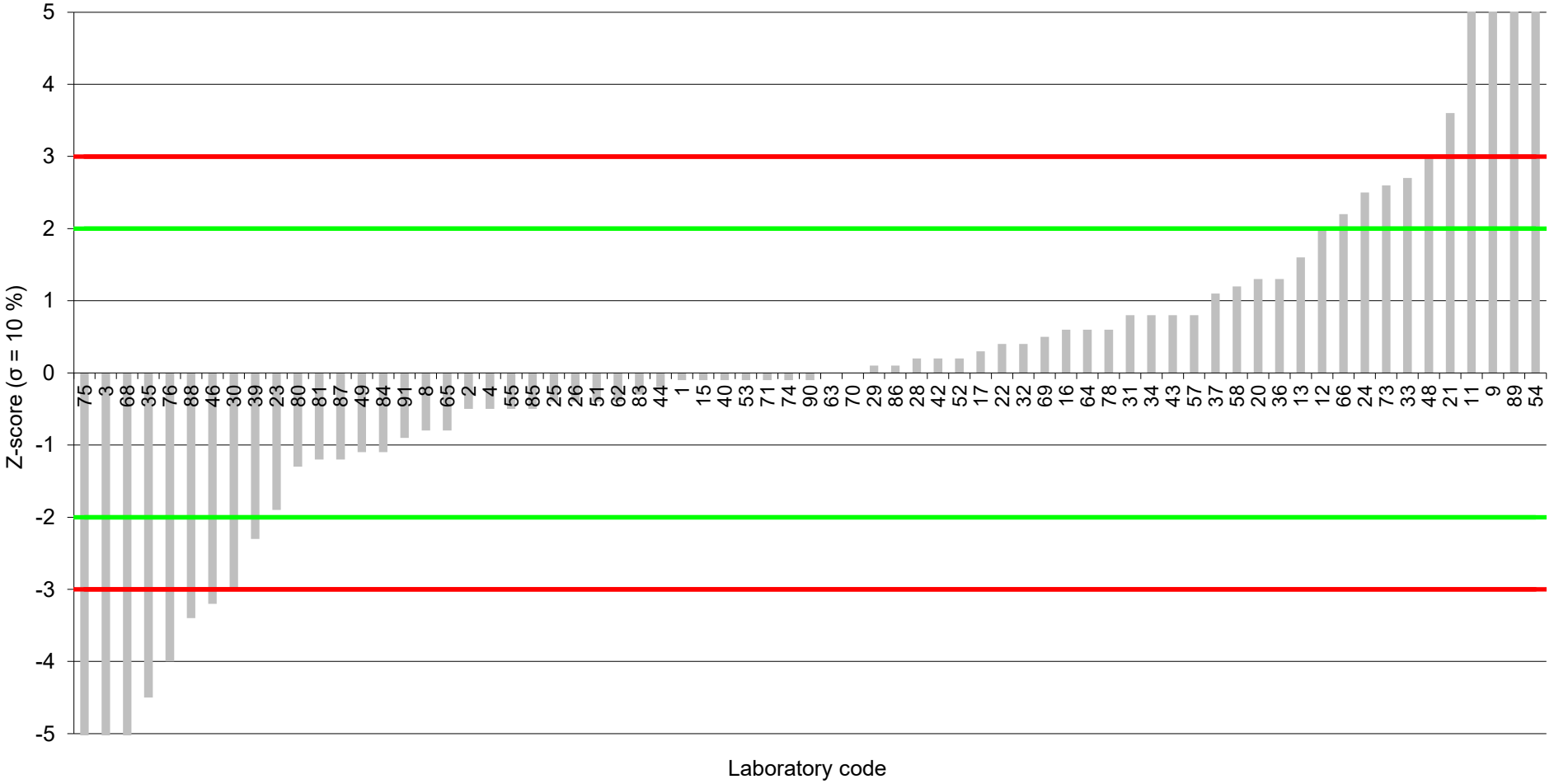
Assigned value: 0.54 ng/kg (12% moisture content)



Bentonite (2402-BT)

WHO-PCDD/F-TEQ upper bound (calculated)

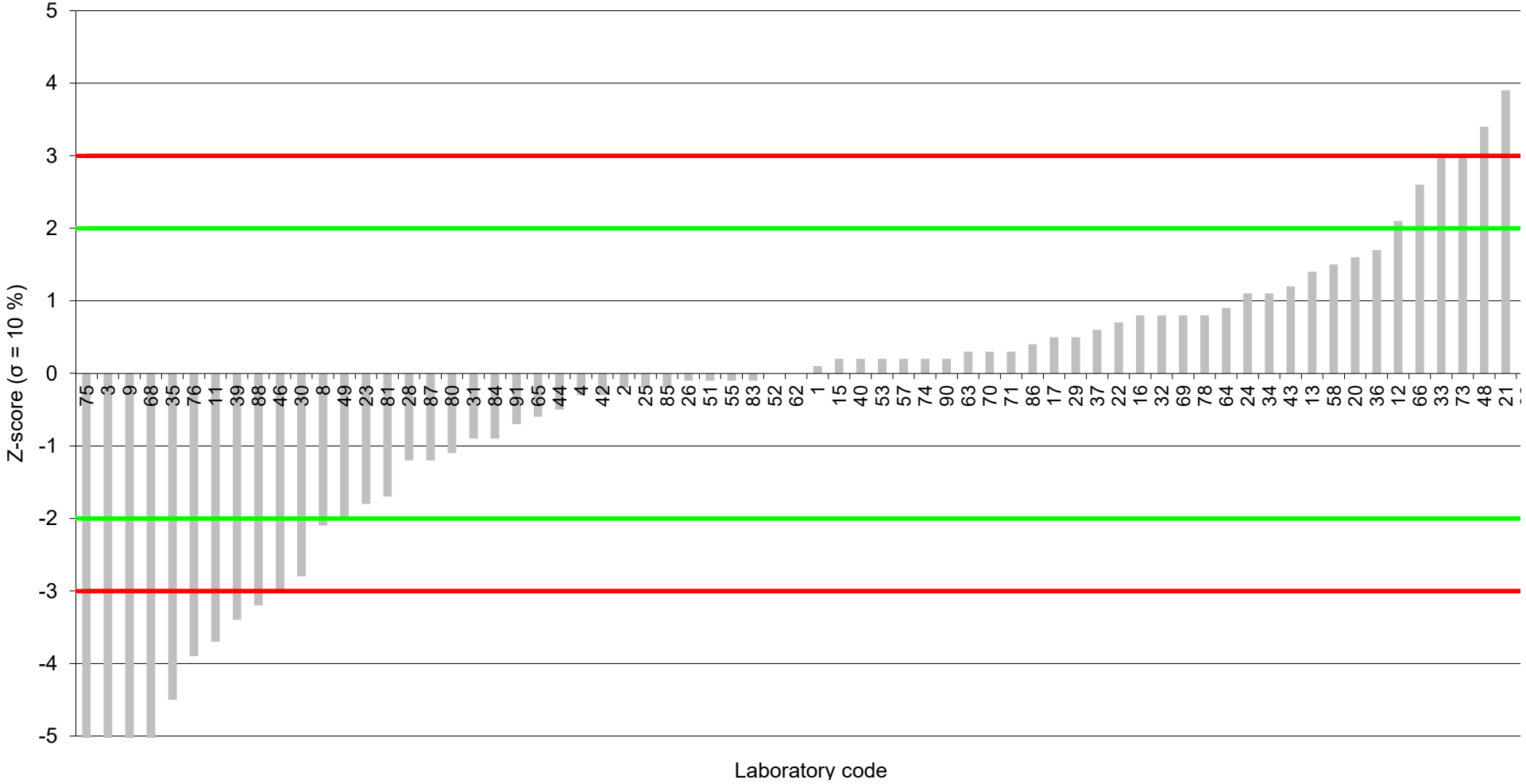
Assigned value: 0.554 ng/kg (12% moisture content)



Bentonite (2402-BT)

WHO-PCDD/F-TEQ lower bound (calculated)

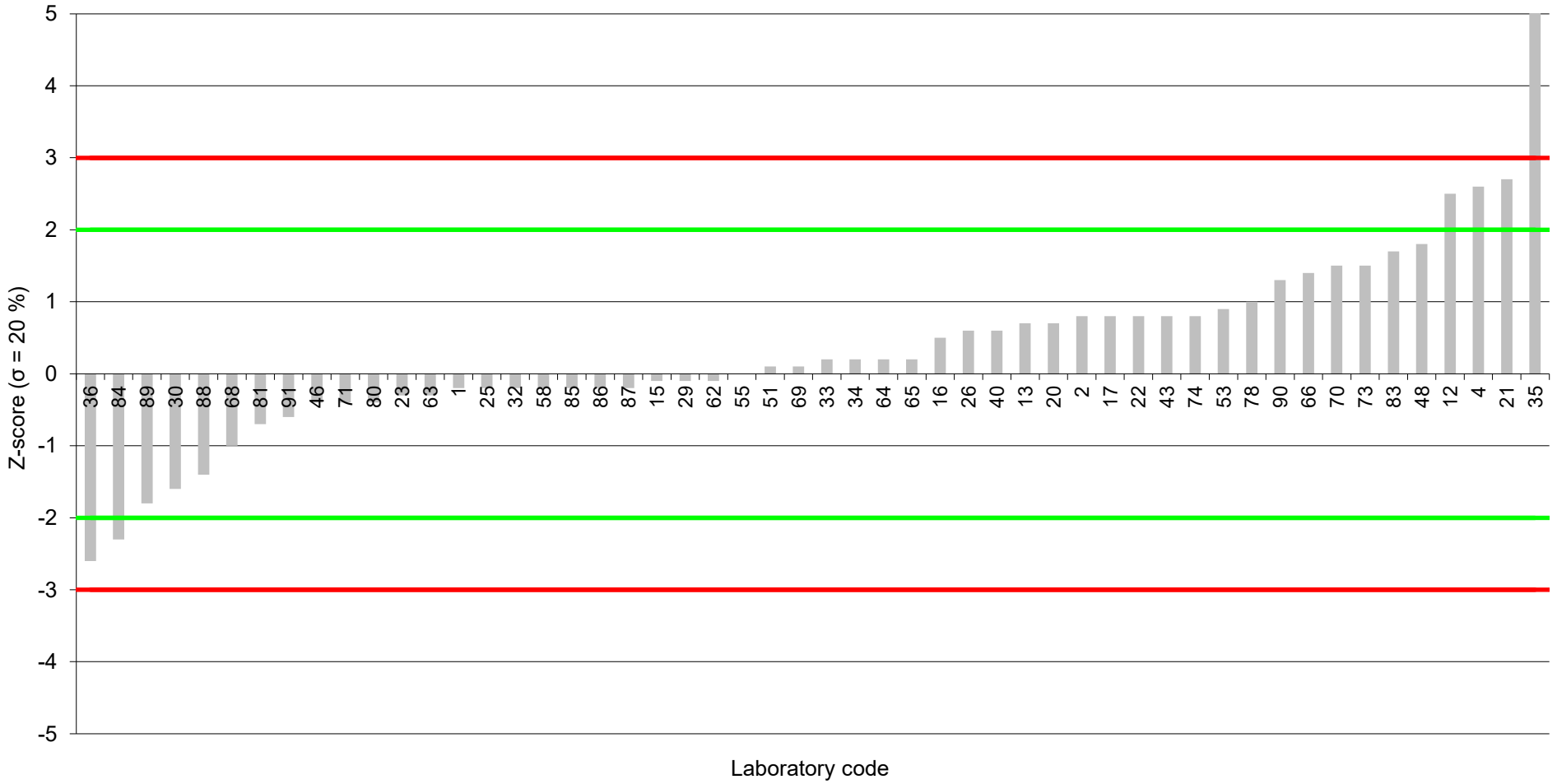
Assigned value: 0.536 ng/kg (12% moisture content)



Bentonite (2402-BT)

2,3,7,8-TCDD

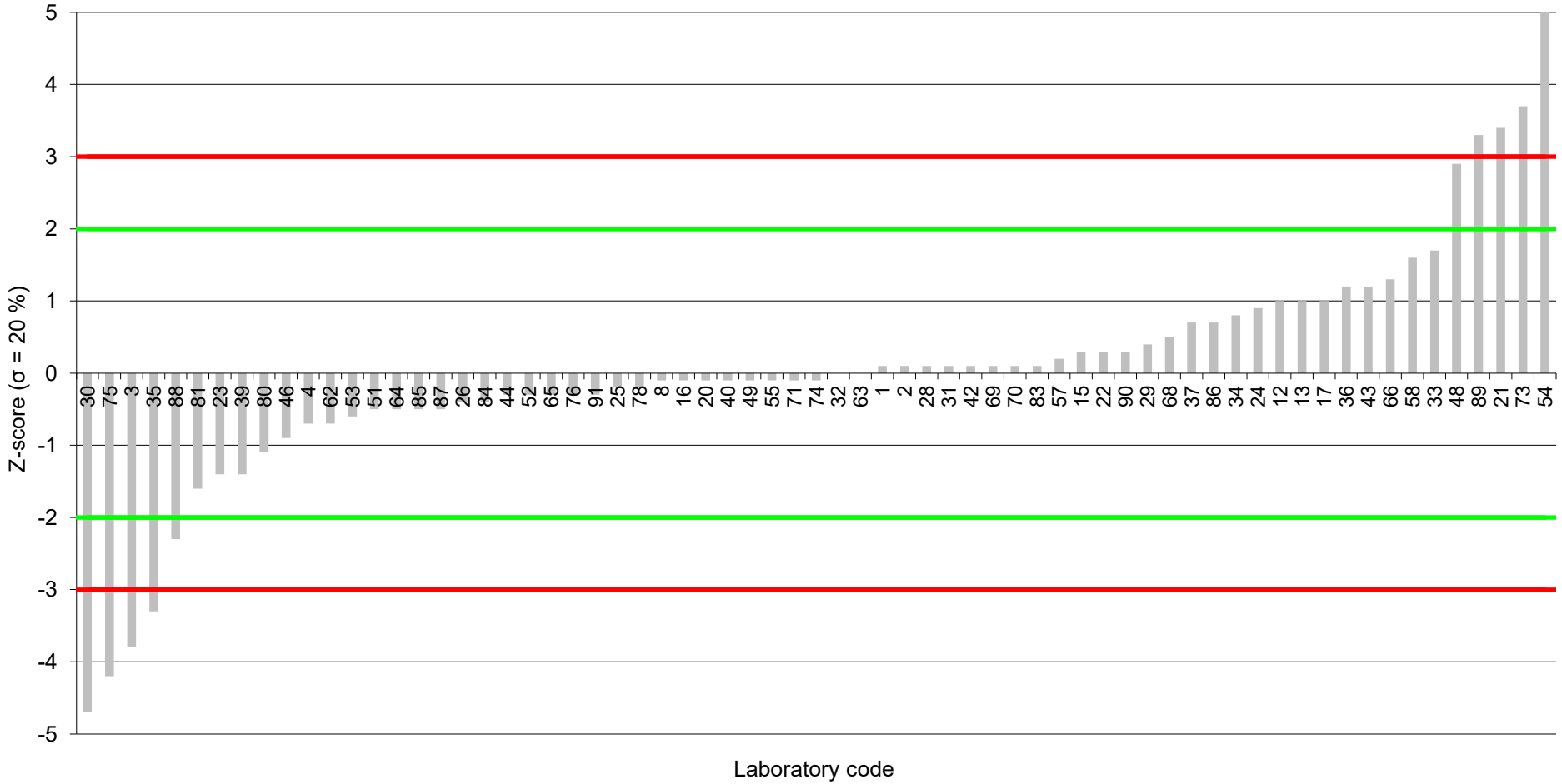
Assigned value: 0.0521 ng/kg (12% moisture content)



Bentonite (2402-BT)

1,2,3,7,8-PeCDD

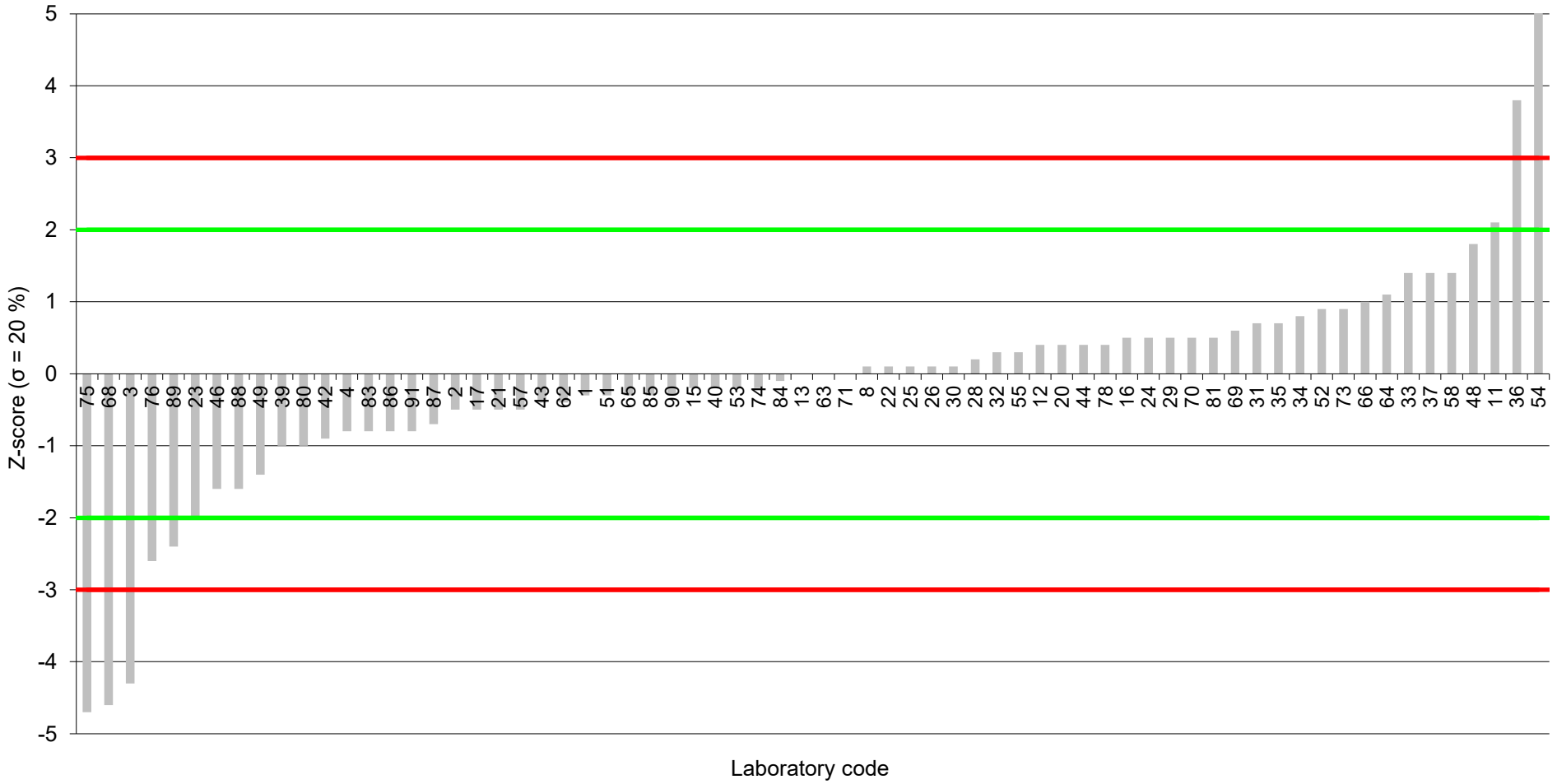
Assigned value: 0.167 ng/kg (12% moisture content)



Bentonite (2402-BT)

1,2,3,4,7,8-HxCDD

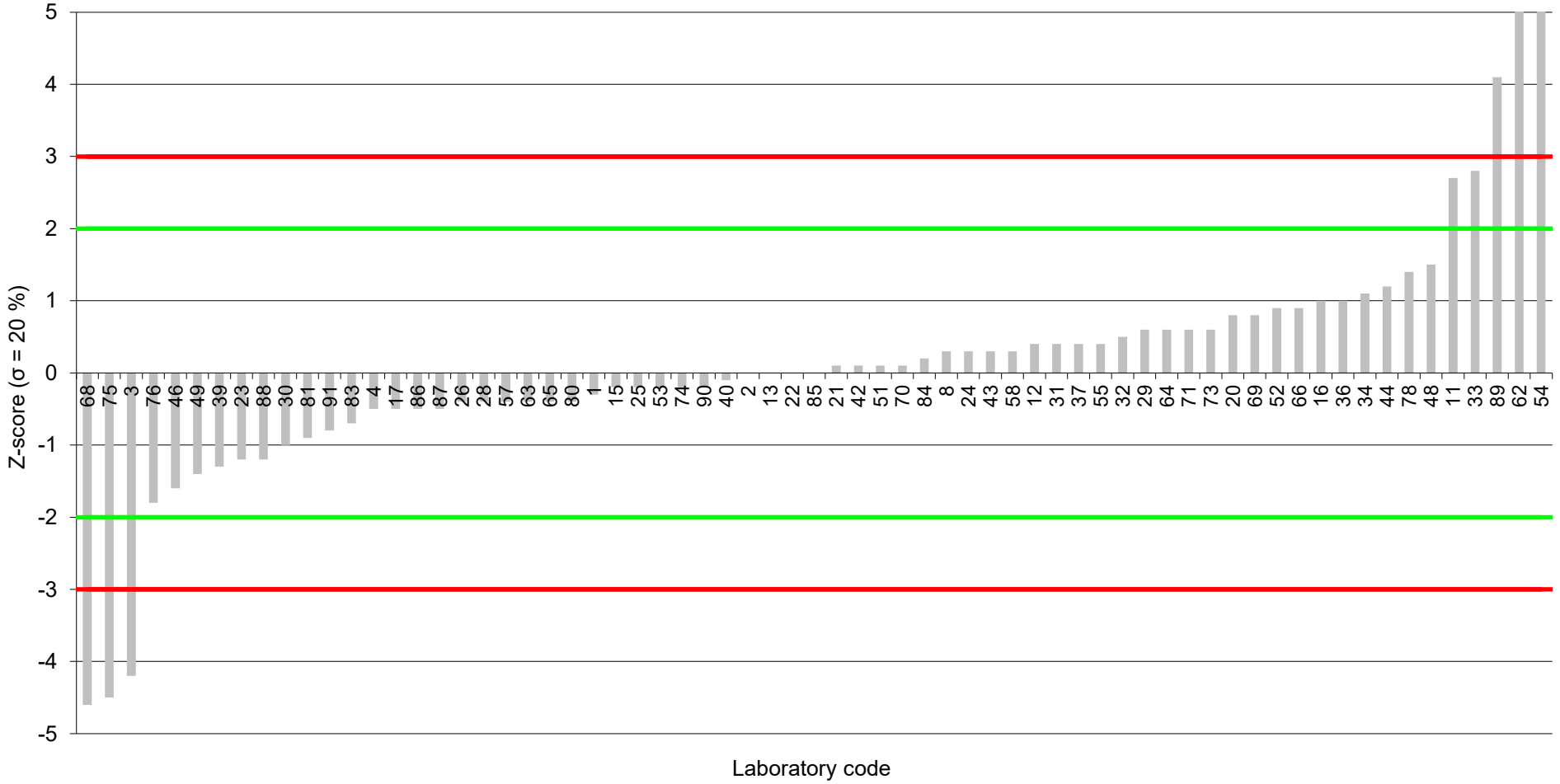
Assigned value: 0.265 ng/kg (12% moisture content)



Bentonite (2402-BT)

1,2,3,6,7,8-HxCDD

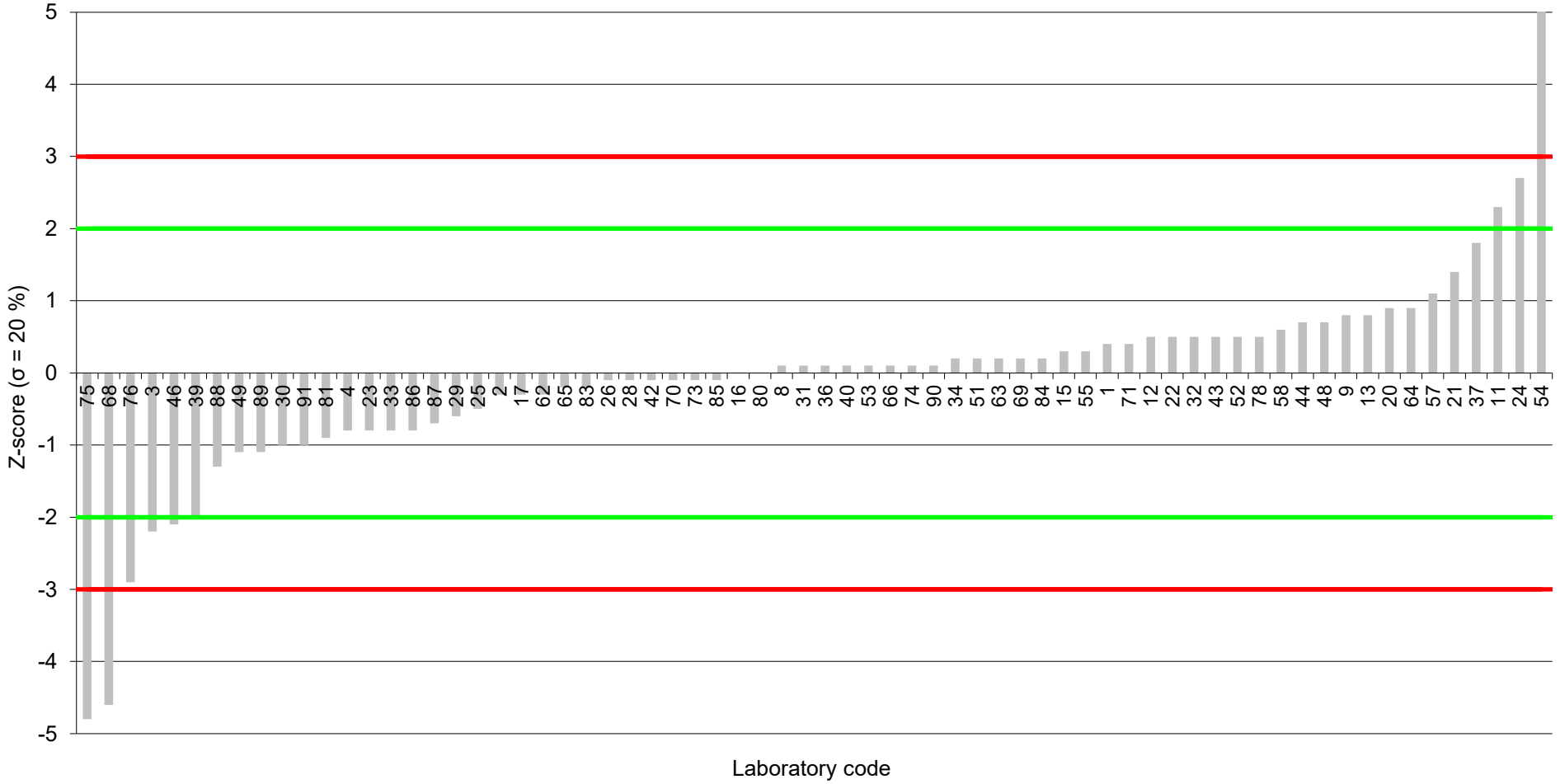
Assigned value: 0.313 ng/kg (12% moisture content)



Bentonite (2402-BT)

1,2,3,7,8,9-HxCDD

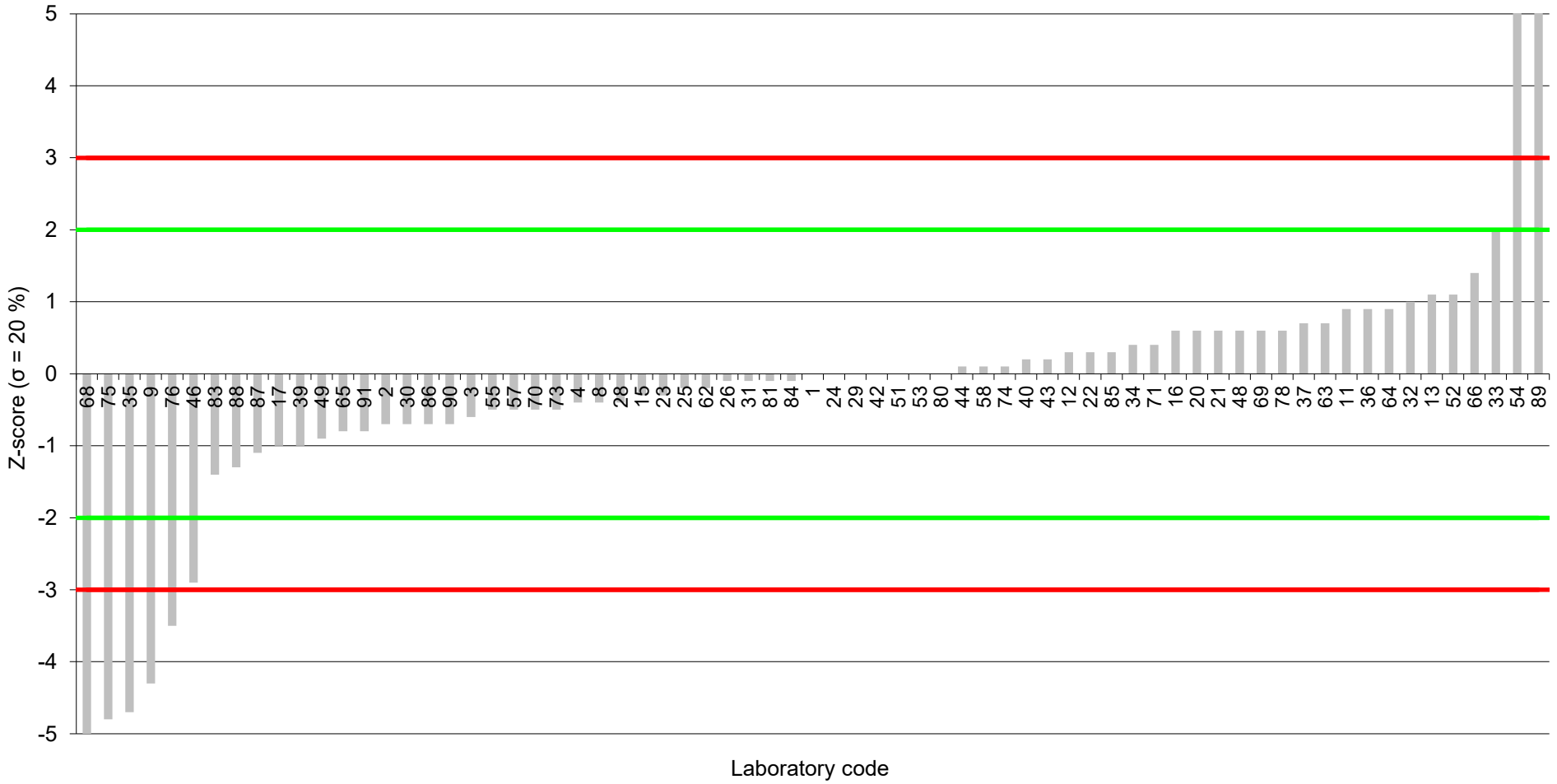
Assigned value: 0.73 ng/kg (12% moisture content)



Bentonite (2402-BT)

1,2,3,4,6,7,8-HpCDD

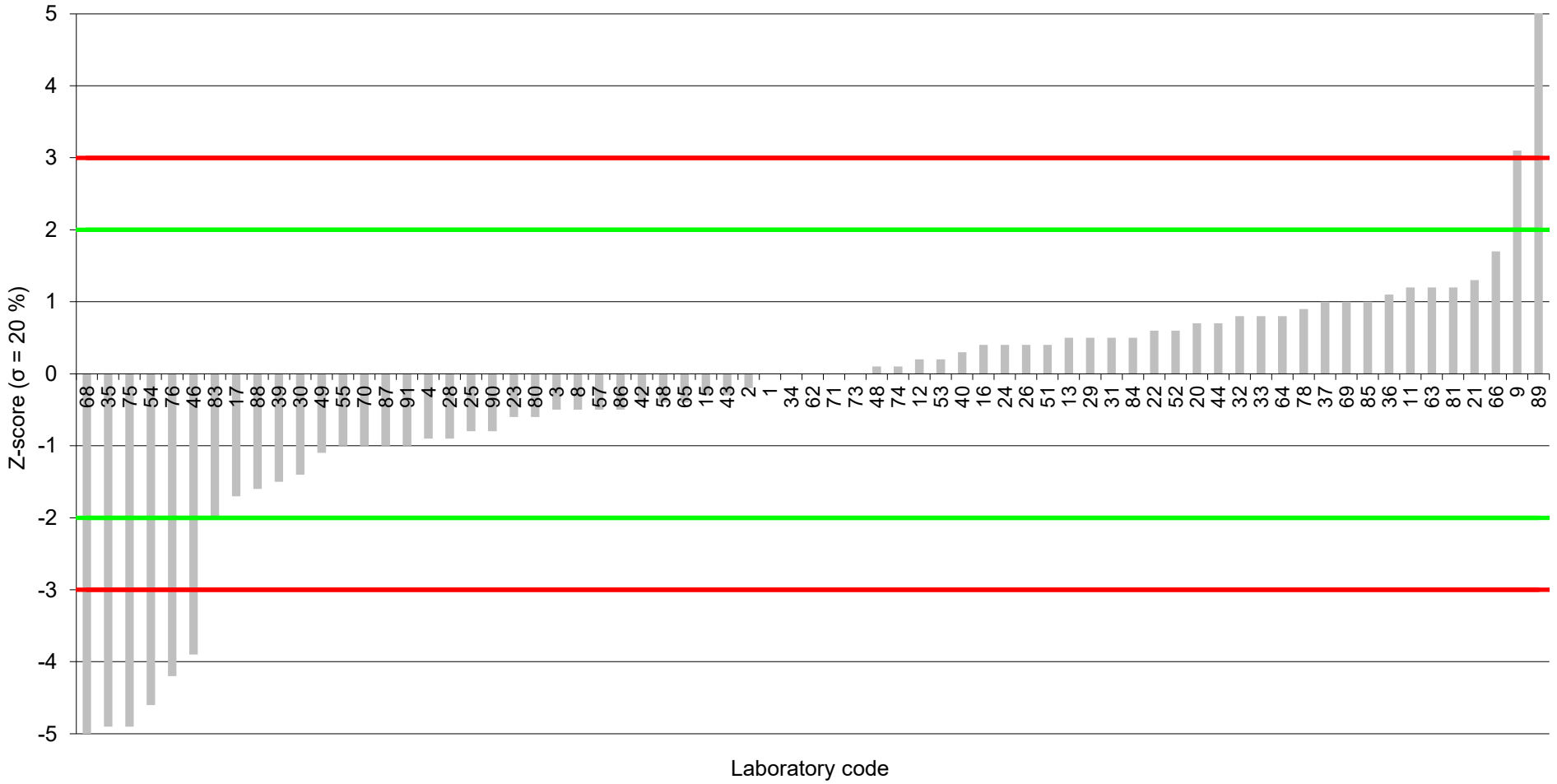
Assigned value: 8.56 ng/kg (12% moisture content)



Bentonite (2402-BT)

OCDD

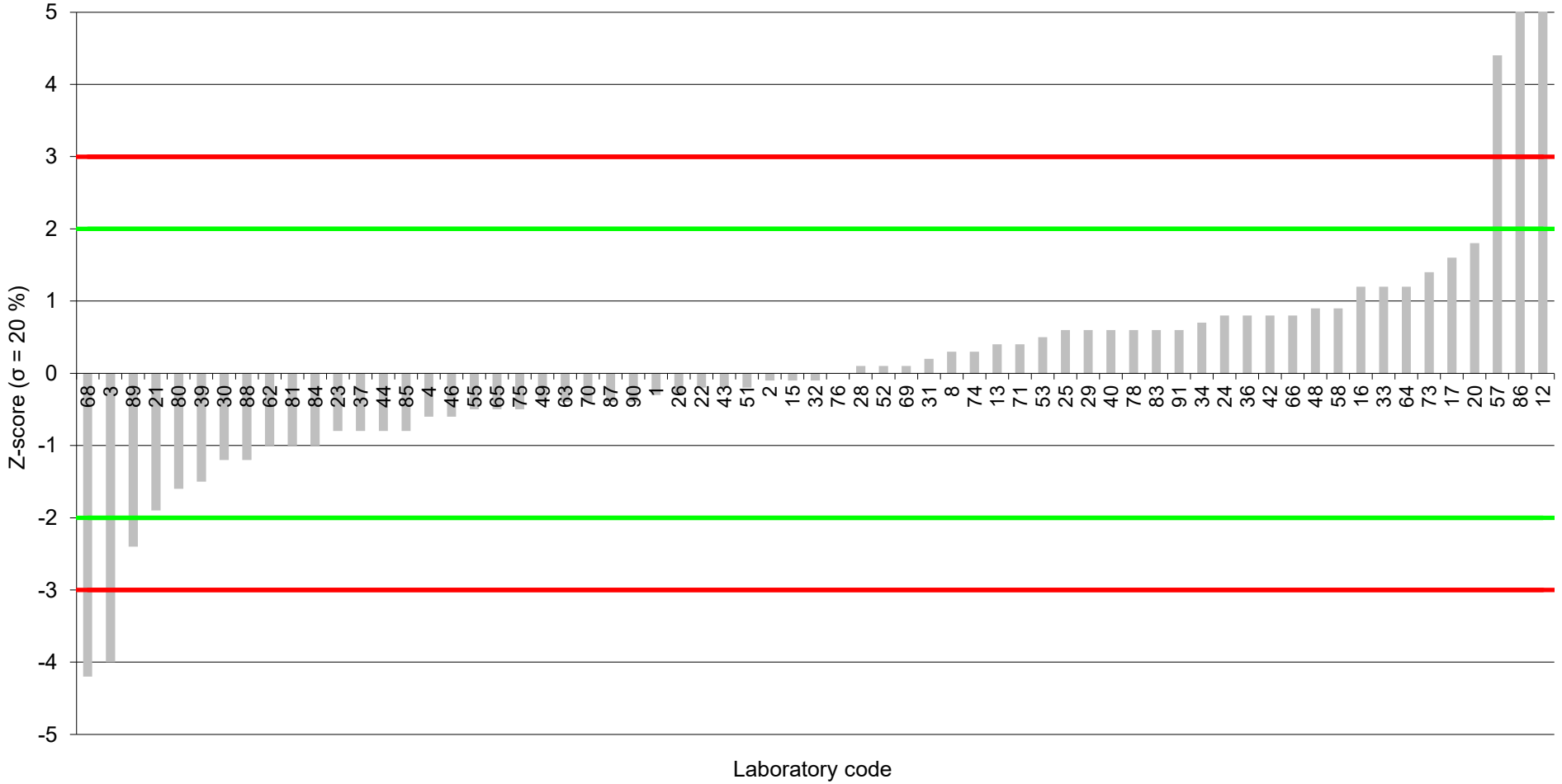
Assigned value: 92.4 ng/kg (12% moisture content)



Bentonite (2402-BT)

2,3,7,8-TCDF

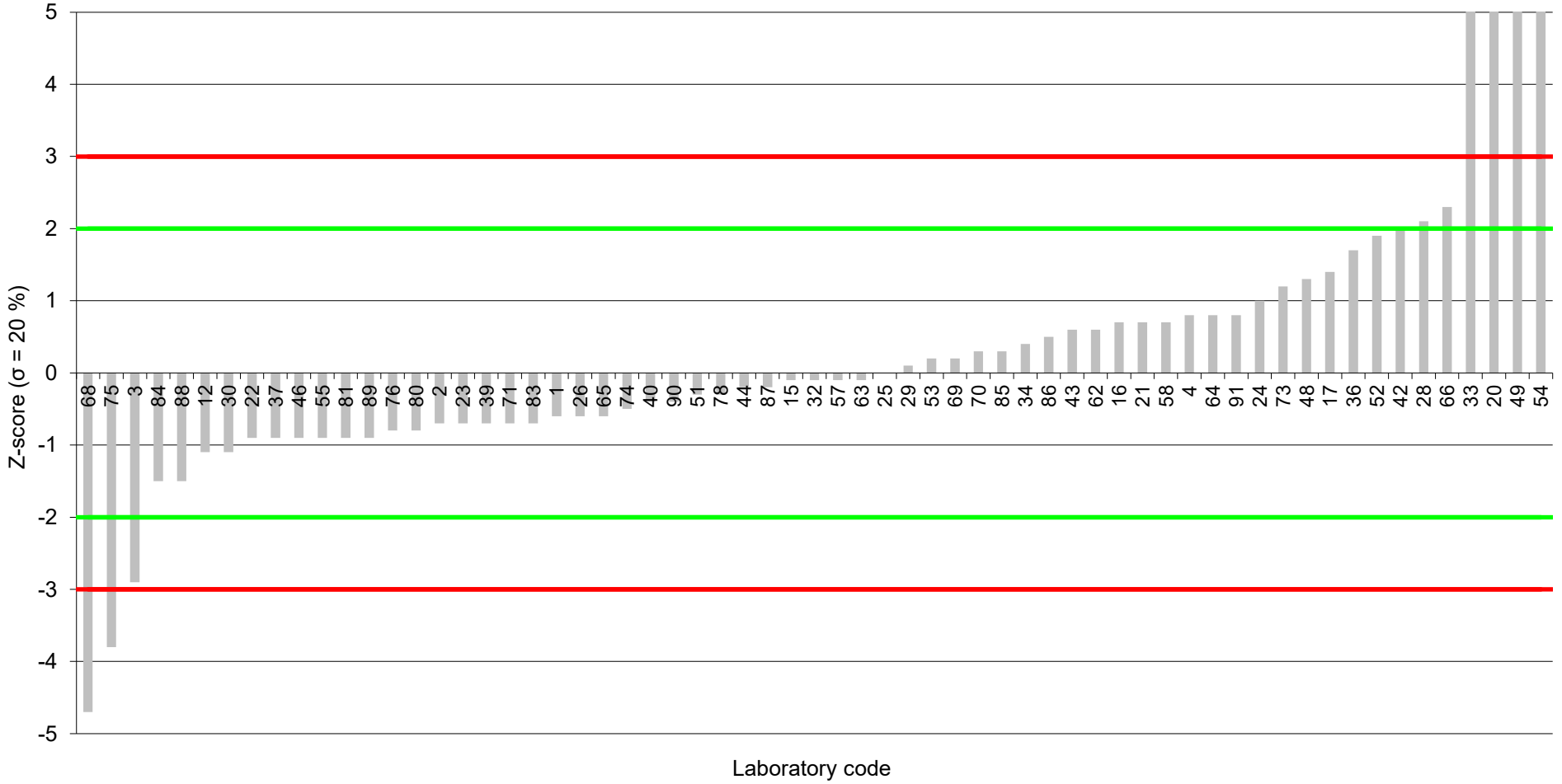
Assigned value: 0.143 ng/kg (12% moisture content)



Bentonite (2402-BT)

1,2,3,7,8-PeCDF

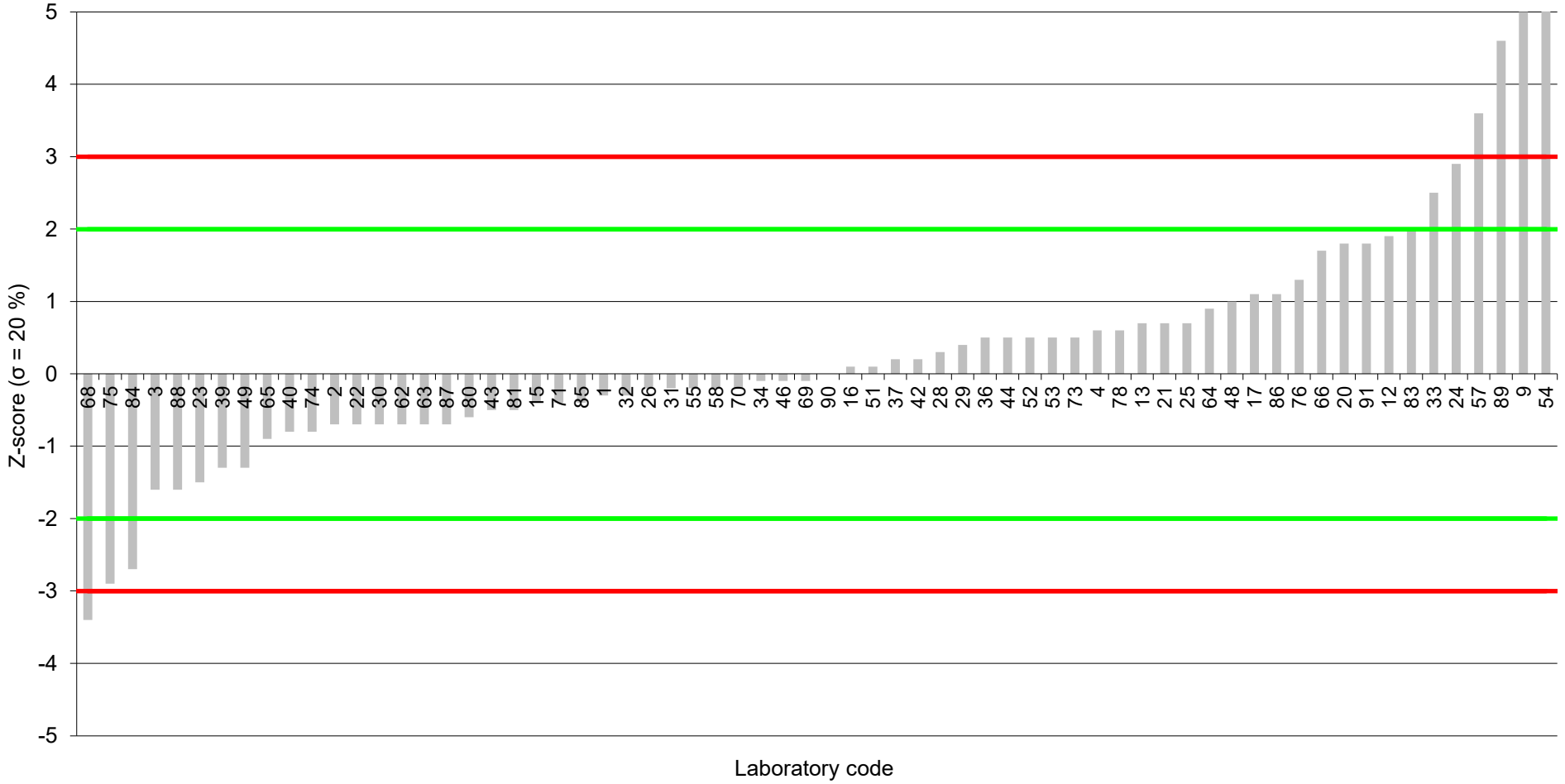
Assigned value: 0.0701 ng/kg (12% moisture content)



Bentonite (2402-BT)

2,3,4,7,8-PeCDF

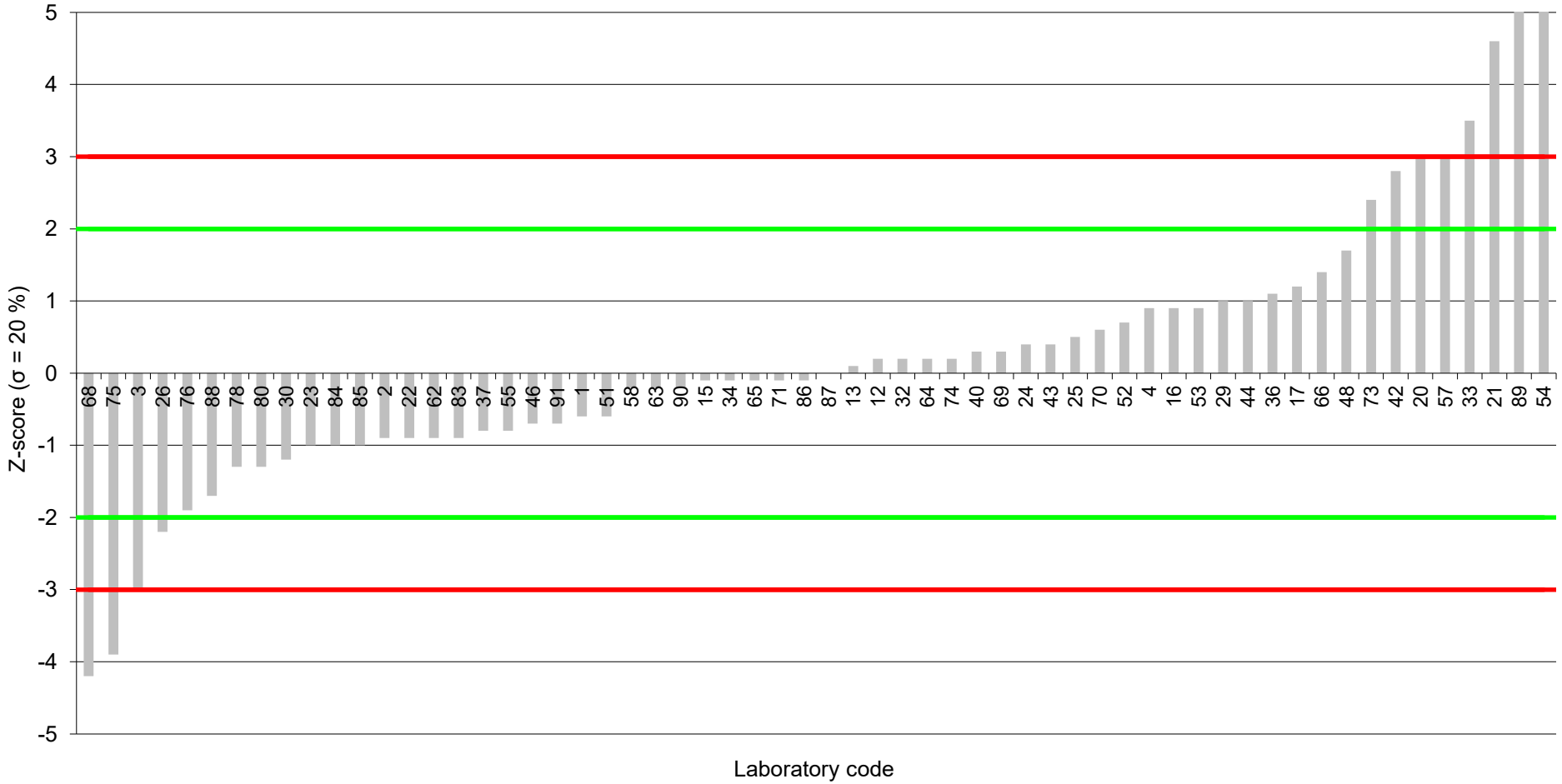
Assigned value: 0.115 ng/kg (12% moisture content)



Bentonite (2402-BT)

1,2,3,6,7,8-HxCDF

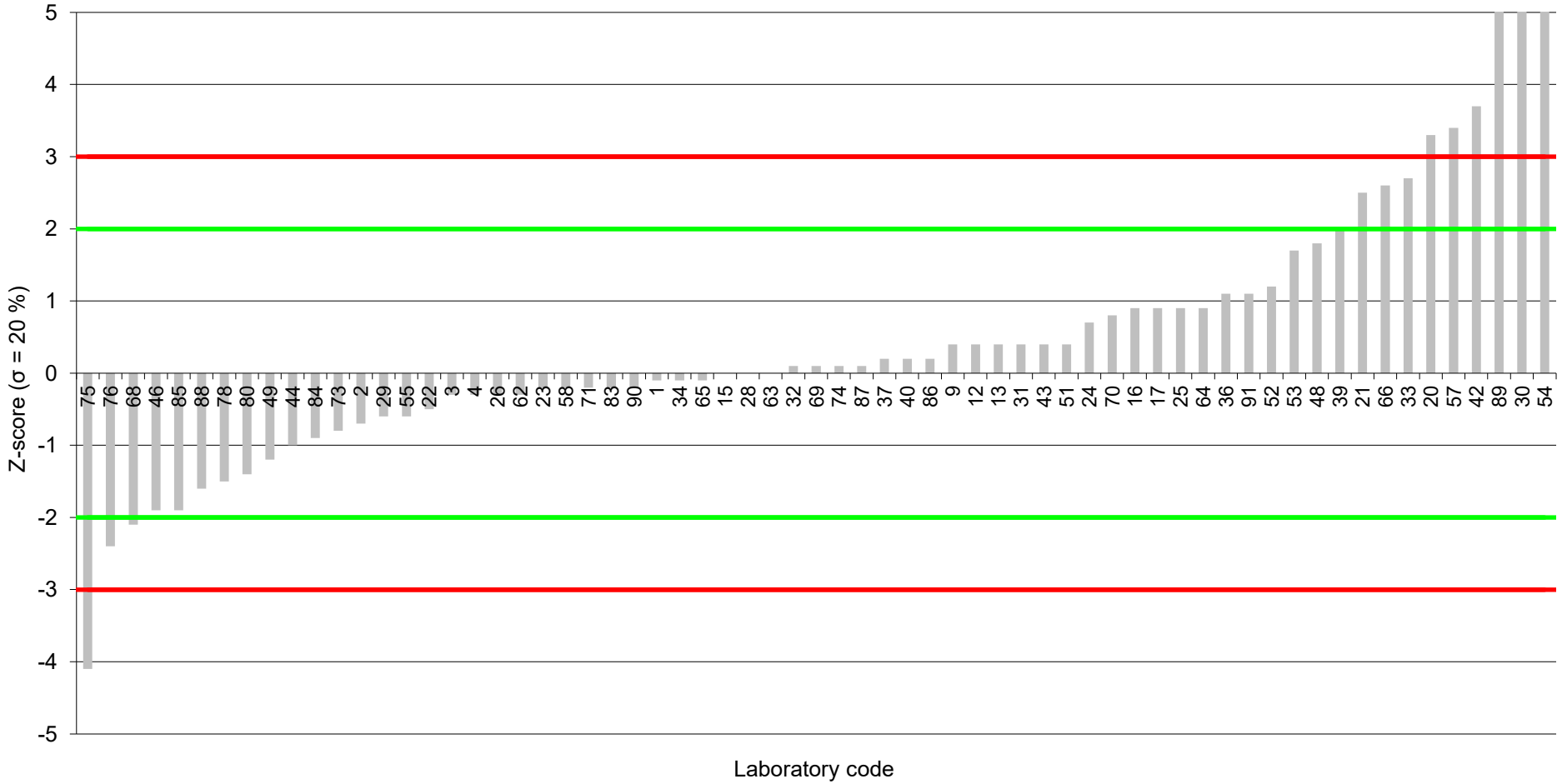
Assigned value: 0.0727 ng/kg (12% moisture content)



Bentonite (2402-BT)

1,2,3,4,7,8-HxCDF

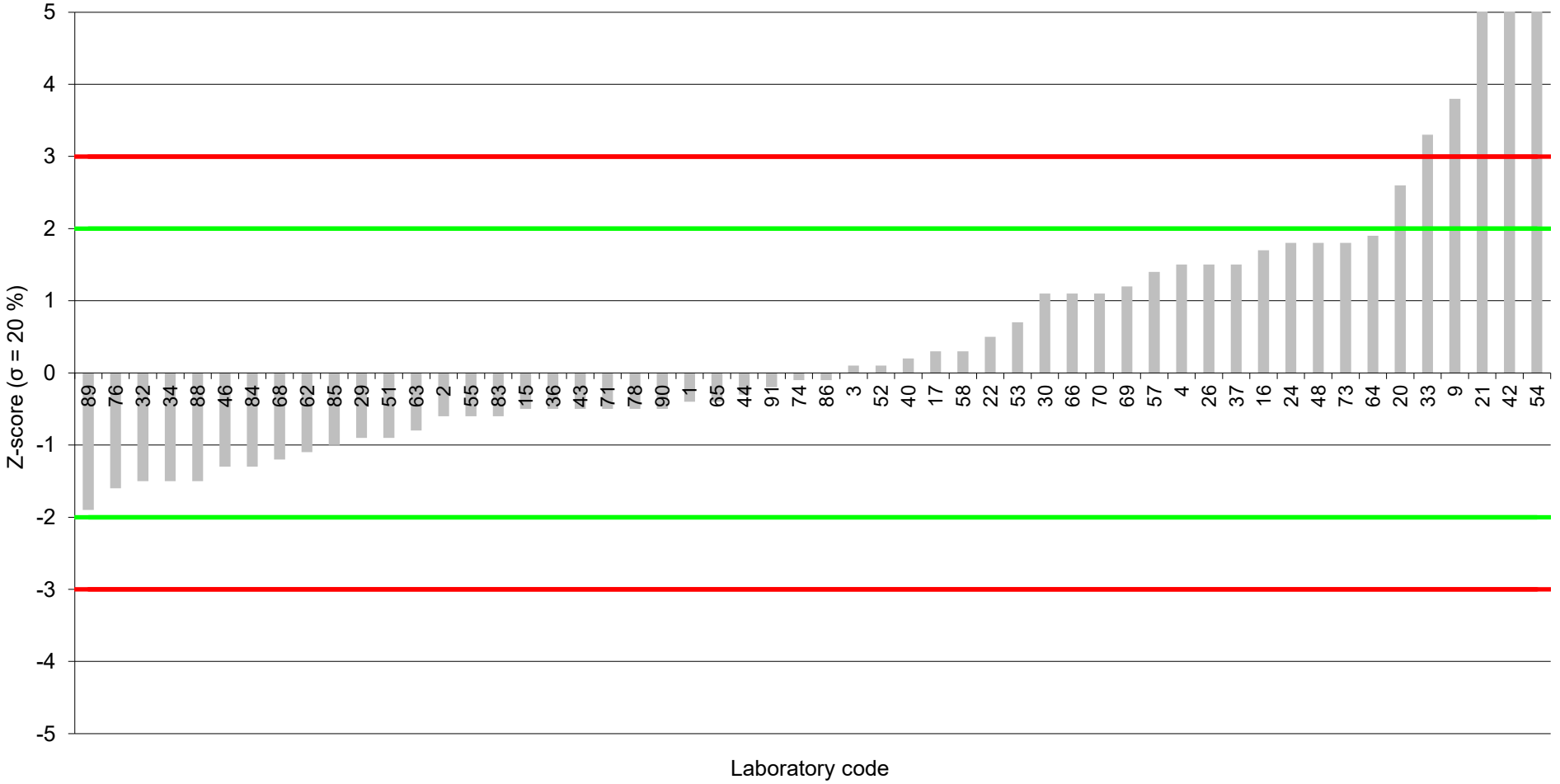
Assigned value: 0.0929 ng/kg (12% moisture content)



Bentonite (2402-BT)

2,3,4,6,7,8-HxCDF

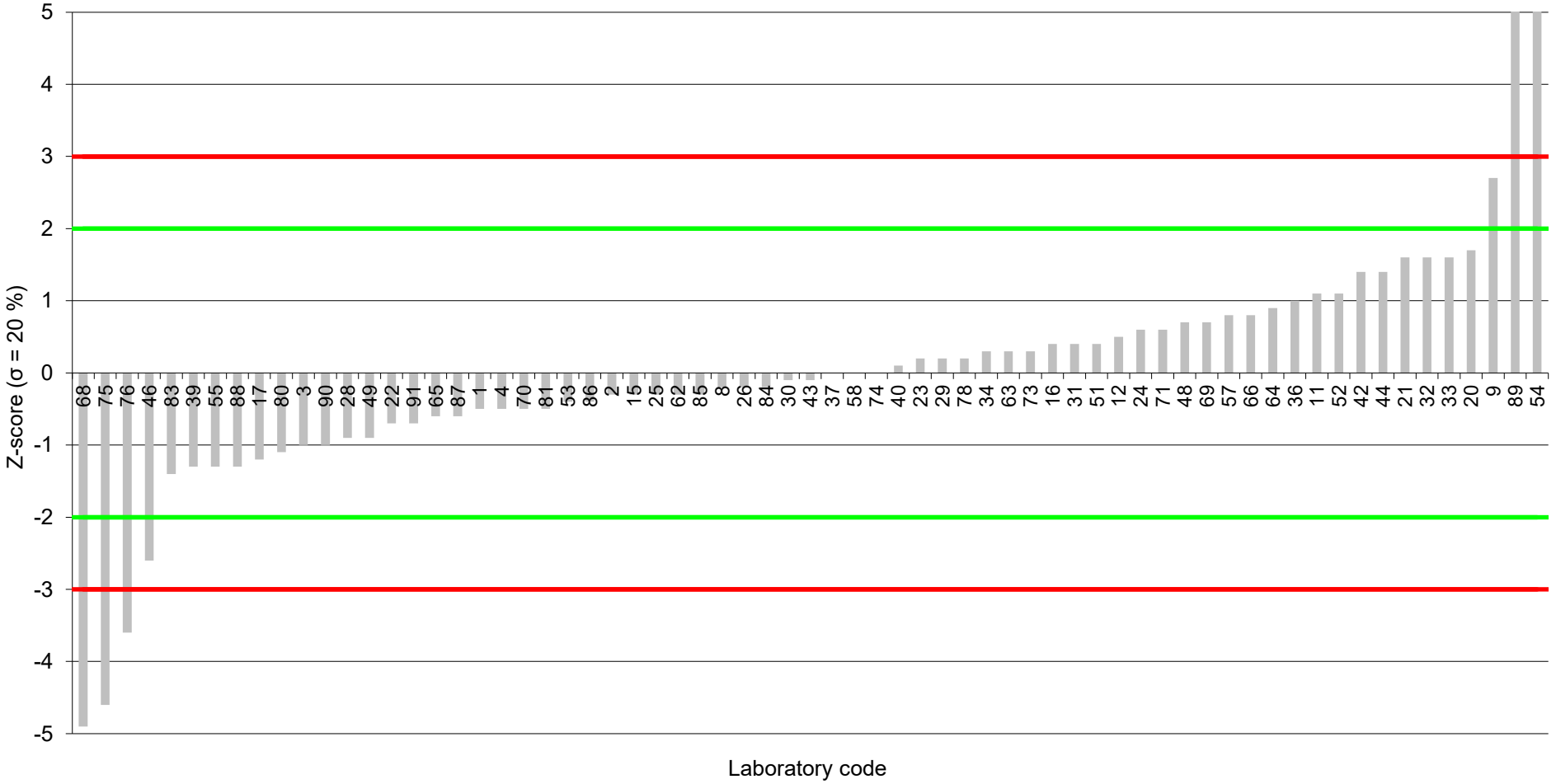
Assigned value: 0.057 ng/kg (12% moisture content)



Bentonite (2402-BT)

1,2,3,4,6,7,8-HpCDF

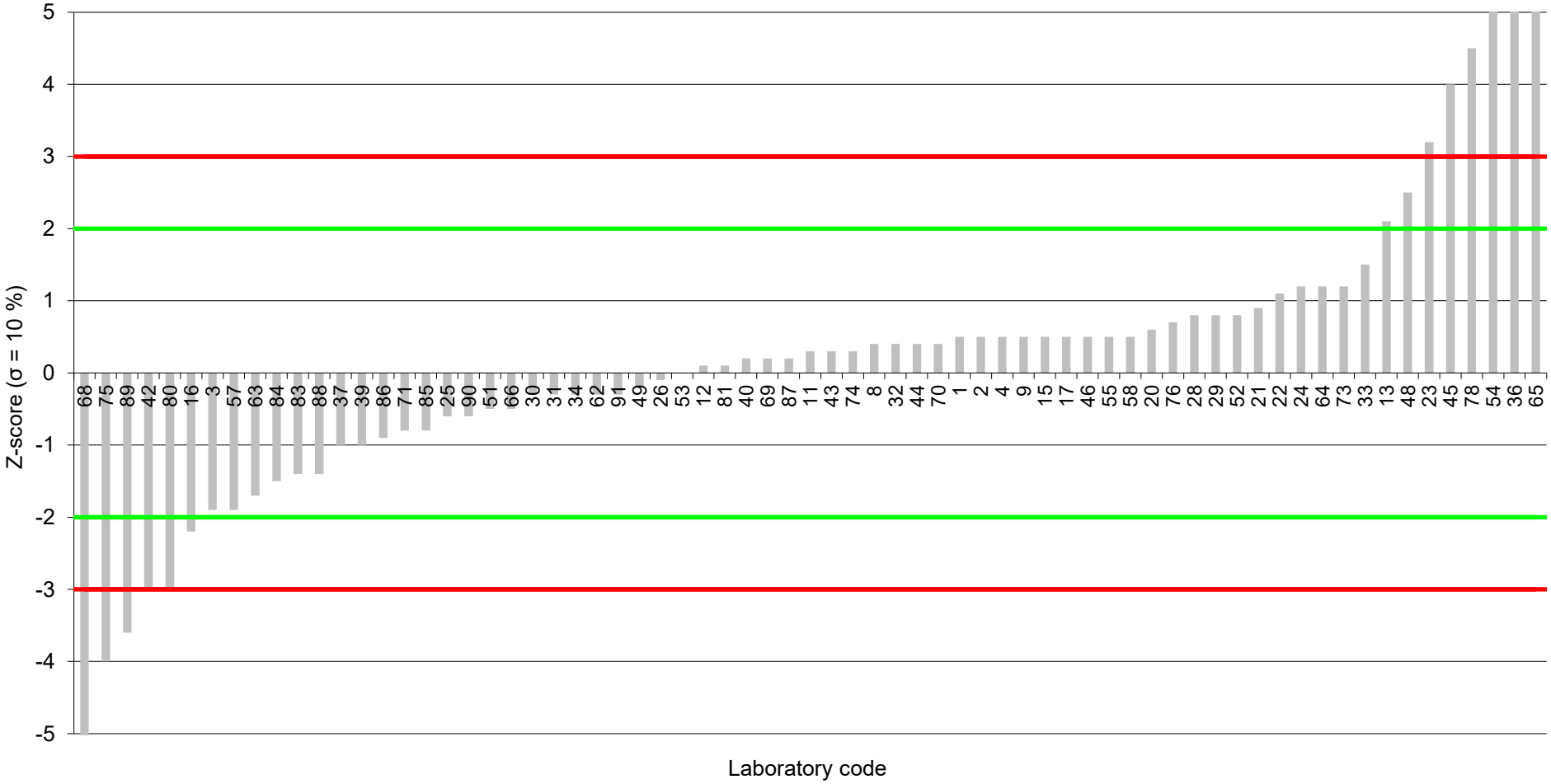
Assigned value: 0.784 ng/kg (12% moisture content)



Bentonite (2402-BT)

WHO-PCB-TEQ upper bound (reported)

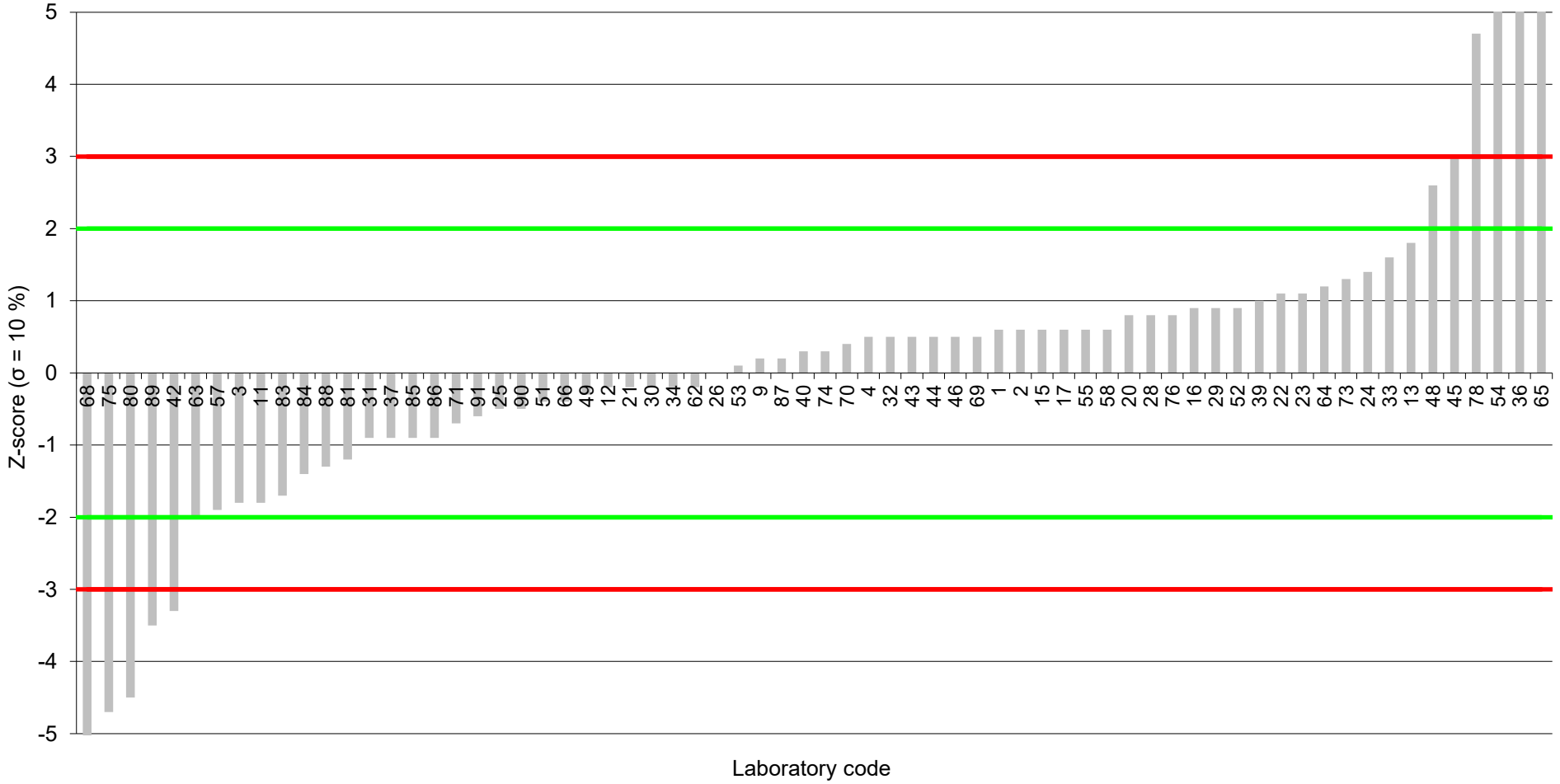
Assigned value: 0.267 ng/kg (12% moisture content)



Bentonite (2402-BT)

WHO-PCB-TEQ lower bound (reported)

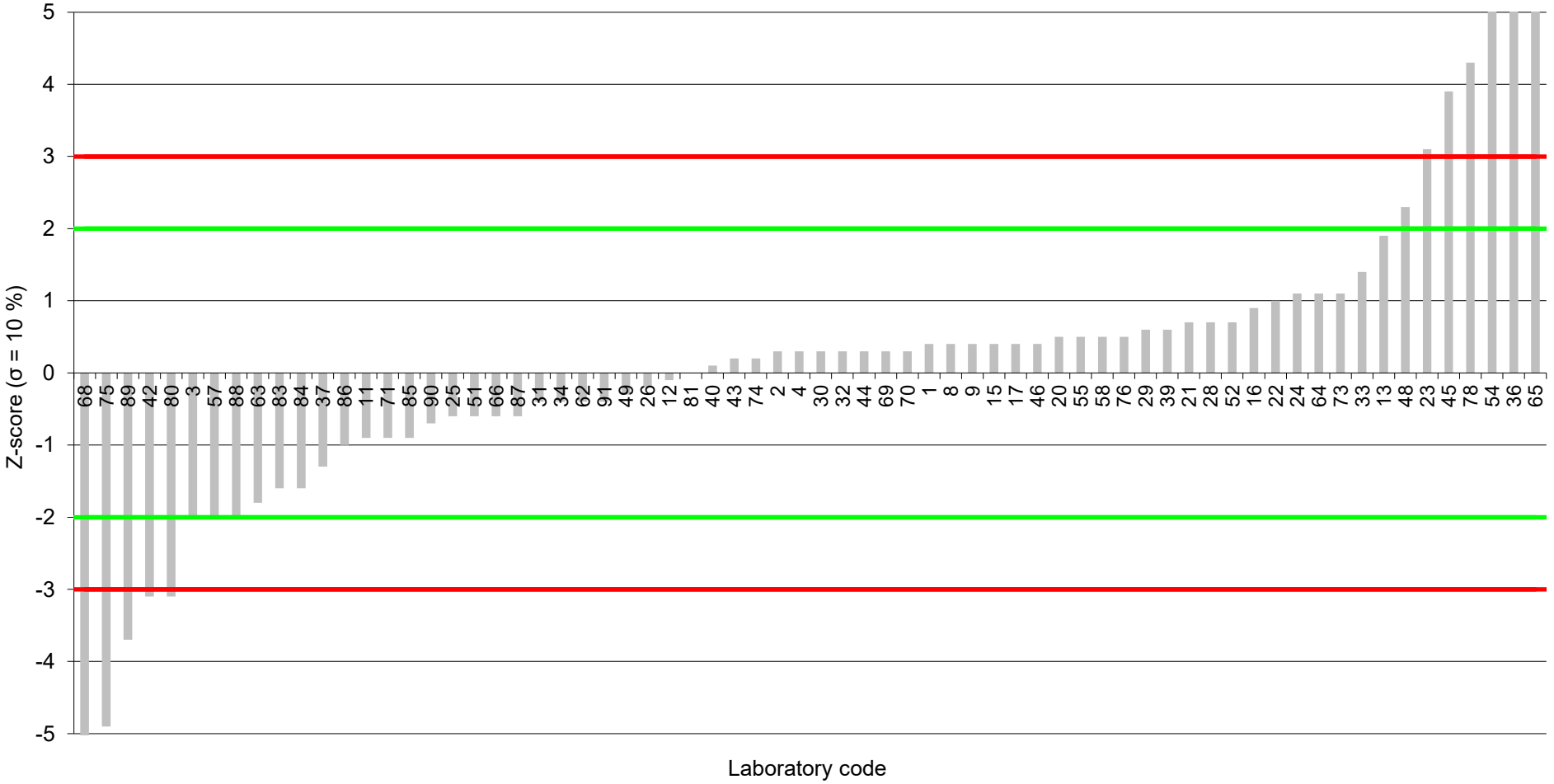
Assigned value: 0.264 ng/kg (12% moisture content)



Bentonite (2402-BT)

WHO-PCB-TEQ upper bound (calculated)

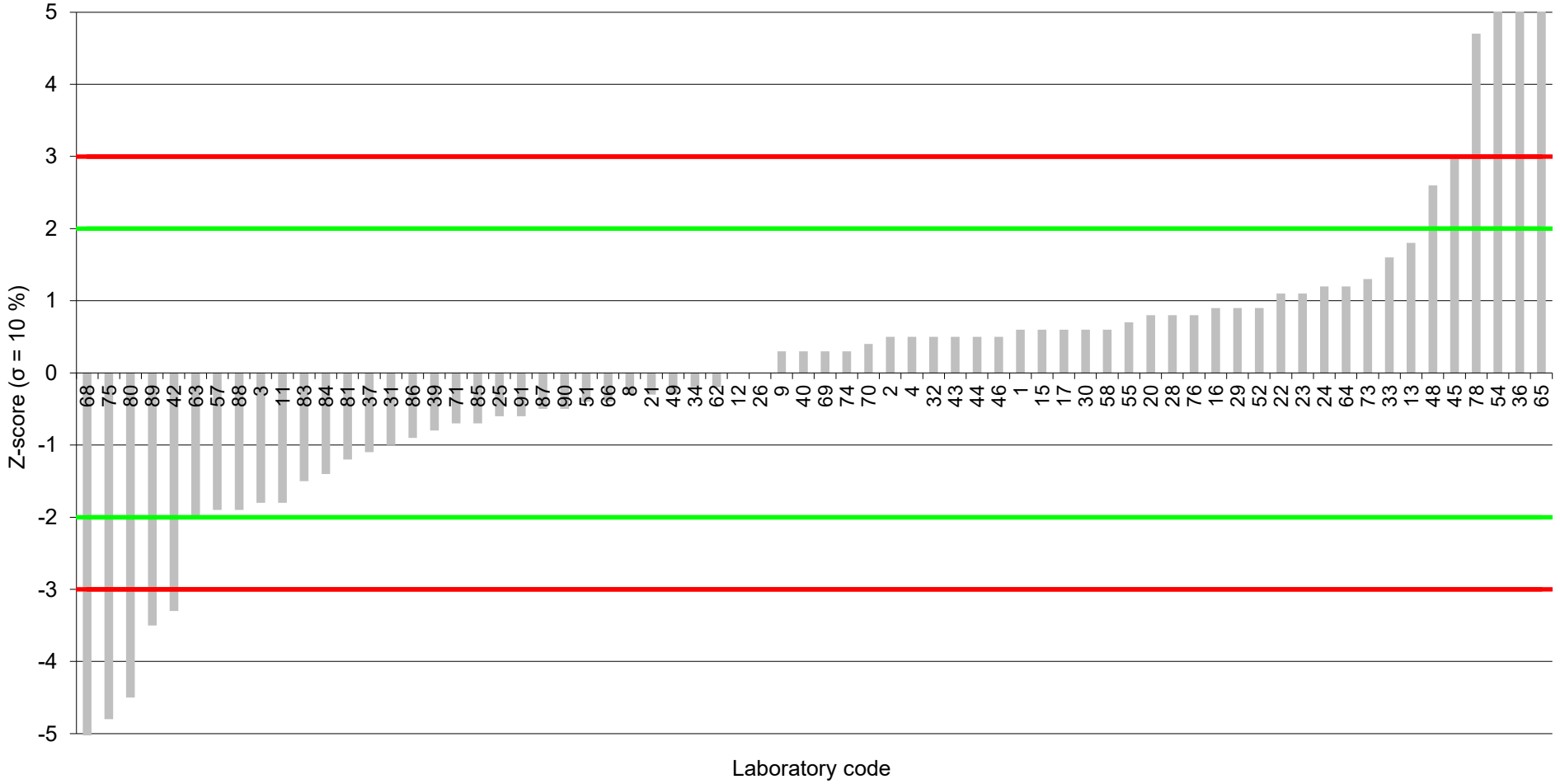
Assigned value: 0.27 ng/kg (12% moisture content)



Bentonite (2402-BT)

WHO-PCB-TEQ lower bound (calculated)

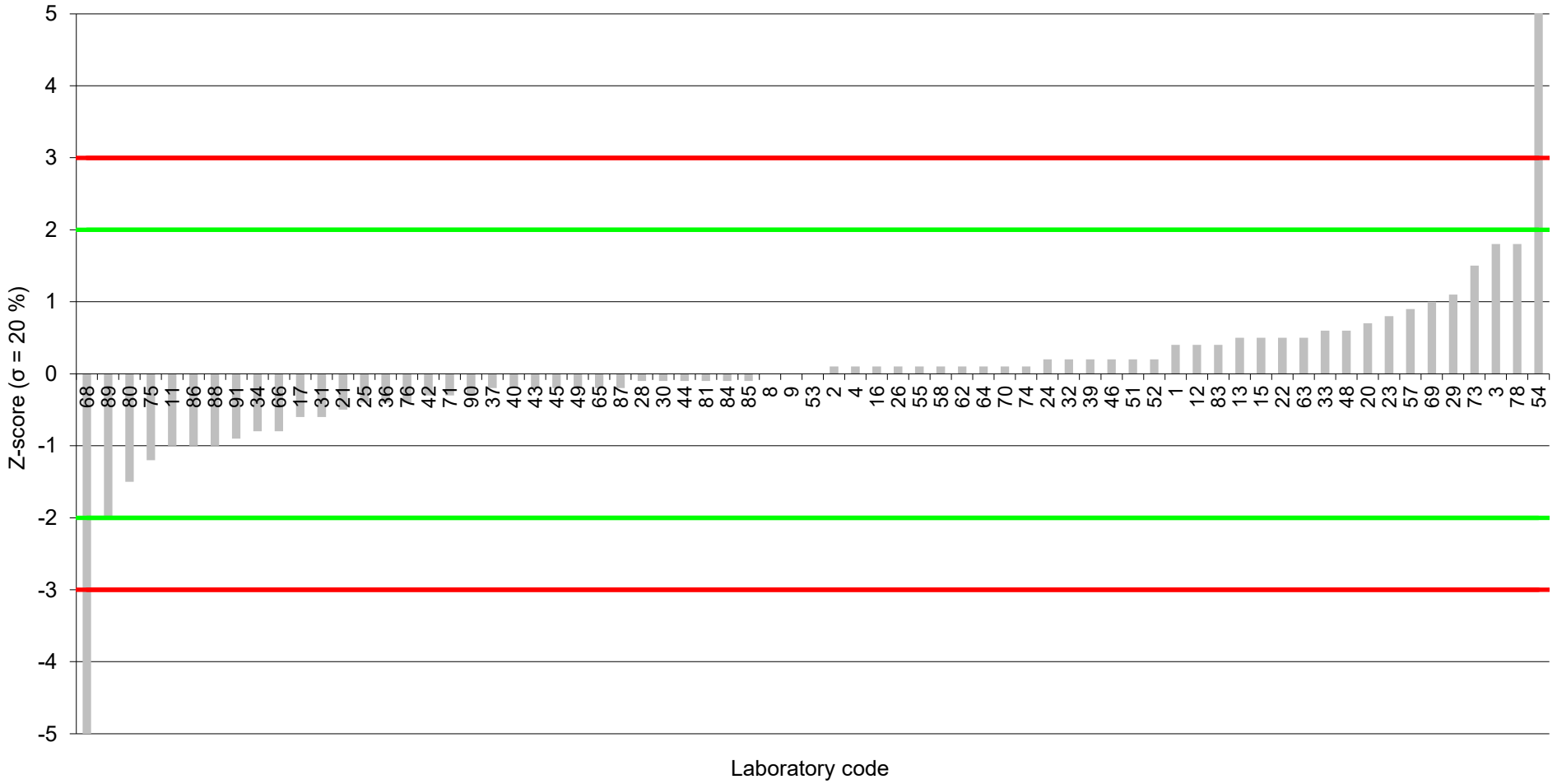
Assigned value: 0.264 ng/kg (12% moisture content)



Bentonite (2402-BT)

PCB 105

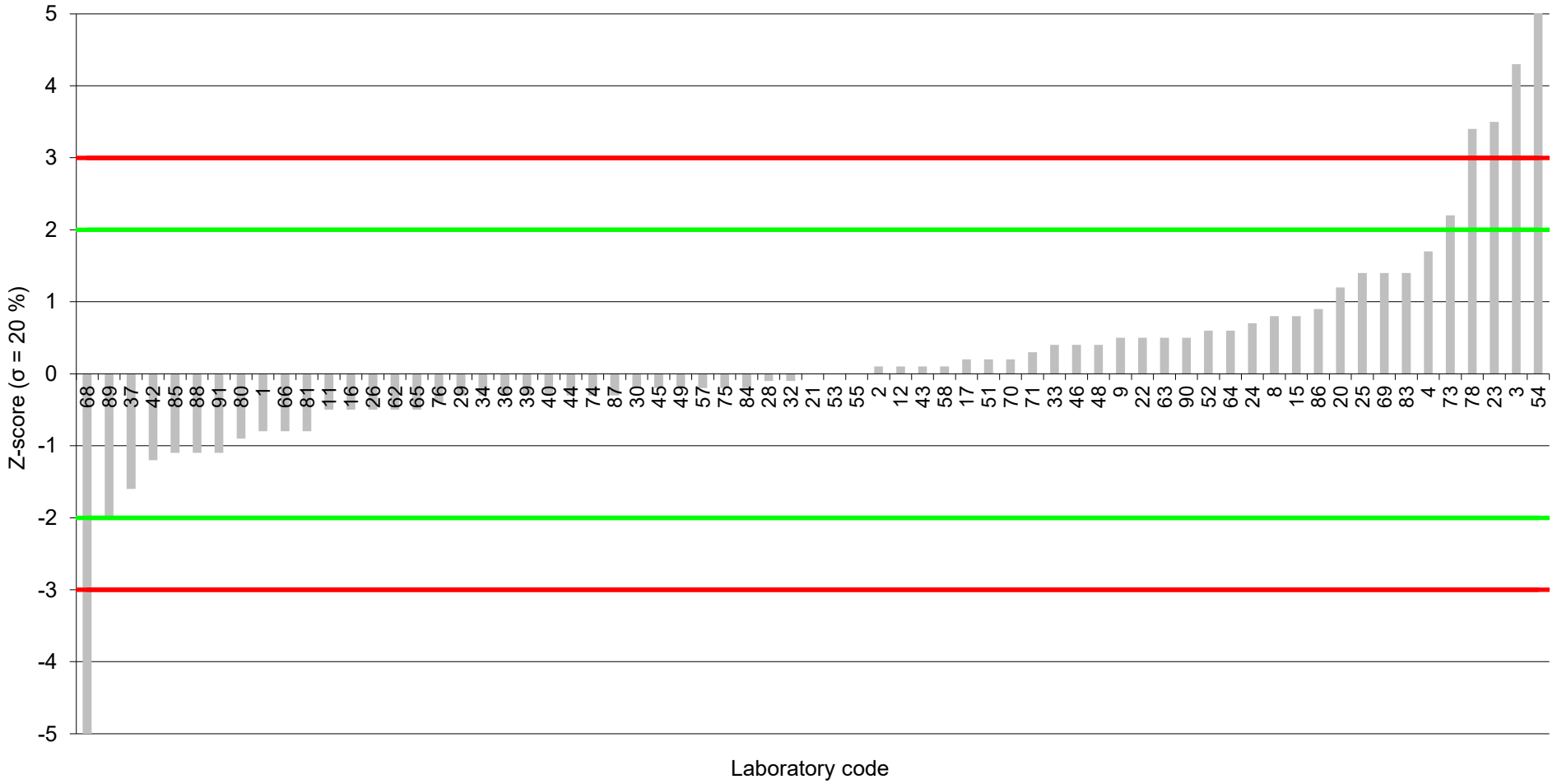
Assigned value: 516 ng/kg (12% moisture content)



Bentonite (2402-BT)

PCB 114

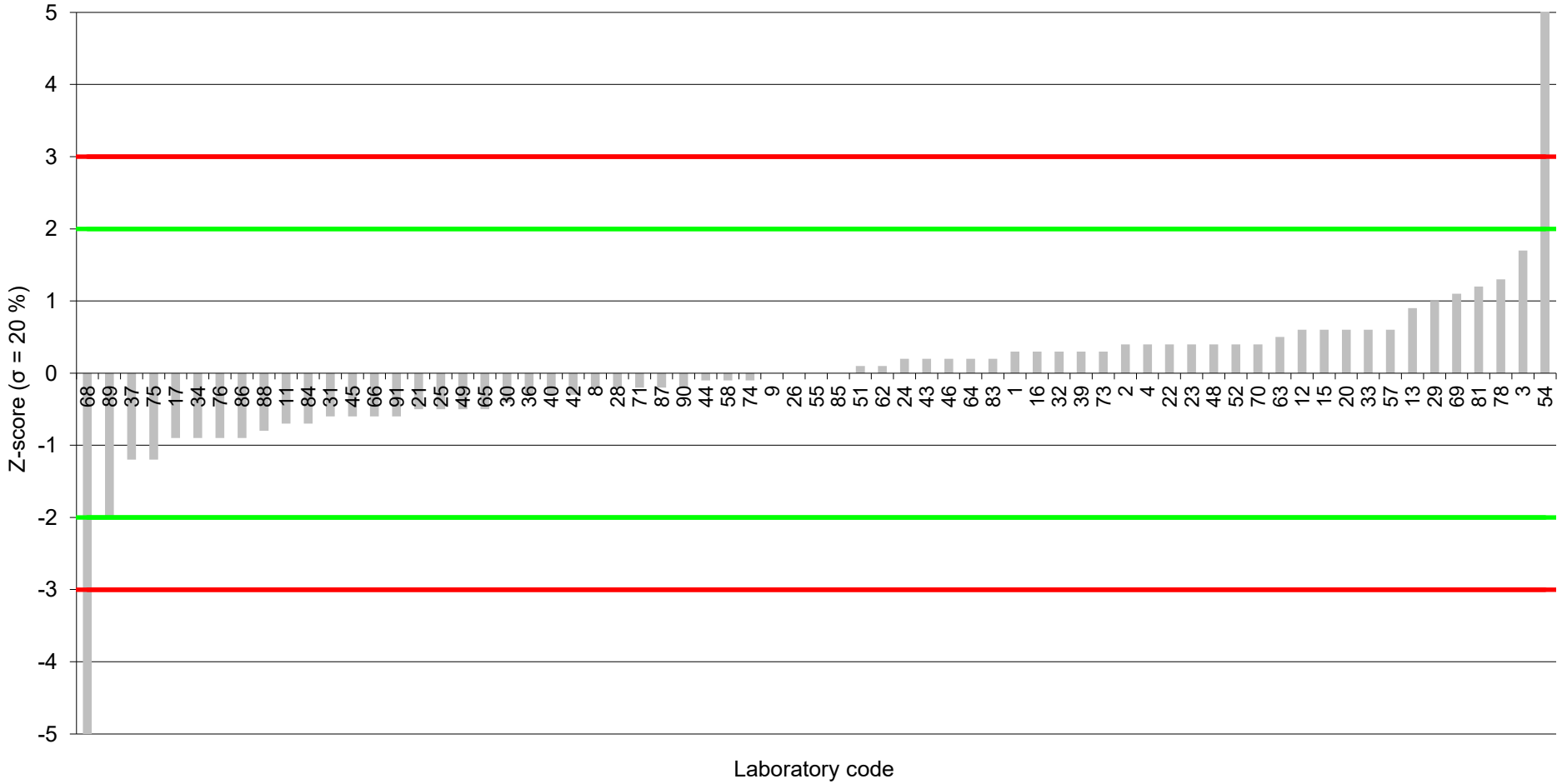
Assigned value: 38.2 ng/kg (12% moisture content)



Bentonite (2402-BT)

PCB 118

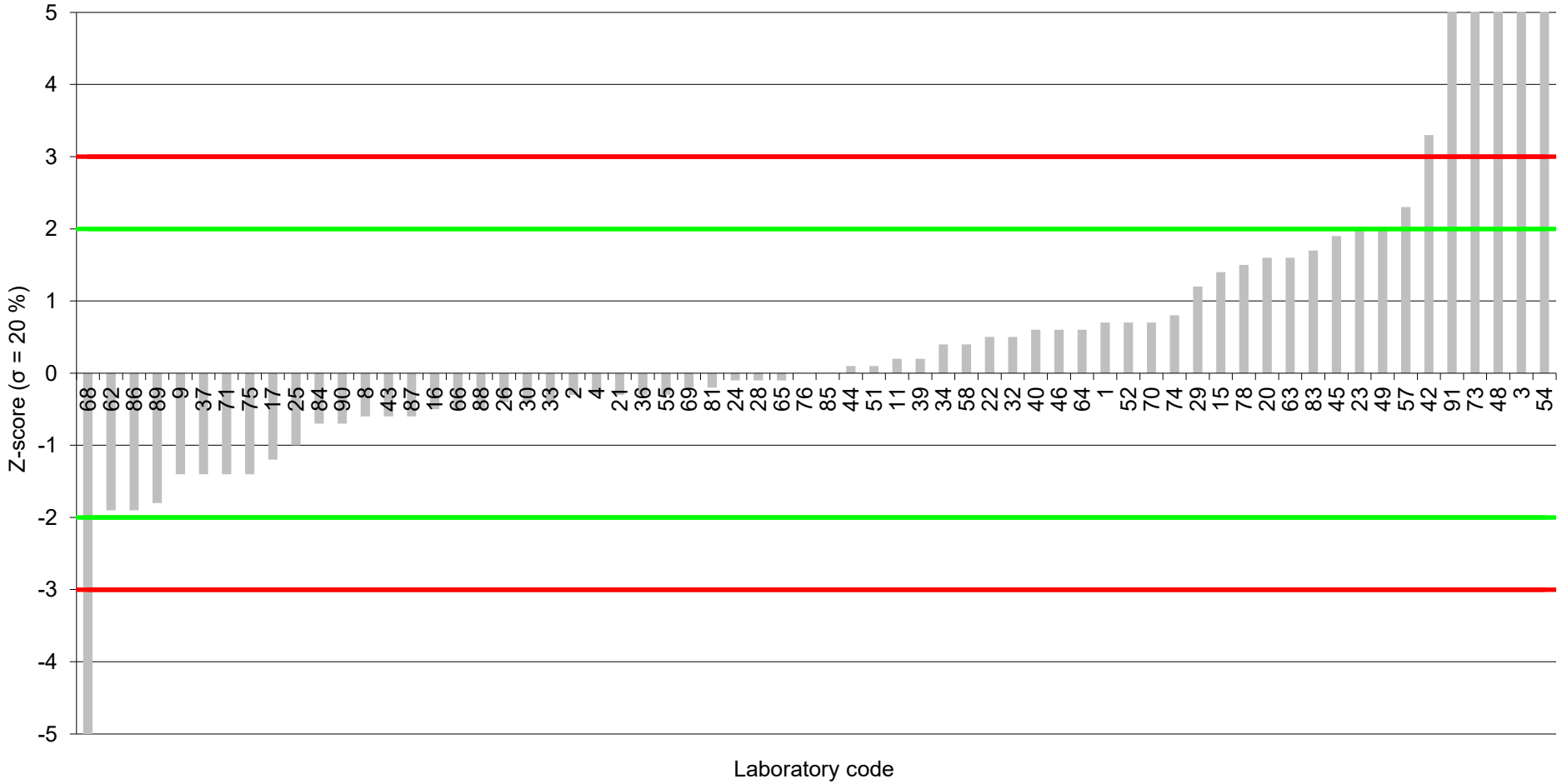
Assigned value: 949 ng/kg (12% moisture content)



Bentonite (2402-BT)

PCB 123

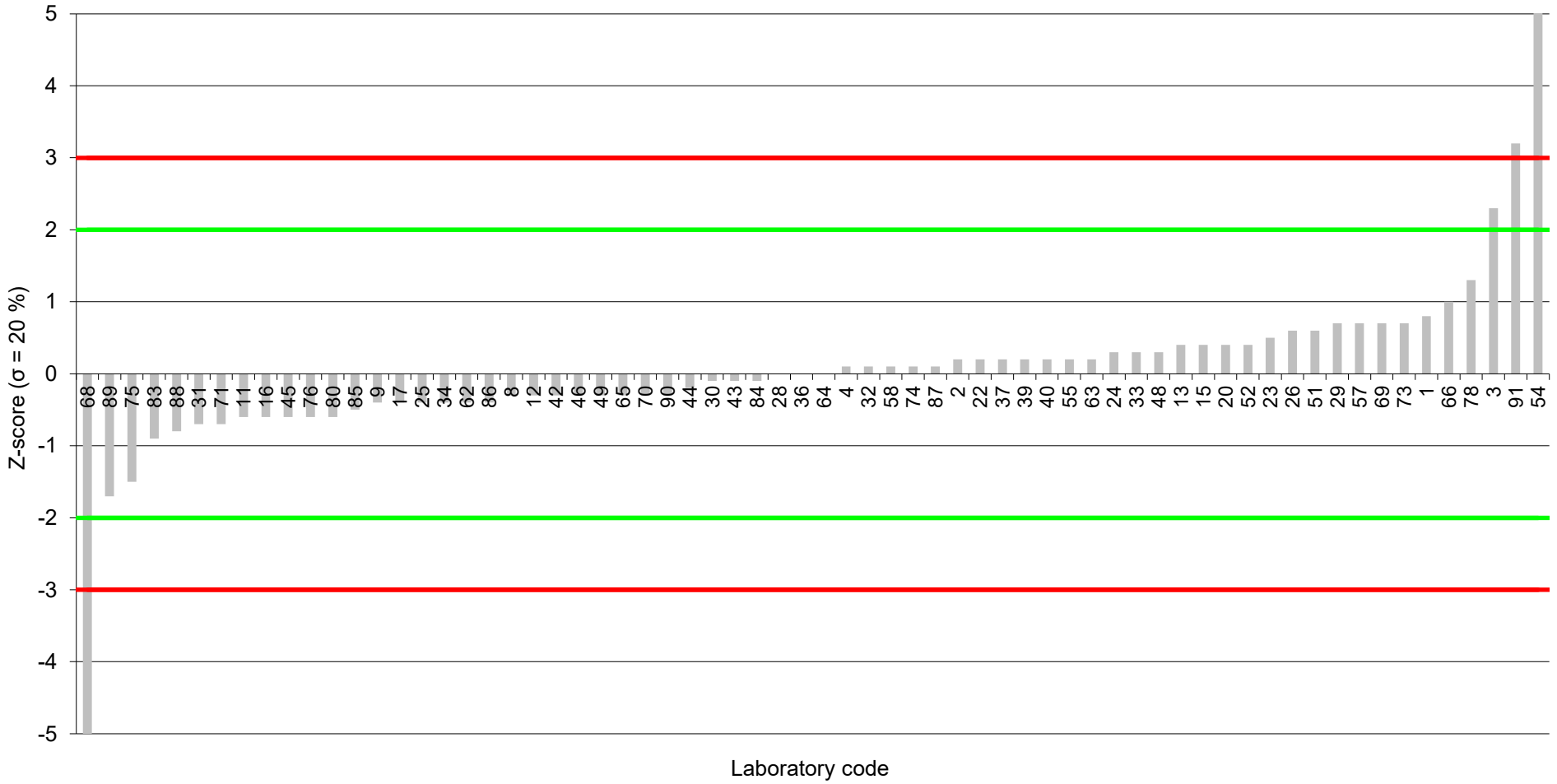
Assigned value: 22.3 ng/kg (12% moisture content)



Bentonite (2402-BT)

PCB 156

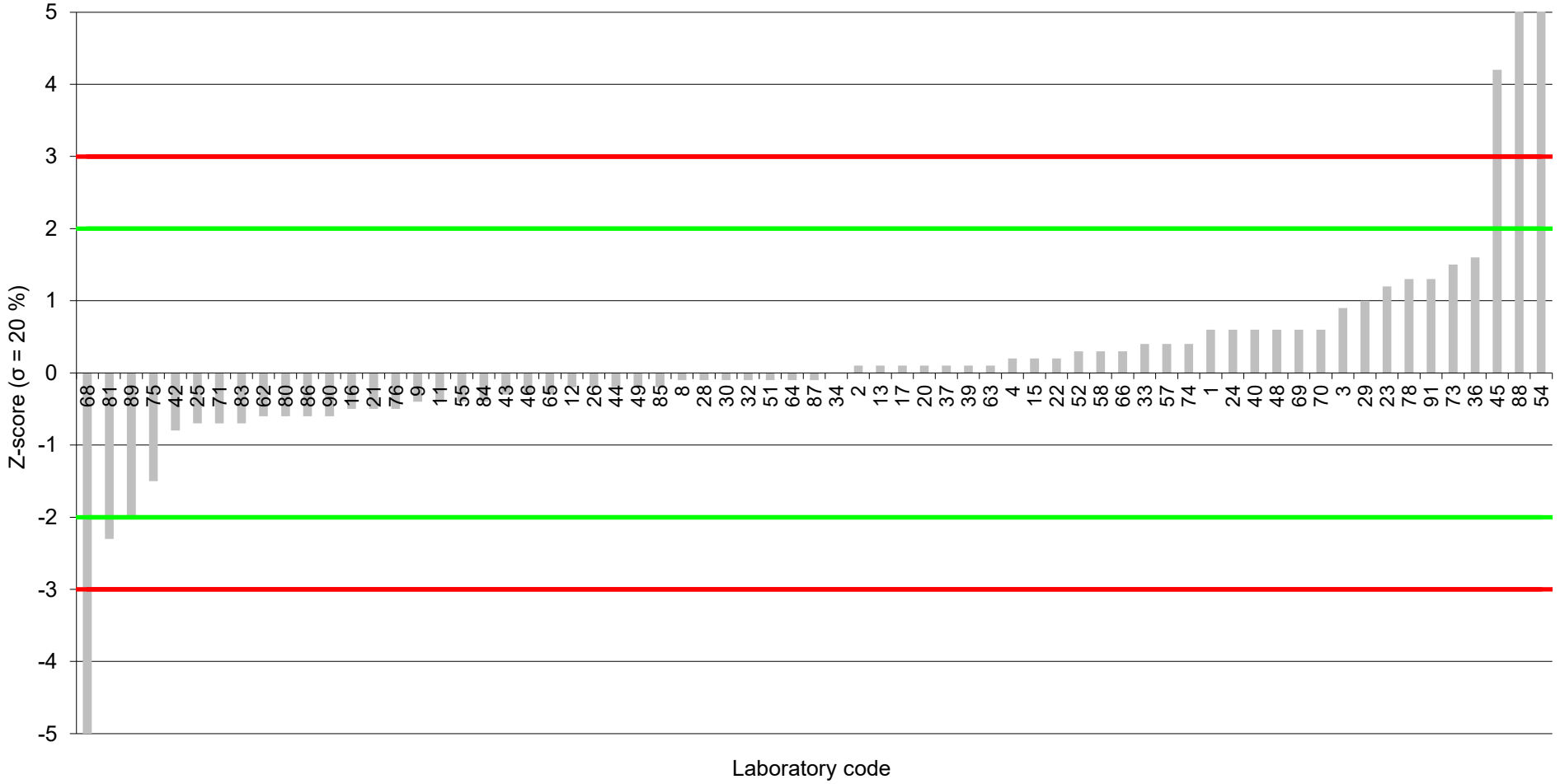
Assigned value: 88.1 ng/kg (12% moisture content)



Bentonite (2402-BT)

PCB 157

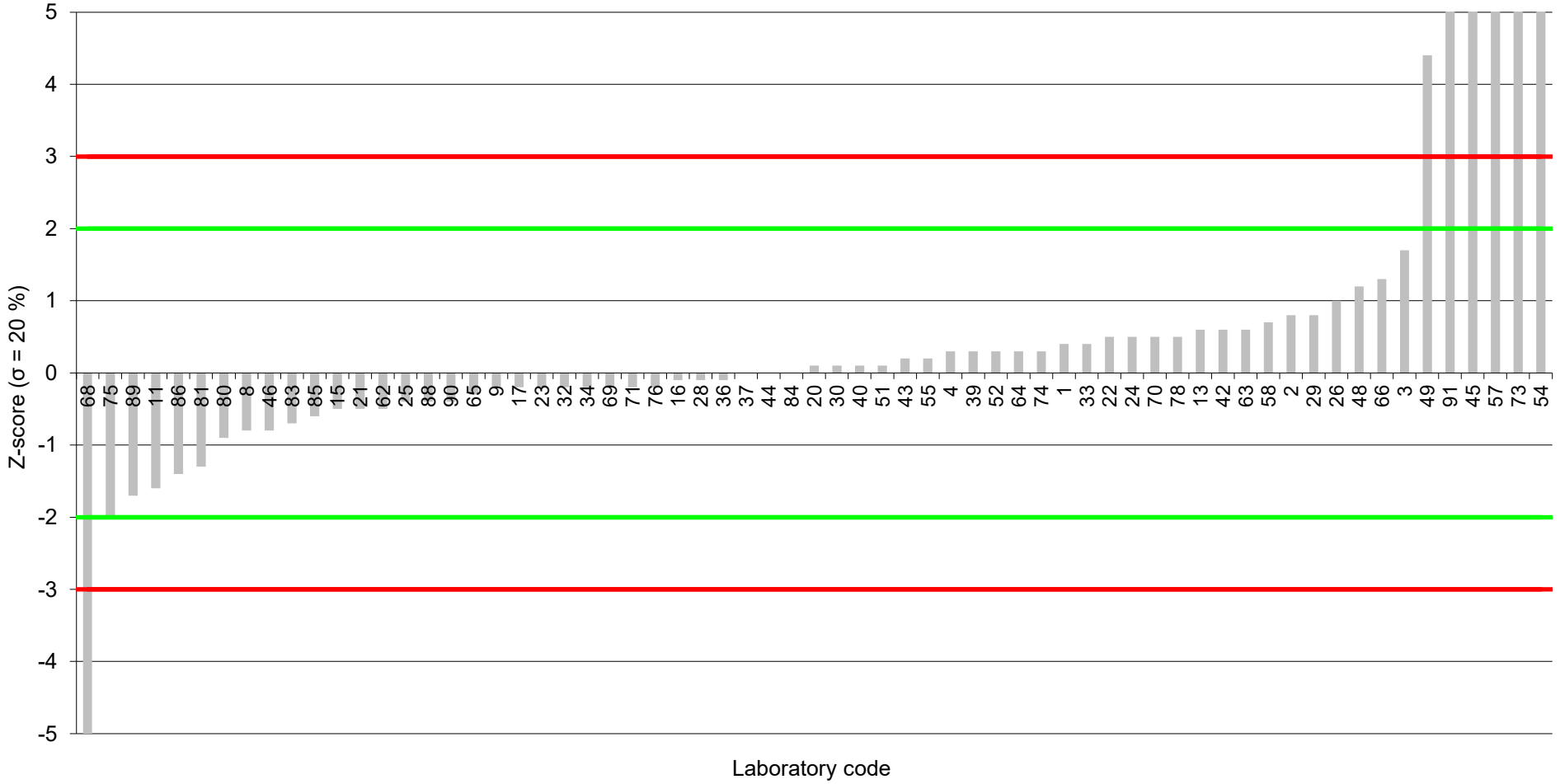
Assigned value: 18.6 ng/kg (12% moisture content)



Bentonite (2402-BT)

PCB 167

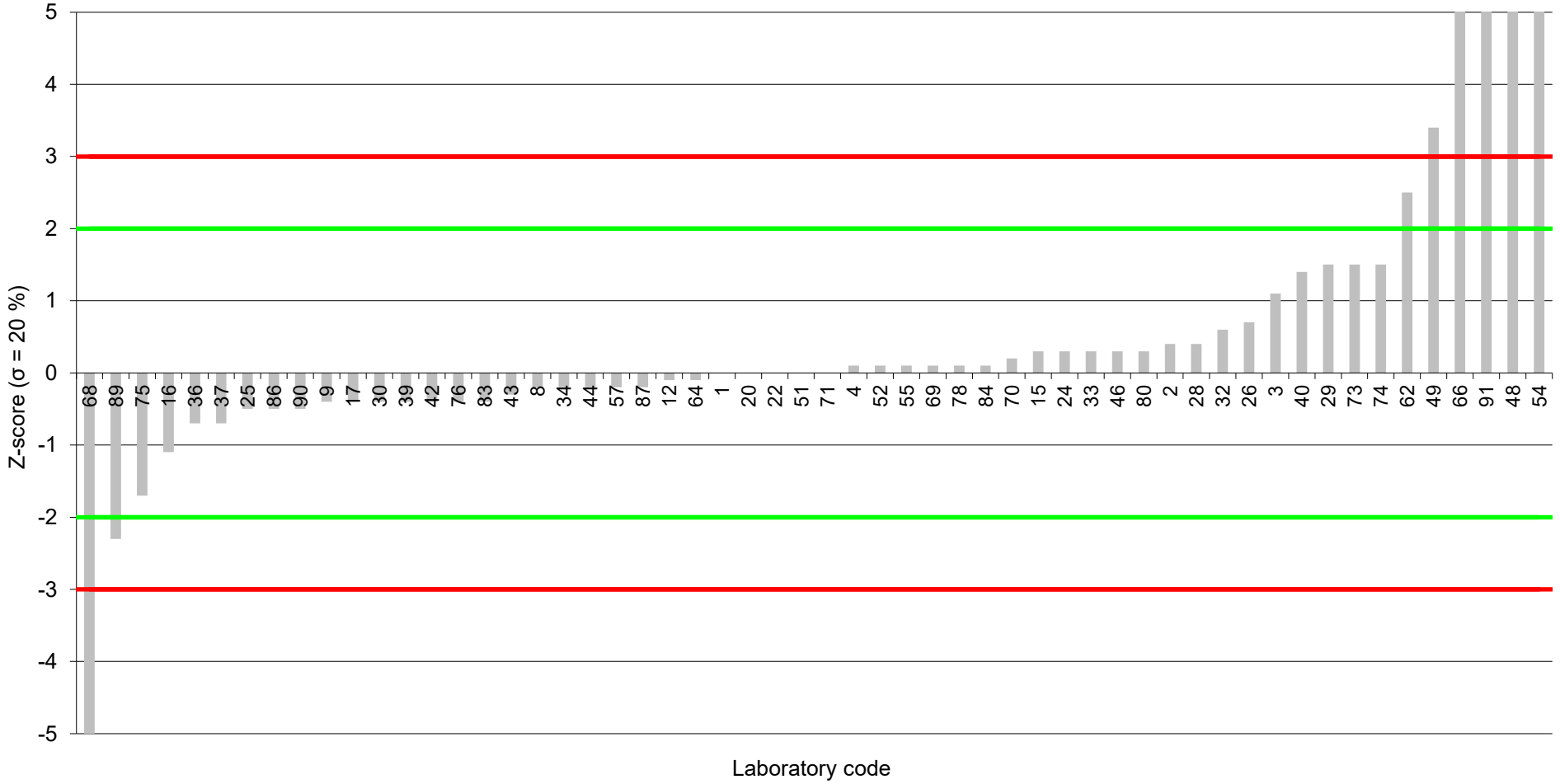
Assigned value: 30.2 ng/kg (12% moisture content)



Bentonite (2402-BT)

PCB 189

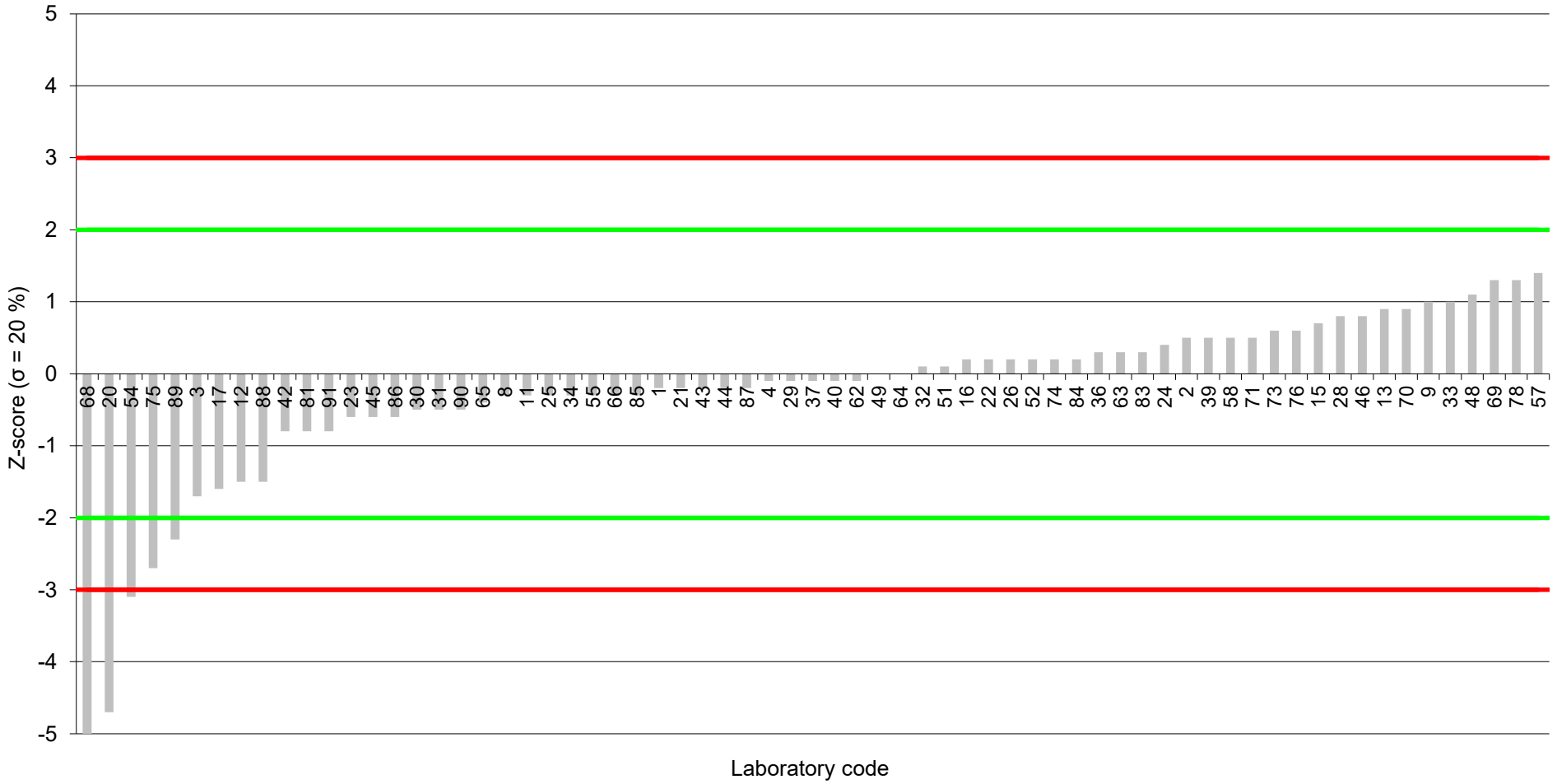
Assigned value: 4.37 ng/kg (12% moisture content)



Bentonite (2402-BT)

PCB 77

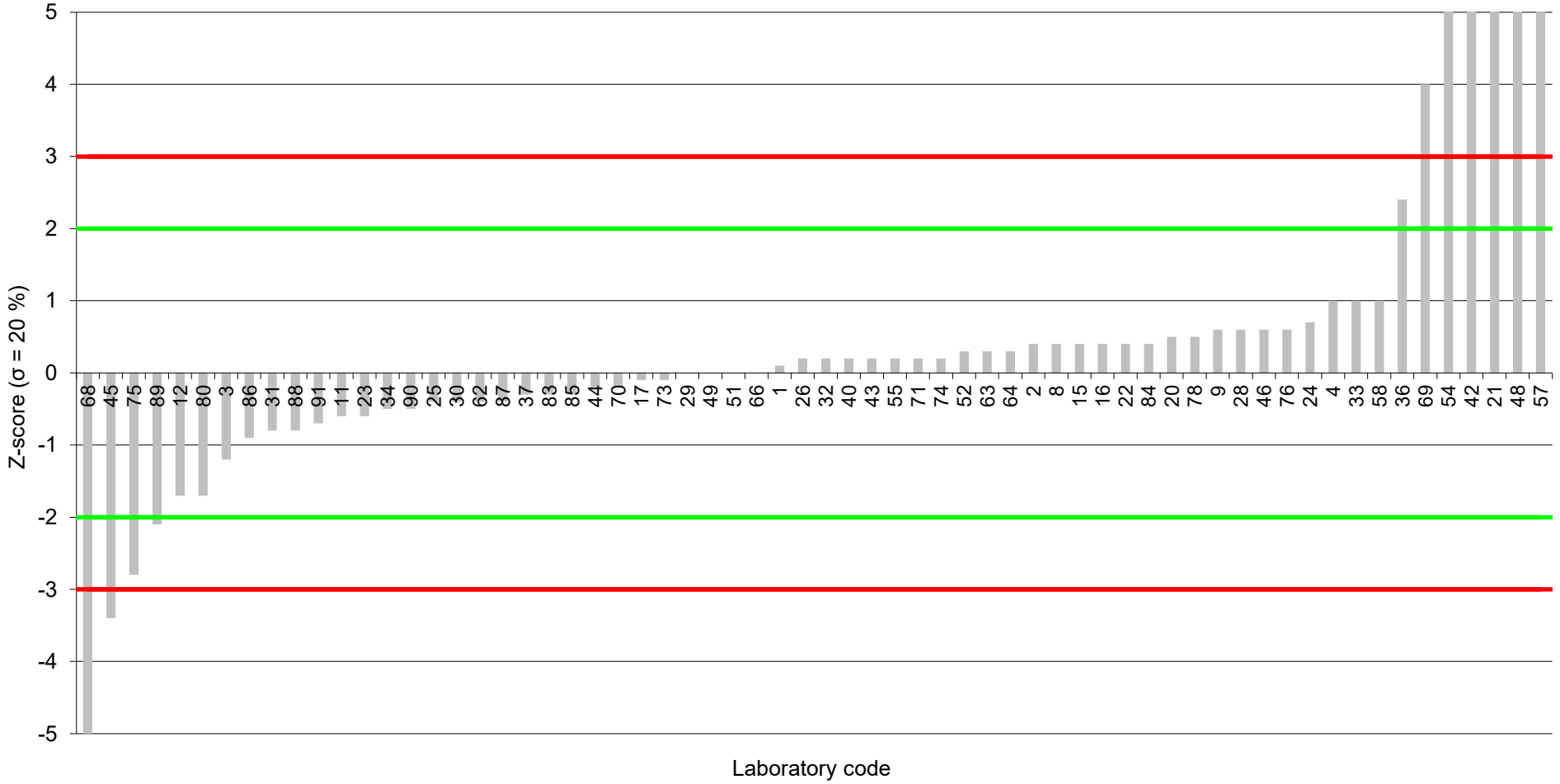
Assigned value: 100 ng/kg (12% moisture content)



Bentonite (2402-BT)

PCB 81

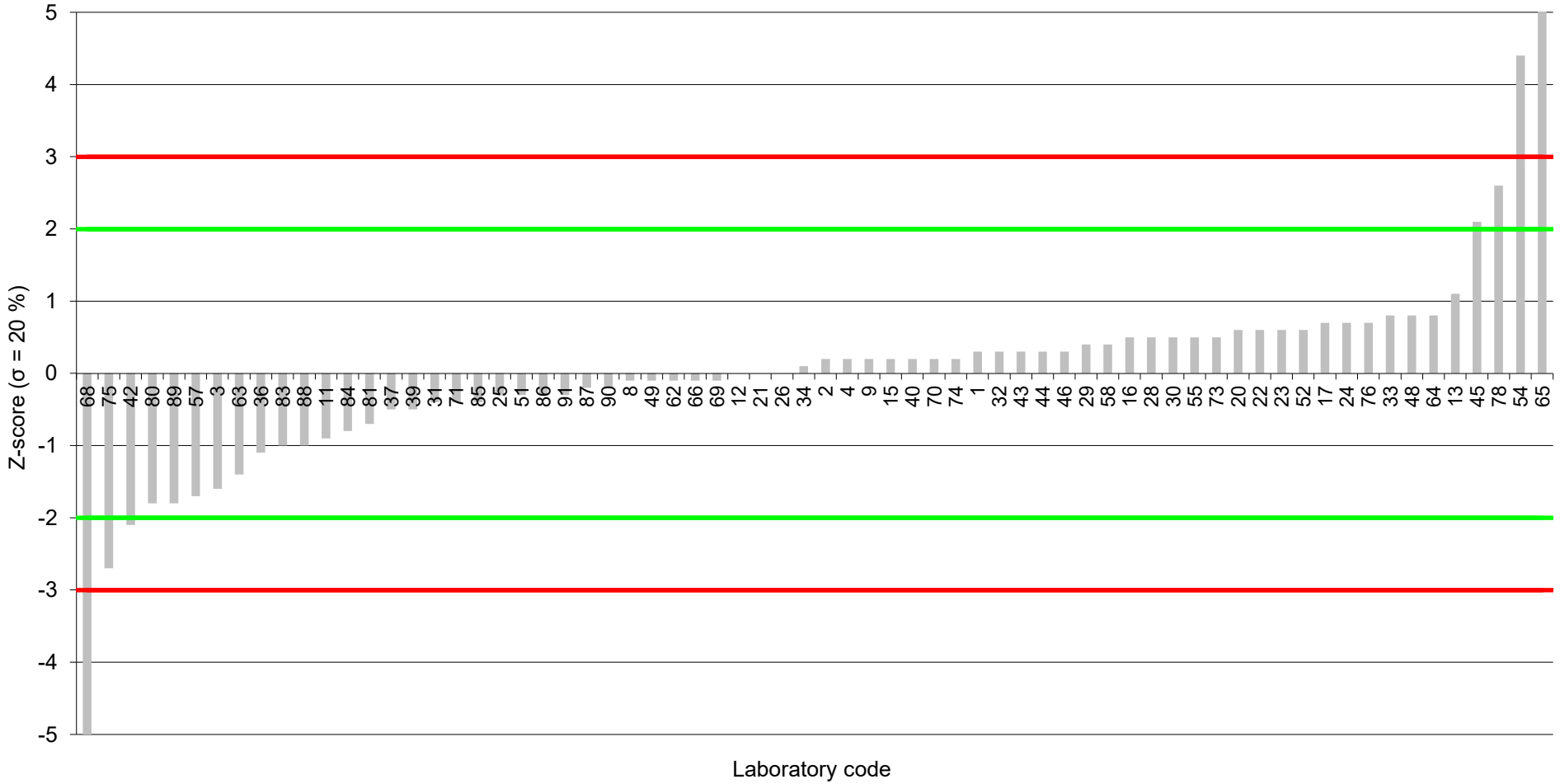
Assigned value: 5.03 ng/kg (12% moisture content)



Bentonite (2402-BT)

PCB 126

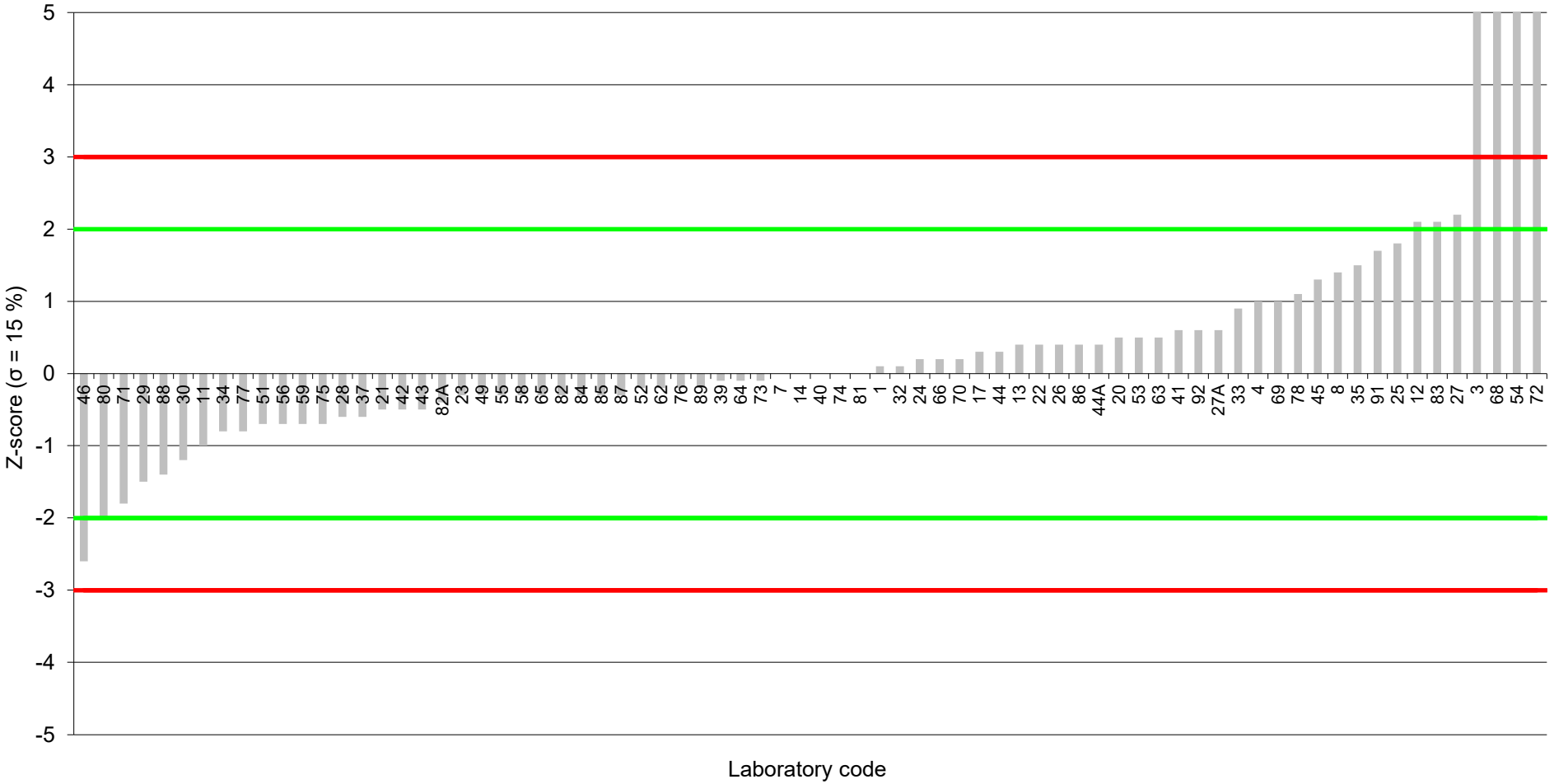
Assigned value: 2.01 ng/kg (12% moisture content)



Bentonite (2402-BT)

Sum of 6 NDL-PCBs upper bound (reported)

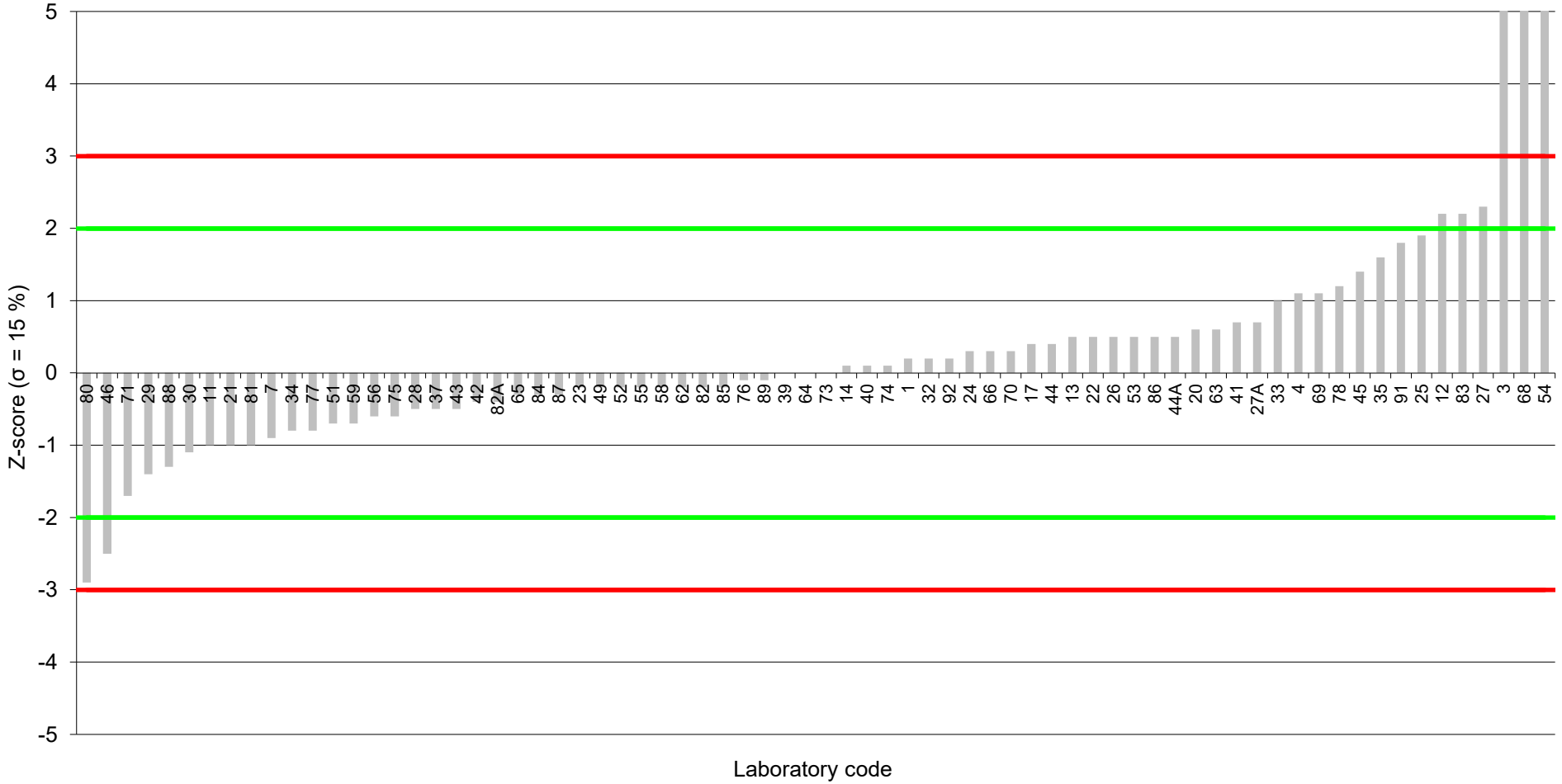
Assigned value: 6.69 µg/kg (12% moisture content)



Bentonite (2402-BT)

Sum of 6 NDL-PCBs lower bound (reported)

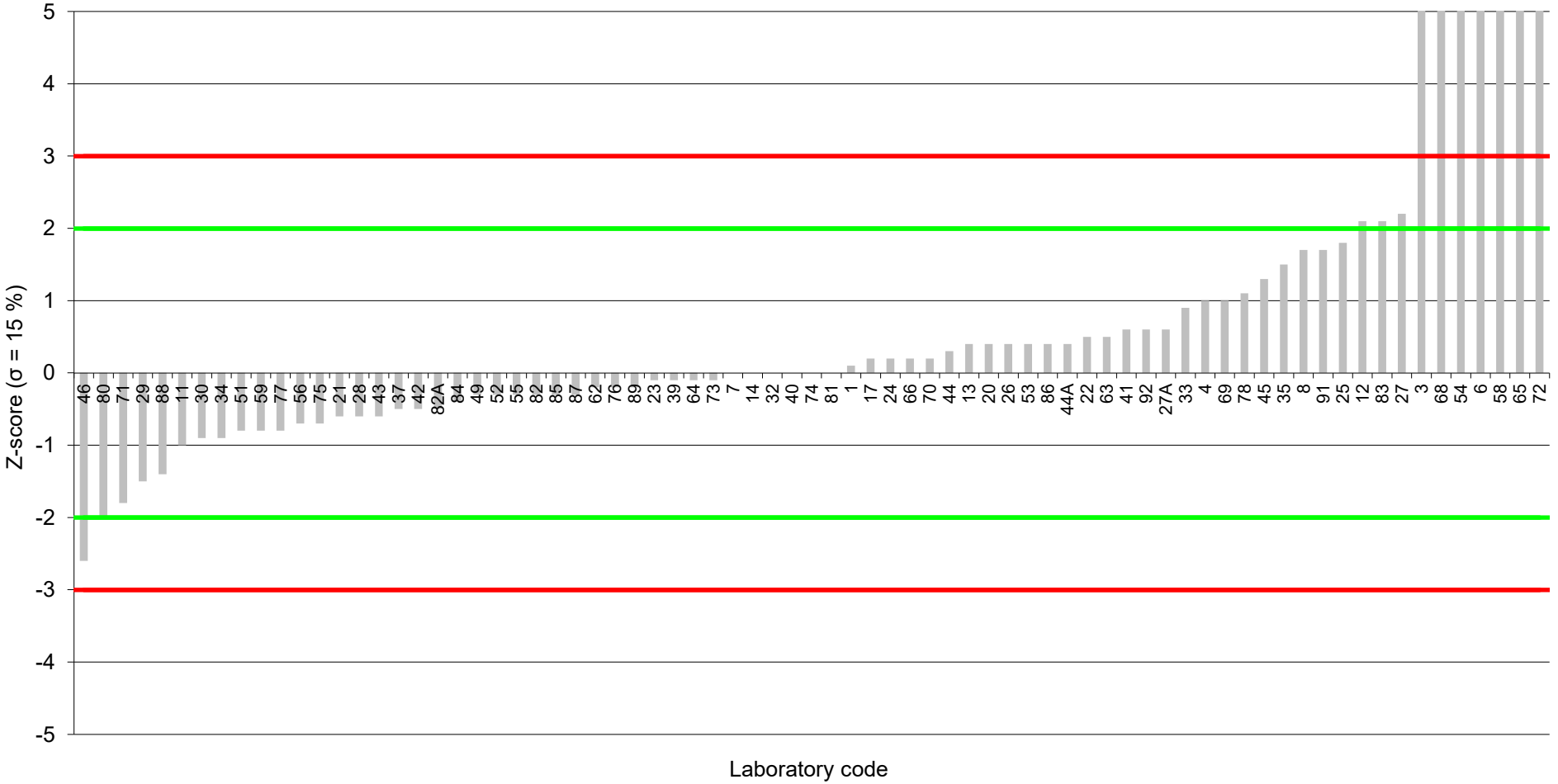
Assigned value: 6.61 µg/kg (12% moisture content)



Bentonite (2402-BT)

Sum of 6 NDL-PCBs upper bound (calculated)

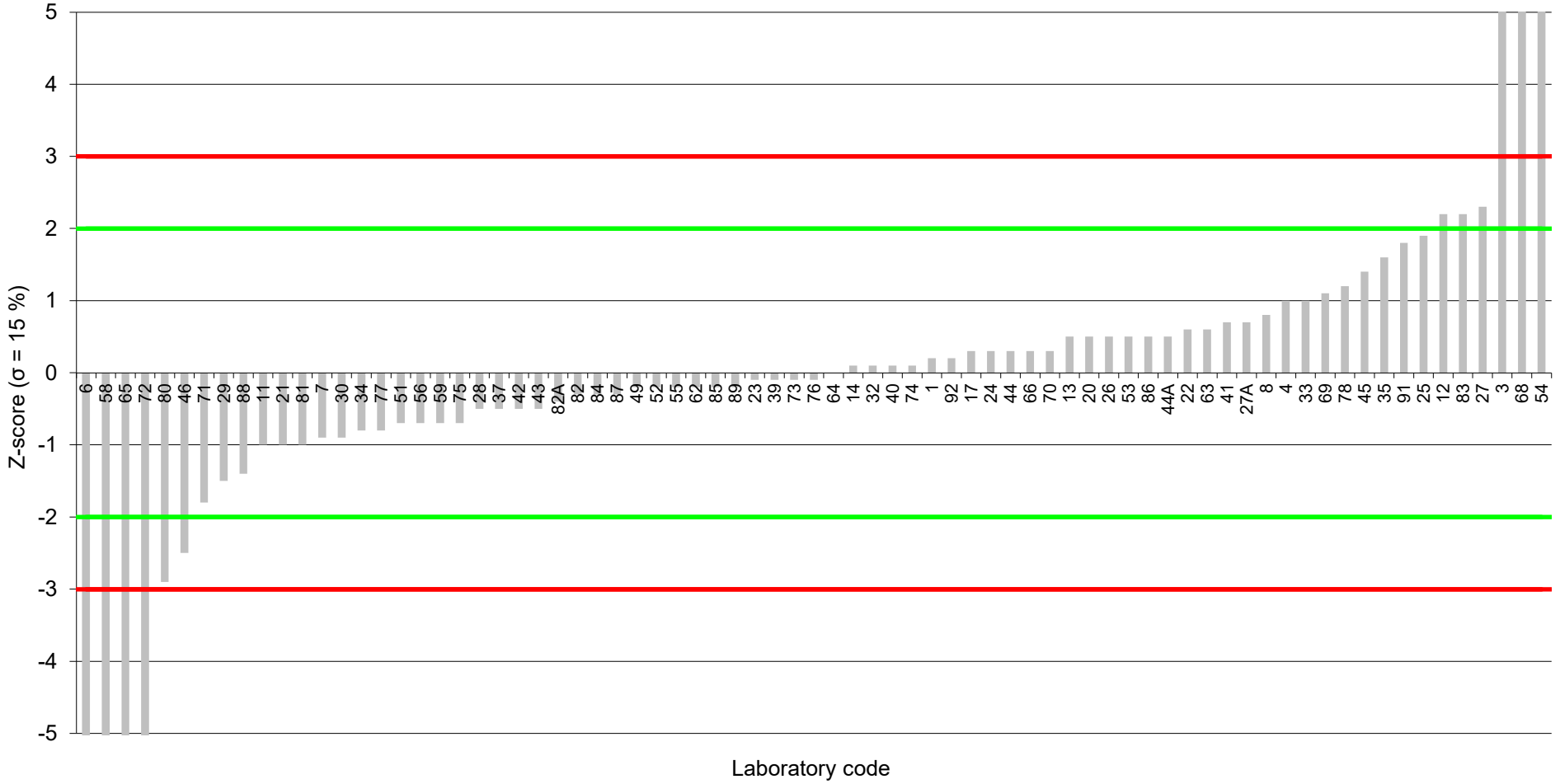
Assigned value: 6.71 µg/kg (12% moisture content)



Bentonite (2402-BT)

Sum of 6 NDL-PCBs lower bound (calculated)

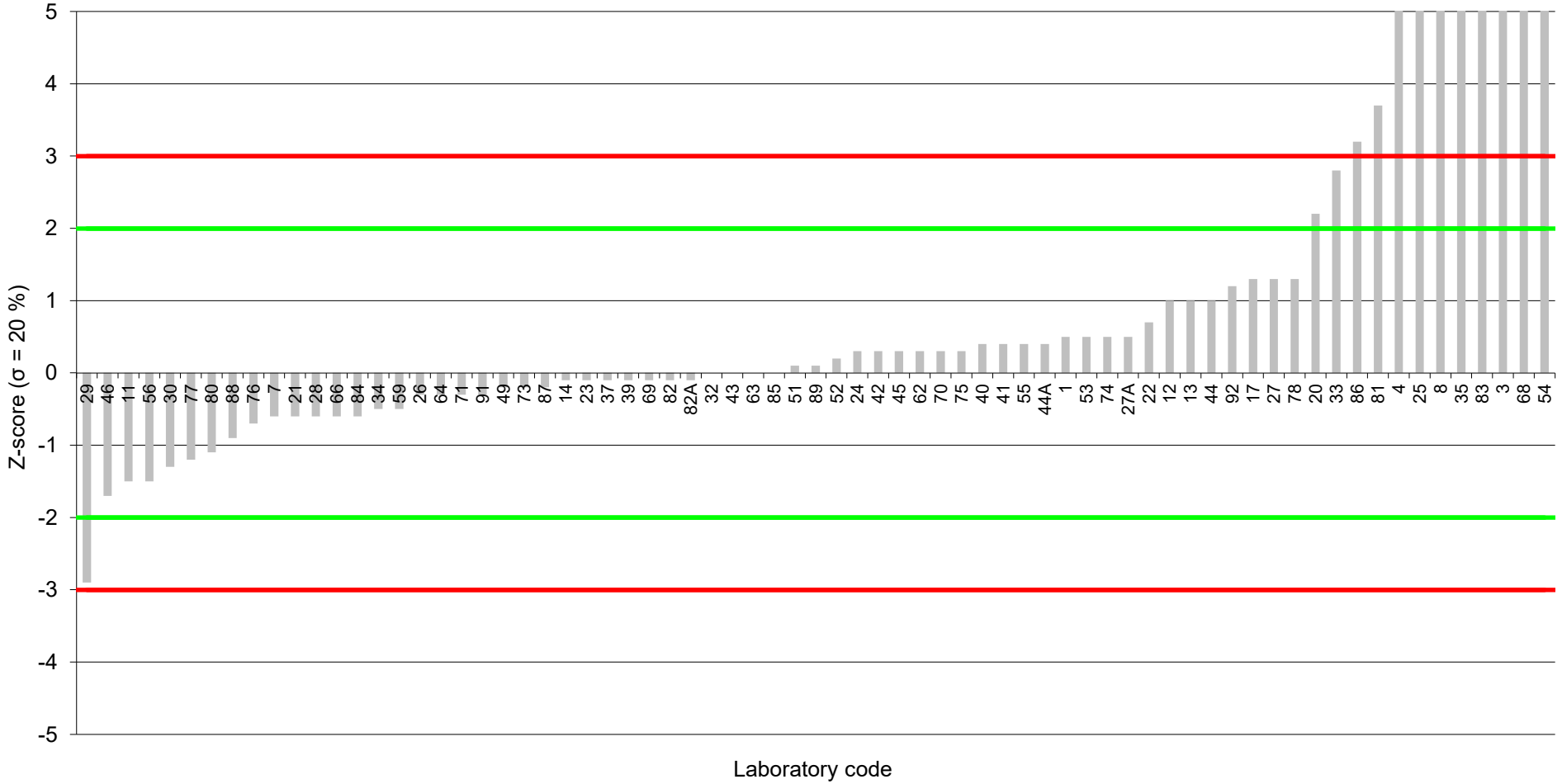
Assigned value: 6.64 µg/kg (12% moisture content)



Bentonite (2402-BT)

PCB 28

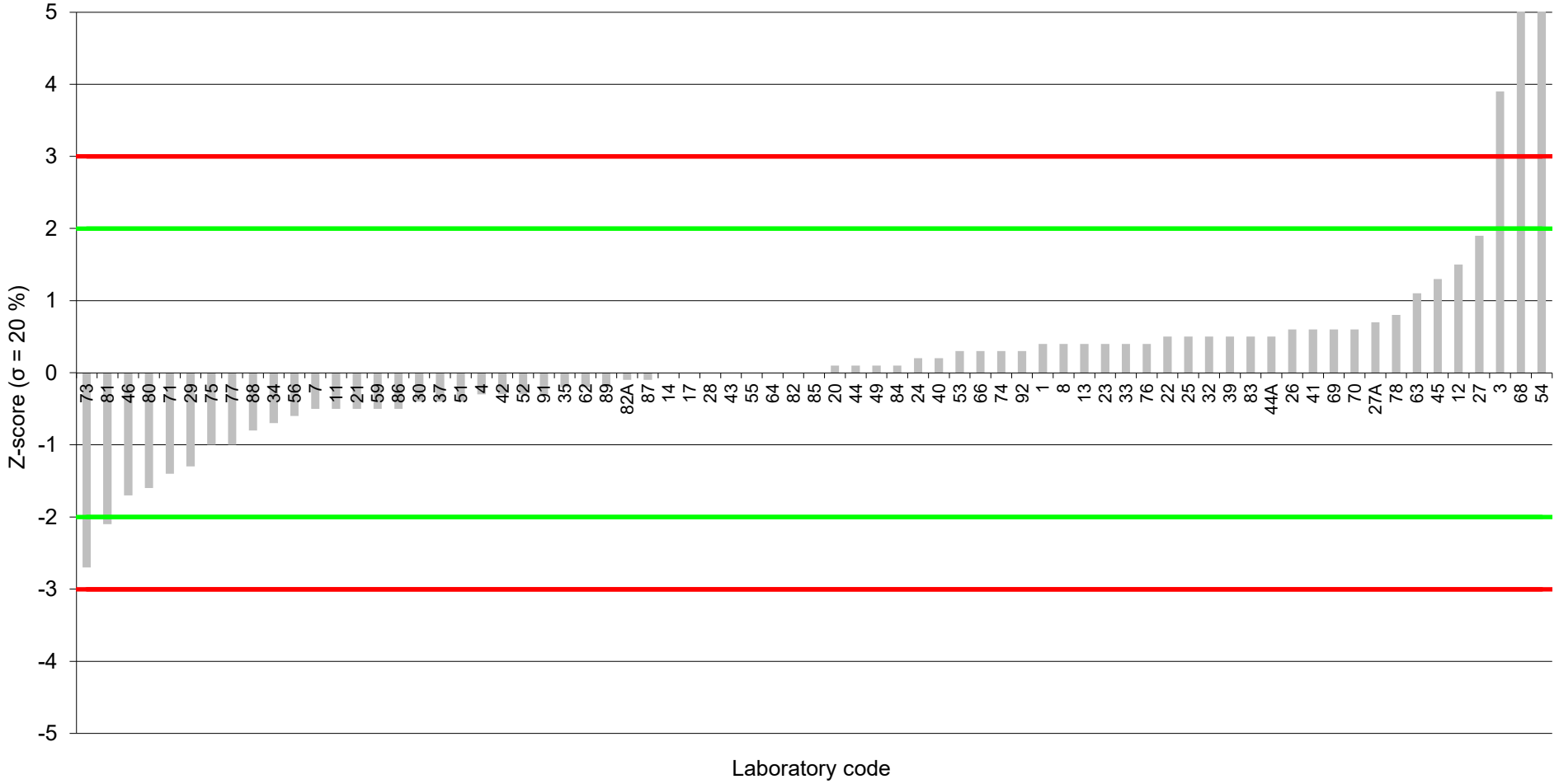
Assigned value: 1.34 µg/kg (12% moisture content)



Bentonite (2402-BT)

PCB 52

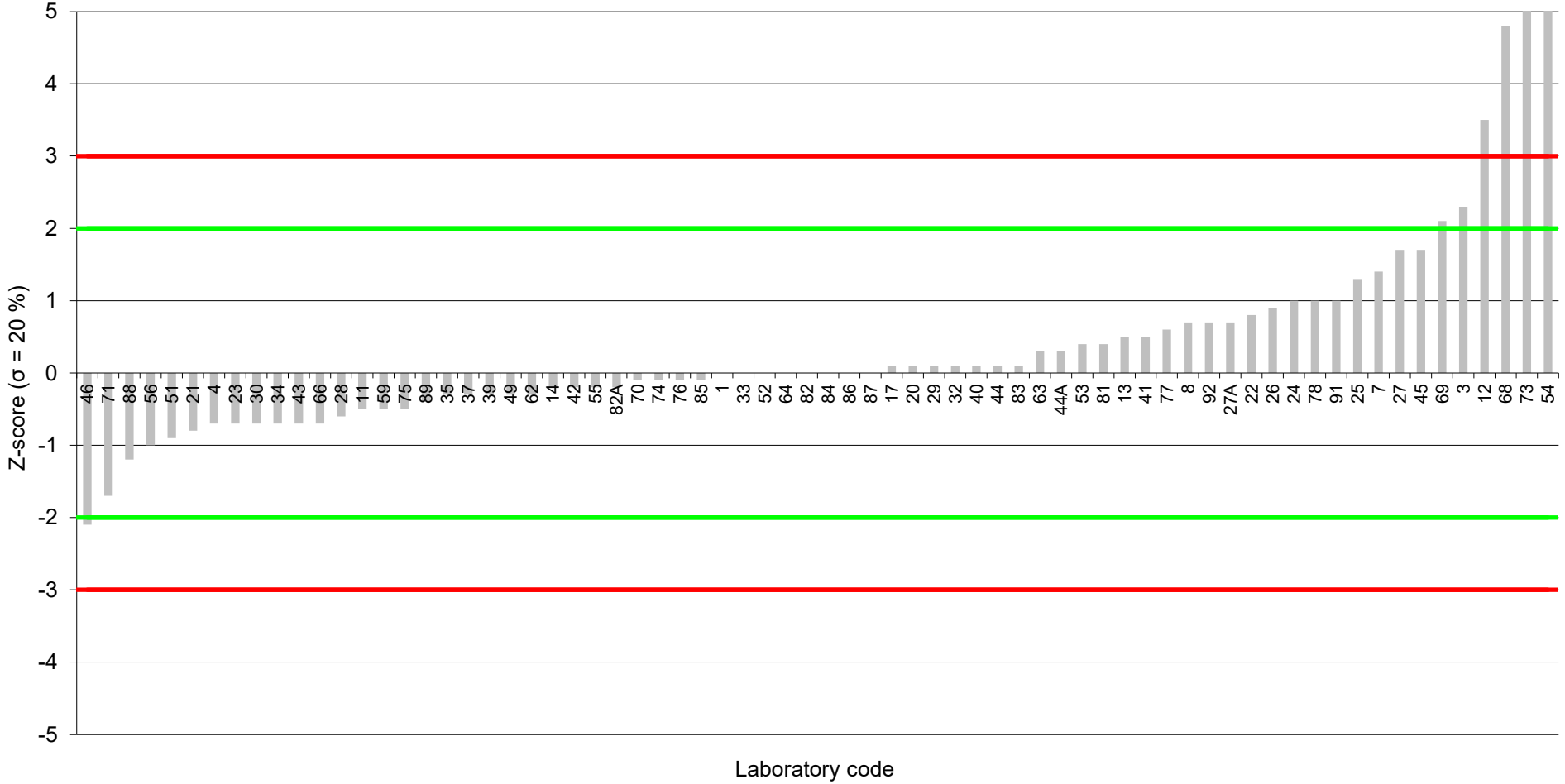
Assigned value: 2.38 µg/kg (12% moisture content)



Bentonite (2402-BT)

PCB 101

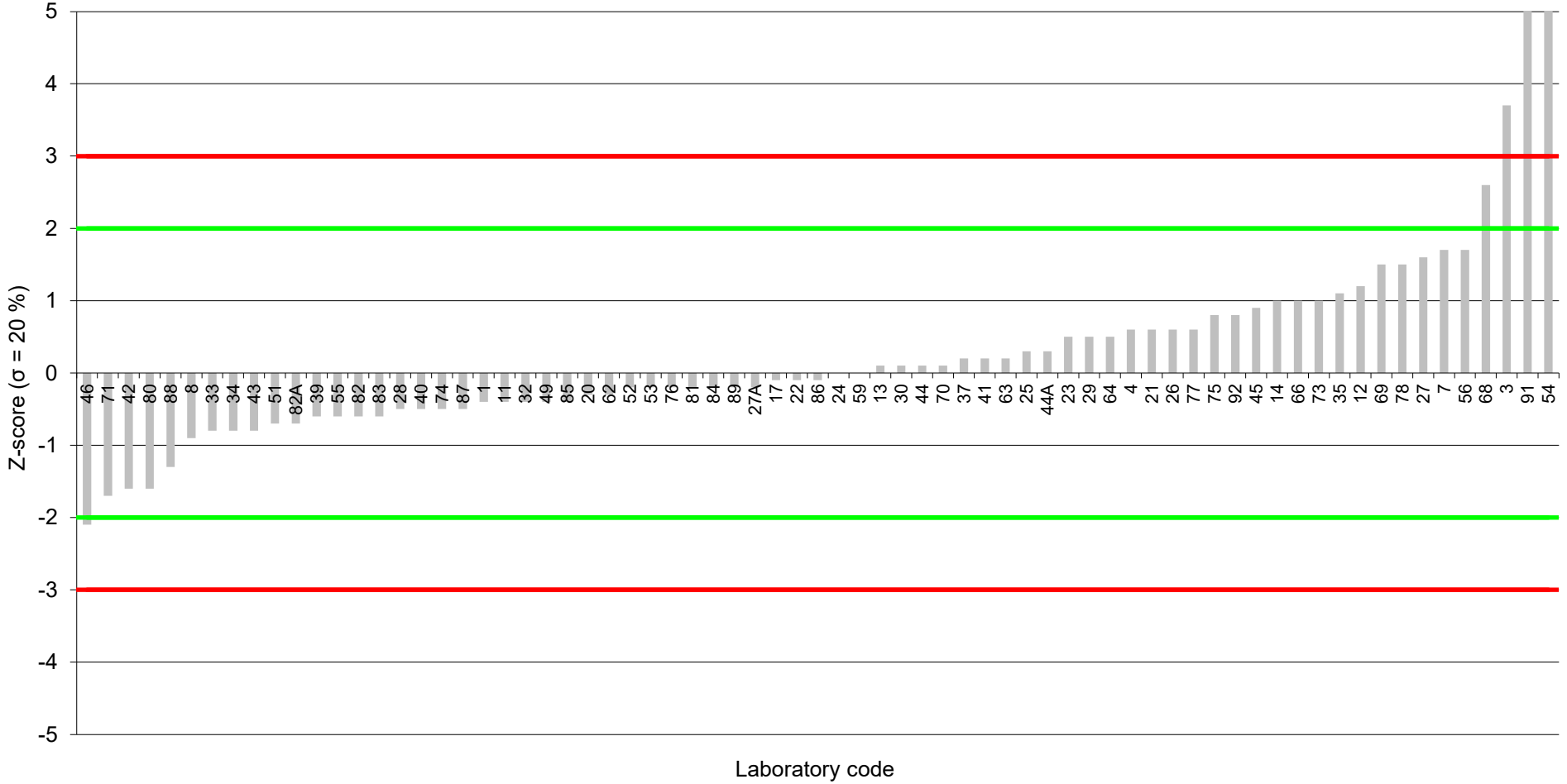
Assigned value: 1.28 µg/kg (12% moisture content)



Bentonite (2402-BT)

PCB 138

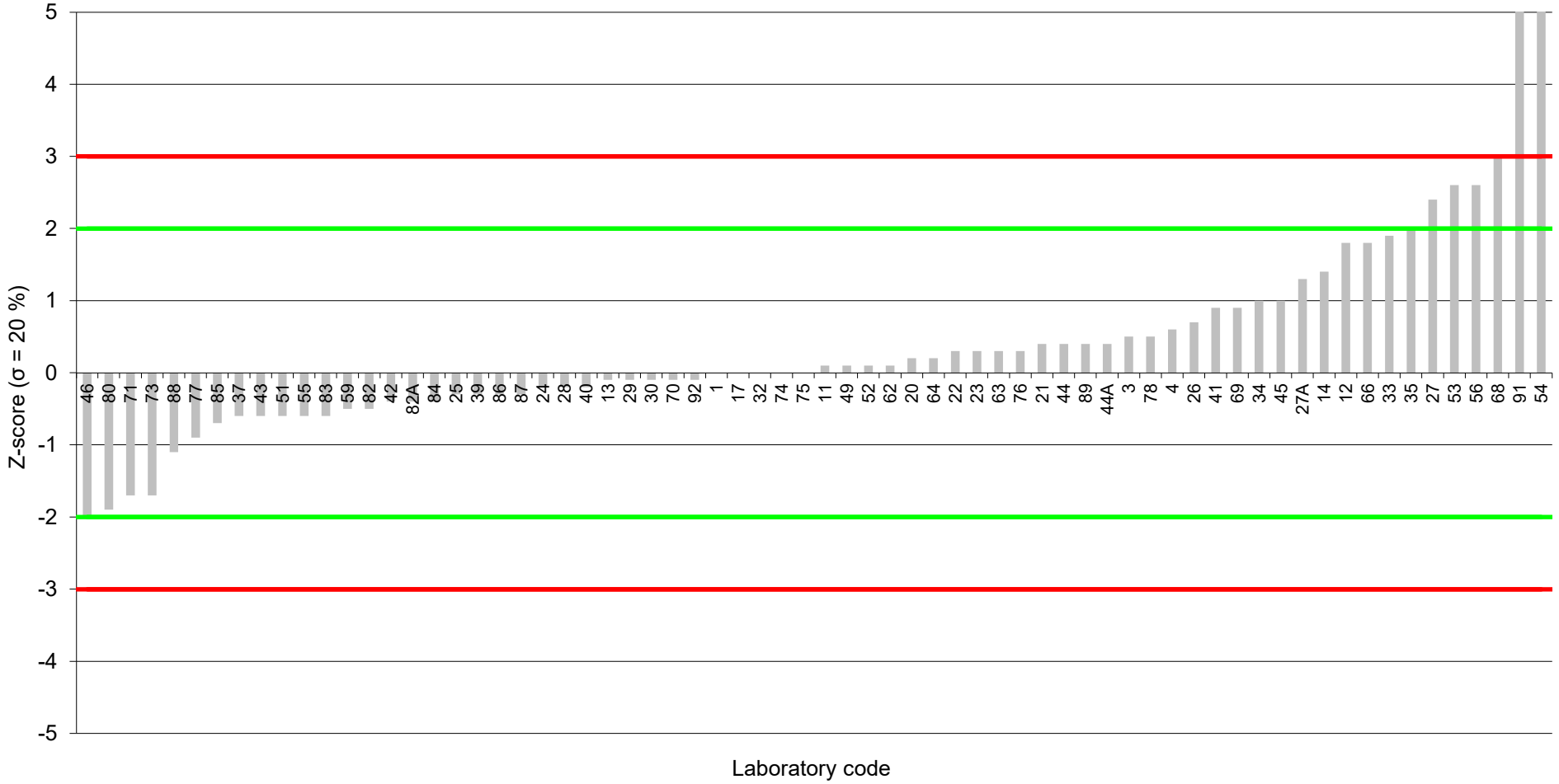
Assigned value: 0.612 µg/kg (12% moisture content)



Bentonite (2402-BT)

PCB 153

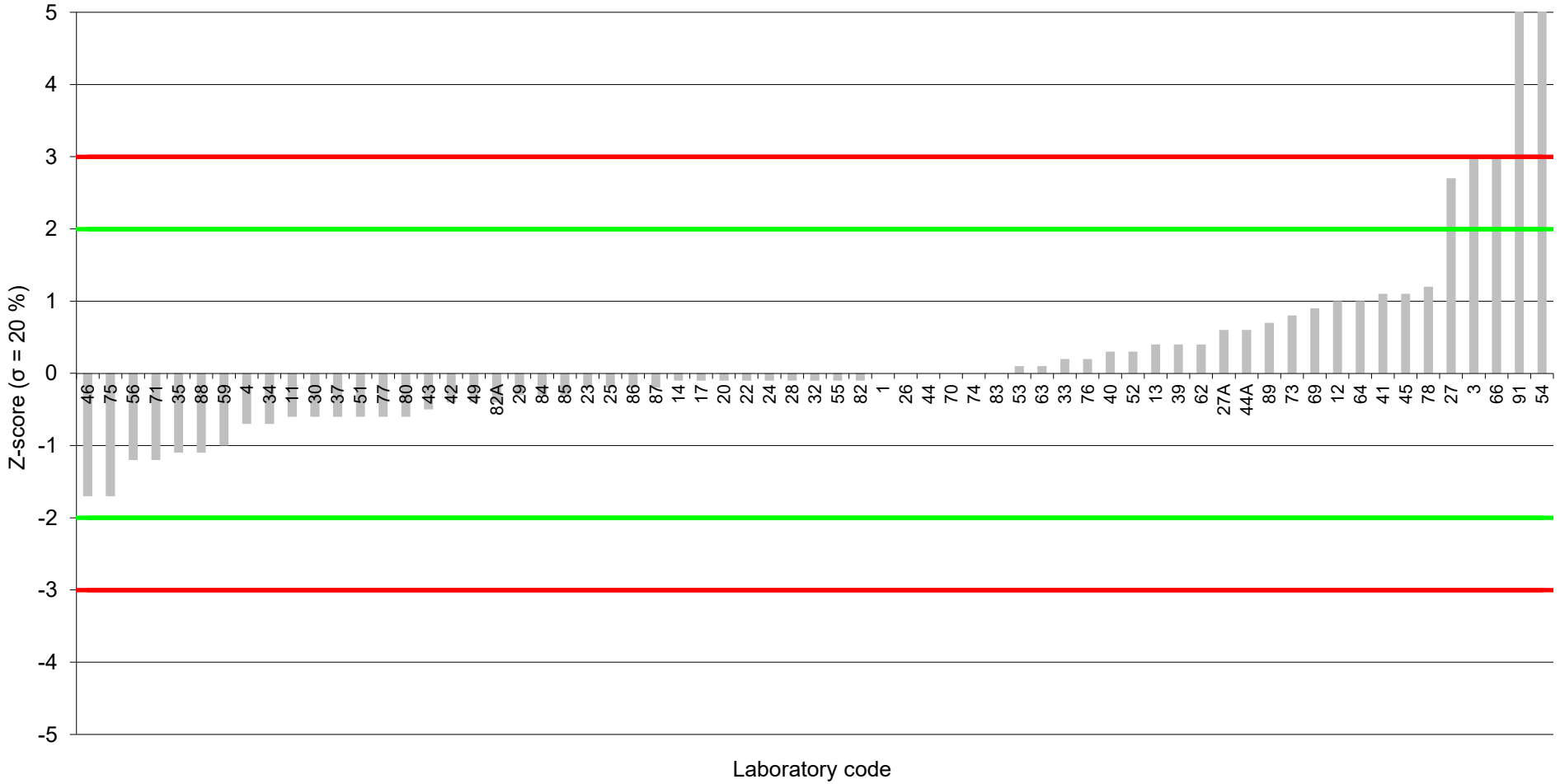
Assigned value: 0.523 µg/kg (12% moisture content)



Bentonite (2402-BT)

PCB 180

Assigned value: 0.408 µg/kg (12% moisture content)



EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food
25 August 2025

Annex 5: Scoring system for PCDD/Fs and PCBs

Test sample - Bentonite (2402-BT)

Positive scoring system

The "positive scoring system" gives one assessment for the PT sample covering all relevant PCDD/F and PCB sum parameters and congeners.
The criteria are applicable for sum parameter concentrations in the range (about 0.5 to 4 times) of the level of interest.

The total score for the positive scoring system is calculated according to the following general principles:

- Calculation of z-scores for sum parameters and evaluated individual congeners
- Calculation of the positive scores according to the following table:

Positive scoring system	I z-score I ≤ 2	2 < I z-score I < 3	I z-score I ≥ 3
Individual congeners	Positive score	Positive score	Positive score
Contribution to sum parameter* > 10 %	12	6	0
Contribution to sum parameter* 3 – 10 %	8	4	0
Contribution to sum parameter* < 3 %	6	3	0
Not evaluated congeners	0	0	0

*separately for the respective sum parameters WHO-PCDD/F-TEQ, WHO-PCB-TEQ and the sum of six indicator PCBs

- Calculation of maximum achievable scores (I z-score I ≤ 2) for PCDD/F and DL-PCB and indicator PCB congeners separately:
  Maximum score = Σmax. score(> 10 %) + Σmax. score(3-10 %) + Σmax. score(< 3 %)
- Calculation of the participant's scores for PCDD/F and DL-PCB and indicator PCB congeners separately:
  Participant's score = Σscore(> 10 %) + Σscore(3-10 %) + Σscore(< 3 %)
- Calculation of achieved scoring percentage for each participant:
  Participant's scoring percentage = Participant's score / Maximum score • 100

Criteria for successful participation:

Sum parameters:	≤ 1 parameter with Iz-scoreI > 2, no parameter with Iz-scoreI ≥ 3
PCDD/F congeners:	≥ 75 % of maximum score
DL-PCB congeners:	≥ 75 % of maximum score
Indicator PCB congeners:	≥ 75 % of maximum score
Difference between reported and calculated results for sum parameters	≤ 10 %

Successful participation for PCDD/Fs and PCBs, if all above mentioned criteria for the reported analytes are met.

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Summary Scoring system

LC	Sample	Scoring system	WHO-PCDD/F-PCB-TEQ z-score	WHO-PCDD/F-TEQ z-score	WHO-PCB-TEQ z-score	Sum Indicator PCBs z-score	Sum Parameters (≤ 1 parameter with |z-score| ≥ 2, no parameter with |z-score| ≥ 3)	PCDD/F congeners (≥ 75 % of max. score)	DL-PCB congeners (≥ 75 % of max. score)	NDL-PCB congeners (≥ 75 % of max. score)	Calculation of sum parameters (deviation ≤ 10 %)	Evaluation	Successful participation	Reason for not successful participation				
														Sum parameters	PCDD/F congeners	DL-PCB congeners	NDL-PCB congeners	Calculation sum param.
1	2402-BT		0.1	-0.1	0.5	0.1	Passed	100%	100%	100%	yes		yes					
2	2402-BT		-0.1	-0.5	0.5		Passed	100%	100%		yes		yes					
3	2402-BT		-4.3	-5.5	-1.9	7.0	Failed	56%	82%	30%	yes		no	x	x		x	
4	2402-BT		-0.2	-0.5	0.5	1.0	Passed	96%	100%	80%	yes		yes					
6	2402-BT																	
7	2402-BT					0.0	Passed			100%	yes		yes					
8	2402-BT		-0.4	-0.9	0.4	1.4	Passed	100%	100%	73%	yes		no				x	
9	2402-BT		8.0	11.6	0.5		Failed	36%	100%		no		no	x	x			x
11	2402-BT		0.5	0.6	0.3	-1.0	Passed	74%	100%	100%	no		no		x			x
12	2402-BT		1.3	1.9	0.1	2.1	Passed	91%	100%	80%	yes		yes					
13	2402-BT		1.7	1.5	2.1	0.4	Passed	100%	100%	100%	yes		yes					
14	2402-BT					0.0	Passed			100%	yes		yes					
15	2402-BT		0.1	-0.2	0.5		Passed	100%	100%		yes		yes					
16	2402-BT		0.7	0.5	-2.2		Passed	100%	100%		no		no					x
17	2402-BT		0.5	0.4	0.5	0.3	Passed	100%	100%	100%	yes		yes					
19	2402-BT																	
20	2402-BT		1.0	1.2	0.6	0.5	Passed	84%	90%	90%	yes		yes					
21	2402-BT		2.8	3.7	0.9	-0.5	Failed	72%	91%	100%	yes		no	x	x			
22	2402-BT		0.6	0.4	1.1	0.4	Passed	100%	100%	100%	yes		yes					
23	2402-BT		-0.3	-2.0	3.2	-0.3	Failed	100%	92%	100%	yes		no	x				
24	2402-BT		2.1	2.4	1.2	0.2	Failed	90%	100%	100%	yes		no	x				
25	2402-BT		-0.4	-0.5	-0.6	1.8	Passed	100%	100%	80%	yes		yes					
26	2402-BT		-0.3	-0.4	-0.1	0.4	Passed	97%	100%	100%	yes		yes					
27	2402-BT					2.2	Passed			87%	yes		yes					
28	2402-BT		0.4	0.2	0.8	-0.6	Passed	97%	100%	100%	yes		yes					
29	2402-BT		0.3	0.1	0.8	-1.5	Passed	100%	100%	90%	yes		yes					
30	2402-BT		-2.1	-3.0	-0.3	-1.2	Failed	84%	100%	100%	yes		no	x				
31	2402-BT		0.5	0.8	-0.3		Passed	100%	100%		yes		yes					
32	2402-BT		0.4	0.4	0.4	0.1	Passed	100%	100%	100%	yes		yes					
33	2402-BT		2.3	2.7	1.5	0.9	Failed	74%	100%	90%	yes		no	x	x			
34	2402-BT		0.4	0.7	-0.3	-0.8	Passed	100%	100%	100%	yes		yes					
35	2402-BT			-4.6		1.5	Failed	17%		80%	yes		no	x	x			
36	2402-BT		26.3	1.0	78.4		Failed	89%	96%		yes		no	x				
37	2402-BT		0.4	1.0	-1.0	-0.6	Passed	100%	100%	100%	yes		yes					
38	2402-BT																	
39	2402-BT		-2.8	-3.7	-1.0	-0.1	Failed	100%	100%	100%	no		no	x				x
40	2402-BT		0.0	-0.1	0.2	0.0	Passed	100%	100%	100%	yes		yes					
41	2402-BT					0.6	Passed			100%	yes		yes					
42	2402-BT		-0.8	0.2	-3.0	-0.5	Passed	86%	78%	100%	yes		yes					
43	2402-BT		0.3	0.3	0.3	-0.5	Passed	100%	100%	100%	yes		yes					
44	2402-BT		0.0	-0.3	0.4	0.3	Passed	100%	100%	100%	yes		yes					
45	2402-BT				4.0	1.3	Failed		68%	100%	yes		no	x		x		
46	2402-BT		-2.0	-3.2	0.5	-2.6	Failed	79%	100%	83%	yes		no	x				
48	2402-BT		2.8	3.0	2.5		Failed	95%	78%		yes		no	x				
49	2402-BT		-0.8	-1.2	-0.2	-0.3	Passed	93%	85%	100%	yes		yes					
51	2402-BT		-0.5	-0.5	-0.5	-0.7	Passed	100%	100%	100%	yes		yes					
52	2402-BT		0.4	0.2	0.8	-0.2	Passed	100%	100%	100%	yes		yes					
53	2402-BT		-0.1	-0.2	0.0	0.5	Passed	100%		93%	yes		yes					
54	2402-BT		295.7	416.3	42.4	49.7	Failed	0%	0%	0%	yes		no	x	x	x	x	
55	2402-BT		-0.1	-0.5	0.5	-0.3	Passed	100%	100%	100%	yes		yes					
56	2402-BT					-0.7	Passed			93%	yes		yes					
57	2402-BT		-0.1	0.8	-1.9		Passed	78%	82%		yes		yes					
58	2402-BT		1.1	1.3	0.5	-0.3	Passed	100%	100%		no		no					x
59	2402-BT					-0.7	Passed			100%	yes		yes					
62	2402-BT		-0.3	-0.4	-0.3	-0.2	Passed	93%	96%	100%	yes		yes					
63	2402-BT		-0.5	0.0	-1.7	0.5	Passed	100%	100%	100%	yes		yes					
64	2402-BT		0.8	0.6	1.2	-0.1	Passed	100%	100%	100%	yes		yes					
65	2402-BT		2316.4	-1.0	7143.6	-0.3	Failed	100%	83%		no		no	x				x
66	2402-BT		1.3	2.1	-0.5	0.2	Passed	95%	93%	93%	yes		yes					
68	2402-BT		-1.4	1.0	-6.3	15.5	Failed	26%	0%	15%	no		no	x	x	x	x	x
69	2402-BT		0.4	0.4	0.2	1.0	Passed	100%	93%	90%	yes		yes					
70	2402-BT		0.1	0.0	0.4	0.2	Passed	100%	100%	100%	yes		yes					
71	2402-BT		-0.3	-0.1	-0.8	-1.8	Passed	100%	100%	100%	yes		yes					
72	2402-BT					591.2	Failed				yes		no	x				
73	2402-BT		2.2	2.6	1.2	-0.1	Failed	87%	82%	70%	yes		no	x			x	
74	2402-BT		0.0	-0.2	0.3	0.0	Passed	100%	100%	100%	yes		yes					
75	2402-BT		-7.1	-8.5	-4.0	-0.7	Failed	10%	84%	100%	no		no	x	x			x
76	2402-BT		-2.5	-4.0	0.7	-0.2	Failed	63%	100%	100%	yes		no	x	x			
77	2402-BT					-0.8	Passed			100%	yes		yes					
78	2402-BT		1.8	0.5	4.5	1.1	Failed	100%	85%	100%	yes		no	x				
80	2402-BT		-1.9	-1.3	-3.0	-2.0	Passed	100%	100%	100%	yes		yes					
81	2402-BT		-0.8	-1.3	0.1	0.0	Passed	100%	95%	59%	yes		no				x	
82	2402-BT					-0.3	Passed			100%	yes		yes					
82A	2402-BT					-0.4	Passed			100%	yes		yes					

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Summary Scoring system

LC	Sample	Scoring system	WHO-PCDD/F-PCB-TEQ z-score	WHO-PCDD/F-TEQ z-score	WHO-PCB-TEQ z-score	Sum Indicator PCBs z-score	Sum Parameters (≤ 1 parameter with |z-score| ≥ 2, no parameter with |z-score| ≥ 3)	PCDD/F congeners (≥ 75 % of max. score)	DL-PCB congeners (≥ 75 % of max. score)	NDL-PCB congeners (≥ 75 % of max. score)	Calculation of sum parameters (deviation ≤ 10 %)	Evaluation	Successful participation	Reason for not successful participation				
														Sum parameters	PCDD/F congeners	DL-PCB congeners	NDL-PCB congeners	Calculation sum param.
83	2402-BT		-0.7	-0.3	-1.4	2.1	Passed	100%	100%	80%	yes		**yes**					
84	2402-BT		-1.3	-1.2	-1.5	-0.3	Passed	93%	100%	100%	yes		**yes**					
85	2402-BT		-0.6	-0.6	-0.8	-0.3	Passed	100%	100%	100%	yes		**yes**					
86	2402-BT		-0.2	0.1	-0.9	0.4	Passed	95%	100%	80%	yes		**yes**					
87	2402-BT		-0.2	-0.5	0.2	-0.3	Passed	100%	100%	100%	yes		**yes**					
88	2402-BT		-3.1	-4.6	-1.4	-1.4	Failed	95%	92%	100%	no		**no**	**x**				**x**
89	2402-BT		8.6	14.5	-3.6	-0.2	Failed	35%	88%	100%	yes		**no**	**x**	**x**			
90	2402-BT		-0.3	-0.1	-0.6		Passed	100%	100%		yes		**yes**					
91	2402-BT		-0.7	-1.0	-0.3	1.7	Passed	100%	71%	60%	yes		**no**			**x**	**x**	
92	2402-BT					0.6	Passed			100%	yes		**yes**					
27A	2402-BT					0.6	Passed			100%	yes		**yes**					
44A	2402-BT					0.4	Passed			100%	yes		**yes**					

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food
25 August 2025

Annex 6: Test for sufficient homogeneity and stability for PCDD/Fs and PCBs

Test sample - Bentonite (2402-BT)

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Sum parameters - Homogeneity test - Data

Analyte	Result ng/kg (12% Moisture Content)	**Mean** (n = 10, duplicate analysis)	**Median** (n = 10, duplicate analysis)	**Relative standard deviation** [%]
WHO-PCDD/F-PCB-TEQ upper bound		0.850	0.849	4%
WHO-PCDD/F-PCB-TEQ middle bound		0.850	0.849	4%
WHO-PCDD/F-PCB-TEQ lower bound		0.850	0.849	4%

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
PCDD/F - Homogeneity test - Data

Analyte	Result ng/kg (12% Moisture Content)	**Mean** (n = 10, duplicate analysis)	**Median** (n = 10, duplicate analysis)	**Relative standard deviation** [%]
WHO-PCDD/F-TEQ upper bound		0.540	0.537	4%
WHO-PCDD/F-TEQ middle bound		0.540	0.537	4%
WHO-PCDD/F-TEQ lower bound		0.540	0.537	4%
2,3,7,8-TCDD		0.0474	0.0471	11%
1,2,3,7,8-PeCDD		0.187	0.189	7%
1,2,3,4,7,8-HxCDD		0.266	0.266	4%
1,2,3,6,7,8-HxCDD		0.316	0.316	5%
1,2,3,7,8,9-HxCDD		0.717	0.719	5%
1,2,3,4,6,7,8-HpCDD		7.73	7.76	3%
1,2,3,4,6,7,8,9-OCDD		82.7	82.3	2%
2,3,7,8-TCDF		0.134	0.133	6%
1,2,3,7,8-PeCDF		0.0602	0.0597	11%
2,3,4,7,8-PeCDF		0.101	0.100	9%
1,2,3,4,7,8-HxCDF		0.0889	0.0883	6%
1,2,3,6,7,8-HxCDF		0.0630	0.0626	7%
2,3,4,6,7,8-HxCDF		0.0532	0.0532	7%
1,2,3,7,8,9-HxCDF		0.00804	0.00829	20%
1,2,3,4,6,7,8-HpCDF		0.631	0.633	2%
1,2,3,4,7,8,9-HpCDF		0.00954	0.00920	20%
1,2,3,4,6,7,8,9-OCDF		0.131	0.134	15%

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
DL-PCB - Homogeneity test - Data

Analyte	Result ng/kg (12% Moisture Content)	**Mean** (n = 10, duplicate analysis)	**Median** (n = 10, duplicate analysis)	**Relative standard deviation** [%]
WHO-PCB-TEQ upper bound		0.310	0.311	9%
WHO-PCB-TEQ middle bound		0.310	0.311	9%
WHO-PCB-TEQ lower bound		0.310	0.311	9%
PCB 105		526	530	4%
PCB 114		36.1	37.1	7%
PCB 118		1010	1010	4%
PCB 123		20.8	20.9	7%
PCB 156		100	102	6%
PCB 157		18.5	18.4	3%
PCB 167		38.5	39.7	10%
PCB 189		5.21	5.26	15%
PCB 77		94.7	94.6	2%
PCB 81		5.22	5.16	7%
PCB 126		2.39	2.38	9%
PCB 169		0.166	0.155	20%

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
NDL-PCB - Homogeneity test - Data

Analyte	Result µg/kg (12% Moisture Content)	**Mean** (n = 10, duplicate analysis)	**Median** (n = 10, duplicate analysis)	**Relative standard deviation** [%]
Sum Indicator PCBs upper bound		6.91	7.05	5%
Sum Indicator PCBs middle bound		6.91	7.05	5%
Sum Indicator PCBs lower bound		6.91	7.05	5%
PCB 28		1.33	1.34	3%
PCB 52		2.46	2.46	3%
PCB 101		1.31	1.34	5%
PCB 138		0.675	0.707	11%
PCB 153		0.692	0.749	15%
PCB 180		0.439	0.446	7%

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Selected congeners - Homogeneity test - Data

Sample	Replicate	Result ng/kg or µg/kg (12% Moisture Content)	1,2,3,4,7,8-HxCDF	PCB 28	PCB 126
8	1		0.0884	1.34	2.37
	2		0.0961	1.37	2.20
47	1		0.0881	1.33	2.61
	2		0.0880	1.26	2.17
51	1		0.0950	1.36	2.17
	2		0.0814	1.26	2.24
58	1		0.0799	1.37	2.67
	2		0.0894	1.37	2.54
61	1		0.0956	1.35	2.24
	2		0.0920	1.34	2.57
80	1		0.0858	1.34	2.57
	2		0.0864	1.27	2.21
82	1		0.0973	1.32	2.54
	2		0.0808	1.31	2.17
105	1		0.0865	1.27	2.20
	2		0.0851	1.32	2.85
144	1		0.0898	1.27	2.40
	2		0.0922	1.32	2.17
204	1		0.0867	1.33	2.52
	2		0.0928	1.36	2.40
Cochran's C-test					
C			0.410	0.342	0.352
$C_{critical}$ (α = 0.05, m = 2, n = 10)			0.602	0.602	0.602
$C_{critical}$ (α = 0.01, m = 2, n = 10)			0.718	0.718	0.718
$C < C_{critical}$			yes	yes	yes
Outliers			no evidence for analytical outliers	no evidence for analytical outliers	no evidence for analytical outliers
Homogeneity test					
General average $\bar{x}$			0.0889	1.33	2.39
Standard deviation of sample averages s_x			0.00293	0.0245	0.120
Wthin-sample standard deviation s_w			0.00578	0.0405	0.243
Between-sample standard deviation s_s			0	0	0
Standard deviation for proficiency assessment σ_{PT}			0.0178	0.266	0.477
s_s / σ_{PT}			0	0	0
Test for homogeneity ($s_s \leq 0.3\ \sigma_{PT}$)			passed	passed	passed

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Selected congeners - Stability test - Data

Sample	Replicate	Result ng/kg (12% Moisture Content)	1,2,3,4,7,8-HxCDF	PCB 28	PCB 126
47	1		0.0869	1.36	2.37
	2		0.0853	1.31	2.35
51	1		0.0837	1.34	2.27
	2		0.0953	1.43	2.25
61	1		0.0871	1.31	2.22
	2		0.0886	1.26	2.31
Stability test					
General average (stability test) $\bar{y}$			0.088	1.335	2.29
General average (homogeneity test) $\bar{x}$			0.089	1.331	2.39
Standard deviation for proficiency assessment σPT			0.0178	0.266	0.477
$\lvert \bar{y} - \bar{x} \rvert$			0.00105	0.00424	0.0919
Test for stability ($\lvert \bar{y} - \bar{x} \rvert \leq 0.3$ σPT)			passed	passed	passed

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food
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Annex 6: Participants' methods for PCDD/Fs and PCBs

Test sample - Bentonite (2402-BT)

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Physico-chemical Methods PCDD/Fs and PCBs - Internal standards

		Weighed sample	Use of isotope-labelled internal standards for all relevant …			Other internal standards		
LC	Sample	[g]	PCDD/F congeners (yes/no)	DL-PCB congeners (yes/no)	NDL-PCB congeners (yes/no)	PCDD/Fs	DL-PCBs	NDL-PCBs
1	2402-BT	25	yes	yes	yes			
2	2402-BT	30	yes	yes		13C-1,2,3,4-Cl4DD, 13C- 1,2,3,4,6-Cl5DF, 13C -1,2,3,4,6,9-Cl6DF, 13C- 1,2,3,4,6,8,9-Cl7DF		
3	2402-BT	30.1	Yes	Yes	Yes			
4	2402-BT	20 (10)	yes (except 1,2,3,7,8,9-HxCDD and 1,2,3,4,6,7,8,9-OCDF)	yes	no			TCMX, PCB-209, trans-nonachlor
6	2402-BT	5	no	no	no			no
7	2402-BT	5.0			no			PCB 171, to check the extraction, not used for quantification
8	2402-BT							
9	2402-BT	5.1	Yes (15)	Yes (12)	No	Yes - 1,2,3,4-TCDD / 1,2,3,7,8,9 HxCDD	Yes - PCB 70 / 111 / 138 / 170	No
11	2402-BT							
12	2402-BT	10	yes	yes	yes	13C-1234-TCDD - 37Cl4-2378-TCDD	13C-1234-TCDD - 13C-PCB-159	13C-1234-TCDD - 13C-PCB-159
13	2402-BT	30.0	yes	yes	yes			
14	2402-BT	20.00			yes			C13-PCB-178
15	2402-BT	12.44	yes	yes	yes			
16	2402-BT	5.24	yes	yes	yes	-	-	-
17	2402-BT	9.5	yes	yes	yes			
19	2402-BT							
20	2402-BT	9.102	yes	yes	yes			
21	2402-BT	1.5	YES	YES	YES			
22	2402-BT	15	yes	yes	no			PCB-20, PCB-97
23	2402-BT	5	Yes	Yes	Yes			
24	2402-BT	5.9	Yes	Yes	Yes			
25	2402-BT	12.49	YES	YES	YES	1,2,3,4-Tetrachlorodibenzo-p-dioxin (13C6,99%) / 1,2,3,4,6,9-Hexachlorodibenzofuran (13C12, 98,7%)	1,2,3,4-Tetrachlorodibenzo-p-dioxin (13C6,99%) / 1,2,3,4,6,9-Hexachlorodibenzofuran (13C12, 98,7%)	2,2',3,3',4,4',5-Heptachlorobiphenyl (PCB170, 13C12,99%)
26	2402-BT	5	yes	yes	yes			
27	2402-BT	5	NO	NO	YES			SYRINGE STANDARD PCB-155-13C12
28	2402-BT	5.01	yes	yes	yes			
29	2402-BT	20.3021	yes	yes	no	no	no	pcb 77L for 28&52; pcb 123L for 101; pcb 167L for 138&153; pcb 189L for 180
30	2402-BT	12	yes	yes	yes			
31	2402-BT	20	YES	YES	YES			
32	2402-BT	35	yes	yes	yes			
33	2402-BT	25	yes	yes	yes			
34	2402-BT	5	yes	yes	yes			
35	2402-BT	10.0058	Yes		No			PCB 209
36	2402-BT	10	yes	yes	no	no	no	no
37	2402-BT	15	yes	yes	yes			
38	2402-BT							
39	2402-BT	6.5	yes	yes	yes			
40	2402-BT	25	yes	yes	yes			
41	2402-BT	1.2	N/A	N/A	Yes	N/A	N/A	3,3',4,4',5-Pentachlorobiphenyl 13C12
42	2402-BT							
43	2402-BT	40.00	yes	yes	yes			
44	2402-BT	2.1	YES	YES	YES			
45	2402-BT	10		yes	yes		13C-PCB101, 13C-PCB-138 (recovery)	
46	2402-BT	30	YES	YES	YES			
48	2402-BT	15	YES	YES				
49	2402-BT	30	yes	yes	yes			
51	2402-BT	10	yes	yes	yes			
52	2402-BT	5	yes	yes	yes			
53	2402-BT	10	yes	yes	yes			
54	2402-BT	5	YES	YES	YES			
55	2402-BT	15	yes	yes	yes			
56	2402-BT	5						
57	2402-BT	10	YES	YES				
58	2402-BT	10.0	Yes	Yes	Yes			
59	2402-BT	5.00	no	no	Yes			PCB-111 (injection standard)
62	2402-BT	7.0	Yes	Yes	Yes	-	-	-
63	2402-BT	7.78	yes	yes	yes			
64	2402-BT	10	yes	yes	yes	1,2,3,4-TCDD	PCB 111	PCB 111
65	2402-BT	15.236	yes	yes	yes			
66	2402-BT	50.04	yes	yes	yes			
68	2402-BT	5.107	yes	yes	yes			
69	2402-BT	15.36	yes	yes	yes			
70	2402-BT	20.4166	yes	yes	yes			
71	2402-BT	10	yes	yes	yes			
72	2402-BT				no			PCB 209
73	2402-BT	10	yes	yes	yes			
74	2402-BT	25.0	yes	yes	yes			
75	2402-BT	20	yes	yes	yes	1234-TCDD	1234-TCDD	1234-TCDD
76	2402-BT	26.7	yes	yes	yes			
77	2402-BT	5			no			PCB 198
78	2402-BT	5	yes	yes	yes			
80	2402-BT	10	yes	yes	yes			
81	2402-BT	5.02	Yes	Yes	Yes			
82	2402-BT	6			yes			syringe standard, PCB 70, PCB 111, PCB 170
83	2402-BT	30	yes	yes	yes			

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]

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

Bentonite (2402-BT)

Physico-chemical Methods PCDD/Fs and PCBs - Internal standards

			Use of isotope-labelled internal standards for all relevant …			**Other internal standards**		
LC	Sample	**Weighed sample** [g]	PCDD/F congeners (yes/no)	DL-PCB congeners (yes/no)	NDL-PCB congeners (yes/no)	PCDD/Fs	DL-PCBs	NDL-PCBs
84	2402-BT	20	yes	yes	yes			
85	2402-BT	5	yes	yes	yes	recovery standards	recovery standards	recovery standards
86	2402-BT	31.64	No (were used 15 labelled congeners)	Yes	Yes			
87	2402-BT	15	yes	yes	yes			
88	2402-BT	15	yes	yes	yes			
89	2402-BT	20	yes	yes	yes			
90	2402-BT	15	yes	yes				
91	2402-BT	25.0	yes	yes	yes			
92	2402-BT	5			yes			
27A	2402-BT	5	NO	NO	YES			SYRINGE STANDARD PCB-155-13C12
44A	2402-BT	2.49			YES			
82A	2402-BT	6			yes			syringe standard, PCB 70, PCB 111, PCB 170

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Physico-chemical Methods PCDD/Fs and PCBs - Extraction

		Extraction					
LC	Sample	Sample preparation/pre-treatment	Extraction technique	Extraction solvent	Extraction time [h]	Extraction temperature [ºC]	Extraction pressure [MPa]
1	2402-BT	none	Soxhlet	Toluene/acetone 70:30	12	70-90 °C	0.1
2	2402-BT		Soxhlet	Toluene/i-Propanol 50/50	overnight	boiling	
3	2402-BT		Soxhlet	Toluene:Ethanol	18		
4	2402-BT	thorough homogenization	Soxhlet (ultrasonic bath, agitate)	toluene:methanol 2:1 (dichloromethane:acetone 2:1)	21 (2.5)	109 (20)	0.1
6	2402-BT		Soxhlet	acetone/hexane (50 % (v/v))	6		
7	2402-BT		shaking	acetone, petrolether	1	room temperature	
8	2402-BT						
9	2402-BT	None	ASE	Toluene	0.5	150	11.7
11	2402-BT						
12	2402-BT	Drying	Buchi	Toluene/Acetone 70/30	1	120	10
13	2402-BT	-	Soxhlet	Toluene	20h	boiling point of solvent mixture	-
14	2402-BT	/	cold extraction	hexane		room temperature	atmospheric pressure
15	2402-BT		ASE	Toluene:Ethanol (70:30)			
16	2402-BT	No	ASE	Toluene/Acetone (9:1)	1 hour	100°C	
17	2402-BT	Homogenisation	Liquid-liquid	n-hexane	1x60 min. + 2x30 min.	Ambient	Ambient
19	2402-BT						
20	2402-BT	No	ASE	tolueen:ethanol (9:1)	0.75	100	
21	2402-BT		ASE	TOLUENE	0.5	135	1500
22	2402-BT	homogenisation using sea sand	Soxhlet	toluene/ethyl acetate (70:30, v/v) and toluene/ethanol (70:30, v/v) respectively	16	77-110 (boiling points of ethyl acetate and toluene)	ambient pressure
23	2402-BT		Soxhlet	Ethanol/Toluene	18		
24	2402-BT	No	ASE	Toluene/Ethanol (90/10 v/v)	1	100	10342
25	2402-BT	N/A	SOXTEC	ETHANOL / TOLUENE	2	160	N/A
26	2402-BT	no	ASE	n-Hexan; n-Hexan/Aceton (4:1); iso-Propanol:Toluol (25:75); Toluol/Aceton (3:1)	30 min	120	10 psi
27	2402-BT	oven drying	ASE	ACETONE:HEXANE 1:1	1/3	100	10,34
28	2402-BT	no	Soxhlet	70/30 Ethanol/toluene	16	210	n/a
29	2402-BT	hydromatrix and sand added to the sample in the extraction cell	ASE350	Toluene (extraction 1) Toluene:Acetone 30% (extraction 2)	half an houre	100	10,34
30	2402-BT	drying	ASE		45'	160°C	
31	2402-BT		ASE	TOLUENE + TOLUENE/ETHANOL (9:1)	1	100	10,3
32	2402-BT		Speed-Extractor	Toluene / Ethanol (30/70)	1h30	150	10
33	2402-BT		Soxhlet	DCM	24		
34	2402-BT	drying	PLE	Tolune/Acetone (70/30)			
35	2402-BT		Solvent	Solvent mixture (2-propanol/cyclohexane 1:2)	24	21	
36	2402-BT	no	PLE	Toluene	2.5	120	11.7
37	2402-BT	none	Soxhlet	Toluene	72		
38	2402-BT						
39	2402-BT	none	ASE	DCM:Hexane (1:1)	25 mins	100	10
40	2402-BT		ASE	toluene:methanol 9:1			
41	2402-BT	Homogeneisation	Solvent extraction	Toluene/methanol (20/6)	1,5	Room temperature	Atmospheric pressure
42	2402-BT						
43	2402-BT	no	Soxhlet	Toluol	17	110	
44	2402-BT	drying	ASE	Toluene/acetone (70/30)	0,5	120	10
45	2402-BT	105 C	Soxhlet	Toluene	24h	reflux	ambient
46	2402-BT		SOXHLET	TOLUENE/ETHANOL (3/7)	24H		
48	2402-BT		ASE	n-hexane:dichloromethane	0.75	100	10 aprox
49	2402-BT	homogenize	ASE	1. Toluol (100%) and 2. Cyclohexan/Dichlormethan (50/50)	0,5	90	10
51	2402-BT	Mixed with sodium sulphate	ASE	Toluene/Acetone (70:30)	1	125	10.3
52	2402-BT		ASE	Toluol/Ethanol 7/3		100	10
53	2402-BT	-	Soxhlet	toluene/acetone 7/3	4		
54	2402-BT	DRYING		HEXANE, TOLUENE, NONANE	6	90	
55	2402-BT	freeze drying	Twisselmann	Ethanol:Toluene (1:1, v/v)	6	boiling point	
56	2402-BT	homogenisation	shaking	Petrolether, water	1 hour	abient	normal
57	2402-BT		SOXHLET	toluene	24	75	
58	2402-BT		ASE	Toluene / Ethanol (80/20 V/V)	0.30 (including 2 static cycles of 5 mins)	100	10.3
59	2402-BT	no	solid/liquid extraction	1) toluene 2) methanol	0,017	ambiente	ambiente
62	2402-BT	Drying	ASE	Toluene / Acetone (70/30)	0.25 h	120 °C	10 Mpa
63	2402-BT		Soxhlet	Toluene / Ethanol (90 / 10)	12		
64	2402-BT		ASE	toluene/acetone (70/30)	0,3	100	10
65	2402-BT	homogenisation	Soxtherm	Ethanol / tolueen 70:30	2 hour 17 min	240	atmospheric
66	2402-BT		Soxhlet	Hexane:Acetone (41:59)	24		
68	2402-BT	hydratation	SOXHLET	HEXANE	3	90	
69	2402-BT		Soxhlet	Toluol	48		
70	2402-BT	Homogenisation	Soxhlet	Step 1: toluene /ethanol 50 / 50 - step 2: toluene	24 for each step (48 in total)	120	atm
71	2402-BT	freeze drying	Twisselmann extraction	toluole	6 h	110 °C	0,101 Mpa
72	2402-BT	the weighed sample is mixed with Na2SO4 for drying	ultrasonic bath	Ethylacetate / Acetone 1:1	1h	60 °C	environmental preassure
73	2402-BT	no	ASE	Toluene:Acetone 9:1	1.30	130	1700
74	2402-BT		ASE	toluene:methanol 9:1			
75	2402-BT	drying 3 h	soxhlet	cyclohexane/toluene (1/1) and EtOH/toluene (7/3)	app. 12 h	70	
76	2402-BT	drying	Soxhlet (hot extraction)	Toluene	3	120	Atmospheric
77	2402-BT		shaking	Petrolether/Aceton 3/4	16 h	20 °c	
78	2402-BT	homogenisation	Soxhlet	toluene	6		
80	2402-BT	-	ASE	(1) Toluene - (2) Toluene:Ethanol 90:10	0.25	100°C	10.3
81	2402-BT	No	Preteatment HCl 1M, ASE	Toluene	45 minutes	135	
82	2402-BT	none	Soxhlet	n-hexane	6	120	unknown
83	2402-BT	no	Soxhlet	EtOH/Toluene 2/1	8		

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

Bentonite (2402-BT)
Physico-chemical Methods PCDD/Fs and PCBs - Extraction

LC	Sample	Extraction Sample preparation/pre-treatment	Extraction technique	Extraction solvent	Extraction time [h]	Extraction temperature [ºC]	Extraction pressure [MPa]
84	2402-BT	homogenisation, drying (only for determination of moisture content)	ASE, Soxhlet	toluene, ethanol (ASE), toluene (Soxhlet)	30 min/sample (ASE), 16 h (Soxhlet)	100 °C (ASE)	10 MPa (ASE)
85	2402-BT		soxhlet	toluene/ethanol 70/30	12	bp	ambient
86	2402-BT	sample mixed with sodium sulphate before extraction	Soxhlet	Ethanol:Toluene (70:30)	24 h		
87	2402-BT	none	Soxhlet	toluene / ethanol	3	110	ambient
88	2402-BT		ASE	pentane/acetone 88/12	0,5	80	1500
89	2402-BT	no	ASE	Toluene	1	150	12
90	2402-BT		twisselmann	Ethanol/Toluol (7:3)	8	boiling point	
91	2402-BT	addition of water (20%)	soxhlet	ethanol:toluene (5./5.)	12		
92	2402-BT		ASE	Ethylacetate/Cyclohexane (1:1 v/v)	0,25	100	10
27A	2402-BT	oven drying	ASE	ACETONE:HEXANE 1:1	1/3	100	10,34
44A	2402-BT	drying	ASE	Toluene/acetone (70/30)	0,5	120	10
82A	2402-BT	none	ASE	n-hexane	1	120	unknown

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Physico-chemical Methods PCDD/Fs and PCBs - Clean-up

		Clean-up									
LC	Sample	Gelchromatography	Silica/sulfuric acid column	Florisil column	Alumina column	Carbon column	Others	Final volume [µl]: PCDD/F	Final volume [µl]: DL-PCB (non-ortho-PCBs)	Final volume [µl]: DL-PCB (mono-ortho-PCBs)	Final volume [µl]: Indicator PCBs
1	2402-BT	no	yes	no	yes	yes	no	40.00	40.00	200.00	200
2	2402-BT	no	yes	no	yes	yes		10.00	10.00	80.00	
3	2402-BT	No	Yes	No	Yes	Yes	-	50.00	50.00	50.00	50.00
4	2402-BT	yes	yes	no	yes	yes	basic silica, silver nitrate silica	15.00	15.00	50.00	1000
6	2402-BT						purified with anhydrous magnesium sulfate and fine copper powder				1000
7	2402-BT		yes								1000
8	2402-BT										
9	2402-BT	No	Yes	No	Yes	Yes	None	10.00	10.00	30.00	N/A
11	2402-BT										
12	2402-BT	no	yes		yes	yes	AgNO3	1,5 ml -> 20µl	1,5 ml -> 20µl	1,5 ml -> 20µl	1,5 ml -> 20µl
13	2402-BT	no	yes	yes	no	no	no	25.00	25.00	250.00	250
14	2402-BT	no	yes	no	yes	no	no	/	/	/	500 µl
15	2402-BT	no	yes	yes	yes	yes	no	15.00	15.00	25.00	
16	2402-BT	yes	yes	no	yes	no	-	10.00	20.00	20.00	-
17	2402-BT	no	yes	yes	yes	yes		20.00	20.00	100.00	100
19	2402-BT										
20	2402-BT	no	yes	no	yes, Al2O3	yes	no	500.00	500.00	500.00	500
21	2402-BT	no	yes	no	yes	yes		10.00	80.00	80.00	80.00
22	2402-BT	no	yes	no	yes	yes		15.00	15.00	15.00	1000
23	2402-BT	no	yes	no	yes	yes		40.00	40.00	200.00	200
24	2402-BT	No	Yes	No	Yes	Yes		10.00	10.00	200.00	200
25	2402-BT	NO	YES	NO	YES	YES		20.00	20.00	20.00	200
26	2402-BT	no	yes	no	yes	yes	silica/AgNO3	50.00	50.00	50.00	50
27	2402-BT	YES	YES	NO	NO	NO	SPE SILICA COLUMN 1g/6mL				250
28	2402-BT	no	yes	no	yes	yes	none	20.00	20.00	20.00	20
29	2402-BT	no	no	no	no	no	cleanup performed by automatic system GO-2HT Miura using columns: silver nitrate silica gel, sulfuric acid silica gel, carbon, alumina	20.00	20.00	20.00	20
30	2402-BT	no	yes	yes	yes	yes		10.00	10.00	20.00	50
31	2402-BT	NO	YES	NO	YES	YES	NO	20.00	20.00	500.00	500
32	2402-BT	no	yes	no	yes	yes	acidic treatment	25.00	25.00	50.00	50.00
33	2402-BT	no	yes	no	yes	yes		20.00	20.00	20.00	50
34	2402-BT	No	Yes	Yes	No	Yes		12.00	12.00	50.00	50
35	2402-BT	Yes	Yes	Yes	Yes	Yes		1500.00			250
36	2402-BT	no	yes	no	yes	yes	no	20.00	20.00	no	no
37	2402-BT	no	yes	no	yes	yes	Silica/AgNO3	50.00	50.00	100.00	100
38	2402-BT										
39	2402-BT	no	yes	yes	no	no	Sulfoxide SPE	100.00	100.00	100.00	100
40	2402-BT	no	yes	no	yes	no	no	50.00	50.00	1000.00	1000
41	2402-BT	Yes	Yes	No	Yes	No	N/A	N/A	N/A	N/A	100
42	2402-BT										
43	2402-BT	no	yes	no	yes	no	no	100µl	100µl	100µl	100µl
44	2402-BT	no	yes	no	yes	yes		10.00	20.00	50.00	50
45	2402-BT	yes	yes	yes	no	yes	acidic treatment		50.00	50.00	50
46	2402-BT	NO	YES	YES	YES	YES	NO	10.00	10.00	10.00	50
48	2402-BT	no	yes	no	yes	yes		20.00	50.00	50.00	
49	2402-BT	yes	yes	no	no	yes		16.00	16.00	20.00	800
51	2402-BT	no	yes	no	yes	yes		20.00	20.00	40.00	100
52	2402-BT	no	yes	no	yes	yes		20.00	20.00	20.00	20
53	2402-BT	no	yes	no	yes	yes		40.00	40.00	100.00	100
54	2402-BT	NO	YES	NO	YES	YES	SILICA BASIC COLUMN	30.00	30.00	30.00	30
55	2402-BT	yes	yes	yes	no	yes	no	20.00	60.00	500.00	500
56	2402-BT	no	no	no	no	no	acid hydrolysis by sulfuric acid	0.00	0.00	0.00	500
57	2402-BT	yes	yes	yes	no	yes		25.00	25.00	25.00	
58	2402-BT	No	Yes - Miura	Yes - Miura	Yes - Miura	Yes - Miura	N/A	25 µl	25 µl	500 µl	500 µl
59	2402-BT	no	no	no	no	no					1000
62	2402-BT	No	Yes	Yes	No	Yes		10.00	10.00	50.00	50.00
63	2402-BT	yes	yes	yes	yes	no		10.00	50.00	50.00	50
64	2402-BT	no	yes	yes	no	yes		10.00	20.00	50.00	50
65	2402-BT	no	yes	no	yes	yes		20.00	20.00	20.00	20
66	2402-BT	no	yes	no	no	yes	no	15.00	15.00	15.00	75
68	2402-BT	NO	SI	NO	SI	NO	NO	12.00	20.00	20.00	20
69	2402-BT						Silica with sulfuric acid	10.00	50.00	50.00	50
70	2402-BT	no	yes	no	yes	yes		25.00	100.00	100.00	100
71	2402-BT	no	yes (MiURA system)	yes (MiURA system)	yes (MiURA system)	yes (MiURA system)		50.00	50.00	100.00	100
72	2402-BT	no	no	no	no	no	no				
73	2402-BT	no	yes	no	yes	yes		40.00	40.00	500.00	500
74	2402-BT	no	yes	no	yes	no	no	50.00	50.00	1000.00	1000
75	2402-BT		yes	yes		yes		20.00	200.00	200.00	200
76	2402-BT	no	yes	no	yes	yes		20.00	20.00	80.00	80
77	2402-BT	yes	no	no	no	no	no				1000
78	2402-BT	no	yes	no	yes	no	silica	10.00	100.00	500.00	500.00
80	2402-BT	no	yes	no	yes	yes	-	9.00	9.00	100.00	100
81	2402-BT	No	Yes	Yes	Yes	Yes		10.00	20.00	20.00	20
82	2402-BT	no	yes	no	no	no	no				1000
83	2402-BT	yes	yes	no	no	yes		30.00	30.00	30.00	30

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

Bentonite (2402-BT)
Physico-chemical Methods PCDD/Fs and PCBs - Clean-up

			Clean-up									
LC	Sample		Gelchromatography	Silica/sulfuric acid column	Florisil column	Alumina column	Carbon column	Others	Final volume [µl]: PCDD/F	Final volume [µl]: DL-PCB (non-ortho-PCBs)	Final volume [µl]: DL-PCB (mono-ortho-PCBs)	Final volume [µl]: Indicator PCBs
84	2402-BT		no	yes	no	no	yes	no	10.00	10.00	20.00	20
85	2402-BT		no	yes	no	yes	yes		15.00	15.00	500.00	500
86	2402-BT		no	yes	no			basic set of "power-prep system" columns	20.00	40.00	40.00	40
87	2402-BT		no	yes	no	yes	no		20.00	20.00	100.00	100
88	2402-BT		no	yes	no	yes	yes	Silver nitrate column	20.00	20.00	1000.00	1000
89	2402-BT		no	yes	no	yes	yes	no	25.00	25.00	500.00	500
90	2402-BT		no	yes	no	yes	yes	no	30.00	30.00	400.00	
91	2402-BT		no	yes		yes	yes		15.00	50.00	50.00	50
92	2402-BT		yes	no	no	no	no	Silica 10% water				1000
27A	2402-BT		YES	YES	NO	NO	NO	SPE SILICA COLUMN 1g/6mL				250
44A	2402-BT		no	yes	yes	no	no					50
82A	2402-BT		no	no	no	no	no	In-Cell Cleanup (sulfuric acid silica 44%)				1000

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Physico-chemical Methods PCDD/Fs and PCBs - Detection

		PCDD/F				Dioxin-like PCB (non-ortho-PCB)				Dioxin-like PCB (mono-ortho-PCB)				Indicator PCB			
LC	Sample	GC injection	Injected volume [µl]	GC separation: Stationary phase	Detector	GC injection	Injected volume [µl]	GC separation: Stationary phase	Detector	GC injection	Injected volume [µl]	GC separation: Stationary phase	Detector	GC injection	Injected volume [µl]	GC separation: Stationary phase	Detector
1	2402-BT	PTV	5	ZB-DIOXIN	MS/MS	PTV	5	ZB-DIOXIN	MS/MS	splitless	1	HT-8	MS/MS	splitless	1	HT-8	MS/MS
2	2402-BT	splitless	1,5	Thermo TR-Dioxin (5% diphenyl - 95% polysilphenylene siloxane)	HRMS	splitless	1,5	Thermo TR-Dioxin (5% diphenyl - 95% polysilphenylene siloxane)	HRMS	splitless	1,5	Thermo TR-Dioxin (5% diphenyl - 95% polysilphenylene siloxane)	HRMS				
3	2402-BT	Splitless	1.5	DB-5MS	HRMS, DFS	Splitless	1.5	DB-5MS	HRMS, DFS								
4	2402-BT	splitless	45293	DB-5MS	HRMS (R>10000)	splitless	1	DB-5MS	HRMS (R>10000)	splitless	1	DB-5MS	HRMS (R>10000)	splitless	1	HT-8	µECD
6	2402-BT													splitless	1.0	(5%-Phenyl)-methylpolysiloxane	micro ECD, MSD
7	2402-BT													splitless, PTV	1	HP5-MS UI, 2x 15m x 0,25mm x 0,25µm	LRMS, triple quadrupole
8	2402-BT																
9	2402-BT	Splitless	1	5%-Phenyl-Arylene-95% DimethylPolysiloxane (ZB5-MS)	Thermo DFS HRMS	Splitless	1	5%-Phenyl-Arylene-95% DimethylPolysiloxane (ZB5-MS)	Thermo DFS HRMS	Splitless	1	5%-Phenyl-Arylene-95% DimethylPolysiloxane (ZB5-MS)	Thermo DFS HRMS	N/A	N/A	N/A	N/A
11	2402-BT																
12	2402-BT	PTV	1	DB5 MS	LR-MS-MS	PTV	1	DB5 MS	LR-MS-MS	PTV	2	DB5 MS	LR-MS-MS	PTV	2	DB5 MS	LR-MS-MS
13	2402-BT	splitless	2	Rxi-5 Sil MS	MS/MS	splitless	2	Rxi-5 Sil MS	MS/MS	splitless	1	Rxi-5 Sil MS	MS/MS	splitless	1	Rxi-5 Sil MS	MS/MS
14	2402-BT	/	/	/	/	/	/	/	/	/	/	/	/	splitless	1 µl	XLB	LR-MS
15	2402-BT	splitless	2,0	60 m DB-5 MS capillary column	HRMS	splitless	1,5	60 m DB-5 MS capillary column	HRMS	splitless	1,5	60 m DB-5 MS capillary column	HRMS				
16	2402-BT	PTV	3	Fenil Arileno equivalente a (5%-fenil)-dimetilpolisiloxano	CG-MS/MS	PTV	3	Fenil Arileno equivalente a (5%-fenil)-dimetilpolisiloxano	CG-MS/MS	PTV	3	Fenil Arileno equivalente a (5%-fenil)-dimetilpolisiloxano	CG-MS/MS				
17	2402-BT	splitless	2	phenyl arylene polymer (J&W DB5-ms)	LRMS	splitless	2	phenyl arylene polymer (J&W DB5-ms)	LRMS	splitless	1	phenyl arylene polymer (J&W DB5-ms)	LRMS	splitless	1	phenyl arylene polymer (J&W DB5-ms)	LRMS
19	2402-BT																
20	2402-BT	PTV	100	DB5 MS (60m, 0.25mm, 0.25 µm)	HRMS (DFS, Thermo Fisher)	PTV	100	DB5 MS (60m, 0.25mm, 0.25 µm)	HRMS (DFS, Thermo Fisher)	splitless	2	DB5 MS (60m, 0.25mm, 0.25 µm)	HRMS (DFS, Thermo Fisher)	splitless	2	DB5 MS (60m, 0.25mm, 0.25 µm)	HRMS (DFS, Thermo Fisher)
21	2402-BT	Splitless	1	5% Phenyl (equiv) polysilphenylene-siloxane	HRMS	Splitless	1	TR-PCB 8 MS	HRMS	Splitless	1	TR-PCB 8 MS	HRMS	Splitless	1	TR-PCB 8 MS	HRMS
22	2402-BT	splitless with PTV-injector	1	Macherey-Nagel OPTIMA 5 HT + 10m Guard Column, 60m x 0.25mm x 0.25µm	GC-MS/MS	splitless with PTV-injector	1	Macherey-Nagel OPTIMA 5 HT + 10m Guard Column, 60m x 0.25mm x 0.25µm	GC-MS/MS	splitless with PTV-injector	1	Macherey-Nagel OPTIMA 5 HT + 10m Guard Column, 60m x 0.25mm x 0.25µm	GC-MS/MS	splitless with PTV-injector	1	Macherey-Nagel OPTIMA 5 HT + 10m Guard Column, 60m x 0.25mm x 0.25µm	GC-MS/MS
23	2402-BT	PTV	5	DB5-ms	HRMS	PTV	5	DB5-ms	HRMS								
24	2402-BT	Splitless	2	% 5 phenyl %95 polydimethylsiloxane	APGC-MS-MS	Splitless	2	% 5 phenyl %95 polydimethylsiloxane	APGC-MS-MS	Splitless	2	% 5 phenyl %95 polydimethylsiloxane	APGC-MS-MS	Splitless	2	% 5 phenyl %95 polydimethylsiloxane	APGC-MS-MS
25	2402-BT	PTV	2.5	5% Diphenyl / 95% Dimethylpolysiloxan	LRMS	PTV	2.5	5% Diphenyl / 95% Dimethylpolysiloxan	LRMS	PTV	2.5	5% Diphenyl / 95% Dimethylpolysiloxan	LRMS	PTV	1	5% Diphenyl / 95% Dimethylpolysiloxan	LRMS
26	2402-BT	PTV	2	DB 5 ms	HRMS	PTV	2	DB 5 ms	HRMS	PTV	1	XLB	HRMS	PTV	1	XLB	HRMS
27	2402-BT													SPLITLESS	1	HT8 SGE	GC-MS TRIPLE QUAD
28	2402-BT	splitless	2	Agilent DB-5MS UI	HRMS	splitless	2	Agilent DB-5MS UI	HRMS	splitless	1	Agilent DB-5MS UI	HRMS	splitless	1	Agilent DB-5MS UI	HRMS
29	2402-BT	splitless	1	db5ms	HRMS	splitless	1	ht8	HRMS	splitless	1	ht8	HRMS	splitless	1	ht8	HRMS
30	2402-BT	splitless	1	5% phenyl, 94% methyl, 1% vinylsilicone, 60 m x 0.25 mm x 0.1 µm	HRMS	splitless	1	5% phenyl, 94% methyl, 1% vinylsilicone, 60 m x 0.25 mm x 0.1 µm	HRMS	splitless	1	8% phenylpolycarborane-siloxane, 60 m x 0.25 mm x 0.25 µm	HRMS	splitless	1	8% phenylpolycarborane-siloxane, 60 m x 0.25 mm x 0.25 µm	HRMS
31	2402-BT	MMI	05. Jan	5% fenil-metilpolisiloxane	MS/MS	MMI	5	5% fenil-metilpolisiloxane	MS/MS	MMI	1	5% fenil-metilpolisiloxane	MS/MS	MMI	1	5% fenil-metilpolisiloxane	MS/MS
32	2402-BT	splitless	1.8	DB-5MS	HRMS (Autospec Ultima Waters)	splitless	1	HT8-PCB	HRMS (Autospec Ultima Waters)	splitless	1	HT8-PCB	HRMS (Autospec Ultima Waters)	splitless	1.0	HT8-PCB	HRMS (Autospec Ultima Waters)
33	2402-BT	splitless	2	DB5MS, DB17	MSMS	splitless	2	DB5MS	MSMS								
34	2402-BT	Splitless	2	DB5MS	HRMS	Splitless	2	DB5MS	HRMS	Splitless	1	HT8PCB	HRMS	Splitless	1	HT8PCB	HRMS
35	2402-BT	PTV	5	VF 5 MS	LRMS									splitless	2	VF 5 MS	LRMS
36	2402-BT	Splitless	2	TG-Dioxin	HRMS	Splitless	2	TR-PCB-8MS	HRMS	no	no	no	no	no	no	no	no
37	2402-BT	PTV	8, 5	DBDIOXIN, DB-5	HRMS	PTV	8, 5	DBDIOXIN, DB-5	HRMS	PTV	2, 5	DBDIOXIN, DB-5	HRMS	PTV	2, 5	DBDIOXIN, DB-5	HRMS
38	2402-BT																
39	2402-BT	PTV	20	DB-5	MS/MS	PTV	20	HT-8	MS/MS	PTV	20	HT-8	MS/MS	PTV	20	HT-8	MS/MS
40	2402-BT	PTV	5	SLB-5 MS	HRMS	PTV	5	HT-8	HRMS	PTV	5	HT-8	HRMS	PTV	5	HT-8	HRMS
41	2402-BT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	splitless	2	TR-PCB-8MS Thermo-scientific	MS-MS
42	2402-BT																
43	2402-BT	Large PTV	25µl	DB 5MS	HRMS	Large PTV	25µl	DB 5MS	HRMS	Large PTV	10µl	HT 8	HRMS	Large PTV	10µl	HT 8	HRMS
44	2402-BT	splitless	2	DB-5MS	HRMS	splitless	2	DB-5MS	HRMS	splitless	2	HT8-PCB	HRMS	splitless	2	HT8-PCB	HRMS
45	2402-BT					PTV	1	ZB-5MSi	HRMS	PTV	1	ZB-5MSi	HRMS	PTV	1	ZB-50	MS/MS
46	2402-BT	SPLITLESS	2	DB5MS	HRMS	SPLITLESS	1	DB5MS	HRMS	SPLITLESS	1	DB5MS	HRMS	SPLITLESS	1	DBXLB	HRMS
48	2402-BT	splitless	2	TG-Dioxin	HRMS	splitless	1	TG-Dioxin	HRMS	splitless	1	TG-Dioxin	HRMS				
49	2402-BT	splitless	1	db-xlb	HRMS	splitless	1	db-xlb	HRMS	splitless	1	db-xlb	HRMS	splitless	1	db-xlb	HRMS
51	2402-BT	splitless	1	DB-5MS 60m X 0.25mm X 0.1µm	HRMS	splitless	1	HT8-PCB 60m x0,25mm x 0,25µm	HRMS	splitless	1	HT8-PCB 60m x0,25mm x 0,25µm	HRMS	splitless	1	HT8-PCB 60m x0,25mm x 0,25µm	HRMS
52	2402-BT	PTV	5	DB-5MS	HRMS	PTV	5	DB-5MS	HRMS	PTV	1	HT8-PCB	HRMS	PTV	1	HT8-PCB	HRMS
53	2402-BT	splitless	2	DB 5 MS	HRMS	splitless	2	DB 5 MS	HRMS	splitless	2	HT 8	HRMS	splitless	2	HT 8	HRMS
54	2402-BT	PTV	5	DB5-MS	MS/MS	PTV	5	DB5-MS	MS/MS	PTV	5	DB5-MS	MS/MS	PTV	5	DB5-MS	MS/MS
55	2402-BT	PTV	5	DB5-MS	HRMS	PTV	5	DB5-MS	HRMS	SSL	1	HT8-PCB	HRMS	SSL	1	HT8-PCB	HRMS
56	2402-BT													splitless	2	crosslinked 5% PH ME Siloxane	ECD
57	2402-BT	splitless	1,5	diphenyl dimethyl polysiloxane	HRMS	splitless	1,5	diphenyl dimethyl polysiloxane	HRMS	splitless	1,5	diphenyl dimethyl polysiloxane	HRMS				
58	2402-BT	PTV in splitless mode	6 µl	RTX Dioxin 2	HRMS	PTV in splitless mode	2 µl	HT 8/RTX Dioxin 2	HRMS	PTV in splitless mode	2 µl	HT 8/RTX Dioxin 2	HRMS				
59	2402-BT																
62	2402-BT	Splitless	2	RTX-PCB 40m	HRMS	Splitless	2	RTX-PCB 40m	HRMS	Splitless	2	RTX-PCB 40m	HRMS	Splitless	1	Rxi-XLB	LRMS: GCMSMS
63	2402-BT	splitless	1	VF-Xms	MSMS (TQ)	splitless	1	Rxi 5Sil MS	MSMS (TQ)	splitless	1	Rxi 5Sil MS	MSMS (TQ)	splitless	2	RTX-PCB 40m	HRMS
64	2402-BT	PTV splitless	02. Jan	DB-5MS	HRMS	PTV splitless	01. Jan	DB-5MS	HRMS	PTV splitless	1	DB-5MS, HT-8	HRMS	splitless	1	Rxi 5Sil MS	MSMS (TQ)
65	2402-BT	Splitless	3	DB-5MS : 5% Phenyl 95% dimethylpolysiloxane	MSMS	Splitless	3	DB-5MS : 5% Phenyl 95% dimethylpolysiloxane	MSMS	Splitless	3	DB-5MS : 5% Phenyl 95% dimethylpolysiloxane	MSMS	PTV splitless	1	DB-5MS, HT-8	HRMS
66	2402-BT	Splitless	2	Rtx-5MS, BPX-DXN	HRMS	Splitless	2	Rtx-5MS	HRMS	Splitless	2	Rtx-5MS, HT8-PCB	HRMS	Splitless	3	DB-5MS : 5% Phenyl 95% dimethylpolysiloxane	MSMS
68	2402-BT	SPLITLESS	1,5	POLYSILOXANE	MS TRIPLE QUAD	SPLITLESS	1,5	POLYSILOXANE	MS TRIPLE QUAD	SPLITLESS	1,5	POLYSILOXANE	MS TRIPLE QUAD	Splitless	2	Rtx-5MS, HT8-PCB	HRMS
69	2402-BT	PTV	5	VFXms	MS/MS	PTV	2	VFXms	MS/MS	PTV	2	VFXms	MS/MS	SPLITLESS	1,5	POLYSILOXANE	MS TRIPLE QUAD
70	2402-BT	splitless	1	DB5MS	APGC-MSMS	splitless	1	DB5MS	APGC-MSMS	splitless	1	DB5MS	APGC-MSMS	PTV	2	VFXms	MS/MS
71	2402-BT	PTV	7	db-5ms	HRMS	PTV	7	db-5ms	HRMS	PTV	7	db-5ms	HRMS	splitless	1	DB5MS	APGC-MSMS
72	2402-BT													PTV	7	db-5ms	HRMS
73	2402-BT	Splitless	2	TR-Dioxin, 60m, 0.25, 0.25	HRMS	Splitless	2	TR-Dioxin, 60m, 0.25, 0.25	HRMS	Splitless	2	TR-Dioxin, 60m, 0.25, 0.25	HRMS	PTV	2	DB-XLB	Agilent 5975C
74	2402-BT	PTV	5	SLB-5 MS	HRMS	PTV	5	HT-8	HRMS	PTV	5	HT-8	HRMS	Splitless	2	TR-Dioxin, 60m, 0.25, 0.25	HRMS
75	2402-BT	splitless	2	DB-5 MS	HRMS	splitless	1	DB-5 MS	HRMS	splitless	1	DB-5 MS	HRMS	PTV	5	HT-8	HRMS
76	2402-BT	PTV	1	5% Polysilarylene - 95% Polydimethilsyloxane (Zebron-dioxins)	HRMS	PTV	1	5% Polysilarylene - 95% Polydimethilsyloxane (Zebron-dioxins)	HRMS	PTV	1	HT8-Forte SGE	HRMS	splitless	1	DB-5 MS	HRMS
77	2402-BT													PTV	1	HT8-Forte SGE	HRMS
78	2402-BT	splitless	1	DB5-MS	HRMS	splitless	1	DB5-MS	HRMS	splitless	1	DB5-MS	HRMS	splitless	1	HP-5MS	MS/MS
80	2402-BT	PTV	5	VF5-MS	HRMS	PTV	5	VF5-MS	HRMS	Splitless	2	HT-8	HRMS	splitless	1	DB5-MS	HRMS
81	2402-BT	Splitless	1	DB5MS	HRMS	Splitless	1	DB5MS	HRMS	Splitless	1	DB5MS	HRMS	Splitless	2	HT-8	HRMS
82	2402-BT													splitless	1	DB5MS	HRMS
83	2402-BT	splitless	5	DB5 MS	GC MS/MS	splitless	1	DB5 MS	GC MS/MS	splitless	1	DB5 MS	GC MS/MS	splitless	2	SGE HT-8, 50 m, 0,22 mm, 0,25 µm	triplequad MS/MS
														splitless	1	DB5 MS	GC MS/MS

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Physico-chemical Methods PCDD/Fs and PCBs - Detection

		PCDD/F				Dioxin-like PCB (non-ortho-PCB)				Dioxin-like PCB (mono-ortho-PCB)				Indicator PCB			
LC	Sample	GC injection	Injected volume [µl]	GC separation: Stationary phase	Detector	GC injection	Injected volume [µl]	GC separation: Stationary phase	Detector	GC injection	Injected volume [µl]	GC separation: Stationary phase	Detector	GC injection	Injected volume [µl]	GC separation: Stationary phase	Detector
84	2402-BT	splitless	3	DB-5ms	HRMS	splitless	3	DB-5ms	HRMS	splitless	2	DB-5ms	HRMS	splitless	2	DB-5ms	HRMS
85	2402-BT	splitless	5	(5%-phenyl)-methylpolysiloxane		Splitless	5	(5%-phenyl)-methylpolysiloxane	MS/MS	Splitless	5	(5%-phenyl)-methylpolysiloxane	MS/MS	Splitless	5	(5%-phenyl)-methylpolysiloxane	MS/MS
86	2402-BT	Splitless	2	DB-5MS (60 m, 0.25 mm id, 0,25 mm film)	HRMS (Mat-95 XP)	Splitless	1	DB-5MS (60 m, 0.25 mm id, 0,25 mm film)	HRMS (Mat-95 XP)	Splitless	1	DB-5MS (60 m, 0.25 mm id, 0,25 mm film)	HRMS (Mat-95 XP)	Splitless	1	DB-5MS (60 m, 0.25 mm id, 0,25 mm film)	HRMS (Mat-95 XP)
87	2402-BT	splitless	3	DB5-MS	MSMS	splitless	3	DB5-MS	MSMS	splitless	3	DB5-MS	MSMS	splitless	3	DB5-MS	MSMS
88	2402-BT	splitless	2	DB5-MS	HRMS	splitless	2	DB5-MS	HRMS	PTV	1	HT8	HRMS	PTV	1	HT8	HRMS
89	2402-BT	splitless	2	XLB	QQQ	splitless	2	XLB	QQQ	splitless	2	XLB	QQQ	splitless	2	XLB	QQQ
90	2402-BT	PTV	5	DB5	HRMS (DFS)	PTV	5	DB5	HRMS (DFS)	PTV	2	DB5	HRMS (DFS)				
91	2402-BT	splitless	2	DB-5MS	HRMS	splitless	2	DB-XLB	HRMS	splitless	2	DB-XLB	HRMS	splitless	2	DB-XLB	HRMS
92	2402-BT													splitless	1	HP 5ms UI (5%Phenyl - 95% Dimethylpolysiloxan)	MSMS
27A	2402-BT													SPLITLESS	1	HT8 SGE	GC-MS TRIPLE QUAD
44A	2402-BT													splitless	2	HT8-PCB	HRMS
82A	2402-BT													splitless	2	SGE HT-8, 50 m, 0,22 mm, 0,25 µm	triplequad MS/MS

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bentonite (2402-BT)
Bioanalytical screening methods PCDD/Fs and PCBs - Clean-up and Separation

LC	Sample		**Weighed sample** [g]	**Extraction** Sample preparation/pre-treatment	Extraction technique	Extraction solvent	Extraction time [h]	Extraction temperature [ºC]	Extraction pressure [Mpa]
11	2402-BT		5	homogenisation	PSE	tolueen / ethanol	1,5	100	10.00
19	2402-BT		10	Drying with Na2SO4	Column	n-hexane/acetone 2/1 v/v	2	18-22 (room ambient temperature)	-
20	2402-BT		2	homogenisation	shaking	hexane/diethyl ether 97/3 (after mixing of sample with methanol/water 85/15)	2x 1 hr	RT	
31	2402-BT		9		ASE	HEXANE/ACETONE (9:1)	1	100	10,3
38	2402-BT		2	homogenisation	shaking and sonication	50% acetone/50% toluene	1h	room temperature	
53	2402-BT		4	-	Soxhlet	toluene/acetone 7/3			
56	2402-BT		6	homogenisation	shaking	water, n-Propanol, n-Hexan/DEE v/v 97/3	1 hour and 2x 1/2 hours	ambient	normal
64	2402-BT		10	yes	shaking	1. toluene 10ml + acetone 20ml 2-4. toluene 10ml + acetone 10ml	1	-	-

			Clean-up (PCDD/Fs and PCBs)						**Clean-up (Separate analysis of PCDD/Fs and PCBs)**			
LC	Sample		Silica/sulfuric acid column	Alumina column	Florisil column	Carbon/celite column	Others	Separate analysis of PCDD/Fs and DL-PCBs	Alumina column	Florisil column	Carbon/celite column	Others
11	2402-BT		yes	yes	no	yes	yes	yes	yes	no	yes	yes
19	2402-BT		yes	no	yes - second result without florisl was identical	no		no	no	no	no	
20	2402-BT		yes	no	no	no	no	no	no	no	no	no
31	2402-BT		YES	NO	NO	NO		NO				
38	2402-BT		yes			yes					yes	
53	2402-BT		yes	no	no	no	no	no				
56	2402-BT		yes	no	no	no		no				
64	2402-BT		yes	no	no	yes	no	yes	no	no	yes	no

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]

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

Bentonite (2402-BT)

Bioanalytical screening methods PCDD/Fs and PCBs - Cell bioassay

LC	Sample	Name, type and provider of cell line	Method validated according to EU Regulation	Sample replicates on microtiter plate	Type of calibrators	Type of calibration function	Curve fitting method	Procedure blank correction	Recovery correction	Type of recovery reference sample(s)	Matrix of recovery reference sample(s)	Level(s) of recovery reference sample(s)		
												PCDD/F + DL-PCB	PCDD/F	DL-PCB
19	2402-BT	H4IIE, rat hepatome wild type, from Helmholtz-Zentrum Neuherberg/Germany	Not for feed	triplicate	TCDD	S-Curve, 4-Parameter-Fit	SSR	yes	yes	PT material	Sepiolith (2014)	0,83 ng WHO2005-PCDD/F+dlPCB-TEQ/kg product with a moisture content of 12%		
20	2402-BT	rat H4IIE (Wageningen University, now BDS)	yes	triplicates	reference samples	exponential	no	yes, automatically	yes, automatically	reference samples	chicken feed	0.02/0.29/0.48/0.70/1.57/3.35 ng TEQ/kg		
31	2402-BT	DR CALUX provided by BDS	under validation	triplicate	TCDD	CALIBRATION CURVE	SSP	YES	YES	RM	FEED	0,98		
38	2402-BT		yes	triplicates	TCDD	curve				spiked			0.95	0.95
53	2402-BT	rat Hepatoma Typs H4L 1.1 c4 (University of California, Davis)	yes	triplicates	TCDD	curve model	WSSR regression	yes	yes	QC sample GC-HRMS confirmed	compound feed	76.00		
56	2402-BT	H4IIE Pgudluc 1.1 rat hepatoma cell line from BDS	yes	triplicates	TCDD	linear	SSR	yes	yes	certified BRM 06		16,0 ng/kg		
64	2402-BT	H1L6.1c3, XDS Inc.	yes	duplicates	TCDD, PCB 126	4-PL	SSR	yes	yes	spiked	bentonite	1,03	0,79	0,24

LC	Sample	Bioassay cut-off value(s) calculated from				Other approach to bioassay cut-off value(s)
		matrix-matched calibration experiments (spiking) during initial validation	multiple analysis (n>6) of a sample contaminated at the GC/MS DL	multiple analysis (n>6) of a sample contaminated at 2/3 level of interest	matrix-matched calibration experiments (confirmed samples) during re-evaluation	
19	2402-BT	no	no	no	no	Cut off = 2/3 of concentration of interest
20	2402-BT	no	no	no	no	using AL for PCDD/Fs
31	2402-BT		YES			
38	2402-BT	yes				
53	2402-BT	no	yes	no	no	
56	2402-BT					2/3 of ML
64	2402-BT	yes	no	no	no	cut-off for AL set as 3/4 of AL

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Bentonite 2024 [EURL-PT-DPB_2402-BT]

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

Bentonite (2402-BT)

Physico-chemical Methods PCDD/Fs and PCBs - Additional Information

LC	Sample		**Additional information** Physical-chemical methods		**Additional information** Bioanalytical methods
7	2402-BT		sample nb. 2402-BT-004	measurement: a GC-MSMS is used	
9	2402-BT		J&W DB-Dioxin column [44% methyl- 28% phenyl-20% cyanopropylpolysiloxane + 8% carbowax] used for confirmation of certain congeners.		
20	2402-BT				moisture content determined for GC/HRMS but considering high response not relevant
29	2402-BT		two fractions are obtained after MIURA purification: fraction 1 contains PCDD/Fs & mono-ortho-PCBs; fraction 2 contains other DL-PCBs; for the indicator PCBs two fractions are mixed together		
41	2402-BT		N/A= non-applicable		
62	2402-BT		Automatic purification MIURA		
78	2402-BT		Test also with DEX Tech (Fa. LC Tech) with Florisil and Carbon columns		