

GAMA - lab performance check

River water Reference Material for Trace Metals SLRS-5

Element	Measured GAMA lab Agilent ICP-MS 7700 $x \pm u_m$	Certified SLRS-5 $X_a \pm U (k=2)$	Z	Z'	zeta-score
	$x \quad u_x$	$X_a \quad U_a$			
Al ppb	48.6 \pm 2.4	49.5 \pm 5	-0.4	-0.4	-0.3
Cr ppb	0.22 \pm 0.022	0.208 \pm 0.023	1.0	0.5	0.5
Mn ppb	4.2 \pm 0.21	4.33 \pm 0.18	-1.4	-0.6	-0.6
Fe ppb	91 \pm 6.4	91.2 \pm 5.8	-0.1	0.0	0.0
Ni ppb	0.44 \pm 0.035	0.476 \pm 0.064	-1.1	-1.0	-0.8
Cu ppb	17.3 \pm 1.2	17.4 \pm 1.3	-0.2	-0.1	-0.1
As ppb	0.42 \pm 0.034	0.413 \pm 0.039	0.4	0.2	0.2
Cd ppb	0.007 \pm 0.0018	0.006 \pm 0.001	1.4	0.6	0.5
Hg ppb	< 0.01				
Pb ppb	0.1 \pm 0.011	0.081 \pm 0.006	6.3	1.7	1.7
Zn ppb	0.99 \pm 0.12	0.845 \pm 0.095	3.1	1.2	1.1

x - measured value

X_a - certified value

u_x - uncertainty of the measured result

u_a - uncertainty from the certificate

$$u_a = \frac{1}{2} U_a$$

$$Z = \frac{x - X_a}{u_a} \quad Z' = \frac{x - X_a}{u_x} \quad \xi = \frac{x - X_a}{\sqrt{u_x^2 + u_a^2}}$$