

MATRIX REFERENCE MATERIALS

EnviroMAT™ and **AgroMAT™** Matrix Reference Materials are an invaluable component of any laboratory quality control program. This is because **SCP SCIENCE** CRMs are designed to imitate typical field samples, and as such, each aspect of a laboratory's analytical method can be evaluated.

Prepared using real world-materials, these products are certified via Round Robin, which provides not only realistic, method-dependent, un-biased consensus values, but also very useful confidence and tolerance intervals. The result is a Certificate of Analysis that will permit objective evaluation whether developing new methods or measuring your laboratory's overall performance.



<i>EnviroMAT</i> Standards	Quantity	Catalog No.
Soil, Contaminated SS-1	100 g	140-025-001
Soil Contaminated SS-2	100 g	140-025-002
Sludge, Sewage	50 g	140-025-011
Water, Drinking, Low Level, Concentrate	250 ml	140-025-031
Water, Drinking, High Level, concentrate	250 ml	140-025-032
Water, Ground, Low Level, Concentrate	250 ml	140-025-034
Water, Ground, High Level, Concentrate	250 ml	140-025-035
Water, Waste, Low Level, Concentrate	250 ml	140-025-037
Water, Waste, High Level, Concentrate	250 ml	140-025-038
Oil, Used	125 ml	140-025-041
Lead in Paint, Level 1	20 g	140-025-200
Lead in Paint, Level 2	20 g	140-025-201
Lead and Cadmium in Paint	20 g	140-025-205

<i>AgroMAT</i> Standards	Symbol	Quantity	Catalog No.
Soil, Clay	AG-1	175 g	140-025-101
Soil, Sandy	AG-2	175 g	140-025-102
Compost	CP-1	100 g	140-025-111

Features

Each MRM is prepared in accordance with ISO Guide 34 and certified through a round robin study, focusing on specific methods of analysis.

- Independent verification from multiple laboratories

Includes Certificate of Analysis, prepared in accordance with ISO Guides 31 and 35, providing Consensus values and Confidence and Tolerance Intervals for each method used in the certification.

- Complete documentation for audit purposes

Economically priced, **SCP SCIENCE** MRMs pay for themselves by exposing and helping to correct analytical deficiencies.

- Confirmation of strong performance = peace of mind

Matrix Reference Materials

EnviroMAT™

CONTAMINATED SOIL (SS-1)

Element	EPA-3050A Digestion Values			TOTAL Digestion Values		
	Consensus Value (mg/kg)	Confidence Interval (mg/kg)	Tolerance Interval (mg/kg)	Consensus Value (mg/kg)	Confidence Interval (mg/kg)	Tolerance Interval (mg/kg)
Ag	0.88	0.85 – 0.91	0.72 – 1.04	(3.4)	-----	-----
Al	12 163	11 753 – 12 572	9 579 – 14 746	40,106	36,686 - 43,526	22,672 - 57,540
As	20.7	19.7 – 21.8	14.0 – 27.5	17	13 - 21	1 - 33
B	26.9	18.5 – 35.2	0.0 – 77.8	-----	-----	-----
Ba	464	448 – 480	359 – 569	401	356 - 446	169 - 633
Be	0.48	0.43 – 0.53	0.22 – 0.74	(1.2)	-----	-----
Ca	50 265	49 052 – 51 478	42 222 – 53 308	137,664	124,276 - 151,052	69,413 - 205,915
Cd	3.2	3.0 – 3.5	1.8 – 4.7	35	32 - 38	23 - 47
Ce	(40.1)	----	----	(36)	-----	-----
Co	12.9	12.5 – 13.4	10.2 – 15.7	32	30 - 34	22 - 42
Cr	103	97.9 – 109	66.6 – 140	110	97 - 123	47 - 173
Cu	403	393 – 413	334 – 472	720	691 - 749	576 - 864
Fe	72 000	69 728 – 74 273	57 212 – 86 789	29,161	27,360 - 30,962	19,980 - 38,342
Hg	0.41	0.39 – 0.43	0.29 – 0.53	(0.25)	-----	-----
K	2232	2082 – 2382	1257 – 3208	14,495	13,185 - 15,805	7815 - 21,175
Li	14.3	12.9 – 15.8	6.4 – 22.3	(17)	-----	-----
Mg	9690	9459 – 9920	8141 – 11 239	9710	8925 - 10,495	5709 - 13,711
Mn	737	718 – 756	605 – 869	557	534 - 580	441 - 673
Mo	6.8	6.5 – 7.2	4.7 – 9.0	(8)	-----	-----
Na	650	587 – 714	235 – 1066	9528	8363 - 10,693	3877 - 15,179
Ni	59.2	57.9 – 60.5	50.4 – 68.0	239	215 - 263	123 - 355
P	1552	1518 – 1586	1329 – 1775	1188	1116 - 1260	857 - 1519
Pb	764	749 – 779	665 – 863	253	227 - 279	123 - 383
S	1916	1776 – 2057	1045 – 2787	(7994)	-----	-----
Sb	5.5	4.4 – 6.6	0.0 – 12.0	(1.7)	-----	-----
Se	0.78	0.64 – 0.92	0.02 – 1.54	(1.8)	-----	-----
Sn	340	324 – 357	245 – 436	(4.3)	-----	-----
Sr	114	113 - 116	106 – 122	332	308 - 356	211 - 453
Ti	530	473 – 587	195 – 865	1969	1782 - 2156	1015 - 2923
Tl	(0.19)	----	----	(0.9)	-----	-----
U	(0.76)	----	----	(21)	-----	-----
V	27.2	25.9 – 28.6	18.8 – 35.7	42	39 - 45	27 - 57
Y	-----	-----	-----	(16)	-----	-----
Zn	1114	1078 – 1151	860 – 1369	7290	6813 - 7767	4857 - 9723

Matrix Reference Materials

EnviroMAT™

CONTAMINATED SOIL (SS-2)

Element	EPA-3050A Digestion Values			TOTAL Digestion Values		
	Consensus Value (mg/kg)	Confidence Interval (mg/kg)	Tolerance Interval (mg/kg)	Consensus Value (mg/kg)	Confidence Interval (mg/kg)	Tolerance Interval (mg/kg)
Ag	(1.3)	-----	-----	(3)	-----	-----
Al	13 265	12 114 - 14 416	6743 - 19 787	44 853	37 791 - 51 915	8005 - 81 701
As	75	65 - 85	25 - 125	78	62 - 94	5 - 151
B	(12)	-----	-----	-----	-----	-----
Ba	215	202 - 228	149 - 281	650	594 - 706	380 - 920
Be	(0.7)	-----	-----	(4)	-----	-----
Ca	112 861	107 989 - 117 733	87 443 - 138 279	118 738	106 798 - 130 678	56 442 - 181 034
Cd	(2)	-----	-----	(2)	-----	-----
Ce	(71)	-----	-----	(79)	-----	-----
Co	12	11 - 13	9 - 15	14	13 - 15	7 - 21
Cr	34	30 - 38	14 - 54	58	51 - 65	21 - 95
Cu	191	182 - 200	139 - 243	198	189 - 207	155 - 241
Fe	21 046	19 597 - 22 495	12 831 - 29 261	29 070	27 262 - 30 878	19 638 - 38 502
Hg	(0.28)	-----	-----	(0.34)	-----	-----
K	3418	3066 - 3770	1500 - 5336	18 119	16 349 - 19 889	9096 - 27 142
Li	14	12 - 16	5 - 23	(20)	-----	-----
Mg	11 065	10 459 - 11 671	7628 - 14 502	14 225	12 995 - 15 455	7953 - 20 497
Mn	457	433 - 481	324 - 590	577	545 - 609	409 - 745
Mo	(4)	-----	-----	(4)	-----	-----
Na	558	456 - 660	-----	12 539	11 362 - 13 716	6830 - 18 248
Ni	54	50 - 58	33 - 75	59	55 - 63	42 - 76
P	752	734 - 770	671 - 833	814	744 - 884	483 - 1145
Pb	126	116 - 136	68 - 184	148	130 - 166	63 - 233
S	(2193)	-----	-----	(2254)	-----	-----
Sb	(0.8)	-----	-----	(6)	-----	-----
Se	(0.8)	-----	-----	(1)	-----	-----
Sr	214	202 - 226	156 - 272	(6)	-----	-----
Ti	850	742 - 958	298 - 1402	382	351 - 413	226 - 538
Tl	(0.3)	-----	-----	2893	2664 - 3122	1753 - 4033
U	(1.3)	-----	-----	(0.6)	-----	-----
V	34	31 - 37	17 - 51	(2)	-----	-----
Y	(12)	-----	-----	59	54 - 64	36 - 82
Zn	467	444 - 490	337 - 597	(21)	-----	-----
Zn	509	479 - 539	362 - 656	509	479 - 539	362 - 656

Description	Quantity	Catalog No.
EnviroMAT Contaminated Soil SS-1	100 g	140-025-001
EnviroMAT Contaminated Soil SS-2	100 g	140-025-002

Matrix Reference Materials

EnviroMAT™

SEWAGE SLUDGE - BE-1

Element	Consensus Value (mg/kg)	Confidence Interval (mg/kg)	Tolerance Interval (mg/kg)
Ag	2.24	2.19 – 2.29	1.83 – 2.65
Al	34 860	34 004 – 35 716	26 517 – 43 203
As	4.31	4.13 – 4.48	2.63 – 5.99
B	12.6	11.8 – 13.3	7.04 – 18.1
Ba	329	319 – 338	238 – 420
Be	0.327	0.312 – 0.341	0.206 – 0.447
Ca	35 970	35 175 – 36 765	27 891 – 44 050
Cd	0.878	0.810 – 0.946	0.191 – 1.56
Co	6.21	6.09 – 6.34	5.05 – 7.38
Cr	58.0	55.7 – 60.2	34.6 – 81.4
Cu	300	294 – 306	233 – 367
Fe	18 143	17 692 – 18 593	13 626 – 22 660
Hg	0.680	0.646 – 0.714	0.404 – 0.956
K	3376	3281 – 3472	2428 – 4325
Li	7.59	7.06 – 8.12	4.28 – 10.9
Mg	7202	7071 – 7332	5877 – 8526
Mn	551	514 – 561	450 – 652

Element	Consensus Value (mg/kg)	Confidence Interval (mg/kg)	Tolerance Interval (mg/kg)
Mo	4.93	4.74 – 5.11	3.03 – 6.83
Na	817	790 – 844	565 – 1069
Ni	25.1	24.3 – 25.8	17.7 – 32.5
P	23 911	23 506 – 24 315	20 083 – 27 738
Pb	26.7	25.8 – 27.6	17.8 – 35.5
S	8201	7984 – 8418	6419 – 9983
Sb	1.71	1.50 – 1.92	0.00 – 3.56
Se	2.87	2.66 – 3.07	0.935 – 4.80
Sn	12.4	11.2 – 13.6	1.35 – 23.4
Sr	221	216 – 227	174 – 269
Ti	315	280 – 350	10.4 – 620
U	3.48	3.39 – 3.57	2.75 – 4.20
V	27.8	27.2 – 28.3	22.9 – 32.7
Zn	466	458 – 475	378 – 555
Y	(12)	-----	-----
Zn	467	444 – 490	337 – 597

Description	Quantity	Catalog No.
Sewage Sludge BE-1	50 g	140-025-011



Matrix Reference Materials

EnviroMAT™

WASTE WATER

LOW (EU-L)				HIGH (EU-H)			
Element	Consensus Value (mg/L)	Confidence Interval (mg/L)	Tolerance Interval (mg/L)	Element	Consensus Value (mg/L)	Confidence Interval (mg/L)	Tolerance Interval (mg/L)
Al	0.0628	0.0610 – 0.0647	0.0478 – 0.0778	Al	0.418	0.411 – 0.426	0.357 – 0.479
As	0.0840	0.0823 – 0.0847	0.0732 – 0.0938	As	0.779	0.771 – 0.787	0.711 – 0.848
B	0.117	0.115 – 0.119	0.096 – 0.138	B	0.705	0.695 – 0.716	0.612 – 0.799
Ba	0.124	0.121 – 0.126	0.103 – 0.145	Ba	1.07	1.06 – 1.08	0.952 – 1.19
Be	0.0123	0.0121 – 0.0124	0.0108 – 0.0137	Be	0.460	0.452 – 0.468	0.389 – 0.531
Ca	2.09	2.04 – 2.13	1.72 – 2.45	Ca	41.3	40.8 – 41.7	37.4 – 45.1
Cd	0.0228	0.0223 – 0.0233	0.0186 – 0.0270	Cd	0.265	0.262 – 0.268	0.237 – 0.292
Co	0.0825	0.0818 – 0.0833	0.0762 – 0.0888	Co	0.499	0.491 – 0.506	0.434 – 0.564
Cr	0.0626	0.0611 – 0.0641	0.0487 – 0.0766	Cr	0.395	0.390 – 0.401	0.347 – 0.444
Cu	0.106	0.104 – 0.108	0.0871 – 0.125	Cu	0.741	0.733 – 0.749	0.667 – 0.815
Fe	0.0580	0.0571 – 0.0589	0.0504 – 0.0657	Fe	0.577	0.570 – 0.583	0.521 – 0.633
K	2.07	2.02 – 2.12	1.68 – 2.47	K	44.7	44.2 – 45.2	40.3 – 49.0
Mg	0.938	0.916 – 0.961	0.753 – 1.124	Mg	25.3	25.1 – 25.6	23.2 – 27.4
Mn	0.122	0.120 – 0.124	0.107 – 0.138	Mn	0.452	0.447 – 0.457	0.409 – 0.495
Mo	0.0397	0.0389 – 0.0405	0.0327 – 0.0467	Mo	0.718	0.704 – 0.732	0.593 – 0.843
Na	5.22	5.13 – 5.31	4.48 – 5.95	Na	46.3	45.7 – 47.0	40.9 – 51.7
Ni	0.0834	0.0823 – 0.0846	0.0731 – 0.0938	Ni	0.739	0.732 – 0.746	0.678 – 0.800
P	0.990	0.975 – 1.004	0.874 – 1.105	P	10.5	10.3 – 10.8	8.94 – 12.2
Pb	0.0418	0.0412 – 0.0424	0.0361 – 0.0475	Pb	0.612	0.603 – 0.621	0.529 – 0.695
Sb	0.0184	0.0177 – 0.0191	0.0128 – 0.0240	Sb	0.523	0.512 – 0.535	0.430 – 0.616
Se	0.0279	0.0264 – 0.0295	0.0137 – 0.0422	Se	0.135	0.133 – 0.137	0.117 – 0.153
Sr	0.140	0.135 – 0.144	0.102 – 0.177	Sr	0.914	0.901 – 0.927	0.819 – 1.009
Tl	0.0837	0.0821 – 0.0852	0.0723 – 0.0951	Tl	0.394	0.384 – 0.405	0.314 – 0.475
U	0.102	0.100 – 0.105	0.0897 – 0.115	U	0.0989	0.0961 – 0.102	0.0813 – 0.117
V	0.0495	0.0488 – 0.0503	0.0434 – 0.0557	V	0.816	0.807 – 0.825	0.745 – 0.888
Zn	0.0305	0.0284 – 0.0325	0.0125 – 0.0484	Zn	0.871	0.855 – 0.887	0.731 – 1.011

Description	Quantity	Catalog No.
EnviroMAT Waste Water Low	250 ml	140-025-037
EnviroMAT Waste Water High	250 ml	140-025-038

Matrix Reference Materials

EnviroMAT™

GROUND WATER

Element	LOW (ES-L)			HIGH (EU-H)		
	Consensus Value (mg/L)	Confidence Interval (mg/L)	Tolerance Interval (mg/L)	Consensus Value (mg/L)	Confidence Interval (mg/L)	Tolerance Interval (mg/L)
Al	0.0383	0.0345 – 0.0422	0.0187 – 0.0580	0.209	0.194 – 0.224	0.121 – 0.297
As	0.00412	0.00344 – 0.00479	0.000574 – 0.00766	0.404	0.391 – 0.417	0.328 – 0.481
B	(0.024)	-----	-----	1.61	1.56 – 1.67	1.32 – 1.91
Ba	0.0202	0.0196 – 0.0208	0.0169 – 0.0235	3.12	3.03 – 3.21	2.59 – 3.64
Be	0.0196	0.0192 – 0.0200	0.0171 – 0.0221	0.197	0.190 – 0.201	0.157 – 0.237
Ca	0.153	0.129 – 0.177	0.0256 – 0.281	6.50	6.24 – 6.75	4.96 – 8.03
Cd	0.00399	0.00361 – 0.00436	0.00200 – 0.00598	0.200	0.194 – 0.205	0.166 – 0.233
Co	0.0200	0.0195 – 0.0205	0.0170 – 0.0230	0.119	0.114 – 0.125	0.090 – 0.149
Cr	0.00819	0.00758 – 0.00880	0.00494 – 0.0114	0.401	0.388 – 0.414	0.325 – 0.478
Cu	0.00936	0.00787 – 0.0108	0.00129 – 0.0174	0.781	0.761 – 0.801	0.658 – 0.903
Fe	0.0104	0.00671 – 0.0141	0.000 – 0.0284	1.17	1.12 – 1.22	0.86 – 1.48
K	0.0903	0.0641 – 0.116	0.000 – 0.221	2.84	2.71 – 2.97	2.09 – 3.59
Li	0.0191	0.0178 – 0.0203	0.0133 – 0.0249	0.096	0.088 – 0.105	0.058 – 0.135
Mg	0.0752	0.0695 – 0.0809	0.0447 – 0.106	6.11	5.91 – 6.30	4.94 – 7.27
Mn	0.0399	0.0388 – 0.0410	0.0333 – 0.0466	0.318	0.310 – 0.327	0.268 – 0.369
Mo	0.00410	0.00342 – 0.00479	0.000543 – 0.00767	0.387	0.375 – 0.398	0.321 – 0.452
Na	0.413	0.378 – 0.448	0.228 – 0.599	17.4	16.6 – 18.3	12.5 – 22.3
Ni	0.00416	0.00386 – 0.00447	0.00261 – 0.00572	0.789	0.754 – 0.824	0.587 – 0.992
P	(0.006)	-----	-----	0.448	0.420 – 0.476	0.306 – 0.590
Pb	(0.001)	-----	-----	0.102	0.097 – 0.107	0.073 – 0.132
Sb	0.00226	0.00187 – 0.00264	0.000546 – 0.00397	0.040	0.038 – 0.042	0.030 – 0.051
Se	(0.003)	-----	-----	0.030	0.028 – 0.031	0.021 – 0.038
Sr	0.0511	0.0451 – 0.0572	0.0197 – 0.0826	0.979	0.968 – 0.991	0.919 – 1.040
Tl	0.0275	0.0260 – 0.0289	0.0202 – 0.0347	0.035	0.032 – 0.039	0.020 – 0.051
U	(0.019)	-----	-----	(0.244)	0	0
V	0.00456	0.00407 – 0.00505	0.00208 – 0.00704	0.798	0.780 – 0.816	0.693 – 0.903
Zn	0.0105	0.00817 – 0.0128	0.000 – 0.0230	0.800	0.764 – 0.836	0.577 – 1.023

Description	Quantity	Catalog No.
EnviroMAT Ground Water Low	250 ml	140-025-034
EnviroMAT Ground Water High	250 ml	140-025-035

Matrix Reference Materials

EnviroMAT™

DRINKING WATER

LOW (EP-L)				HIGH (EP-H)			
Element	Consensus Value (mg/L)	Confidence Interval (mg/L)	Tolerance Interval (mg/L)	Element	Consensus Value (mg/L)	Confidence Interval (mg/L)	Tolerance Interval (mg/L)
Al	0.100	0.0985 – 0.1015	0.0899 – 0.1101	Al	0.296	0.288 – 0.304	0.244 – 0.348
As	0.0106	0.0103 – 0.0109	0.00878 – 0.0124	As	0.122	0.120 – 0.125	0.104 – 0.140
B	0.0790	0.0767 – 0.0814	0.0634 – 0.0947	B	3.40	3.32 – 3.48	2.89 – 3.91
Ba	0.00791	0.00779 – 0.00804	0.00712 – 0.00870	Ba	0.777	0.759 – 0.795	0.665 – 0.889
Be	0.00198	0.00196 – 0.00200	0.00186 – 0.00210	Be	0.0488	0.0480 – 0.0497	0.0438 – 0.0539
Ca	0.482	0.464 – 0.500	0.365 – 0.599	Ca	10.18	10.01 – 10.35	9.09 – 11.27
Cd	0.00197	0.00193 – 0.00200	0.00174 – 0.00219	Cd	0.0490	0.0480 – 0.0500	0.0426 – 0.0554
Co	0.00975	0.00957 – 0.00994	0.00853 – 0.0110	Co	0.0366	0.0359 – 0.0372	0.0325 – 0.0406
Cr	0.0127	0.0126 – 0.0129	0.0117 – 0.0137	Cr	0.242	0.237 – 0.247	0.209 – 0.276
Cu	0.0156	0.0153 – 0.0159	0.0136 – 0.0176	Cu	0.487	0.474 – 0.500	0.403 – 0.571
Fe	0.0279	0.0272 – 0.0285	0.0241 – 0.0316	Fe	0.469	0.464 – 0.474	0.437 – 0.501
Hg	---	---	---	Hg	4.56	4.34 – 4.78	3.42 – 5.70
K	0.404	0.397 – 0.410	0.362 – 0.446	K	5.93	5.84 – 6.01	5.41 – 6.44
Li	---	---	---	Li	0.390	0.381 – 0.400	0.338 – 0.442
Mg	0.0458	0.0451 – 0.0466	0.0415 – 0.0501	Mg	3.31	3.24 – 3.38	2.87 – 3.75
Mn	0.00585	0.00576 – 0.00594	0.00527 – 0.00643	Mn	0.109	0.107 – 0.112	0.0945 – 0.124
Mo	0.0226	0.0222 – 0.0230	0.0198 – 0.0253	Mo	0.197	0.193 – 0.201	0.171 – 0.223
Na	0.229	0.223 – 0.235	0.190 – 0.268	Na	7.64	7.42 – 7.87	6.16 – 9.13
Ni	0.0199	0.0196 – 0.0202	0.0179 – 0.0219	Ni	0.242	0.237 – 0.247	0.209 – 0.276
P	(0.0174)	---	---	P	0.233	0.225 – 0.241	0.184 – 0.282
Pb	0.00400	0.00394 – 0.00406	0.00365 – 0.00435	Pb	0.193	0.189 – 0.198	0.165 – 0.222
Sb	0.0119	0.0117 – 0.0121	0.0106 – 0.0132	Sb	0.0505	0.0489 – 0.0521	0.0407 – 0.0603
Se	0.0585	0.0567 – 0.0595	0.0522 – 0.0649	Se	0.115	0.113 – 0.117	0.102 – 0.128
Sr	0.141	0.139 – 0.143	0.131 – 0.151	Sr	0.363	0.357 – 0.370	0.328 – 0.399
Tl	0.00625	0.00610 – 0.00640	0.00539 – 0.00711	Tl	0.0794	0.0761 – 0.0826	0.0609 – 0.0979
U	---	---	---	U	0.0192	0.0184 – 0.0199	0.0150 – 0.0234
V	0.0136	0.0135 – 0.0138	0.0125 – 0.0147	V	0.376	0.370 – 0.383	0.337 – 0.415
Zn	0.0425	0.0420 – 0.0431	0.0389 – 0.0462	Zn	2.42	2.38 – 2.46	2.18 – 2.66

Description	Quantity	Catalog No.
EnviroMAT Drinking Water Low	250 ml	140-025-031
EnviroMAT Drinking Water High	250 ml	140-025-032

Matrix Reference Materials

EnviroMAT™

USED OIL

Element	HU-1				Description	Quantity	Catalog No.
	Consensus Value (mg/kg)	Uncertainty +/- (mg/kg)	Confidence Interval (mg/kg)	Tolerance Interval (mg/kg)			
Ag	17.4	4.0	15.5 – 19.4	4.33 – 30.6	Used Oil HU-1	125 ml	140-025-041
Al	28.9	2.1	27.8 – 29.9	20.7 – 37.0			
B	26.7	5.1	24.2 – 29.2	7.55 – 45.9			
Ba	18.7	1.3	18.0 – 19.4	13.5 – 23.9			
Ca	62.7	6.1	59.7 – 65.8	39.9 – 85.6			
Cd	19.5	1.5	18.7 – 20.2	14.2 – 24.8			
Cr	18.0	1.3	17.3 – 18.7	12.8 – 23.1			
Cu	4182	360	4002 – 4362	2932 – 5431			
Fe	94.5	6.9	91.1 – 98.0	68.6 – 120			
K	26.7	3.6	24.9 – 28.5	16.3 – 37.1			
Mg	18.6	1.5	17.8 – 19.3	12.9 – 24.3			
Mn	19.9	1.4	19.3 – 20.6	14.6 – 25.2			
Mo	18.0	1.0	17.5 – 18.6	14.0 – 22.1			
Na	35.1	6.1	32.0 – 38.2	12.3 – 57.9			
Ni	64.0	6.8	60.6 – 67.4	38.8 – 89.3			
P	(48)	-----	-----	-----			
Pb	25.1	3.2	23.5 – 26.7	12.5 – 37.6			
Si	21.3	1.9	20.4 – 22.2	14.5 – 28.2			
Sn	510	71	474 – 546	269 – 751			
Ti	16.8	1.6	16.0 – 17.6	10.5 – 23.0			
V	17.1	1.5	16.4 – 17.9	11.4 – 22.9			
Zn	58.5	4.2	56.5 – 60.6	44.0 – 73.1			

LEAD AND CADMIUM IN PAINT

LEAD AND CADMIUM IN PAINT			
Element	Consensus Value (mg/kg)	Confidence Interval (mg/kg)	Tolerance Interval (mg/kg)
Cd	219.4	215.9 – 222.8	189.2 – 249.5
Pb	224.2	220.0 – 228.5	187.1 – 261.3

Description	Quantity	Catalog No.
Lead in Paint Level 1	20 g	140-025-200
Lead in Paint Level 2	20 g	140-025-201
Cadmium and Lead in Paint	20 g	140-025-205

LEAD IN PAINT LEVEL 1		
Consensus Value (mg/kg)	Confidence Interval (mg/kg)	Tolerance Interval (mg/kg)
94.3	92.1 – 96.1	70.3 – 118.3
219.4	215.9 – 222.8	189.2 – 249.5
224.2	220.0 – 228.5	187.1 – 261.3

LEAD IN PAINT LEVEL 2		
Consensus Value (mg/kg)	Confidence Interval (mg/kg)	Tolerance Interval (mg/kg)
287.4	282.5 – 292.3	233.2 – 341.7

Certificate of Analysis

Catalogue Number: 140-025-002
Description: Matrix Reference Material
EnviroMAT Contaminated Soil (SS-2-2)
Lot Number: S150827031
Date of Initial Certification: October 30th, 2015
Date of Last Verification: N/A
Expiration date: 2 years after shipping date

Elements	Unit	Consensus Value	Uncertainty +/-	Confidence Interval	Tolerance Interval
Ag	mg/kg	3.9	0.2	3.6 - 4.1	1.8 – 6.0
Al	mg/kg	9548	294	9254 – 9842	7060 – 12 036
As	mg/kg	3.36	0.17	3.18 – 3.53	1.77 – 4.94
B	mg/kg	8.5	0.4	8.1 – 9.0	5.9 – 11.1
Ba	mg/kg	100	2	98 – 102	80 – 119
Be	mg/kg	0.34	0.01	0.33 – 0.36	0.25 – 0.44
Ca	mg/kg	31 082	563	30 519 – 31 645	26 317 – 35 847
Cd	mg/kg	0.91	0.03	0.88 – 0.94	0.65 – 1.17
Ce	mg/kg	----	----	----	----
Co	mg/kg	6.9	0.3	6.6 – 7.2	4.0 – 9.8
Cr	mg/kg	92.6	4.1	88.4 – 96.7	54.2 – 131
Cu	mg/kg	120	2	118 – 122	99 – 141
Fe	mg/kg	23 083	597	22 486 – 23 680	17 888 – 28 278
Hg	mg/kg	0.059	0.004	0.055 – 0.063	0.034 – 0.084
K	mg/kg	1671	87	1584 – 1758	907 – 2435
Li	mg/kg	9.5	0.6	8.8 – 10.1	5.9 – 13.1
Mg	mg/kg	5132	158	4975 – 5290	3798 – 6467
Mn	mg/kg	252	7	245 – 258	191 – 313
Mo	mg/kg	1.03	0.04	0.99 – 1.07	0.69 – 1.38
Na	mg/kg	797	37	760 – 833	486 – 1107
Ni	mg/kg	25.1	0.6	24.5 – 25.6	19.6 – 30.6
P	mg/kg	752	18	735 – 770	614 – 891
Pb	mg/kg	244	5	239 – 250	192 – 297
S	mg/kg	550	25	525 – 574	395 – 705
Sb	mg/kg	3.5	0.4	3.1 – 3.8	0.5 – 6.4
Se	mg/kg	0.49	0.10	0.39 – 0.58	0 – 1.04
Sn	mg/kg	10.6	0.4	10.1 – 11.0	7.1 – 14.1
Sr	mg/kg	80	2	77 – 82	60 – 99
Tl	mg/kg	0.084	0.006	0.078 – 0.089	0.054 – 0.114
U	mg/kg	0.52	0.02	0.50 – 0.54	0.40 – 0.64
V	mg/kg	30.0	0.7	29.2 – 30.7	23.7 – 36.3
Y	mg/kg	----	----	----	----
Zn	mg/kg	281	7	274 – 288	220 – 342

Date of shipment: _____

Organization responsible for the certification:

SCP SCIENCE
21800 Clark Graham
Baie d'Urfé, QC, Canada
H9X 4B6

Phone: (514) 457-0701
Fax: (514) 457-4499
Web: www.scpscience.com
e-mail: sales@scpscience.com

Certified by: 
Daniel Boisvert, Chemist

Person responsible for initial certification: Daniel Boisvert, Chemist

Please note that the Material Safety Data Sheet and this Certificate of Analysis are available on our web site.
(Ce certificat est également disponible en français)

Description:

The Matrix Reference Material SS-2 is a Type C naturally contaminated soil (not spiked or fortified) with a particle size of -200 mesh. It is designed to be used for quality control verification or methods development for the analysis of soil by ICP, ICP/MS, GFAA or AA Spectroscopy techniques. Not intended for calibration.

Stability:

This certification is valid for 2 years from the shipping date provided the material is kept sealed and stored under normal laboratory conditions and used according to good laboratory practices. Shipping date will be stamped on container at time of shipping. **SCP SCIENCE** will monitor the stability of representative samples every two years and if any changes occur that invalidate this certification, **SCP SCIENCE** will notify purchasers.

Instructions for use:

The material must be dried at 105°C for two hours before use. Before weighing, mix the material by shaking the container to avoid segregation in the bottle. In order to have a representative sample, the minimum use quantity must be 250 mg to conform to previous homogeneity testing. Calculate results on a dry weight basis.

Preparation method:

The initial sample has been dried and sieved through a 0.5 inch sieve. The "fines" portion has been further crushed and sieved with 80% of the material passing through a 200 mesh screen. This portion has been re-pulverized and sieved through a 200 mesh sieve to obtain 100% less than 200 mesh. The final material has then been packaged in 100 g containers and tested for homogeneity.

The homogeneity of the material has undergone third party verification by Particle Size Analysis (Microtrac) and by metals oxides analysis using an X-ray fluorescence spectrometer. The method used for the determination of the homogeneity of the material is based on ISO Guide 35.

Certification and Calculation Methods:

The Certification Method is based on an inter-laboratory Study (or round-robin study) analysis involving 15 international laboratories (Canada, USA and Europe). Each laboratory was asked to supply analysis data for two samples in duplicate for a specific list of parameters. Not all the laboratories supplied data for the different parameters. Certified values are based on an average of 49 values per parameter (68 values being the highest and 21 values being the lowest). Values in brackets are not certified as less than 12 values were received. They are provided for information only.

Most of participating labs employed an extraction method based on EPA-3050B. HNO₃, HNO₃/HCl or HNO₃/HCl/H₂O₂ digestion method was used. Hot water extraction method is not applicable to determine Boron. ICP-MS, ICP-AES and AFS (Hg only) were used for quantification by most of inter-laboratory Study participating laboratories.

The outliers were removed using the Interquartile range rule and by data comparison after confirmation that there was neither a connection between outliers and the methods used for analysis nor between the outliers and the nature of the sample.

The Confidence Interval has been calculated using the 95% Confidence Level (equivalent to 2σ) using the following formula:

$$\bar{x} \pm \frac{ts}{\sqrt{n}}$$

where

- n: number of data
- s: Standard Deviation of the Average
- t: factor for Student Test
- x: Reference Value

The Confidence Interval should be used for routine quality control.

The Tolerance Interval has been calculated using again a 95% probability with a 95% inclusion of the population. The following formula was used:

$$\bar{x} \pm ks$$

where

- k: factor for two-sided Tolerance Limits
- s: Standard Deviation of the Average
- x: Reference Value

The Tolerance Interval is an indication of the lowest possible value and the highest possible value based on the complete set of data, exclusive of outliers, used to calculate the Certified Value.

The following table is a guideline on how to interpret the results:

Results within Confidence Interval	Method working properly
Results outside Confidence Interval but within Tolerance Interval	Method needs improvement
Results outside Tolerance Interval	Method not working properly

References:

ISO Guide 30: Terms and definitions used in connection with reference materials
 ISO Guide 31: Contents of certificates of reference materials
 ISO Guide 35: Certification of reference materials--General and statistical principles
 Standard Reference Materials-Handbook for SRM Users - John K. Taylor
 Quality Assurance of Chemical Measurements - John K. Taylor
 EPA 3050B - Acid Digestion of Sediments, Sludge and Soils (December 1996)

Matrix Reference Materials

AgroMAT™

Parameters	Units	Consensus Value	Confidence Interval	Tolerance Interval	Description	Quantity	Catalog No.
Fe–Total	mg/kg	25 547	24 526 – 26 568	16 458 – 34 637	Compost CP-1	100 g	140-025-111
Hg–Total	mg/kg	0.142	0.126 – 0.158	0.027 – 0.257			
K–Total	mg/kg	2373	2252 - 2495	1360 – 3387			
Mg–Total	mg/kg	1720	1656 - 1785	1166 – 2275			
Mn–Total	mg/kg	710	696 - 725	583 – 838			
Mo–Total	mg/kg	1.21	1.13 – 1.29	0.645 – 1.78			
Na–Total	mg/kg	(908)	----	----			
Ni–Total	mg/kg	11.1	10.6 – 11.7	6.42 – 15.9			
P–Total	mg/kg	6711	6511 - 6910	5060 – 8361			
Pb–Total	mg/kg	15.6	14.9 – 16.2	10.1 – 21.1			
S–Total	mg/kg	3215	3080 - 3350	2296 – 4134			
Se–Total	mg/kg	0.899	0.813 – 0.984	0.390 – 1.408			
Zn–Total	mg/kg	248	242 - 254	196 - 300			
pH	-----	7.00	6.94 – 7.05	6.49 – 7.50			
Organic Matter	%	63.4	61.2 – 65.7	44.7 – 82.2			
NO ₃ -N	mg/kg	35.9	31.7 – 40.1	8.21 – 63.6			
N–Total	%	2.25	2.19 – 2.32	1.79 – 2.72			
H ₂ O	%	6.28	5.87 – 6.69	3.16 – 9.41			
C/N Ratio	-----	17.1	16.3 – 17.9	11.3 – 22.9			
Al–Total	mg/kg	4579	4262 - 4896	1909 – 7249			
As–Total	mg/kg	2.24	2.12 – 2.36	1.46 – 3.02			
Ca–Total	mg/kg	18 530	18 100 – 18 960	15 189 – 21 870			
Cd–Total	mg/kg	0.719	0.663 – 0.774	0.313 – 1.124			
Co–Total	mg/kg	3.00	2.84 – 3.17	1.78 – 4.22			
Cr–Total	mg/kg	16.1	15.0 – 17.1	7.66 – 24.5			
Cu–Total	mg/kg	76.2	73.5 – 78.9	51.7 – 100.7			



Matrix Reference Materials

AgroMAT™

CLAY SOIL AG-1

Parameter	Extraction Method	Units	Consensus Interval	Confidence Interval	Tolerance Interval
Phosphorus	Mehlich III	ppm	8.37	7.26 – 9.48	1.62 – 15.1
	Olsen	ppm	33.1	28.8 – 37.4	8.66 – 57.5
Potassium	Ammonium Acetate pH 7	ppm	337	307 - 367	149 – 524
	Mehlich III	ppm	387	370 - 404	276 – 498
Calcium	Ammonium Acetate pH 7	ppm	2030	1943 - 2117	1528 – 2532
	Mehlich III	ppm	2170	2084 - 2255	1620 – 2719
Magnesium	Ammonium Acetate pH 7	ppm	214	197 - 230	111 – 316
	Mehlich III	ppm	285	274 - 295	217 – 352
Sodium	Ammonium Acetate pH 7	ppm	71.3	67.4 – 75.1	47.9 – 94.6
	Mehlich III	ppm	80.2	74.1 – 86.3	46.6 – 114
Zinc	DTPA	ppm	0.67	0.58 – 0.76	0.19 – 1.16
	Mehlich III	ppm	2.38	2.28 – 2.48	1.73 – 3.02
Manganese	DTPA	ppm	41.7	38.9 – 44.5	27.2 – 56.3
	Mehlich III	ppm	238	223 - 253	138 – 338
Copper	DTPA	ppm	1.26	1.19 – 1.34	0.87 – 1.66
	Mehlich III	ppm	0.61	0.52 – 0.70	0.061 – 1.16
Iron	DTPA	ppm	102	95.9 - 109	67.0 – 138
	Mehlich III	ppm	584	541 - 628	297 – 871
Boron	Hot Water	ppm	0.50	0.40 – 0.60	0 – 1.07
	Mehlich III	ppm	0.76	0.63 – 0.88	0.050 – 1.46
Sulfur	Mehlich III	ppm	19.7	18.7 – 20.6	14.1 – 25.2
Aluminum	Mehlich III	ppm	1519	1451 - 1586	1123 – 1914
pH	1 :1 (Soil:Water)	-----	7.04	7.00 – 7.08	6.81 – 7.28
	1 :2 (Soil:Water)	-----	7.16	7.10 – 7.21	6.82 – 7.49
	Saturated Paste	-----	6.94	6.84 – 7.05	6.44 – 7.45
	Buffer SMP	-----	7.19	7.06 – 7.32	6.51 – 7.86
Organic Matter	LOI	%	3.74	3.49 – 3.98	1.92 – 5.55
	Walkley Black	%	2.21	2.02 – 2.40	1.18 – 3.24
Nitrogen as Nitrate	KCl	ppm	9.75	9.34 – 10.2	7.01 – 12.5
Soluble Salts	1 :1 Soil :Water	uS/cm	(287)	----	----
	1 :2 Soil :Water	uS/cm	197	184 - 211	113 – 282
	Saturated Paste	uS/cm	(597)	----	----

Description

Quantity

Catalog No.

Clay Soil AG-1

175 g

140-025-101

Matrix Reference Materials

AgroMAT™

SANDY SOIL AG-2

Parameter	Extraction Method	Units	Consensus Interval	Confidence Interval	Tolerance Interval
Phosphorus	Bray 1	ppm	(47.3)		
	Mehlich III	ppm	89.9	85.8-94.0	64.3-115.5
	Olsen	ppm	45.6	41.1-50.2	20.8-75.5
Potassium	Ammonium Acetate pH 7	ppm	364	341-387	224-504
	Mehlich III	ppm	398	380-416	286-511
Calcium	Ammonium Acetate pH 7	ppm	1370	1305-1435	995-1746
	Mehlich III	ppm	1484	1426-1543	1110-1859
Magnesium	Ammonium Acetate pH 7	ppm	134	124-144	72.9-195
	Mehlich III	ppm	186	178-194	133-238
Sodium	Ammonium Acetate pH 7	ppm	35.4	32.8-38.0	19.7-51.2
	Mehlich III	ppm	37.8	35.2-40.4	23.5-52.1
Zinc	DTPA	ppm	0.79	0.73-0.85	0.47-1.11
	Mehlich III	ppm	2.84	2.72-2.95	2.12-3.55
Manganese	DTPA	ppm	16.8	14.5-19.1	4.17-29.5
	Mehlich III	ppm	156	147-164	103-209
Copper	DTPA	ppm	1.26	1.17-1.35	0.791-1.72
	Mehlich III	ppm	1.25	1.17-1.35	0.791-1.72
Iron	DTPA	ppm	64.4	57.0-71.9	23.6-105
	Mehlich III	ppm	700	660-740	437-963
Boron	Hot Water	ppm	0.39	0.28-0.49	0-0.95
	Mehlich III	ppm	0.45	0.39-0.51	0.16-0.74
Sulfur	Mehlich III	ppm	15.2	14.6-15.8	11.9-18.5
Aluminum	Mehlich III	ppm	1354	1322-1387	1168-1541
pH	1 :1 (Soil:Water)	----	6.89	6.86-6.93	6.67-7.12
	1 :2 (Soil:Water)	----	7.02	6.98-7.07	6.76-7.29
	Saturated Paste	----	6.85	6.74-6.96	6.33-7.37
	Buffer SMP	----	7.06	6.95-7.17	6.53-7.59
Organic Matter	LOI	%	3.77	3.57-3.97	2.26-5.27
	Walkley Black	%	2.79	2.63-2.94	1.96-3.61
Nitrogen as Nitrate	KCl	ppm	27.3	26.6-28.0	22.3-32.3
Soluble Salts	1 :1 Soil:Water	uS/cm	(334)	----	----
	1 :2 Soil:Water	uS/cm	199	188-211	121-277
	Saturated Paste	uS/cm	(551)	----	----

Description	Quantity	Catalog No.
Sandy Soil AG-2	175 g	140-025-102