Certificate of Analysis
CERTIFIED REFERENCE MATERIAL

Metals on Sediment

Number	CRM015-50G
Lot	FF15
Solvent (Matrix)	Sediment
Hazard	Irritant
Storage &Handling	Store in a cool dry environment.
Expiration Date	See Sample Label
Certification Date:	August 31, 2011
Certified By:	*(signature)* Christopher Rucinski - QA Director

ISO Guide 34
Cert# AR-1470

ISO/IEC 17025
Cert# AT-1467

Analyte	Units	Certified [1,4] Value	k[5]	Standard [2] Deviation	Confidence Interval	Prediction Interval
Aluminum, Al	mg/Kg	9200 ± 976	2.00	3150	7890 - 10500	2550 - 15900
Traceable to: NIST SRM 3101a Lot 992003						
Arsenic, As	mg/Kg	6.60 ± 0.433	2.00	1.40	6.10 - 7.10	3.70 - 9.50
Traceable to: NIST SRM 3103a Lot 010713						
Barium, Ba	mg/Kg	83.0 ± 3.31	2.00	10.7	79.0 - 87.0	60.7 - 105
Traceable to: NIST SRM 3104a Lot 070222						
Beryllium, Be	mg/Kg	0.470 ± 0.0433	2.00	0.140	0.400 - 0.500	0.200 - 0.800
Traceable to: NIST SRM 3105a Lot 892707						
Calcium, Ca	mg/Kg	23500 ± 688	2.00	2220	22600 - 24400	18800 - 28100
Traceable to: NIST SRM 3109a Lot 050825						
Chromium, Cr (total)	mg/Kg	14.3 ± 1.44	2.00	4.67	12.6 - 16.0	4.60 - 24.0
Traceable to: NIST SRM 3112a Lot 990607						
Cobalt, Co	mg/Kg	6.04 ± 0.142	2.00	0.460	5.80 - 6.20	5.10 - 7.00
Traceable to: NIST SRM 3113 Lot 000630						
Copper, Cu	mg/Kg	16.1 ± 0.585	2.00	1.89	15.4 - 16.8	12.2 - 20.1
Traceable to: NIST SRM 3114 Lot 891811						
Iron, Fe	mg/Kg	17100 ± 717	2.00	2320	16100 - 18100	12200 - 21900
Traceable to: NIST SRM 3126a Lot 051031						
Lead, Pb	mg/Kg	15.0 ± 0.539	2.00	1.74	14.4 - 15.7	11.4 - 18.7
Traceable to: NIST SRM 3128 Lot 030721						
Magnesium, Mg	mg/Kg	13600 ± 345	2.00	1120	13200 - 14100	11300 - 16000
Traceable to: NIST SRM 3131a Lot 050302						
Manganese, Mn	mg/Kg	183 ± 4.52	2.00	14.6	178 - 189	153 - 214
Traceable to: NIST SRM 3132 Lot 050429						
Mercury, Hg	mg/Kg	0.221 ± 0.00619	2.00	0.0434	0.134 - 0.308	0.0908 - 0.351
Traceable to: NIST SRM 3133 Lot 061204						
Nickel, Ni	mg/Kg	17.5 ± 0.520	2.00	1.68	16.9 - 18.2	14.0 - 21.1
Traceable to: NIST SRM 3136 Lot 000612						
Potassium, K	mg/Kg	2070 ± 127	2.00	412	1910 - 2240	1210 - 2940
Traceable to: NIST SRM 3141a Lot 051220						
Sodium, Na	mg/Kg	401 ± 47.4	2.00	153	337 - 465	78.8 - 723
Traceable to: NIST SRM 3152a Lot 010728						
Vanadium, V	mg/Kg	22.1 ± 1.84	2.00	5.96	19.7 - 24.6	9.63 - 34.7
Traceable to: NIST SRM 3165 Lot 992706						
Zinc, Zn	mg/Kg	69.9 ± 2.82	2.00	9.11	66.4 - 73.3	50.9 - 88.8
Traceable to: NIST SRM 3168a Lot 001402						
Total cyanide	mg/Kg	6.04 ± 0.774	2.00	2.50	4.84 - 7.25	0.720 - 11.4

Additional Information

Informational Values (Non-certified)

Informational Values (Non-certified)

Trace Metal Acid Digestion by USEPA 3050B

Antimony, Sb - 0.360 mg/Kg
Bismuth, Bi - 0.300 mg/Kg
Boron, B - 8.60 mg/Kg
Cadmium, Cd - 0.520 mg/Kg
Molybdenum, Mo - 1.16 mg/Kg
Selenium, Se - 0.800 mg/Kg
Silver, Ag - 0.237 mg/Kg
Thallium, Tl - 1.00 mg/Kg
Tin, Sn - <5.00 mg/Kg
Titanium, Ti - 80.0 mg/Kg

Description

A total sample size of 100 g is provided.

The sample has been heat sterilized.

This sample should be digested using USEPA method 3050, 3051 or equivilent methods.

Preparation Instructions

Perform the sample digestion on an appropriate amount of sample according to the selected digestion procedure. The recommended minimum sampling size is 1.0 grams.

Determination of the percent moisture content of the material is required.

All results are reported on a dry weight basis.

Storage

The sample should be stored at 18°C (Room temperature) in a dark dry location. It has been determined to be stable for the duration of the expiration date.

After sub-sampling replace cap securely and store remaining sample at 18°C.

The shelf life of the product was determined by historic stability of similar CRM's. RTC may extended the expiration date based on stock and popularity upon successful stability testing by a 17025 accredited laboratory.

Stability and shelf life after opening must be determined by the user, taking into account sampling frequency/volume and all local conditions.

Scope and Application

The Metals in Sediment Certified Reference Material (CRM) consists of a single polypropylene sample jar containing approximately 100 grams of metals contaminated soil from a site located in the Western United States. Being a natural matrix 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 the metals which are listed on the enclosed Certificate of Analysis. The Reference Values were determined by USEPA SW846 (3rd edition) Methods 3050/3051 and 6010, except for Arsenic (7060A), Mercury (7471A), Selenium (7740), Thallium (7841), and Cyanide (9010A). The sample is suitable for other 3000-series metals digestion procedures and 7000-series spectroscopic methods.The sample has been analyzed by 120 independent laboratories in a round-robin to meet the requirements specified by the ISO Guides 34 and 35, and ISO 17025.

Evaluation of Results

The Reference Value, 95% confidence interval(C.I.) for the Reference Value and 95% Prediction Interval (P.I.) around the Reference Value were obtained by the methods identified in the 'Scope and Application' section of this Certificate of Analysis. Samples were selected in a random fashion from the beginning to the end of the bottling sequence and sent for analysis by an independent 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".

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. Laboratories should use the PI as guidance for laboratory performance.

Additional information on the program may be obtained by referring to the reference or by downloading the program from the EMSL-CINN web site. Additionally contact RTC for additional guidance - 1(307)742-5452 - support@rt-corp.com - www.rt-corp.com

Health and Safety Information

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CERTIFIED REFERENCE MATERIAL

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Health and Safety Information

All RTC Certified Reference Materials are intended only for professional use by properly trained laboratory personnel. This CRM has been reviewed for both health and safety and shipping risks. It is classified as non hazardous and is not classified as hazardous goods for shipping by road, sea or air transport.

A full international MSDS as a downloadable pdf file is available at www.rt-corp.com

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1 Certified values are the robust statisitical mean when prepared according to instructions from an Interlaboratory Study and internal rigorous testing.
2 The standard deviation is the robust statistical standard deviation from the round robin interlaboratory study.
4 Expanded Uncertainty (Ucrm) - All uncertainty values in this document expressed as ± *value* are expanded uncertainties.
5 *k*: Coverage factor derived from a t-distribution table, based on the degrees of freedom of the data set. **Confidence interval = 95%**

TRACEABILITY: The standard was manufactured under an ISO 17025 certified quality system. The balance used to weigh raw materials is accurate to +/- 0.0001g and calibrated regularly using mass standards traceable to NIST. All dilutions were preformed gravimetrically. Additionally, individual analytes are traceable to NIST SRMs where available and specified above.

HOMOGENEITY ASSESSMENT: Between-bottle homogeneity was assessed in accordance with ISO Guide 35. Completed units were sampled over the course of the bottling operation. Samples were taken in the following manner: the units produced in the bottling operation were divided into three chronological groups, those from the Early third, the Middle third, and the Late third (Groups). A pre-determined number of sample units were then randomly selected from each group. A subset of each group was then randomly selected for chemical analysis. The results of the chemical analysis were then compared by Single Factor Analysis of Variance (ANOVA).

UNCERTAINTY STATEMENT: Uncertainty values in this document are expressed as Expanded Uncertainty (Ucrm) corresponding to the 95% confidence interval. Ucrm is derived from the combined standard uncertainty multiplied by the coverage factor k, which is obtained from a *t*-distribution and degrees of freedom. The components of combined standard uncertainty include the uncertainties due to characterization, homogeneity, long term stability, and short term stability (transport). The components due to stability are generally considered to be negligible unless otherwise indicated by stability studies.

THIS PRODUCT WAS DESIGNED, PRODUCED AND VERIFIED FOR ACCURACY AND STABILITY IN ACCORDANCE WITH ISO 17025 (AClass Cert AT-1467) and ISO GUIDE 34 (AClass Cert AR-1470).

MSDS reports for components comprising greater than 1.0% of the solution or 0.1% for components known to be carcinogens are available upon request.

Manufactured and certified by Sigma-Aldrich RTC, Inc.

242 - 18