



TETRA INNOVATION GROUP (TIG)

TETRA Innovation Group (TIG) specializes in providing custom, innovative solutions for oilfield customer challenges.

Our world-class experts ensure that you can focus on your core business when outsourcing your testing and development requirements to TETRA Innovation Group. TIG has international reach and employs the latest technology and methodologies—so that you get the most innovative and cost-effective solutions. Our expert staff is highly trained, has in-depth knowledge of their fields and your business needs, and has experience in meeting both international and local regulations for a broad spectrum of industries.

Our global network of laboratories is among the best. With decades of experience in scientific testing, skills, and our collective knowledge, we offer custom-tailored solutions designed to meet your particular requirements. Our team will be able to advise what is best for you, whether you require full-time support or extra help during peak periods.

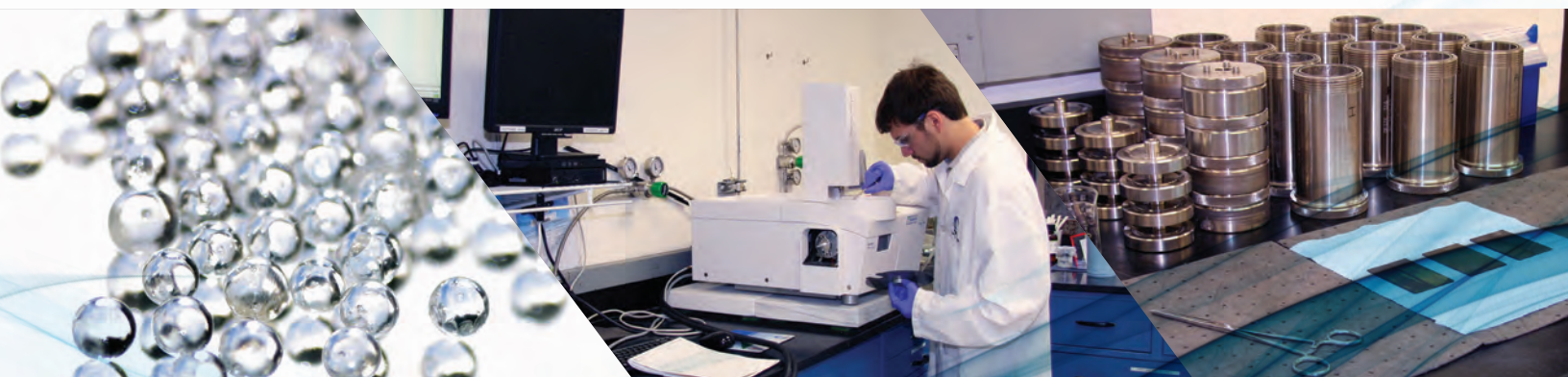
Companies across the globe are experiencing the benefits of our scientific capabilities. Every client, from multi-national companies to smaller organizations, receives the same level of commitment of providing solutions as efficiently and quickly as possible.

Putting Customers First. Your Success Is Our Success.

We are constantly looking beyond our customers' expectations and regulators' requirements in order to deliver market-leading products and services. Our focus on providing specialized solutions that improve quality, safety, and productivity helps our customers navigate in an increasingly regulated world. For us, success is partnering with our customers in order to achieve their desired environmental, social, or economic business objectives.

We specialize in providing custom solutions to our clients' experimental needs. Wherever you are in the world, you can rely on our international team to provide you with specialized solutions to make your business more efficient. TIG employs Agile project methodology with iterative Sprints to develop, test, obtain customer feedback, and revise products and solutions. The use of Sprints allows product design to be adapted as needed and, ultimately, reduces overall development time.

We offer a wide-range of laboratory and technical services across many business lines, particularly those in oil and gas services. Designed with the benefit of TETRA Technologies' experience as the industry's foremost provider of a broad range of oil and gas services, we are able to address the industry's ever-changing challenges.



Global Laboratory Services

TETRA offers a full range of completion and drill-in fluid support services, including:

Specialized Fluid Testing

- Brookfield Rheology
- Mud Displacement Modeling
- High Pressure Differential Scanning Calorimetry
- Gas Hydrate Inhibition Modeling and Testing
- Heat Capacity/Thermal Conductivity Measurement
- Formation Damage Testing
- Lost Circulation Prevention Systems Testing
- Thermal Stability Studies
- Corrosion Mitigation Testing and Modeling
- Insulated Packer Fluid Formulation

Analytical Testing

- GC-Mass Spectrometry (GC-MS)
- Fourier Transform Infra-Red (FTIR)
- Color Spectrophotometer
- Inductively Coupled Plasma Spectrometry (ICP)
- High Pressure Liquid Chromatography (HPLC)
- Ion Chromatography (IC)
- Total Organic Carbon (TOC)
- X-ray Diffraction (XRD)
- Particle Size Analysis (Laser Scattering)
- Thermogravimetric Analysis Differential Scanning Calorimeter (TGA/DSC)
- High Pressure Differential Scanning Calorimeter (HP DSC)
- Flash Point
- Reaction Calorimeter

Completion Fluid Testing

- Brine Reclamation
- Crystallization Point Determination
- Compatibility Testing
- Brine Composition Analysis
- Brine System Optimization
- Oil and Grease Testing
- API RP 13J Testing

Frac Water Testing

- Water Analysis
- Bacterial Analysis
- Water Clarification
- Scaling Index Analysis

All test equipment used to perform laboratory measurements is subject to programmed calibration and maintenance in accordance with documented procedures. We employ the JIRA Agile project management system that helps us stay on top of what's happening, define and manage processes, and ensure task ownership and completion.

Research and Development

Our Research and Development Department explores and develops new and innovative technologies to deliver best-in-class solutions for our customer's greatest challenges, including:

- ▶ Novel, high-density fluids
- ▶ Reservoir drilling fluids
- ▶ Insulating packer fluids
- ▶ Wellbore cleaning chemicals
- ▶ Filtercake breakers
- ▶ Corrosion control
- ▶ Brine Additives - CO₂, H₂S and O₂ scavengers, and flocculants
- ▶ Process development and risk assessment

Technical Services and Product Development

Our Technical Services Department conducts standard and non-standard testing and product development on drill-in, completion, and packer fluids, including:

- ▶ Hydrate modeling and testing
- ▶ Corrosion mitigation modeling, testing, and development
- ▶ Mud displacement modeling, testing, and development
- ▶ Formation damage modeling and testing
- ▶ Loss-circulation prevention modeling, testing, and development
- ▶ Rheological properties evaluation and development
- ▶ Engineered solutions for support of fluid design and management
- ▶ Field support in engineering design and fluid testing
- ▶ Fluid reclamation evaluation and recommendations
- ▶ Fluid troubleshooting

Frac Water Treatment

Our Frac Water Treatment Department performs field and lab testing to deliver customized, cost-effective clean water solutions, including:

- ▶ Water Analysis
- ▶ Bacterial Analysis
- ▶ Water Clarification
- ▶ Scaling Index Analysis

Analytical Services

Our Analytical Services Department offers a broad spectrum of chemical and material characterization capabilities and expertise. Analyses ranging from bulk properties to ultra-trace elemental quantification can be performed in-house via various types of instrumental and wet chemical techniques. The analytical group provides direct support to all technical functions within TETRA and provides the data required to help customize fluid formulations or to identify non-compliant materials.

Instrumentation with Typical Applications

Color Spectrophotometer

Transmission measurements of liquid samples to measure color in a variety of applications.

Flash Point Tester

Pensky–Martens closed-cup apparatus for measuring flash point of liquids.

Fourier Transform Infrared Spectrometer (FT-IR)

FT-IR can be used to confirm the presence of known and unknown materials, or determine the quality or consistency of a sample or the amount of components in a mixture.

Gas Chromatography and Mass Spectrometer (GC-MS)

GC-MS combines the features of gas-liquid chromatography and mass spectrometry to identify components of complex mixtures. It can be used for detecting organic impurities in fluids which aids in design, maintenance, and troubleshooting.

High Performance Liquid Chromatography (HPLC)

High-performance liquid chromatography is a technique used to separate, identify, and quantify the components in a mixture.

High Pressure Differential Scanning Calorimeter (HP DSC)

HP DSC measurements can be conducted under very high pressure, up to 18,000 psi. It can be used to measure the crystallization of salts under pressure (PCT and gas hydrate formation/dissociation).

High Pressure High Temperature Rheometer

Viscometer for measuring fluid rheology and stability up to 30,000 psi and 500°F.

Inductively Coupled Plasma Spectrometer (ICP)

ICP is used to determine trace elements in a variety of matrices.

Ion Chromatography (IC)

Ion Chromatography is used to identify and quantify cations and anions in variety of matrices.

Laser Diffraction Particle Size Analyzer (PSA)

PSA determines the size and distribution of particulate solids in solid or liquid matrices.

Reaction Calorimeter

Reaction calorimeter can be used for basic reaction calorimetry as well as investigating crystallization of salts under controlled atmospheric conditions (TCT).

Return Permeability Tester

Equipment for quantifying fluid formation damage potential.

Thermal Gravimetric Analysis & Differential Scanning Calorimeter (TGA/DSC)

TGA/DSC can be used to obtain thermal critical points like phase changes, degradation, enthalpy, specific heat or glass transition temperature of substances.

Total Organic Carbon (TOC)

TOC quantifies the amount of organic carbon in a variety of matrices. TIG instrumentation is unique in affording the ability to analyze highly concentrated inorganic salt solutions.

X-Ray Diffractometer (XRD)

XRD can be used to determine the mineral composition of cores, cuttings, and ores, identification of scales, corrosion by-products, and unknown materials.



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