Rev 0

Certificate of Analysis

Clean Soil Reference Material

Catalog Number:	EDF-5183
Lot Number:	ER10091501
Expiration Date:	May 2023
Matrix:	Soil
Amount per Vial:	10 g
Storage and Handling:	Freezer.

Intended Use: For laboratory use only. This product is a sample of homogeneous soil matrix taken from an area where no known chemical contamination has occurred. This sample is intended for use in evaluating the performance of an analytical laboratory for the listed analytes.

Preparation: "Clean" soil was obtained from a location in Texas which was expected to contain minimal contamination. The soil was sieved to achieve uniform particle size and homogenized to within 5% using a disodium fluorescein indicator. Samples were then sterilized three times for two hours at 121°C and 15 psi.

Interlaboratory Analysis: This product was included in the Second Round of International Interlaboratory 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 one new dioxin, seventeen new PCBs, ten BDEs, and two new PAHs.

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

December 02, 2015
Date

Interlaboratory Participants:

Alta Analytical Laboratory, USA
CARSO, France
CEAEQ, Canada
Chinese Center for Disease Control and Prevention, China
Clean Harbors Environmental Services, USA
Columbia Analytical Services, Inc., USA
East Bay Municipal Utility District, USA
GfA (Gesellschaft für Arbeitsplatz und Umweltanalytik) mbH, Germany
Hong Kong Baptist University, Hong Kong
Labo Van Vooren, Belgium
Maxxam Analytics, Inc., Ontario Canada
Maxxam Analytics, Inc., British Columbia Canada
Military Institute of Chemistry and Radiometry, Poland
Nab Labs Ympäristöanalytiika Oy, Finland
National Central University, Taiwan
Oekometric GmbH, Germany
Pace Analytical Services, Inc., USA
Severn Trent Laboratories, CA USA
Severn Trent Laboratories, TN USA
SGS Institut Fresenius GmbH Bayreuth, Germany
Sun Dreams Environmental Technology Corp., Taiwan
Xiamen University, China

Interlaboratory Results:

Compound	*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	0.11	0.07	0.11 ± 0.14	18
Total Tetrachlorodibenzo-p-dioxin	0.32	0.44	0.32 ± 0.88	8
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.39	0.16	0.39 ± 0.32	18
Total Pentachlorodibenzo-p-dioxin	2.96	1.20	2.96 ± 2.40	10
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1.12	0.26	1.12 ± 0.52	18
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	4.39	0.44	4.39 ± 0.88	18
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	2.00	0.60	2.00 ± 1.20	18
Total Hexachlorodibenzo-p-dioxin	50.9	11.4	50.9 ± 22.8	10
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	153	28.6	153 ± 57.2	18
Total Heptachlorodibenzo-p-dioxin	492	123	492 ± 246	10
Octachlorodibenzo-p-dioxin	7,870	825	7,870 ± 1,650	18
2,3,7,8-Tetrachlorodibenzofuran	0.70	0.17	0.70 ± 0.34	18
Total Tetrachlorodibenzofuran	3.21	1.06	3.21 ± 2.12	10
1,2,3,7,8-Pentachlorodibenzofuran	0.23	0.11	0.23± 0.22	18
2,3,4,7,8-Pentachlorodibenzofuran	0.34	0.07	0.34 ± 0.14	18
Total Pentachlorodibenzofuran	3.31	2.87	3.31 ± 5.74	10
1,2,3,4,7,8-Hexachlorodibenzofuran	0.86	0.22	0.86 ± 0.44	18
1,2,3,6,7,8-Hexachlorodibenzofuran	0.58	0.13	0.58 ± 0.26	18
1,2,3,7,8,9-Hexachlorodibenzofuran	0.12	0.08	0.12 ± 0.16	17
2,3,4,6,7,8-Hexachlorodibenzofuran	0.72	0.48	0.72 ± 0.92	18
Total Hexachlorodibenzofuran	15.6	6.35	15.6 ± 12.7	10
1,2,3,4,6,7,8-Heptachlorodibenzofuran	13.9	1.84	13.9 ± 3.68	18
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.25	0.31	1.25 ± 0.62	18
Total Heptachlorodibenzofuran	54.0	7.98	54.0 ± 16.0	10
Octachlorodibenzofuran	58.2	16.2	58.2 ± 32.4	18

Interlaboratory Results (continued):

Compound	*Assigned [1] Value (ng/kg)*	*Standard Deviation*	*Reference [2] Value (ng/kg)*	*(n) [3]*
Polychlorinated biphenyls [4]				
2,2',5-Trichlorobiphenyl (#18)	78.9	15.2	78.9 ± 30.4	6
2,4,4'-Trichlorobiphenyl (#28)	140	63.6	140 ± 127	13
3,4,4'-Trichlorobiphenyl (#37)	1,710	220	1,710 ± 440	5
2,2',3,5'-Tetrachlorobiphenyl (#44)	1,070	276	1,070 ± 552	7
2,2',4,5'-Tetrachlorobiphenyl (#49)	638	175	638 ± 350	5
2,2',5,5'-Tetrachlorobiphenyl (#52)	2,020	372	2,020 ± 744	12
2,4,4',5-Tetrachlorobiphenyl (#74)	447,000	174,000	447,000 ± 348,000	5
3,3',4,4'-Tetrachlorobiphenyl (#77)	2,230	494	2,230 ± 988	13
3,4,4',5-Tetrachlorobiphenyl (#81)	5.52	3.71	5.52 ± 7.42	11
2,2',3,4,5'-Pentachlorobiphenyl (#87)	2,370	266	2,370 ± 532	6
2,2',4,4',5-Pentachlorobiphenyl (#99)	1,100	222	1,110 ± 444	7
2,2',4,5,5'-Pentachlorobiphenyl (#101)	5,370	782	5,370 ± 1,564	11
2,3,3',4,4'-Pentachlorobiphenyl (#105)	629	79.2	629 ± 158.4	15
2,3,3',4',6-Pentachlorobiphenyl (#110)	5,880	1,050	5,880 ± 2,110	7
2,3,4,4',5-Pentachlorobiphenyl (#114)	34.6	9.01	34.6 ± 18.0	13
2,3',4,4',5-Pentachlorobiphenyl (#118)	6,520	1,150	6,520 ± 2,300	14
2',3,4,4',5-Pentachlorobiphenyl (#123)	24.1	11.6	24.1 ± 23.2	12
3,3',4,4',5-Pentachlorobiphenyl (#126)	33.5	5.13	33.5 ± 10.3	13
2,2',3,3',4,4'-Hexachlorobiphenyl (#128)	342	68	342 ± 135	6
2,2',3,4,4',5-Hexachlorobiphenyl (#137)	87.1	16.4	87.1 ± 32.8	5
2,2',3,4,4',5'-Hexachlorobiphenyl (#138)	2,350	382	2,350 ± 764	11
2,2',3,4,5,5'-Hexachlorobiphenyl (#141)	514	55.8	514 ± 112	6
2,2',3,4',5',6-Hexachlorobiphenyl (#149)	2,280	212	2,280 ± 424	6
2,2',3,5,5',6-Hexachlorobiphenyl (#151)	910	376	910 ± 752	7
2,2',4,4',5,5'-Hexachlorobiphenyl (#153)	2,330	421	2,330 ± 842	13
2,3,3',4,4',5-Hexachlorobiphenyl (#156)	189	25.0	189 ± 25.0	14
2,3,3',4,4',5'-Hexachlorobiphenyl (#157)	31.0	7.56	31.0 ± 15.1	12
2,3,3',4,4',6-Hexachlorobiphenyl (#158)	224	22.4	224 ± 44.8	6
2,3',4,4',5,5'-Hexachlorobiphenyl (#167)	83.2	12.0	83.2 ± 12.0	13
3,3',4,4',5,5'-Hexachlorobiphenyl (#169)	0.57	0.34	0.57 ± 0.68	11
2,2',3,3',4,4',5-Heptachlorobiphenyl (#170)	436	51.2	436 ± 102	7
2,2',3,3',4',5,6-Heptachlorobiphenyl (#177)	362	39.5	362 ± 79.0	7
2,2',3,3',5,5',6-Heptachlorobiphenyl (#178)	135	11.3	135 ± 22.6	5
2,2',3,4,4',5,5'-Heptachlorobiphenyl (#180)	1,116	250	1,116 ± 500	13
2,2',3,4,4',5',6-Heptachlorobiphenyl (#183)	360	12.6	360 ± 25.2	7
2,2',3,4',5,5',6-Heptachlorobiphenyl (#187)	679	71.6	679 ± 143	5
2,3,3',4,4',5,5'-Heptachlorobiphenyl (#189)	14.2	2.66	14.2 ± 5.32	13
2,2',3,3',4,4',5,5'-Octachlorobiphenyl (#194)	182	22.3	182 ± 44.6	7
2,2',3,3',4,4',5,6-Octachlorobiphenyl (#195)	90.6	8.61	90.6 ± 17.2	7
2,2',3,3',4,5,6,6'-Octachlorobiphenyl (#199)	229	17.1	229 ± 34.2	6
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl (#206) [5]	74.8	54.1	74.8 ± 108	7
2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl (#208) [5]	38.3	30.7	38.3 ± 61.4	7
Decachlorobiphenyl (#209)	12.9	11.5	12.9 ± 23.0	7

Interlaboratory Results (continued):

Compound	*Assigned [1] Value (ng/kg)*	*Standard Deviation*	*Reference [2] Value (ng/kg)*	*(n) [3]*
Brominated diphenyl ethers [6]				
2,2',4-Tribromodiphenyl ether (#17)	4.80	3.05	4.80 ± 6.10	7
2,4,4'-Tribromodiphenyl ether (#28)	38.0	39.9	38.0 ± 79.8	11
2,2',4,4'-Tetrabromodiphenyl ether (#47)	192	123	192 ± 246	11
2,2',4,5'-Tetrabromodiphenyl ether (#49)	24.4	9.86	24.4 ± 19.7	5
2,3',4,4'-Tetrabromodiphenyl ether (#66)	12.6	5.46	12.6 ± 10.9	8
2,2',3,4,4'-Pentabromodiphenyl ether (#85)	19.5	8.97	19.5 ± 17.9	8
2,2',4,4',5-Pentabromodiphenyl ether (#99)	213	93.0	213 ± 186	11
2,2',4,4',6-Pentabromodiphenyl ether (#100)	55.4	15.5	55.4 ± 31.0	11
2,2',3,4,4',5-Hexabromodiphenyl ether (#138)	25.8	12.9	25.8 ± 25.8	9
2,2',4,4',5,5'-Hexabromodiphenyl ether (#153)	111	12.0	111 ± 24.0	11
2,2',4,4',5,6'-Hexabromodiphenyl ether (#154)	46.0	13.3	46.0 ± 26.6	11
2,2',3,4,4',5',6-Heptabromodiphenyl ether (#183)	286	35.4	286 ± 70.8	11
Decabromodiphenyl ether (#209)	1,930	1,150	1,930 ± 2,300	7
Polyaromatic hydrocarbons				
Anthracene	9,650	2,990	9,650 ± 5,980	6
Benz[*a*]anthracene	11,200	4,710	11,200 ± 9,420	7
Benzo[*b*]fluoranthene	18,100	9,580	18,100 ± 19,200	7
Benzo[*k*]fluoranthene	5,870	1,660	5,870 ± 3,320	7
Benzo[*g* ,*h* ,*i*]perylene	8,280	1,300	8,280 ± 2,600	7
Benzo[*a*]pyrene	7,620	3,080	7,620 ± 6,160	7
Chrysene	16,000	3,750	16,000 ± 7,500	7
Fluoranthene	33,000	5,170	33,000 ± 10,300	7
Indeno[1,2,3-*cd*]pyrene	9,550	2,070	9,550 ± 4,140	7
Phenanthrene	25,900	19,100	25,900 ± 38,200	6
Pyrene	26,300	4,340	26,300 ± 8,680	7

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

[2] 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.

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

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

[5] Assigned values from the First Round of International Interlaboratory Study.

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

COA Revision History

Revision No.	Date	Reason for Revision
00	December 02, 2015	Initial version