



/ Expro Excellence

Wireless Well Solutions

CaTS™ wireless monitoring technology provides critical data during early stage field development in the deepwater pre-salt Santos Basin of Brazil



Objectives

- Uncertainties in reservoir connectivity and compartmentalisation risk are important considerations when thinking about any new field appraisal or development – having a better understanding allows for an appropriate drainage strategy and optimised field development plan
- Petrobras is conducting an active programme of drilling and well testing evaluation in the pre-salt Santos Basin area with the objective of maximising the collection of data to prove the reservoir model
- Newly drilled development wells may be suspended for a period of two to three years prior to installing a completion – an opportunity was identified to instrument the wells with CaTS wireless gauges to gather valuable reservoir data during the extended period of well suspension
- The primary monitoring objective was to gather dynamic reservoir pressure data that could be used to identify interference effects resulting from production or injection events in the adjacent field area, thus confirming connectivity
- A secondary objective in one well was to perform a long-term pressure build-up to investigate the presence of any far reservoir boundaries or flow barriers
- With water depths in excess of 2100m and gauge setting depths of approximately 2800m below the seabed, the monitoring environment was considered to be quite challenging

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- CaTS wireless transmitting gauges were deployed into two wells: in the first well the gauges were deployed using e-line and set in an R nipple profile in the tailpipe; for the second well the gauges were set in the nipple profile at surface and then deployed integral with the packer and tailpipe assembly
- The gauges for the first well were pre-programmed with a data transmission schedule of one reading per day to give three years of monitoring, and in the second well, eight readings per day were to be transmitted over approximately 17 months
- Shallow and deep-set cement plugs were set to provide the necessary barriers in the well
- A CaTS subsea receiver was mounted on the side of the well debris cap located on each suspended well

Value to client

- 873 days of data was wirelessly recovered from the first well, providing clear confirmation of wide scale reservoir connectivity with adjacent wells located between 2.5km and 10km away
- In the second well, a long-term post-DST pressure build-up was recorded over a 341 day monitoring period with no evidence of reservoir connectivity with an adjacent well located 15km to the North
- Detailed analysis was performed leading to a reservoir model history match

CaTS does not require a tubing string in the well and is not affected by cemented pipe, cement plugs or bridge plugs, lending itself naturally to monitoring in abandoned or suspended wells without compromise to the integrity of the well. Up to 20 discrete zones have been monitored in a single abandoned well.



Technical paper reference

B.P Champion, Expro; E.A Puntel, Petrobras, "Reducing Reservoir Uncertainty During Appraisal and Development – Novel Applications of a new Wireless Reservoir Monitoring Technology in Santos Basin Pre-Salt", SPE 175075-MS, SPE Annual Technical Conference and Exhibition, Houston, USA, (September 2015)

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