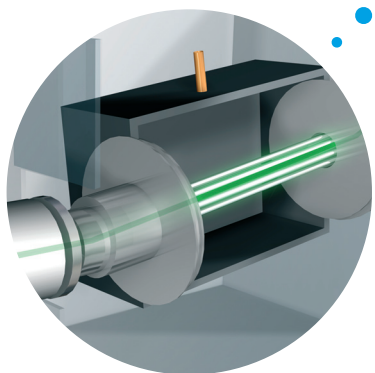


Agilent ICP-MS Journal

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Agilent Technologies

ICP-MS Analysis of Trace Selenium in the Great Salt Lake

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Introduction

As part of the effort to preserve the water quality of one of the Western Hemisphere's most important migratory bird habitats – the Great Salt Lake (GSL) in Utah – the GSL Water Quality Steering Committee [1] was established to recommend numeric water quality standards for some metals in the open waters of the lake [2]. The initial plan calls for recommendation of numeric water quality standards for selenium in the Great Salt Lake by the Utah Department of Environmental Quality (DEQ) to the USEPA by the end of 2007. Critical to determining baseline data for Se in the lake is the validation of a reliable analytical method.

Method Criteria

To meet the needs of the study, the successful analytical method must meet several requirements:

- High sensitivity must be achieved (due to required minimum detectable limit (MDL) of <0.5 ppb in the undiluted sample).
- Analysis must be performed with minimum sample dilution in order to retain sensitivity.
- The method must tolerate high total dissolved salt concentrations with minimum signal suppression and minimum signal drift.
- Method must avoid significant spectral interferences on at least one Se isotope.
- Method must be simple and reliable.

Because of the requirement for the lowest possible detection limit (<0.5 ppb), only sensitive techniques such as hydride generation atomic absorption (HGAA), graphite furnace atomic absorption (GFAA) or ICP-mass spectrometry (ICP-MS) were considered.

Technique		% Recovery [Accuracy]	Std Dev / Mean [CV]
		Accuracy	Precision
ORS-ICP-MS	Average	94.9%	19.4%
	1 meter	95%	18.6%
	7 meter	95%	20.1%
Non-cell ICP-MS	Average	2950%	29.4%
	1 meter	481%	24.2%
	7 meter	5420%	33.8%
DRC-ICP-MS measuring m/z 94	Average	558%	26.3%
	1 meter	478%	26.8%
	7 meter	637%	25.9%
DRC-ICP-MS measuring m/z 96	Average	781%	32%
	1 meter	631%	43.8%
	7 meter	931%	18.3%
DRC-ICP-MS	Average	250%	330%
	1 meter	191%	281%
	7 meter	320%	388%
Hydride AA (reference method)	Average	91%	7.9%
	1 meter	105%	1.5%
	7 meter	77%	12.7%

Table 1. Summary of ICP-MS results from round-robin study

Round-Robin Study

As part of the method selection process, a recent round-robin study among seven laboratories was conducted by the Utah Division of Water Quality to compare ambient level Se measurements and low-level spike recoveries of Se in GSL waters using multiple techniques.

In addition to traditional GFAA and HGAA techniques, both conventional (non-cell) and passive and dynamic collision/reaction cell ICP-MS instruments were evaluated. Collision/reaction cell ICP-MS was considered due to its ability to remove polyatomic interferences in complex matrices such as GSL waters.

Sample Collection and Preservation

Two samples (1-m and 7-m deep) were collected from a single location near the middle of the south arm of the lake. In addition to native Great Salt Lake water, triplicate spikes were prepared. Sample identification numbers were applied randomly to all sample replicates and distributed "blind" to participating laboratories. A total of 36 samples were submitted to each participating laboratory for analysis. Each laboratory was free to choose the analytical technique, depending upon their proficiency and available instrumentation.

In all cases, standard analytical methods were employed. Analytical techniques included HGAA (EPA 270.3) GFAA (EPA 200.12), conventional (non-cell) ICP-MS (EPA 200.8 – Agilent 7500a) dynamic reaction cell (DRC) ICP-MS (EPA-200.8 modified – PerkinElmer Elan DRC II), and octopole reaction cell ICP-MS (EPA 200.8 modified – Agilent 7500ce).

Although all the techniques employed are commonly used for analysis of selenium in various environmental samples, Great Salt Lake water presented a significant challenge to most. Because of the very high level of dissolved solids, both spectral and nonspectral interferences were evident for all techniques evaluated. The levels of interferences ranged from slight to severe.

The final round-robin results for all participating laboratories using ICP-MS are presented in Table 1. Two techniques, hydride AA and octopole reaction cell ICP-MS provided sufficiently accurate and precise results. The remaining techniques, GFAA, DRC ICP-MS, and conventional (noncell) ICP-MS, showed significant positive bias and yielded unusable results. GFAA is known to suffer from interferences from chlorides and sulfates, which can be mitigated by the addition of nickel nitrate, but not eliminated. In the case of Great

Salt Lake waters, the Cl and SO₄ concentrations are too high. Similarly, conventional ICP-MS suffers from too many polyatomic interferences to measure selenium in high Cl, high Br matrices. The DRC ICP-MS situation is a bit different. Like the octopole reaction cell instrument, the DRC ICP-MS system uses a collision/reaction cell to remove polyatomic interferences before they enter the mass spectrometer and are measured. Typically, reactive gases are used with the goal of separating the analyte from the interferant by shifting either the mass of the polyatomic interference or the analyte to a new mass via ion-molecule reaction. In this case, oxygen was used as the reaction gas. Oxygen readily combines with Se⁺ to form SeO⁺, effectively shifting the Se signal away from the Ar²⁺ interferences at m/z 78 and 80. The resulting analyte signal is measured at m/z 94 (⁷⁸Se¹⁶O⁺), and m/z 96 (⁸⁰Se¹⁶O⁺). However, the very large positive bias in the results, approximately 500–800%, suggests the presence of large, unknown interferences at the new masses. Furthermore, very specific reaction chemistry, such as that used in both DRC ICP-MS and hydride AA, limits the scope of the analysis to only a few related analytes.

Conversely, octopole reaction cell ICP-MS uses simple, universal conditions to remove polyatomic interferences generically while maintaining the analyte (in this case, selenium) at its actual mass. Therefore, the use of octopole reaction cell ICP-MS presents the advantage over hydride AA of being able to simultaneously measure other trace elements in addition to selenium in saline samples. This will prove useful as the characterization of the Great Salt Lake progresses to other analytes.

Overall, octopole reaction cell ICP-MS was chosen for continued work because of its sensitivity, lack of bias, multielement capability, and ease of use.

Determining Sensitivity

The 7500ce ICP-MS system was operated in hydrogen mode in order to effectively remove argon-based polyatomic interferences on ⁷⁸Se. The typical response for ⁷⁸Se on the ORS ICP-MS system in H₂ reaction

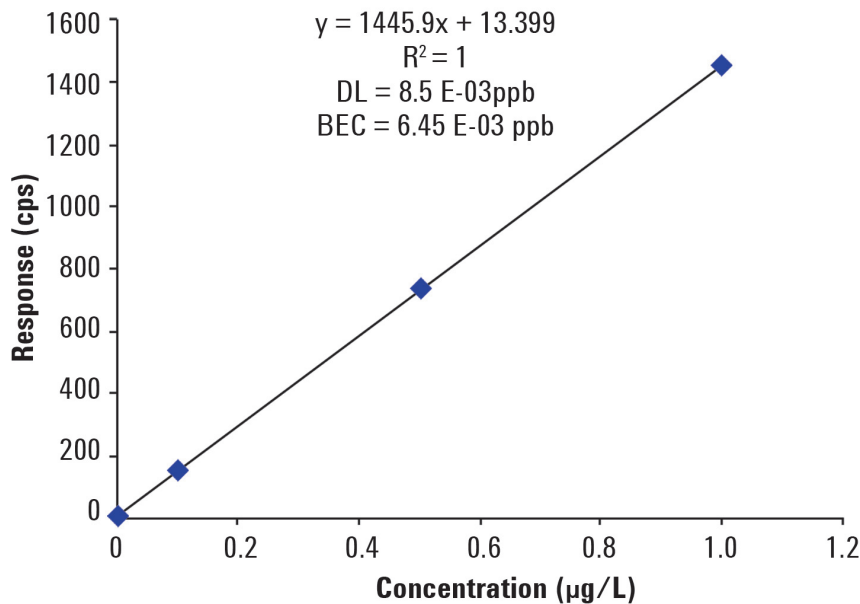


Figure 1. Se calibration at 0.1, 0.5, and 1 µg/L using mass 78. BEC = 0.0065 ppb, DL = 0.0085 ppb.

mode is ~ 1500 cps/µg/L. This allows linear calibrations from 0.1 to 1 ppb and a calculated detection limit of less than 10 ppt with a background equivalent concentration (BEC) of 6.45 ppt (Figure 1).

Conclusions

Because of the high levels of dissolved salts in Great Salt Lake water, most conventional techniques for the analysis of selenium in waters are inappropriate, resulting in significant positive bias. Of the techniques evaluated, including GFAA, conventional ICP-MS (no collision/reaction cell), DRC ICP-MS, hydride AA, and ORS-ICP-MS, only hydride AA and ORS-ICP-MS were able to provide consistent and presumably accurate measurement of selenium from ambient levels to samples spiked as high as 85 ppb.

ORS-ICP-MS provides the added benefits of simple sample preparation, high sample throughput, and capability for simultaneous multi-element analysis. As such, the Utah Division of Water Quality have recommended that USEPA begin the process of certifying ORS-ICP-MS as an available method for selenium analysis in hypersaline samples such as the Great Salt Lake.

References

1. http://www.deq.utah.gov/issues/GSL_WQSC/
2. <http://nature.org/wherewework/northamerica/states/utah/science/art14352.html>

User Profile – Upgrading an Agilent 7500i to a 7500ce

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The Analytical Services Laboratory of the Wyoming Department of Agriculture is located in Laramie, Wyoming. The laboratory is composed of chemical and bacteriological sections and handles a broad range of sample types including water, dairy products, animal feeds and forage, fertilizers, petroleum products and natural gas, anti-freeze, pesticide and herbicide formulations and residues in water, plants and soils. Water samples alone cover a broad range of composition and include laboratory deionized, reverse osmosis and distilled water, bottled and drinking water, surface and ground waters, irrigation and stock waters, and wastewaters.

The basic cations and metals analyses were performed using a combination of sequential ICP-OES and atomic absorption techniques including flame, graphite furnace, cold vapor and hydride generation. These methods provide the flexibility to meet many of our clients needs, but they tend to be labor intensive and costly both in terms of time and resources because only one analyte may be run at a time. We lacked the ability to simultaneously scan a broad range of potential constituents. This limited our ability to meet part of the stated mission of the laboratory, to promote the health and economic well-being of the citizens of Wyoming.

The Decision for ICP-MS

By 2000 – 2001 the laboratory was facing an increasing need to more efficiently analyze samples. For our metals work we had long considered simultaneous ICP-OES, but ICP-MS was also an intriguing possibility. Our choice of technique and instrumentation rested on several considerations:

- Ability to meet current and future analytical needs and workloads



Agilent 7500 with ORS upgrade in labs at Wyoming Dept. of Agriculture

- Method requirements of USEPA, USFDA and other regulators
- Reliability
- Price
- Ease of regular maintenance
- Proximity of technical support and the cost of maintenance agreements
- Cost of expendable items (e.g. gas consumption, torches, spray chambers, nebulizers, cones, etc.)
- Length and steepness of the learning curve for both the hardware and software
- Ability to upgrade the existing instrument to new technology
- Animal and plant tissues
- Animal feed supplements
- Paint chips, milk and dry milk
- Soils, stream and lake sediments
- A variety of suspect foodstuffs

It seemed that ICP-MS in general and the Agilent 7500i in particular met all these criteria. The 7500i was a non-octopole reaction system (ORS) instrument designed primarily for environmental work and included an ISIS auto-dilution system. The initial installation of our 7500i occurred in January, 2002. It was brought into full operation following onsite training in February, 2002. During the next couple of months we continued to analyze water samples by the older methods as well as by ICP-MS until we were confident of both the instrument and our ability to reliably handle the isobaric and polyatomic interferences that can limit the application of the method. For the next four years we used the instrument in this configuration. The reliability of the instrument and the productivity increases, while expected, still amazed.

Used in combination with closed-vessel microwave digestion we were able to apply the method to an increasing list of sample types including:

Surface and ground waters continue to compose the major portion of our routine sample load. Some of these waters can have very high concentrations of carbonates, bicarbonates, chlorides and sulfates all of which can create significant polyatomic interferences at masses of interest. Taken in combination with the variety of sample types, we saw a need to better deal with potential interferences and reduce the dependence on interference equations. Upgrading our 7500i to an ORS equipped instrument – making it the equivalent of a newer 7500ce – seemed a practical next step to meet our evolving needs.

Upgrading to the ORS

The upgrade was installed in January, 2006 and involved a major renovation of the instrument including hardware and software upgrades. The precision of the workmanship of the new and replacement parts was remarkable. Everything seemed to fit perfectly. The ISIS auto-dilution system was retained as a component of the system. Following two days of onsite training we were back in business running samples. Two weeks later we successfully ran a USEPA proficiency testing sample in both ORS and non-ORS modes with no need for reruns.

Final Changes

A drawback of this configuration

was that the ISIS used a lot of sample, diluent and rinsing solution. We wanted to be able to analyze limited volume samples without dilution while retaining the flexibility that we had with the original and upgraded configurations. These aims were met and our instrument reached its current configuration by disconnecting the ISIS, upgrading the software and extending the calibration range of calcium, sodium, magnesium, silicon, strontium and barium using the He (collision) mode of the ORS. We currently cannot use this approach with USEPA regulated drinking waters, but this is seldom a problem with this type of sample.

These changes had some unexpected consequences. The sample consumption was reduced from approximately 7 mL with the ISIS to less than 1 mL without the ISIS. Not only did this help with running limited volume samples, but it also helped us significantly reduce our waste stream, consequently reducing the cost of waste disposal and making our operation safer. Because of the reduced rinsing times, the time to run a sample has been significantly reduced.

Daily Operation

The ORS instrument is tuned (or the tune is checked) each day of use with an aqueous solution of ⁷Li, ⁵⁹Co, ⁸⁹Y, ¹⁴⁰Ce and ²⁰⁵Tl all at 10 ug/L concentration. The matrix of this tuning solution is typically 1% HNO₃ and 1% HCl. In non-gas mode, sensitivity for ⁷Li, ⁸⁹Y, and ²⁰⁵Tl is typically 20,000, 70,000 and 60,000 counts per second (cps) respectively. The ratio 156/140 representing CeO/Ce is tuned to approximately 1% or less. The ratio 70/140 representing Ce²⁺/Ce is maintained below 3%.

In Helium collision mode, masses 51, 52, 59 and 75 are monitored. He flow to the cell is set at 4.5 mL/min during tuning and analysis. Mass 75 (⁷⁵As, ⁴⁰Ar³⁵Cl, ⁴⁰Ca³⁵Cl, ³⁸Ar³⁷Cl, ⁵⁹Co¹⁶O, ³⁶Ar³⁸Ar¹H, ³⁹K³⁶Ar, ²³Na¹²C⁴⁰Ar) is the main focus of attention and is tuned to obtain <10cps (usually 5-7 cps). Mass 51 (⁵¹V, ³⁵Cl¹⁶O) and mass 52 (⁵²Cr, ³⁶Ar¹⁶O, ³⁵Cl¹⁷O, ¹⁵N³⁷Cl, ³⁵Cl¹⁶O¹H, ³⁸Ar¹⁴N, ³⁶Ar¹⁵N¹H, ³⁴S¹⁸O, ³⁶S¹⁶O) are tuned to obtain <20 cps (usually ~15cps). Mass 59 (⁵⁹Co) is maximized at >5000 cps (typically ~6000 cps). This tuning

yields 400-500 cps for a 1ug/L As standard (mass 75) and 3000-4000 cps for 1 ug/L standards of both V and Cr (masses 51 and 52 respectively) during calibration and analysis. Keeping in mind that the tuning solution contains 1% HCl, achieving these excellent sensitivities during tuning indicates that the ORS in He mode is practically eliminating potential Cl based interferences while maintaining excellent response during calibration and analysis.

In Hydrogen reaction mode, masses 56, 59, and 78 are monitored. H₂ flow to the cell is set at 4 mL/min during tuning and analysis. Mass 78 (⁷⁸Se, ³⁸Ar⁴⁰Ar, ⁴⁰Ca³⁸Ar, ⁴³Ca³⁵Cl) is the main focus of attention and is tuned to less than 10 cps (usually ~1cps). Mass 59 is again maximized at a value >5000 cps (usually ~10,000 cps). This tuning yields ~1000 cps for a 1ug/L Se standard (mass 78) during calibration and analysis.

Once stabilized – about 15 minutes to get the spray chamber cooled to 2°C – tuning in the non-gas mode can take less than 5 minutes. Add another 5 minutes or less to do a pulse/analog tune and we are ready to run samples. Time spent tuning using the ORS in both He- and H₂-modes was reduced from about 30 minutes to less than 15 minutes. These time savings are primarily due to changes in the tuning pages of the newest version of the ICP-MS ChemStation software (B.03.03) which allow the user to select tuning parameters that are used in all three modes of operation.

Interference Correction Equations

The ORS has not eliminated the need for correction equations, but greatly reduced their use. Collision mode (He-mode) primarily removes polyatomic interferences by kinetic energy discrimination (KED) but not isobaric interferences or interferences from doubly charged ions.

We have successfully used H₂ reaction mode to eliminate the isobaric interferences of Ar on Ca at mass 40 and of the N dimer on Si at mass 28. Polyatomic interferences at the 56 mass (⁵⁶Fe, ⁴⁰Ar¹⁶O, ⁴⁰Ca¹⁶O) and the 78 mass are also eliminated using this mode.

There is still a need for interference

corrections at masses where isobaric overlap can occur (e.g. ¹¹⁵Sn on ¹¹⁵In), interference from doubly charged ions (e.g. ⁴³Ca and ⁴⁴Ca from ⁸⁶Sr and ⁸⁸Sr respectively) and when isotopes have nearly equal abundance (e.g. summation of ²⁰⁶Pb, ²⁰⁷Pb, and ²⁰⁸Pb). With these considerations we have reduced our use of interference equations from 13 in our basic non-ORS method currently used for USEPA regulated drinking water analyses to 5 in the equivalent ORS method.

The Bottom Line

Our aim continues to be achieving lower method detection limits (MDL) while applying a robust method that can handle the many types of samples we analyze. Table 1 contains a list of analytes and MDLs obtained for acidified water matrices with the ORS in the most recent configuration of our 7500 (without the ISIS). The calibration ranges used for this method include:

- Ca, Na - 0.1 to 200 mg/L
- Mg - 0.1 to 50 mg/L
- K - 0.1 to 20 mg/L
- Si - 0.010 to 10 mg/L
- Fe - 0.020 to 5 mg/L
- Sr, Ba - 1 to 2000 ug/L
- Trace metals - 1 to 200 ug/L
- Hg - 0.050 to 1 ug/L

Element	Conc (ug/L)	Element	Conc (ug/L)
Ca	4	Pb	0.03
Mg	3	Li	0.09
Na	3	Mn	0.05
K	4	Hg	0.002
Al	0.2	Mo	0.06
Sb	0.05	Ni	0.03
As	0.05	Se	0.03
Ba	0.03	Si	0.7
Be	0.03	Ag	0.03
B	0.3	Sr	0.03
Cd	0.04	Tl	0.05
Cr	0.02	Th	0.04
Co	0.02	U	0.03
Cu	0.03	V	0.03
Fe	0.6	Zn	0.06

Table 1. ICP-MS (ORS) Method Detection Limits (MDL).

Conclusions

Adding ICP-MS to our analytical tool box and upgrading to ORS capability has allowed us to make our laboratory operations more efficient, safer and more environmentally sound while improving the quality of our data and speeding the time of analysis.

7500ce ICP-MS: Isotope Dilution Applications using Custom Databases

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The ChemStation software on the Agilent 7500 ICP-MS contains a very useful tool, the 'custom database', which we have utilized to help with some complex isotope dilution mass spectrometry (IDMS) uncertainty calculations.

IDMS is used for high accuracy quantitative analysis in a variety of matrices, where an accurate uncertainty statement is required. This may be for a number of reasons, such as:

- Reference material characterization¹
- Participation in international inter-laboratory comparisons²
- Provision of reference values for Proficiency testing (PT) schemes methodology

The approach frequently adopted at LGC is an exact matching double IDMS procedure.³ The mass fraction of the analyte is calculated according to the following equation;

$$C'_X = C_Z \cdot \frac{m_Y}{m_X} \cdot \frac{m_{Zc}}{m_{Yc}} \cdot \frac{R_Y - R'_B \cdot \frac{R_{Bc}}{R'_{Bc}}}{R'_B \cdot \frac{R_{Bc}}{R'_{Bc}} - R_X} \cdot \frac{R_{Bc} - R_Z \cdot \frac{\sum R_{iX}}{\sum R_{iZ}}}{R_Y - R_{Bc} \cdot \frac{\sum R_{iX}}{\sum R_{iZ}}}$$

Where,

C'_X = mass fraction of analyte in sample X

C_Z = mass fraction of analyte in primary standard Z

m_Y = mass of spike Y added to sample X to prepare the sample blend B (B=X+Y)

m_X = mass of sample X added to the spike Y to prepare the blend B

m_{Zc} = mass of primary standard solution Z added to the spike Y to

make the calibration blend Bc (Bc=Y+Z)
 m_{Yc} = mass of spike Y added to the primary standard solution Z to make the calibration blend Bc

R'_B = measured isotope ratio of the sample blend B

R'_{Bc} = measured isotope ratio of the calibration blend Bc

R_{Bc} = gravimetric value of the isotope ratio of calibration blend Bc

R_x = isotope amount ratio of primary standard Z (IUPAC value)

R_y = isotope ratio of spike material Y (certificate value)

$\sum R_{iX}$ = sum of all isotope ratios in the sample X

$\sum R_{iZ}$ = sum of all isotope ratios in the primary standard Z.

Calculation of the uncertainty involves combining the uncertainty associated with each component of the equation in accordance with Guide to the Expression of Uncertainty in Measurement (GUM) guidelines.⁴ Many of these uncertainty contributions can be calculated from 'non-measurement' (or Type B) data. For example, information detailed on the certificate of the isotopically enriched spike is used to derive the uncertainty associated with the isotope ratio of the spike solution.

An important and often major contributor to the standard uncertainty of a single measurement is the uncertainty of the measured isotope ratio of the sample and calibration blends (R'_B and R'_{Bc}). In order to calculate these uncertainty contributions it is necessary to obtain the %RSD of the measured isotope ratio for each solution analyzed.

When an isotope ratio report is generated, the individual replicate isotope ratios, the average ratio, the standard deviation and %RSD are given. A report is generated for each solution analyzed, which can be displayed on screen, printed or

saved as a file, but no summary report is available. When performing IDMS analysis, each sample blend is bracketed by a calibration blend and there are often 40-50 solutions in one analytical run. Therefore the data from one run is spread over a large number of reports/files. In order to obtain all the necessary data in one place, the operator had to copy and paste the required info from each individual file into one summary file – a time-consuming operation.

In an attempt to stream-line this, a custom database was set up. The database wizard prompts the user to choose which information to include in the database. By selecting the required options, in this case 'Quant Element (Replicate Data)', then 'Raw Counts/CPS' and placing the links in the relevant cells of the database, the raw data for each replicate of each isotope can be displayed. Once this information is present, additional columns can be added to the database, and simple formulae inserted to calculate the required values, as you would with an excel spreadsheet. For example, replicate isotope ratios, the average isotope ratio, SD and %RSD information can be displayed for each sample processed. Once the database has been set up, the user simply updates the database with any new data that is created.

An example of the database which we have setup for our Se IDMS work is shown. The database takes some time to set-up, but once established is a great time-saving tool.

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2. C. S. J. Wolff-Briche, Metrologia, 2003, 40, 08010.
3. T. Catterick, B. Fairman and C. F. Harrington, J. Anal. At. Spectrom., 1998, 13, 1009.
4. Guide to the Expression of Uncertainty in Measurement. ISO, Geneva, Switzerland (1993). (ISBN 92-67-10188-9).

Custom Reports - Full Quant Mode - [C:\ICPCHEM\1\RPTTMP\SEIDMS_1.fqd]																						
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New Fileview Plus Data Extraction Software for the Agilent 7500 Series

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Introduction

Developed from the widely popular Fileview data extraction software, new Fileview Plus contains all the features found in the original version plus many new functions users have requested. New features of Fileview Plus include:

• Customizable Grid View

A great feature is the flexibility to select from *counts average, replicate counts, concentration, RSD, units, detector mode, and internal standard reference* – and to display these fields simultaneously on the same grid. Up to four different column configurations can be stored and recalled with a mouse click.

• Auto View Function

With the Auto View function, all new data can be automatically imported and displayed in the grid in real time as a sequence progresses. When the Fileview Plus grid is open, new data columns appear as each sample acquisition finishes. The user can review all data generated in a tabulated form, in real time, in a single location.

• MDL, IDL and BEC Calculator

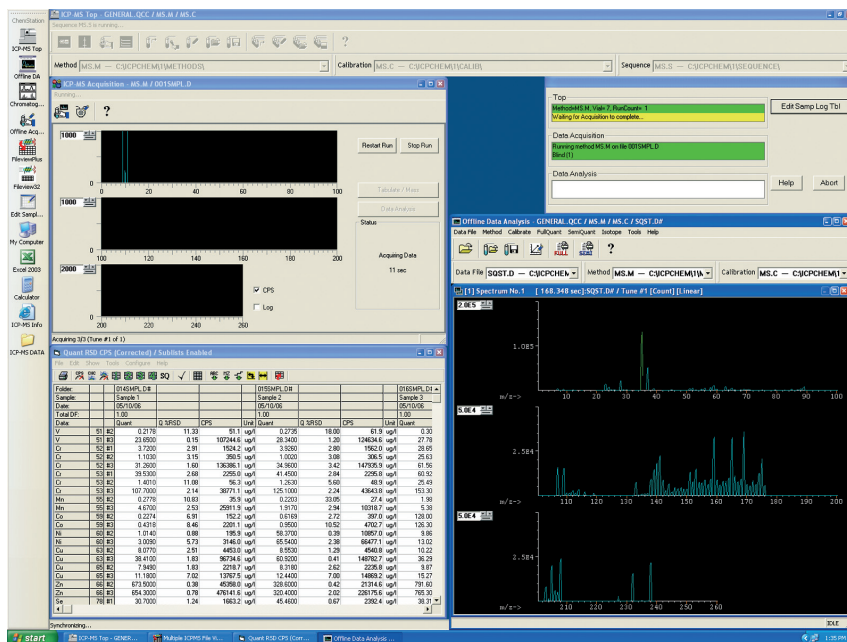
Method detection limit (MDL), instrument detection limit (IDL), and background equivalent concentration (BEC) can now be automatically calculated, exported and saved for every sample batch. This is a great tool that can be used to easily track instrument performance over time.

• CCV and CCB Calculator

Continuing calibration verification (CCV) and continuing calibration blank (CCB) data can be exported in a tabulated form. "Out of range" values can be displayed in a separate column (ranges are user configurable). Data can also be exported to a spreadsheet application.

• IS Plot Engine

The Internal Standard (IS) plotting engine creates two output formats to easily troubleshoot instrument



Fileview Plus grid can be viewed simultaneously with the ChemStation software while the sequence progresses.

performance:

- A graphical plot showing normalized data.
- A grid showing all the tabulated count information.

This calculation requires a reference value (normally the calibration blank) against which all other samples are plotted. The graphical plot can be printed directly from Fileview Plus or copied to the clipboard and pasted into another application.

• Print Capabilities

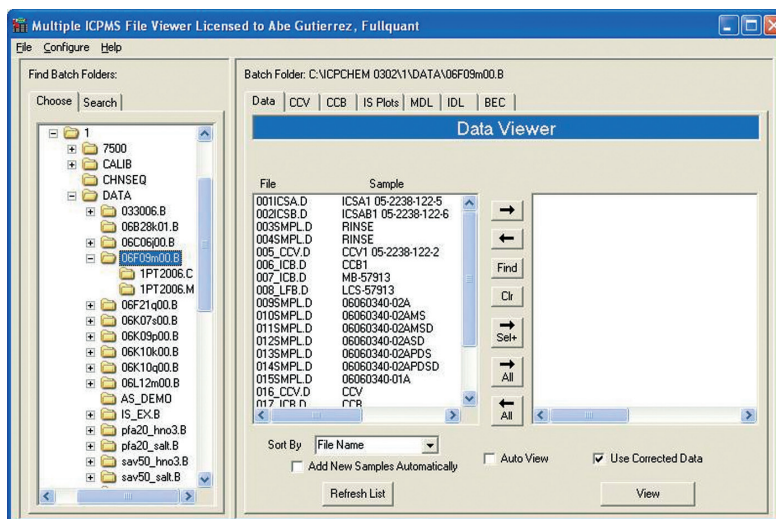
The Fileview Plus grids print data directly with options that include portrait and landscape orientation, margin adjustment, scaling, and

automatic formatting (vertically, horizontally, or both) in multiple pages. The element and header information is printed on each page.

Other new features include semiquant data extraction and data file search capabilities. Fileview Plus works with all 7500 Series ChemStation on Windows 2000 or Windows XP revisions and is distributed and supported worldwide by FullQuant Corp. in the US.

Ordering Information

For more information, to purchase Fileview Plus or for a 15 day free trial, visit the Fileview Plus website at www.fileviewplus.com



Features like printing capabilities, automated grid update, replicate information, internal standards plotting engine and IDL calculator are only a few of the great new tools Fileview Plus offers

Official Opening of Metallomics Center of the Americas



Agilent's Rudi Grimm and University of Cincinnati's Joe Caruso declare the center open

Many guests enjoyed the unveiling of the University of Cincinnati/ Agilent Technologies Metallomics Center of the Americas on Jan. 19. Researchers will use Agilent provided technology to pursue work in all fields related to metallomics – the analysis of metals and metal species and their interactions within biological and ecological systems. Applications include neurological research, metalloproteomics, metal tags for ultra-trace-level organic compound determination, and environmental monitoring, among many others, by using LC paired with ICP-MS and MS.

Chemistry professor and center director Joe Caruso, said, "The Metallomics Center of the Americas is the first of its kind in the world. The establishment of this center portends great things for a wide spectrum of colleges at the university and for the center's many partners throughout the Americas."

Current partners include:

- Argentina Atomic Energy Commission
- Indiana University, U.S.
- National Council for Scientific and Technical Research of Argentina
- National Research Council, Canada
- Research and Development Center for Industrial Fermentation, Argentina
- Laboratory of Environmental Research and Services, Argentina
- University of Guanajuato, Mexico
- University of San Luis, Argentina
- University of Sao Paulo Nuclear Energy Center, Brazil

This information is subject to change without notice

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8 Months Until 4500 Series End of Support

A reminder that Agilent will continue to fully support all 4500 Series instruments until their End of Support (EOS) date of October 31, 2007. This includes the renewal of support contracts, which can be purchased pro rata – to run to EOS date. After EOS date, service parts will be available from Agilent until supplies are exhausted, and labor-only contracts can be purchased for a further 1 year after EOS date. These labor-only contracts are available under Agilent's Asset Maximization program (Asset Max). Ask your Agilent support sales representative for details.

Labs that rely on their Agilent 4500 for all ICP-MS analysis, where the 4500 is the only ICP-MS in the lab, are advised to plan now to replace their instrument. Contact your Agilent support sales representative for more information.

New Agilent ICP-MS Users

A very warm welcome to all companies and institutions that have recently added an Agilent ICP-MS to their analytical facilities. Remember to join the Agilent web-based ICP-MS User Forum – the place where you can exchange information relating to your 7500.

To access the Forum, you will simply need to log-in to the Agilent web site, or register if you haven't already, and enter your instrument's serial number on your first visit only. Look for the link to the ICP-MS User Forum from: www.agilent.com/chem/icpms

Trade Shows and Conferences

2007 European Winter Plasma Conference, 18-23Feb 2007, Taormina, Sicily, Italy, www.uc.edu/plasmachem/taormina.htm

Pittcon 2007, 25 Feb 2007 - 02 Mar 2007, Chicago, USA, www.pittcon.org/

CANAS Konstanz, 18-21 March 2007, Germany, www.canas.de

Spectratom Pau, 21-24 May 2007, France, www.speciation.net/TraceSpec2007

Agilent ICP-MS Publications

To view and download these latest publications, go to www.agilent.com/chem/icpms and look under "Library Information"

- High-Throughput Semiquantitative Screening of Ambient Air Samples by ORS-ICP-MS and Integrated Sample Introduction System (ISIS), 5989-6123EN

Front page photo: Agilent ICP-MS staff: Masa Endo, Product Support, Tokyo Analytical Division and Glenn Carey (standing), Product Support Engineer, Europe

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