

# Satellite Laboratories

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## Expro operates a network of laboratories across the globe providing the highest quality analysis close to our client's operations.

The first permanent installation was made in Algeria in 1998, and the laboratories have since expanded to cover eight different countries. From the inception, Expro has been dedicated to the principle of providing exceptional experimental PVT and compositional analysis wherever we work. This objective is delivered through the Fluid Analysis Centre (FAC) in the UK, and has been achieved by training, technology transfer, calibration and rigorous quality control.

Using state of the art PVT equipment, Expro is able to offer an extensive range of analysis including:

- Reservoir Condition Analysis
- Flow Assurance
- Analysis of non-hydrocarbon components
- Basic Water Analysis
- Enhanced Oil Recovery

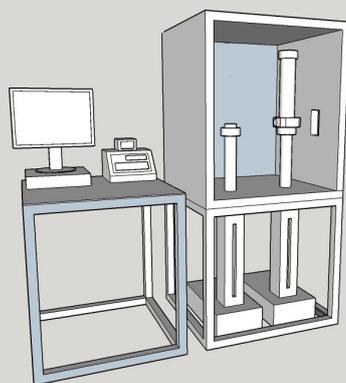
Analysing fluids at HPHT (15,000 psi, 175°C), and routinely handling samples with high levels of H<sub>2</sub>S and CO<sub>2</sub> the laboratories can provide analysis solutions for some of the most challenging environments.

The PVT equipment is supported by advanced chromatography techniques which deliver high quality hydrocarbon compositions up to C36+. Rigorous quality control with duplicate runs ensures robust reliable compositional data.

All the key aspects of the satellite laboratory activities are traceable to internationally recognised standards. A dedicated metrology laboratory at the FAC operates a stringent calibration regime for all instruments used for PVT and compositional data. Portable calibration equipment is sent from the FAC for this purpose, with all records being stored centrally in accordance with the ISO 9001 management system.

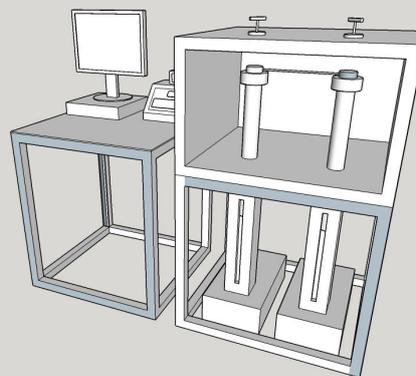
The laboratory analysis is overseen by a dedicated team of PVT and analytical specialists, based in the UK, who continually review the performance of all the instruments and the quality of the produced data.

To provide our clients with confidence that our data will always meet expectations and be of a consistent quality, we use calibration, verification and review.



Global Onsite Laboratory Data (GOLD)

Condensate



Global Onsite Laboratory Data (GOLD)

Black oil

### Locations

Satellite laboratories are at the hub of a network of regional Expro Fluids Laboratories, delivering the same excellent standard of analysis wherever it is conducted. Through the use of standards, training, calibration and technology transfer we can remove the need to waste time and money on complicated logistics, providing the results when they are needed.



## Capabilities

Each laboratory has been established to meet local requirements; however, these are constantly under review with equipment and personnel available for rapid deployment, from our technical centre in the UK, to expand the analysis options we are able to offer.

	Fluids transfer and validation	Compositional analysis	Black Oil PVT	Gas condensate PVT	Flow assurance	EOR	Basic production chemistry	Specialist services
Algeria	●	●	●	●	●	●	●	
Angola	●	●	●	●	●	●	●	
Bolivia	●	●	●	●	●	●	●	
Brazil	●	●	●	●	●	●	●	
Iraq	●	●	●	●	●	●	●	
Qatar	●	●	●	●	●	●	●	Sulphur speciation
Saudi	●	●	●	●	●	●	●	
USA	●	●	●	●	●	●	●	HPHT capability

● Available

● Denotes capability that can be added with the deployment of additional equipment

## Analysis Techniques

### Fluids, Transfer and Validation

Expro is able to handle all commercially available sampling tools and the majority of third party equipment. Using advanced inline sensors in our Turbo PVT instrument, initial data on samples including the volume of phases and live density can be provided during the transfer of fluids to Expro storage cylinders.

Cylinders are available to store samples from the most challenging HPHT reservoirs, including chambers designed to capture H<sub>2</sub>S samples without compromising sample integrity.

Assessing the viability and validity of all samples prior to embarking on detailed analysis programs is essential. The initial validation will depend on the sample type and analysis requirements, but will seek to identify unrepresentative samples or issues that have occurred in transit.

### Compositional Analysis

Accurate compositional analysis of produced fluids is essential for a full understanding of hydrocarbon reservoirs, and provides the starting point for good Equation of State Simulation. Analyses are customised to meet the exacting needs of every project. The analytical procedures have been developed at our UK technical centre with the techniques being applied in all our laboratories. A commitment to the highest quality data using rigorous calibration, verification and monitoring procedures allows us to provide the best compositional data every time.

Using Gas Chromatography as the primary technique we can provide hydrocarbon composition to C36+ as standard, including N<sub>2</sub>, CO<sub>2</sub> and H<sub>2</sub>S.



## Black Oil PVT and Gas Condensate PVT

Understanding the physical properties of fluids is a key element in the successful development of hydrocarbon reservoirs and allows optimisation of the fluid processing and transportation facilities. The PVT analysis helps to describe the thermodynamic behavior that exists at reservoir conditions and throughout the production and processing systems.

Conventional black oil studies will include a, Constant Composition Expansion (CCE) Differential, Multi-stage Separator Tests and Viscosity.

Gas Condensate studies will include Dew point determination, CCE with liquid phase measurements, Constant Volume Depletion (CVD) and Separator Tests.

## Specialist Analysis

In today's challenging environment our client's requirements are continuously changing; to support this, the FAC in the UK is able to deploy additional equipment and resources to any of our laboratories to provide specialised analysis solutions. This can either be through established techniques or the development of novel approaches.

## Flow Assurance

Preventing costly unexpected interventions is essential to maximise the profitability of reservoirs. Understanding the undesired behavior of the fluid during extraction, production and processing gives confidence in the large investments necessary.

The Expro Laboratories are focused on fluid stability examining the precipitation of asphaltenes and waxes. We are able to perform work at high pressures and extremes of temperature to assess the fluid during the entire production. In addition, we are able to demonstrate the compatibility with other fluids and injection gases. Where unwanted behaviour is observed we can examine the effectiveness of chemical inhibitors.

## Basic Production Chemistry

High quality routine gas and liquid analysis is required to monitor ongoing production against expectations and allows appropriate intervention to prevent adverse behaviour. Expro's satellite laboratories can provide high quality analysis in this field, especially where local infrastructure is still developing.

## Enhanced Oil Recovery (EOR)

Prior to launching into an expensive project to recover additional oil from a reservoir, the process can be simulated in the laboratory to establish project viability. A range of experimental techniques are used to assess the interactions between the injection gas and reservoir fluids at a range of conditions, helping to refine and validate EOS models and establish an EOR strategy. Testing includes swelling studies, slim tube displacements, multi-contact studies and re-vaporisation experiments.



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