

EVALUATION OF MEASUREMENT UNCERTAINTY (MU)

SGS INDUSTRIES & ENVIROMENT, ENVIRONMENTAL TESTING:

PERTH LABORATORY, WA

Evaluation of measurement uncertainty (MU) was calculated at the 95% confidence interval, coverage factor $k = 2$ using batch control sample results. The following MU values are derived from as mentioned batch control samples ranging from 10 to 100 times the limit of reporting (LOR). As analyte results decrease and approach the LOR, estimated MU will increase. At concentrations

$< 5 \times \text{LOR}$, MU will be reported as the LOR concentration. i/s indicates insufficient data for MU Evaluation.

Microbiological measurement uncertainty (MU) is evaluated by analysis of cleint unknowns and PT samples by a minimum of two analysts and calculated from the standard deviation of the reproducibility of the final results which is then used to evaluate the uncertainty associated with the method.

Last Reviewed: 01 September 2025

Method Number	Method Description	Test/Analyte	Water	Water	Soil	Air
			Relative MU % unless stated otherwise.	Relative MU % unless stated otherwise.	Relative MU % unless stated otherwise.	Relative MU % unless stated otherwise.
AN014	HCl extractable sulfur	S _{HCl}			21.1	
AN101	pH (soil, sludge, sediment, water)	pH	0.2 pH Units		0.2 pH Units	
AN106	Conductivity and TDS by Calculation	Conductivity	4.6		5.8	
AN113	Total Dissolved Solids	TDS	10.1			
AN114	Total Suspended Solids	TSS	10.0			
AN119	Turbidity	Turbidity	11.6			
AN135	Alkalinity in Aqueous Solution	Total Alkalinity	5.8			
AN140	Acidity	Acidity	10.8			
AN141	Fluoride (ion selective)	Fluoride	7.2			
AN142	Fluoride - soils	Fluoride			18.3	
AN144	Chlorine free and total DPD (colourmetric)	Chlorine - Free/Total	19.3	21.5		
AN149	Sulphide - iodometric	Sulfide, S ²⁻	15.4			
AN156	Thiocyanate	Thiocyanate	18.1			
AN176	DO meter and Winkler Titration	Dissolved Oxygen	15.6			
AN183	Biochemical Oxygen Demand	BOD	17.1			
AN184	Oil & Grease and Hydrocarbons-Water- by Soxtec Extraction	Oil & Grease	5.3			
AN185	Oil and Grease and hydrocarbons - Water - Gravimetric	Oil & Grease	20.2			

Method Number	Method Description	Test/Analyte	Water	Water	Soil	Air
			Relative MU % unless stated otherwise.	Relative MU % unless stated otherwise.	Relative MU % unless stated otherwise.	Relative MU % unless stated otherwise.
AN190	TOC by NDIR	Non Purgeable Organic Carbon	8.7			
AN192	MBAS	MBAS	12.4			
AN214	Acid Neutralising Capacity (ANC) ASS	ANC BT			7.8	
AN216	Net Acid Generation (NAG)	Net Acid Generation			15.1	
AN217	Chromium Reducible Sulphur (CRS)	Cr _s			16.4	
AN218	TPA ANC SPOCAS	TPA			17.0	
		S Pos			28.4	
		Ca P			22.4	
		Mg P			16.0	
AN219	TAA SPOCAS	TAA			13.5	
		S KCl			16.9	
		Ca KCl			19.9	
		Mg KCl			18.9	
AN226	Formaldehyde	Formaldehyde	21.7			
AN240	Redox Potential (Eh)	Redox Potential (Eh)	5.9			
AN245	IC anions	Bromide	6.5			
		Bromate	15.4			
		Chlorate	8.0			
		Chlorite	8.2			
		Iodide	10.5			
AN258	Nitrate Nitrite CFA / FIA	NO _x	7.8		11.4	
		NO ₂	11.6		13.5	
AN261	Ammonia CFA / FIA	NH ₃ -N	9.6		13.2	

Method Number	Method Description	Test/Analyte	Water	Water	Soil	Air
			Relative MU % unless stated otherwise.	Relative MU % unless stated otherwise.	Relative MU % unless stated otherwise.	Relative MU % unless stated otherwise.
AN270	Silica by DA	Reactive Silica, Si	10.6			
AN271	Ferrous Iron DA	Ferrous Iron	15.1			
AN272	COD DA	Chemical Oxygen Demand	6.4			
AN274	Chloride DA	Chloride	8.6		11.3	
AN275	Sulfate DA - Turbidimetric	Sulfate	9.5		16.7	
AN278	Reactive Phosphorus DA	FRP	8.6			
AN279	Total Phosphorus DA	Total P	15.9			
AN281	TKN DA	TKN	12.2		14.0	
AN283	Hexavalent Cr(6+) DA	Hexavalent Chromium	12.3		21.4	
AN285	Colour DA	True Colour	9.4			
AN289	Phenols - colourmetric DA	Total Phenols	19.2			
AN296	Cyanide forms by SAN++ CFA	Free CN	19.5			
		WADCN	16.7		21.3	
		Total CN	20.2		20.4	
AN311	Metals Cold Vapour - Water only - Mercury	Mercury	20.9	16.5		
AN312	Metals Cold Vapour - Soils - Mercury	Mercury			17.5	
AN318	ICP MS	ICP MS	Soluble	Total		
		Aluminium	18.1	24.3		
		Antimony	19.5	20.1		
		Arsenic	11.3	22.7		
		Barium	19.2	20.2		

Method Number	Method Description	Test/Analyte	Water	Water	Soil	Air
			Relative MU % unless stated otherwise.	Relative MU % unless stated otherwise.	Relative MU % unless stated otherwise.	Relative MU % unless stated otherwise.
		Beryllium	18	25.5		
		Bismuth	19.2	17.4		
		Boron	16.6	17.0		
		Cadmium	9.1	18.3		
		Caesium	12.2	12.1		
		Chromium	18.3	12.5		
		Cobalt	13.0	14.6		
		Copper	11.3	12.3		
		Gallium		13.9		
		Iron	14.5	19.0		
		Lead	11.5	15.9		
		Lithium	18.5	15.4		
		Manganese	10.4	14.2		
		Molybdenum	14.3	16.7		
		Nickel	12.1	12.5		
		Niobium	14.4	11.4		
		Rubidium	11.5			
		Selenium	12.6	29.1		
		Silver	32.8	40.9		
		Strontium	9.8	11.9		
		Tellurium	17.0			
		Thallium	17.6	18.2		
		Thorium	21.5	19.4		
		Tin	18.0	11.7		
		Titanium	19.0	10.2		
		Tungsten	14.5			
		Uranium	14.1	14.3		
		Vanadium	18.4	12.4		
		Zinc	19.5	19.7		
		Zirconium	26.3	22.3		
AN320	Elements ICP OES	Elements ICP OES	Soluble	Total		
		Aluminium	15.1	10.7	16.1	
		Antimony			12.5	
		Arsenic	10	16.4	13.6	

Method Number	Method Description	Test/Analyte	Water	Water	Soil	Air
			Relative MU % unless stated otherwise.	Relative MU % unless stated otherwise.	Relative MU % unless stated otherwise.	Relative MU % unless stated otherwise.
		Barium	9.9	11.7	14.5	
		Beryllium		11.3	12.4	
		Boron	10.9	18.8	13.9	
		Cadmium	12.9	12.4	11.2	
		Calcium	7.6	12.6	12.3	
		Chromium	7.5		12.9	
		Cobalt	10.5		12.6	
		Copper	9.6	15.0	12.7	
		Iron	9.7	11.2	25.6	
		Lead	10.1	14.6	16.4	
		Magnesium	6.7	12.6	15.2	
		Manganese	6.7	12	14.2	
		Molybdenum		14.4	17.7	
		Nickel	10.8	12.5	13.1	
		Potassium	4.8	15.1	7.9	
		Phosphorus	11.4		25.3	
		Selenium			23.7	
		Silicon	10.2			
		Silver		14.7	15.0	
		Sodium	6.4	10.9	12.6	
		Strontium	9.6		13.0	
		Sulfur	11.3	13.5	23.4	
		Tin		11.8	17.8	
		Titanium			17.6	
		Vanadium		13.8	11.9	
		Zinc	7.5	13.2	13.6	
AN503	Deposit Gauge Dust Deposition In-House					
		Total Solids				9.6
		Insoluble Solids				8.8
		Soluble Solids				10.9
AN738	Chlorophyll Spectrometric	Chlorophyll	14.5			