

Dry Target Interval Is Shadowed By ‘Virgin’ Up-hole Zone Previously Bypassed

Case Study: HDD™ Simultaneous Formation Tester Data Identifies Bypassed Producing Zones in North Texas.

Challenge:

RAINBOW SEVEN OIL & GAS requested RECON’s assistance with the identification and evaluation of multiple potential gas zones on its new-drill North-Texas well in the summer of 2009.

In this area the gas zones may look prolific on open hole logs; however, because of the production history of the area, many of these zones are near depletion.

Accurate reservoir pressure measurement is critical to making correct completion decisions in this particular area.

Solution:

RECON runs open hole logs and formation tests, utilizing its standard High Resolution sampling rate of 10 samples/ft to provide the client with more accurate and precise open hole log data. *Multiple potential gas zone picks were identified* and the microlog data assisted in determining the permeability potential of each of these gas zones.

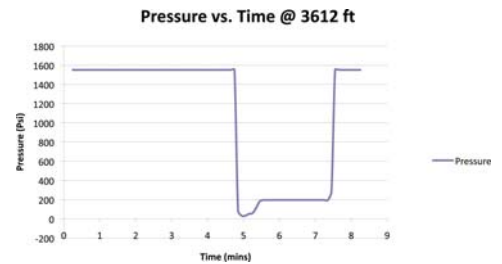
Based upon the open hole log data “picks”, the client decided to test five sands/conglomerate targets.

Using RECON’s caliper type HDD™ Simultaneous Formation Tester, “no-limit” sampling of multiple pressure points at multiple depths can be combined with collection of a formation fluid sample, all in one open hole wireline trip into the wellbore. This single pass HDD™ log provides highly accurate formation pressures and fluid measurements.

RECON’s open hole logging tool suite run on this well was: Dual Induction-LL3, Compensated Neutron, Litho-Density (Pe), Microlog, Gamma Ray, and X/Y Caliper.

Results:

Sample point #2



150,000 mcf/day is on-line and flowing - an impressive result for a 200 psi zone.

New drill and off-sets expected to deliver significant production from previously bypassed “virgin” zones (sample point #5)

Client saves between \$50,000 and \$100,000 in drilling and completions costs; Review these conclusions on page #7

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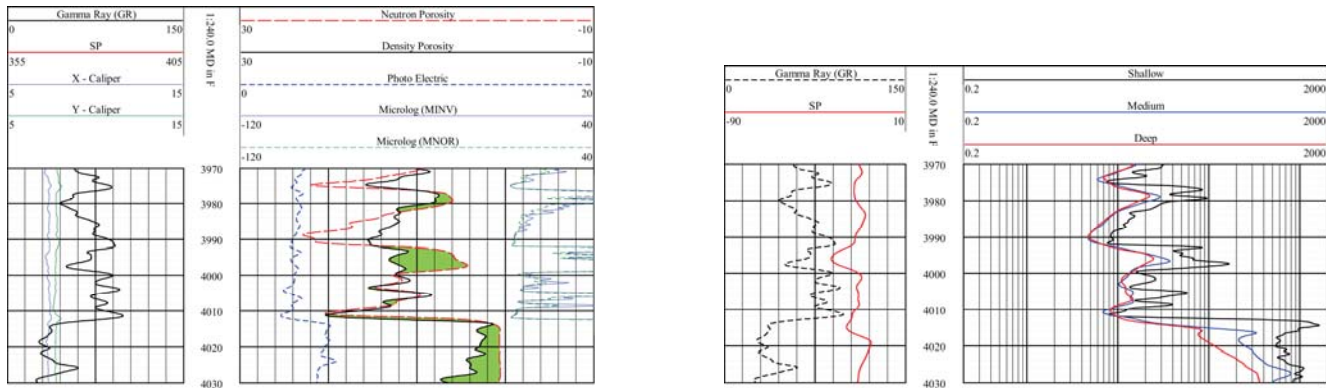
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Case History Data:

Based upon the open hole log data “picks”, the client decided to test five (5) sands/conglomerate targets. The well depth tests ranged between 4,000 ft. and 1700 ft. The client chose not to capture fluid samples during the operation.

Sample Point #1:

Open Hole Log Data:

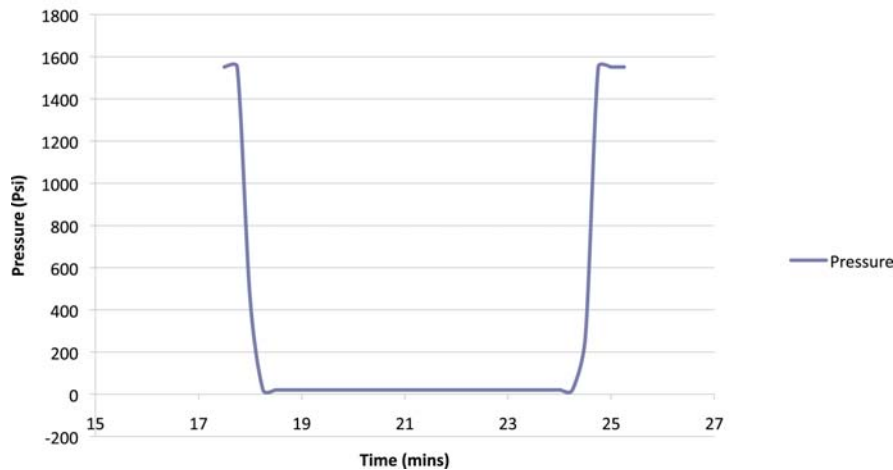


Description:

This is a conglomerate zone, approximately 6 ft in thickness. The Rt value is 22 ohms with a porosity value of 10%. There is an indication of gas being present by the suppression of the Neutron curve. This zone shows poor microlog, possibly a low permeability zone.

Pressure Data:

Pressure vs. Time @ 3996 ft



Analysis:

The pressure test indicated a tight zone. The drawdown was 20.88 psi and remained at that pressure for approximately 6 minutes. This is further affirmed by the poor indication from the microlog data. This zone was of particular interest because it was not present in the direct offset wells. The rock in this zone is non productive. The customer decided not to complete this zone.

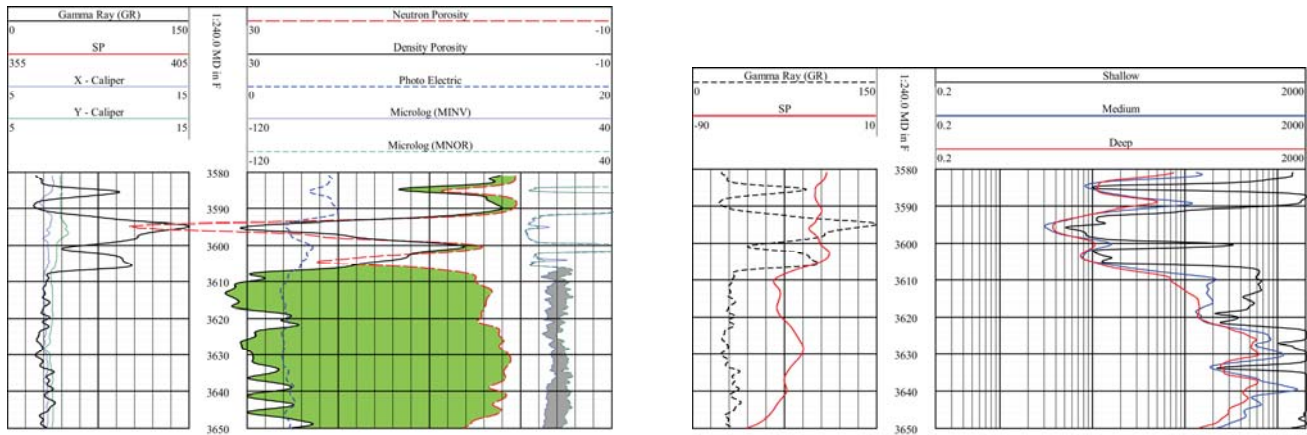
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Sample Point #2:

Open Hole Log Data:

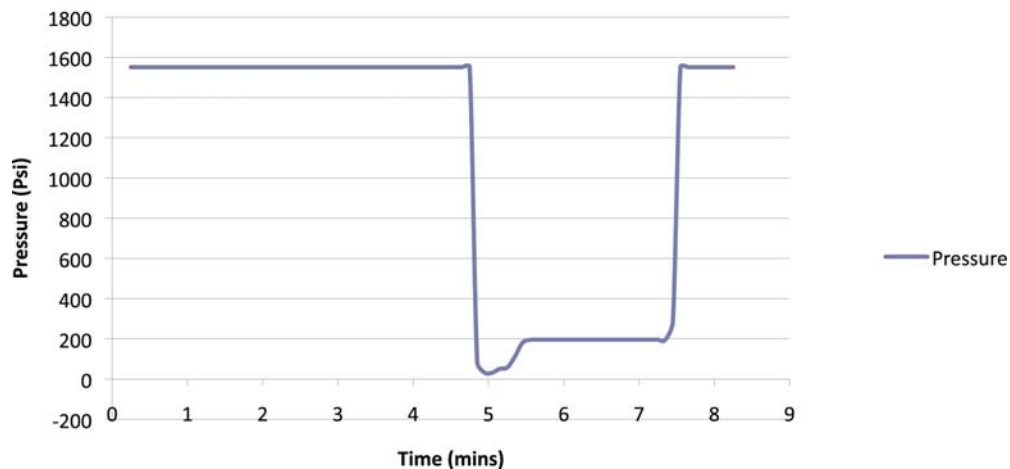


Description:

This is a very porous gas bearing sand formation. The sand is well developed, perhaps indicative of a depleted zone. The zone had excellent permeability as can be seen from the microlog.

Pressure Data:

Pressure vs. Time @ 3612 ft



Analysis:

The test of this zone was a good test, resulting in a formation pressure of 196 psi. The time from drawdown to formation pressure was under one minute. The well-developed sand and permeability contributed to the quick pressure buildup. Although the pressure of 196 psi may appear to be on the verge of depletion, the client has developed good production methods, allowing them to exploit this zone. Based on the pressure data, the client decided to complete this zone.

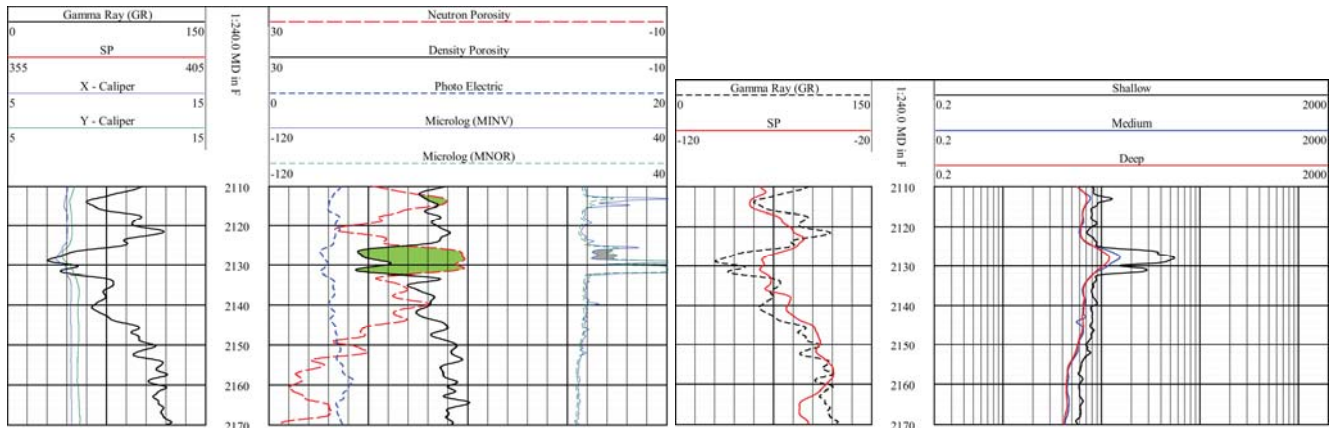


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Sample Point #3:

Open Hole Log Data:

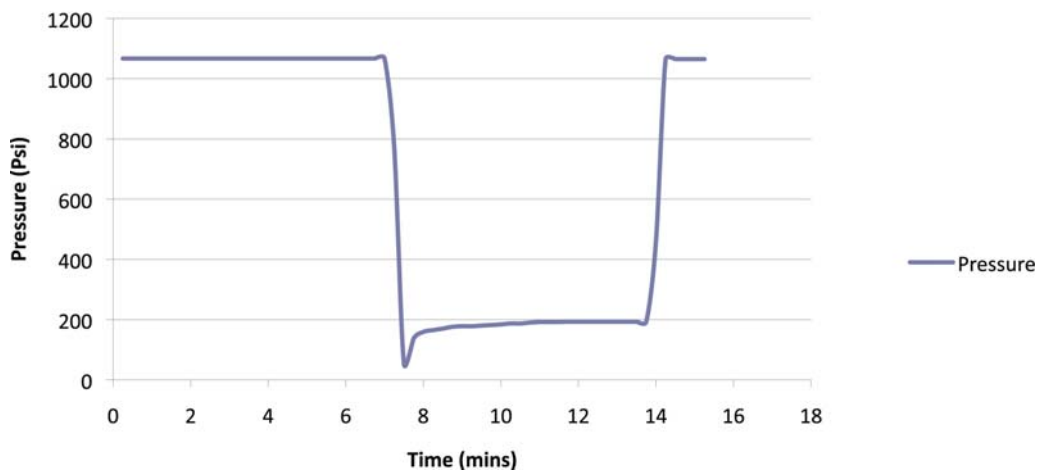


Description:

This is another six foot thick sand, showing approx 12 ohms of resistivity and approx 16-18% porosity. There is a slight indication of some permeability on the microlog.

Pressure Data:

Pressure vs. Time @ 2128 ft

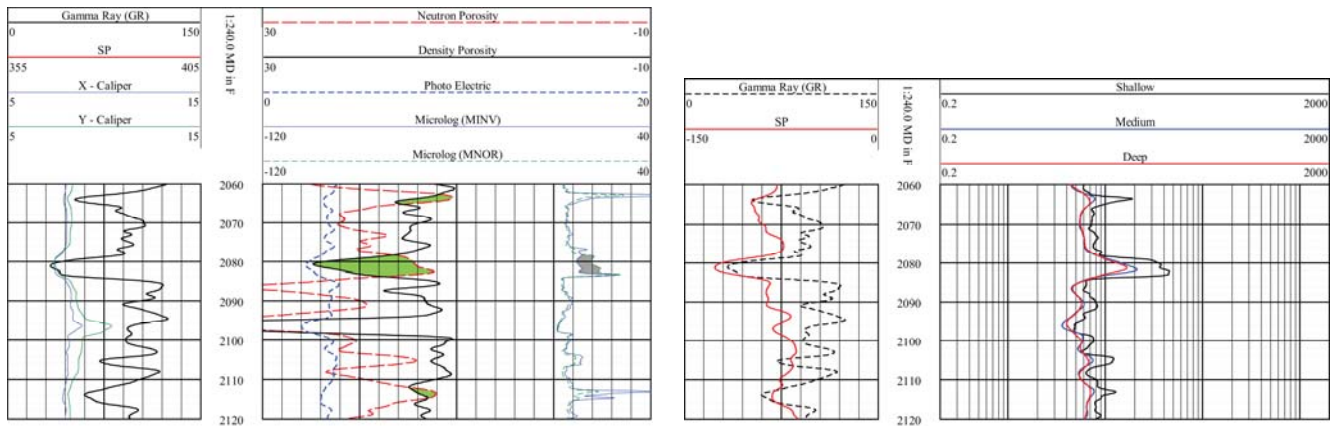


Analysis:

The test of this zone was a good test. The formation pressure eventually stabilized at approx 193 psi after 7 minutes. Being only 6 ft in thickness, this could be a zone of interest for future development.

Sample Point #4:

Open Hole Log Data:

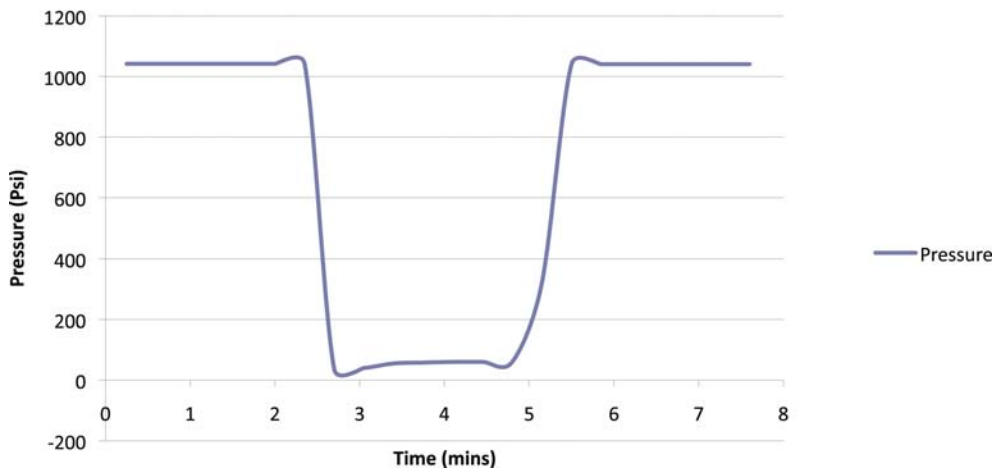


Description:

This is a thin 4 ft sand with good resistivity value of approx 28 ohms and approx 20% porosity. The sand has good microlog show, indicative of good permeability.

Pressure Data:

Pressure vs. Time @ 2080 ft

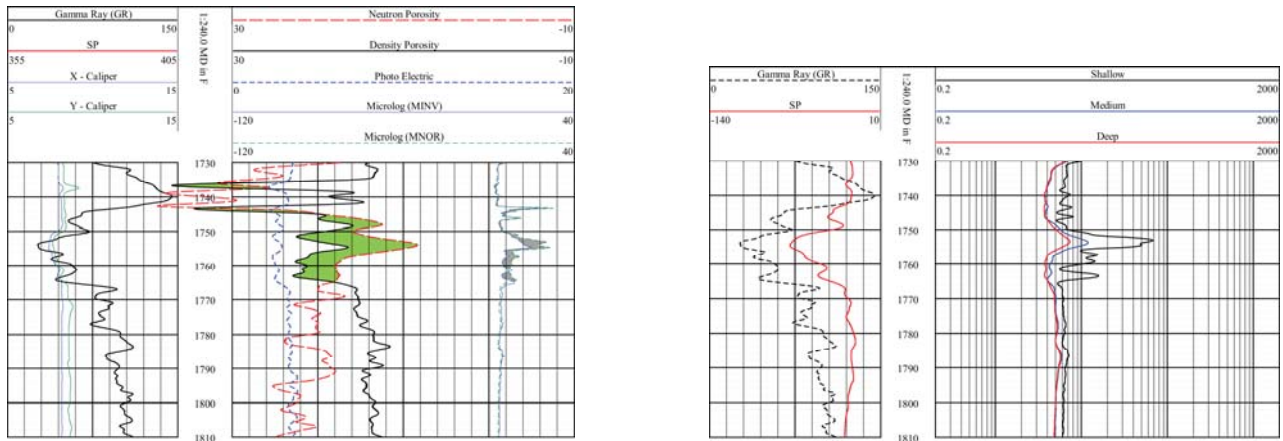


Analysis:

The formation pressure was very low, approximately 61 psi. The Open Hole log data indicated favorable development in this sand, however there is a lack of pressure in the formation. This zone appears to be depleted.

Sample Point #5:

Open Hole Log Data

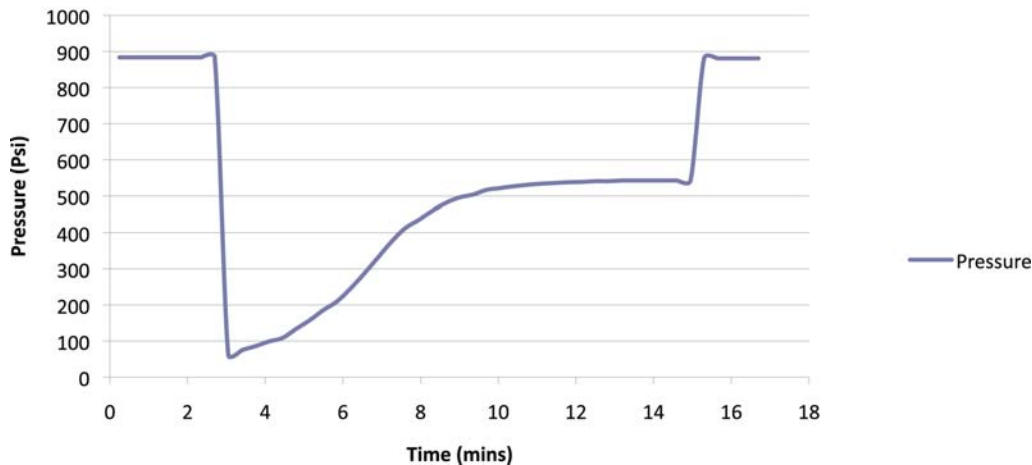


Description:

A rather thick well-developed sand, this formation has some water on the bottom with potential Gas Cap on top. This zone has good microlog development throughout.

Pressure Data:

Pressure vs. Time @ 1751 ft



Analysis:

The test of this zone was a good test. The stabilized formation pressure was 543 psi, a very good pressure for this area. The test result at this zone confirmed to the client the productive potential of this gas bearing formation. Because the well is drilled below 4000 ft, the client did not want to risk cementing this high in the wellbore. The client decided to drill new shallower depth wells targeting this “virgin” zone.



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Summary:

In total, five formation tests were performed with good operational results. Three of the five zones proved to be productive zones with good pressure. The other two zones had either depleted or tight results.

The client decided to initially perforate the sample point #2 zone, while leaving the other two productive zones for future production consideration. The sample point #2 zone is now online and is producing at 150,000 mcf/day up the production string, while holding 150 psi on the backside, with a saltwater production of one bpd - **an impressive result for a 200 psi zone.**

Conclusions:

Utilizing *RECON's* High Resolution Open Hole Log data complimented with its HDD™ Simultaneous Formation Tester (SFT), Rainbow Seven Oil & Gas was able to reduce drilling costs by approximately \$50,000 to \$60,000. Conventional Drill-stem Tests (DST) alone would cost between \$10,000 and \$15,000 per test. The major factor contributing to the cost of running a DST is the additional rig time. A significant advantage of deploying *RECON's* HDD™ Simultaneous Formation Tester is the ability to perform multiple tests on one wireline trip into the wellbore.

In addition to the drilling cost savings, there were savings resulting from not completing the two picks on the open hole logs that were not producing zones (one too tight and one too depleted). The client indicated that costs to perform any type of cased hole completion for zone evaluation would have been an addition \$20,000 to \$30,000 for each zone.

Owing to *RECON's* HDD™ High Definition Data, and the resulting production from this well, Rainbow Seven Oil & Gas modified their drilling plans to offset this well and drill two shallow offsetting wells to delineate the virgin zone identified in Sample Point #5. The HDD™ Simultaneous Formation Tester will be run on both of these new drills. Additionally, dip-meter logs will be run on both new drills to better understand potential drill target opportunities.

Acknowledgment:

Thank you to RAINBOW SEVEN OIL & GAS for allowing *RECON* the opportunity to publish this Case Study.

Presenter:

This Case Study was both researched and published through the efforts of Andrew Nguyen, a Professional Petroleum Engineer with *RECON's* Mansfield Texas Open Hole Logging base of operations.

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