Multistage Physico-Chemical Method

RESEARCH & DEVELOPMENT

MPC technology is the result of two decades of Research & Development. It commenced with research into combustion mechanisms and problems of hydrogen energy.

Well output increase is driven by :

- Active physical and chemical action in the uncovered formation zone of high-energy compounds where combustive and oxidizing mixtures are being generated;
- Applying action of gases that are facing the payzone (Hydrogen) produced during the reaction, heat and new chemical effects. A process of In-situ Pyrolysis breakdown of hydrocarbons occurs around the reaction zone.

MPC TECHNOLOGY

RESEARCH & DEVELOPMENT….*Cont'd*

MPC Technology provides considerable increase in permeability of well bottom-hole zone and causes:

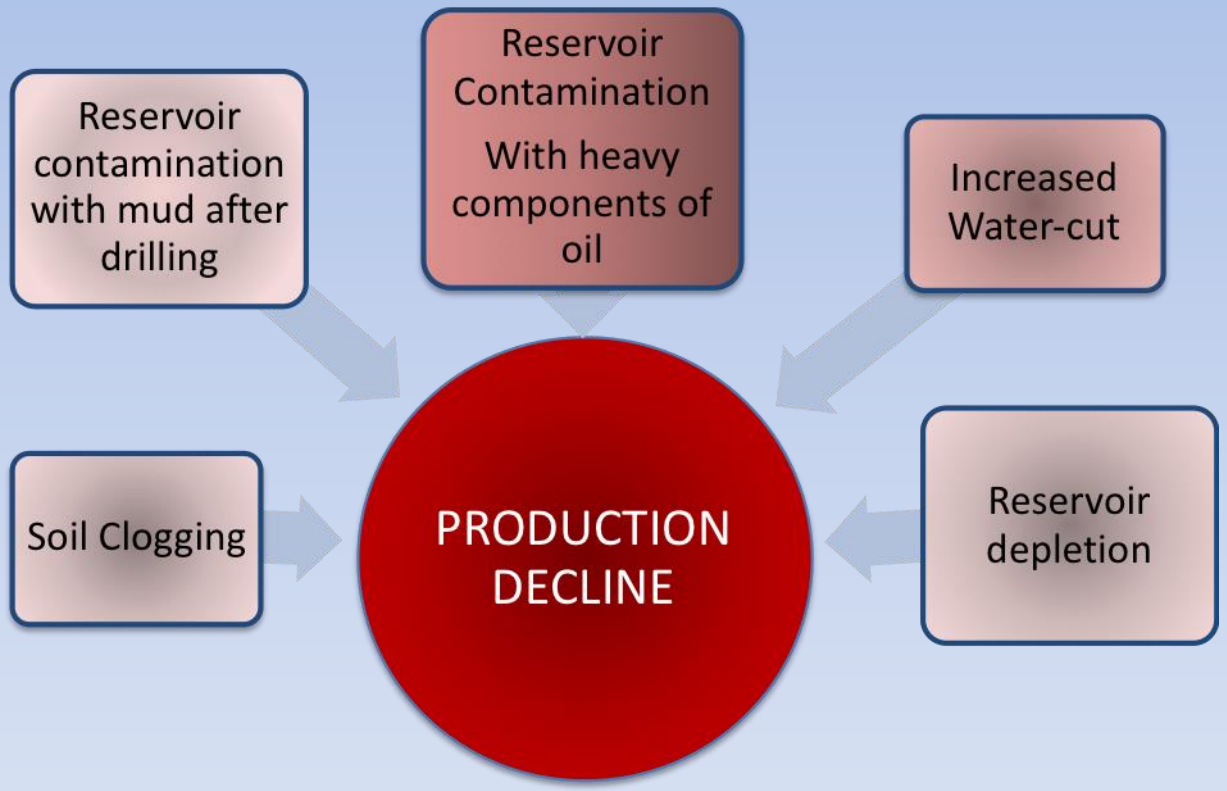
- Micro-fracturing of the formation;
- Removal of soil clogging and contamination;
- Removal of skin-effect;
- Short term in-situ cracking-pyrolysis of high molecular hydrocarbons and transforming them into gasoline fraction;
- Significant rise of oil fluidity due to reservoir temperature rise during intrastratal combustion of charred coal and asphalt, resin and paraffin deposits;
- Opening of enclosed pore spaces during penetration of atomic hydrogen into it and recombination into molecule with generation of an energy quantum;
- Enlargement of existing pores, creating new microfracs due to reaction impulses and temperature variation.

MPC TECHNOLOGY

PRODUCTION DECLINE & CONVENTIONAL TECHNOLOGIES IN OIL & GAS

STIMULATION TECHNOLOGIES:

- Hydraulic Fracturing
- Acid Treatment
- Alkali treatment
- Matrix stimulation
- Thermal Action
- Others



MPC TECHNOLOGY

CONVENTIONAL STIMULATION TECHNOLOGIES, COMPARED

Hydraulic Fracturing	• It is the most efficient among traditional methods. • Average output is increased by 2 - 6 times. • Requires great amounts of water, time and people. • Very Expensive & very logistics demanding.
Acid Treatment	• Increases well's output by 20 - 70%. • Not long-lasting effect.
Heat Treatment	• Comparatively cheap • Low Efficiency

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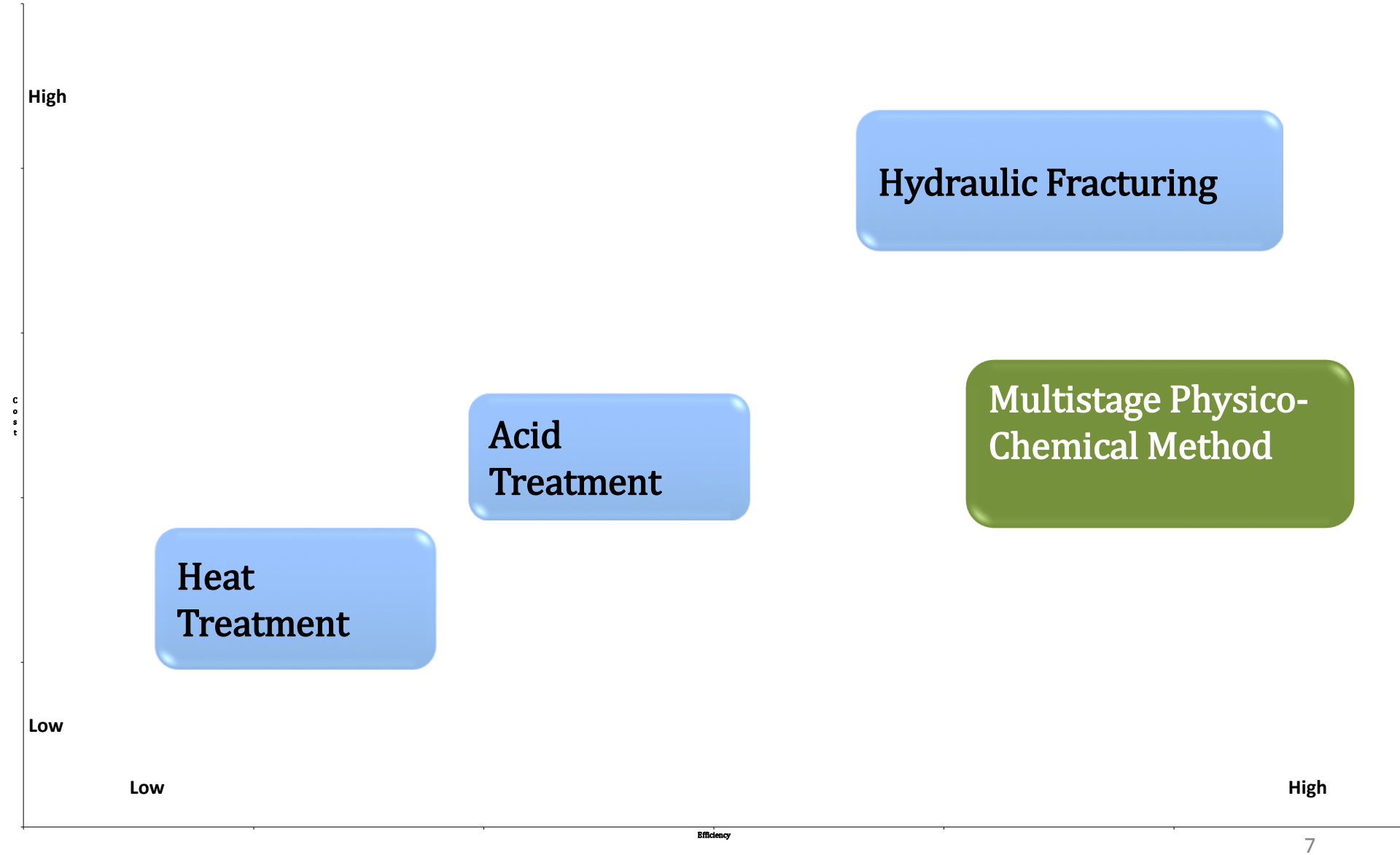
Acid Treatment	• Increases well's output by 20 - 70%. • Not long-lasting effect.
Heat Treatment	• Comparatively cheap • Low Efficiency
Multistage Physico-Chemical Method	• Output increased: Oil wells by 1.5-10 times. Gas wells by 3-12 times; Gas condensate wells by 3-15 times; • Efficient even in highly watered wells. • Cost effective compared to Hydraulic Fracturing.

MPC TECHNOLOGY

OUR CHALLENGING SOLUTION



HSE

- ✓ Worldwide track records prove no negative environmental effects;
- ✓ No damages or accidents;
- ✓ All Chemicals are non-hazardous, eco-friendly and can be applied with bare hands.
- ✓ Certificates obtained (Ukraine, Russia, Turkmenistan, China & the UAE)

MPC TECHNOLOGY

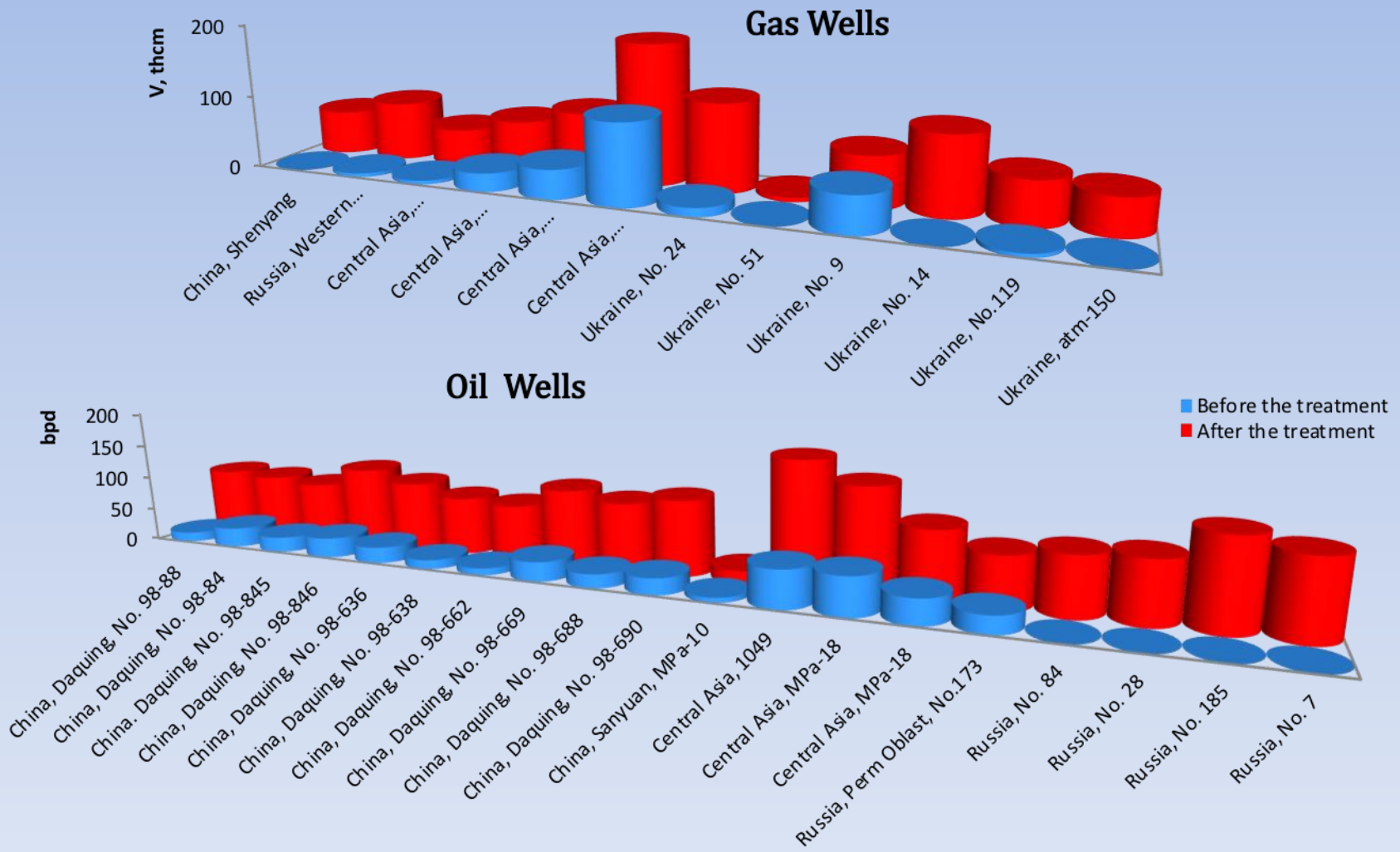
SPECIFIC CHARACTERISTICS OF MPC

Multistage Physico-Chemical Method proves to be more efficient compared with commonly applied intensification technologies of hydrocarbon raw materials inflow:

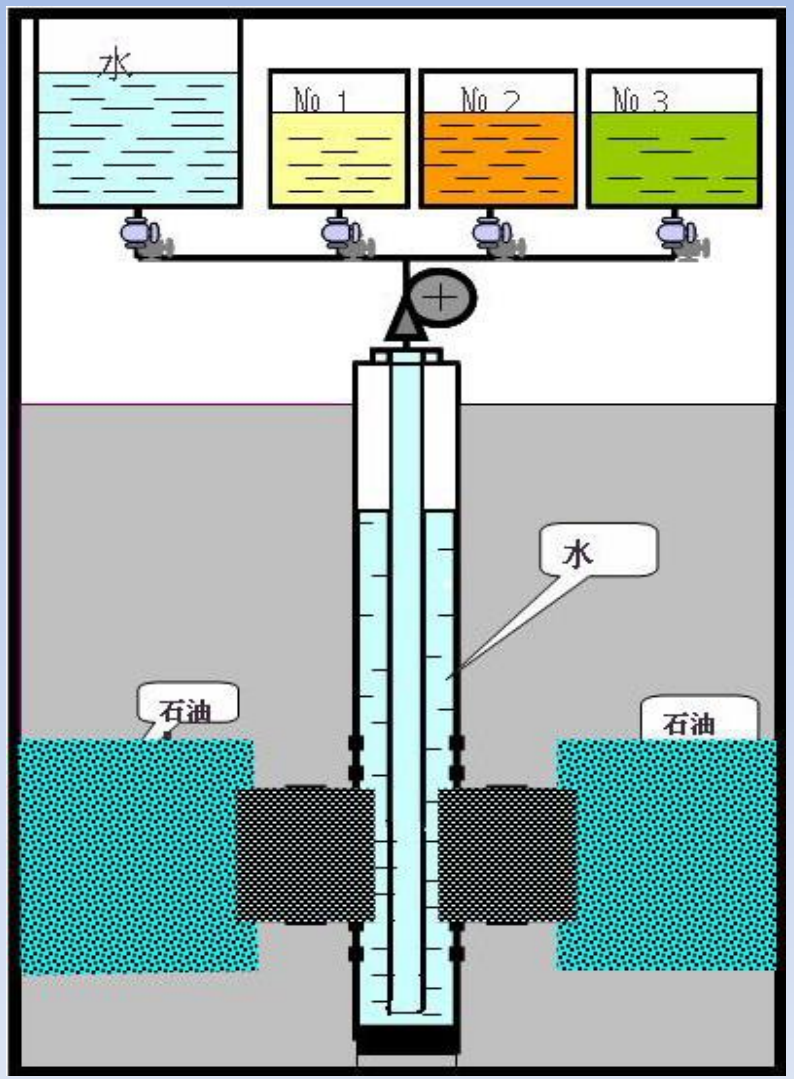
- In oil wells output increases by **1.5 up to 10 times**;
- In gas wells output increases by **3 up to 12 times;**
- In gas condensate wells output increases by **3 up to 15 times**

MPC TECHNOLOGY

MPC – FIELD RESULTS



Multistage Physico-Chemical method (Step 1)

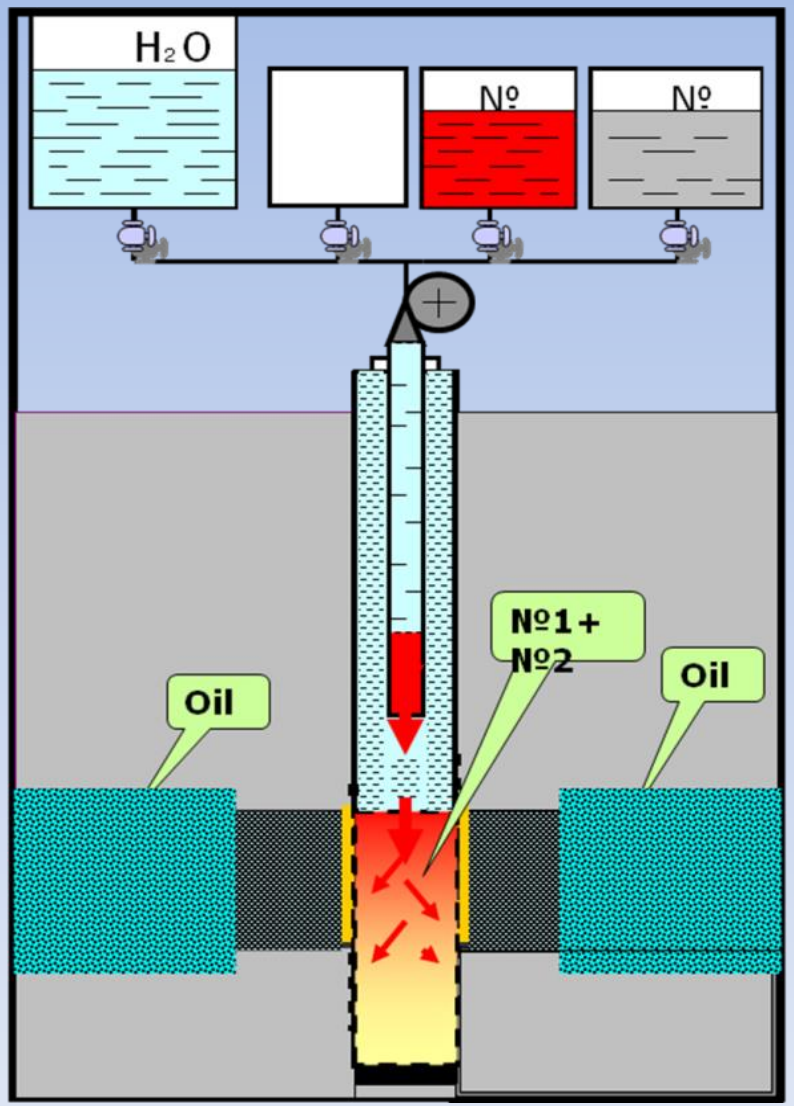


1. Fill the well with water

2. Lower pump tubing down to the bottom hole

3. Pump in Mixture No.1 keeping the annular space open.

Multistage Physico-Chemical method (Step 2)



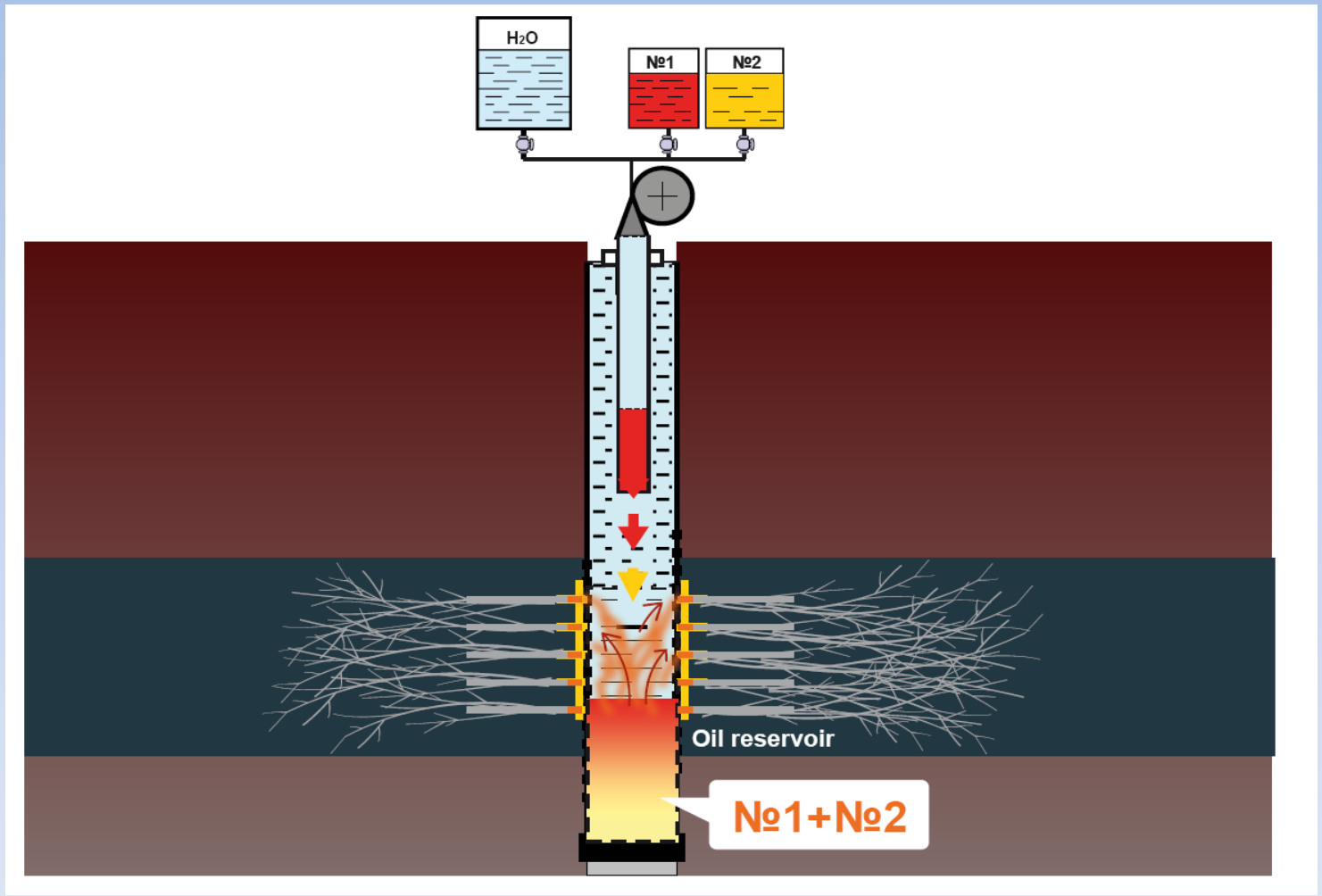
1. Lift tubing 20 m above the uppermost holes of the perforated zone.

2. Pump in Mixture No.2, (hydro-reactive compositions (HRC) and combustible oxidizing mixtures (COM) in a flushing solution) till its spilling from the tubing;

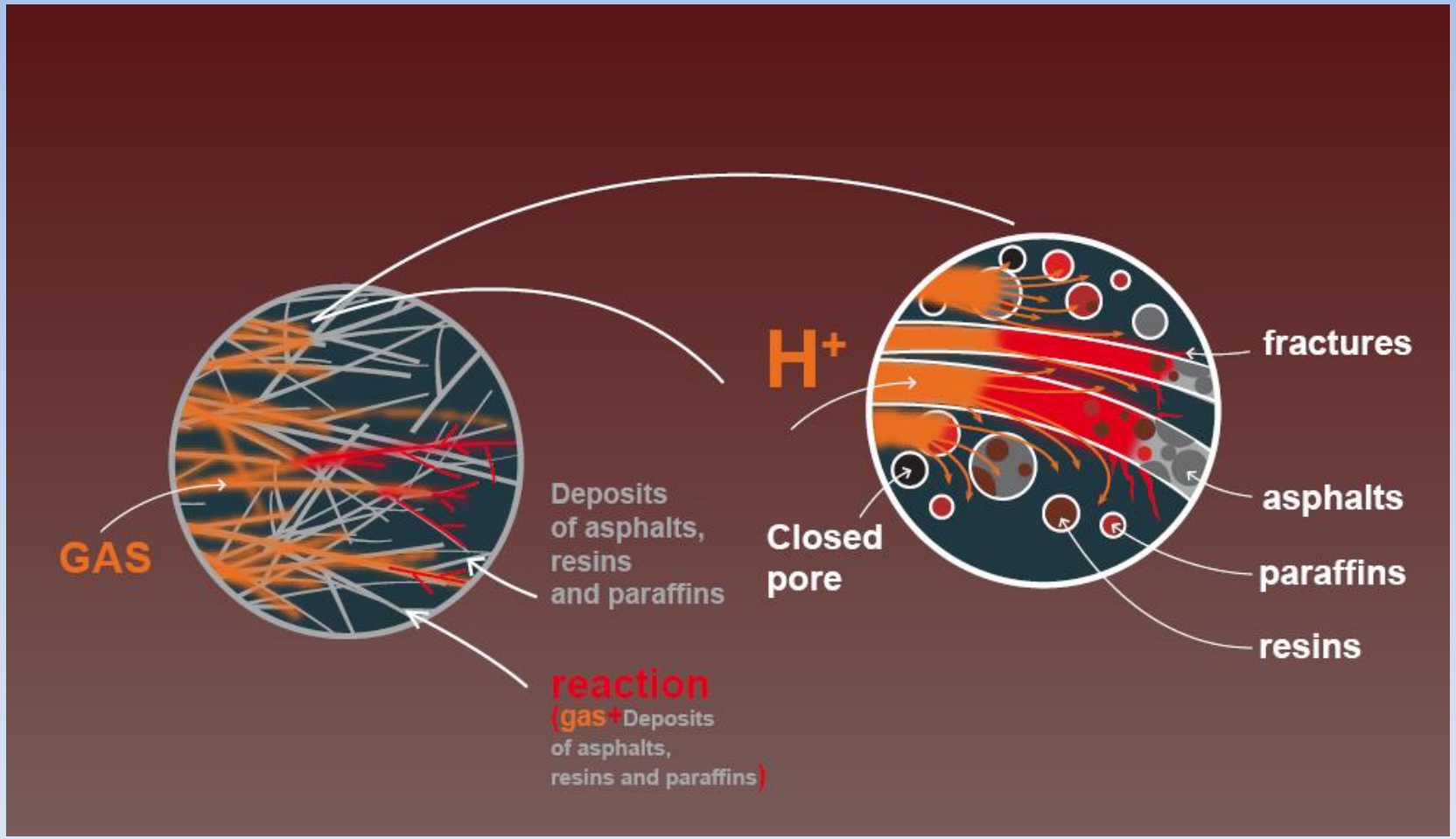
3. Reaction starts & temperature in the production string rises up to 300 degrees Celsius.

4. Pressure within the hole remains hydrostatic .

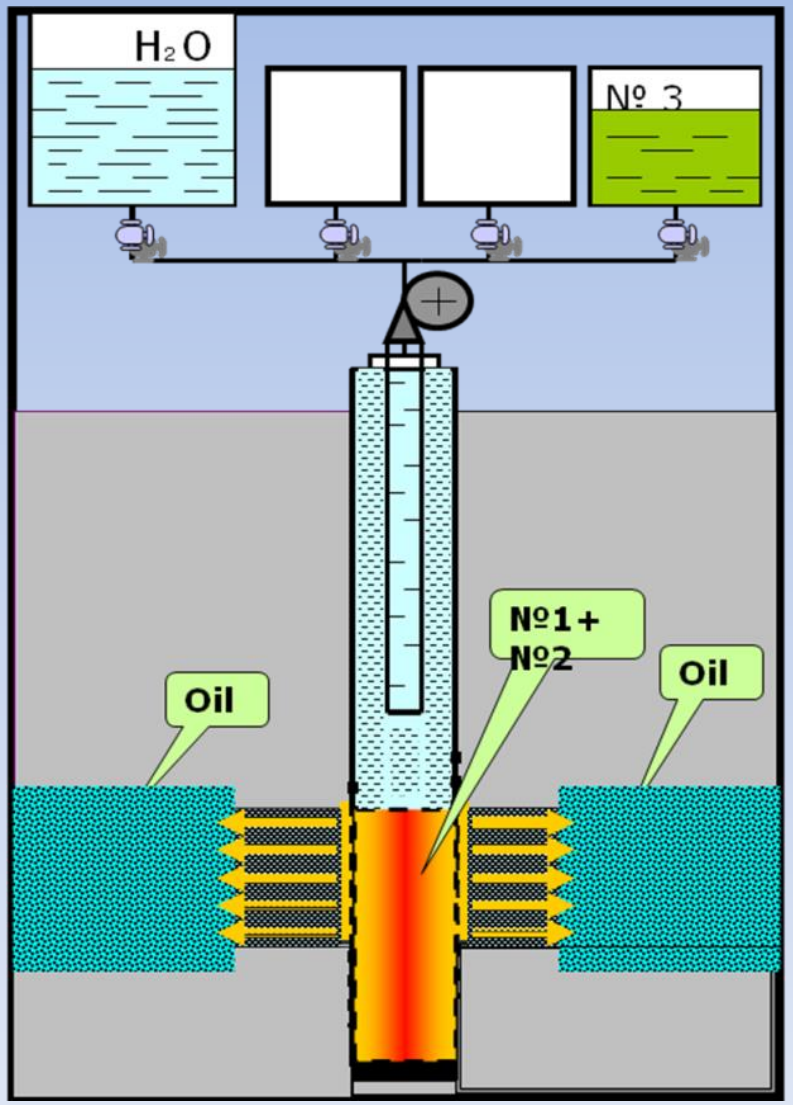
Launching of chemical reaction in the bottom hole



Impact of hot gases and reaction inside the formation



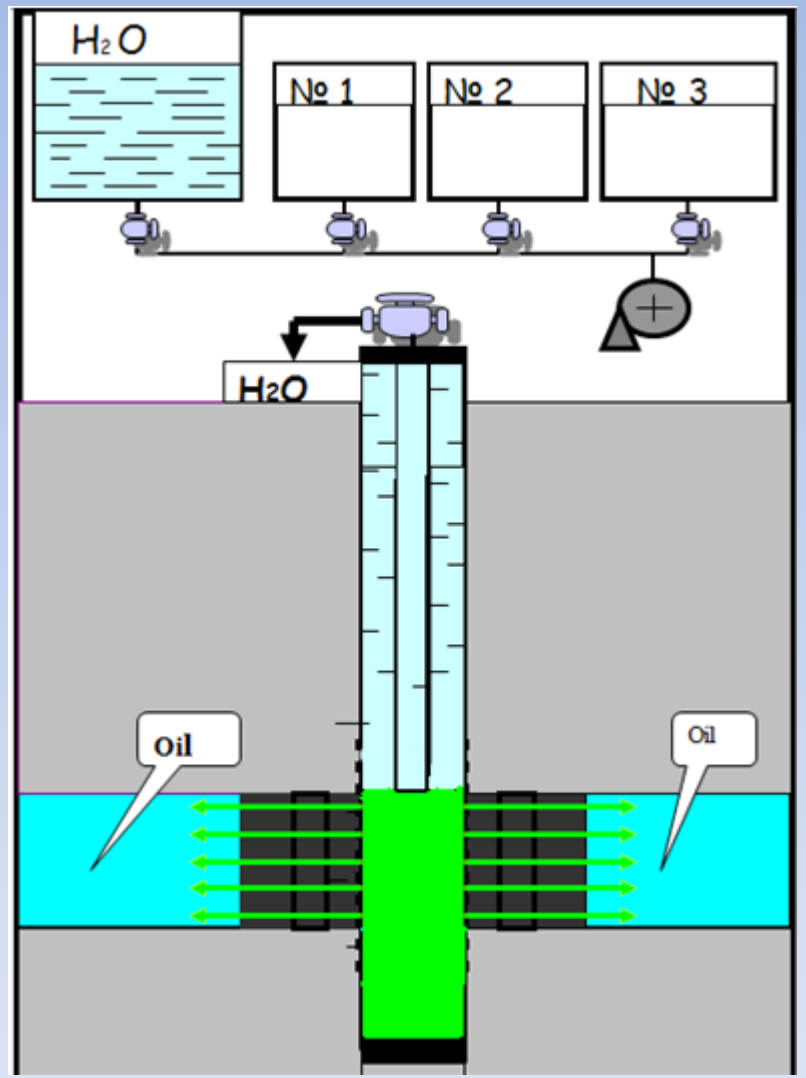
Multistage Physico-Chemical method (Step 3)



1. Leave the well for 12 hours (to allow time for chemical reaction and heat transfer to take place).

2. Close the annular space and inject the reaction products into the subject layer. Lower-down the coil tubing to the uppermost holes of the perforation zone.

Multistage Physico-Chemical method (Step 4)



1. Lower-down the tubing to the upper- most holes of the perforation zone.
2. Close the annular space.
3. Pump-in Mixture 3 into the formation to neutralize & remove the resultant chemical products formed

Multistage Physio-Chemical method (Step 1)

Multistage Physico-Chemical method (Step 2)

Multistage Physico-Chemical method (Step 3)

LAUNCHING OF CHEMICAL REACTION IN THE BOTTOM HOLE

Multistage Physico-Chemical method (Step 4)

Multistage Physico-Chemical method (Step 4)

TRACK RECORD

TRACK RECORD

More than 200 runs.

Approximate additional inflow from the moment of exploitation:

- **China: 85 oil wells**. Averaged output increased **4 times**. Additional petroleum output 6,000 - 7,000 bpd

- **Russia: 30 oil wells.** Averaged output increased **3.7 times.** Additional petroleum output 2,200 bpd

- **Turkmenistan: 23 oil wells.** Averaged output increased **4.3 times.** Additional petroleum output 2,700 bpd

- **Ukraine: 9 oil wells**. Averaged output increased **3.9 times.** Additional petroleum output 1,120 bpd; 8 gas wells. Averaged output increased 7 times. Additional natural gas output 20,000 m3/day (706,000 cfpd)

- **Average indicator** of growth of additionally extracted raw hydrocarbon increased by **4 times**

MPC RESULTS IN INDIA

MPC Services for heavy oil production from 2 wells in Baola & Modhera Fields, Gujarat, India

- Sun Oil & Natural Gas a division of Sun Petrochemicals Pvt Ltd is focused on the E&P business for exploration, development, production & providing various services for oil and gas fields in India and Abroad
- Baola#8 was spudded on August 28 2010. It is located in IPL's small onshore Baola block, approx. 40 kms from the city of Ahmedabad, in Gujarat, India. The Baola block had been previously categorized primarily as a gas field.

MPC RESULTS IN INDIA

Baola Reservoir Parameters:

- Baola-8 well was drilled to a depth of 1009 meters and encountered the target Middle Eocene Oolite reservoir section of the Kalol Formation from 904.5 to 928 meters. Several hydrocarbon bearing sections were identified through, mud log and electric-line log evaluation, geochemical evaluation of side-wall cores and a preliminary testing of the interval 909-911 meters yielded heavy oil that flowed to surface under natural flow.
- During initial testing liquid flowed @271 bbls / day in self-flow containing 76.7 % oil and 23.3% technical water. After doing CBL-VDL, cementation and re-perforation well could not come to production.
- **Numerous stimulation jobs using various technologies carried out during 2011-2015 didn't give material results.**

MPC RESULTS IN INDIA

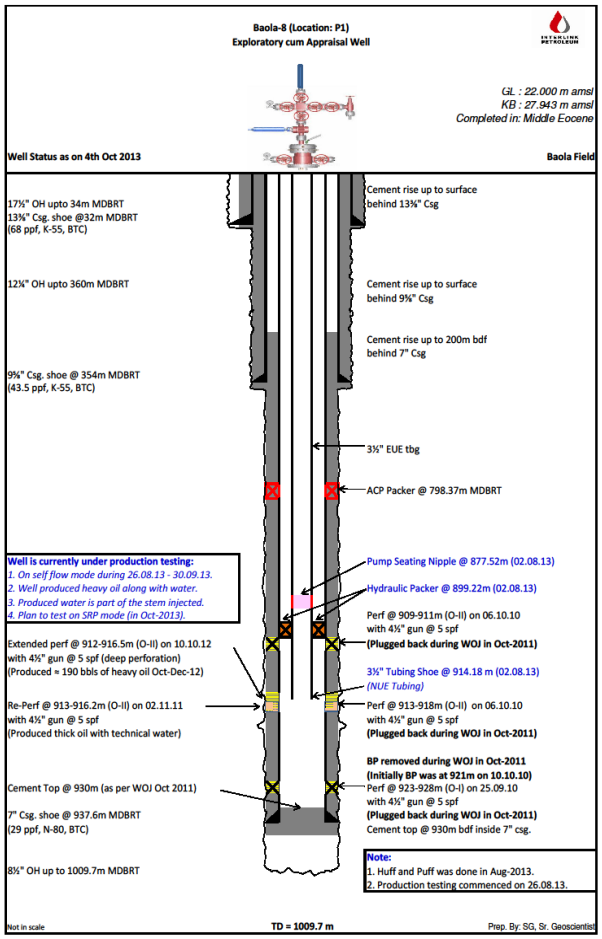
Baola Reservoir Parameters:

- API gravity of produced oil is 14-18 API.
- GOR is not measurable.
- No sand production observed during testing. No sand control measures are required.
- This field is having 3 Nos. of wells(B#1, B#5 &B#8)
- Water zone is about 12 m below the existing perforations.
- Porosity is 30% and permeability 37 md.
- Formation pressure is hydrostatic.
- Bottom Hole Temperature is about 60 degree centigrade.

MPC RESULTS IN INDIA

Baola #8 Well data

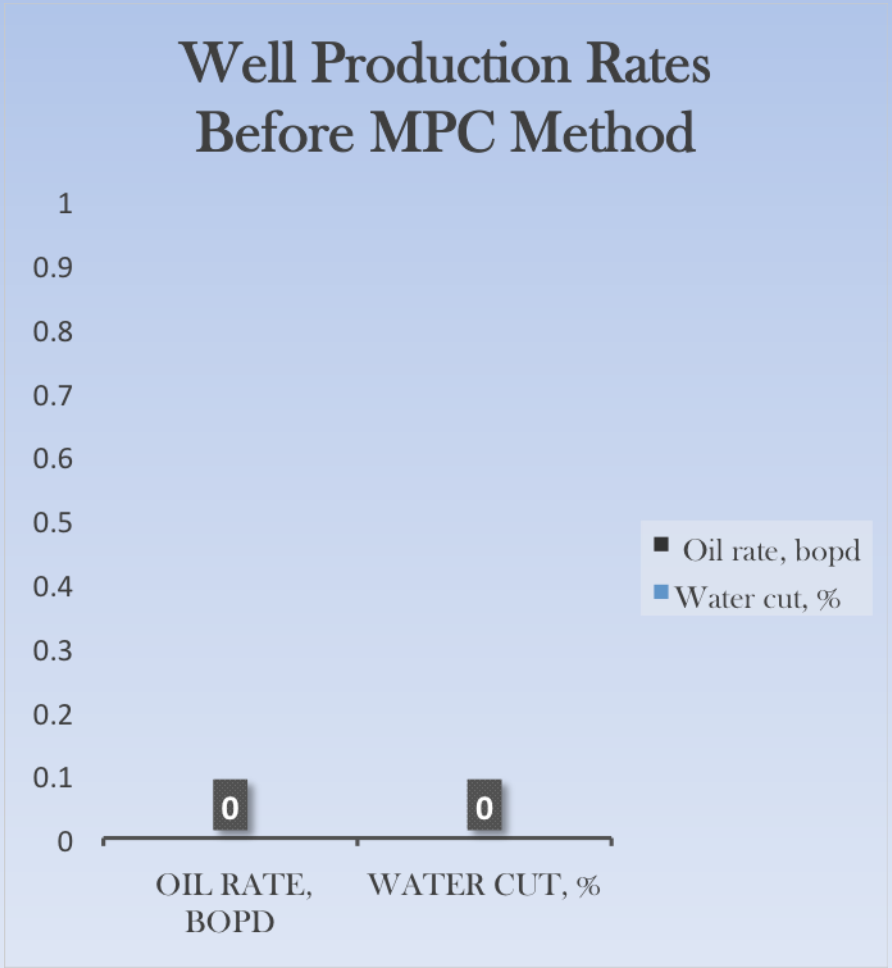
- Casing size ID-157.07 mm and Rat hole volume (sump below perforation) is about 300 liters. Tubing OD-88.99 mm, ID 74.22mm. Tubing shoe is at 914.18 m in between perforation.
- Cement squeeze job have been performed in zone (909-911m) above existing perforations. Further bottom is plugged back by cement plug at 930m and another zone (923-928m) below existing perforations is plugged by cement squeeze job.
- During initial testing liquid flowed @271 bbls / day in self-flow containing 76.7 % oil and 23.3% technical water. After doing CBL-VDL, cementation and re-perforation well could not come to production.

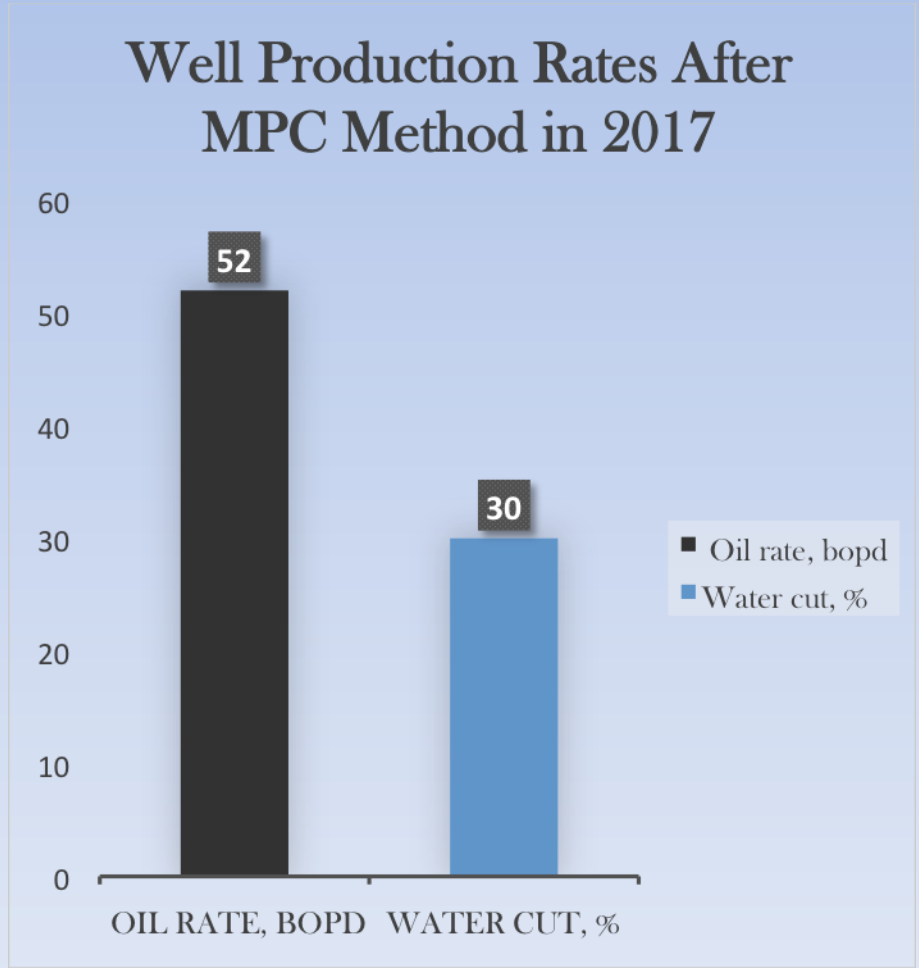


MPCM for Sun Petrochemicals Pvt Ltd

India. Sun Oil & Natural Gas – a division of Sun Petrochemicals Pvt Ltd

Well # Baola 8.





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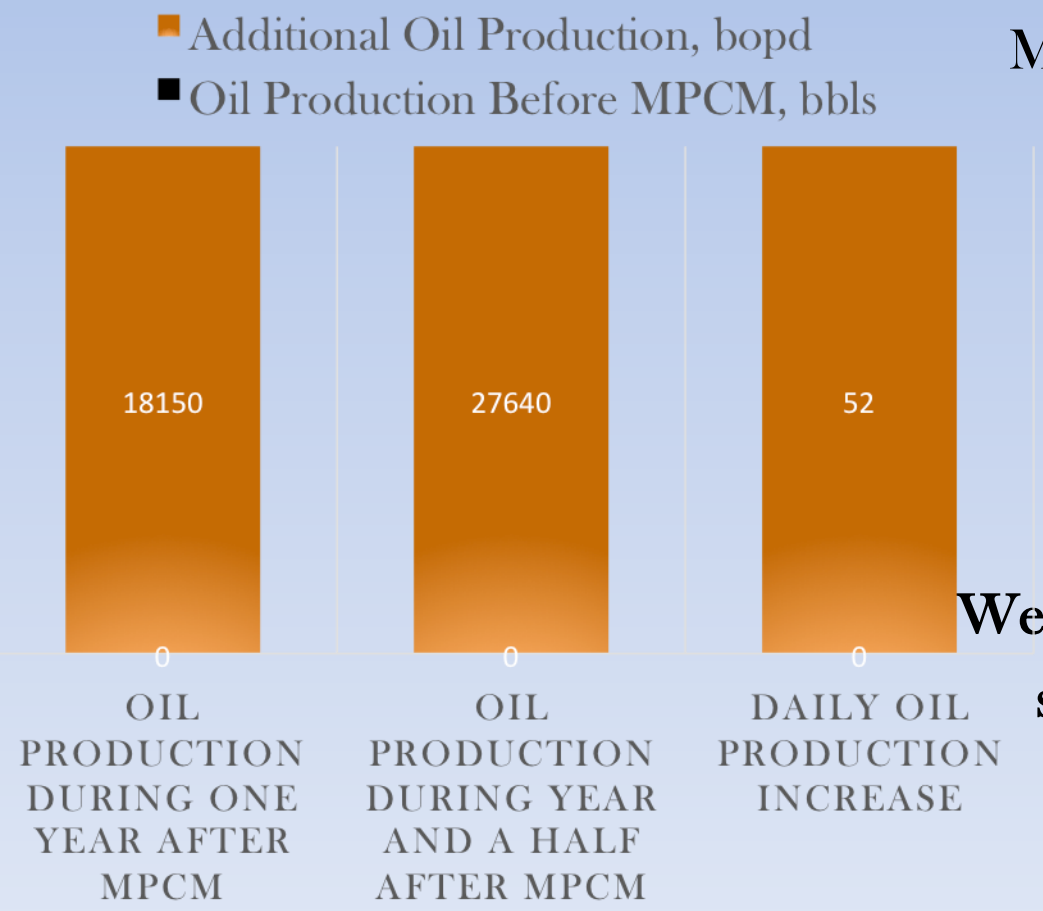


MPC Method for Well #Baola 8

Highlights:

- Daily oil production was Increased from **0 to 52 bopd**
- Cumulative oil additionally produced after MPCM – **27640 bbls**

Well was activated successfully and started operating in a stable and commercially effective mode.

MPCM for Polar Lights Company

Russia. Polar Lights Company – JV between ConocoPhillips & RosNeft.
Well # D-7.

Perforations:

3565 - 3568 m MD (3 m) DF2,

3577 - 3583 m MD (6 m) DF2

3588 - 3591 m MD (3 m) DF2

Target depth:

3632 m MD / 3380 m TVD

TD - 3633 m MD / 3375.7 m TVD

PBTD @ 3620.5 m MD / 3363.6 m TVD

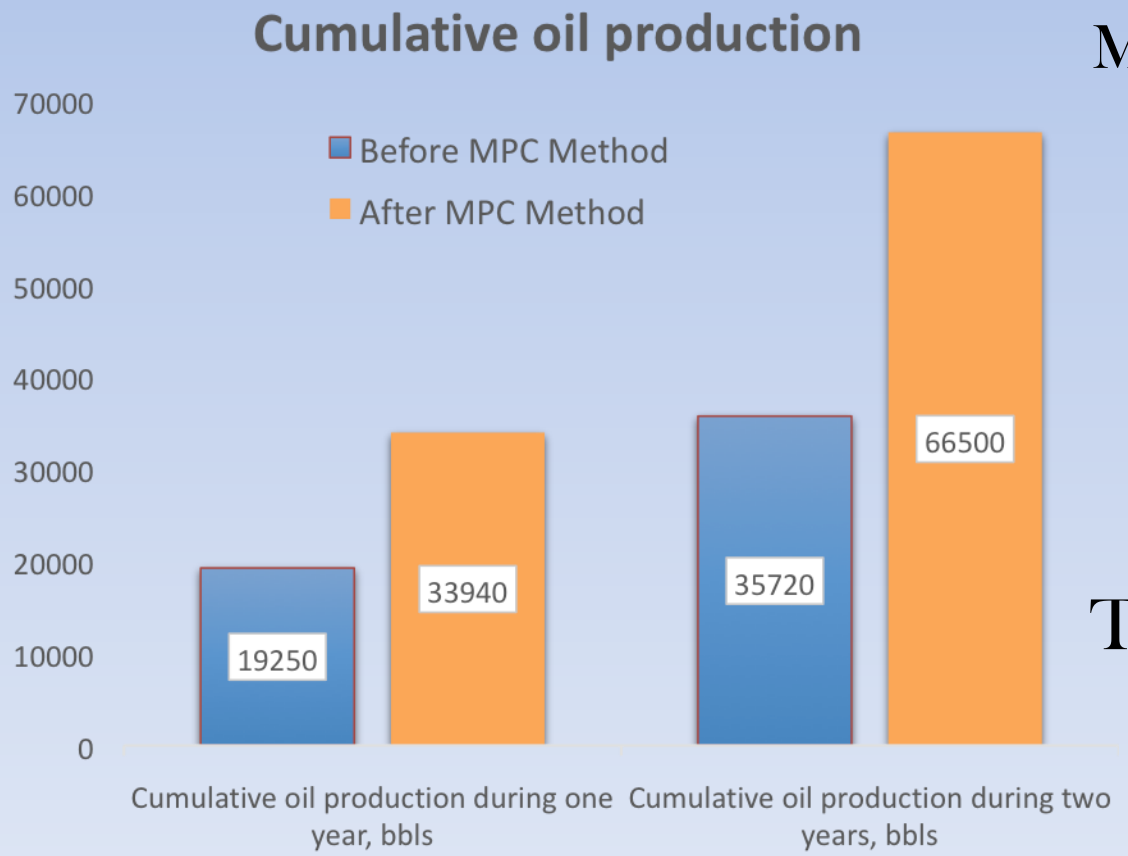
Parameter	Average
Carbonate content	97,32%
Calcite content	85,45%
Dolomite content	11,87%
Insoluble residue	2,68%
Open Porosity	4,39 %
Permeability	$8{,}56*10^{-3}$ micron^2

WELL DOWNTIME DUE TO INACCESEBILITY FOR WORKOVER IN SUMMER SEASON FROM APRIL 2011 TILL MAY 2012.

MPCM for Polar Lights Company

Russia. Polar Lights Company – JV between ConocoPhillips & RosNeft.

Well # D-7. Results.



MPC Method for Well #D7

Highlights:

- Daily oil production was Increased from **55 to 112 bopd**
- Cumulative oil additionally produced after MPCM treatment

Two years – **30,790 bbls**

MPCM for Polar Lights Company

Russia. Polar Lights Company – JV between ConocoPhillips & RosNeft.

Well # C-2.

Perforations:

3565 - 3568 m MD (3 m) DF2,

3577 - 3583 m MD (6 m) DF2

3588 - 3591 m MD (3 m) DF2

PBTD @ 3547 m MD / 3349 m TVD

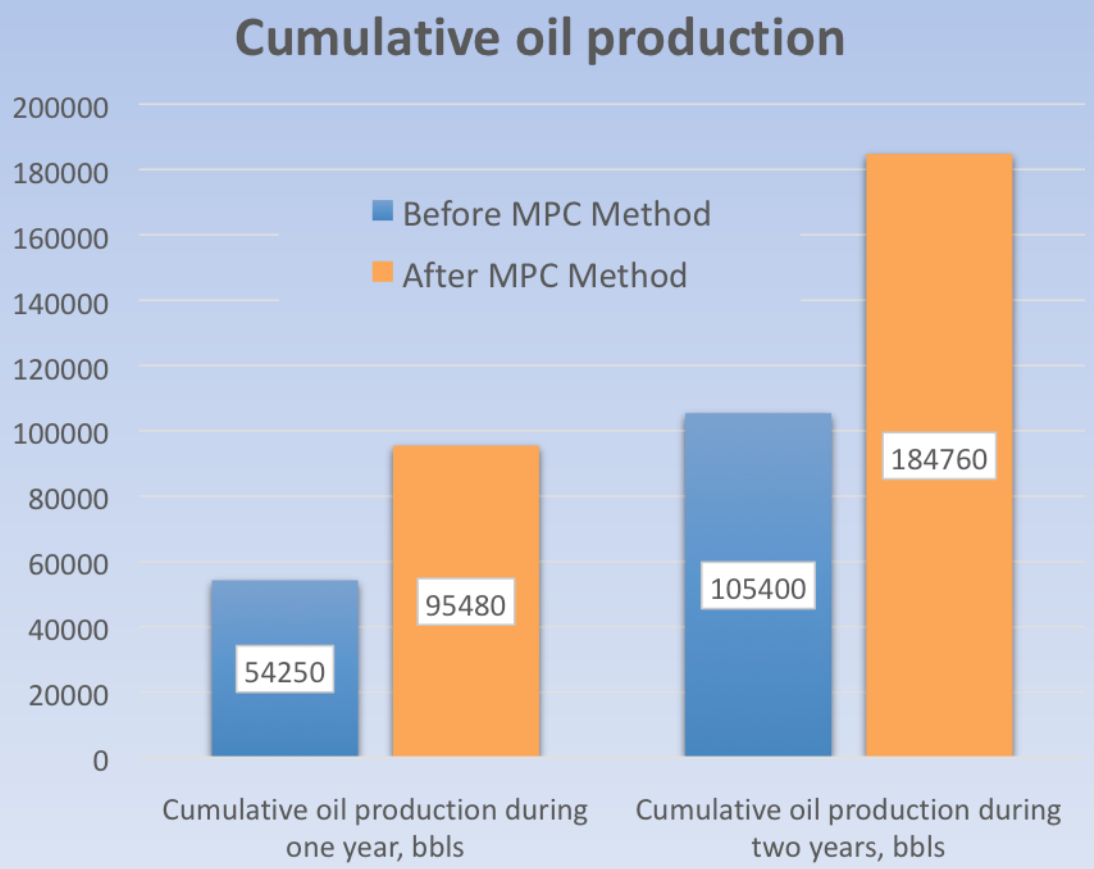
Parameter	Average
Carbonate content	97,62%
Calcite content	87,45%
Dolomite content	11,87%
Insoluble residue	2,68%
Open Porosity	1,93 %
Permeability	$0,25*10^{-3}$ micron^2

MPCM was applied on July 27-28,2013.

MPCM for Polar Lights Company

Russia. Polar Lights Company – JV between ConocoPhillips & RosNeft.

Well # C-2. Results.



MPC Method for Well #C2

Highlights:

- Daily oil production was Increased from **175 to 314 bopd**
- Cumulative oil additionally produced MPCM (1 year) – **41230 bbls**

Additional effect in five offset wells after **MPCM – 52740 bbls**

MPCM for JSC "Mangistaumunaigaz"

Kazakhsatan. JSC MMG. Well # 517.

Well characteristics:

The well has been in operation for over 35 years; the neighboring wells are characterized by identical rates of productivity. It is characterized by a low water cut (10%) and a strong influence of the gas (Pwellhead 2.5-3). The effective thickness of the reservoir is 17 meters (U-08).

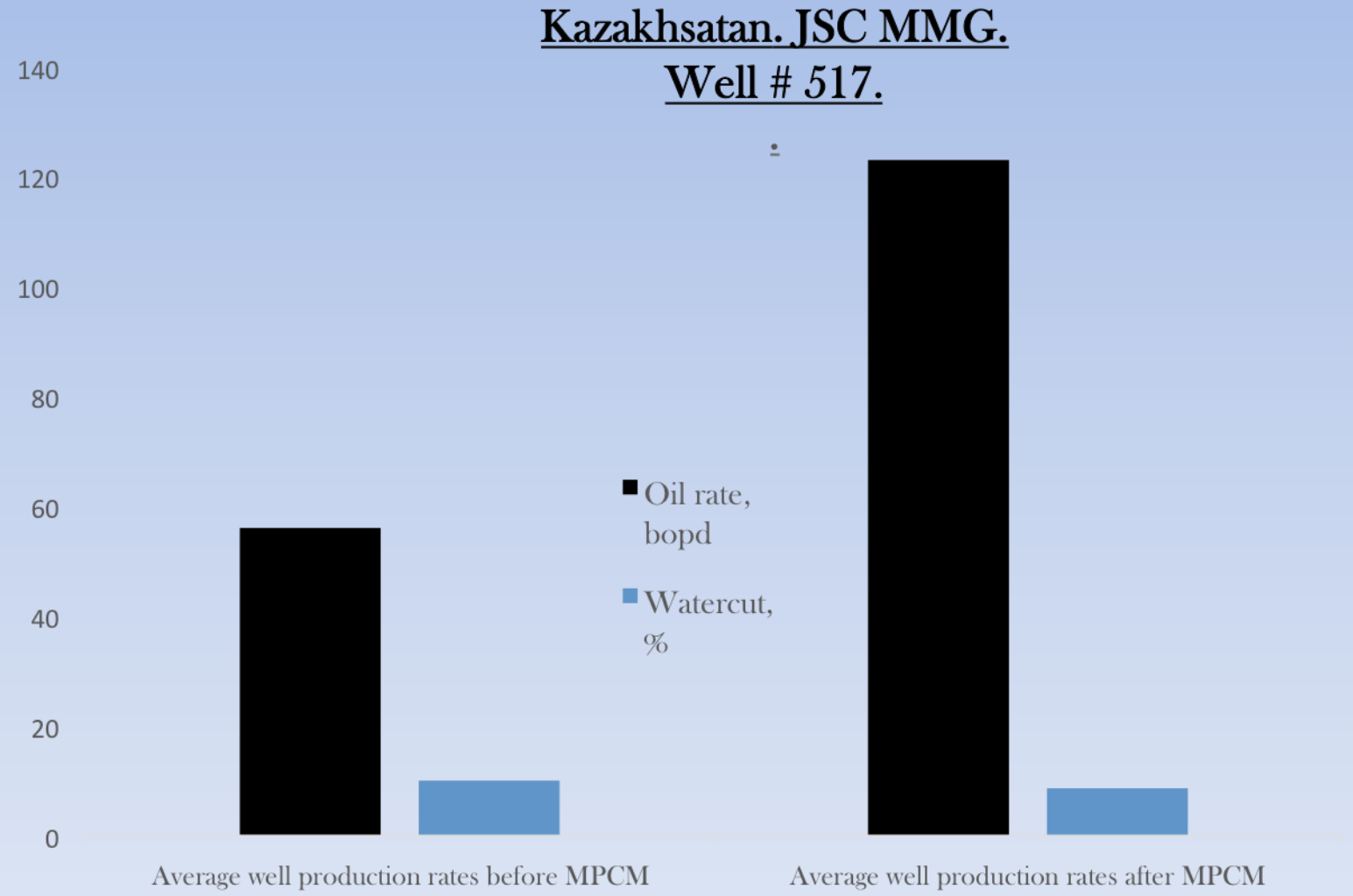
Perforations:

2132 – 2136 m MD,

2141 – 2155 m MD

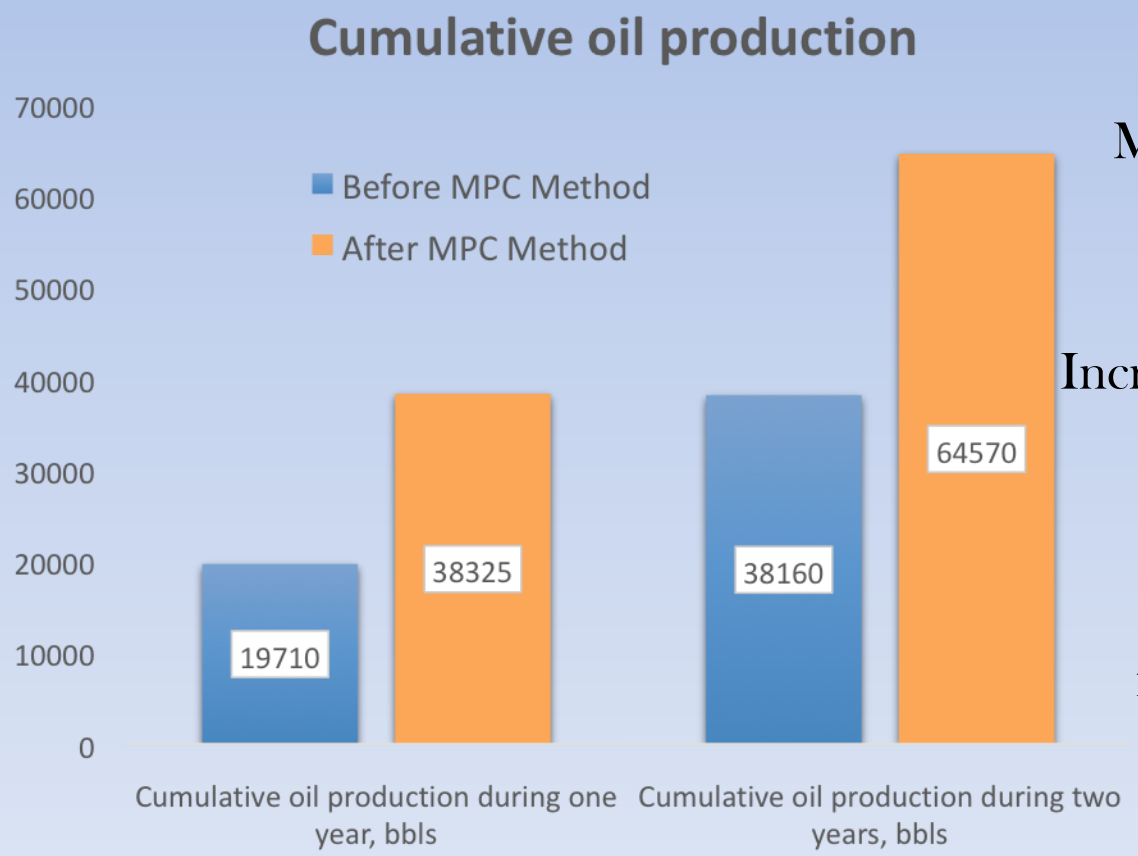
Parameter	Average
Formation pressure	176 atm.
Bottom hole pressure	156 atm.
Asphalt/resinous/paraffin	28,6%
Degassed oil density	0.84 g/cm3

MPCM for JSC "Mangistaumunaigaz"



MPCM for JSC "Mangistaumunaigaz"

Kazakhsatan. JSC MMG. Well # 517.



MPC Method for Well #517

Highlights:

- Daily oil production was Increased from **54 to 123 bopd**
- Cumulative oil additionally produced after MPCM during first two years – **26 400 bbls**

MPCM for JSC "Mangistaumunaigaz"

Kazakhsatan. JSC MMG. Well # 3332.

Well characteristics:

The well has been in operation for over 25 years; the neighboring wells are characterized by identical rates of productivity. It is characterized by a low water cut (10%) and a strong influence of the gas ($P_{wellhead}$ 2.5-3). The effective thickness of the reservoir is 9 meters (U-12).

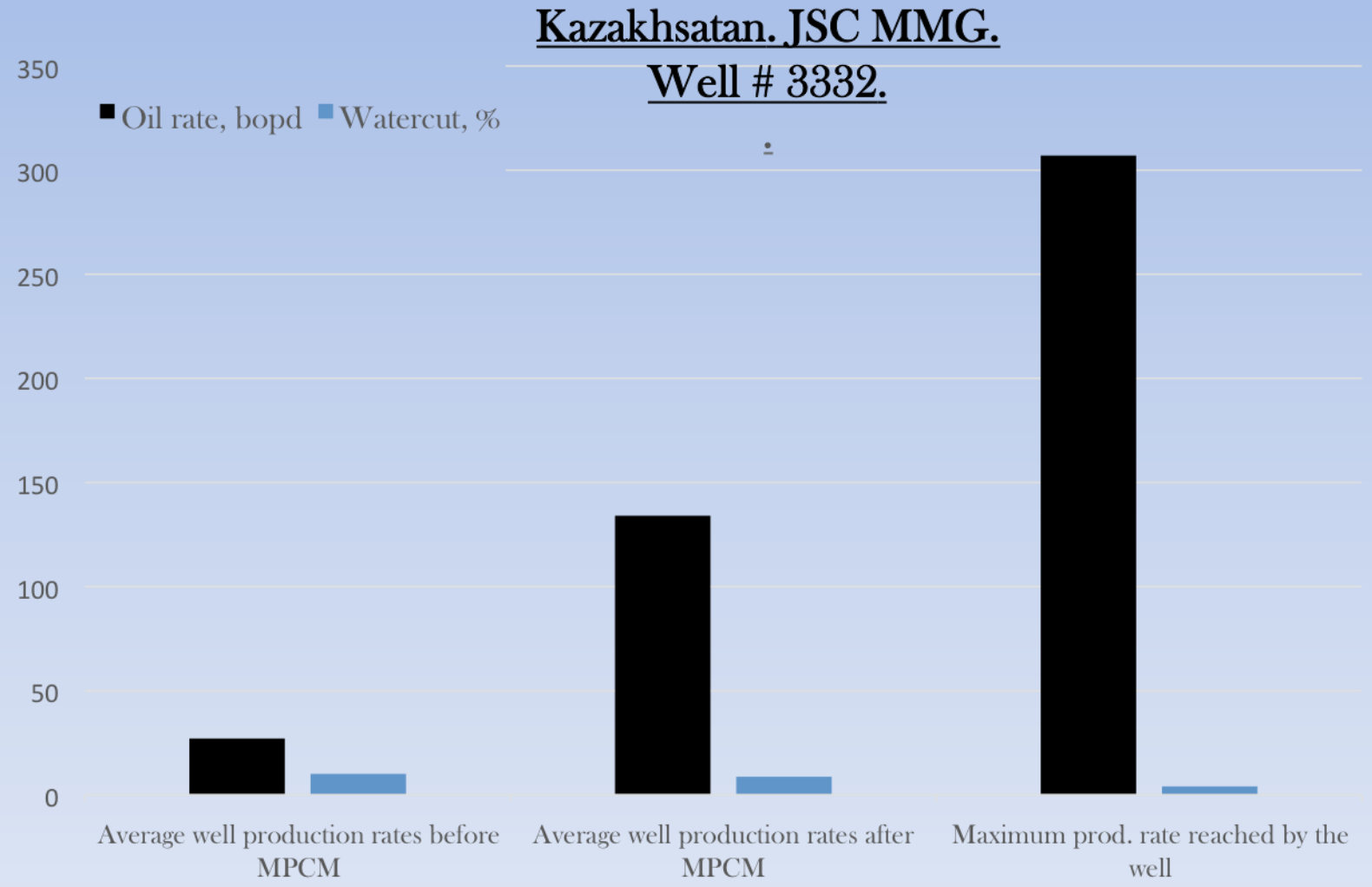
Perforations:

2357 – 2360,5 m MD,

2364,5 – 2370,5 m MD.

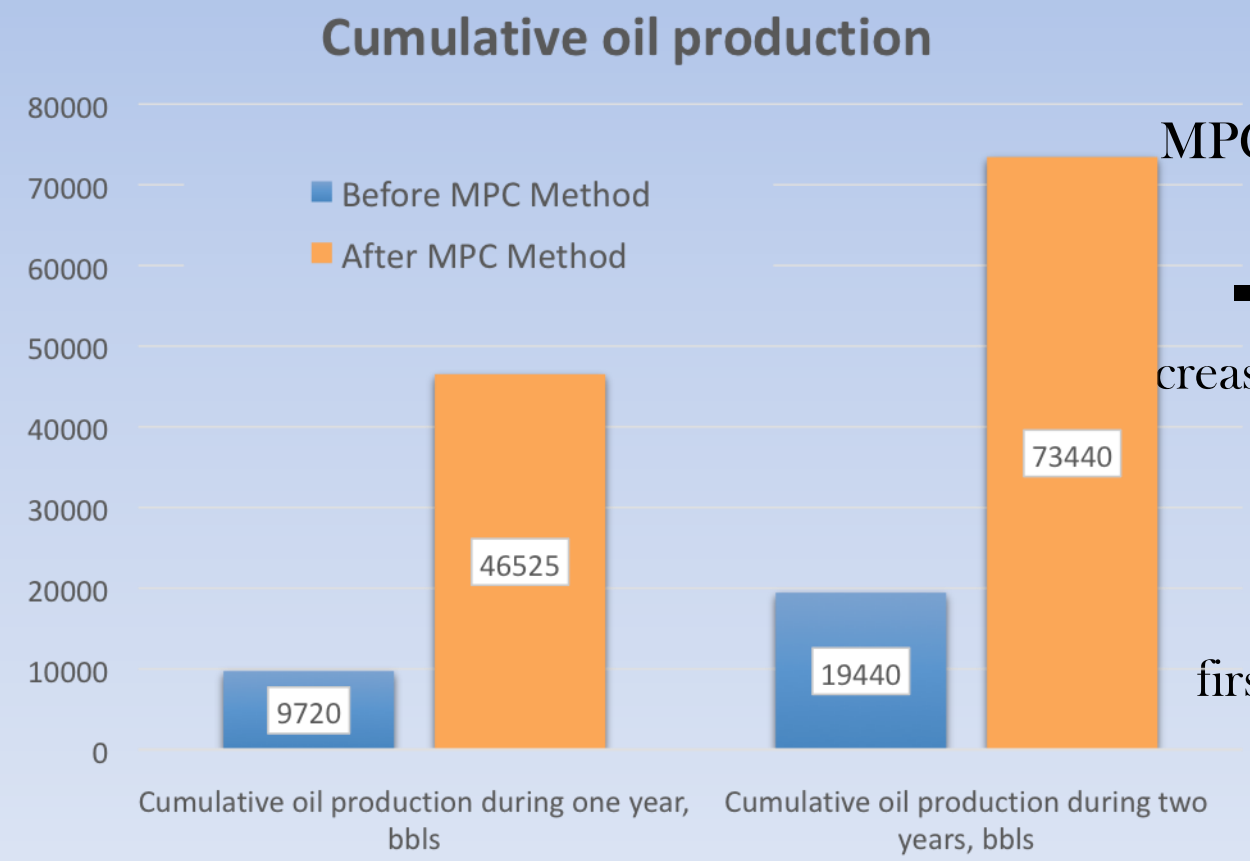
Parameter	Average
Formation pressure	173 atm.
Bottom hole pressure	159 atm.
Asphalt/resinous/paraffin	28,6%
Degassed oil density	0.84 g/cm3

MPCM for JSC "Mangistaumunaigaz"



MPCM for JSC "Mangistaumunaigaz"

Kazakhsatan. JSC MMG. Well # 3332.



MPC Method for Well #517

Highlights:

- Daily oil production was increased from **27 to 134 bopd**
- Cumulative oil additionally produced after MPCM during first two years – **54000 bbls**

Our Team

Sergiy Malygon
president

Oleg Boguslavets
key advisor, EOR Specialist

Alexei Palko
key account manager

Alexei Podlisovskiy
petroleum engineer

Alexei Symonenko
chemical engineer

Sergiy Polyshchuk
chief engineer

PRESTILENERGY LTD

THANK YOU!

MPC TECHNOLOGY

www.mpc.technology
info@mpc.technology

PRESTILENERGY LTD

TRACK RECORD

SPECIFIC FIGURES

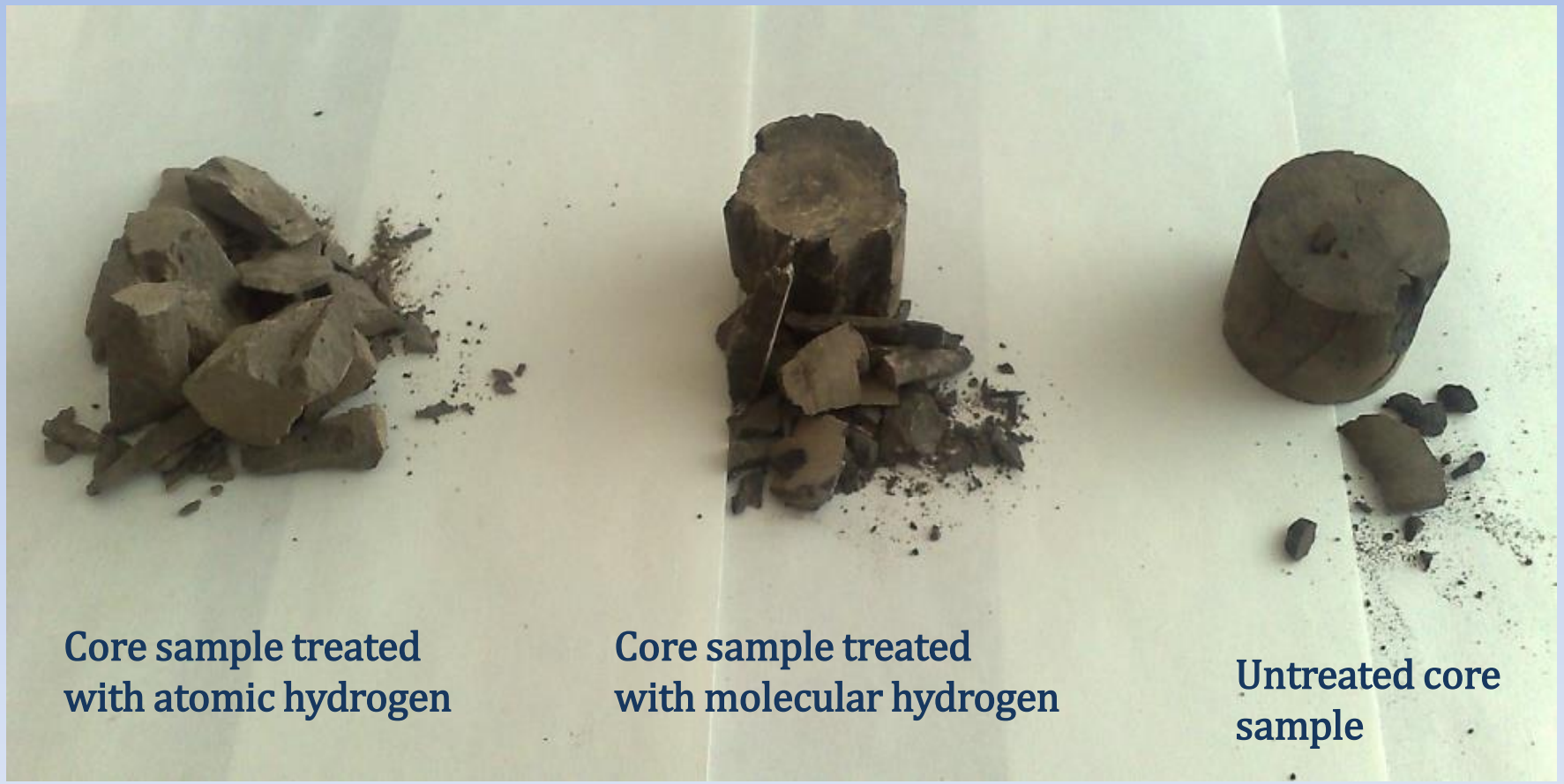
- The well №51, Shebelinsky field, Ukraine, increased its output by 30 times due to treatment in 2001.
- Since treatment in 2001, the well №1324 of Yaun-Lorsky field, group 445 (Russia) has been steadily operating till now with additional surplus of 42 bpd of oil (extremely watered well).
- The well №58-88 of the Dazing field (China) was treated on 21.11.2009. By 26.11.2010 the petroleum output had increased from 17.6 up to 94.3 bpd.

GENERAL FIGURES

Total number of more than 200 successful runs.
Approximate additional inflow from the moment of exploitation:

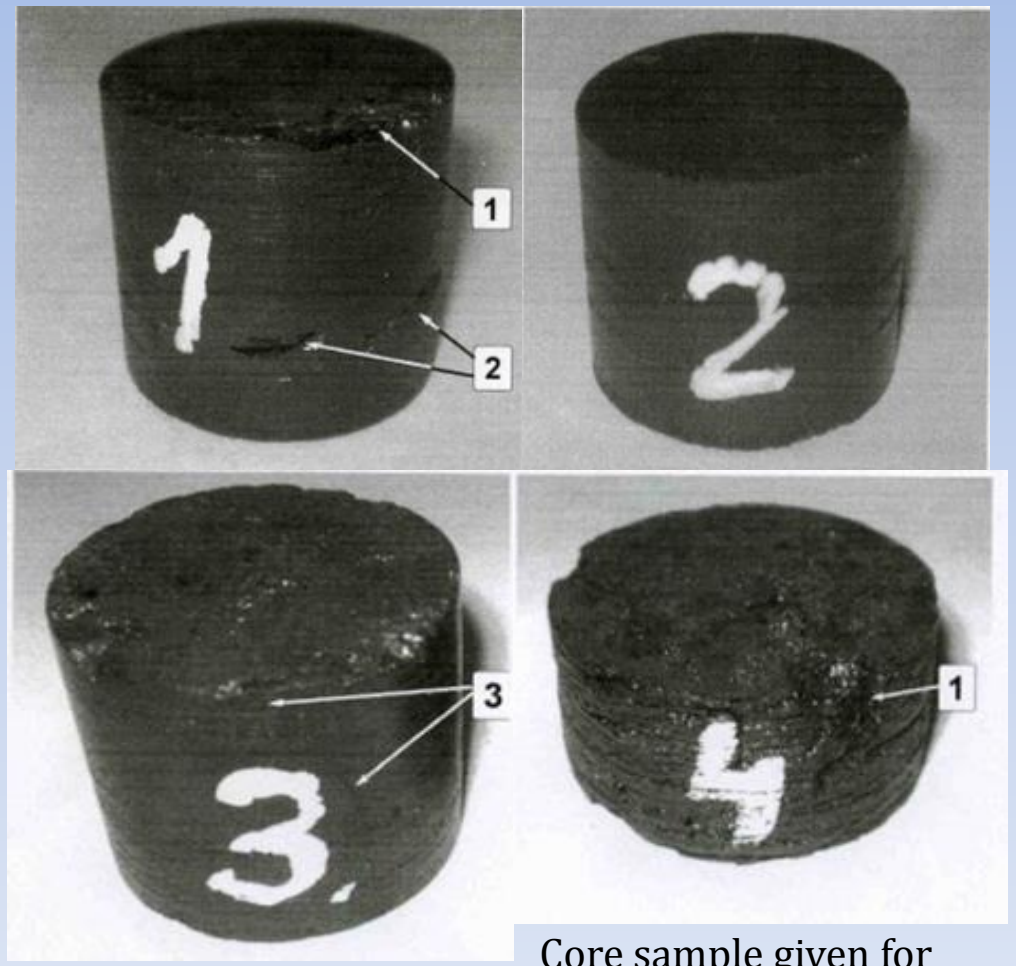
- **India, Pakistan, Kazakhstan** – more than **30 wells** successfully treated.
- **China: 85 oil wells**. Averaged output increased **4 times**. Additional petroleum output 6,000 - 7,000 bpd
- **Russia: 30 oil wells.** Averaged output increased **3.7 times.** Additional petroleum output 2,200 bpd
- **Turkmenistan: more than 85 oil wells.** Averaged output increased **4.3 times.** Additional petroleum output 2,700 bpd
- **Ukraine: 9 oil wells**. Averaged output increased **3.9 times.** Additional petroleum output 1,120 bpd; 8 gas wells. Averaged output increased 7 times. Additional natural gas output 20,000 m3/day (706,000 cfpd)
- **Average indicator** of growth of additionally extracted raw hydrocarbon increased by **4 times** and total increment constituted 1700-1800 thousand m^3

Samples after strength tests



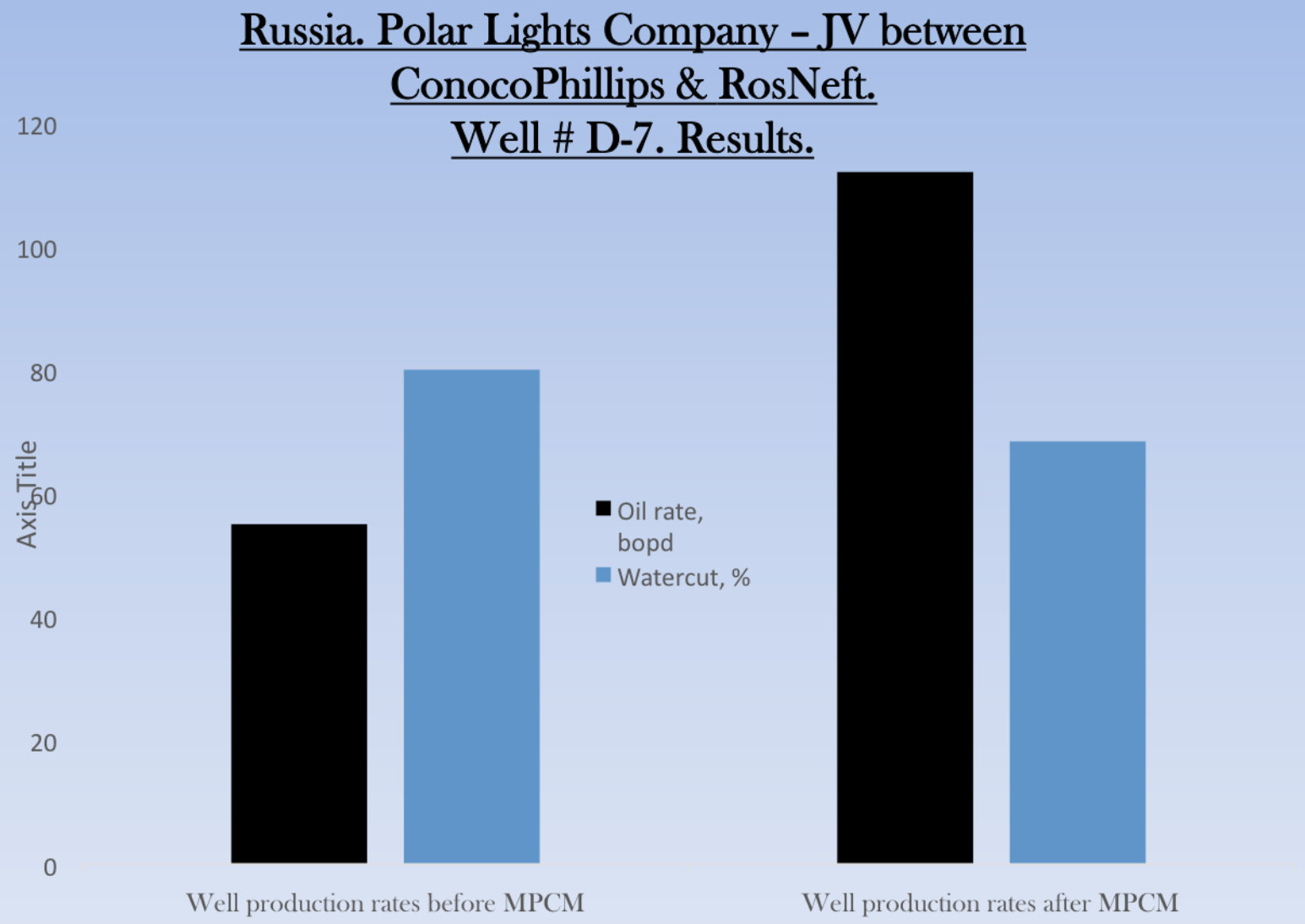
Increasing coal core gas permeability

1 - Spall
2 - Cavities
3 - Fractures



Core sample given for test

MPCM for Polar Lights Company



THE TECHNOLOGYCAL HISTORY

1980's:
Developed from Soviet military rocket fuels.

1990's:
the Multistage Physico-Chemical approach was tested & improved in Ukraine & Russia

Early 2000's:
Acquired patents in Russia, Ukraine & USA

Late 2000's:
UK-based Prestil Energy successfully performing in China & Central Asia

MPCM for Sun Petrochemicals

India. Sun Oil & Natural Gas – a division of Sun Petrochemicals Pvt Ltd

Well # Baola 8.

Perforations:

894 - 874 m MD (20 m) DF2,

912 - 916 m MD (4 m) DF2

PBTD @ 930 m / T 1009,7 m

Porosity – 30% Permeability – 37 md.

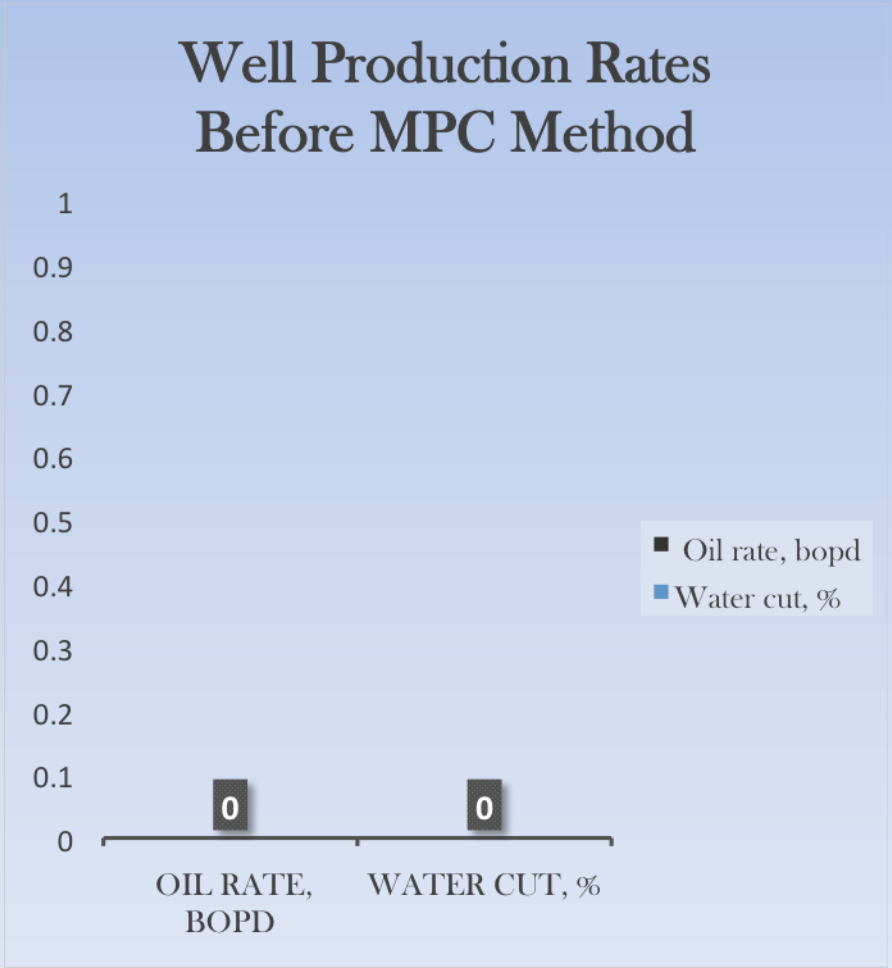
API gravity of produced oil is 14-18 API

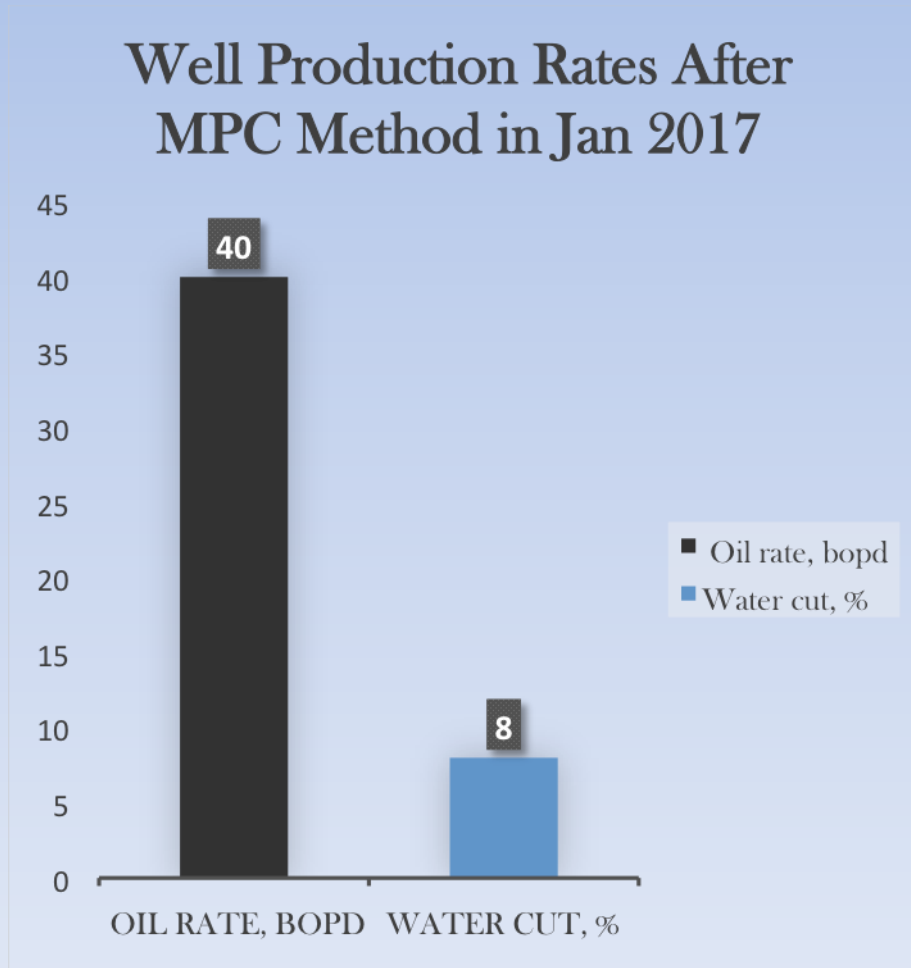
- During initial testing liquid flowed @271 bbls / day in self-flow containing 76.7 % oil and 23.3% technical water. After doing CBL-VDL, cementation and re-perforation well could not come to production.
- Numerous stimulation jobs using various technologies carried out during 2011-2015 didn't give material results.
- Bottom Hole Temperature is about 60 degree centigrade.

MPCM for Sun Petrochemicals Pvt Ltd

India. Sun Oil & Natural Gas – a division of Sun Petrochemicals Pvt Ltd

Well # Modhera 1.





MPCM for Sun Petrochemicals Pvt

India. Sun Oil & Natural Gas – a division of Sun Petrochemicals Pvt

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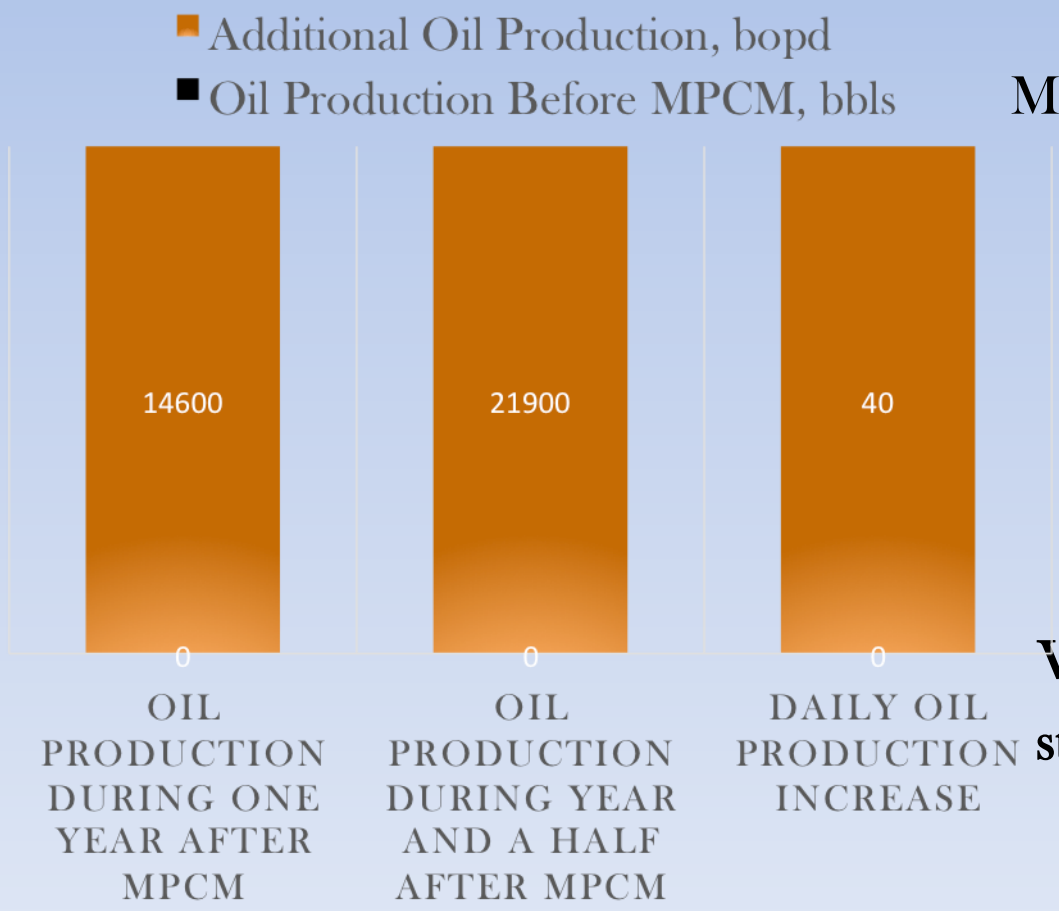

MPC Method for Well #Baola 1

Highlights:

- Daily oil production was Increased from **0 to 40 bopd**
- Cumulative oil additionally produced after MPCM – **21900 bbls**

Well activated successfully and started operating in a stable and commercially effective mode.