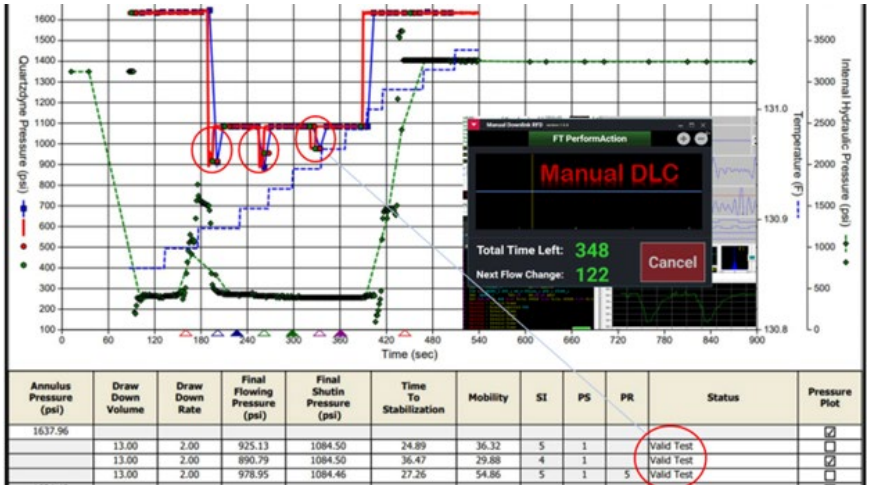
PressureWave® Formation Tester Characterized Reservoir Pressures in Field with High Mobility Environment, Eliminated Wireline Requirements



Annulus Pressure (psi)	Draw Down Volume	Draw Down Rate	Final Flowing Pressure (psi)	Final Shutin Pressure (psi)	Time To Stabilization	Mobility	SI	PS	PR	Status	Pressure Plot
1637.96											☑
	13.00	2.00	925.13	1084.50	24.89	36.32	5	1		Valid Test	☐
	13.00	2.00	890.79	1084.50	36.47	29.88	4	1		Valid Test	☑
	13.00	2.00	978.95	1084.46	27.26	54.86	5	1	5	Valid Test	☐

A good pressure point, it illustrates the seal with the formation and the drawdown/buildup showing repeatability and stability.

Objectives

- Evaluate the formation to study high mobility and define producer intervals.
- Correlate this well's results against field values and define the plan for other wells in the trajectory, taking in account the well was an outpost/exploratory on the Hamaca Field.
- Optimize point-taking times using predetermined settings with a greater success probability as compared to the previous wells.

Our Approach

- The recommended bottomhole assembly—consisting of the HEL™ MWD system, HAGR® high-temperature azimuthal gamma ray, MFR® multi-frequency resistivity sensor, and the PressureWave tester—was run into the wellbore but encountered an issue with the PressureWave tester turning off with the pressure drop. Experts at the Real-Time Operating Centre (RTOC) suggested the field personnel use 30 rpm as an alternative.
- Weatherford drilling services field personnel operated the PressureWave formation tester by manual downlink on the surface, making the pressure drop with a differential on the flowrate from 450 gpm to 350 gpm. The target bit speed (TBS) recognized all the commands and the PressureWave tester performed a successful casing test.

LOCATION
Colombia

FORMATION
Meta Carbonera

LINER SIZE
9-5/8 in.

TEMPERATURE
130°F (54°C)

MEASURED DEPTH
648 ft (197.5 m)

TOTAL DEPTH
4,082 ft (1,244 m)

PRODUCTS/SERVICES
- PressureWave formation tester
- HEL MWD system
- HAGR high-temperature azimuthal gamma ray
- MFR multi-frequency resistivity sensor

Weatherford®

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Our Approach (continued)

- Working together, the specialists decided that the best method to tackle this challenge and acquire a real-time response for validating these pressure points would be to work with 30 rpm and 450 gpm. They would send a downlink on the RUN UI application, start the manual downlink and lower the flowrate to 350 gpm and, at the moment the TBS sends the confirmation, turn off the rpm and locate the string on the tool face.
- Using this acquisition method, the team executed 7 pressure points with RTOC validation.
- Additionally, after the initial learning curve and experts established an optimal operational workflow, the manual downlink alternative took the same time per pressure point as the standard method.
- With the new POPO parameters in place, field personnel deployed the updated BHA and it performed 10 good points with the same pressure drop without rpm (the flowrate differential was 100 gpm). Weatherford experts learned that the analysis of the calipers obtained from the azimuthal data could be used to orient the tool in future operations and overcome borehole ovality issues that plagues this region.

Value to Customer

- Weatherford's IES team evaluated the points and determined an alternative way to operate that allowed the operation to continue without waiting for a wireline unit to finish the job.
- It was possible to operate the tool without a downlink commander. This was a viable option in the future in case the surface equipment is limited or if the rig does not have rig up points for the lines.
- This solution allowed the customer to manually manage the times and provided a suitable solution in case of surface equipment limitations. This experience laid the groundwork for establishing this procedure as an official alternative to continue operating without adding nonproductive time (NPT).
- Data acquired with this method had the same quality and was consistent with the fluid gradient and mobility expected by the customer, thus validating the method.