

Analysis Report

1.0 DESCRIPTION: Matrix Reference Material *EnviroMAT Contaminated Soil* (SS-2)
 Catalogue Number: 140-025-002
 Lot Number: S150827031
 Expiration Date: 2 years from date of shipment (See Ship Date label on bottle)

2.0 CONSENSUS VALUES (See section 8 for additional details):

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

3.0 APPROVAL AND REVISION:
 Approval: Daniel Boisvert, Chemist
 Date of Issue of Report: October 30th, 2015



4.0 DESCRIPTION AND INTENDED USE:

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 for the listed parameters. Not intended for calibration.

5.0 INSTRUCTIONS FOR USE AND STABILITY:

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. Results are to be calculated on a dry weight basis.

Stability: This MRM is guaranteed to be stable up to 2 years from the shipping date provided the material is kept sealed, 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 regularly and if any changes occur that invalidate the reported results, **SCP SCIENCE** will notify purchasers.

Date of last verification: **March 22, 2018**

6.0 HAZARDOUS INFORMATION:

Please refer to the associated Safety Data Sheet (SDS) for information regarding this product (available at <http://www.scpscience.com/ecert>).

7.0 PREPARATION METHOD AND HOMOGENEITY:

Preparation Method: The initial sample has been dried, crushed 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.

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

8.0 ANALYSIS AND DETERMINATION OF CONSENSUS VALUES:

These values were the result of an inter-laboratory study involving fifteen laboratories. Each laboratory was asked to supply analysis data for a specific list of elements. Not all the laboratories supplied data for the different parameters. Consensus 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 and ICP-AES have been used for all metals 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:

$x \pm ts/\sqrt{n}$ 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:

$x \pm ks$ 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 Consensus 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 may need improvement
Results outside Tolerance Interval	Method not working properly

9.0 REFERENCES:

- ISO Guide 30: Terms and definitions used in connection with reference materials
- ISO Guide 31: Reference materials – Contents of certificates, labels and accompanying documentation
- 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, Sludges and Soils (Revision 2, December 1996)

10.0 QUALITY SYSTEM CERTIFICATIONS:

ISO 9001 Certification: This reference material was produced in a facility which operates under a **registered** ISO 9001 Quality Management System. Please consult our web site for a copy of the most recent revision of our certificate of registration.

ISO 17025 Accreditation: SCP SCIENCE (Corporate Headquarters) operates an ISO 17025:2005 **accredited** laboratory. Please consult our web site for a copy of the most recent revision of our certificate and scope of accreditation.

ISO 17034 Accreditation: SCP SCIENCE (Corporate Headquarters) is an ISO 17034 accredited Reference Material Producer. Please consult our website for a copy of our most recent certificate and scope of accreditation.

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