▪ Certificate of Analysis ▪

Product: Metals in Sewage SludG™
Catalog Number: 160
Lot No. D083-160
Certificate Issue Date: November 21, 2013
Expiration Date: October 31, 2016
Revision Number: Original

CERTIFICATION

Parameter	Total Concentration	Certified Value[1]	Uncertainty[2]	QC Performance Acceptance Limits[3]	PT Performance Acceptance Limits[4]
	mg/kg	mg/kg	%	mg/kg	mg/kg
Aluminum	7050	7450	9.51	6180 - 8720	5650 - 9250
Antimony	235	175	28.6	100 - 249	41.3 - 308
Arsenic	279	253	28.7	185 - 321	145 - 360
Barium	1110	1020	19.1	716 - 1320	309 - 1730
Beryllium	91.5	91.5	27.4	77.2 - 106	45.4 - 138
Cadmium	191	152	27.5	113 - 190	100 - 210
Calcium	48400	43000	6.27	32600 - 53400	26700 - 59300
Chromium	211	191	25.7	151 - 230	112 - 269
Cobalt	41.6	35.0	31.4	23.1 - 46.9	18.0 - 52.0
Copper	916	803	7.20	665 - 942	452 - 1150
Iron	24100	22100	6.51	16200 - 28100	15200 - 29100
Lead	149	150	26.9	119 - 181	61.4 - 238
Magnesium	4560	4120	10.6	3360 - 4870	3040 - 5190
Manganese	593	525	15.8	392 - 658	292 - 758
Mercury	12.6	9.12	29.1	3.79 - 14.5	1.26 - 17.4
Molybdenum	149	122	26.9	95.3 - 149	82.3 - 164
Nickel	140	121	26.7	95.8 - 147	74.1 - 169
Potassium	3410	3300	16.5	2470 - 4130	2450 - 4150
Selenium	136	117	27.2	79.9 - 155	69.0 - 166
Silver	134	110	27.0	69.8 - 150	61.0 - 159
Sodium	1970	1920	17.8	1360 - 2480	1280 - 2560
Strontium	553	536	14.5	444 - 629	377 - 696
Thallium	161	125	27.3	86.3 - 164	66.7 - 184
Vanadium	174	160	27.6	107 - 213	101 - 219

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Parameter	Total Concentration	Certified Value[1]	Uncertainty[2]	QC Performance Acceptance Limits[3]	PT Performance Acceptance Limits[4]
	mg/kg	mg/kg	%	mg/kg	mg/kg
Zinc	1130	1060	12.2	821 - 1300	656 - 1460

ANALYTICAL VERIFICATION

Parameter	Certified Value[1]	Proficiency Testing Study			NIST Traceability	
		Mean	Recovery[5]	n	SRM Number	Recovery
	mg/kg	mg/kg	%			%
Aluminum	7450	7450	100	6	-	-
Antimony	175	175	100	7	-	-
Arsenic	253	253	100	12	-	-
Barium	1020	1020	100	7	-	-
Beryllium	91.5	91.5	100	7	-	-
Cadmium	152	152	100	12	-	-
Calcium	43000	43000	100	5	-	-
Chromium	191	191	100	11	-	-
Cobalt	35.0	35.0	100	7	-	-
Copper	803	803	100	12	-	-
Iron	22100	22100	100	6	-	-
Lead	150	150	100	12	-	-
Magnesium	4120	4120	100	5	-	-
Manganese	525	525	100	9	-	-
Mercury	9.12	9.12	100	8	-	-
Molybdenum	122	122	100	11	-	-
Nickel	121	121	100	11	-	-
Potassium	3300	3300	100	6	-	-
Selenium	117	117	100	10	-	-
Silver	110	110	100	8	-	-
Sodium	1920	1920	100	4	-	-
Strontium	536	536	100	5	-	-
Thallium	125	125	100	6	-	-
Vanadium	160	160	100	8	-	-

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Parameter	Certified Value[1]	Proficiency Testing Study			NIST Traceability	
		Mean	Recovery[5]	n	SRM Number	Recovery
	mg/kg	mg/kg	%			%
Zinc	1060	1060	100	12	-	-

1. The Certified Values are equal to the mean recoveries for the parameters as determined in an interlaboratory round robin study based on all applicable digestion techniques reported in the study. The Certified Values are based on an ""as received"" basis, assuming 100% solids content. The certified values are monitored and purchasers will be notified of any significant changes resulting in recertification or withdrawal of this certified reference material during the period of validity of this certificate.

2. The stated **Uncertainty** is the total propagated uncertainty at the 95% confidence interval. The uncertainty is based on the preparation and internal analytical verification of the product by ERA, multiplied by a coverage factor. The uncertainty applies to the product as supplied and does not take into account any required or optional dilution and/or preparations the laboratory may perform while using this product.

3. The **QC Performance Acceptance Limits (QC PALs™)** are based on actual historical data collected in ERA's Proficiency Testing program. The QC PALs™ reflect any inherent biases in the methods used to establish the limits and closely approximate a 95% confidence interval of the performance that experienced laboratories should achieve using accepted environmental methods. Use the QC PALs™ to realistically evaluate your performance against your peers.

4. The **PT Performance Acceptance Limits (PT PALs™)** are calculated using the regression equations and fixed acceptance criteria specified in the NELAC proficiency testing requirements. Use the PT PALs™ when analyzing this QC standard alongside USEPA and NELAC compliant PT standards. Please note that many PT study acceptance limits are concentration dependent (some non-linearly) and, therefore, the acceptance limits of this QC standard and any PT standard may differ relative to their difference in concentrations.

5. The **PT Data/Traceability** data include the mean value, percent recovery and number of data points reported by the laboratories in our Proficiency Testing study compared to the Certified Values. In addition, where NIST Standard Reference Materials (SRMs) are available, each analyte has been analytically traced to the NIST SRM listed. This product is traceable to the lot numbers of its starting materials. All gravimetric and volumetric measurements related to its manufacture are traceable to NIST through an unbroken chain of comparisons.
Traceability Recovery (%) = [(% recovery certified standard)/(% recovery NIST SRM)]*100
The traceability data shown were compiled by analyzing the ERA standards or their associated stock solutions against the applicable NIST SRMs.

6. The Total Concentrations are equal to the background concentrations in the blank sludge matrix (measured using 3050 for Metals and 7471 for Mercury), plus the amount of each analyte spiked onto the sludge.

7. For additional information on this product such as intended use, instructions for use, level of homogeneity, and safety information, please refer to the provided Instruction Sheet

If you have any questions or need technical assistance, please call ERA technical assistance at 1-800-372-0122 or send an email to info@eraqc.com.

Certifying Officer

Tom Widera

Quality Officer

Kristina Sanchez

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