

▪ Certificate of Analysis ▪

Product: Metals in Sewage SludG™
Catalog Number: 160
Lot No. D092-160
Certificate Issue Date: March 03, 2016
Expiration Date: July 31, 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	5970	6960	2.78	5880 - 8030	3800 - 10100
Antimony	143	121	20.0	76.1 - 166	74.5 - 168
Arsenic	149	128	20.0	92.2 - 165	45.2 - 212
Barium	660	654	10.4	474 - 834	531 - 777
Beryllium	141	119	21.8	96.8 - 141	14.1 - 231
Cadmium	149	131	20.0	101 - 161	96.1 - 165
Calcium	48400	47800	1.65	37400 - 58100	36000 - 59600
Chromium	193	176	19.4	140 - 212	138 - 214
Cobalt	31.4	29.3	30.4	20.4 - 38.3	24.4 - 34.5
Copper	925	882	3.44	741 - 1020	717 - 1050
Iron	24100	24500	0.126	18600 - 30500	18800 - 30300
Lead	154	147	21.0	115 - 179	112 - 182
Magnesium	4720	4420	1.61	3640 - 5200	1870 - 6980
Manganese	516	502	10.9	386 - 617	421 - 583
Mercury	31.1	27.4	22.2	14.2 - 40.6	22.2 - 34.2
Molybdenum	102	94.5	21.7	76.0 - 113	61.0 - 128
Nickel	86.1	82.5	23.1	66.8 - 98.2	64.7 - 100
Potassium	4420	4420	12.8	3340 - 5490	2730 - 6110
Selenium	157	148	20.2	105 - 191	102 - 194
Silver	123	111	22.0	73.7 - 147	68.9 - 152
Sodium	1390	1440	10.2	1040 - 1840	1200 - 1680
Strontium	771	789	12.6	660 - 919	658 - 921
Thallium	171	158	20.2	117 - 200	122 - 195

ISO/IEC GUIDE 34:2009

ISO/IEC 17025:2005



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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	142	142	20.2	99.0 - 186	124 - 161
Zinc	878	949	4.61	765 - 1130	790 - 1070

ANALYTICAL VERIFICATION

Parameter	Certified Value ¹	Proficiency Testing Study			NIST Traceability	
		Mean	Recovery ⁵	n	SRM Number	Recovery
	mg/kg	mg/kg	%			%
Aluminum	6960	6960	116	7	-	-
Antimony	121	121	84.8	6	-	-
Arsenic	128	128	86.2	9	-	-
Barium	654	654	99.1	7	-	-
Beryllium	119	119	84.4	5	-	-
Cadmium	131	131	87.7	12	-	-
Calcium	47800	47800	98.7	7	-	-
Chromium	176	176	91.4	12	-	-
Cobalt	29.3	29.3	93.4	5	-	-
Copper	882	882	95.3	13	-	-
Iron	24500	24500	102	7	-	-
Lead	147	147	95.4	13	-	-
Magnesium	4420	4420	93.7	7	-	-
Manganese	502	502	97.2	8	-	-
Mercury	27.4	27.4	88.1	6	-	-
Molybdenum	94.5	94.5	92.6	8	-	-
Nickel	82.5	82.5	95.8	11	-	-
Potassium	4420	4420	100	6	-	-
Selenium	148	148	94.2	9	-	-
Silver	111	111	89.9	6	-	-
Sodium	1440	1440	104	6	-	-
Strontium	789	789	102	5	-	-

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Parameter	Certified Value ¹	Proficiency Testing Study		n	NIST Traceability	
		Mean	Recovery ⁵		SRM Number	Recovery
	mg/kg	mg/kg	%			%
Thallium	158	158	92.5	6	-	-
Vanadium	142	142	100	5	-	-
Zinc	949	949	108	9	-	-

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



Quality Officer

David Kilhefner

