▪ Certificate of Analysis ▪

Product: Metals in Sewage SludG™
Catalog Number: 160
Lot No. D091-160
Certificate Issue Date: December 04, 2015
Expiration Date: April 30, 2019
Revision Number: Original

CERTIFICATION

Parameter	Total Concentration[6]	Certified Value[1]	Uncertainty[2]	QC Performance Acceptance Limits[3]	PT Performance Acceptance Limits[4]
	mg/kg	mg/kg	%	mg/kg	mg/kg
Aluminum	5820	6500	6.60	5450 - 7550	3960 - 9040
Antimony	231	194	28.2	121 - 267	151 - 254
Arsenic	192	167	28.8	121 - 214	120 - 214
Barium	828	791	16.7	566 - 1020	614 - 969
Beryllium	77.0	68.8	27.4	56.7 - 80.9	50.0 - 87.6
Cadmium	207	177	27.5	135 - 218	112 - 242
Calcium	48400	46000	6.35	35600 - 56300	34100 - 57900
Chromium	173	148	25.6	116 - 181	88.0 - 209
Cobalt	37.3	34.3	32.8	23.7 - 45.0	26.0 - 42.6
Copper	916	822	7.29	683 - 961	714 - 1010
Iron	24100	23600	6.68	17700 - 29500	18900 - 28300
Lead	111	103	28.0	79.6 - 126	60.8 - 144
Magnesium	4560	4480	10.7	3730 - 5240	2990 - 5980
Manganese	847	823	18.7	633 - 1010	575 - 1070
Mercury	21.3	19.0	40.2	10.0 - 28.0	8.56 - 29.5
Molybdenum	173	149	26.7	117 - 180	72.8 - 224
Nickel	179	155	26.6	122 - 187	97.3 - 212
Potassium	3120	2990	15.4	2230 - 3750	2080 - 3900
Selenium	138	132	27.9	93.6 - 170	91.6 - 172
Silver	110	104	27.3	70.8 - 137	87.1 - 121
Sodium	1860	1840	17.5	1310 - 2380	1170 - 2520
Strontium	581	563	14.8	465 - 660	385 - 741
Thallium	120	102	27.0	72.8 - 131	67.4 - 136

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Parameter	Total Concentration[6]	Certified Value[1]	Uncertainty[2]	QC Performance Acceptance Limits[3]	PT Performance Acceptance Limits[4]
	mg/kg	mg/kg	%	mg/kg	mg/kg
Vanadium	92.3	90.2	27.5	62.0 - 118	74.6 - 106
Zinc	946	953	10.3	754 - 1150	665 - 1240

ANALYTICAL VERIFICATION

Parameter	Certified Value[1]	Proficiency Testing Study			NIST Traceability	
		Mean	Recovery[5]	n	SRM Number	Recovery
	mg/kg	mg/kg	%			%
Aluminum	6500	6500	112	6	-	-
Antimony	194	194	84.2	7	-	-
Arsenic	167	167	87.1	12	-	-
Barium	791	791	95.6	6	-	-
Beryllium	68.8	68.8	89.3	7	-	-
Cadmium	177	177	85.5	12	-	-
Calcium	46000	46000	94.9	6	-	-
Chromium	148	148	85.8	11	-	-
Cobalt	34.3	34.3	92.1	7	-	-
Copper	822	822	89.8	10	-	-
Iron	23600	23600	98.0	5	-	-
Lead	103	103	92.4	12	-	-
Magnesium	4480	4480	98.3	5	-	-
Manganese	823	823	97.2	7	-	-
Mercury	19.0	19.0	89.3	10	-	-
Molybdenum	149	149	85.9	12	-	-
Nickel	155	155	86.4	12	-	-
Potassium	2990	2990	95.9	7	-	-
Selenium	132	132	95.4	10	-	-
Silver	104	104	94.3	7	-	-
Sodium	1840	1840	99.3	4	-	-
Strontium	563	563	96.9	4	-	-

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Parameter	Certified Value[1]	Proficiency Testing Study			NIST Traceability	
		Mean	Recovery[5]	n	SRM Number	Recovery
	mg/kg	mg/kg	%			%
Thallium	102	102	84.9	8	-	-
Vanadium	90.2	90.2	97.7	7	-	-
Zinc	953	953	101	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 **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

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Quality Officer

David Kilhefner

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