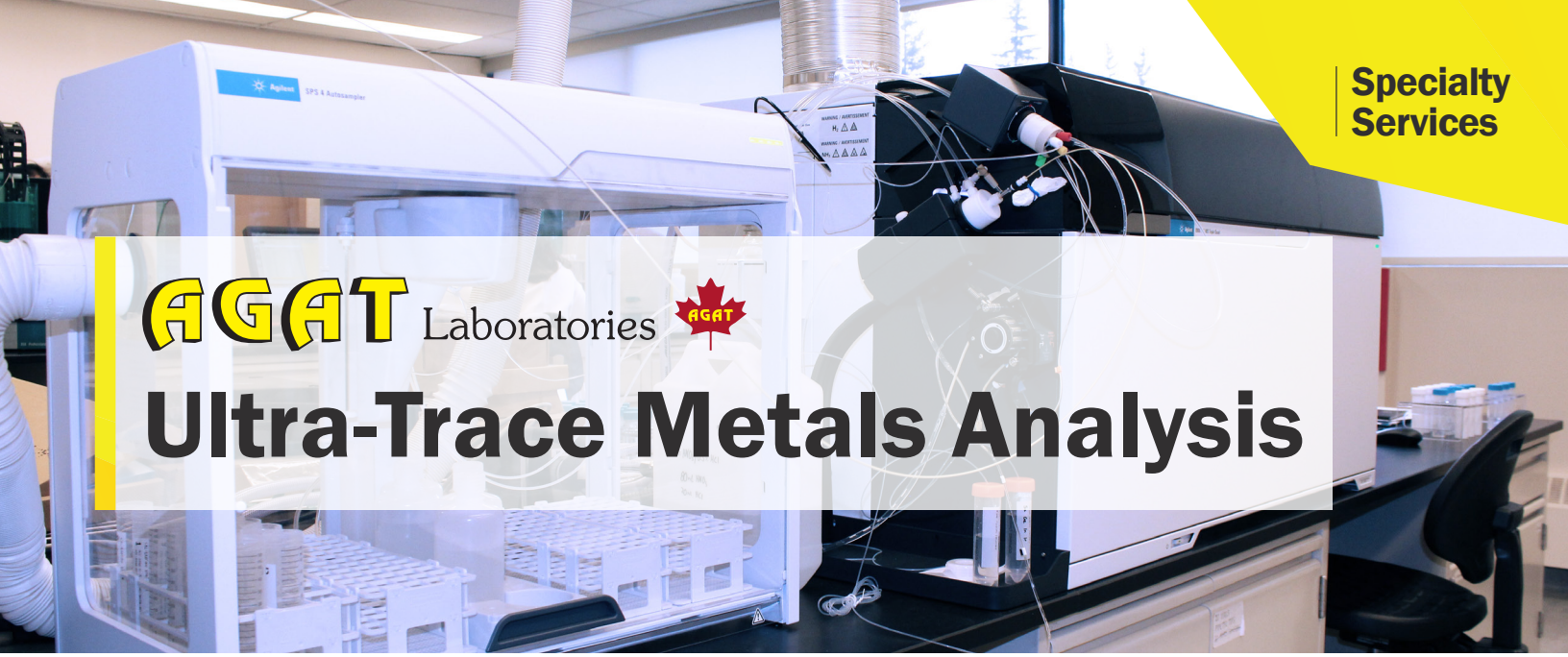


Specialty Services

AGAT Laboratories

Ultra-Trace Metals Analysis

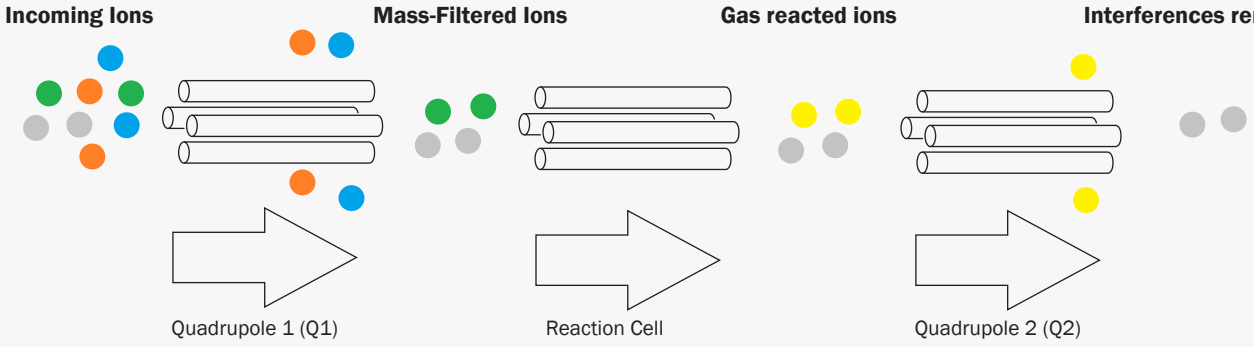
Whether it's due to acute toxicity or bioaccumulation over time, the presence of dissolved metals in natural water systems has the potential to be harmful to ecosystems and humans alike. The general toxicity and the rate of uptake or absorption by different organisms of various compounds depends not only on which elements are present and their concentration, but also the form or species of the element.

In response to the latest science, many regulatory bodies have imposed very low guidance values on metals in bodies of water, particularly in more remote areas with lower natural background levels due to fewer anthropogenic activities. In order to accurately and reliably measure and report these lower values, both state of the art instrumentation and clean handling procedures are critical.

AGAT has established its ultra-trace inorganics laboratory with the ability to analyze not only the parent elements at exceptionally low levels, but also speciation of the various more toxic forms of the elements such as Se, As, Pb, Cr.

By using online hyphenation of a High Performance Liquid Chromatography system to achieve separation of the various element's species and a triple quadrupole ICP-MS equipped with an HMI (High Matrix Introduction) as the detection system, AGAT is set up for not only low-level elements analysis and speciation in fresh water, but also in a range of difficult matrices, such as seawater/ brackish waters with high levels of interference.

Basic Schematic of a Triple Quadrupole System



Q1 = this quadrupole acts as a mass filter to remove non-target elements and isotopes.
Reaction Cell = the remaining ions react within an octopole with specific gases to create ions with a changed mass. If oxygen was the reaction gas, then the ion/isotope would gain an additional 16 AMU's.
Q2 = the second quadrupole acts as a second mass filter before reaching the Electron Multiplier Detector. By using the reaction cell, this allows for the new mass sets to be filtered apart and full removal of interfering ions to happen.

Reportable Detection Limits of ICP-MS/QQQ (µg/L)

Analyte	Dissolved	Total	Standard ICPMS Total
Aluminum	0.2	0.7	4
Antimony	0.005	0.02	1
Arsenic	0.02	0.02	1
Barium	0.02	0.02	50
Beryllium	0.002	0.01	0.5
Bismuth	0.001	0.01	1
Boron	5	5	10
Cadmium	0.005	0.005	0.016
Calcium	20	20	-
Cesium	0.005	0.01	-
Chromium	0.05	0.1	0.5
Cobalt	0.005	0.005	0.9
Copper	0.05	0.1	0.8
Gallium	0.05	0.05	0.1
Iron	1	1	-
Lead	0.005	0.01	-
Lithium	0.2	0.2	1
Magnesium	5	5	-
Manganese	0.005	0.05	5
Molybdenum	0.01	0.05	1
Nickel	0.05	0.05	3

Analyte	Dissolved	Total	Standard ICPMS Total
Phosphorus	0.5	0.5	-
Potassium	50	50	-
Rubidium	0.05	0.05	-
Selenium	0.04	0.04	0.5
Silicon	1	5	32
Silver	0.005	0.005	0.05
Sodium	20	20	-
Strontium	0.02	0.05	0
Sulfur	2	2	-
Tellurium	0.05	0.05	-
Thallium	0.001	0.01	0.05
Thorium	0.005	0.02	-
Tin	0.01	0.1	0.02
Titanium	0.05	0.3	1
Tungsten	0.05	0.5	-
Uranium	0.001	0.003	1
Vanadium	0.01	0.05	1
Yttrium	0.002	0.01	1
Zinc	0.1	0.5	10
Zirconium	0.01	0.06	-

The AGAT Advantage

When dealing with a wholly-owned Canadian company our clients benefit in many ways; our clients are able to communicate directly with both the project management team as well as the subject matter experts who can provide advice on site-specific or project-specific requirements for the next sampling project. This allows AGAT to provide customized bottle orders with pre-cleaned containers specifically prepared for low-level sampling, apply an approach that will work for your sample type, and achieve the detection limits that you're trying to hit.

By working with our clients in this way, AGAT can assist making sure the field program is run efficiently and effectively.

When you work with AGAT, you work with a company that gives back to Canadian communities. The AGAT Foundation has been providing to multiple charities throughout the pandemic.

See our **YouTube Channel** for more information.