Revision 3

Certificate of Analysis

Fortified Fish Reference Material

Catalog Number:	EDF-2526
Lot Number:	R544
Expiration Date:	August 2026
Matrix:	Fish
Amount per Vial:	10 g
Storage and Handling:	The product contains trace amounts of dioxins, furans, PCBs, BFRs, PAHs and pesticides. It should be handled according to OSHA guidelines for hazardous material. Protect from light. Store at room temperature.
Intended Use:	For laboratory use only. This product is a sample of homogeneous fortified fish matrix from Sockeye salmon, a relatively uncontaminated freshwater/marine fish species found in Canada. This sample is intended for use in evaluating the performance of an analytical laboratory for the listed analytes.
Preparation:	The preparation of this fish sample has been detailed in Reference Materials for Environmental Analysis (Clement, Keith, & Siu, 1997). In short, Sockeye salmon were collected as a representative of a relatively uncontaminated fish species and then frozen. Fish were sent for central processing consisting of gutting, homogenizing, and sterilizing.
Interlaboratory Analysis:	The product was included in the Second Round of International Laboratory Study conducted by Cambridge Isotope Laboratories and Cerilliant Corporation. Participating laboratories used a variety of sample preparation and analytical techniques. The results listed below supersede those obtained in the First Round of Interlaboratory Study. This Second Round of Interlaboratory Study adds consensus values for four additional PCB congeners, as well as one brominated diphenyl ether, a class of compounds for which no consensus values were determined in the First Round of Interlaboratory Study.
Interlaboratory Results:	Results of the international interlaboratory study are attached. Consensus values were independently assigned by Manna Associates in the UK using the Cofino model of statistical analysis. These numbers are certified reference values. All values are presented at three significant figures. Analytes with fewer than five laboratories contributing acceptable data do not have assigned values reported in this study.

Cerilliant certifies that this standard meets or exceeds the specifications stated in this data sheet.

Authorized Signature:

Darron Ellsworth, Quality Assurance Manager

July 15, 2016

Date

Interlaboratory Participants:

Alta Analytical Laboratory, USA
Columbia Analytical Services, Inc., USA
Dr. Weßling Laboratorien GmbH, Germany
Environment Canada, Canada
GfA (Gesellschaft für Arbeitsplatz und Umweltanalytik) mbH, Germany
Institute for Environment and Resources, Vietnam
Institute of Chemical Technology, Czech Republic
Nab Labs Ympäristöanalytiika Oy, Finland
National Center for Scientific Research "Demokritos", Greece
National Institute of Nutrition and Food Safety (Chinese Center for Disease Control and Prevention), China
Oekometric GmbH, Germany
Pace Analytical Services, Inc., USA
Severn Trent Laboratories, CA USA
Severn Trent Laboratories, TN USA
SGS Institut Fresenius GmbH Bayreuth, Germany
Xiamen University, China

Interlaboratory Results:

Compound	*Target Value (ng/kg)*	*Assigned [1] Value (ng/kg)*	*Standard Deviation*	*Reference [2] Value (ng/kg)*	*(n) [3]*
Polychlorinated dioxins and furans					
2,3,7,8-Tetrachlorodibenzo-p-dioxin	25	19.7	2.09	19.8 ± 4.18	14
Total Tetrachlorodibenzo-p-dioxin		19.0	0.54	19.0 ± 1.08	5
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	50	39.9	5.29	39.9 ± 10.6	14
Total Pentachlorodibenzo-p-dioxin		38.9	6.87	38.9 ± 13.7	5
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	75	54.9	3.90	54.9 ± 7.80	14
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	75	51.1	9.67	51.1 ± 19.3	14
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	75	52.9	9.04	52.9 ± 18.1	14
Total Hexachlorodibenzo-p-dioxin		149	20.9	149 ± 41.8	5
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	100	70.7	11.6	70.7 ± 23.2	14
Total Heptachlorodibenzo-p-dioxin		66.9	16.1	66.9 ± 32.2	5
Octachlorodibenzo-p-dioxin	250	181	26.7	181 ± 53.4	14
2,3,7,8-Tetrachlorodibenzofuran	25	18.7	2.79	18.7 ± 5.58	14
Total Tetrachlorodibenzofuran		19.0	1.10	19.0 ± 2.20	5
1,2,3,7,8-Pentachlorodibenzofuran	50	39	3.68	39.0 ± 7.36	14
2,3,4,7,8-Pentachlorodibenzofuran	50	37.8	5.12	37.8 ± 10.2	14
Total Pentachlorodibenzofuran		72	7.46	72.0 ± 14.9	5
1,2,3,4,7,8-Hexachlorodibenzofuran	75	83.3	11.5	83.3 ± 23.0	14
1,2,3,6,7,8-Hexachlorodibenzofuran	75	62.8	9.78	62.8 ± 19.6	14
1,2,3,7,8,9-Hexachlorodibenzofuran	75	57.3	5.46	57.3 ± 10.9	14
2,3,4,6,7,8-Hexachlorodibenzofuran	75	58.6	7.09	58.6 ± 14.2	14
Total Hexachlorodibenzofuran		243	35.4	243 ± 70.8	5
1,2,3,4,6,7,8-Heptachlorodibenzofuran	100	81.6	6.86	81.6 ± 13.7	14
1,2,3,4,7,8,9-Heptachlorodibenzofuran	100	76.7	13.3	76.7 ± 26.6	14
Total Heptachlorodibenzofuran		148	11.5	148 ± 23.0	5
Octachlorodibenzofuran	250	185	28.7	185 ± 57.4	14

Interlaboratory Results (continued):

Compound	*Target Value (ng/kg)*	*Assigned [2] Value (ng/kg)*	*Standard Deviation*	*Reference [3] Value (ng/kg)*	*(n) [4]*
Polychlorinated biphenyls [5]					
2,2',5-Trichlorobiphenyl (#18)		100	24.5	100 ± 49.0	5
2,4,4'-Trichlorobiphenyl (#28)		245	134	245 ± 268	11
2,2',5,5'-Tetrachlorobiphenyl (#52)		369	61.9	369 ± 124	11
3,3',4,4'-Tetrachlorobiphenyl (#77)	600	451	89.4	451 ± 179	13
3,4,4',5-Tetrachlorobiphenyl (#81)		3.00	2.80	3.00 ± 5.60	12
2,2',4,4',5-Pentachlorobiphenyl (#99)		215	102	215 ± 204	5
2,2',4,5,5'-Pentachlorobiphenyl (#101)		579	181	579 ± 362	10
2,3,3',4,4'-Pentachlorobiphenyl (#105)	NA	108	36.5	108 ± 73.0	13
2,3,3',4',6-Pentachlorobiphenyl (#110)		288	56.1	288 ± 112	5
2,3,4,4',5-Pentachlorobiphenyl (#114)		7.73	2.18	7.73 ± 4.36	12
2,3',4,4',5-Pentachlorobiphenyl (#118)	NA	348	196	348 ± 392	11
2',3,4,4',5-Pentachlorobiphenyl (#123)		7.38	4.79	7.38 ± 9.58	11
3,3',4,4',5-Pentachlorobiphenyl (#126)	600	431	89.6	431 ± 17.9	13
2,2',3,4,4',5'-Hexachlorobiphenyl (#138)		395	92.2	395 ± 184	11
2,2',3,5,5',6-Hexachlorobiphenyl (#151)		99.8	8.57	99.8 ± 17.1	5
2,2',4,4',5,5'-Hexachlorobiphenyl (#153)		490	167	490 ± 334	12
2,3,3',4,4',5-Hexachlorobiphenyl (#156)		23.3	11.9	23.3 ± 23.8	12
2,3,3',4,4',5'-Hexachlorobiphenyl (#157)		9.30	4.58	9.30 ± 9.16	11
2,3',4,4',5,5'-Hexachlorobiphenyl (#167)		12.0	4.77	12.0 ± 9.54	12
3,3',4,4',5,5'-Hexachlorobiphenyl (#169)	600	512	80.0	512 ± 160	13
2,2',3,4,4',5,5'-Heptachlorobiphenyl (#180)		116	32.2	116 ± 64.4	12
2,3,3',4,4',5,5'-Heptachlorobiphenyl (#189)		3.51	1.38	3.51 ± 2.76	11
Polybrominated Diphenyl ethers [6]					
2,2',4,4',5,5'-Hexabromodiphenyl ether (#153)		7.48	7.34	7.48 ± 14.7	6

[1] The target value represents the theoretical amount of each analyte that was initially added to the clean fish reference material. The difference between these values and the reference values should be a good indication of the percent recovery of the analytical procedure.

[2] Assigned Value was determined by Manna Associates in the UK using Cofino analysis of raw interlaboratory study data.

[3] The Reference Value is the Assigned Value plus or minus two standard deviations. Negative numbers resulting from two standard deviations being greater than the assigned value have no significance.

[4] Number of laboratories providing results for this analyte.

[5] All numbers in parentheses refer to the IUPAC designation for the compound.

[6] All numbers in parentheses refer to the IUPAC designation for the related PCB congener.

COA Revision History

Revision No.	Date	Reason for Revision
03	July 15, 2016	Revised Expiration date from August 2016 to August 2026.