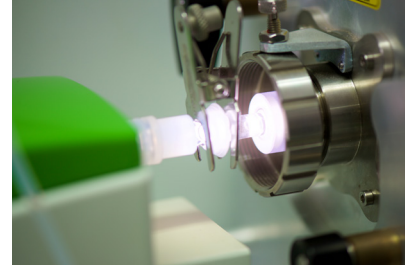


EAL Environmental Analysis Laboratory



Trace metals in seawater

EAL – Southern Cross University’s Environmental Analysis Laboratory – provides accurate results to low parts per billion (ppb) concentrations for a suite of elements in waters and seawaters.

EAL has installed a Perkin Elmer NexION 300D Inductively Coupled Plasma Mass Spectrometer (ICPMS) coupled to an ESI seaFAST sampling module. NATA accreditation is held for this analysis with detection limits and ANZECC Guidelines outlined in the table over the page.

ICPMS is a highly sensitive, accurate and robust analytical technique used for a wide variety of applications. Many laboratories face the challenge of analysing complex matrices with high Total Dissolved Solids (TDS). These cause polyatomic interferences and ionisation suppression leading to inaccurate results. To overcome these interferences EAL uses Kinetic Energy Discrimination (KED) in conjunction with a Dynamic Reaction Cell (DRC) to produce superior detection limits.

Due to the sensitivity of the ICPMS technique a number of field and laboratory practices need to be implemented. Sample bottles must be double rinsed prior to filling and contamination from hair, gloves and dust in the air should be avoided when sampling in the field. At the lab only ultra-trace acid is used to prepare standards and reagents, while the auto sampler has a perspex cover to reduce dust and foreign particles coming into contact with the samples.

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Element	LOR (µg/L) Seawater	LOR (µg/L) Freshwater	ANZECC Guidelines (µg/L) fresh water 95% trigger	ANZECC Guidelines (µg/L) marine water 95% trigger
Silver	<0.1	<0.05	0.05	1.4
Aluminium	<1	<1	ID	ID
Arsenic	<1	<0.5	24 (As III) 13 (AsV)	ID
Cadmium	<0.01	<0.01	0.2	5.5
Chromium	<0.2	<0.2	ID (Cr III) 1.0 (CrVI)	27.4 (Cr III) 4.4 (CrVI)
Copper	<0.05	<0.05	1.4	1.3
Iron	<0.1	<0.1	ID	ID
Manganese	<0.01	<0.01	1900	ID
Nickel	<0.05	<0.05	11	70
Lead	<0.01	<0.01	3.4	4.4
Selenium	<1	<1	11 (Total) ID (SeIV)	ID
Zinc	<0.1	<0.1	8.0	15
Mercury	<0.1	<0.1	0.6 (inorganic) ID (methyl)	0.4 (inorganic) ID (methyl)
Beryllium	<0.2	<0.2	ID	ID
Boron	<5	<1	370	ID
Vanadium	<0.05	<0.05	ID	100
Cobalt	<0.01	<0.01	ID	1
Strontium	<1	<0.5	ID	ID
Molybdenum	<0.1	<0.1	ID	ID
Antimony	<0.5	<0.1	ID	ID
Barium	<0.2	<0.01	ID	ID
Thallium	<0.01	<0.01	ID	ID
Bismuth	<0.05	<0.01	ID	ID
Uranium	<0.01	<0.01	ID	ID

ID: Insufficient Data