Reservoir Characterization
Over 25 years of experience.
A world leading technology company, Tracerco has used its scientific expertise for over 25 years in support of the oil and gas industry, providing unique and specialized detection, diagnostic and measurement solutions.

With facilities, knowledge and expertise located around the world, Tracerco provides its international customers with a first class service expected from an industry leader. Tracerco offers a portfolio of reservoir characterization services based on advanced tracer technologies and sophisticated analytical techniques. Using our extensive multi-disciplined Research and Development team, that forms an integral part of the Tracerco business, and Tracerco’s expertise in field deployment an extensive range of chemical tracing methods for reservoir and near well-bore flow characterization is available.

Why Tracerco?
:: Over 25 years of expertise
:: Operational capabilities globally
:: Significant investment in Research and Development
As the demand for hydrocarbons continues to grow, oilfield professionals are continuously faced with the challenge of discovering, developing and maximizing hydrocarbon reserves from more inhospitable locations and complex geological structures.

Knowledge of subsurface fluid flow provides valuable information to a reservoir field development team during hydrocarbon recovery. This information can be used to ensure effective reservoir displacement to maximize hydrocarbon extraction efficiency.

More information means maximum efficiency to meet the needs of our customers, Tracerco has developed a range of specialist tracer technologies that can be applied to enhance information on oil, water and gas flows in reservoirs. The techniques are applied in many development stages from drilling wells, field development and in late field life to monitor the effectiveness of tertiary recovery operations.
TRACERCO RESERVOIR CHARACTERIZATION

TRACERCO™ Smartsleeve Technology
Tracerco Near Well Bore tracer techniques provide our customers with a reliable method of monitoring the progress and effectiveness during a range of down-hole operations including:

- Coring-Fluid Invasion Measurement
- Hydraulic Fracture and Acid Stimulation In-flow Assessment
- Perforation Positional Flow Measurement

Gain better insight into original fluid saturations.
When drilling wells it is critical that reservoir fluid properties are accurately measured. Any interference due to invasion of oil or water based drilling fluids during drilling activities must be discounted during formation fluid analysis. The Tracerco Core Invasion Measurement technique is used to determine the level of drilling fluid invasion into formation samples. Prior to the start of drilling operations through a zone of interest, a specialist oil or water compatible chemical tracer is added to the mud system providing a constant concentration of tracer throughout the drilling mud system.

For Core Invasion Measurement, as drilling progresses, a series of mud samples are taken at specific drilling depths. Interpretation of the mud sample and core fluid tracer concentration analysis provides:

- A tracer/drilling mud concentration ratio at vertical depths
- Extracted core tracer/drilling mud concentration at specific vertical depths
- Percentage of drilling mud core invasion, calculated from ratio analysis

In addition, contamination of bottom hole samples can be measured using the same technique.

"Use Tracerco to more accurately measure in-situ fluid saturation, formation brine salinity and original water saturation"
A more cost effective and accurate technique for verification of fluid inflow.

Hydraulic Frac and Acid Stimulation In-Flow Assessment

“Gain information on overall production contribution from each stage of a stimulation program using Frac and Acid Stimulation tracers.”

Following multi stage hydraulic fracturing or acid stimulation of a well, it is valuable to gain a better understanding of the overall production contribution from each treatment stage. Historically, there has not been any technology to verify positional fluid inflow other than the use of intrusive production logging tools. In many extended reach wells, the use of a production logging technique has been relatively inaccurate and can be expensive.

Working with its customers Tracerco has developed a technology to provide fluid inflow information after stimulation that has proven to be very beneficial, especially in extended reach horizontal wells that are challenging for conventional well logging.

Interpretation of the data in conjunction with overall well production information enables:

- A comparison to be made of relative hydrocarbon flow from each stage
- Highlight areas of high, low and zero flow (somewhat similar to a production log)
- Confirm flow through downhole tools such as bridge plugs
Tracerco applies oil or gas compatible tracers at the leading edge of each stage.

Tracers are displaced deep into the formation.

Tracers contact reservoir oil and gas and partition into the hydrocarbon.

Presence of tracers confirms production from each stage.

Samples analyzed to determine tracer presence and quantity.

Samples are taken at the surface during well clean up and first production.
Perforating Tracers

“Tracerco’s Perforating Tracer technology provides a proven technology to assess perforated zone backflow confirmation for cemented liner completions.”

This allows confirmation that each zone is contributing to overall production from the well. Information can be used to enhance the data set of the production well test.

Benefits of the perforation tracers:

:: No additional rig time/rig space
:: Low cost
:: Chemical tracer materials used
:: None intrusive confirmation of zonal flow
Unique tracers are located at specific perforation locations in the well bore. During the detonation process, tracer material is forced into the formation where it bonds to the perforation tunnel walls. Sampling production fluids during back flow of the well during clean up and first oil allows a flow profile of each tracer to be established and verifies flow from specific zones.
Reduce routine well intervention activities and associated costs.

**Flow Profiling**

**Water/Oil Inflow Measurement**

“Determine the location of water and oil inflow with zero well intervention using low cost, zero risk Tracerco technology as part of long term reservoir monitoring.”

Tracerco Flow Profiling technologies provide a reliable and cost effective method that can be applied with:

- No additional rig time
- No changes to well completion design
- No changes to well stimulation operations
- Zero safety risk

The measurement of produced water and oil fluid inflow characteristics in extended reach or multi-lateral wells during clean up and long-term production is essential. It allows a better understanding of reservoir sweep and assists in diagnosing well inflow performance problems prior to well remediation operations.

The ability to collect inflow profile data at first oil as well as mid-field life without the need for well intervention enables our customers to significantly reduce routine well intervention activities and associated costs especially when using subsea wells during a field development.
Customer cost efficiency is maximized by:
:: Tracer material optimization
:: Extremely low limits of detection (ppb and ppt)
:: Tracer design and application

Prior to running a completion string, a number of unique chemical tracer materials are incorporated as part of the completion design. Tracers selected are designed to be oil or water soluble. Their chemical and physical design is customized for a specific project allowing them to be released quickly providing an indication of oil or water inflow contribution during first clean-up of a well, or very slowly allowing water or oil fluid inflow to be determined over a significant period of time. A number of unique tracers can be added not only to an individual well bore but can be spread across a number of wells or multi-lateral well bores. This is particularly important in the identification of the source of oil and water production from individual well bore positions.

Sampling is carried out during well clean up and first production if using a relatively short release tracer design or routinely alongside other sampling activities if extended release tracers have been applied. The presence of a specific tracer and its concentration in production fluids allows a fluid inflow profile to be generated at a given point in time.
Optimize ongoing field design and maximize hydrocarbon recovery.

Interwell

“Enhance your understanding of reservoir connectivity by adding a Tracerco Interwell Tracer Study to your reservoir surveillance tool kit.”

Tracerco has developed a range of specialist tracer technologies that allow measurement of interwell flow of injected water, gas and enhanced oil recovery chemicals. The technology is commonly applied in new field developments that use waterflooding or gas injection as part of their initial recovery mechanism, as well as more mature reservoirs where enhanced recovery programs are used to extract incremental oil remaining within the field. A Tracerco Interwell Tracer Study is typically used alongside other reservoir surveillance tools to refine or validate computer flow simulators to optimize ongoing field design and ultimately maximize hydrocarbon recovery.

Our technology provides measurement of water, gas or steam flow from each injector to production wells allowing the determination of:

:: First injection water or gas breakthrough
:: Reservoir interlayer connectivity
:: Detection of fault block communication
:: The presence of high flow permeable channels
:: Measurement of flood wide reservoir preferential flow trends
Accurate measurement of SOR within a mature reservoir using Tracerco chemical tracer technology.

Alongside dynamic flow information, the use of specialist tracers allows additional information to be gained concerning the effectiveness of enhanced oil recovery applications such as:

- High permeable channel blocking
- Release of immobile residual oil in flow paths between wells

For cases of channel blocking, tracer can be used to determine sweep extent and timing prior to the blocking chemical addition and then repeated afterwards. Data generated alongside the measurement of incremental oil production can be used to validate its effectiveness.

For mature reservoirs, tracers can be used to benchmark residual oil saturation levels prior to a tertiary recovery treatment. Subsequent measurement of changes to residual oil within the formation allows the effectiveness of a treatment to be determined.
On-site or off-site, specialist tracer laboratories.

Our global team of experienced production chemists allows us to offer both on-site and off-site monitoring. If using one of our fully equipped mobile laboratories we are able to offer immediate results at the well site. We also have a number of fixed laboratories containing more sophisticated analytical equipment that can be used if enhanced analytical sensitivity is required or sample logistics is not an issue.

Tracerco laboratories are strategically located around the world backed by a dedicated multi-discipline team at our headquarters. This enables us to offer a full range of standard and customized analytical and diagnostic techniques to meet your specific requirements.

“Specialist tracer analysis provided through local service provision.”
Tracerco laboratories provide you with a full range of analytical and diagnostic services.

Through extensive training of specialist staff around the world, we offer local project design, tracer material handling, in-country support, regional analytical capability and tracer data interpretation.

Our global experience in reservoir tracing projects, combined with cutting edge chemical tracer technology and modern facilities, place Tracerco at the forefront of reservoir tracer application.
Tracerco offer a range of other award winning products and services to the oil and gas industry:

:: Analytical Services, offering a full range of standard and custom analytical and diagnostic technologies to meet all reservoir requirements
:: Process Diagnostics
:: Radiation monitors/detectors
:: Subsea services
:: Instrumentation
:: Product Assurance
:: Radiation Protection Advice
Benefit from over 25 years of global experience.

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