Certificate of Analysis

NATURAL MATRIX CERTIFIED REFERENCE MATERIAL

Catalog No: CRM026-050
Lot No: BE026

sandy loam 9

METALS ON SOIL

ANALYTE CONCENTRATIONS

Element	Reference Value	S.D.	Confidence Interval	Prediction Interval
Arsenic, As	5.41	2.49	4.64 - 6.19	0.481 - 10.3
Cadmium, Cd	12.9	1.81	12.2 - 13.6	9.10 - 16.7
Chromium, Cr	36.9	13.9	31.6 - 42.1	7.77 - 65.9
Copper, Cu	22.5	2.83	21.5 - 23.6	16.6 - 28.5
Lead, Pb	30.7	6.73	28.1 - 33.4	16.7 - 44.8
Mercury, Hg	2.42	0.320	2.16 - 2.46	1.30 - 3.32
Nickel, Ni	19.3	4.38	17.6 - 21.0	10.1 - 28.4
Zinc, Zn	169	18.4	161 - 176	130 - 207

All values are expressed in mg/Kg (parts per million) on a dry weight basis. The Reference Values were determined by using USEPA SW846 Method 7060A for Arsenic, by using USEPA SW846 Method 7471B for Mercury, and by using Aqua Regia DIN 38414-S7 Method for Cadmium, Chromium, Copper, Lead, Nickel, and Zinc.

Confidence Interval (C.I.) range is the 95% C.I. for the Reference Value. The Prediction Interval (P.I.) is the 95% P.I. around the Reference Value. Measurements should fall within the P.I. range 19 of 20 times. The Certified Reference Values were established through extensive interlaboratory testing. All values were calculated using the USEPA BIWEIGHT Method.

"THIS PRODUCT WAS DESIGNED, PRODUCED, AND VERIFIED FOR ACCURACY AND STABILITY IN ACCORDANCE WITH USEPA/AALA RM-03 AND ISO GUIDES 34 AND 35."

Certifying Officer

RTC
2931 Soldier Springs Road
Laramie, WY 82070
Phone: 800.576.5690 or 307.742.5452
Fax: 307.745.7936
Web: www.RT-Corp.com

MSDS available upon request

PRODUCT INFORMATION

Instructions For Use
Metals on Soil CRM026-050
Certified Reference Material

● **Caution: Please read instructions before using**

1. Scope and Application

The Metals on Soil Certified Reference Material (CRM) sample consists of a single sample jar containing approximately 50 grams of material. This soil is from a slightly contaminated site located in the Rocky Mountain Region of the US, and is not "spiked or fortified" in any manner. The matrix was air dried, sieved to remove extraneous debris, and homogenized. Being a real-world waste sample the analyst is challenged by the same preparation problems, analytical interferences, etc. as is typical for similar matrices received by the laboratory for analysis.

Rigorous analyses identified, quantified, and certified several metals which are listed on the enclosed Certificate of Analysis. The sample has been analyzed by a minimum of twenty laboratories in a round-robin to meet the requirements specified by the EPA/AALA RM-03, ISO 34 and 35. The sample was certified by USEPA SW846, 3rd edition Method 3050, 6010 (ICP) and 7000 series (AA) methods. The sample is suitable for use by these and other similar methods.

2. Sample Preparation

The entire sample lot has been tested and certified for inter-sample homogeneity, Due to potential settling and stratification in storage, shipping and handling the sample ***must be thoroughly mixed*** as stated in the method. If the reference method is being used, weigh out 1 gram of sample to the nearest .01 gram.

Weigh out additional material to determine percent moisture. All values reported on the Certificate of Analysis are reported on a ***dry weight*** basis.

3. Analysis

Follow the analysis instructions given in the referenced method. If there are any technical questions/problems encountered, or difficulties experienced in the use of these samples, please contact:

R.T. Corporation
Technical Support
Tel. (307) 742-5452
Fax (307) 745-7936

4. Evaluation of Results

The Reference Value, 95% confidence interval(C.I.) for the Reference Value and 95% Prediction Interval around the Reference Value were obtained by the methods identified on the Certificate of Analysis. Samples were selected in a random fashion from the beginning to the end of the bottling sequence and sent for analysis to a 26 laboratory round-robin. The data produced in the round-robin was used to calculate reference values by the USEPA EMSL-CINN's computer program "BIWEIGHT".

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The Biweight program generates a "Student's t" like statistic for constructing confidence intervals on data sets that may have heavier tails than a classical Gaussian distribution. This is appropriate for symmetric, stretch-tailed curves that are often encountered in analysis of homogenous samples via interlaboratory studies. The Biweight method is also more robust in handling data that results from determinations at or near the method detection limits. For data sets that are Gaussian, the Biweight estimates are comparable to traditional calculation methods.

The generated Biweight mean, Biweight standard deviation and Biweight standard deviation of the mean are used to calculate the 95% Confidence Interval (CI) for the mean and the 95% Prediction Interval (PI). For normally distributed data, the Biweight 95% CI compares well to the classical calculation method used to generate a 95% CI. For non-Gaussian data sets, the Biweight method is more robust in data treatment.

Biweight data are also used to calculate a 95% PI. The 95% PI compares well to a 95% tolerance limit calculated using classical methods. For normally distributed data, the Biweight 95% PI typically represents approximately a ± 2 Biweight standard deviation window around the Biweight mean. Again, the Biweight method is more robust than classical methods when handling non-Gaussian data sets.

Laboratories performing the same analytical procedures on a sample whose values have been determined by the Biweight method can assume that the true mean, as determined by the method, is within the 95% CI window. Laboratories analyzing the sample should have results within the 95% PI window 19 out of 20 analyses.

Additional information on the program may be obtained by referring to the reference or by downloading the program from the EMSL-CINN bulletin board.

Additional analytes detected, but not certified, are listed in parenthesis and can be used to determine detection and approximate values.

5. Informational Values

pH – 4.29

Texture Classification – Sandy Loam

[1] Kafadar, K, A Biweight Approach to the One-Sample Problem, Journal of the American Statistical Association, Vol. 77, No. 378, June, 1982, pp. 416-424