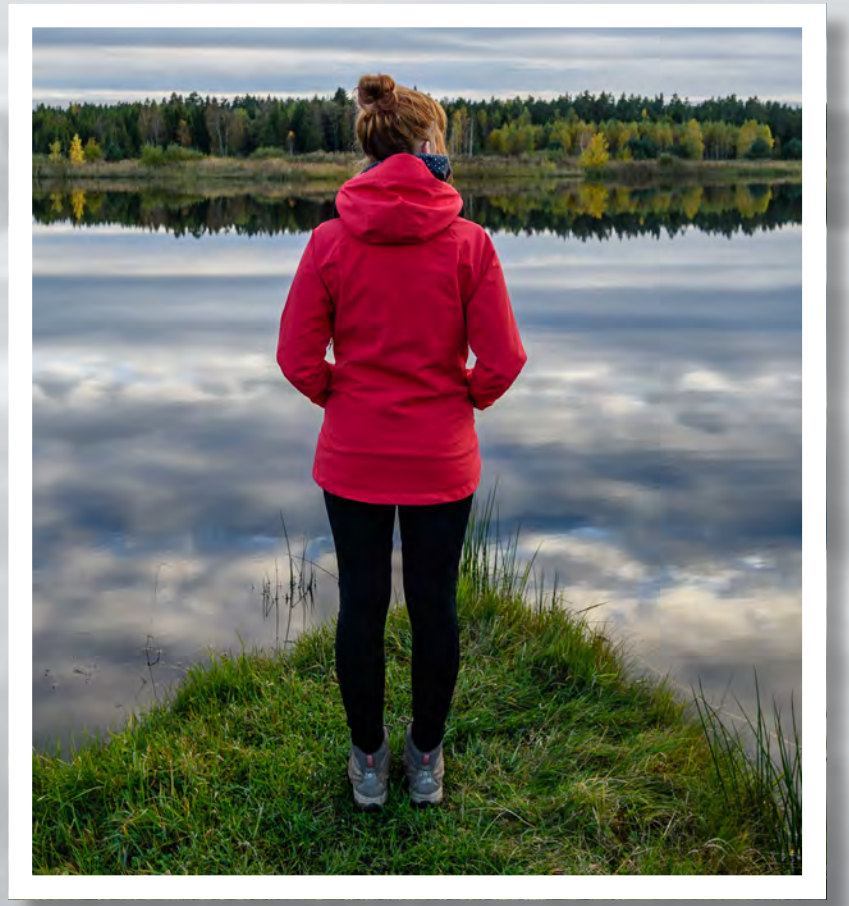
thermo scientific

Protecting tomorrow. WE CAN help.

Environmental Contaminant Analysis



ThermoFisher SCIENTIFIC

Safeguarding our world—today and tomorrow

We know compliance standards and regulations are highly dynamic and will continue to evolve, as new environmental threats emerge year-to-year, from country-to-country. What if the equipment, software, and automation supporting your lab today is designed to meet tomorrow's demanding needs? At Thermo Fisher Scientific, we take a leading-edge approach to your toughest environmental challenges—from simple to complex matrices. The result? Thinking forward and staying ahead of challenges not only helps protect the investments you make today, but also helps protect tomorrow's environment. With the right partner dedicated to your success, you can achieve your goals.

Solve more environmental contaminant challenges together

WE CAN help

Testing service labs
Deliver productivity improvements and access capabilities to maintain a competitive edge

Government and international protection agencies
Establish standard methods of analysis to preserve the environment

Municipalities
Maintain the capabilities to ensure safe community water sources

Academic institutions
Research and discover the impact of emerging environmental contaminants

Our shared vision: a healthier, cleaner, safer world

We have what you need to meet the world's increasing analytical testing demands for virtually every environmental contaminant. Our comprehensive solutions and workflows are designed to go beyond routine analysis and monitoring because so much depends on everything you do. Not just optimizing productivity in the lab to improve the bottom line, but safeguarding our environment and the health of our communities, as well.

Address a broad range of environmental contaminants

From sample input to data output, we can help your lab run seamlessly while enabling test menu expansion for virtually every environmental contaminant with technology advancements that transform your output.

Tackle the toughest emerging concerns

As new environmental concerns emerge, you need the right technologies to take on new contaminant testing cost-effectively. We can help you strike the right balance between your capability needs of today and the challenges of tomorrow.

Accurately analyze samples faster and with fewer interruptions

Every time-saving tool can provide an advantage. We offer a suite of tools with integrated workflow-driven solutions that streamline everyday tasks in smarter ways and help you incorporate the most important analytical methods as part of a connected method setup and data processing ecosystem.

Provide integrated solutions to manage your data stream and day-to-day operation

Every environmental lab can benefit from walkaway efficiencies, and the ability to manage operations from the cloud. Our digital capabilities enable this evolution—through access to secure, cloud-based data storage, scientific analysis applications, and peer collaboration tools.

Maximize operational productivity with automation

Reduce time and repetitive functions you need to perform, while providing highly reproducible results. Add automated sample preparation and streamline parameter testing to improve lab operations.

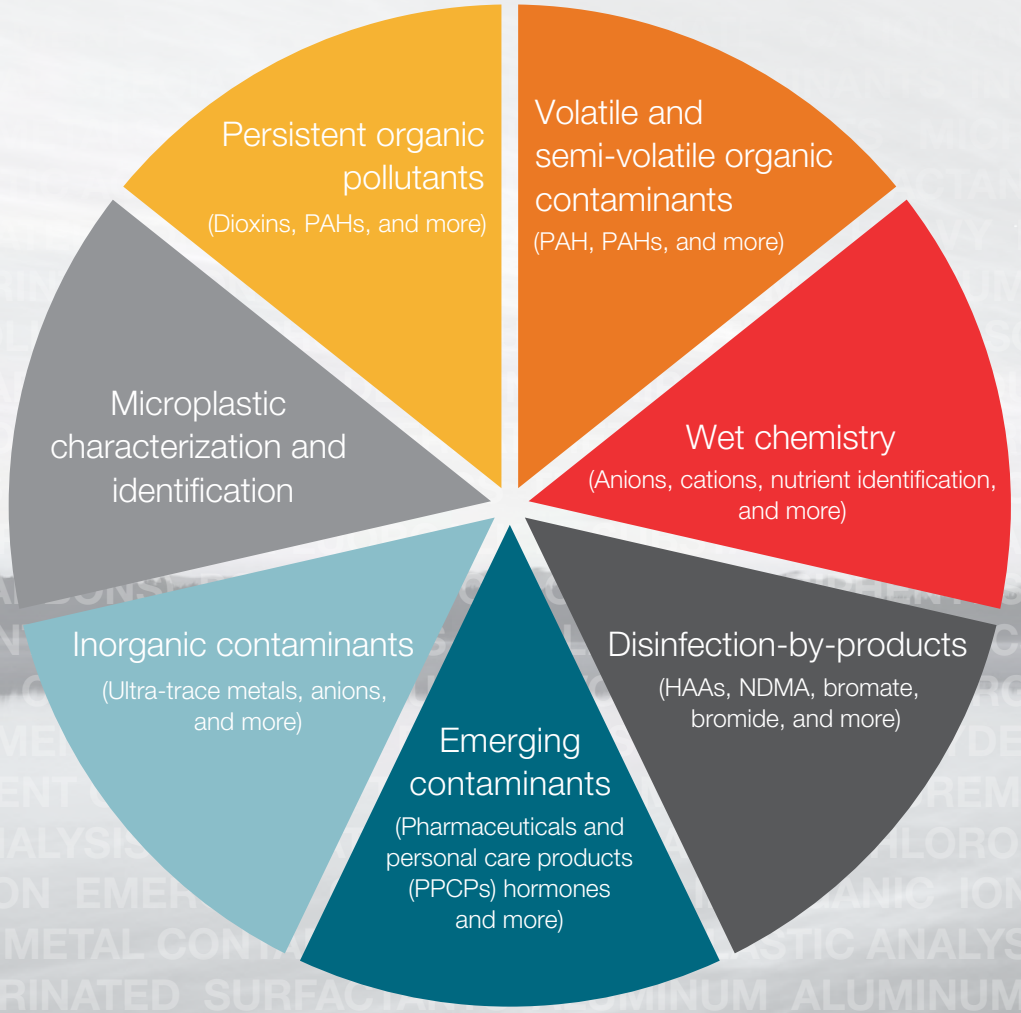
Collaborate at every phase of your contract testing business

We're prepared with the most comprehensive laboratory capabilities, with dedicated support to meet everyday demands as well as the focused attention needed to help overcome barriers to your lab's success.

Spectrum of capabilities

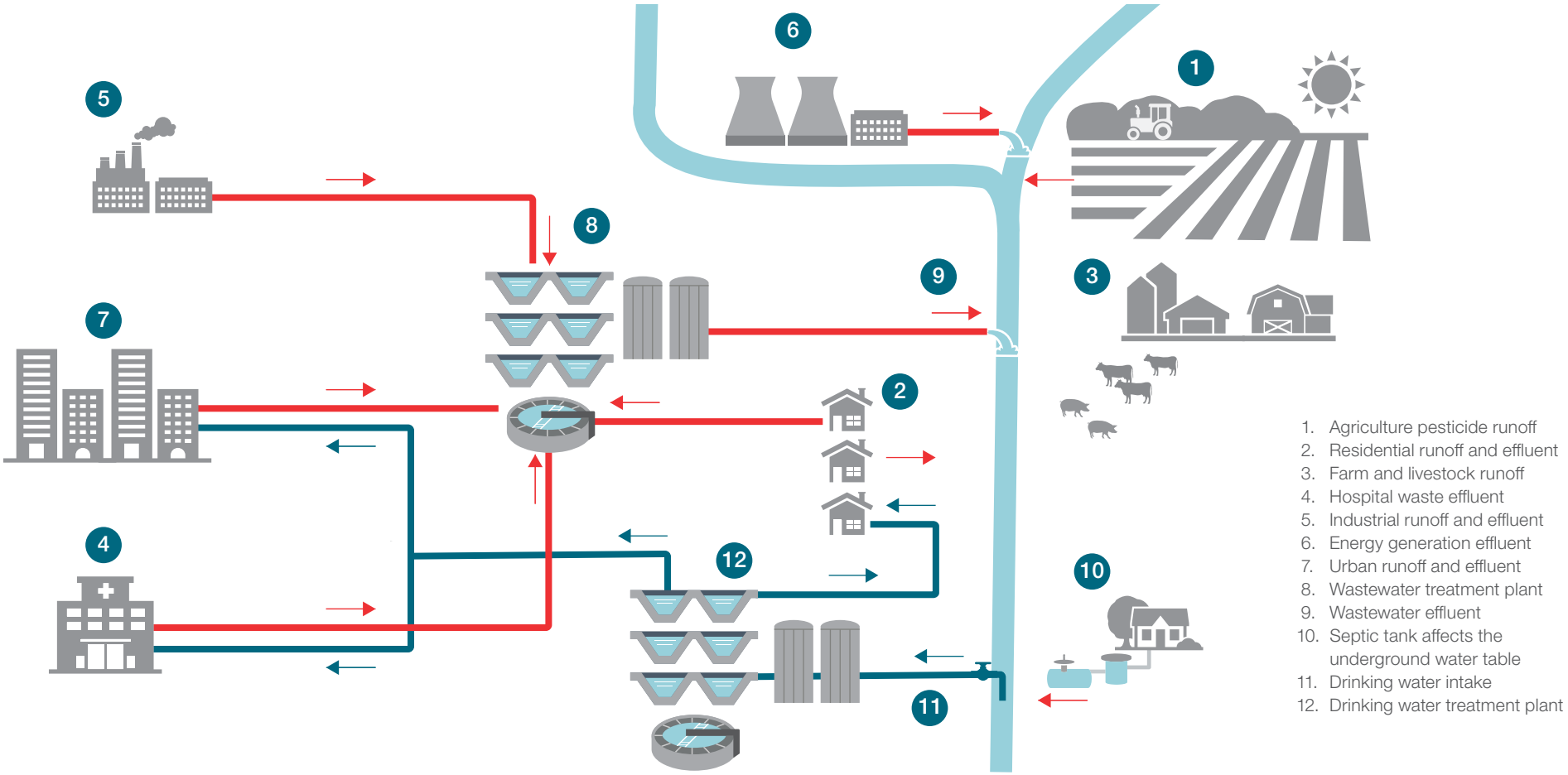
The presence of xenobiotics such as engineered nanomaterials, along with persistent organic pollutants (e.g., flame retardants) in the environment has raised concerns about the impact of these contaminants on the environment and public health. We can help you satisfy some of the world's most stringent regulatory requirements with our broad range of solutions to detect and quantify contaminants in air, drinking water, wastewater, soils, sewage sludge (biosolids), and composts.

WE CAN help



Address a wide array of environmental contaminants

We can help you achieve your most important priorities—researching new contaminants, improving processes, limiting interruptions, balancing operational costs, meeting your customers' needs, and maintaining your reputation for on-time dependability. Your success is our goal—and we are the resource to help you deliver.



Activities such as farming, commercial fishing, energy production, manufacturing, and transportation increase the presence of contaminants in the environment.

Don’t let yesterday’s testing strategies hold your lab back

While environmental testing is highly regulated, new technology to address current and emerging contaminant testing needs and process optimization is necessary and allowable.

We can help move your lab forward to meet today’s standards:

Advancements in testing strategies
As regulatory agencies increasingly allow testing to be improved, environmental analysis laboratories no longer need to rely on outdated instruments to meet method requirements, ensuring minimal interruptions.

Improvements to technology
Laboratories can take advantage of the flexibility provided by regulatory method updates; unlocking paths to quicker sample turnaround.

Enhancements for productivity
Replace aging systems with updated technology to provide labs with the ability to increase efficiency and possibly exceed current sample analysis volumes.

WE CAN help

Find out more at **thermofisher.com/speedofscience**

Organic volatile analysis

Modernize your volatile and semi-volatile workflows to meet tomorrow's regulatory requirements. Don't let unplanned instrument downtime, sample reanalysis, operator error, or inaccurate results impact your profitability and reputation.

Access sensitivity while optimizing throughput and flexibility

Maximize lab uptime and investments with modularity, enabling off-line maintenance while quickly adapting to evolving testing needs. Multiple columns connected to a single gas chromatography mass spectrometer (GC-MS) can quickly expand throughput and flexibility by staggering run times. The system can be ready to perform different applications like PCDD/F, PCBs, PBDEs and more.

"The TSQ GC-MS is used in our lab to run everything from dioxins to high-level PCB to phenyltins and nitrosamines in a dozen different environmental matrices. The system is extremely robust and we can run 2,000+ samples without performing any source maintenance, and following yearly maintenance, we are back up and running quickly without the need for any optimization."

—Patrick Pond, Chief Technical Officer, Pacific Rim Laboratories, Inc.

Improve profitability with consolidated multi-class GC-MS methods

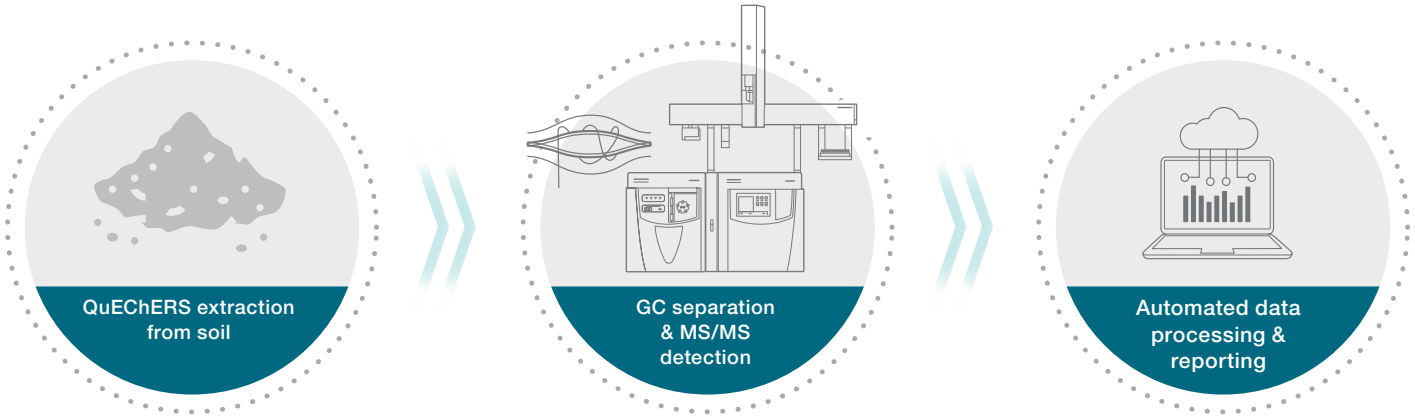
Create new business opportunities, keep pace with changing regulations, and streamline processes through simplified, consolidated multi-class methods. Expand to new capabilities for analytical services to boost productivity and profitability with innovative Thermo Scientitic™ Orbitrap™ high-resolution accurate mass (HRAM) GC-MS workflows.

WE CAN help

Find out more at **thermofisher.com/organic-analysis**

Consolidated PAHs and PCBs soil contaminants workflow

Access with the chromatographic separation and acceptance criteria to meet all analytical performance while reducing analysis time. With Orbitrap HRAM mass spectrometry, achieve **four-fold increase** in throughput compared to conventional methods, improve productivity, and deliver confident results faster.



Address emerging microplastic particle investigation requests

With a pyrolysis-gas chromatography Orbitrap mass spectrometry system, identify and determine the concentration of microplastics fast and efficiently while applying infrared spectroscopy to provide complementary information regarding the number of particles, size, shape and surface area; generating a robust analysis for each sample tested.

Pyrolysis-GC Orbitrap HRAM MS system

Fourier Transform Infrared (FTIR) and Raman spectroscopy and microscopy

Comprehensive sample report

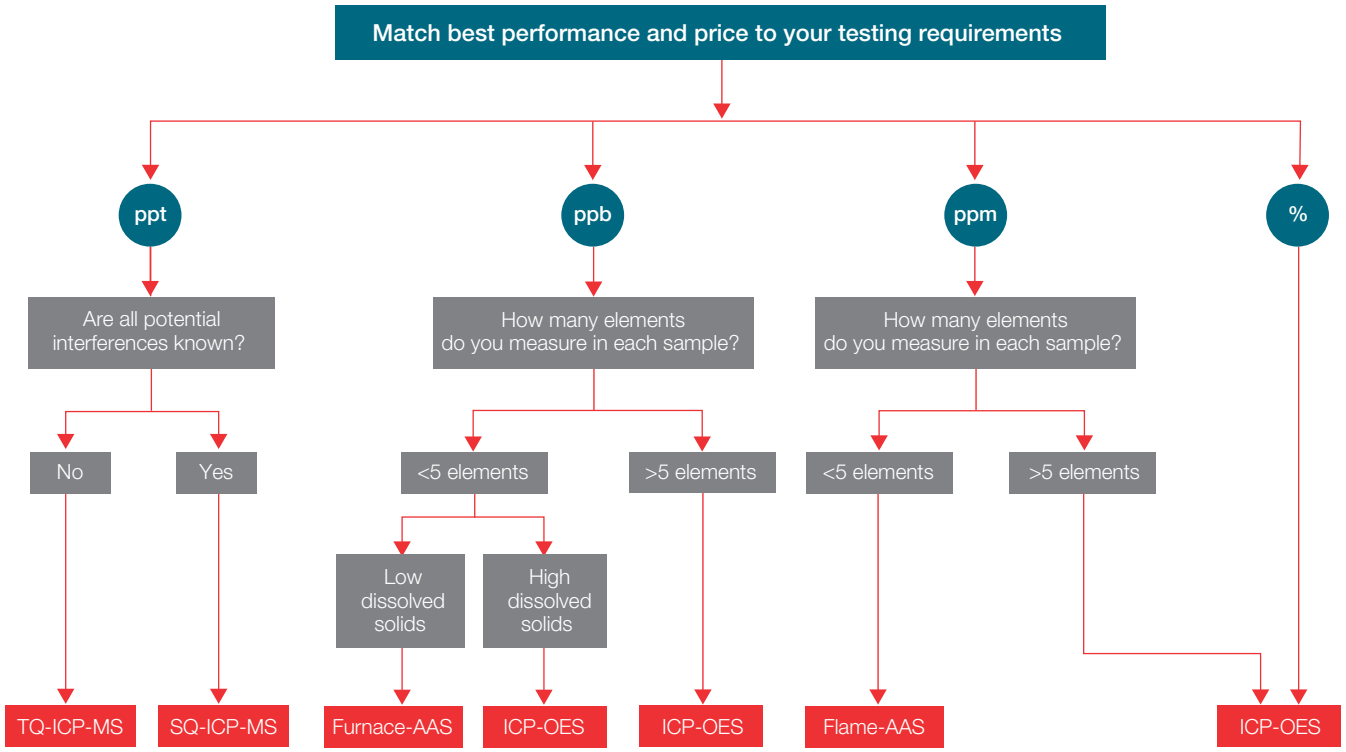
Find out more at **thermofisher.com/organic-contaminant-analysis**

Inorganics, trace metal and speciation testing

We can help you meet regulations and ensure our environment is safe from toxic heavy metals. Tap into our expertise and extensive solutions that enable accurate, precise, high-throughput analysis of trace metals in a variety of sample types at very low concentrations, even in the presence of interfering matrices.

Improve productivity in everyday trace metal element analysis

Maximize throughput and efficiency when analyzing thousands of samples. Increased productivity can be achieved through fast sample introduction, automated sample dilution including prescriptive and intelligent dilution, or integrated software with a “get ready” functionality and stable system performance.



Our technical specialists can provide product selection guidance and help automate your workflow with a variety of readily available options.

WE CAN help

Is environmental metal speciation testing on your horizon?

The determination and characterization of trace metals in complex samples can be difficult. Access advanced solutions to provide clients with precise analysis of metal species such as mercury, arsenic, sulfur and lead in a variety of environmental matrices. Your reportable test results can provide valuable information on the toxicity and mobility of the trace metals to living organisms and help troubleshoot the removal of metals from systems such as water treatment.

Species of Interest	Recommended analytical solutions
Tin speciation (organotin compounds) and alkylated derivatives of mercury	GC-ICP-MS
Mercury speciation (alkylated derivatives of mercury)	GC-ICP-MS
Bromine speciation in drinking water	IC-ICP-MS
Chromium speciation	IC-ICP-MS
Arsenic speciation	IC-ICP-MS

Find out more at **thermofisher.com/metals-analysis**

Nutrient and water quality monitoring

Our technologies can help you to cost-effectively monitor multiple nutrient parameters to determine the overuse or lack of nutrients which may have ecological, human and economic impact.

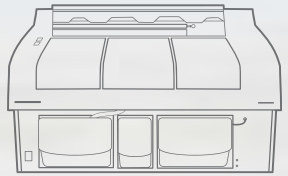
Municipal sewage | Agricultural fertilizers | Livestock waste | Stormwater drainage | Aquaculture

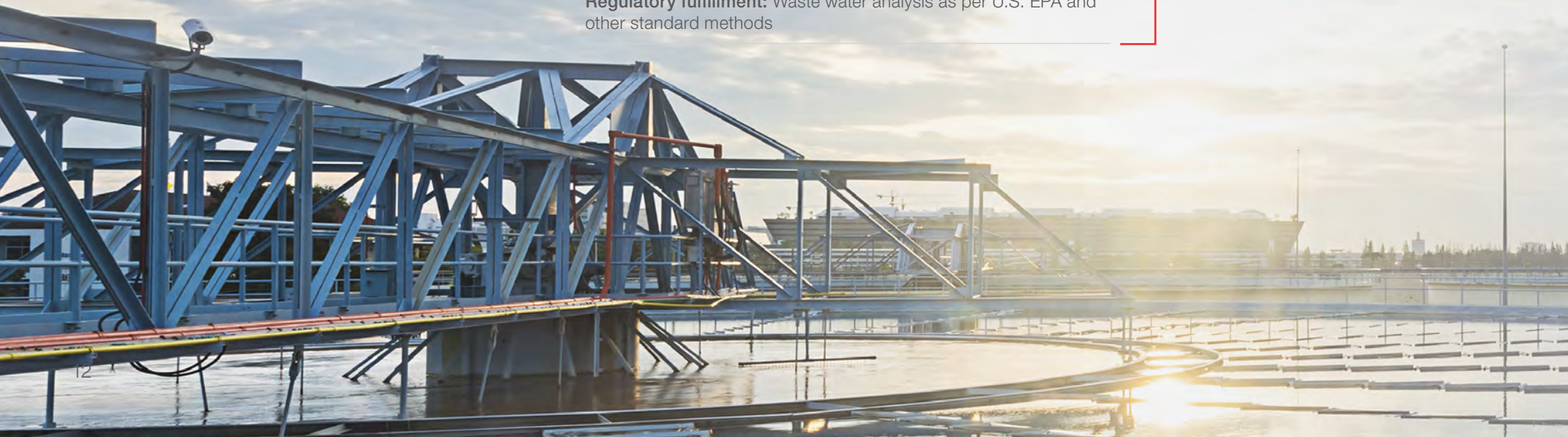
Single instrument—single operator—multiple parameters

Simple walk-away convenience

Automate wet chemical methods with the modern Thermo Scientific™ Gallery™ Discrete Analyzer instrumentation to minimize traditional challenges by improving precision and accuracy while eliminating manual errors and reagent consumption.

- **Basic water testing:** pH, conductivity, alkalinity, total hardness
- **Comprehensive waste water testing as per regulatory methods**: Total Kjeldahl Nitrogen (TKN), total phosphate, total phenol, Total Oxidizable Nitrogen (TON), phosphate, nitrite, nitrate, boron, aluminium
- **Corrosive anions:** Fluoride, chloride, sulfate, sulfide, nitrite, nitrate, phosphate, thiocyanate
- **Scale formers:** Silica, calcium, magnesium
- **Corrosion inhibitors:** Ammonia, zinc, molybdenum, nitrite
- **Corrosion indicators:** Total iron, hexavalent chromium, zinc
- **Free and total cyanide**
- **Regulatory fulfillment:** Waste water analysis as per U.S. EPA and other standard methods

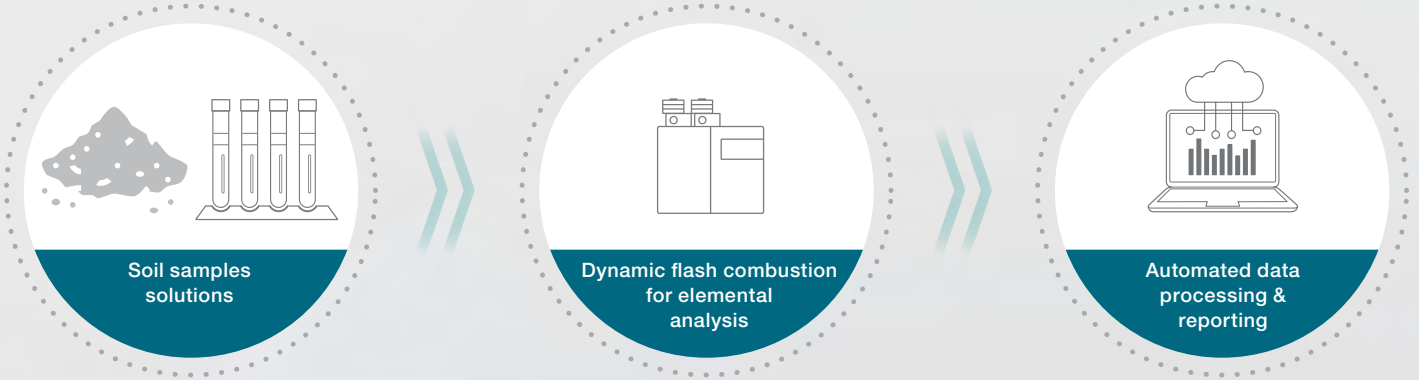




Test for various nutrient pollution sources with automated, integrated solutions

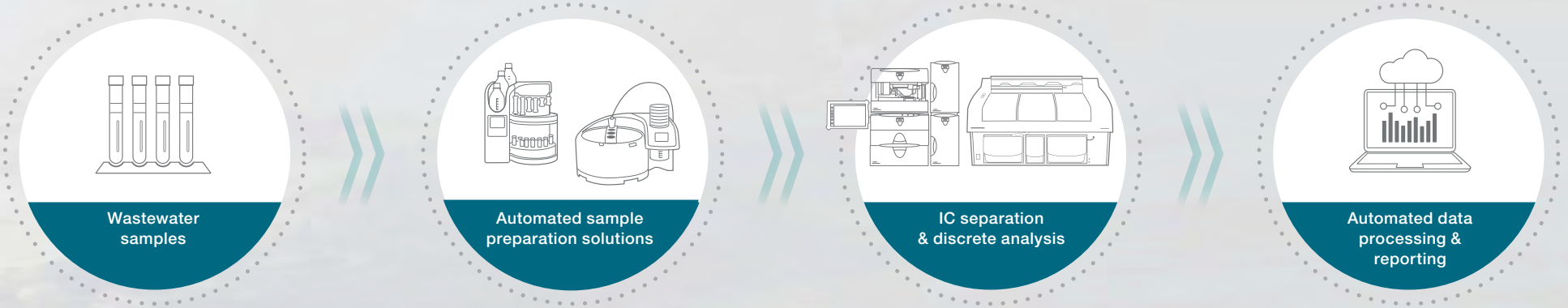
Improve soil nutrient testing

Access an all-in-one analyzer for the quantitative determination of nitrogen, carbon, sulfur, and the C/N ratio, in sample matrices with a wide range of concentrations from low to high amounts.



Achieve comprehensive wastewater nutrient testing

Combining two independent techniques enables comprehensive nutrient analysis



Streamline your path to enable the toughest emerging concerns

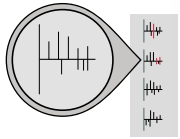
Environmental protection regulations are on the rise to monitor, detect and quantify emerging contaminants. Health concerns are increasing resulting from exposure to new compounds, such as per- and polyfluoroalkyl substances (PFAS), microplastics and the increased demand for water re-use. Access smarter connected solutions to respond faster whether researching or conducting daily testing.

Emerging contaminant analysis solutions

Sensitive and selective ion chromatography (IC), liquid chromatography (LC) or gas chromatography (GC), and mass spectrometry (MS) methods for simultaneous analysis of environmental contaminants due to their co-occurrence and complexity in test samples.

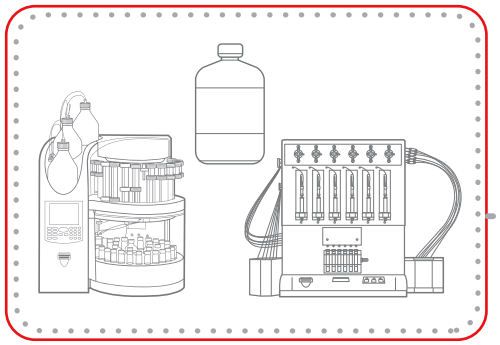
Thermo Scientific™ mzLogic algorithm offers fast, automated logical analysis

Eliminates thousands of candidates and hours of work



Sample preparation

Simplify and accelerate sample extraction, preparation and separation with automated solutions.



Thermo Scientific™ Compound Discoverer™ software provides valuable insights

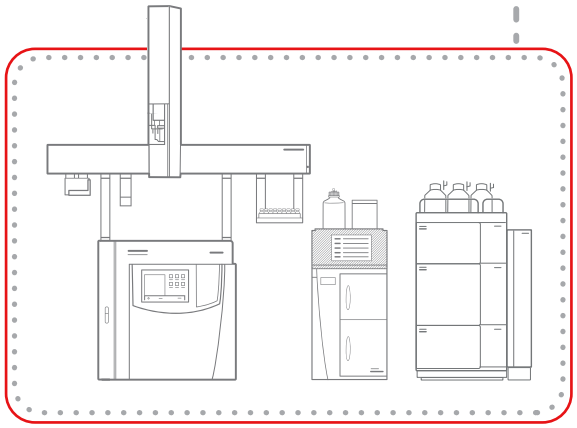
Efficiently extract high confidence data from information-rich HRAM molecular data

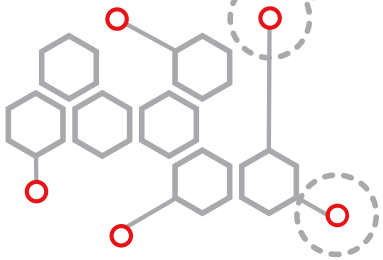
Thermo Scientific™ AcquireX™ intelligent data inclusion acquistion

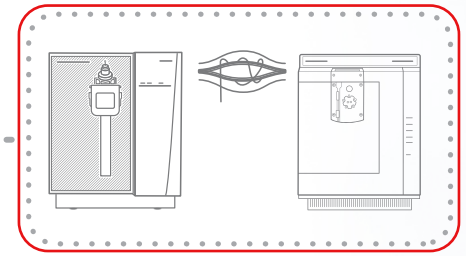
Generate meaningful MS^2 spectra for more sample-relevant compounds

Chromatographic separation

Flexibility with performance to accomplish more from method development to routine analysis with HPLC, UHPLC, GC and IC capabilities and proven column technology.

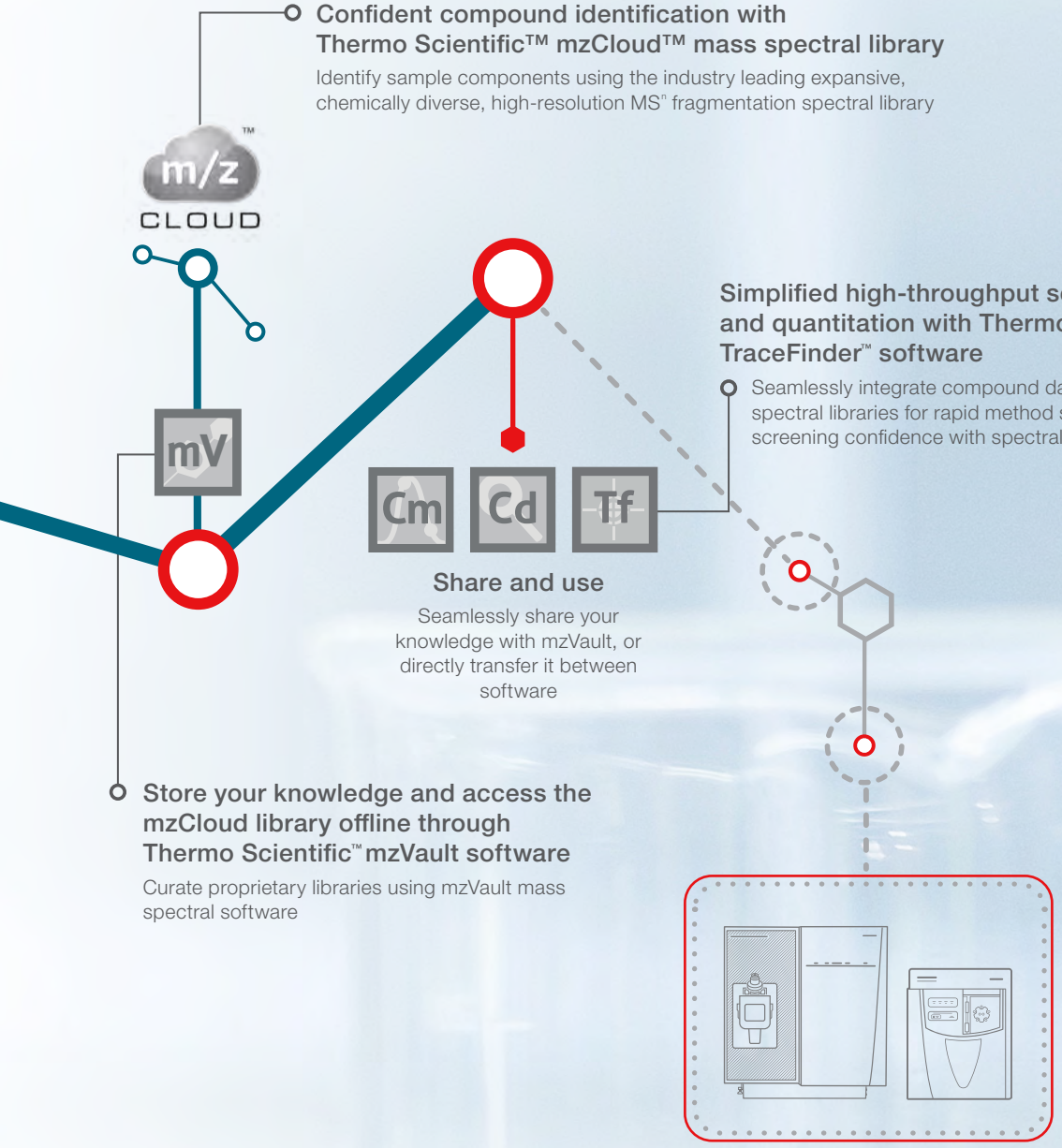






Quantitative Orbitrap HRAM

Making genius simpler; unknown screening to quantitation with advanced high resolution accurate mass



Confident compound identification with Thermo Scientific™ mzCloud™ mass spectral library

Identify sample components using the industry leading expansive, chemically diverse, high-resolution MS^n fragmentation spectral library

Simplified high-throughput screening and quantitation with Thermo Scientific™ TraceFinder™ software

Seamlessly integrate compound databases and mass spectral libraries for rapid method setup and increased screening confidence with spectral matching

Share and use

Seamlessly share your knowledge with mzVault, or directly transfer it between software

Store your knowledge and access the mzCloud library offline through Thermo Scientific™ mzVault software

Curate proprietary libraries using mzVault mass spectral software

Triple Quadrupole

Confident quantitation; with the next generation targeted quantitation performance and everyday ease

"The Orbitrap quantitative hybrid high resolution accurate mass LC-MS has infinite potential—very complex, but at the same time easy to use. We are analyzing perfluorinated compounds and our LOQ is under 5 ng/L, effortlessly. There is no comparison with a QQQ. And the Hypersil Gold aQ C19 polar endcapped LC column, when used with a guard column, maintained expected performance even after over a thousand injections."

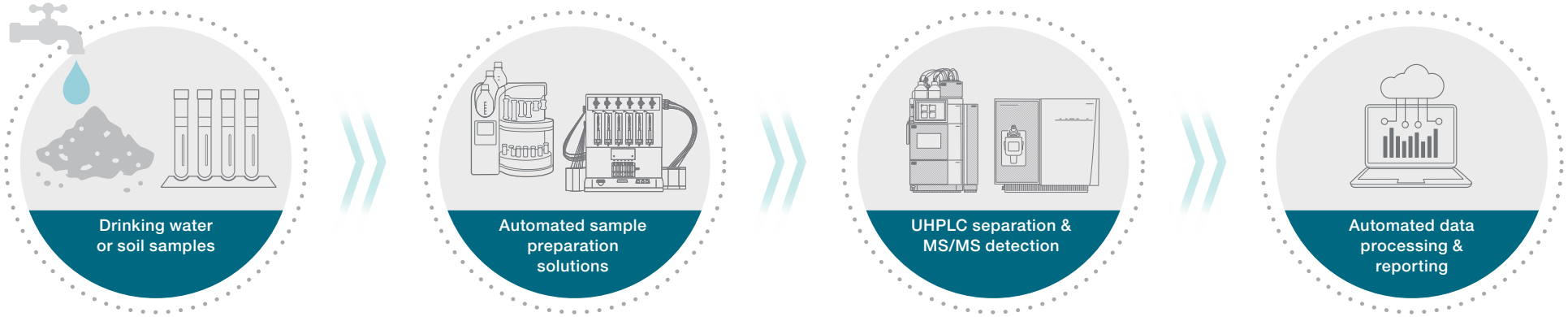
—Tomas Zanchi, Laboratory Technician, Consulenze Ambientali SPA

Per- and polyfluoroalkyl substances

Per- and polyfluoroalkyl substances (PFAS) have become a primary emerging contaminant of concern. Whether your lab needs to address increasing sample requests to meet local regulatory standards, or to enable environmental investigations on unknown soil and water samples, we can help you take on projects of any size and scope.

Scale operations and improve lab efficiency for routine sample requests

Whether testing water or soil samples, our automated solid phase extraction (SPE) sample preparation and solid extraction solutions ensure inertness and prevent PFAS cross-contamination into samples during extraction. Access a variety of triple-quad mass spectrometry solutions to address matrix complexity and improve limits of detection.



Improve recovery and reproducibility

Significantly reduce risk of background PFAS detected by LC-MS

Ultimate sensitivity and robustness with ease

Ultrafast analysis time

PFC free UHPLC

Triple quadrupole MS/MS

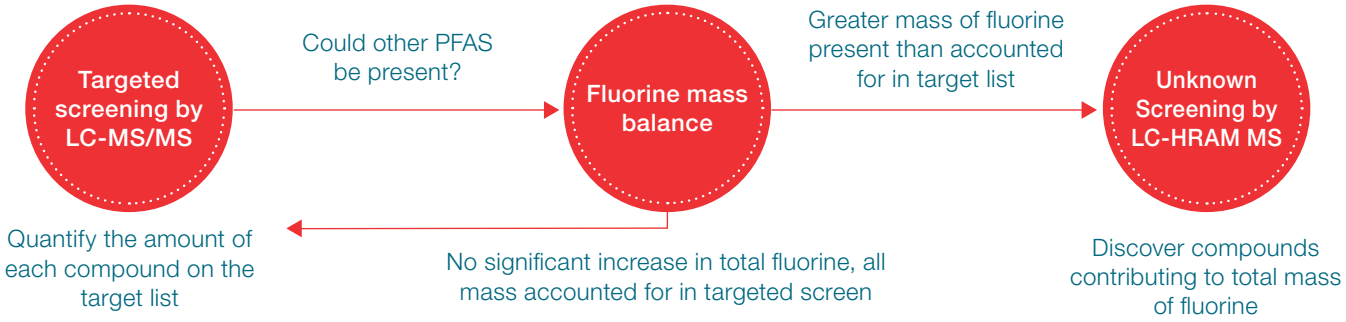
WE CAN help

Find out more at **thermofisher.com/pfas-testing**

Expand test capabilities to address environmental investigations

Adsorbable organic fluorine (AOF) by combustion ion chromatography

The analysis of adsorbable organically-bound fluorine is used to determine if the mass of fluorine present in the sample exceeds that in the targeted screen. If the total amount is higher, then other PFAS may be present in the sample which were not on the target list. The use of this technique is well documented for the determination of other adsorbable organic halogen-containing components (AOX).



Screen and identify unknown PFAS with ease

Identify and quantify unknown PFAS compounds while increasing the range of potential targets monitored using a combination of Orbitrap HRAM MS with ultra high-resolution and a comprehensive data analysis solution to reduce concerns over false results.

Disinfection-by-product analysis

Maintaining public health safety while recycling water has become increasingly complicated. Chemical disinfectants can remove disease-causing microorganisms, but reaction with naturally occurring compounds in water can form unintended disinfection by-products (DBPs) that require innovative new solutions to detect.

Addressing current and emerging disinfecting by-products (DBPs) testing challenges

The use of alternative disinfectants, local requirements, and other unknown water pollutants may drive the need for more advanced water testing processes and technologies. Low concentrations of emerging pollutants are typically not removed by conventional drinking water treatment. And, emerging DBPs appear within the treatment or distribution system due to the combination of disinfection agents (especially chlorine) with precursors, natural organic matter (NOM), algal organic matter (AOM), anthropogenic contaminants (pesticides, pharmaceuticals, detergents etc.), brominated and/or iodinated compounds.

DBPs	Regulatory methods and traditional analytical technology
Total Trihalomethanes	EPA 501.1 (GC purge and trap) EPA 502.2 (GC-ECD) EPA 524.2 (GC-MS) EPA 551.1 (GC)
Haloacetic acids (HAAs)	EPA 552.3 (GC-ECD) EPA 557 (IC-MS)
Chlorite and chlorate	IEPA 300.0 (B) and 300.1 (B), ISO 15061, EPA 317.0, EPA 326, and EPA 327 (colorimetric method)
Bromate	EPA 300.0 (B), 300.1 (B), ISO 15061 EPA 302 (2-D IC); EPA 317, 326, ISO 11206 EPA 321.8 (IC-ICP-MS), EPA 557 (IC-MS)

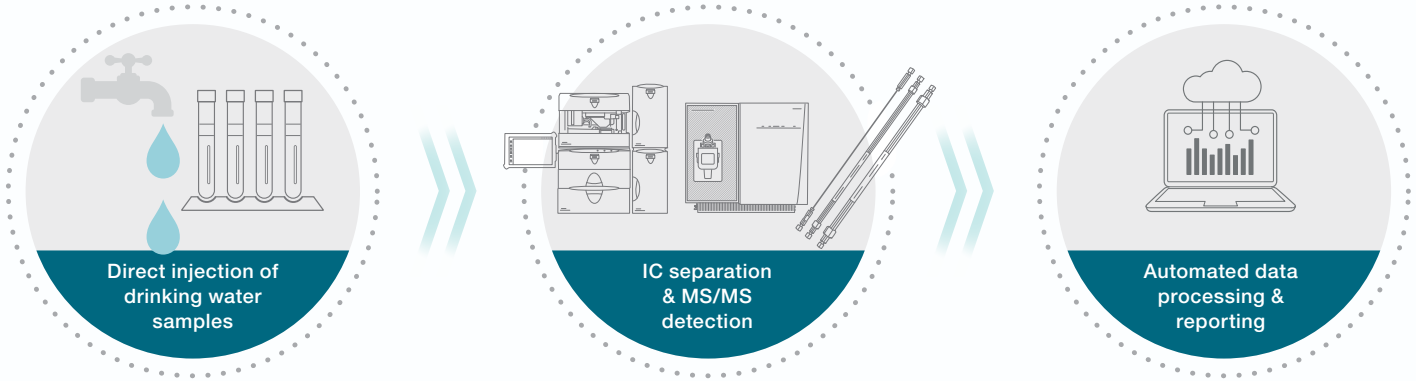
Trihalomethanes are the most studied and monitored of DBPs due to potential carcinogenic and other adverse effects on human health. Studies of HAAs have suggested that these contaminants can be a potential cause of genetic damage.

WE CAN help

Find out more at **thermofisher.com/water-disinfection-analysis**

HAA water analysis workflow

The only integrated high-performance IC-MS/MS system sold and supported by a single trusted manufacturer. Validated for the determination of DPB testing per U.S. EPA Method 557; proven methods that provide confidence and time savings.



"Our prior method for HAAs determination was labor intensive and fraught with recovery issues. Since adopting the IC-MS/MS system, we have improved confidence in our results and the limits of detection needed, as well as eliminated tedious sample preparation steps, such as sample acidification, extraction and derivatization, reducing the overall analysis time."

Gerhard Paluca, Senior Sanitary Chemist, Erie County Public Health Laboratory

Discover emerging disinfection by-products

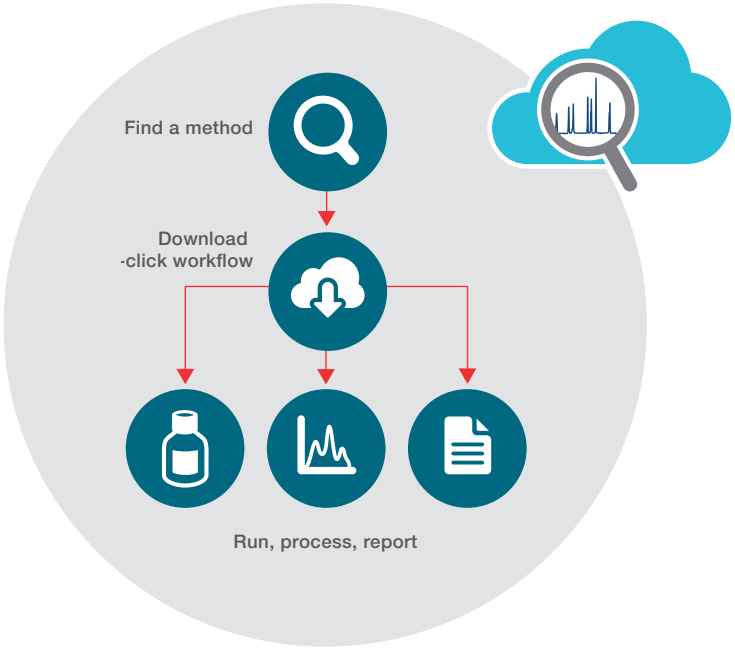
Complete characterization of iodo-DBPs present in DBP mixtures is crucial to further investigate their occurrence in disinfected waters and potential toxicity effects. While the identification of emerging iodinated DBPs in water is difficult due to the complexity of matrix and low concentrations of compounds, a high-resolution accurate mass Orbitrap GCMS workflow can help.

Accurately analyze samples faster and with fewer interruptions

Providing reportable results in a timely manner requires access to a truly connected method setup and data processing ecosystem. Regardless of your application, our setup and data analysis solutions can streamline screening, quantitation and unknown identification using a powerful suite of tools.

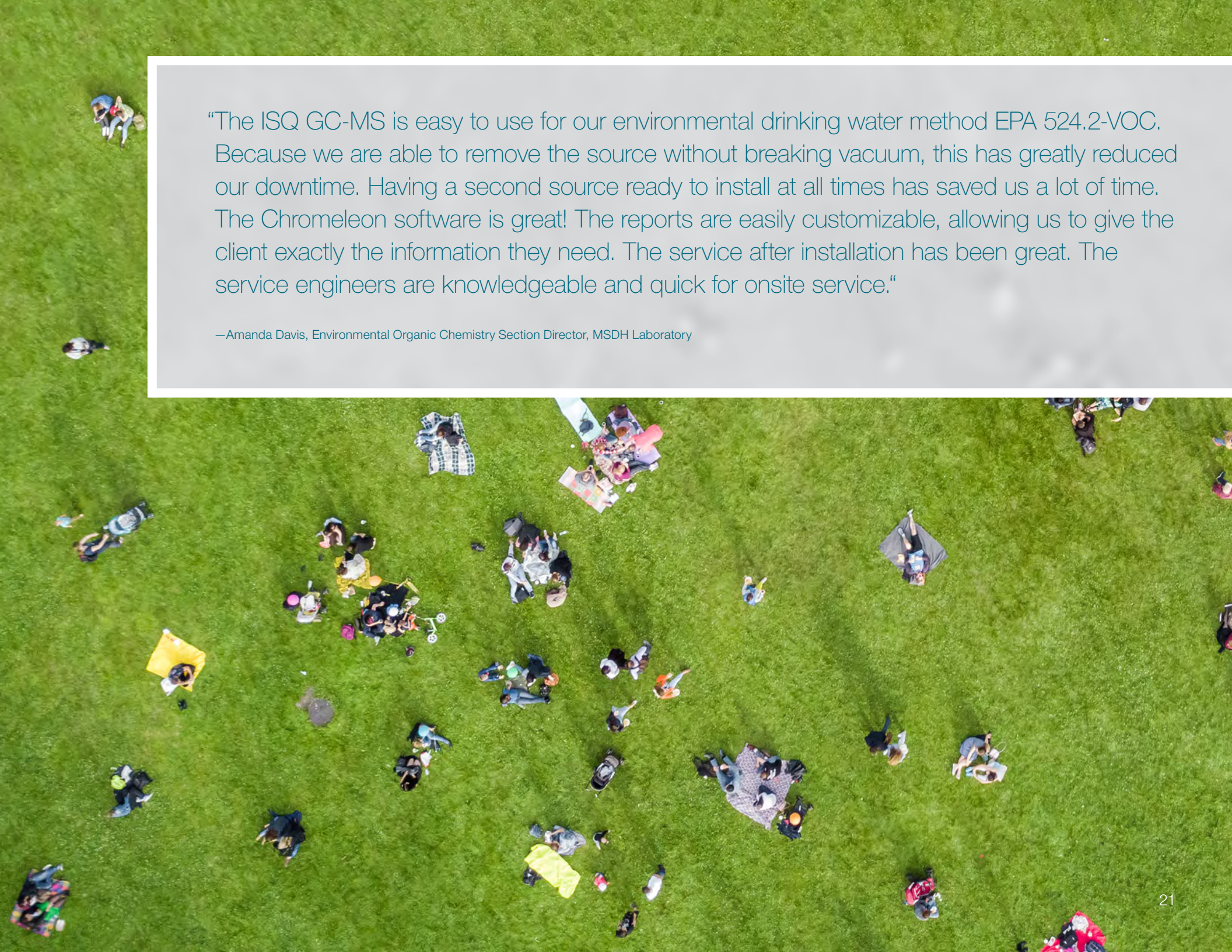
Access the AppsLab Library to jump-start your method development

Method setups just got quicker and easier. Thermo Scientific™ AppsLab Library of Analytical Applications is a searchable online, analytical method repository where you can find environmental applications with detailed method information, chromatograms and related compound information. Do a quick search to find what you need, then move forward with speed and confidence.



Download methods or one-click eWorkflows, created and tested by Thermo Fisher Scientific application scientists, to speed your environmental analysis. All the information needed to run, process and report the analysis is available in ready-to-use methods.

WE CAN help



"The ISQ GC-MS is easy to use for our environmental drinking water method EPA 524.2-VOC. Because we are able to remove the source without breaking vacuum, this has greatly reduced our downtime. Having a second source ready to install at all times has saved us a lot of time. The Chromeleon software is great! The reports are easily customizable, allowing us to give the client exactly the information they need. The service after installation has been great. The service engineers are knowledgeable and quick for onsite service."

—Amanda Davis, Environmental Organic Chemistry Section Director, MSDH Laboratory

Focus on results, not instrument operation

Enable easy rotation of your lab technicians with integrated mass spectrometry workflow-driven software solutions that streamline everyday tasks in smarter ways—from instrument optimization and troubleshooting to routine method development and results reporting.

Easy, intuitive instrument control*

- SmartTune simplifies tuning for Thermo Scientific™ ISQ™ GC-MS and TSQ™ LC-MS and GC-MS instruments—recommending corrective action if a problem is detected
- Ready-to-use templates reduce method development time
- AutoSRM serves as your MS method development expert, integrated into your system
- Timed-SRM automates method optimization when adding more compounds to a single run without compromising sensitivity
- Retention time alignment (RTA) helps maintain retention times during routine operation
- For heavy metal analysis, an intelligent dilution feature registers analytes outside of the defined quality control requirements, then course-corrects and re-runs automatically

** All features not available on all MS instruments.*

Software tailored to analytical testing

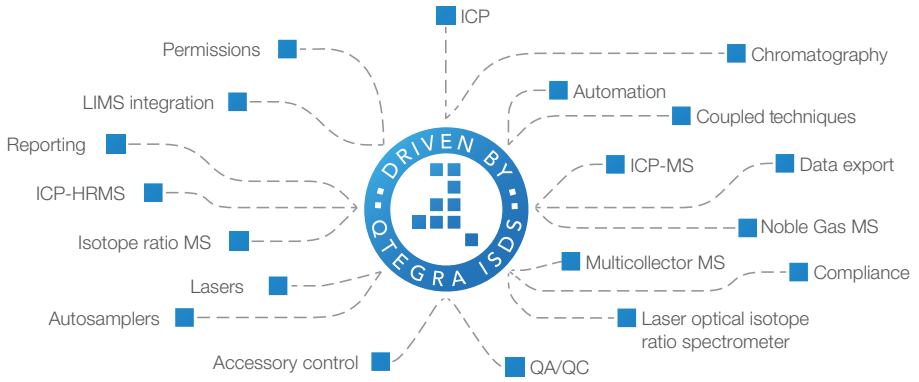
Acquiring data and reporting results in a timely manner is a must for fast turnaround applications.

For GC-MS, LC-MS, IC-MS, and chromatography needs, we offer solutions to streamline your qualitative and quantitative assays applications along with customizable reports and options, including advanced calculations, charting, and results-flagging.

For ICP-OES and ICP-MS trace elemental analysis, Thermo Scientific™ Qtegra™ Intelligent Scientific Data Solution™ provides control and data processing for a wide range of elemental and isotopic analysis.

Needs	Compound Discoverer software	TraceFinder software	Chromeleon CDS software
Non-targeted screening (known/unknown and unknown/unknown)	●	◔	○
Targeted screening	◐	●	◕
Non-targeted and targeted quantitation	○	●	◔
Targeted quantitation only	○	●	●
Complex targeted panel analysis	○	●	◐
GxP/21 CFR Part 11 compliance capable	○	○	●
Library compatibility	●	◕	◐
Thermo Scientific Chromatography and source compatibility	○	●	◕
Third-Party Instrument Control	○	◐	●

○ = Not applicable ◔ = Poor ◐ = Good ◕ = Better ● = Best



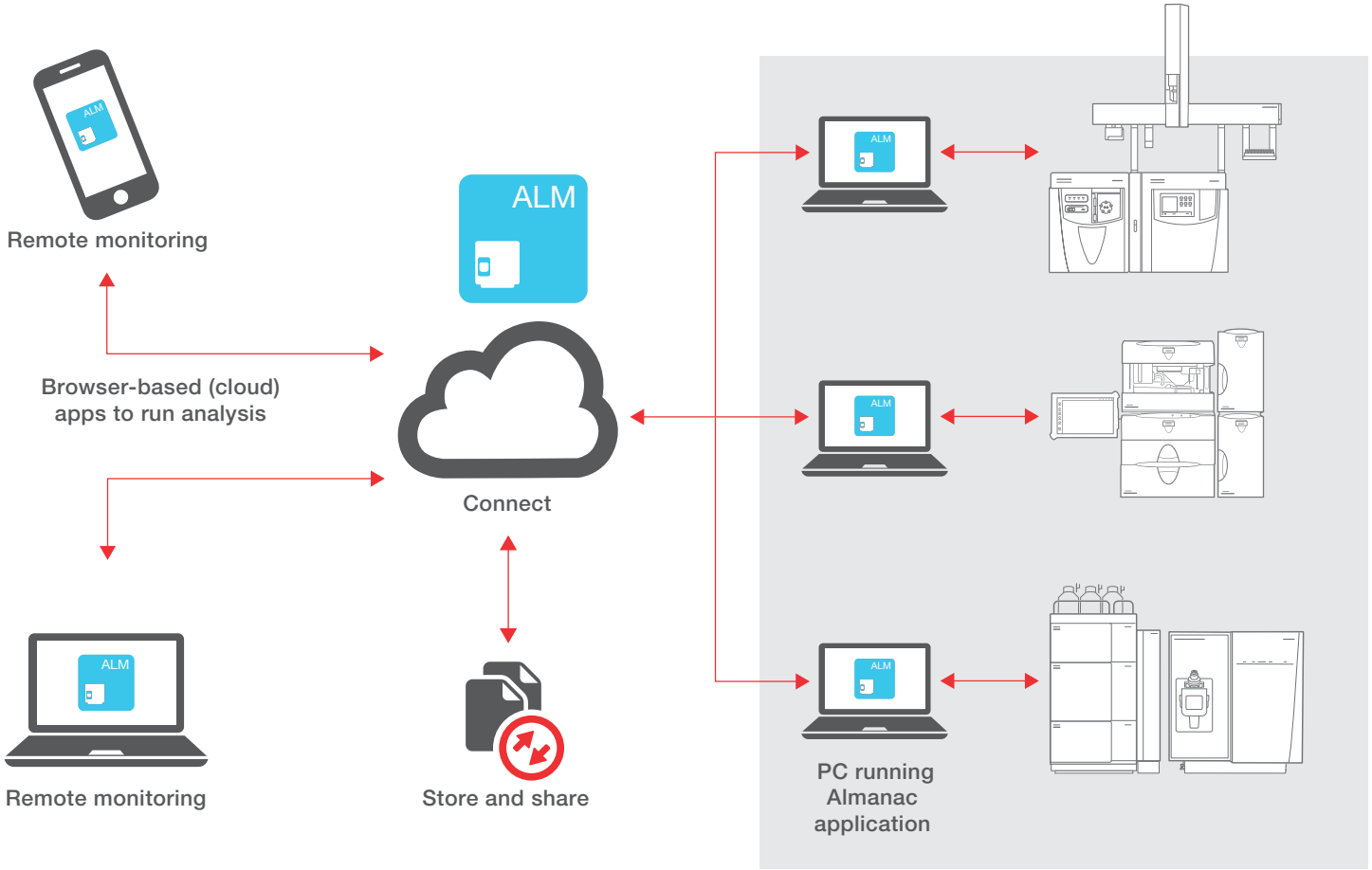
Cross-device training and adoption of new instrumentation is faster and easier, allowing for increased flexibility in modern multi-technique laboratories.

WE CAN help

Provide connected solutions to manage your data stream and day-to-day operations

Every environmental lab can benefit from walkaway efficiencies, and the ability to manage operations from the cloud. Our digital capabilities increasingly enable this evolution—through access to secure, cloud-based data storage, scientific analysis applications, and peer collaboration tools. Asset management tools allow remote time-scheduling on your instruments via your mobile device and monitoring analytical equipment to ensure it's in working order, with real-time telemetry data monitoring and troubleshooting from our service team.

Monitor. Store. Share. Change the way science is done.

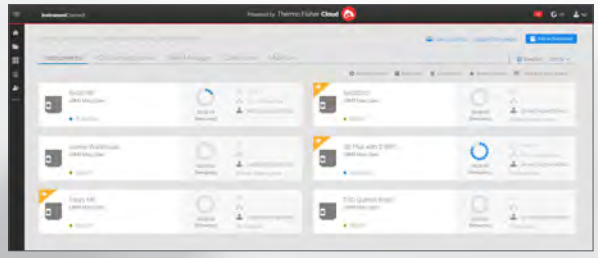


Push. Share. Log. Simplify your instrument management.

Stay connected to your science—let Thermo Scientific™ Almanac™ web based application simplify your instrument management from a single dashboard. Review and share instrument history, stay updated on current acquisition status, and prepare for what's next all from one accessible productivity tool.

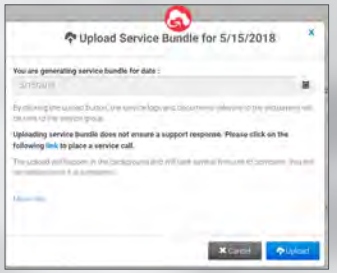
Almanac application features

Lab view



View instrument status

Push to service



Log and push files to service for faster resolution

Digitally connected data

Enabling scientific discovery, designed for the human experience

Reduce operator learning with enterprise software

Use Thermo Scientific™ Chromeleon™ Chromatography Data System (CDS) software to control your entire chromatography lab. It's fully scalable from a single workstation to an enterprise-wide installation, and provides control of more than 350 modules from Thermo Fisher and many other vendors, including support for quantitative MS workflows for all chromatography separation techniques and MS variants, all using the same intuitive user interface.

Track your water sample trends

With Thermo Scientific™ Sample Profiler cloud-based analysis software, in addition to comparing compounds against a database of profiles, this application can easily measure, track, and trend how sample populations (like water samples) change with time, location, production method, and more.

Simplify regulatory reporting

The Thermo Scientific™ SampleManager LIMS™ software includes a pre-configured, ready-to-use water and environmental sample management system designed to simplify regulatory reporting. Developed with ISO 17025 and NELAC requirements in mind, the solution includes sample scheduling, regulatory reports and other templates that allow customers to reduce administration overhead, cost, and implementation time.

WE CAN help

AnalyteGuru online community

A collaborative place to connect with your peers and Thermo Fisher Scientific specialists to get help, share expertise and grow your scientific brainpower.

Plug in. Get answers. Stay connected.

We recently launched an all-new online scientific community that connects scientists across numerous industries, regions and analytical applications. It's your place to ask questions, share insights, converse with scientific peers and technical experts, and solve analytical challenges.

- Connect with thousands of registered users from around the world
- Engage within scientific specialty communities
- Find and share educational resources to advance your science

Find out more at **thermofisher.com/analyteguru**

Collaborate at every phase of your contract testing business

We understand the diverse constraints and challenges that come with operating an environmental contract testing business and meeting customer expectations. We're prepared with the most comprehensive laboratory capabilities, the support to meet everyday demands and the focused attention needed to help overcome barriers to your lab's success.

Business Development
- Laboratory planning
- Technology funding
- Workflow development
- Information management

Pre-Analysis
- Sample receiving
- Sample storage and handling
- Service and support

Analysis
- Lab information and data management
- Sample treatment, extraction and preparation
- Sample analysis
- Service and support

Post-Analysis
- Information management
- Data analysis
- Quality control and compliance
- Sample storage
- Service and support

Managed Growth
- Laboratory expansion planning
- Instrument and software upgrades
- Continued training and learning

WE CAN help

Find out more at **thermofisher.com/powerofpartnership**

thermo scientific

Your partner for environmental testing productivity

From research to everyday, we're focused on protecting the future so we can help you meet the now and next environmental challenges faster, more cost-effectively and with certainty.

Almanac web-based monitoring and management

Stay connected to your science. See how the Thermo Scientific™ Almanac™ application can help you get the most out of your instruments.

thermofisher.com/almanac

Technical and online support: peak performance for your instruments

Helping you keep your instruments running at peak performance is our goal. Whether you're looking for an instrument manual or spare parts, want to submit a repair request, or check on the status of your warranty or service contract, we have every support option you're looking for.

thermofisher.com/technicalresources

Stay up and running with unparalleled laboratory services

Unity™ Lab Services provides a single source for integrated instrument service and support as well as laboratory and supply management. Our customized service offerings and highly experienced world-class service experts have the flexibility and expertise to address your lab's unique needs. We provide a complete portfolio of services and support designed with the MAM workflow in mind to help you improve productivity, reduce total cost of ownership, and help ensure performance of your instruments and workflows.

unitylabservices.com/serviceadvantages

Learn more about our technologies

Chromatography columns and sample preparation
thermofisher.com/chromatography-consumables

Chromatography sample preparation
thermofisher.com/chromatography-sample-prep

Liquid chromatography
thermofisher.com/hplc

Ion chromatography and mass spectrometry
thermofisher.com/ic

Liquid chromatography mass spectrometry
thermofisher.com/lcms

Gas chromatography and mass spectrometry
thermofisher.com/gc-ms

Spectroscopy, elemental and isotope analysis
thermofisher.com/spectroscopy-analysis

Discrete analysis
thermofisher.com/discreteanalysis

Lab data management and analysis
thermofisher.com/data-management

Find out more at **thermofisher.com/environmental-analysis**

ThermoFisher SCIENTIFIC