Efficient reservoir development requires a good understanding of reservoir and production systems, especially in a low oil price market scenario where established fields are the most likely places to find additional oil and gas production. Improving the performance of existing wells that are already producing or suspended is a cost-effective way to offset natural decline, extend field life and improve hydrocarbon recovery.

**Reservoir Surveillance, Pressure Transient Analysis & Production Optimization with Permanent Downhole Gauges:**

Multiple wells completed with Permanent Downhole Gauges or with Electrical Submersible Pumps or Progressive Cavity Pumps equipped with Permanent Downhole Gauges? Permanent Downhole Gauges are a remarkable source of information.

Let us at CAYROS collect, store, visualize and analyze all these data in one common database that allows you to monitor in real time the performance of each well, for continuous production optimization and enhanced reservoir characterization and management.

**Reservoir Surveillance with Permanent Downhole Gauges:**

Permanent Downhole Gauges are able to collect tens of thousand of data points per day where the actual characteristics of the reservoir and production systems are embedded. These gauges monitor real-time well’s performance that includes bottomhole flowing pressures and temperatures where occasional unplanned buildups, in the case of pump failures, or planned buildups, in the case of annual pressure surveys are captured. By collecting, smart filtering, noise reduction and analyzing these data, CAYROS’ Engineers can help you to further characterize your reservoir, understand wells performance and optimize your production. Permanent Downhole Gauges are also an excellent source of data for Rate Transient Analysis – RTA (see our brochure on Advanced Rate Transient Analysis – RTA).
Analysis of Planned and Un-Planned Build-ups:

Pressure Transient Analysis allows you to characterize critical reservoir properties, such as: flow regimes, average reservoir pressure, permeability, skin, boundaries, heterogeneities, driving mechanisms and productivities; also permits to evaluate completion efficiencies and recommend potential stimulations or optimization practices.

CAYROS Engineers have extensive knowledge and worldwide experience in analyzing, designing and supervising several hundred of pressure transient analyses, including: build-ups, drawdowns, fall-offs, formation evaluation, interference and pulse tests. Pressure transient analyses performed on a wide variety of conditions: horizontal, slanted and vertical wells; gas, condensate, light and heavy oil wells; producing and injection wells; sandstone and carbonate reservoirs; on-shore and off-shore fields.

Production Optimization with Permanent Downhole Gauges:

The best results and benefits of acquiring, processing and interpreting several Giga bits of test data is by applying these learnings and knowledge on the identification and implementation of best practices for production efficiency and optimization through increasing of production and reserves, reducing operating expenses and maximizing profitability.

CAYROS Geoscientists and Engineers have participated on multiple reservoir and production optimization studies where production issues related with reservoir conditions (i.e. skin damage, by pass pay, etc) and/or mechanical production conditions (i.e. pump issues) were identified and corrected by stimulations and re-completions.
Efficient reservoir development requires a good understanding of reservoir and production systems, especially in a low oil price market scenario where established fields are the most likely places to find additional oil and gas production. Improving the performance of existing wells that are already producing or suspended is a cost-effective way to offset natural decline, extend field life and improve hydrocarbon recovery.

**Reservoir Surveillance & Optimization of Field Production & Reserves with Rate Transient Analysis:**

Need for additional arguments to support volumetrics (OGIP-OOIP), reserves (EUR), drainage areas or reservoir characteristics (K, S, Xf)? Need for identification of flow regimes, productivity issues, interference, down spacing or effectiveness of stimulation treatments? Rate Transient Analysis (RTA) could be the answer.

Let us at CAYROS analyze your production and flowing pressure data and put all these data to work. With RTA, CAYROS' Engineers can use multiple independent techniques for estimating original hydrocarbons in-place, expected ultimate recoveries, reservoir characteristics, productivity issues and effectiveness of stimulation treatments without the need for you to shutting-in production.

**Diagnostic Typecurves and Material Balance with Rate Transient Analysis:**

The diagnostic typecurve plots yield estimates of hydrocarbons in-place, expected ultimate recoveries, drainage areas, permeability, skin and fracture half-lengths, in addition to identification of dominant flow regimes, liquid loading and interference issues, and pressure support without the need for shutting-in production.

The Flowing Material Balance (FMB) is a depletion analysis procedure, where the straight-line portion of the graph extrapolates to the amount of hydrocarbons in-place. The Productivity Index (PI) is a useful tool for identifying localized shifts in productivity, due to: interference, liquid loading or other disturbances.
Analytical/Numerical Modeling and History Match with Rate Transient Analysis:

Analytical and numerical models are created, assuming volumetric rectangular reservoirs with vertical, horizontal or fractured wells in the center. From this, flowing pressure history matches are generated in an effort to confirm the results from the diagnostic typecurve analysis and flowing material balance. To calibrate the history match models, additional degrees of flexibility are introduced, such as the shape of the drainage area and the location of the well within the drainage area.

CAYROS’ Engineers have analyzed several hundreds of wells with RTA. Volumetrics (OGIP-OOIP), reserves (EUR), drainage areas and reservoir characteristics (K, S, Xf) are supported with actual well performance production data. Flow regimes, productivity issues, interference, down spacing and effectiveness of stimulation treatments are identified.

Production Forecasting & Optimization with Rate Transient Analysis:

With a wide suite of quick and easy to use analytical and gridded numerical models, including single and multi-layer reservoirs, multi-stage fractured horizontal wells, dual porosity and more, forecasting future production is faster than traditional simulation and can be applied to a large number of wells in a practical time frame.

Once diagnostic analysis, modeling and history matching has been completed, CAYROS’ Engineers perform several production forecasting and optimization sensitivity cases under different constraints to evaluate opportunities for incremental reserves and production.