

## Analysis Report

**1.0 DESCRIPTION:** Matrix Reference Material *EnviroMAT Ground water, High (ES-H)*  
 Catalogue Number: 140-025-035/-135  
 Lot Number: **S161128029**  
 Expiration Date: 12 months from date of shipment (See Ship Date label on bottle)

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

Parameter	Consensus Value (mg/l)	Uncertainty (+/-)	Confidence Interval (mg/l)	Tolerance Interval (mg/l)
Al	0.235	0.003	0.232 – 0.238	0.203 – 0.267
As	0.423	0.008	0.416 – 0.431	0.345 – 0.502
B	1.65	0.02	1.62 – 1.67	1.44 – 1.86
Ba	3.30	0.065	3.24 – 3.37	2.65 – 3.95
Be	0.209	0.0030	0.206 – 0.212	0.183 – 0.236
Ca	7.72	0.14	7.58 – 7.86	6.51 – 8.93
Cd	0.221	0.003	0.218 – 0.224	0.190 – 0.252
Co	0.124	0.002	0.121 – 0.126	0.103 – 0.144
Cr	0.434	0.006	0.428 – 0.440	0.370 – 0.498
Cu	0.815	0.009	0.805 – 0.824	0.720 – 0.909
Fe	1.27	0.02	1.25 – 1.29	1.03 – 1.50
K	2.88	0.07	2.81 – 2.95	2.23 – 3.53
Li	0.100	0.002	0.0981 – 0.101	0.0882 – 0.111
Mg	6.59	0.11	6.49 – 6.70	5.59 – 7.60
Mn	0.342	0.004	0.339 – 0.346	0.305 – 0.379
Mo	0.404	0.006	0.398 – 0.410	0.347 – 0.461
Na	18.0	0.3	17.7 – 18.3	15.2 – 20.8
Ni	0.835	0.012	0.823 – 0.847	0.710 – 0.960
P	0.499	0.012	0.487 – 0.511	0.419 – 0.579
Pb	0.110	0.002	0.108 – 0.111	0.0943 – 0.125
Sb	0.0431	0.0009	0.0421 – 0.0440	0.0339 – 0.0522
Se	0.0324	0.0007	0.0318 – 0.0331	0.0259 – 0.0390
Sr	0.935	0.011	0.924 – 0.947	0.834 – 1.036
Tl	0.0385	0.0005	0.0379 – 0.0390	0.0337 – 0.0433
U	0.258	0.009	0.249 – 0.267	0.188 – 0.327
V	0.873	0.013	0.861 – 0.886	0.757 – 0.989
Zn	0.848	0.016	0.833 – 0.864	0.683 – 1.014

**Results after 1:50 dilution** (Refer to 'Instructions for use' to perform dilution)

Notes: (a) Values in brackets are for information only (not certified value)

**3.0 APPROVAL AND REVISION:**

Approval: Daniel Boisvert, Chemist  
 Date of Issue of Report: April 25<sup>th</sup>, 2017



#### 4.0 DESCRIPTION AND INTENDED USE:

The Matrix Reference Material ES-H is a ground water that has been spiked with metals. It is designed to be used for quality control verification or methods development for water analysis for the listed parameters. Not intended for calibration.

#### 5.0 INSTRUCTIONS FOR USE AND STABILITY:

**Instructions for use:** This water Matrix Reference Material is in the form of a concentrate and does not require digestion. Dilute sample **1:50** with pure deionized water before analysis. The concentrate acid matrix is 3% nitric acid on a v/v basis. Match your final acid concentration (after dilution) with acid concentration of your standards to eliminate possible matrix differences. Reported results in table in section 2 are for the 1:50 dilution.

**Stability:** This MRM is guaranteed to be stable up to 12 months 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: **June 4, 2020**

#### 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:** Commercial ground water has been collected and then spiked with desired metals at specific concentrations. Nitric acid has been added for preservation (3% HNO<sub>3</sub> v/v). The final material has then been packaged in 250ml containers and tested for homogeneity.

**Homogeneity:** The homogeneity of the material has undergone in house verification by inductively coupled plasma spectrometer (ICP-AES). 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 international 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 66 values per parameter (80 values being the highest and 32 values being the lowest). Values in brackets are not certified as less than 12 values were received. They are provided for information only.

ICP-MS and ICP-AES have been used for metals quantification by 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 2 $\sigma$ ) 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

## 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 **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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