

*EnviroMAT™* and *AgroMAT™* Certified Reference Materials (CRMs) are designed to complement existing Performance Evaluation Programs in environmental and agricultural analysis. *EnviroMAT™* CRMs allow frequent method verification, providing the assurance of quality analysis on a daily basis, at an affordable price.

<b><i>EnviroMAT™</i> Standards</b>	... 49
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<b>Certificate of Analysis</b>	
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Certified Reference  
Materials - Notes

Certified Reference  
Materials

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## Certified Reference Materials EnviroMAT™ & AgroMAT™

Certified Reference  
Materials

EnviroMAT™ & AgroMAT™ Certified Reference Materials (CRM) can be an invaluable component of any laboratory quality control program. Consensus certification removes any chance of analytical bias. A wide range of matrices are available.

- Each CRM is certified through a round-robin study employing specific methods of analysis
  - Independent verification from multiple laboratories
- Includes Certificate of Analysis listing Consensus Values, Confidence and Tolerance Intervals, and Instructions for Use
  - Complete documentation for audit purposes
- Each **SCP SCIENCE** CRM is economically priced
  - Affordable - better control charts through more frequent Quality Control Analysis



EnviroMAT™ Standards	Symbol	Code	Quantity	Catalog Number
Soil, Contaminated	SS-1		100 g	140-025-001
Soil, Contaminated	SS-2		100 g	140-025-002
Sludge, Sewage	BE-1		50 g	140-025-011
Water, Drinking, Low Level, Concentrate	EP-L-1	✓ ⊗	250 ml	140-025-031
Water, Drinking, High Level, Concentrate	EP-H-1	✓ ⊗	250 ml	140-025-032
Water, Drinking, High & Low	SET	✓ ⊗	250 ml	140-025-030
Water, Ground, Low Level, Concentrate	ES-L-1	✓ ⊗	250 ml	140-025-034
Water, Ground, High Level, Concentrate	ES-H-1	✓ ⊗	250 ml	140-025-035
Water, Ground, High & Low	SET	✓ ⊗	250 ml	140-025-033
Water, Waste, Low Level, Concentrate	EU-L-1	✓ ⊗	250 ml	140-025-037
Water, Waste, High Level, Concentrate	EU-H-1	✓ ⊗	250 ml	140-025-038
Water, Waste, High & Low	SET	✓ ⊗	250 ml	140-025-036
Oil, Used	HU-1		125 ml	140-025-041

AgroMAT™ Standards	Symbol	Code	Quantity	Catalog Number
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

⊗ Glass Container  
✓ Dangerous Goods\*

Ⓟ Poison  
Ⓢ Corrosive

Ⓣ Flammable  
Ⓟ Oxidant

\* as defined by :

• Hazardous Materials Regulations of the U.S. Department of Transportation, Tariff No. BOE-6000-R  
• Canadian Transportation of Dangerous Goods Act and Regulations, Revision December 2000  
• International Air Transport Association - Dangerous Goods Regulation, 40th Edition

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## Certified Reference Materials

## EnviroMAT™



## Contaminated Soil - SS-1

Parameter	EPA-3050A Digestion Values		Total Digestion Values	
	Consensus Value (ppm)	Confidence Interval (95%)	Consensus Value (ppm)	Confidence Interval (95%)
Ag	(1.9)	---	(3.4)	---
Al	9518	8417 - 10,619	40,106	36,686 - 43,526
As	18	17 - 19	17	13 - 21
B	(13)	---	---	---
Ba	102	96 - 108	401	356 - 446
Be	(0.5)	---	(1.2)	---
Ca	137,375	131,222 - 143,528	137,664	124,276 - 151,052
Cd	34	32 - 36	35	32 - 38
Ce	(32)	---	(36)	---
Co	28	26 - 30	32	30 - 34
Cr	64	55 - 73	110	97 - 123
Cu	690	657 - 723	720	691 - 749
Fe	20,406	19,037 - 21,775	29,161	27,360 - 30,962
Hg	(0.19)	---	(0.25)	---
K	1913	1553 - 2273	14,495	13,185 - 15,805
Li	11	9 - 13	(17)	---
Mg	6088	5710 - 6466	9710	8925 - 10,495
Mn	425	406 - 444	557	534 - 580
Mo	5	4.3 - 5.7	(8)	---
Na	217	177 - 257	9528	8363 - 10,693
Ni	231	218 - 244	239	215 - 263
P	1070	1021 - 1119	1188	1116 - 1260
Pb	233	219 - 247	253	227 - 279
S	(7843)	---	(7994)	---
Sb	(0.6)	---	(1.7)	---
Se	(1.6)	---	(1.8)	---
Sn	---	---	(4.3)	---
Sr	202	195 - 209	332	308 - 356
Ti	248	186 - 310	1969	1782 - 2156
Tl	(0.5)	---	(0.9)	---
U	(21)	---	(21)	---
V	19	17 - 21	42	39 - 45
Y	(8)	---	(16)	---
Zn	6775	6467 - 7083	7290	6813 - 7767

Catalog Number	Code	Quantity
140-025-001		100 g

⊗ Glass Container  
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Ⓔ Poison  
Ⓢ Corrosive

Ⓕ Flammable  
Ⓟ Oxidant

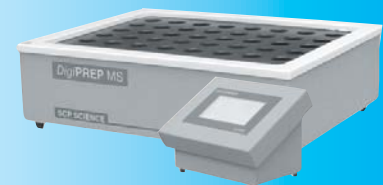
\* as defined by :

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• Canadian Transportation of Dangerous Goods Act and Regulations, Revision December 2000  
• International Air Transport Association - Dangerous Goods Regulation, 40th Edition

## DigiPREP MS - For Soil Testing

An acid resistant digestion system for multiple digestion applications:

- Selection of programmable digital controllers available
- 48 sample tube capacity, ideal for EPA 3000 Series digestions
- Optional *DigiPROBE* for accurate sample temperature control



"Spring is when you feel like whistling even with a shoe full of slush." -Doug Larson-

Contaminated Soil - SS-2

Parameter	EPA-3050A Digestion Values		Total Digestion Values	
	Consensus Value (ppm)	Confidence Interval (95%)	Consensus Value (ppm)	Confidence Interval (95%)
Ag	(1.3)	---	(3)	---
Al	13,265	12,114 - 14,416	44,853	37,791 - 51,915
As	75	65 - 85	78	62 - 94
B	(12)	---	---	---
Ba	215	202 - 228	650	594 - 706
Be	(0.7)	---	(4)	---
Ca	112,861	107,989 - 117,733	118,738	106,798 - 130,678
Cd	(2)	---	(2)	---
Ce	(71)	---	(79)	---
Co	12	11 - 13	14	13 - 15
Cr	34	30 - 38	58	51 - 65
Cu	191	182 - 200	198	189 - 207
Fe	21,046	19,597 - 22,495	29,070	27,262 - 30,878
Hg	(0.28)	---	(0.34)	---
K	3418	3066 - 3770	18,119	16,349 - 19,889
Li	14	12 - 16	(20)	---
Mg	11,065	10,459 - 11,671	14,225	12,995 - 15,455
Mn	457	433 - 481	577	545 - 609
Mo	(4)	---	(4)	---
Na	558	456 - 660	12,539	11,362 - 13,716
Ni	54	50 - 58	59	55 - 63
P	752	734 - 770	814	744 - 884
Pb	126	116 - 136	148	130 - 166
S	(2193)	---	(2254)	---
Sb	(0.8)	---	(6)	---
Se	(0.8)	---	(1)	---
Sn	---	---	(6)	---
Sr	214	202 - 226	382	351 - 413
Ti	850	742 - 958	2893	2664 - 3122
Tl	(0.3)	---	(0.6)	---
U	(1.3)	---	(2)	---
V	34	31 - 37	59	54 - 64
Y	(12)	---	(21)	---
Zn	467	444 - 490	509	479 - 539

Sewage Sludge - BE-1

Parameter	Consensus Value (µg/g)	Confidence Interval (95%)
Ag	21	20 - 22
Al	43917	42324 - 45510
As	4.6	4.1 - 5.1
B	(9.9)	---
Ba	446	413 - 479
Be	0.21	0.17 - 0.25
Ca	28636	27185 - 30087
Cd	1.9	1.6 - 2.2
Co	2.3	2.1 - 2.5
Cr	34	31 - 37
Cu	408	392 - 424
Fe	8925	8478 - 9372
Hg	1.3	1.1 - 1.5
K	2273	2034 - 2512
Li	3.6	3.0 - 4.2
Mg	3808	3600 - 4016
Mn	213	205 - 221
Mo	6.4	5.9 - 6.9
Na	1459	1260 - 1658
Ni	14	13 - 15
P	29826	27906 - 31746
Pb	57	53 - 61
S	(8048)	---
Sb	(0.9)	---
Se	2.9	2.4 - 3.4
Sn	(16)	---
Sr	349	331 - 367
Ti	(91)	---
U	(2.1)	---
V	12	11.5 - 12.5
Zn	381	367 - 395

Catalog Number	Code	Quantity
140-025-011		50 g

Catalog Number	Code	Quantity
140-025-002		100 g

⊗ Glass Container  
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Ⓢ Corrosive

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Ⓟ Oxidant

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peCHECK - Compliance Standards

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- Variable concentration levels to match your specific needs



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Certified Reference Materials

EnviroMAT™

Certified Reference Materials

Waste Water		EU-L-1		EU-H-1	
Parameter	After 1:100 Dilution		After 1:50 Dilution		
	Consensus Value (ppm)	Confidence Interval (95%)	Consensus Value (ppm)	Confidence Interval (95%)	
Al	0.15	0.12 – 0.18	0.45	0.43 – 0.47	
As	0.21	0.20 – 0.22	0.86	0.81 – 0.91	
B	0.25	0.24 – 0.26	0.87	0.78 – 0.96	
Ba	0.30	0.29 – 0.31	1.26	1.23 – 1.29	
Be	0.03	0.029 – 0.031	0.52	0.50 – 0.54	
Ca	4.03	3.91 – 4.15	40.6	39.8 – 41.4	
Cd	0.06	0.058 – 0.062	0.31	0.30 – 0.32	
Co	0.20	0.197 – 0.203	0.74	0.72 – 0.76	
Cr	0.15	0.147 – 0.153	0.46	0.45 – 0.47	
Cu	0.26	0.25 – 0.27	0.93	0.91 – 0.95	
Fe	0.11	0.10 – 0.12	0.65	0.62 – 0.68	
K	4.49	4.39 – 4.59	43.7	42.4 – 45.0	
Mg	1.24	1.21 – 1.27	13.8	13.6 – 14.0	
Mn	0.30	0.29 – 0.31	0.52	0.51 – 0.53	
Mo	0.10	0.097 – 0.103	0.82	0.80 – 0.84	
Na	10.4	10.2 – 10.6	43.0	42.2 – 43.8	
Ni	0.20	0.196 – 0.204	0.88	0.86 – 0.90	
P	2.67	2.58 – 2.76	12.7	12.1 – 13.3	
Pb	0.10	0.098 – 0.102	0.73	0.72 – 0.74	
Sb	0.06	0.05 – 0.07	0.63	0.60 – 0.66	
Se	0.07	0.067 – 0.073	0.17	0.16 – 0.18	
Sr	0.38	0.37 – 0.39	1.09	1.06 – 1.12	
Tl	0.20	0.19 – 0.21	0.48	0.46 – 0.50	
V	0.12	0.116 – 0.124	0.96	0.94 – 0.98	
Zn	0.06	0.057 – 0.063	1.00	0.97 – 1.03	

Catalog Number	Code	Quantity	Catalog Number	Code	Quantity
140-025-037	✓ ⑧	250 ml	140-025-038	✓ ⑧	250 ml

Ground Water		ES-L-1		ES-H-1	
Parameter	After 1:500 Dilution		After 1:50 Dilution		
	Consensus Value (ppm)	Confidence Interval (95%)	Consensus Value (ppm)	Confidence Interval (95%)	
Al	0.094	0.085 – 0.103	0.55	0.52 – 0.58	
As	0.011	0.010 – 0.012	1.03	0.99 – 1.07	
B	(0.036)	---	4.07	3.90 – 4.24	
Ba	0.050	0.048 – 0.052	8.26	8.11 – 8.41	
Be	0.052	0.051 – 0.053	0.53	0.52 – 0.54	
Ca	0.25	0.24 – 0.26	13.9	13.5 – 14.3	
Cd	0.010	0.009 – 0.011	0.51	0.50 – 0.52	
Co	0.051	0.050 – 0.052	0.30	0.29 – 0.31	
Cr	0.020	0.0196 – 0.0204	0.98	0.96 – 1.00	
Cu	0.020	0.018 – 0.022	1.99	1.93 – 2.05	
Fe	0.021	0.019 – 0.023	3.02	2.94 – 3.10	
K	0.18	0.16 – 0.20	6.45	6.12 – 6.78	
Li	0.050	0.049 – 0.051	0.25	0.24 – 0.26	
Mg	0.110	0.105 – 0.115	9.11	8.99 – 9.23	
Mn	0.096	0.093 – 0.099	0.79	0.77 – 0.81	
Mo	0.011	0.010 – 0.012	1.03	1.02 – 1.04	
Na	1.27	1.13 – 1.41	43.3	42.6 – 44.0	
Ni	0.010	0.0096 – 0.0104	2.01	1.96 – 2.06	
P	(0.005)	---	1.12	1.02 – 1.22	
Pb	(0.002)	---	0.33	0.32 – 0.34	
Sb	0.006	0.005 – 0.007	0.11	0.106 – 0.114	
Se	(0.001)	---	0.077	0.074 – 0.080	
Sr	0.121	0.116 – 0.126	2.53	2.50 – 2.56	
Tl	0.071	0.068 – 0.074	0.104	0.102 – 0.106	
U	0.050	0.049 – 0.051	0.49	0.47 – 0.51	
V	0.010	0.009 – 0.011	2.02	1.98 – 2.06	
Zn	0.021	0.020 – 0.022	2.00	1.95 – 2.05	

Catalog Number	Code	Quantity	Catalog Number	Code	Quantity
140-025-034	✓ ⑧	250 ml	140-025-035	✓ ⑧	250 ml

Drinking Water EP-L-1 EP-H-1

Parameter	After 1:1000 Dilution		After 1:100 Dilution	
	Consensus Value (ppm)	Confidence Interval (95%)	Consensus Value (ppm)	Confidence Interval (95%)
Al	0.26	0.24 – 0.28	0.92	0.88 – 0.96
As	0.027	0.025 – 0.029	0.40	0.38 – 0.42
B	0.20	0.18 – 0.22	9.88	9.51 – 10.25
Ba	0.021	0.020 – 0.022	2.01	1.97 – 2.05
Be	0.005	0.0049 – 0.0051	0.16	0.15 – 0.17
Ca	0.94	0.92 – 0.96	22.1	21.6 – 22.6
Cd	0.005	0.0048 – 0.0052	0.20	0.19 – 0.21
Co	0.026	0.025 – 0.027	0.095	0.092 – 0.098
Cr	0.035	0.034 – 0.036	0.68	0.66 – 0.70
Cu	0.040	0.038 – 0.042	0.50	0.49 – 0.51
Fe	0.068	0.063 – 0.073	1.48	1.43 – 1.53
K	0.84	0.79 – 0.89	12.8	12.3 – 13.3
Li	0.030	0.029 – 0.031	0.71	0.68 – 0.74
Mg	0.054	0.050 – 0.058	4.83	4.75 – 4.91
Mn	0.015	0.014 – 0.016	0.34	0.33 – 0.35
Mo	0.063	0.062 – 0.064	0.52	0.51 – 0.53
Na	0.68	0.58 – 0.78	21.6	21.2 – 22.0
Ni	0.051	0.050 – 0.052	0.83	0.80 – 0.86
P	(0.039)	---	0.42	0.40 – 0.44
Pb	0.009	0.008 – 0.010	0.63	0.61 – 0.65
Sb	0.031	0.029 – 0.033	0.21	0.20 – 0.22
Se	0.15	0.14 – 0.16	0.32	0.30 – 0.34
Sr	0.35	0.34 – 0.36	0.95	0.93 – 0.97
Tl	0.015	0.014 – 0.016	0.26	0.25 – 0.27
U	0.009	0.008 – 0.010	0.097	0.092 – 0.102
V	0.036	0.035 – 0.037	0.99	0.96 – 1.02
Zn	0.103	0.100 – 0.106	5.01	4.82 – 5.20

Catalog Number	Code	Quantity	Catalog Number	Code	Quantity
140-025-031	✓ ⑧	250 ml	140-025-032	✓ ⑧	250 ml

⊗ Glass Container  
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Ⓢ Poison  
Ⓢ Corrosive

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Ⓢ Oxidant

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Used Oil - HU-1

Parameter	Consensus Value (µg/g)	Confidence Interval (95%)
Ag	13	10 – 16
Al	14	11 – 17
Ba	9	8.5 – 9.5
Ca	72	67 – 77
Cd	15	14 – 16
Cr	15	13 – 17
Cu	3132	2906 – 3358
Fe	59	53 – 65
K	(11)	---
Mg	11	10 – 12
Mn	18	17 – 19
Mo	11	10 – 12
Na	(20)	---
Ni	45	42 – 48
P	(40)	---
Pb	20	19 – 21
Si	(10)	---
Sn	(305)	---
Ti	9	7 – 11
V	7	6.5 – 7.5
Zn	16	14 – 18

Catalog Number	Code	Quantity
140-025-041		125 ml

Save more with MATPak  
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Compost - CP-1

Parameter	Unit	Consensus Value	Confidence Interval (95%)
Al - Total	mg/kg	7544	6838 - 8250
As - Total	mg/kg	5.5	3.6 - 7.4
C/N Ratio	---	(20.6)	---
Ca - Total	mg/kg	54393	51699 - 57087
Cd - Total	mg/kg	(1.6)	---
Co - Total	mg/kg	5.5	4.6 - 6.4
Cr - Total	mg/kg	41	35 - 47
Cu - Total	mg/kg	227	215 - 239
Fe - Total	mg/kg	17550	16923 - 18177
H <sub>2</sub> O	%	2.7	2.3 - 3.1
Hg - Total	mg/kg	0.6	0.52 - 0.68
K - Total	mg/kg	1334	1136 - 1532
Mg - Total	mg/kg	4493	4283 - 4703
Mn - Total	mg/kg	658	637 - 679
Mo - Total	mg/kg	(2.3)	---
N - Total	%	0.82	0.77 - 0.87
Na - Total	mg/kg	462	392 - 532
Ni - Total	mg/kg	30	27 - 33
NO <sub>3</sub> - N	mg/kg	797	702 - 892
Organic Matter	%	28	25 - 31
P - Total	mg/kg	6874	6615 - 7133
Pb - Total	mg/kg	33	31 - 35
pH	---	7.2	7.1 - 7.3
S - Total	mg/kg	2042	1783 - 2301
Se - Total	mg/kg	(0.8)	---
Zn - Total	mg/kg	240	232 - 248

Catalog Number	Code	Quantity
140-025-111		100 g

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**Certified Reference Materials**  
*AgroMAT™*

Certified Reference Materials

Parameter	Method	Unit	Clay Soil		Sandy Soil	
			AG-1		AG-2	
			Consensus Value	Confidence Interval (95%)	Consensus Value	Confidence Interval (95%)
Phosphorus	Bray 1	ppm	34	27 – 41	22	17 – 27
	Mehlich III	ppm	52	49 – 55	21	19 – 23
	Olsen	ppm	38	34 – 42	15	12 – 18
Potassium	Ammonium Acetate	ppm	108	104 – 112	79	71 – 87
	Mehlich III	ppm	121	113 – 129	88	82 – 94
Calcium	Ammonium Acetate	ppm	2184	2075 – 2293	371	345 – 397
	Mehlich III	ppm	2580	2488 – 2672	468	433 – 503
Magnesium	Ammonium Acetate	ppm	249	237 – 261	27	20 – 34
	Mehlich III	ppm	298	286 – 310	39	34 – 44
Zinc	DTPA	ppm	0.9	0.8 – 1.0	1.6	1.5 – 1.7
	Mehlich III	ppm	2.1	2.0 – 2.2	3.8	3.6 – 4.0
Manganese	DTPA	ppm	14	12 – 16	33	27 – 39
	Mehlich III	ppm	140	132 – 148	214	199 – 229
Copper	DTPA	ppm	0.9	0.8 – 1.0	0.8	0.7 – 0.9
	Mehlich III	ppm	0.7	0.6 – 0.8	1.1	1.0 – 1.2
Iron	DTPA	ppm	57	48 – 66	96	74 – 118
	Mehlich III	ppm	546	511 – 581	481	456 – 506
Boron	Hot Water	ppm	0.4	0.3 – 0.5	0.3	0.2 – 0.4
	Mehlich III	ppm	0.7	0.5 – 0.9	0.4	0.2 – 0.6
Sodium	Ammonium Acetate	ppm	25	19 – 31	20	16 – 24
	Mehlich III	ppm	(31)	---	(25)	---
Sulfur	Mehlich III	ppm	(11)	---	(25)	---
Aluminum	Mehlich III	ppm	(913)	---	(1370)	---
pH	1 :1 Soil :Water	---	7.1	7.0 – 7.2	5.7	5.6 – 5.8
	1 :2 Soil :Water	---	7.1	6.9 – 7.3	5.7	5.5 – 5.9
	Saturated Paste	---	(7.1)	----	(5.8)	---
	Buffer SMP	---	7.2	7.1 – 7.3	6.4	6.3 – 6.5
Organic Matter	LOI	%	2.7	2.4 – 3.0	3.2	2.9 – 3.5
	Walkley Black	%	2.3	2.1 – 2.5	2.5	2.3 – 2.7
Nitrogen as Nitrate	Cadmium Reduction	ppm	14	13 – 15	5	4 – 6
Soluble Salts	1 :1 Soil :Water	uS/cm	(256)	---	(78)	---
	1 :2 Soil :Water	uS/cm	171	151 – 191	72	58 – 86
	Saturated Paste	uS/cm	(562)	---	(228)	---

Catalog Number	Code	Quantity	Catalog Number	Code	Quantity
140-025-101		175 g	140-025-102		175 g

⊗ Glass Container    Ⓟ Poison    Ⓝ Flammable    \* as defined by :    ⚠ Hazardous Materials Regulations of the U.S. Department of Transportation, Tariff No. BOE-6000-R  
 ✓ Dangerous Goods\*    Ⓢ Corrosive    Ⓟ Oxidant    ⚠ Canadian Transportation of Dangerous Goods Act and Regulations, Revision December 2000  
 ⚠ International Air Transport Association - Dangerous Goods Regulation, 40th Edition

**Instrument Control Kit - PlasmaTEST ICP-AES**

- Perfect for instrument compliance auditing
- A single product providing instrument testing QC for ICP-AES
- Monitor and document 7 different instrument parameters
- Detect operational & mechanical problems before analytical errors occur



*“One should not be assigned one’s identity in society by the job slot one happens to fill.” -Judith Martin-*



# Certificate of Analysis

## General Information

Sewage Sludge  
Certified Reference Material BE-1

Sample

**Organization responsible for the certification:**

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

Date of receipt : \_\_\_\_\_

Ph: (514) 457-0701

Fax: (514) 457-4499

**Date of initial Certification:**

September 29, 1999

**Date of last Verification:**

February 8, 2005

**Description:**

The Reference Standard BE-1 is a natural sewage sludge (not spiked or fortified) with a particle size of -200 mesh. It is designed to be used for quality control verification, internal standards validation or methods development for the analysis of the listed parameters using the indicated methods.

This certification is valid for 12 months from the shipping date or 24 months after the verification date, whichever comes first, provided the material is kept tightly capped and stored under normal laboratory conditions. **SCP SCIENCE** will monitor the stability of representative samples annually and, if any changes occur that invalidate this certification, **SCP SCIENCE** will notify purchasers.

## Certificate of Analysis: EnviroMAT™ Example

**Directions:**

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 with previous homogeneity testing. The procedure used for digestion is based on the EPA 3050 Method ie. strong acid digest. Do not use a total digestion procedure. The results are on a dry weight basis so you need to dry the material at 105 °C to constant weight before weighing.

**Preparation method:**

The initial sample has been dried and crushed. The “fines” portion has been further crushed and sieved with 80% of the material passing through a 200 mesh screen. The final material has then been packaged in 50 g containers and tested for homogeneity.

The homogeneity of the material has undergone third party verification by Particle Size Analysis and by Total Digestion using ICP-AES for analysis. 15 bottles were taken at random from the lot. 12 of these bottles were analysed once and the 3 remaining bottles were analysed 12 times each. The resulting data was analysed statistically and the elemental standard deviations were consistent with a homogenous material.

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 a round-robin analysis involving 18 laboratories. Each laboratory was asked to supply analysis data 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 19 values per parameter (27 values being the highest and 10 values being the lowest). Values in brackets are not certified as less than 10 values were received. They are provided for information only.

The outliers were removed using the Dixon Test 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.

Certificate of Analysis:  
EnviroMAT™ Example

Certified Reference  
Materials

The Confidence Interval has been calculated using the 95% Confidence Level (equivalent to  $2\sigma$ ) 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 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 consistently outside Confidence Interval but within Tolerance Interval	Method needs improvement
Results outside Tolerance Interval	Method not working properly

**References:**

- ISO Guide 30 (1992): Terms and definitions used in connection with reference materials
- ISO Guide 31 (1981): Contents of certificates of reference materials
- ISO Guide 35 (1989): 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

## Certificate of Analysis: EnviroMAT™ Example

Catalog number : 140-025-011

Consensus Values for **EnviroMAT** – Sewage Sludge BE-1

Parameter	Unit	Consensus Value	Confidence Interval	Tolerance Interval
Ag	mg/kg	21	20 – 22	15 – 27
Al	mg/kg	43917	42324 – 45510	34552 – 53282
As	mg/kg	4.6	4.1 – 5.1	1.8 – 7.4
B	mg/kg	(9.9)	-----	-----
Ba	mg/kg	446	413 – 479	251 – 641
Be	mg/kg	0.21	0.17 – 0.25	0.01 – 0.41
Ca	mg/kg	28636	27185 – 30087	20253 – 37019
Cd	mg/kg	1.9	1.6 – 2.2	0 – 3.8
Co	mg/kg	2.3	2.1 – 2.5	0.9 – 3.7
Cr	mg/kg	34	31 – 37	18 – 50
Cu	mg/kg	408	392 – 424	305 – 511
Fe	mg/kg	8925	8478 – 9372	6254 – 11596
Hg	mg/kg	1.3	1.1 – 1.5	0.2 – 2.4
K	mg/kg	2273	2034 – 2512	970 – 3576
Li	mg/kg	3.6	3.0 – 4.2	0.7 – 6.5
Mg	mg/kg	3808	3600 – 4016	2605 – 5011
Mn	mg/kg	213	205 – 221	164 – 262
Mo	mg/kg	6.4	5.9 – 6.9	3.4 – 9.4
Na	mg/kg	1459	1260 – 1658	469 – 2449
Ni	mg/kg	14	13 – 15	6 – 22
P	mg/kg	29826	27906 – 31746	20757 – 38895
Pb	mg/kg	57	53 – 61	28 – 86
S	mg/kg	(8048)	-----	-----
Sb	mg/kg	(0.9)	-----	-----
Se	mg/kg	2.9	2.4 – 3.4	0 – 5.8
Sn	mg/kg	(16)	-----	-----
Sr	mg/kg	349	331 – 367	252 – 446
Ti	mg/kg	(91)	-----	-----
U	mg/kg	(2.1)	-----	-----
V	mg/kg	12	11.5 – 12.5	9 – 15
Zn	mg/kg	381	367 – 395	296 – 466

**Note :** Values in bracket are not certified. They are listed for information only.

Manufactured according to an ISO 9001:2000 Quality System and ISO 17025 (in-process)

### SCP SCIENCE

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