

5 Reasons Why You May Want to Choose *ICP-MS over Standard ICP?

1. **Incredibly low detection limits!**

When ppt limits for metals in waters and sub ppb limits for soils are a requirement for your projects, Torrent believes ICP-MS is the clear choice.

High number of ions and very low background results in extremely low initial Detection limits

2. **Very low spectral interference** – like ICP, ICP-MS uses plasma to dissociate the sample into the atoms but doesn't rely only on light emission for identification.

ICP-MS detects the ions themselves not just the wavelength the ions occupy resulting in immediate element confirmation.

No dilutions to remove spectral interferences from elements of non interest are required which keeps the “not detected” limit extremely low.

3. **Little to no chemical interference** – ICP-MS uses a collision/reaction cell which removes interfering ions through ion/neutral reactions

With ICP-MS false positives are highly unlikely and false negatives nearly impossible

4. **Reliability for the low level detection of “problem” metals in soil is vastly enhanced-** Normal RPD for low level concentrations of metals in soils by ICP and

GFAA have been as great as 30% but analysis by ICP-MS dramatically reduces the typical RPDs especially for traditionally difficult elements such as ***Arsenic, Thallium, Selenium and Antimony.***

ICP-MS % RPDs are in the 2 – 5% range for soils and in the 0.1 – 2% range for Waters

5. **Expanded list of reportable elements**-Typical reportable elements for ICP-AES are between 36 - 73 elements while ICP-MS is capable of providing a standard list of up to 82 elements

-Mercury can be run by ICP-MS eliminating the necessity and extra cost for standard CVAA analysis

-Due to the many different internal standards available for ICP-MS, elements such as Carbon, Phosphorus, Sulfur, Uranium and many other less common elements can be easily detected and reported.

*Torrent has been ICP-MS certified by CA ELAP for soil and water (including drinking water) since 2008, and in January 2014 by DoD /NELAC (Air Force, Army and Navy) for metals in soil and water.

Summary of ICP-MS vs. GFAA and standard ICP-AES

	GFAA	ICP-AES	ICP-MS
Detection Limits	Most ppb, some ppt	Most ppb, some ppm	Most ppt, some ppb
Dynamic Range	1000	10000	10000000
Precision (typical)	10– 20% Avg (soil – but some up to 30%) 0.5 -5% (water)	5 – 10% Avg (soil – but some up to 30%) 0.1-2% (water)	2 – 5% Avg (soil – but some up to 30%) 0.5 -2% (water)
Throughput	3-4 minutes per element	1-73 element per min	82 element in <1 min
Interferences – Spectral Chemical Physical	Very Few Many Very Few	Many Few Few	Very Few Very Few Very Few
Applicable Elements	50+	73	82
Isotopic Analysis	No	No	Yes
Cost per elemental analysis	High	Low-Medium	Low-Medium
Speciation Ability	No	No	Yes

Bonus Reason to consider using ICP-MS – Metal Speciation

In the near future, Torrent hopes to offer metal speciation which can be accomplished by ICP-MS in tandem with several IC technologies. Below are just a few examples of the benefits of speciation.

- **Arsenic's** six common species can be separated and quantitated – a growing trend due to recent studies indicating the risk of cancer from arsenic ingestion is higher than originally thought. Speciation of inorganic and organic forms of arsenic in our food and water supply will become more and more critical.
- **Chromium** speciation - hexavalent chromium will no longer need to be determined in a separate analysis and will not be subject to the short holding time requirements now in place
- **Selenium** – As more and more selenium is introduced into the environment just knowing whether selenium is present is no longer sufficient. The species of selenium is critical in determining if it is in a benign form or a toxic form.



- **Mercury** poisoning continues to severely impact our food and water supply. While all forms of mercury are toxic, the speciation between inorganic and organic mercury has become more and more essential in developing remediation plans in the environmental and human health sectors.