

## Analysis Report

**1.0 DESCRIPTION:** Matrix Reference Material *EnviroMAT Sewage Sludge* (BE-1)  
 Catalogue Number: 140-025-011  
 Lot Number: S131211025  
 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	2.24	0.05	2.19 – 2.29	1.83 – 2.65
Al	34 860	856	34 004 – 35 716	26 517 – 43 203
As	4.31	0.18	4.13 – 4.48	2.63 – 5.99
B	12.6	0.7	11.8 – 13.3	7.04 – 18.1
Ba	329	9	319 – 338	238 – 420
Be	0.327	0.015	0.312 – 0.341	0.206 – 0.447
Ca	35 970	795	35 175 – 36 765	27 891 – 44 050
Cd	0.878	0.068	0.810 – 0.946	0.191 – 1.56
Co	6.21	0.12	6.09 – 6.34	5.05 – 7.38
Cr	58.0	2.2	55.7 – 60.2	34.6 – 81.4
Cu	300	6	294 – 306	233 – 367
Fe	18 143	451	17 692 – 18 593	13 626 – 22 660
Hg	0.680	0.034	0.646 – 0.714	0.404 – 0.956
K	3376	96	3281 – 3472	2428 – 4325
Li	7.59	0.53	7.06 – 8.12	4.28 – 10.9
Mg	7202	130	7071 – 7332	5877 – 8526
Mn	551	10	514 – 561	450 – 652
Mo	4.93	0.19	4.74 – 5.11	3.03 – 6.83
Na	817	27	790 – 844	565 – 1069
Ni	25.1	0.7	24.3 – 25.8	17.7 – 32.5
P	23 911	405	23 506 – 24 315	20 083 – 27 738
Pb	26.7	0.9	25.8 – 27.6	17.8 – 35.5
S	8201	217	7984 – 8418	6419 – 9983
Sb	1.71	0.21	1.50 – 1.92	0.00 – 3.56
Se	2.87	0.21	2.66 – 3.07	0.935 – 4.80
Sn	12.4	1.2	11.2 – 13.6	1.35 – 23.4
Sr	221	5	216 – 227	174 – 269
Ti	315	35	280 – 350	10.4 – 620
U	3.48	0.09	3.39 – 3.57	2.75 – 4.20
V	27.8	0.5	27.2 – 28.3	22.9 – 32.7
Zn	466	8	458 – 475	378 – 555

**3.0 APPROVAL AND REVISION:**

Approval: Daniel Boisvert, Chemist  
 Date of Issue of Report: June 27<sup>th</sup>, 2014



#### 4.0 DESCRIPTION AND INTENDED USE:

The Matrix Reference Material 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 or methods development for soil analysis 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. Acid digestion is the normal procedure used. Do not use a total digestion procedure. 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: **February 19, 2019**

#### 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. The final material has then been packaged in 50 g containers and tested for homogeneity and sterilized by irradiation.

**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 twenty-one 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 64 values per parameter (83 values being the highest and 36 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. HNO<sub>3</sub>, HNO<sub>3</sub>/HCl or HNO<sub>3</sub>/HCl/H<sub>2</sub>O<sub>2</sub> digestion method was used. ICP-MS and ICP-AES have been used for all metals and for Hg ICP-AES, ICP-MS and CVAA 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.

**CORPORATE HEADQUARTERS**  
 21800 Clark Graham  
 Baie D'Urfé (Montréal), Quebec,  
 H9X 4B6 Canada  
 Phone: +1 (800) 361-6820  
 Fax: +1 (800) 253-5549

**USA**  
 3<sup>rd</sup> Party Distribution Center  
 348 Route 11, Champlain,  
 N.Y. 12919-4816  
 Phone: +1 (800) 361-6820  
 Fax: +1 (800) 253-5549

**FRANCE**  
 12 Ave. de Québec, Bat. Iberis  
 SILIC 642, 91965 Courtaboef  
 Phone: +33 (0) 1 69 18 71 17  
 Fax: +33 (0) 1 60 92 05 67

**GERMANY**  
 Alte Marktoberdorfer Straße 14,  
 87616 Marktoberdorf  
 Phone: +49 (0) 8342-89560-61  
 Fax: +49 (0) 8342-89560-69

CORPORATE :

Phone: +1 (514) 457-0701 | Fax: +1 (514) 457-4499

www.scpscience.com | sales@scpscience.com

