

# METALS ANALYSIS



The Australian Water Quality Centre (AWQC) is dedicated to ensuring and responding to the public health requirements relating to the provision of water and wastewater services for communities in Australia and across the world.

— Specialist water services  
Ensuring public health

#### Sampling Requirements:

- 355mL acid washed PET bottles
- Samples for Mercury analysis require 250mL acid washed glass bottles
- No air gap
- Transport & store at 40C

#### Analysing for metals in water, wastewater, saline and soil samples

##### Background

A number of metal species have potential health implications for drinking water supplies as well as toxic effects to aquatic ecosystems. The Australian Drinking Water Guidelines (ADWG) list a number of metals which have either or both a health and aesthetic limit placed on them. In addition, there are environmental guidelines published as the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. All of the metals listed in these two publications are analysed at AWQC on waters, wastewaters, saline and soil samples. Further information on these guideline publications can be found at <http://www.nhmrc.gov.au/publications/synopses/eh19syn.htm> (ADWG) and [http://www.mincos.gov.au/publications/australian\\_and\\_new\\_zealand\\_guidelines\\_for\\_fresh\\_and\\_marine\\_water\\_quality](http://www.mincos.gov.au/publications/australian_and_new_zealand_guidelines_for_fresh_and_marine_water_quality).

While measuring the total amount of a metal is frequently sufficient to compare against a guideline value, there is sometimes extra value to be gained from looking at the speciation of a metal. Metals can be present in a truly soluble form, as colloids, chelated to organic molecules or attached to particles. In certain circumstances, the bioavailability of a metal will depend on what form or species it is in eg the ADWG guideline for aluminium specifies that acid soluble aluminium is the most accurate method to determine the “available” aluminium in a drinking water sample. AWQC can analyse water samples for total, soluble (filterable through 0.45µm membranes), and acid hydrolysable and acid soluble.

### Current AWQC list and limits of reporting

AWQC has continued to improve its service by recently purchasing two Inductively Coupled Plasma – Mass Spectrometer (ICP-MS, 7500cx) instruments from Agilent. These instruments are capable of faster processing times and lower limits of reporting compared to the older ICP-OES and AAS instruments. The current list of metals and their associated Limits of Reporting (LOR) are listed below.

Limits of Reporting (LOR) are based on the limit of quantitation (LOQ) which is derived from an estimation of the Instrument Detection Limit (IDL) and Method Detection Limit (MDL) using the procedure in NATA Technical Note 17 (as modified 01 April 2009).

Metal	LOR (mg/L) clean waters	LOR (mg/L) saline waters	LOR (mg/kg) soils (dry wt)
Aluminium (Al)	0.001	0.01	1
Antimony (Sb)	0.0005	0.005	n/a
Arsenic (As)	0.0003	0.003	1
Barium (Ba)	0.0005	0.005	0.5
Beryllium (Be)	0.0003	0.003	0.5
Boron (B)	0.02	0.2	5
Cadmium (Cd)	0.0001	0.001	0.5
Calcium (Ca)	0.04	0.4	10
Chromium (Cr)	0.0001	0.001	0.1
Cobalt (Co)	0.0001	0.001	0.5
Copper (Cu)	0.0001	0.001	0.5
Iron (Fe)	0.0005	0.005	0.5
Lanthanum (La)	0.0001	0.001	n/a
Lead (Pb)	0.0001	0.001	1
Lithium (Li)	0.0003	0.003	1
Manganese (Mn)	0.0001	0.001	0.1
Magnesium (Mg)	0.04	0.4	5
Mercury (Hg)	0.00003	0.0003	0.3
Molybdenum (Mo)	0.0001	0.001	n/a
Nickel (Ni)	0.0001	0.001	0.5
Potassium (K)	0.04	0.4	5
Selenium (Se)	0.0001	0.001	1
Silicon (Si)	1.0	1.0	100
Silver (Ag)	0.00003	0.0003	2
Sodium (Na)	0.04	0.4	10
Strontium (Sr)	0.0001	0.001	0.5
Thallium (Tl)	0.0001	0.001	n/a
Tin (Sn)	0.0005	0.005	1
Titanium (Ti)	0.0003	0.003	0.5
Uranium (U)	0.0001	0.001	n/a
Vanadium (V)	0.0001	0.001	0.5
Zinc (Zn)	0.0003	0.003	0.5

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