



Environmental Resource Associates (ERA) adds a NexION 300Q to its Inorganic Proficiency Testing Process

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Proficiency testing (PT) is defined as a means of evaluating a laboratory's performance under controlled conditions relative to a given set of criteria through the analysis of unknown samples provided by an external source. Many organizations that manage proficiency-testing studies are also responsible for producing the certified reference materials (CRMs) and quality

control (QC) standards that support validation of the testing methodology. The characterization and certification of these kinds of materials requires an extremely high level of analytical expertise, together with instrumental techniques that are capable of generating accuracy and precision data of the highest caliber. Two of the most well-known suppliers of reference materials include the National Institute of Science and Technology (NIST®) in the U.S. and the Institute for Reference Materials and Measurements (IRMM) in Europe. However, even though they offer a diverse range of standards, many proficiency-testing organizations produce their own unique, matrix-specific certified reference materials and QC standards that can be traced back to NIST® and IRMM sources.

One of the most well-respected proficiency testing providers that serve the environmental and pharmaceutical markets is Environmental Resource Associates (ERA), a division of Waters Corporation based in Arvada, Colorado. In operation since 1978, ERA has become the largest supplier of proficiency-testing studies and certified reference materials for environmental laboratories in North America. It has not become the market leader by accident. Its reputation over the past 33 years is based on knowledge and expertise in the determination

of inorganic and organic analytes in samples such as drinking waters, non-potable waters, soils, hazardous wastes, and industrial effluents/discharges. As a result, ERA has achieved accreditation by a number of global standards organizations such as ISO (International Organization for Standardization) for its excellence in quality management systems, A2LA (American Association for Laboratory Accreditation) for the design, preparation and operation of proficiency testing schemes and ILAC (International Laboratory Accreditation Cooperation) for its competence in providing impartial proficiency-testing studies.

ERA Headquarters

ERA is rapidly becoming recognized as the global leader in this kind of work. Recently, the company was selected by the United Nations to manage a PT scheme for the Global Environment Monitoring System (GEMS), to improve water quality monitoring and assessment capacity in 150 participating countries, and to determine the state and trends of regional and global water quality. It has also been named as the exclusive supplier of Total Organic Carbon (TOC) CRMs on board the international space station (ISS), to ensure the accuracy of TOC concentrations in drinking water. TOC is one of many analytes that provides an indication of overall water quality by measuring the presence of potentially hazardous chemicals in the ISS drinking water supply.

It was therefore of great pride to PerkinElmer that in May of 2010, ERA made the decision to purchase a NexION® 300Q ICP mass spectrometer (ICP-MS). ERA had been a PerkinElmer® Optima™ ICP-OES user for a number of years, but was using another vendor's ICP-MS system for its ultra-trace element determinations. When ERA decided they needed another instrument to keep up with its increasing workload, we had the opportunity to present the NexION technology to them, soon after it was introduced at the Pittsburgh Conference in Orlando, Florida. After a brief evaluation period, including running samples and a demonstration of the instrument, we were very excited that ERA



Mike Balderston and Christy Van Campen with the NexION 300Q ICP-MS.

decided to go with PerkinElmer. The major reason can be summed up by Christy Van Campen, an Inorganic Chemist at ERA and the person who carried out the evaluation:

"I must admit, we were a bit worried about buying an instrument that was an entirely new design. But we knew from owning other PerkinElmer equipment that they would take care of us if we had any problems. Their service and technical support is outstanding, which made the decision much easier to go with the NexION."

The NexION 300Q was finally installed on Monday, July 12th of last year. Two of the local PerkinElmer Service Engineers, Mike Balderston and Isaac Kirchner, came first to pump the instrument down, while Larry Gugliotta, the regional Inorganic Service Specialist, arrived the next day to set it up and run the installation tests. By Thursday, July 15th, Christy was running samples. It took 3 weeks for her to run all her validation standards, but with the help of Randy Hergenreder, the local Atomic Spectroscopy Product Specialist, their NexION was fully operational running samples within 1 month of installation.

ERA purchased a NexION 300Q ICP-MS, which is the non-cell version of the instrument, because their matrices are very well characterized and they also felt that they could always upgrade to a cell-based instrument at a later date if their analytical requirements changed. It's also worth mentioning that the monitoring of drinking water samples cannot be carried out using collision/reaction cell technology at the present time, because the U.S. EPA is currently investigating its suitability for use with Method 200.8. On the other hand, the method has been approved for the analysis of wastewater samples, under the National Pollutant Discharge Elimination System (NPDES) permit program, provided that method performance specifications relative to measurements in the collision/reaction mode are met.

Today, ERA's NexION 300Q ICP-MS runs up to 6 hours a day, 3-4 days a week. On average, they analyze over 100 samples every week for 26 trace elements per sample, which are a mix of drinking waters, non-potable water, wastewaters, soils and industrial effluents. The demands on the instrument's performance are explained by Christy Van Campen again:

"Its detection capability has been an order of magnitude better than we were used to and the stability allows us to run for many hours without recalibration. The limits I have to meet are very stringent when compared to EPA methods, so I have to have an instrument that doesn't drift and my calibration has to be perfect for all 26 metals on each run."

This was very encouraging to us, because stability was one of our main performance goals in the design of the NexION technology. The unique triple cone interface provides less dispersion of the ion beam, preventing sample deposition on internal metallic surfaces, therefore reducing signal drift. When combined with the quadrupole ion deflector (QID), which bends the ion beam 90 degrees to remove the majority of particulates and neutral species, it enables the instrument to deliver exceptional signal stability, even when running the most challenging environmental matrices.

We have always prided ourselves on producing instruments that excel with difficult, real-world applications. Christy's comments are therefore confirmation that the NexION technology has achieved those design goals. But besides designing high-performance instruments, simple and straight forward routine maintenance is another critical area of importance. An ICP-MS has to be cleaned and maintained on a regular basis to ensure it is operating at optimum performance, especially in the hands of inexperienced or novice users. Whether it's changing sample introduction components, cleaning the interface cones or ensuring the

pumping system is working correctly, the operator has to pay attention to all these areas. So in order to make this as seamless as possible and to keep the instrument running at peak performance, the NexION software will send out alarms to remind the operator when it's time for simple preventative maintenance tasks such as oil changes and tubing replacement. The system will even display the number of hours of use of various components and suggest when they might need to be cleaned or replaced. As a user with 10 years of ICP-MS experience, this is another aspect of the NexION that Christy really liked when she remarked:

"It's so easy to get to the cones, torch and the detector, and the pumping system is the quietest I have ever seen. We also love the fact that the software includes a maintenance schedule – a foolproof way for our ICP-MS operators to keep on top of routine maintenance. Compared to our older instrument, this is going to save us a ton in maintenance costs."

We are extremely happy that ERA, one of the leading providers of proficiency-testing samples and environmental CRMs in the U.S., agreed to become the first NexION user profiled in our series on ICP-MS customer case studies. We'll leave the final words to Christy:

"Our customer needs to have confidence in the fact that the evaluation we are providing is correct. The confidence in our evaluations is tied directly to our ability to ensure that the products we make are accurate and homogenous, which in turn is related to the quality of our chemists and state-of-the-art instrumentation, such as the NexION 300Q."

Thank you Christy for your kind words and the trust you have put in our ICP-MS technology. PerkinElmer is very proud to be a part of your success.



ERA Inorganic Team (left to right): Christian Milek – Chemist; Amanda Bruggeman – Chemist; Kemi Alexander – Technician; Christy Van Campen – Chemist; Tom Widera – Product Line Manager.