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

< 5xLOR, 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.

			Water	Water	Soil	Air
Method Number	Method Description	Test/Analyte	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}			23.2	
AN101	**pH (soil, sludge, sediment, water)**	pH	0.2 pH Units		0.2 pH Units	
AN106	**Conductivity and TDS by Calculation**	Conductivity	4.0		4.0	
AN113	**Total Dissolved Solids**	TDS	11.6			
AN114	**Total Suspended Solids**	TSS	9.9			
AN119	**Turbidity**	Turbidity	7.6			
AN135	**Alkalinity in Aqueous Solution**	Total Alkalinity	6.7			
AN140	**Acidity**	Acidity	9.6			
AN141	**Fluoride (ion selective)**	Fluoride	9.2			
AN142	**Fluoride - soils**	Fluoride			15.8	
AN144	**Chlorine free and total DPD (colourmetric)**	Chlorine - Free/Total	6.4	13.3		
AN149	**Sulphide - iodometric**	Sulfide, S^{2-}	19.6			
AN156	**Thiocyanate**	Thiocyanate	17.7			
AN176	**DO meter and Winkler Titration**	Dissolved Oxygen	11.0			
AN183	**Biochemical Oxygen Demand**	BOD	16.4			
AN184	**Oil &Grease and Hydrocarbons- Water- by Soxtec Extraction**	Oil & Grease	5.4			
AN185	**Oil and Grease and hydrocarbons - Water - Gravimetric**	Oil & Grease	16.2			
AN190	**TOC by NDIR**	Non Purgeable Organic Carbon	11.0			
AN192	**MBAS**	MBAS	9.9			
AN214	**Acid Neutralising Capacity (ANC) ASS**	ANC BT			9.5	
AN216	**Net Acid Generation (NAG)**	Net Acid Generation			14.7	
AN217	**Chromium Reducible Sulphur (CRS)**	Cr_s			16.0	
AN218	**TPA ANC SPOCAS**	TPA			17.0	
		S Pos			26.5	
		Ca P			21.6	
		Mg P			16.0	
AN219	**TAA SPOCAS**	TAA			15.9	
		S KCl			18.1	
		Ca KCl			21.5	
		Mg KCl			19.0	
AN226	**Formaldehyde**	Formaldehyde	21.7			
AN240	**Redox Potential (Eh)**	Redox Potential (Eh)	5.3			
AN245	**IC anions**	Bromide	7.7			
		Bromate	13.5			
		Chlorate	9.2			

		Chlorite	16.4			
		Iodide	11.0			
AN258	**Nitrate Nitrite CFA / FIA**	NO_x	13.4		21.3	
		NO_2	18.4		21.8	
AN261	**Ammonia CFA / FIA**	NH_3-N	14.0		15.6	
AN270	**Silica by DA**	Reactive Silica, Si	9.7			
AN271	**Ferrous Iron DA**	Ferrous Iron	14.8			
AN272	**COD DA**	Chemical Oxygen Demand	4.6			
AN274	**Chloride DA**	Chloride	7.2		8.2	
AN275	**Sulfate DA - Turbidimetric**	Sulfate	12.6		10.4	
AN278	**Reactive Phosphorus DA**	FRP	9.4			
AN279	**Total Phosphorus DA**	Total P	13.8			
AN281	**TKN DA**	TKN	14.7		12.3	
AN283	**Hexavalent Cr(6+) DA**	Hexavalent Chromium	13.5		17.7	
AN285	**Colour DA**	True Colour	9.8			
AN289	**Phenols - colourmetric DA**	Total Phenols	22.4			
AN296	**Cyanide forms by SAN++ CFA**	Free CN	20.2			
		WADCN	23.9		23.5	
		Total CN	22.6		17.6	
AN311	**Metals Cold Vapour - Water only - Mercury**	Mercury	15.6	25.2		
AN312	**Metals Cold Vapour - Soils - Mercury**	Mercury			25.9	
AN318	**ICP MS**	**ICP MS**	**Soluble**	**Total**		
		Aluminium	19.3	23.0		
		Antimony	28.6	18.5		
		Arsenic	20.5	21.8		
		Barium	19.1	21.7		
		Beryllium	19.0	11.4		
		Bismuth	24.1	15.8		
		Boron	24.1	19.0		
		Cadmium	17.0	11.9		
		Caesium	23.8	21.7		
		Chromium	17.2	15.4		
		Cobalt	16.4	11.4		
		Copper	23.1	19.7		
		Gallium	21.0	19.4		
		Iron	21.8	25.4		
		Lead	19.7	18.1		
		Lithium	23.3	16.1		
		Manganese	18.7	15.4		
		Molybdenum	14.5	11.8		

		Nickel	21.1	17.4		
		Niobium	23.6	20.8		
		Rubidium	22.5			
		Selenium	25.3	22.3		
		Silver	24.2	18.0		
		Strontium	22.5	22.7		
		Tellurium	18.2			
		Thallium	22.1	17.7		
		Thorium	36.5	29.0		
		Tin	16.6	12.8		
		Titanium	23.5	23.0		
		Tungsten	26.8			
		Uranium	21.5	20.2		
		Vanadium	19.9	12.9		
		Zinc	26.4	21.2		
		Zirconium	29.2	29.3		
AN320	**Elements ICP OES**	**Elements ICP OES**	**Soluble**	**Total**		
		Aluminium	9.5	10.6	19.8	
		Antimony			15.9	
		Arsenic	10.2	16.6	14.9	
		Barium	10.6	11.6	18.1	
		Beryllium	11.6	12.7	14.9	
		Boron	11.6	19.6	18.5	
		Cadmium	12.3	13.5	12.8	
		Calcium	11.8	12.1	13.3	
		Chromium	7.1		12.9	
		Cobalt	10.8		15.1	
		Copper	9.1	14.8	16.4	
		Iron	9.6	10.1	18.4	
		Lead	9.5	14.6	12.5	
		Magnesium	10.6	16.3	18.0	
		Manganese	8.8	12.0	15.8	
		Molybdenum	9.9	14.9	16.1	
		Nickel	8.7	12.3	15.6	
		Potassium	7.3	8.2	12.3	
		Phosphorus	12.9		27.2	
		Selenium			24.6	
		Silicon	14.6			
		Silver	15.7	15.3	15.6	
		Sodium	11.4	15.8	16.2	
		Strontium	11.2		11.5	

		Sulfur	10.0	13.9	20.2	
		Tin	11.3	13.2	18.4	
		Titanium			17.2	
		Vanadium		16.6	13.9	
		Zinc	9.0	16.5	13.9	
AN503	**Deposit Gauge Dust Deposition In House**					
		Total Solids				10.1
		Insoluble Solids				7.3
		Soluble Solids				13.9