



**DYNACHEM**  
RESEARCH CENTER

# ANALYTICAL SERVICES

Analytical Capabilities for Well Fracture Operations



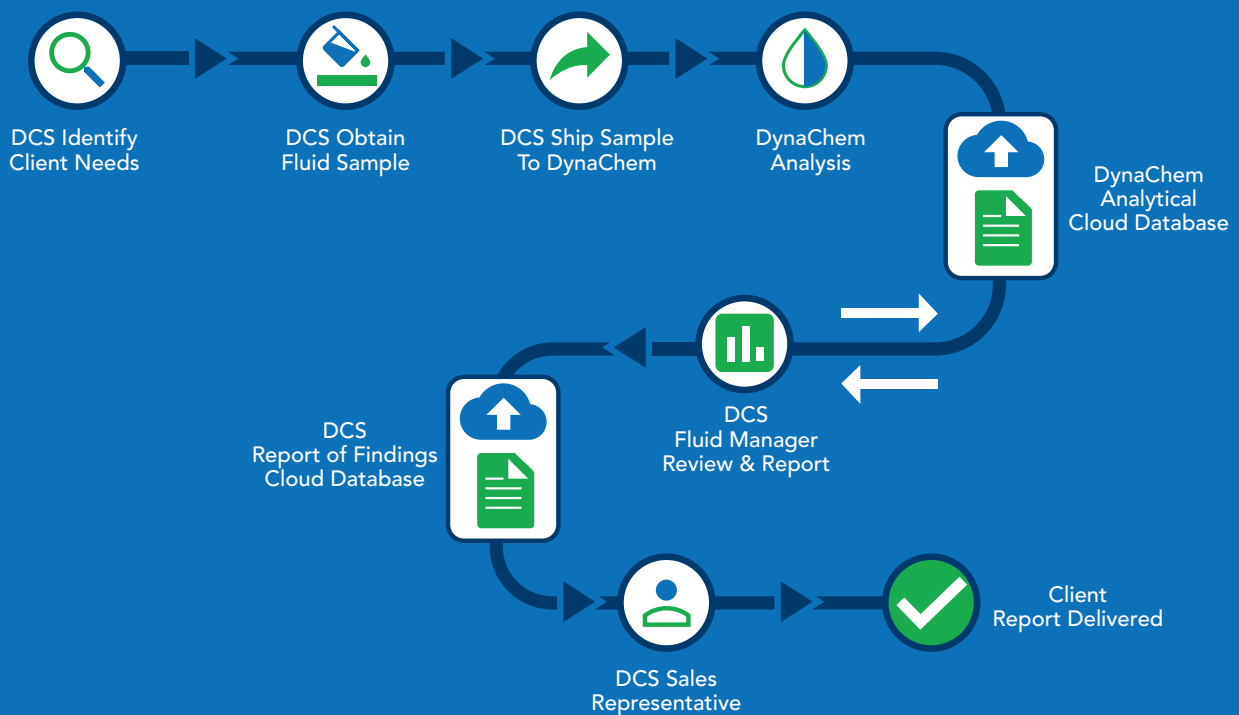
Performance comes from developing a better understanding of the characteristic of water used to create frac fluid systems. DynaChem Research Center provides accurate and responsive analytical results for Downhole Chemical Solutions' clients to optimize fluid designs and achieve superior results in well fracture operations.



## COMPREHENSIVE ANALYTICAL SERVICES

The scientists at DynaChem Research work closely with the sales team of Downhole Chemical Solutions to provide key technical information on the water being used by clients, recording interaction of the water with performance chemicals in frac fluid systems. The DynaChem team is staffed with experienced scientists with many years of experience in the use of analytical instrumentation to provide the most accurate results in the shortest time interval possible. DynaChem’s technical center can provide thorough analysis of inorganic, organic, microbiological materials within water, as well as, complex chemical mixtures.

### PROCESS FLOW



**DynaChem along with Downhole Chemical Solutions provide a seamless path for clients to obtain responsive analytical data and reports of field samples.**



## WATER ANALYSIS

A complete understanding of water chemistry (anions & cations) allow for anticipation and prevention of operational problems such as polymer interference, scale deposition, and suspended solids production. DynaChem scientist use several routine and advanced analytical techniques and instrumentation to obtain water characteristics, including:

- Inductively Coupled Plasma - Optical Emission Spectrometry (ICP-OES)
- Ion Chromatography (IC) and Ion Specific Electrode (ISE)
- Conductivity, Alkalinity, and pH
- UV-Vis Spectroscopy to estimate Chemical Oxygen Demand (COD)
- Fourier transform Infrared Spectrometry (FT-IR)

## MICROBIOLOGICAL ANALYSIS

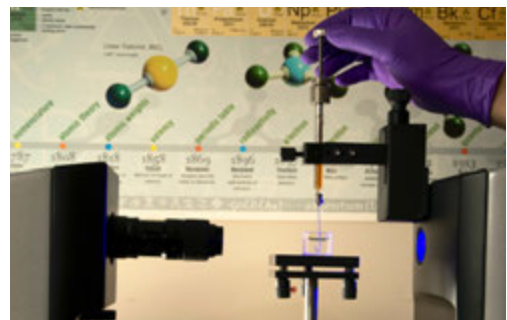
DynaChem scientists perform several analytical methods to identify and determine concentration of microbial populations in frac water. Analysis methods include:

- Identification of various bacteria including sulfate-reducing (SRB) and acidproducing (APB) bacteria.
- Biocide screening of oxidizing biocides and organic biocides.
- Microscopic techniques such as identification of live/dead staining.
- Adenosine triphosphate residuals (ATP)

## SURFACE TENSION ANALYSIS

Surfactants are key components in well fracfluid development. In general, surfactants in water possess hydrophobic (water repelling) and hydrophilic (water adsorptive) parts and tend to adsorb in the oil-liquid interface. Interfacial tension studies the response of the adsorbed interfacial layer and the influence surfactants

have on the flow of oil in water. DynaChem researchers use advanced interfacial tension instruments to measure the influence of surfactants in water with crude oil. The sensitivity of these instruments allow researchers to gauge the influence of small changes in surfactant type and concentration on the performance of well frac fluids.





## SOLIDS ANALYSIS

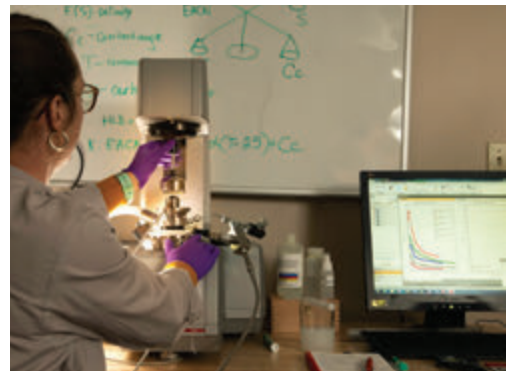
DynaChem scientists use advanced organic and inorganic methods with instrumentation to identify unknown components of complex solids. Some techniques used include:

- Organic characterization with FT-IR and pyrolysis scan GC/MS
- Mineral analysis through X-Ray Diffraction (XRD)
- Detection of inorganic components with Scanning Electron Microscopy Energy Dispersive X-Ray Spectroscopy (SEM-EDS).
- Loss on ignition test by standard ashing and gravimetric determination.



## SOLIDS ANALYSIS

Rheology studies the deformation and flow of matter. Investigating the influence of shear and stress on polymers in water are essential for researchers involved in well fracture fluid development. Variations in polymers along with possible negative interaction with certain compounds in fluid systems require expert analysis of the rheological characteristics of treated water. DynaChem researchers use the latest in rheological testing equipment to develop data on polymers in different water stress conditions.





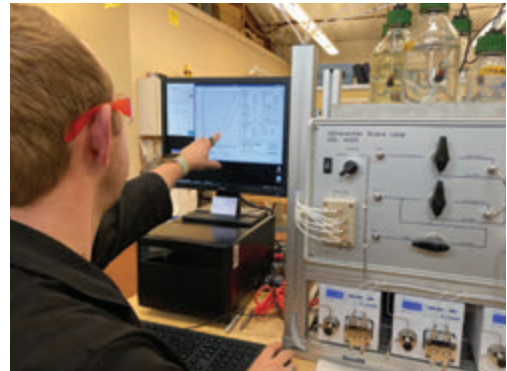
## FLUID FRICTION TESTING

Friction reduction is one of the key parameters in the evaluation of potential polymers for use in well fracture operations. DynaChem scientists use industry standard hydraulic flow loop instrumentation to obtain friction reduction performance of polymers in different types of waters at different dosage rates. The friction flow loop testing of polymers can be supplemented with the addition of other performance chemicals such as scale inhibitors, surfactants, biocides and viscosity enhancers. The results of testing are captured in real time and translated into analysis reports.



## SCALE PREDICTION & INHIBITOR SELECTION

It is important for clients to know in advance of well completion operations if a water or a blend of waters might result in a mineral scale deposit. DynaChem chemist use a combination of methods and instrumentation to predict the potential for mineral scale in produced waters. Methods include water simulation, and compatibility (turbidity) screening. DynaChem also uses Differential Scale Loop (DSL) equipment to simulate real - world conditions (pressure / temperature) combining waters which potentially form scale resulting in an increase in differential pressure across a small diameter tubing channel. The information provides the minimum effective concentration of the scale inhibitor tested, forming the basis for the decision of which inhibitor to use in application.





## DYNACHEM RESEARCH PERSONNEL

### **Suchandra Hazra, MS**

#### *Research Chemist*

Suchandra obtained a degree in Veterinary Sciences from West Bengal University of Animal & Fishery Sciences and a Master of Science in Biology from University of Louisiana Lafayette. Suchandra has over 5 years of experience in analytical testing and specialty chemical development with extensive research in friction reducing polymers, clay control chemicals, and the influence of produced waters on the performance of specialty chemical additives in well fracture operations. Suchandra possesses advanced knowledge and experience in the use of advanced rheological instrumentation (Anton Paar MCR Rheometer) used to evaluate visco-elastic and oscillatory polymer stress/strain values.

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### **Yash Doshi, MS**

#### *Research Chemist - Chemical Engineer*

Yash obtained a BS in Chemical Engineering from Mumbai University, Mumbai, India and a Masters Degree (MS) in Chemical Engineering from University of Louisiana Lafayette. As an engineer at DynaChem Yash combines his field chemical plant experience with his research work to provide basic and advanced test results in the experimentation of friction reduction in hydraulic flow loop. Yash's knowledge and experience in modeling software provides valuable simulation data for chemical reactions.



## DYNACHEM RESEARCH PERSONNEL

### **Richard "Butch" Trahan**

#### *Business Manager (DynaChem)*

Butch has an extensive business background in operations and facility management, at DynaChem he provides coordination of all aspects of work flow for the DynaChem Research Center. Managing the physical flow of materials into the center and the digital flow of analytical research information coming out of the technical center is a priority of every day operations. Butch coordinates with internal and external stakeholders to meet client timing and objectives for information.

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### **David Trahan**

#### *Chief Science Officer*

David obtained a BS in Chemistry and Physical Science from the University of Louisiana Lafayette. Over a 40 year career David has led research and development efforts in specialty chemical applications in the oil & gas upstream and midstream areas. David's advanced knowledge and experience working with organic/inorganic chemical raw materials provides a sound foundation for formulating a broad range of chemical solutions. For his innovative work, David has been awarded a number of US and foreign patents with inventions designed to improve oil & gas processes.



## DOWNHOLE CHEMICAL SOLUTIONS, LLC

Molecule to the Wellhead™

Downhole Chemical Solutions supplies chemicals and services for well fracture operations in the oil and gas industry.

**To learn more, contact a technical sales representative or visit online.**



DynaChem Research Center, LLC  
A division of Dynamic Chemical Solutions, Inc.

**Technical Center**  
1424 Hugh Wallis Rd S.  
Lafayette, Louisiana 70508

**Corporate**  
One Cowboy Way, Suite 572  
Frisco, Texas 75034

[www.stimchems.com](http://www.stimchems.com)

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