



Neftegaztekhnologiya



**Innovation project for
radial formation
penetration.
Blood Vessels version 01**

Phone: +7(499)394-56-28

e-mail: info@n-gt.ru

www.n-gt.ru

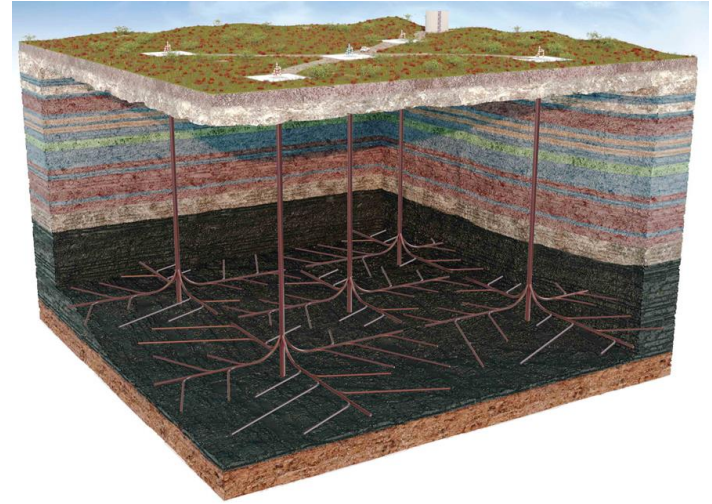


Blood Vessels technology relevance

BV technology goal – creating network of channels, controlled by power and distribution, which provides for maximum achievable coverage and area of well drainage, decreases formation anisotropy, involves in development hydrocarbons reserves which previously could not be recovered.

Blood Vessels technology is a new tool and complementary service for such technologies as hydraulic fracturing, side-tracking, drilling of horizontal wellbores or multi-lateral wells for development:

- low-permeable reservoirs of hydrocarbons
- reservoirs with heavy oils
- bottom water-drive reservoirs
- unconventional reservoirs
- gas condensate reservoirs with abnormal low reservoir pressure



Environmental safety is provided by means of wellhead sealing throughout all job cycle and work fluid circulation by closed loop.

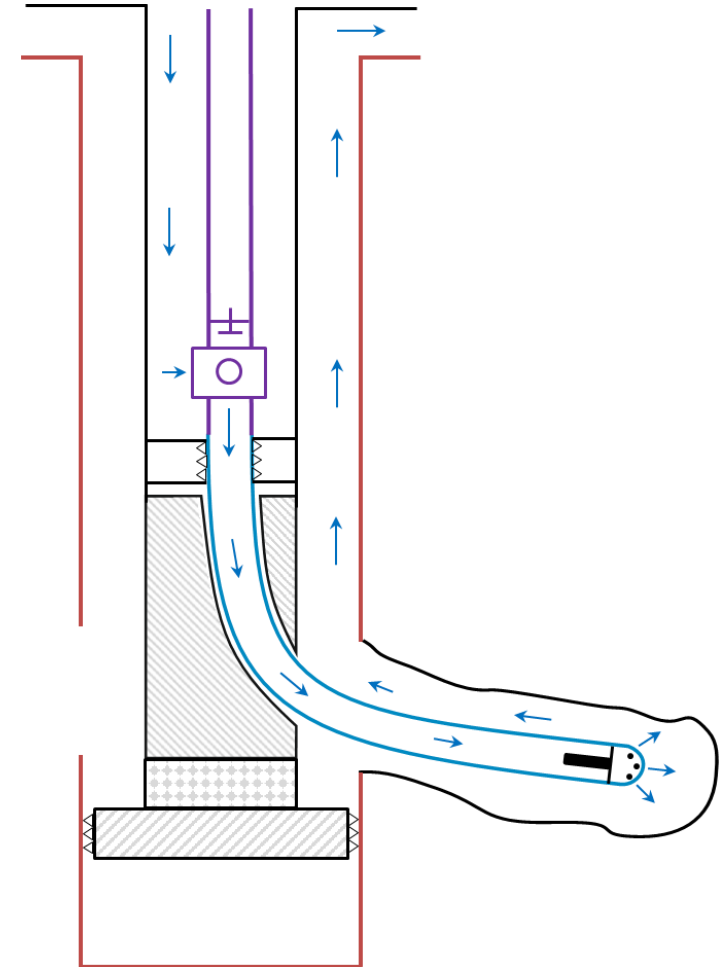
Blood Vessels technology version 01 (BV_01)

The product of BV technology is controlled water jet creation of multiple long radial TAML2 filtration channels in producing formation.

Trajectory control is realized by means of autonomy inclination angle module, stepped drilling of wellbore and correcting of bottomhole assembly as needed.

Additional options of the technology are:

- Possibility of matrix stimulation, penetrating at depth of radial channels
- Possibility of underbalanced operations in terrigenous formations, including wells with abnormal low reservoir pressure



BV_01 technical characteristics

Parameters

- channel diameter – 60-80 mm;
- channel length – 25-60m;
- exiting from casing string into formation with 1.5" coiled tubing;
- build curve intensity is 5 deg. / 1 m
- radius of formation penetration – 12 m
- fluid rate – up to 500 l/min;
- number of side-tracks at one level – 4;
- milling of 4 rectangular windows in casing at one level. Size of the windows is 70 x 350 mm, phasing is 90 deg.



Equipment for BV_01 technology

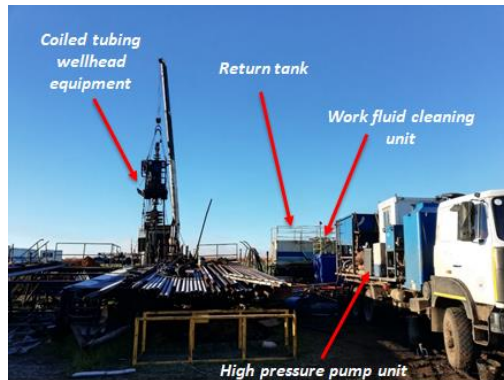
Standard oilfield equipment:

- Well workover rig
- 1.5" coiled tubing package
- Nitrogen unit
- 3.5" tubing for high internal pressure
- Drill pipes
- Tubing for workover operations
- "CA-320" pump unit
- Mobile water tank
- Vacuum truck



Special downhole BV equipment:

- Anchor device
- Setting device
- Orienting device
- Package for casing windows milling
- Coiled tubing whipstock
- Rotation mechanism
- Sealing device
- Flow direction device
- Water jet nozzles
- Downhole filter and axillary BHA components
- Autonomy inclination angle module



Special wellsite BV equipment:

- Coarse- and fine-mesh fluid filtering complex
- Return tank with degasser
- High-pressure pump unit
- High pressure wellhead stack



Well preparation

Well preparation

- Normalization of well bottom
- Scraping of intervals for anchor setting
- Drift run
- Testing of production casing integrity
- Well logging: inflow profile, GR, CCL, CBL
- Anchor and orientating device run in hole
- Well logging: depth correlation
- Anchor setting

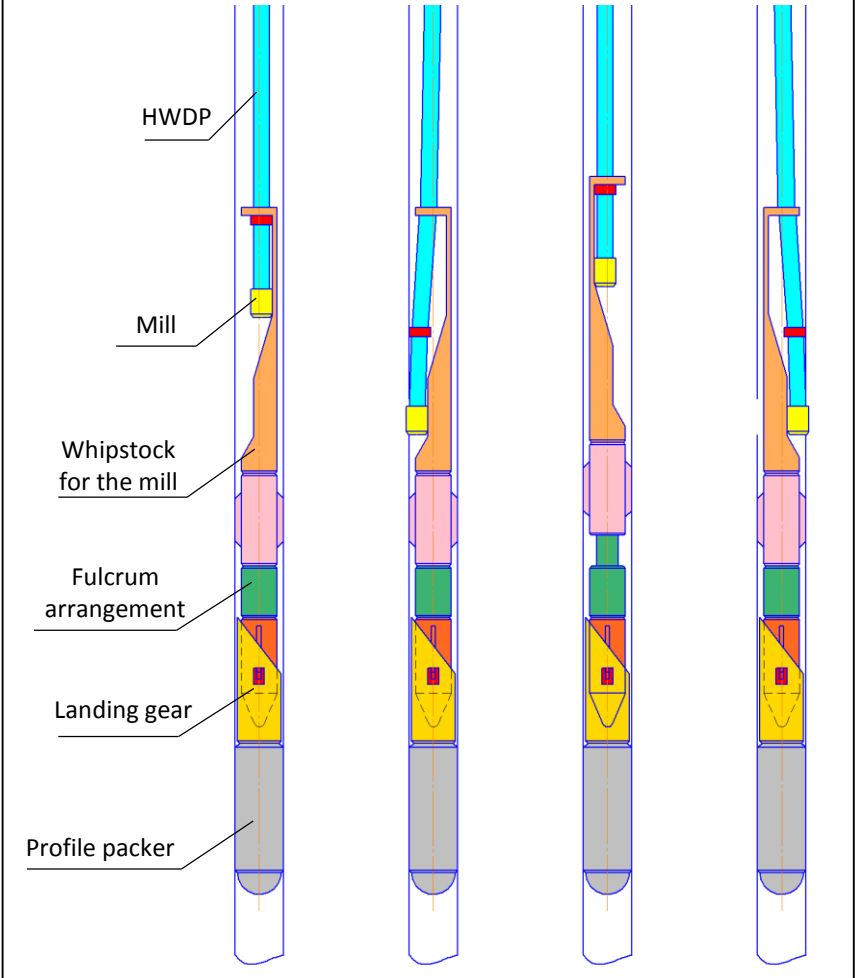


Casing milling

- Run in hole whipstock for casing milling
- Casing milling by using rotor with hydraulic power supply
- Assembly turn at 90 deg.
- Step by step milling of 4 windows in casing, size is 70 x 350 mm
- Wellbore cleanout
- Milling assembly pulling out of the hole

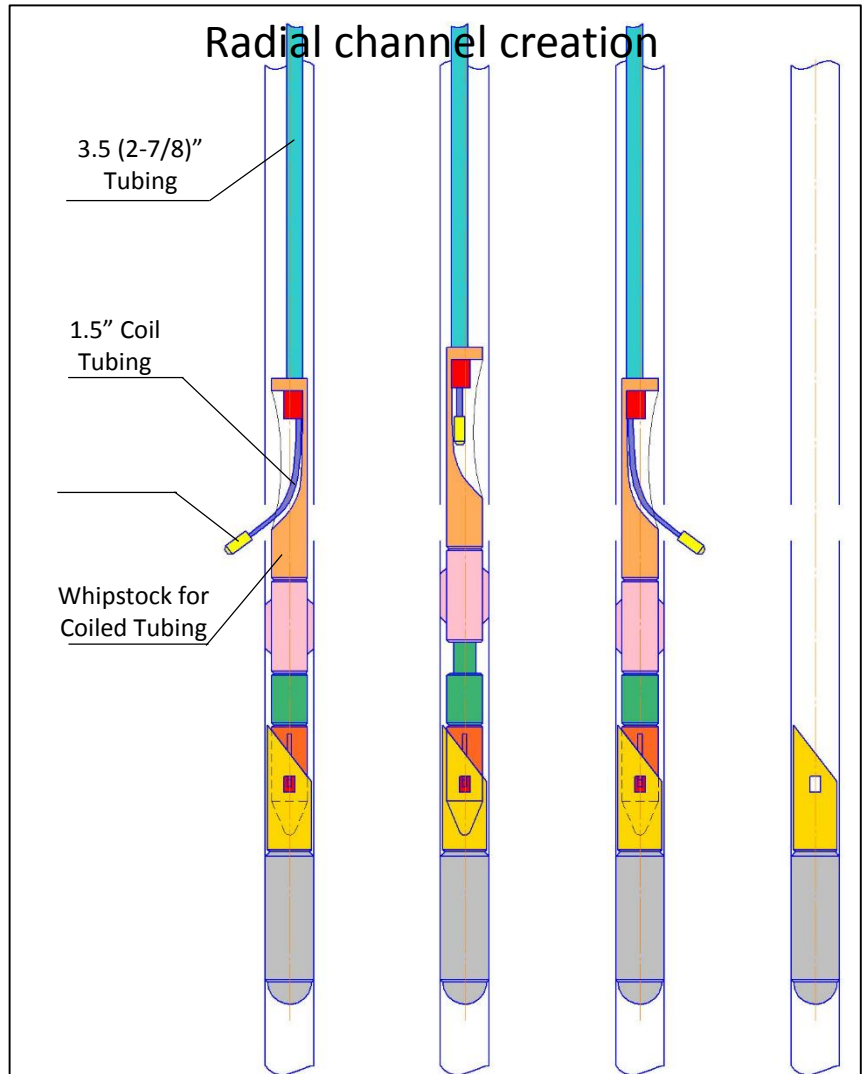


Milling process

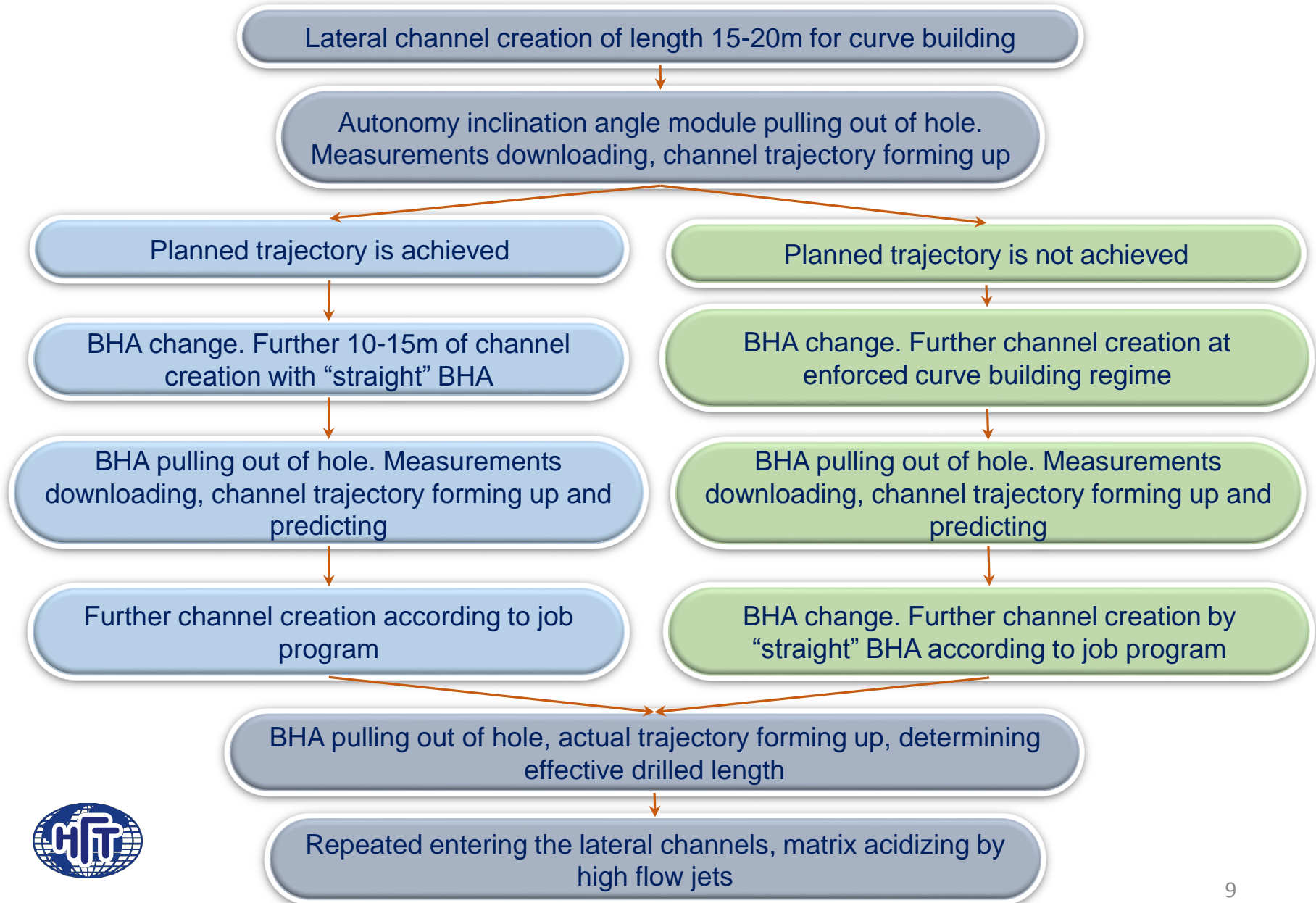


Lateral channels creation

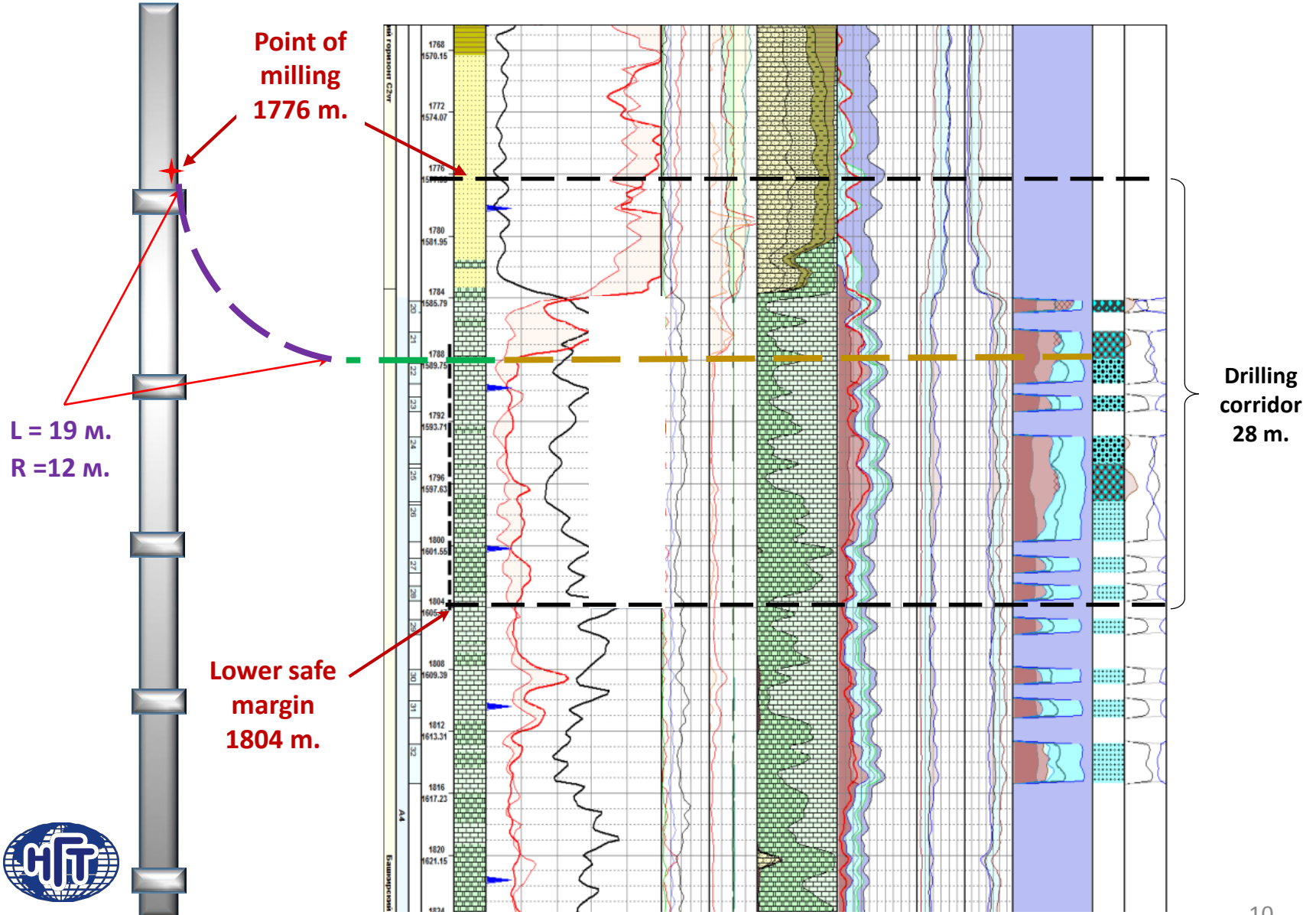
Run in hole 1.5" coiled tubing with water jet nozzle and autonomy inclination angle module. Creation of high pressure jet in the nozzle provides for rock destruction, coiled tubing movement provides for creation of channel in the formation. Step by step with turning coiled tubing whipstock by 90 deg. 4 lateral channels are created.



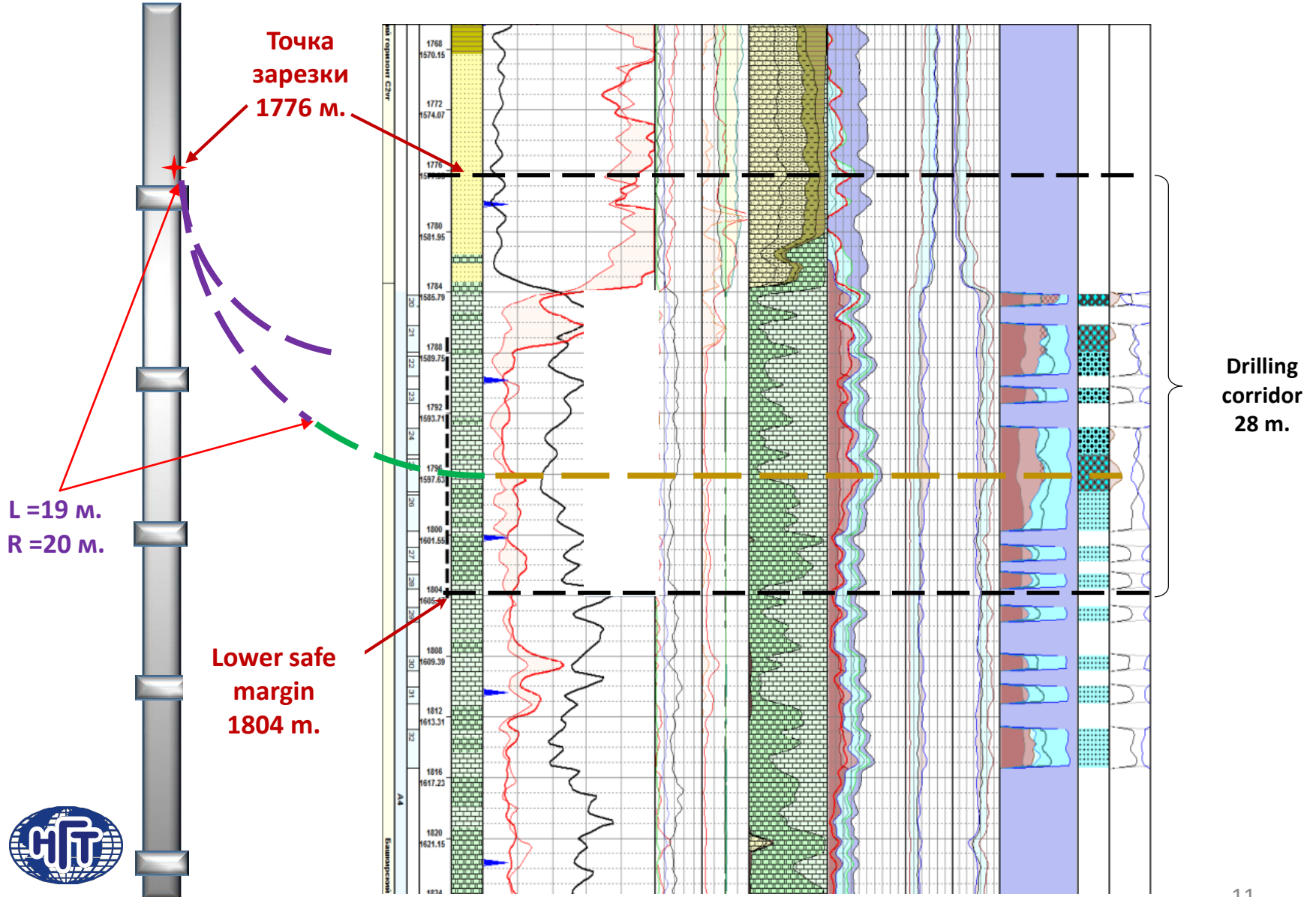
BV_01 at Bashkirian stage wells



BV_01 at Bashkirian stage wells

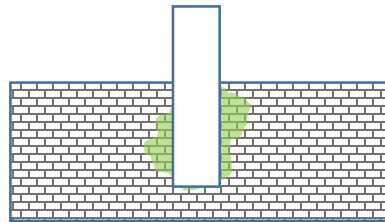


BV_01 at Bashkirian stage wells

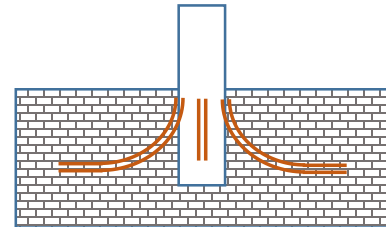


Additional production

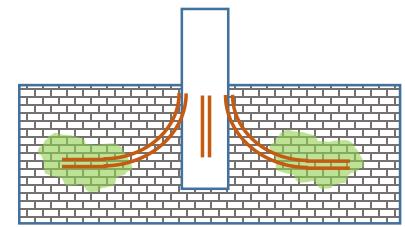
Base vertical well after
matrix acidizing



4 BV channels
by 60 m



Matrix acidizing by high
flow jets



Fluid production	m3/day	54,8
Water cut	%	50,0
Oil production	ton/day	23,5
Oil production in 5 years	Kton	28,9
Add. oil production in 5 years	Kton	0,0

89,8
50,0
38,5
47,3
18,4

103,0
50,0
44,1
54,3
25,4

BV technology effectiveness at typical Bashkirian stage well along with matrix acidizing by high flow jets estimated as increase in daily oil rate at 20.6 ton/day and additional oil production in 5 years equal 25.4 Kton.





www.n-gt.ru

Thank you for attention!

Pavel Popov
CEO

+7(926) 202-87-51
ppopov@n-gt.ru

Boris Kuzichev
CTO

+7(929) 587-56-49
bkuzichev@n-gt.ru

Aleksandr Filippenko
CBDO

+ 7(929) 546-09-58
afilippenko@n-gt.ru

Vadim Morozov
CFO

+7(929) 546-09-57
vmorozov@n-gt.ru