

Cased hole

PS-112M, PGSP-2, PGSP-3 BORING PERFORATION GUNS

SCOPE OF APPLICATION

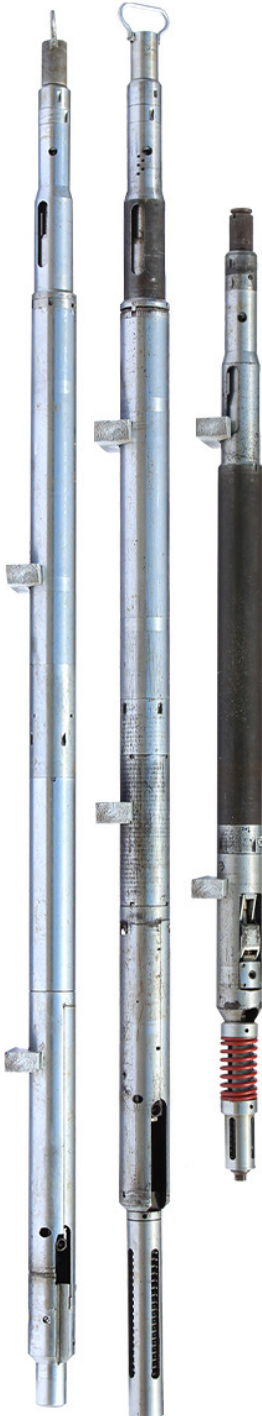
- perforation of thin pay beds with bottom water and gas cap
- pay zones, where the oil-bearing part is separated from the water-bearing part by a thin fluctuant barrier
- selective perforation of thin-layered formations, representing alternating permeable consolidated interlayers
- temporary holes in multistring wells for workover operations on recementing of annular space

FEATURES

- High selectivity in perforation of complex reservoirs and thin interlayers
- Reduce oil-water cut when developing fields with close aquifer and minimize gas factor if gas-bearing reservoir is close
- Absence of shock prevents damage of casing integrity, cement sheath, and decrease of filtration properties of bottomhole zone
- Controlled perforation of casing, cement, formation (recording of motor load current and tool penetration) allows to certificate each perforated channel

SPECIFICATIONS

	PS-112M	PGSP-2	PGSP-3
Pressure	80 MPa/ 11600 psi	80 MPa/ 11600 psi	80 MPa/ 11600 psi
Temperature	150 °C/ 302 °F	120 °C/ 248 °F	120 °C/ 248 °F
Supply voltage	380 V	380 V	380 V
Tool dimensions: diameter/ length	112/2400 mm 4.41/ 94.49 in	112/3100 mm 4.41/ 122.1 in	112/3240 mm 4.41/ 9.45 in
Downhole tool weight	80 kg/ 176.4 lb	110 kg/ 242.5 lb	120 kg/ 264.6 lb
Perforated channel dimension: diameter/length, mm	15/70 mm 0.59/ 2.76 in	20/150 mm 0.79/ 5.91 in	20/300 mm 0.79/ 11.81 in



Case Study No.1

Example of obtaining water-free oil inflows from thin beds located close to formation waters and bottom water strata

Challenge

- Preserving the quality of formation isolation and filtration properties of perforated beds, achieved in the process of well casing
- Increase productivity of wells in the Republic of Tatarstan

Solution

It has been proposed the application of boring perforation as a method of «gentle» penetration of pay zones. The main advantage of this method is shown in comparison with the jet perforation.

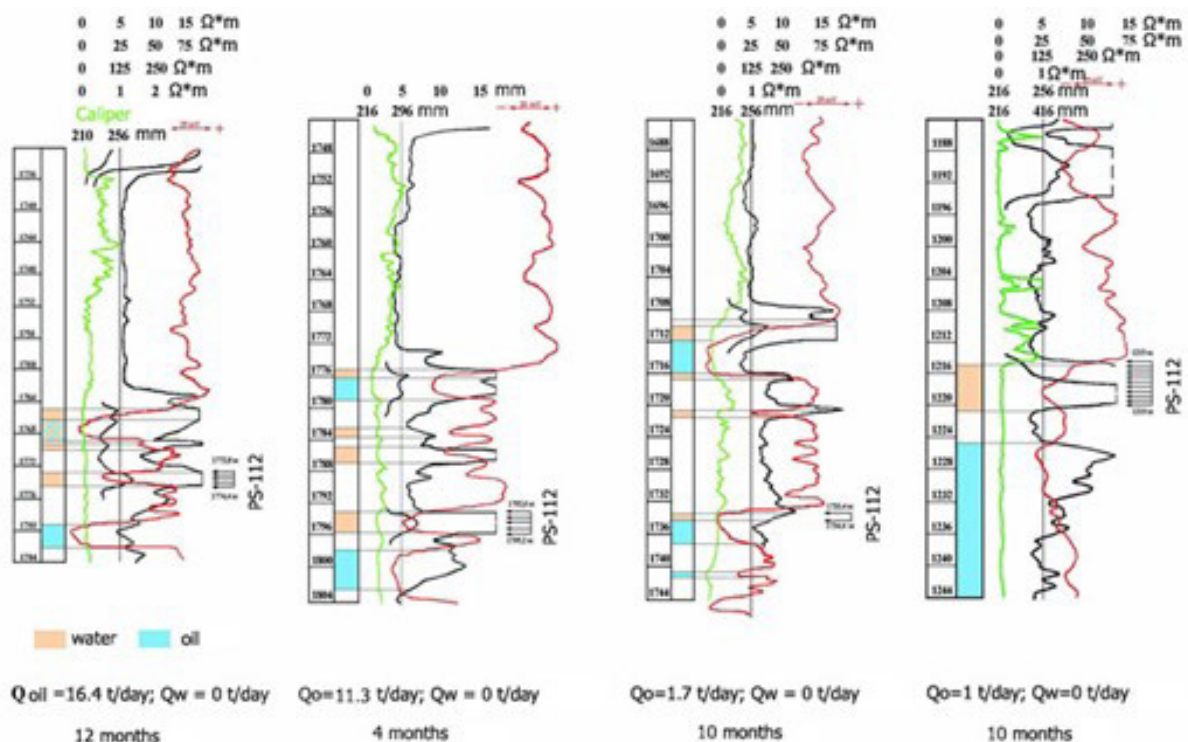
Results

Figure shows water-free oil inflows from thin pay beds located in the Republic of Tatarstan, which are separated by thin fluctuant barrier.

Key benefits

- High selectivity in perforation of complex reservoirs and thin interlayers
- Reduce oil-water cut when developing fields with close aquifer and minimize gas factor if gas-bearing reservoir is close
- Absence of shock prevents damage of casing integrity, cement sheath, and decrease of filtration properties of bottomhole zone
- Controlled perforation of casing, cement, formation (recording of motor load current and tool penetration) allows to certificate each perforated channel

Well	Interval, m	Barrier thickness, m	Number of perforated channels	Shot density, holes/m	Average production rate, tons/day
1	1772,8–1774,4	4,8	7	4,37	16,4
2	1792,6–1795,2	1,4	11	4,33	11,3
3	1733,4–1734,4	BHK	6	6	1,7
4	1215–1219	4,0	21	5,25	0,9–1,0



Case Study No.2

Example of obtaining water-free oil inflows from bottom water and gas cap strata

Challenge

- Preserving the quality of formation isolation during the process of well casing and filtration properties of perforated beds
- Increase productivity of wells

Solution

It has been proposed the application of boring perforation as a method of «gentle» penetration of pay zones. The main advantage of this method is shown in comparison with the jet perforation.

Results

Figure shows the comparison of cumulative and drilling perforation in the West Siberia field comprising bottom water and gas cap pay formations.

As a result of boring perforation, it has been obtained oil-free inflows and gas/oil ratio decreased by 18 %.

Key benefits

- High selectivity in perforation of complex reservoirs and thin interlayers
- reduce oil-water cut when developing fields with close aquifer and minimize gas factor if gas-bearing reservoir is close
- Absence of shock prevents damage of casing integrity, cement sheath, and decrease of filtration properties of bottomhole zone
- Controlled perforation of casing, cement, formation (recording of motor load current and tool penetration) allows to certificate each perforated channel

Jet perforation data

Well	Interval, m	Hole size, mm	Casing size, mm	Number of channels, pcs.	Result		
					Production rate, tons/day	Water cut, %	Gas/oil ratio
1	2268,6–2274	215,9	146	54	21,6	46,3	24
2	2273–2275,5	215,9	146	26	15	90	55

Boring perforation data

Well	Interval, m	Hole size, mm	Casing size, mm	Number of channels, pcs.	Result		
					Production rate, tons/day	Water cut, %	Gas/oil ratio
3	2234–2243	215,9	168	43	22	–	–
4	2159–2168	215,9	168	45	55,1	–	–



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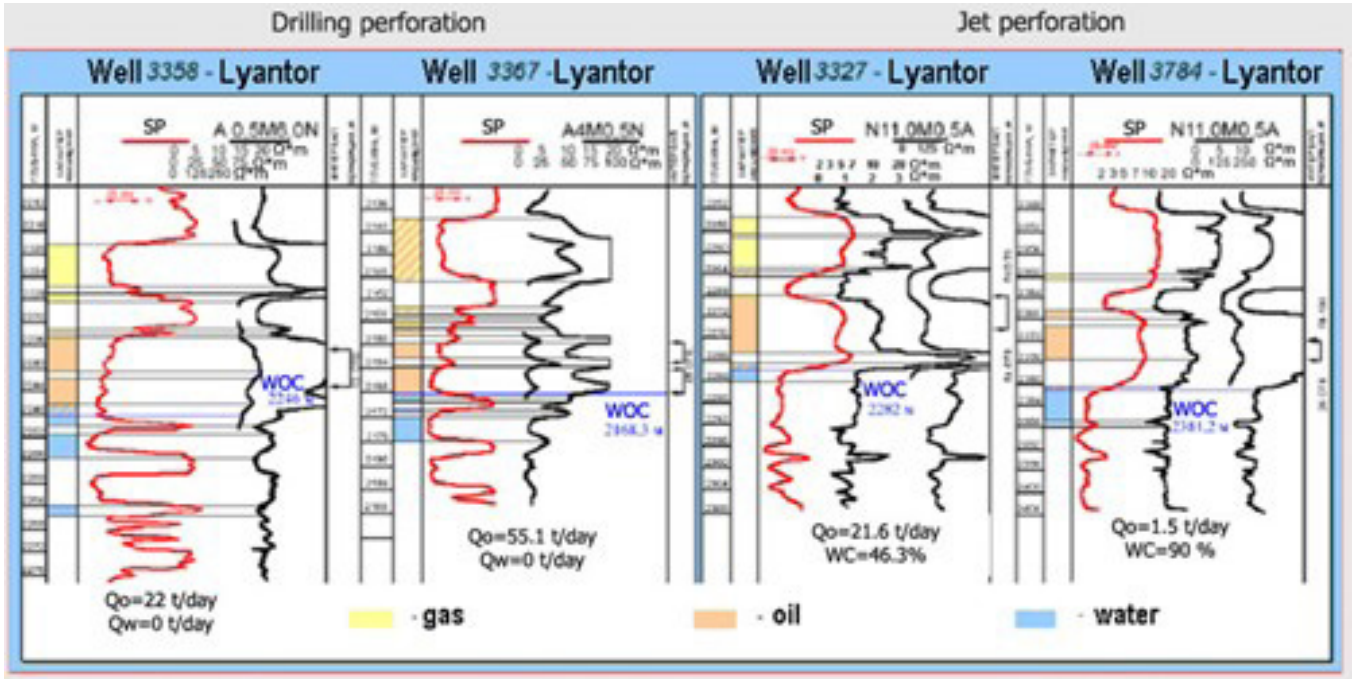
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