Certified Reference Material

▪ Certificate of Analysis ▪

Product: Metals in Sewage SludG™
Catalog Number: 160
Lot No. D127-160
Certificate Issue Date: September 23, 2024
Expiration Date: April 17, 2028
Revision Number: Original

Product use instructions are included as part of the certification packet and are paginated separately from this Certificate of Analysis. Please reference the product use instructions for catalog #160 revision 090119.

CERTIFICATION

Parameter	Certified Value[1]	Uncertainty[2]	QC Performance Acceptance Limits[3]	PT Performance Acceptance Limits[4]
	mg/kg	%	mg/kg	mg/kg
Aluminum	3470	6.53	2590 - 4040	1090 - 5540
Antimony	154	13.3	90.9 - 184	100 - 174
Arsenic	138	15.6	85.8 - 148	93.5 - 152
Barium	764	3.26	541 - 957	480 - 1020
Beryllium	141	5.52	106 - 164	82.8 - 170
Cadmium	128	6.58	92.6 - 139	92.0 - 141
Calcium	37600	5.34	34300 - 49500	24300 - 47000
Chromium	140	7.43	106 - 162	106 - 162
Cobalt	17.3	4.91	13.3 - 20.9	12.0 - 22.2
Copper	818	7.15	695 - 954	642 - 1010
Iron	25200	7.17	20500 - 32100	18000 - 34600
Lead	76.5	11.0	57.1 - 91.7	50.3 - 98.5
Magnesium	3450	10.1	3050 - 4410	2200 - 4240
Manganese	515	6.30	448 - 667	423 - 692
Mercury	27.0	4.29	16.0 - 36.1	15.2 - 37.0
Molybdenum	198	6.61	143 - 222	137 - 228
Nickel	75.7	10.4	57.5 - 84.9	52.9 - 89.5
Potassium	2970	5.81	2570 - 3860	2340 - 4080
Selenium	125	9.57	87.4 - 154	85.6 - 156
Silver	104	9.07	71.0 - 134	49.4 - 156
Sodium	3610	7.52	2720 - 4480	2210 - 4840
Strontium	916	8.21	D.L. - 179	589 - 1120
Thallium	106	12.5	70.1 - 122	44.7 - 147
Vanadium	107	6.31	82.0 - 130	60.1 - 132

16341 Table Mountain Pkwy ▪ Golden, CO 80403 ▪ T: 800.372.0122 ▪ 303.431.8454 ▪ www.eraqc.com

Parameter	Certified Value[1]	Uncertainty[2]	QC Performance Acceptance Limits[3]	PT Performance Acceptance Limits[4]
	mg/kg	%	mg/kg	mg/kg
Zinc	1330	5.63	1150 - 1710	765 - 2100

ANALYTICAL VERIFICATION

Parameter	Certified Value[1]	Proficiency Testing Study			NIST Traceability	
		Mean	Recovery[5]	n	SRM Number[6]	Recovery
	mg/kg	mg/kg	%			%
Aluminum	3470	3320	95.6	7	-	-
Antimony	154	137	89.2	6	-	-
Arsenic	138	117	84.8	10	-	-
Barium	764	749	98.1	6	-	-
Beryllium	141	135	95.5	3	-	-
Cadmium	128	116	90.5	11	-	-
Calcium	37600	41900	112	4	-	-
Chromium	140	134	95.9	11	-	-
Cobalt	17.3	17.1	99.1	5	-	-
Copper	818	825	101	11	-	-
Iron	25200	26300	104	7	-	-
Lead	76.5	74.4	97.3	11	-	-
Magnesium	3450	3730	108	5	-	-
Manganese	515	557	108	7	-	-
Mercury	27.0	26.1	96.7	9	-	-
Molybdenum	198	182	92.2	7	-	-
Nickel	75.7	71.2	94.1	11	-	-
Potassium	2970	3210	108	8	-	-
Selenium	125	121	96.8	10	-	-
Silver	104	103	98.7	7	-	-
Sodium	3610	3600	99.7	3	-	-
Strontium	916	-	-	-	-	-
Thallium	106	95.9	90.5	4	-	-
Vanadium	107	106	99.0	3	-	-
Zinc	1330	1430	108	13	-	-

16341 Table Mountain Pkwy ▪ Golden, CO 80403 ▪ T: 800.372.0122 ▪ 303.431.8454 ▪ www.eraqc.com

▪ Certificate of Analysis ▪

1. The **Certified Values** are the actual gravimetric/volumetric "made-to" concentrations confirmed by ERA analytical verification. 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** represents an expanded uncertainty and approximates a 95% confidence interval. The uncertainty is based on the characterization, homogeneity and stability characteristics of the product, multiplied by a coverage factor (k=2). 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. The formula used to calculate the expanded uncertainty is:
$U_{expanded} = k * SQRT((U_{char}^2) + (U_{homogen}^2) + (ULTS^2) + (USTS^2) + (URSS^2))$

Where:

$U_{expanded}$ = Expanded uncertainty.
k = Coverage factor.
U_{char} = Combined standard uncertainty of the manufacturing and/or analytical verification assessment.
$U_{homogen}$ = Standard uncertainty of the homogeneity assessment.
ULTS = Standard uncertainty associated with long-term stability.
USTS = Standard uncertainty associated with short-term (transport) stability.
URSS = Standard uncertainty associated with repeated sampling of the product (where permitted by product use instructions).

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 certified reference material alongside USEPA and NELAC compliant PT study materials. Please note that many PT study acceptance limits are concentration dependent (some non-linearly) and therefore, the acceptance limits of this certified reference material and any PT study material may differ relative to their difference in concentrations.

5. The **PT Performance Data** include the mean value, percent recovery and number of data points reported by laboratories in our Proficiency Testing study compared to the Certified Values. In the event this lot was not used in a proficiency testing scheme, the data displayed was generated internally by ERA.

6. Where NIST Standard Reference Materials (SRMs) are available, each analyte has been analytically traced to the NIST SRM listed. **Analytical Traceability Recovery (%)** = [(% recovery ERA certified reference material)/(% recovery NIST SRM)]*100
The traceability data shown were compiled by analyzing this ERA certified reference material and/or it's associated stock solution(s) against the applicable NIST SRMs.

7. The **Reference Values** are equal to the mean recoveries for the parameters as determined in an interlaboratory round robin study. The **Reference Values** represent the expected performance for the analytes in this standard. ERA recommends using the **Reference Values** when assessing or evaluating your results.

8. **Metrological Traceability**. This certified reference material is metrologically traceable to NIST mass reference materials through an unbroken chain of comparisons.

9. For additional information on this product such as intended use, storage information, instructions for use, minimum sample size, and safety information, please refer to the Product Use Instructions provided.

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

This Certificate of Analysis is authorized by Waters ERA, Quality and Technical departments.

16341 Table Mountain Pkwy ▪ Golden, CO 80403 ▪ T: 800.372.0122 ▪ 303.431.8454 ▪ www.eraqc.com