CONTROLLING BACKGROUND EQUIVALENT CONCENTRATIONS IN INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY (ICP-MS) AS A MEANS OF ACHIEVING LOW QUANTIFICATION LIMITS IN REAL SAMPLES.

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Inductively Coupled Plasma Mass Spectrometry (ICP-MS) is generally recognised as a means of making ultra-trace measurements of elements. The technique can provide laboratories with a relatively simple and cost-effective means of quantifying elements at single figure, or even sub- ppt (ngL^{-1}) levels.

There are, however, barriers to achieving this level of quantification for many elements. Even small amounts of background "noise" can compromise low-level quantification. A useful measure of "noise" is the Background Equivalent Concentration (BEC). BEC is simply the background signal represented as an equivalent concentration and provides an excellent means of gauging the true magnitude of "noise". BEC is used extensively by analysts in the semiconductor and ultra pure chemical industries as an important criterion for instrument performance.

The single biggest factor that must be overcome is contamination of acids, solvents and vessels used during sample preparation, because even traces can compromise the minimum detectable level of an isotope. Good laboratory practice is an absolute prerequisite for ultra-trace measurements.

Other factors influence the quantification at low levels, include molecular species, residual quantities of analyte in the sampling system (so called "memory effects") and random background. All combine to produce high BECs that, in turn, compromise quantification limits.

The presentation will review the various means of controlling, minimising and eliminating background. This will include details for a collision/reaction system. We will compare results with a ShieldTorch/Cool Plasma for the management of molecular species. Also, a novel ion acceleration design will be introduced, that significantly limits the BEC attributed to easily ionised elements that can persist at relatively high levels. Ion beam modelling will be used to highlight our proposed mechanism for the production of these species.

All data will be highlighted with applications examples and will include figures of merit that illustrate the various aspects of "noise" control as discussed.