Certificate of Analysis

Catalogue Number: 140-025-135
Description: Certified Reference Standard
*Enviro*MAT Ground Water, High (ES-H-2)
Lot Number: SC6074648
Date of Initial Certification: June 13, 2007
Date of Last Verification: June 26, 2009

Consensus Values:

Parameter	Unit	Consensus Value	Confidence Interval	Tolerance Interval
Al	ppm	**0.209**	0.194 – 0.224	0.121 – 0.297
As	ppm	**0.404**	0.391 – 0.417	0.328 – 0.481
B	ppm	**1.61**	1.56 – 1.67	1.32 – 1.91
Ba	ppm	**3.12**	3.03 – 3.21	2.59 – 3.64
Be	ppm	**0.197**	0.190 – 0.201	0.157 – 0.237
Ca	ppm	**6.50**	6.24 – 6.75	4.96 – 8.03
Cd	ppm	**0.200**	0.194 – 0.205	0.166 – 0.233
Co	ppm	**0.119**	0.114 – 0.125	0.090 – 0.149
Cr	ppm	**0.401**	0.388 – 0.414	0.325 – 0.478
Cu	ppm	**0.781**	0.761 – 0.801	0.658 – 0.903
Fe	ppm	**1.17**	1.12 – 1.22	0.86 – 1.48
K	ppm	**2.84**	2.71 – 2.97	2.09 – 3.59
Li	ppm	**0.096**	0.088 – 0.105	0.058 – 0.135
Mg	ppm	**6.11**	5.91 – 6.30	4.94 – 7.27
Mn	ppm	**0.318**	0.310 – 0.327	0.268 – 0.369
Mo	ppm	**0.387**	0.375 – 0.398	0.321 – 0.452
Na	ppm	**17.4**	16.6 – 18.3	12.5 – 22.3
Ni	ppm	**0.789**	0.754 – 0.824	0.587 – 0.992
P	ppm	**0.448**	0.420 – 0.476	0.306 – 0.590
Pb	ppm	**0.102**	0.097 – 0.107	0.073 – 0.132
Sb	ppm	**0.040**	0.038 – 0.042	0.030 – 0.051
Se	ppm	**0.030**	0.028 – 0.031	0.021 – 0.038
Sr	ppm	**0.979**	0.968 – 0.991	0.919 – 1.040
Tl	ppm	**0.035**	0.032 – 0.039	0.020 – 0.051
U	ppm	**(0.244)**	0	0
V	ppm	**0.798**	0.780 – 0.816	0.693 – 0.903
Zn	ppm	**0.800**	0.764 – 0.836	0.577 – 1.023

Notes: 1. Results after dilution 1 : 50

Date of receipt: 9/27/2011

Organization responsible for the certification:

SCP SCIENCE
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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 Reference Standard ES-H-2 is a ground water that has been spiked with metals. It is designed to be used for quality control verification, internal standards validation or methods development for the analysis of the listed parameters.

Stability:

This certification is valid for 12 months from the shipping date provided the material is kept sealed 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.

Instructions for use:

This water reference material is in the form of a concentrate and does not require digestion. Dilute the sample 1:50 before analysis. The acid concentration of the concentrate is 7.4% Nitric Acid on a V/V basis. Match your final acid concentration (after dilution) to the acid concentration of your standards to eliminate possible matrix differences.

Certification and Calculation Methods:

The Certification Method is based on a round-robin analysis involving 21 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 24 values per parameter (29 values being the highest and 13 values being the lowest).

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.

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

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

where
- n: Number of data
- s: Standard Deviation of the Average
- t: Factor for Student Test
- x: Reference value

The 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 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 (2000): Reference materials – Contents of certificates and labels;
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.