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Precede Sand Control Technology

东方智慧 全球分享

Oriental wisdom , Global sharing

Contents

Headquarters: Dongying China

Shandong Precede petroleum technology company,.Ltd is a wholly owned subsidiary of ANTON oil company,.Ltd . Precede is founded in 1999,the registered captial is 100 million. The number of staff is more than 200.

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- The earliest product line
- The largest screen & completion tools supplier in China
- The biggest gravel packing services provider in China



Overview of Precede Sand Control

The company persisits in principle of safety, quality, efficiency, cooperation to meet the needs of the clients.The business scope of the company includes manufacture of the oil equipment, petroleum technology service,drilling engineering,directional well etc. Especially, the sand control technology of the company always at the top of the list in sand control field. The company holds many patents for invention about the differnent tools and technology in sand control field.

Contents

Gravel Packing Technologies

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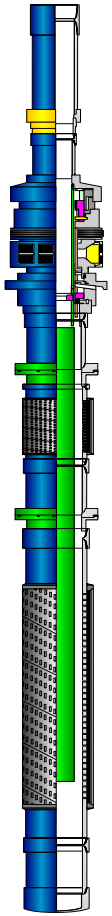
- Circulation Gravel Pack
- HRWP
- Micro-fracturing Pack
- Frac Pack

1. Gravel packing in vertical well



Tubing/ DP
Crossover
Lifting sub

Packing Packer

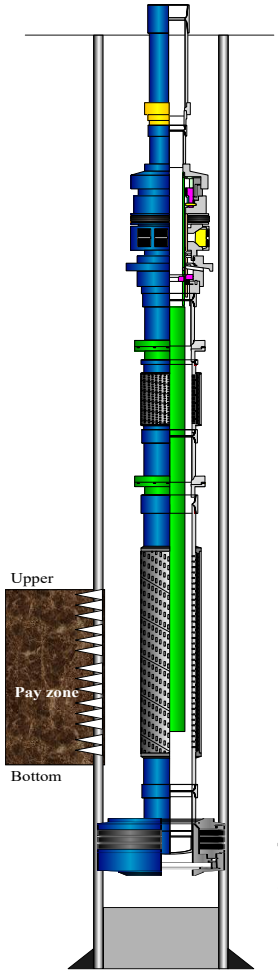
EOD washing pipe
Safety Sub
Tell-tale

Blank pipe
Safety Sub

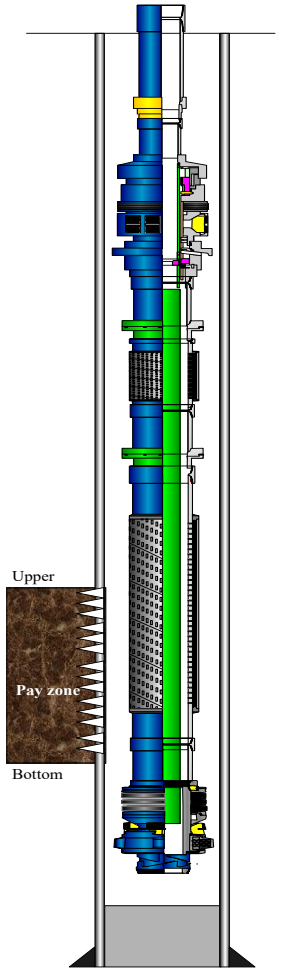
Screen

Short Tubing

Plug/ Sump Packer



Two trip
Sump packer:
Bridge plug



One string
Sump packer
Mechanical
packer

Gravel Packing Technologies

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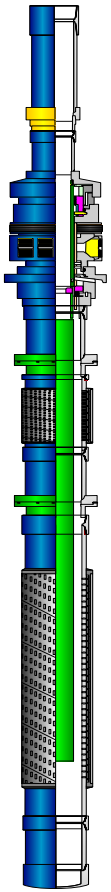


Tubing/ DP
Crossover
Lifting sub

Packing Packer

EOD washing pipe
Safety Sub
Tell-tale

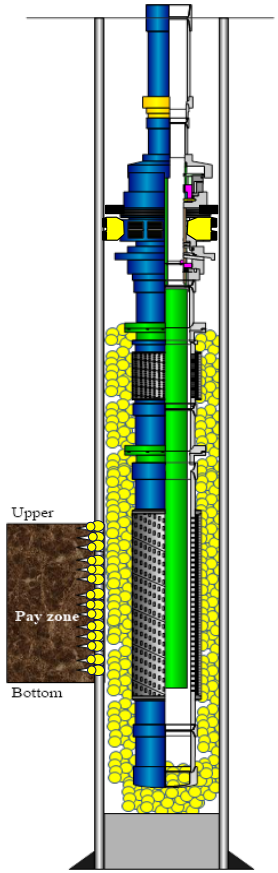
Blank pipe
Safety Sub

Screen

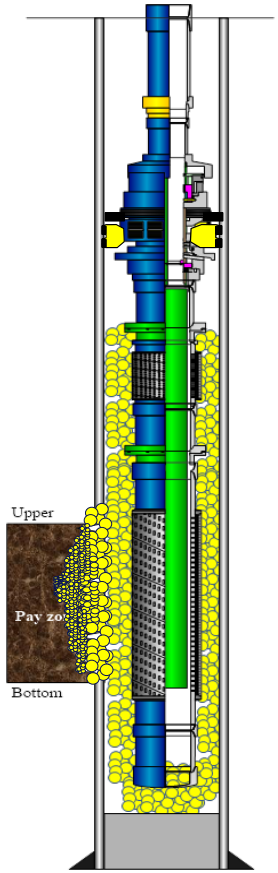
Short Tubing

Plug/ Sump Packer

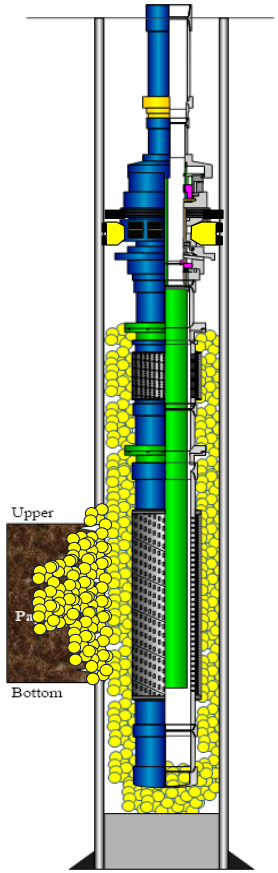
Circulation Pack



HRWP,
Micro-Fracturing Pack



Frac Pack



Gravel Packing Technologies

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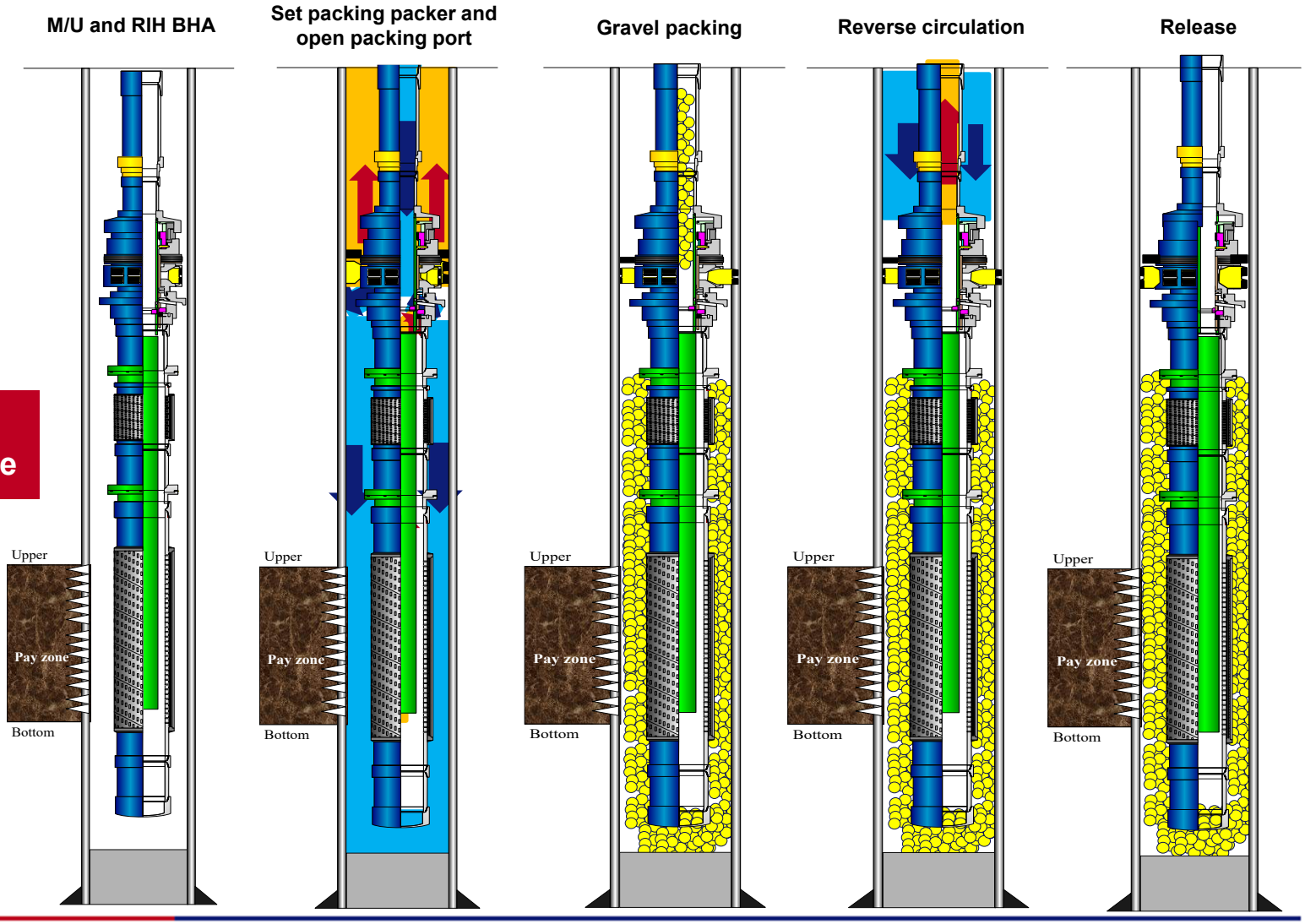
Treating Procedure



Main tools:

Packing packer

- **Feature**

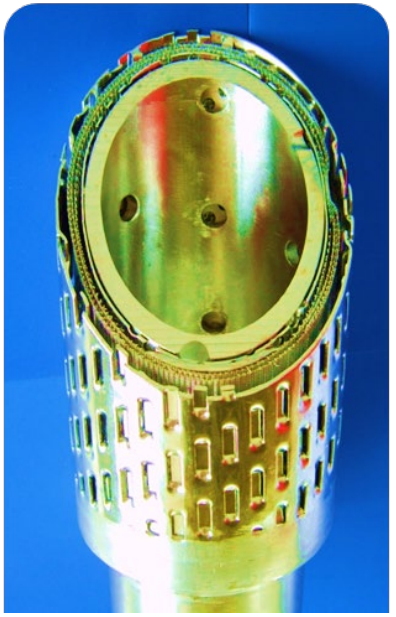
- **Hydraulic setting**
- **Mechanical release**
- **Retrievable**
- **High temperature**
- **Simple operation**
- **High reliability**

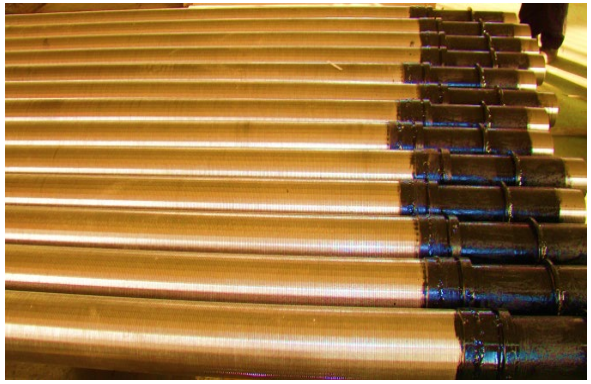
Model	PFZ-150R
Hanging Casing	7”, 23#/26#/29#
OD (inch)	5.91
ID (inch)	2.992
Length (ft)	5.0
Steel ball (inch)	1.378
Set packer pressure (psi)	1100-1700
Open packing channel pressure (psi)	2600-3600
Release	Hydraulic & Clockwise >50 circles
Working temperature (°F)	≤680
Workload (lb)	22000
Connection threads (box/pin)	2-7/8” NU BOX / 3-1/2” NU PIN
Unset & fishing	3-1/2” NU

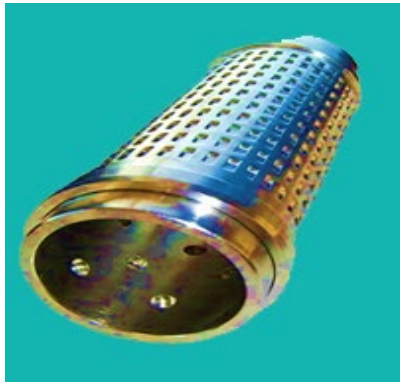
Main tools:

Screen

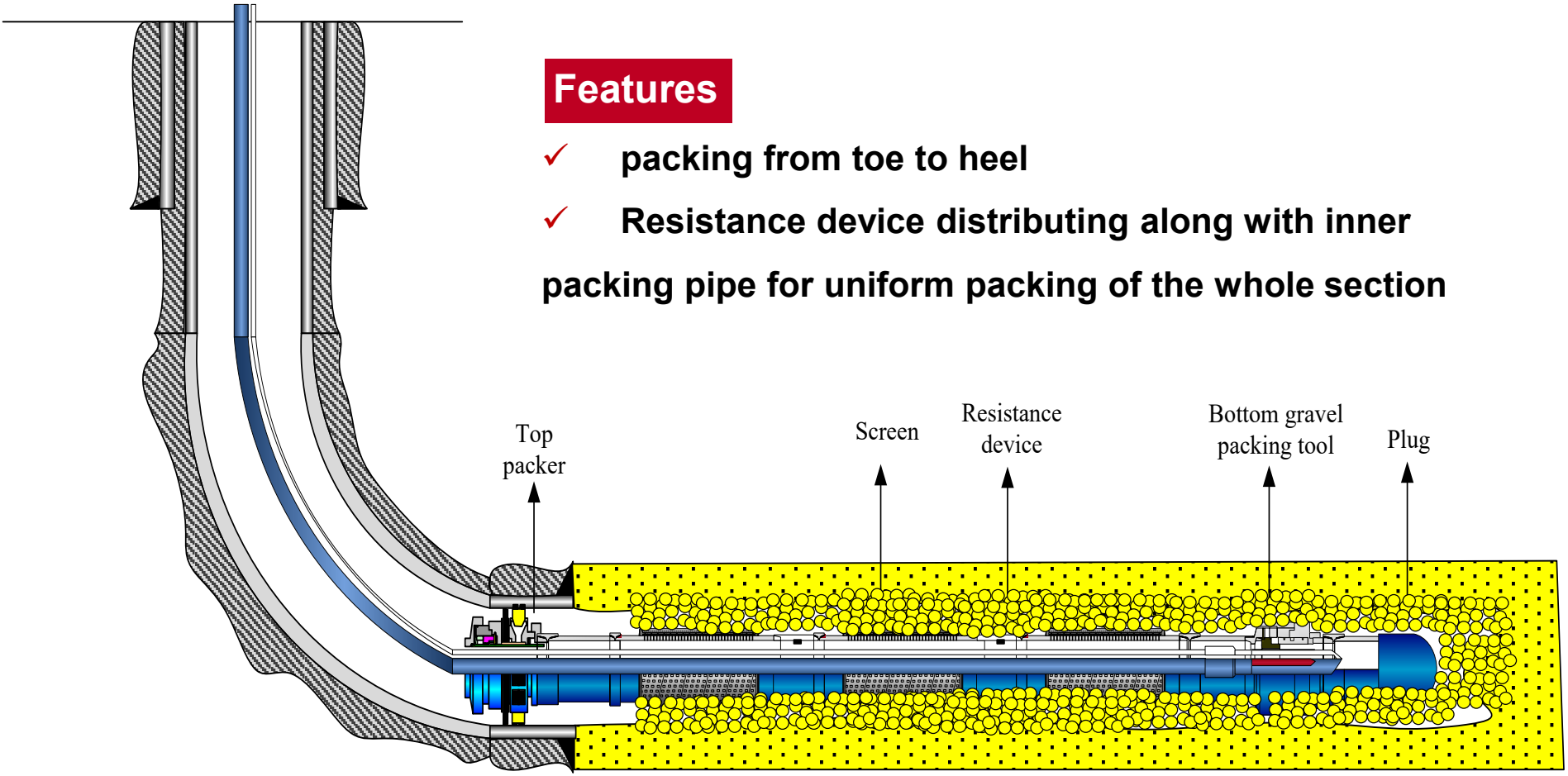
Can provide full range of products(2-3/8”-7”) with API and/or non-API standard PMC screen, PPS screen, Wire wrapped screen, Slotted liner for gravel packing operation depend on clients’ demand.







2. Gravel pack in Horizontal wells-two trip



Features

- ✓ packing from toe to heel
- ✓ Resistance device distributing along with inner packing pipe for uniform packing of the whole section

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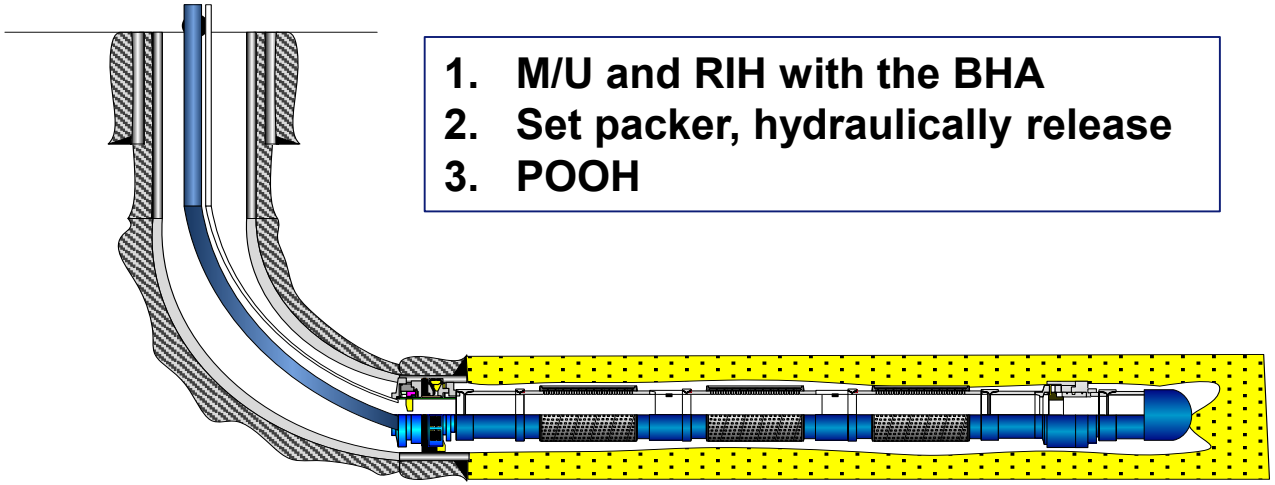
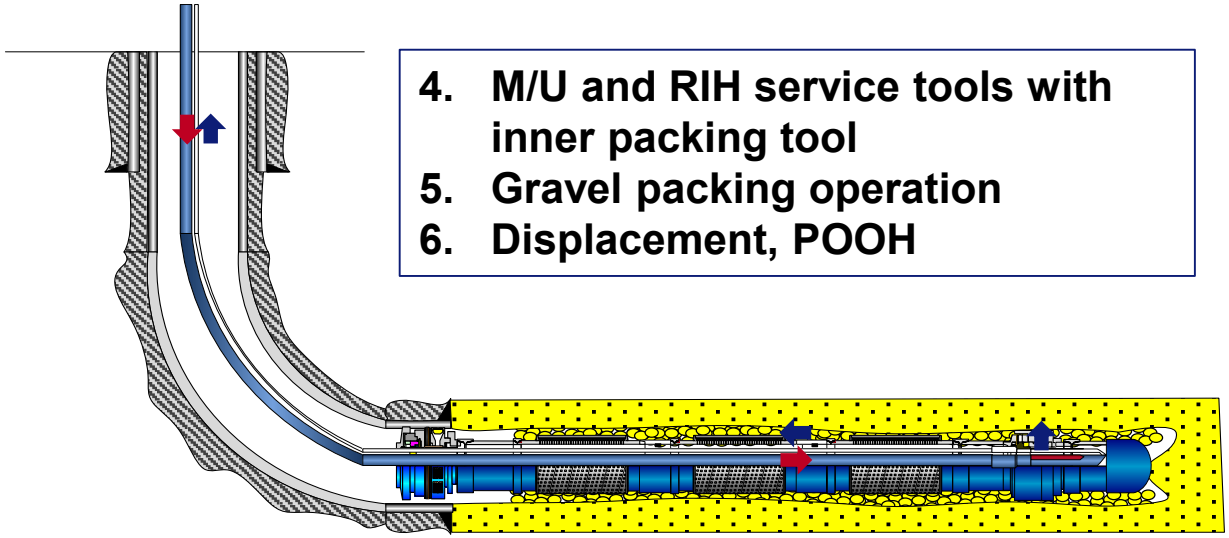


1. M/U and RIH with the BHA
2. Set packer, hydraulically release
3. POOH



4. M/U and RIH service tools with inner packing tool
5. Gravel packing operation
6. Displacement, POOH

Main tools:

Top packer

- **Feature**

- **Hydraulic set**
- **Hydraulic release**
- **Retrievable**
- **High temperature**
- **Simple operation**
- **High reliability**

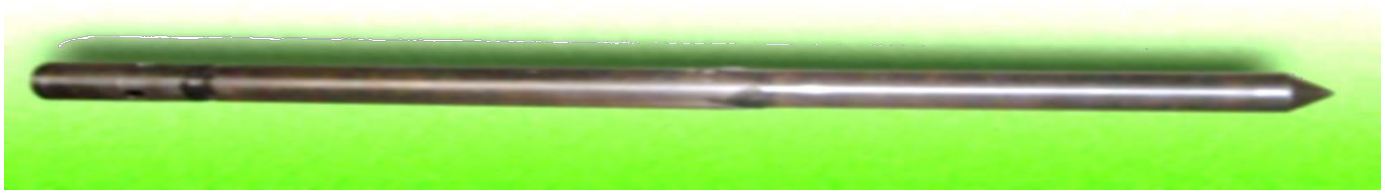
model	PY445—215	PY445—150	PY445—115
Hanging Casing in	9-5/8”	7”	5.5”
ODmax in	8.46	5.94	4.57
ID in	4.72	2.99	2.36
Set Packer Pressure(psi)	2030-2320	2030-2320	2030-2320
Releasing Pressure(psi)	2610-3625	2610-3625	2610-3625
Hanging Load（lb）	66150	66150	66150
Work Temperature（℉）	≤680	≤680	≤680
Bottom connection type	7”	3-1/2”	2-7/8”
Unset & fishing	51/2 LTC	31/2 NU	27/8NU

Main tools:

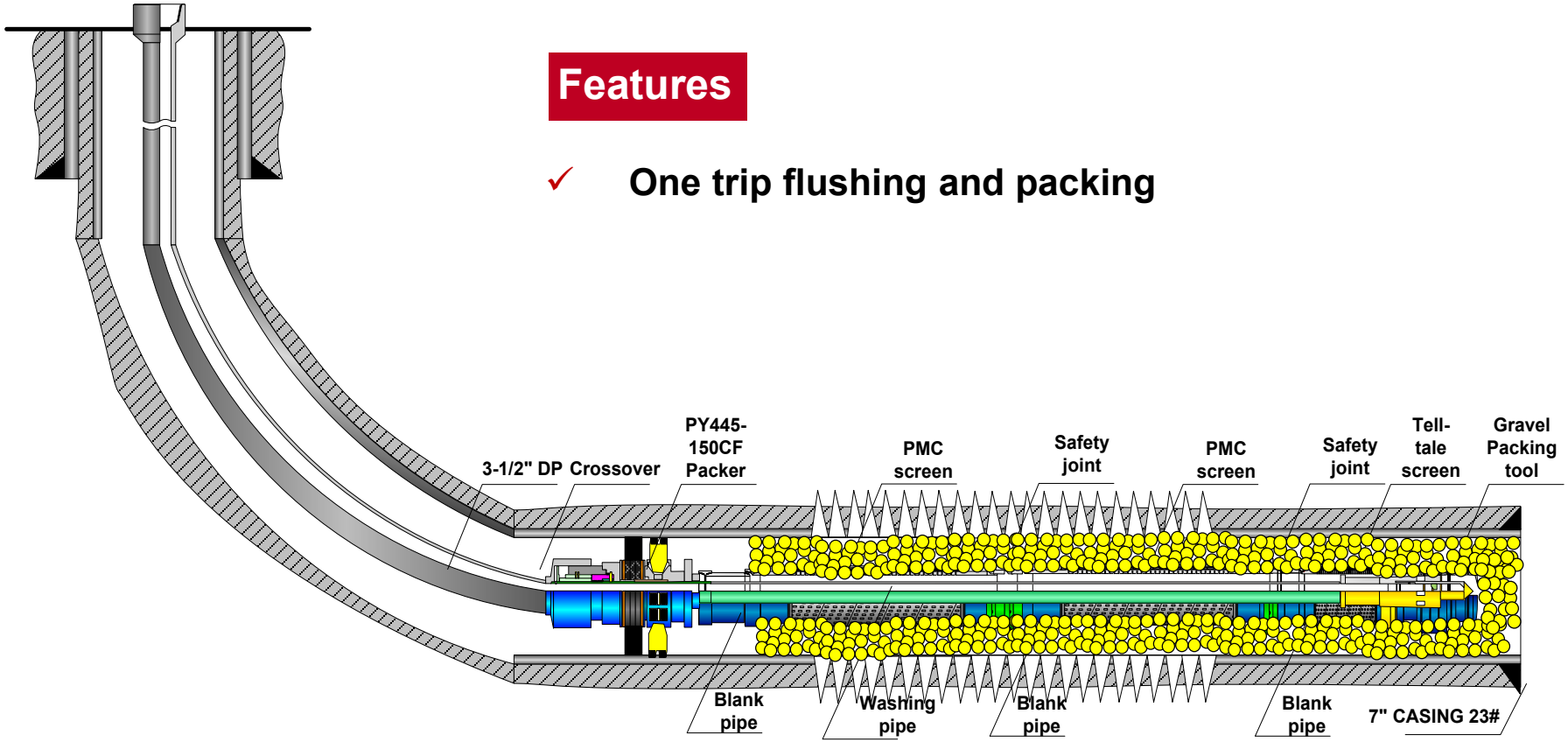
Bottom Packing assembly

- Packing Tool
- Packing Service Tool

- Packing, Flushing
- High temperature
- Simple operation
- High reliability



3.Gravel pack in Horizontal wells-one trip



Features

- ✓ One trip flushing and packing

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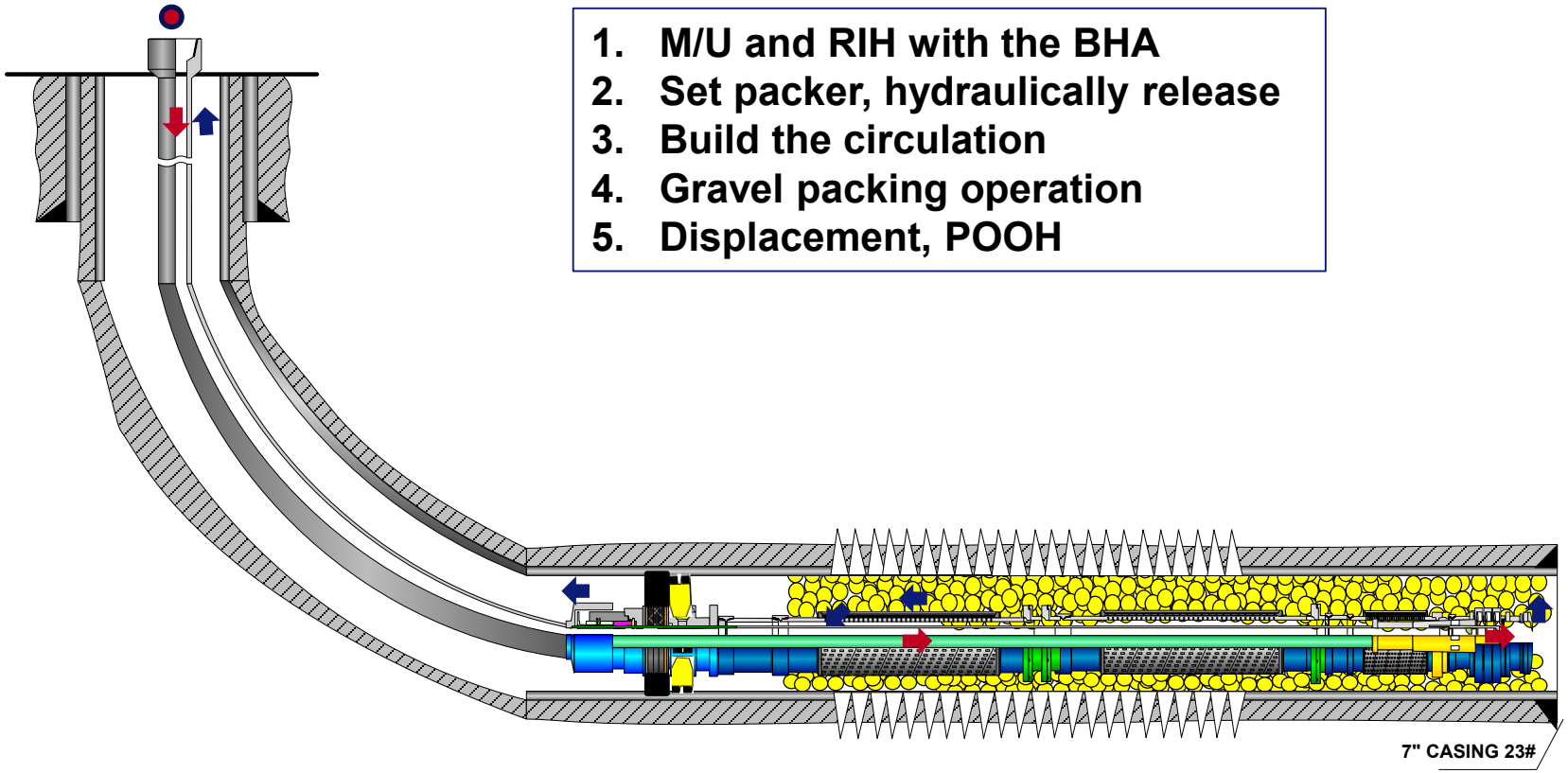
1. M/U and RIH with the BHA
2. Set packer, hydraulically release
3. Build the circulation
4. Gravel packing operation
5. Displacement, POOH



Main tools:

Gravel packing packer

- Hydraulic set
- Hydraulic release
- Retrievable
- Achieve one trip gravel pack
- High temperature
- Simple operation
- High reliability

model	PY445CF—150
Hanging Casing in	7”
ODmax in	5.91
ID in	3.5
Set Packer Pressure(psi)	725-1305
Releasing Pressure(psi)	2175-2610
Hanging Load（lb）	66150
Work Temperature（℉）	≤680
Bottom connection type	4”NU
Unset & fishing	4” NU

Main tools:

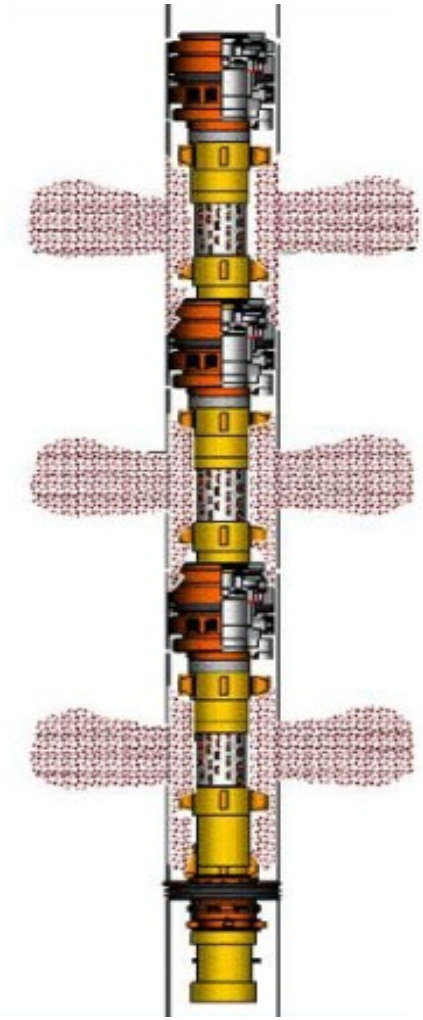
Packing assembly

Packing tool	
OD max	4.92in
Length	15.42ft
ID min	0.24in
Connect type	4” NU BOX

Packing service tool	
OD max	2.87in
Length	12.47ft
Connect type	2.375” NU
Build the circulation channel	3635psi

Multi-Stage Gravel pack in Vertical Wells

Multi-stage gravel pack in horizontal wells



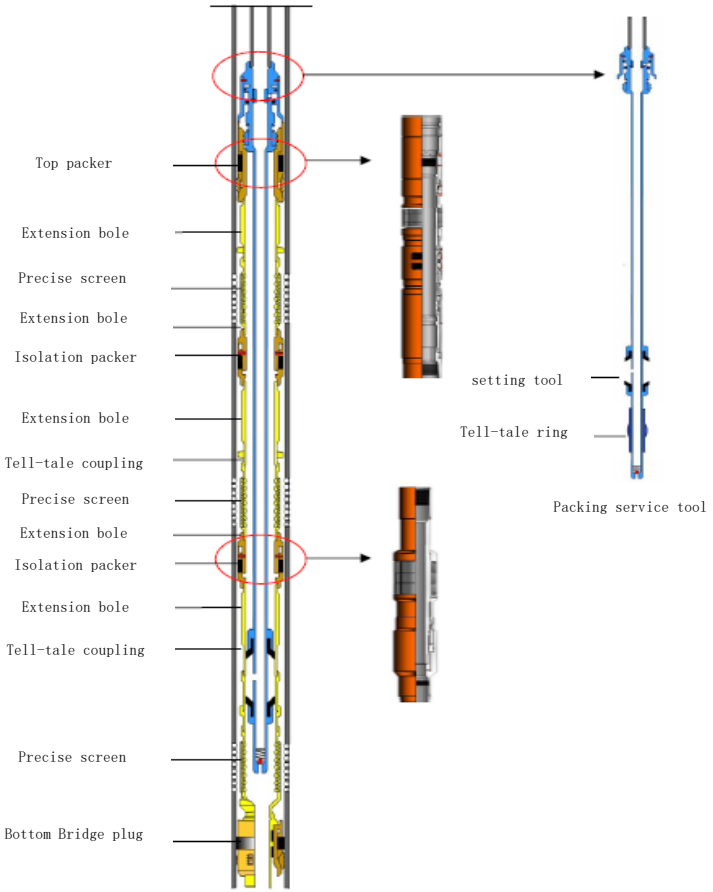
Multi-Stage Gravel packing in Vertical Wells

- **Two Trips Multi-stage GP**
- **Single Trip Multi-stage GP**

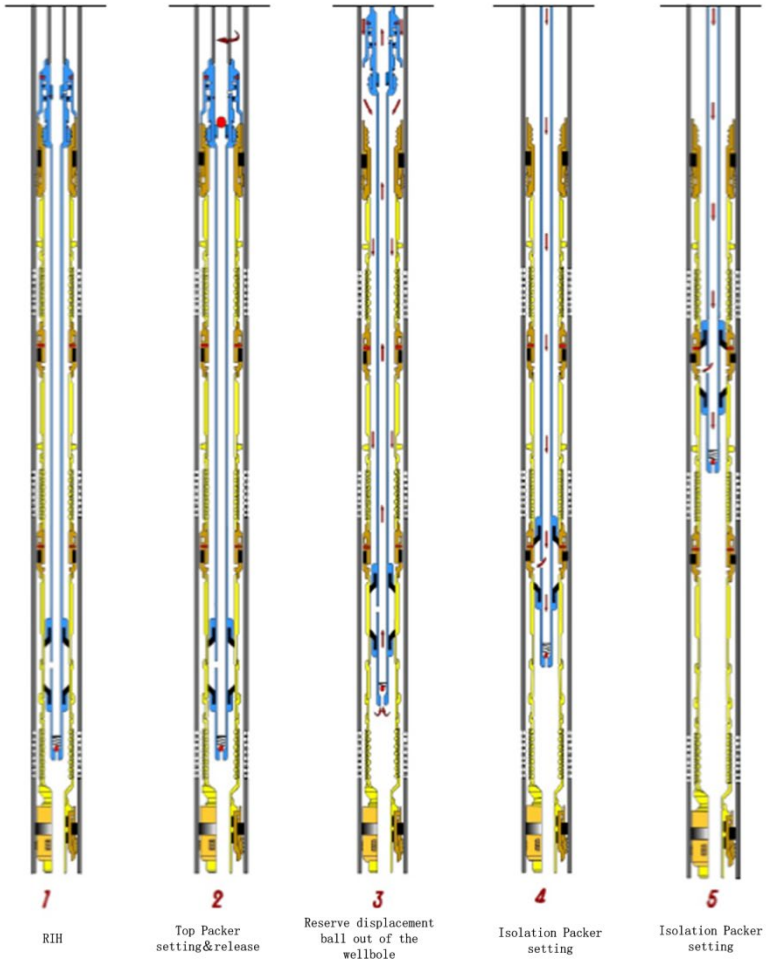
Features

- ✓ **Independent operation for each zone to avoid interference**
- ✓ **One or two trips multi-stage packing operation**
- ✓ **Capability for zonal production and water control**

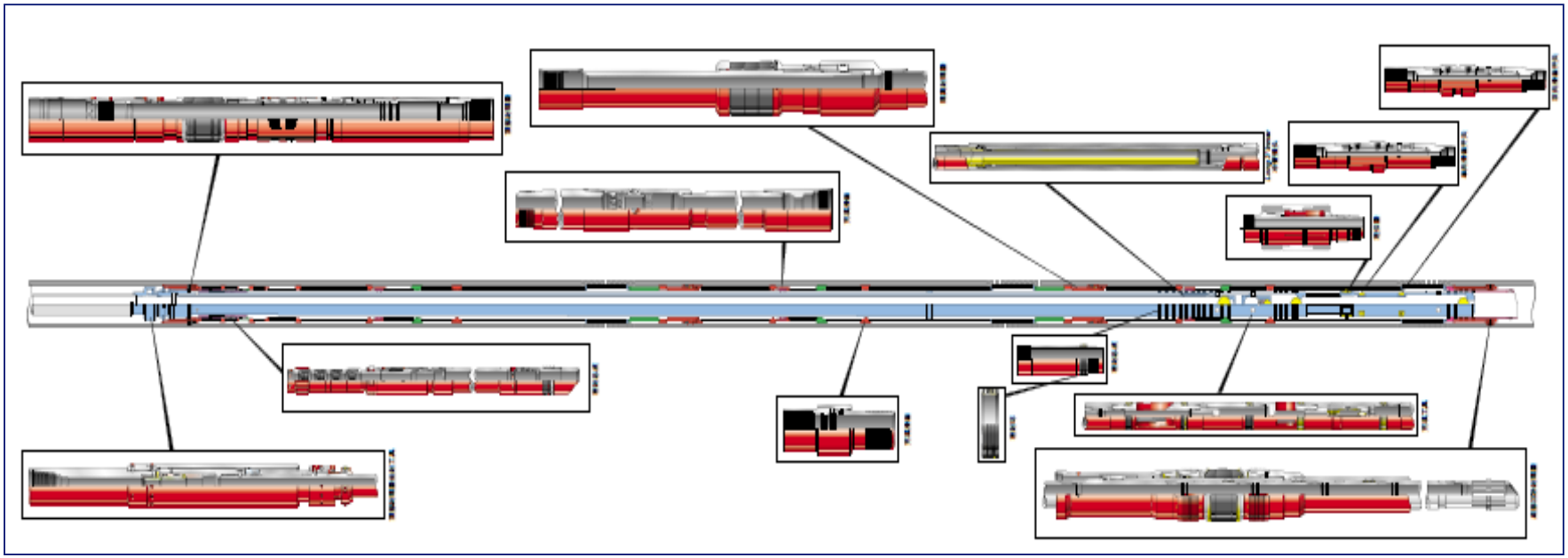
MSC Two trip multi-stage GP assembly



MSC Two trip multi-stage GP assembly setting schedule



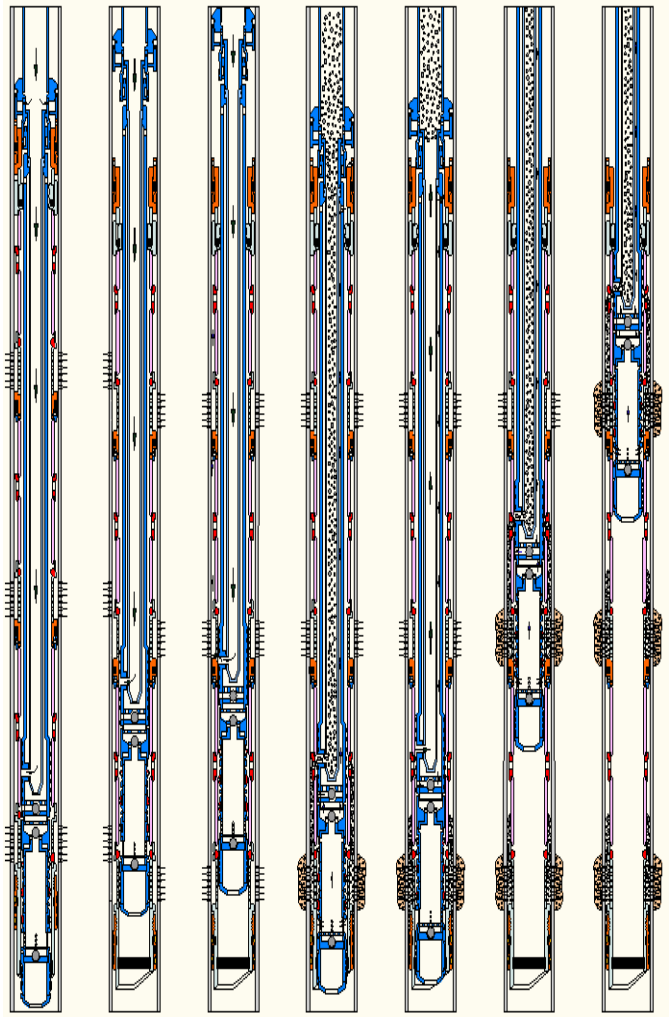
Single Trip Multi-stage GP



- Top packer
- Isolation packer
- Packing sliding sleeve
- Screen
- Blind pipe
- Service Tools

Schedule（Video）

- RIH with sand control assembly
- Setting bridge plug mechanically
- Top packer setting, checking and release
- Lifting string and setting isolation packers
- Sliding sleeves checking for shifting function
- Lower the string to bottom packing position
- Bottom zone packing, reverse washing, close sliding sleeve, checking sliding sleeve
- Pull up and repeat gravel packing operation for middle and top zones



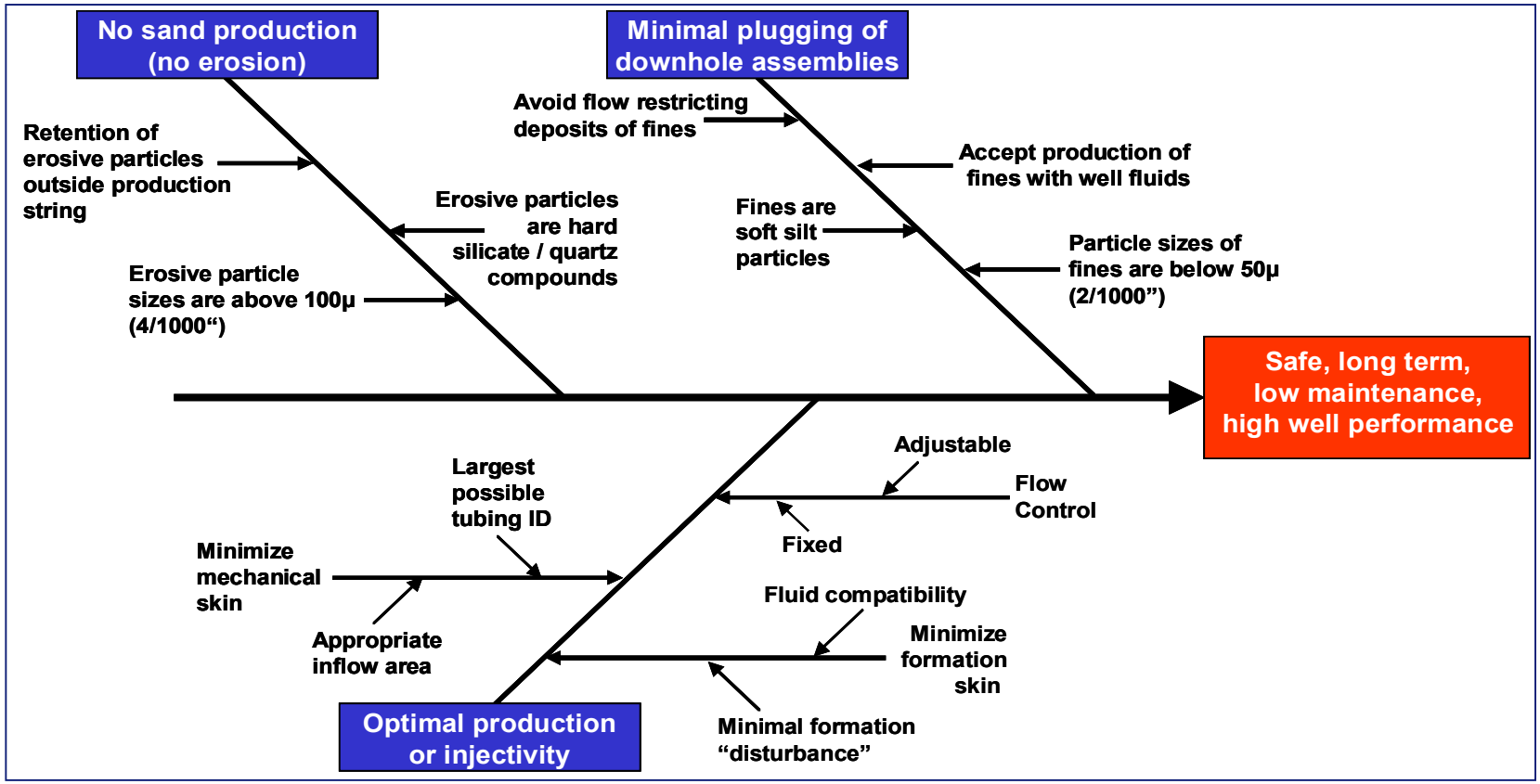
Tool specifications

Well Type	STMZ™ Multizone systems	Screen Size	Packer Off Min ID	Fluid Isolation Joint	Packing Pipe	Screen Min ID
9-5/8” casing perforation	MSC-4.75	5-1/2”	3-1/2”	3-1/2”	2-3/8”	4.75”
7” casing perforation	MSC-3.88	4-1/2”	3-1/2”	3-1/2”	2-3/8”	3.88”
7” casing perforation	MSC-3.25	4”	3-1/2”	3-1/2”	2-3/8”	3.25”
5-1/2” casing perforation	MSC-2.5	3-1/2”	NA	NA	2-3/8”	2.5”

Contents

Design capacity

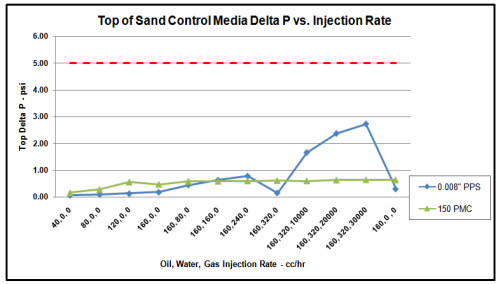
◆ Principle of sand control design

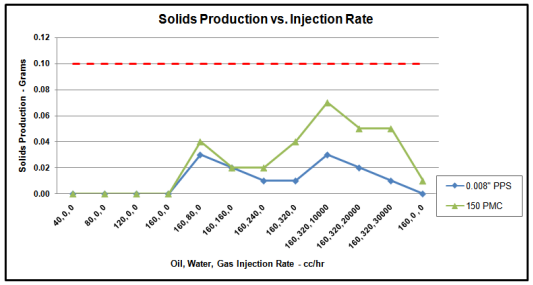


Research & Development Centers

Sand control labs (Dongying,Qingdao China)

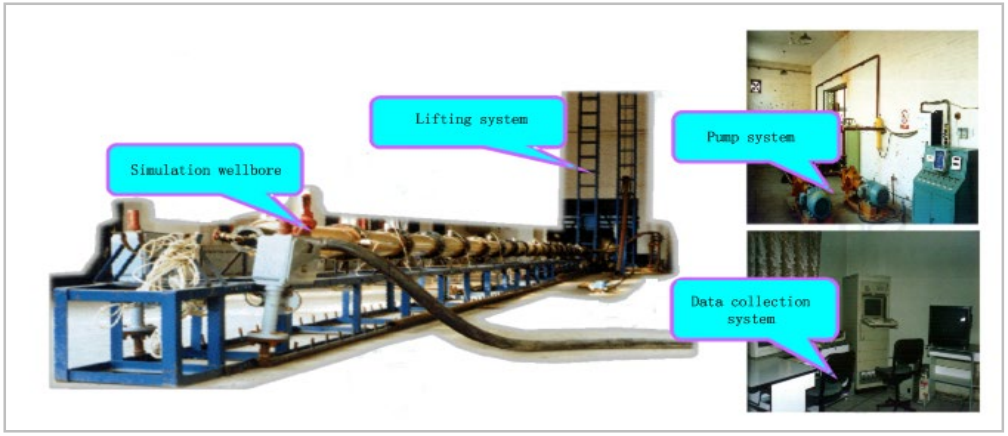
■ Optimize the sand control products
■Sand and water control evaluation capability for reservoirs





Research & Development Centers

Gravel pack labs (Shandong China)



Research & Development Centers

Completion tool development and test center

Manufactory base

Screen & completion tools ase

completion tools base

Screen assemble base

Gravel Packing service base

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Pumping service equipment

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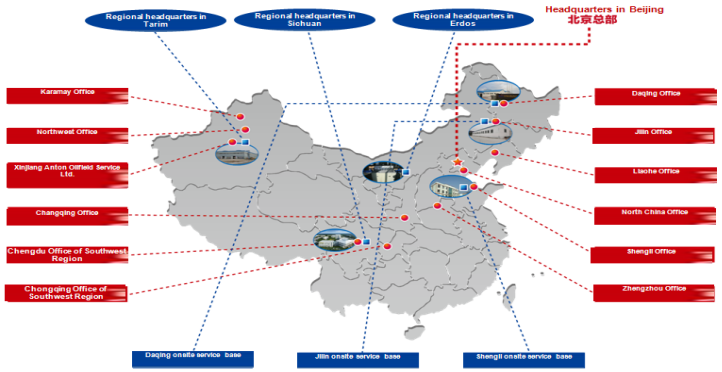
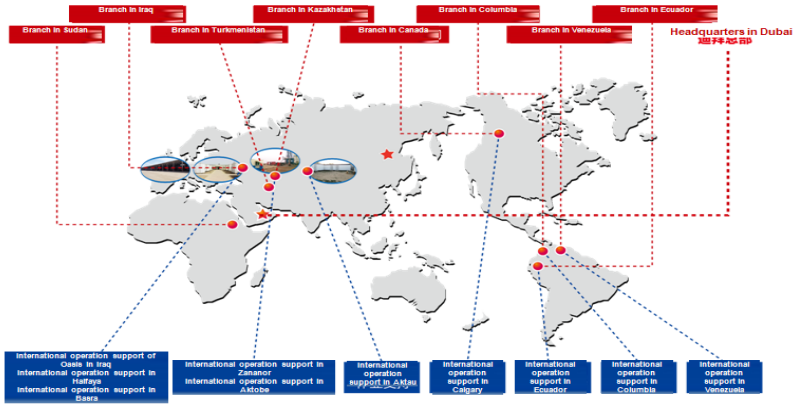
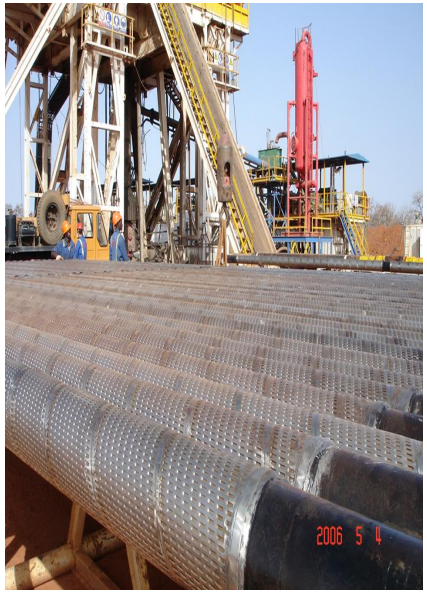
- Global service capability







Contents

The Development of the Technology

- First HP gravel packing tool was invented (Nov,1999)
- First frac pack well completion in China Cheng27-92(April, 2000)
- First frac pack well completion for the gas well,still work now,guarentee period more than 13 years Se3-7 (Oct,2003)
- First time large-scale application of the gravel packing technology for the new block Lin-102 block(2003)
- First sand control and steam injection completed string in thermal well Gao62-P1(April,2004)
- First gravel packing in horizontal well in China: Ying13-Ping1 (Feb, 2004)
- First multi-stage gravel packing in horizontal well in China : Ying13-Ping2 (Aug, 2005)
- First multi-stage gravel packing in horizontal open hole in China: Zheng411-Ping47 (Nov, 2005)

The Development of the Technology

- The longest horizontal well gravel packing in Shengli: Gao43-P1 (990m) (Jul, 2006)
- The smallest sidetrack horizontal well gravel packing in Shengli: P40-46CP1 (Mar, 2007)
- The first gravel packing operation had successfully finished in Sudan CNPC,untill now more than 50 wells finished sand control operation (Jan,2011)
- Single trip multi-stage gravel packing and water control in PL19-3 of ConocPhilipps (Mar, 2012)
- The first multi-stage frac packing in horizontal well (Linzhong9-Ping4) in the world, 500m. (Apr, 2013)
- 19 wells standalone screen completion with acid flushing operation were completed in Colombia (Emerald)in 2014.
- The first gravel packing operation had successfully finished in Jan. 2015 in Colombia (NGEC).

Year	Service location	Screen sales Ft	Operation (wells)	
			Stand alone screen completion	Gravel pack
2014-2015	Global	234,332	468	568
	China	566,451	625	966

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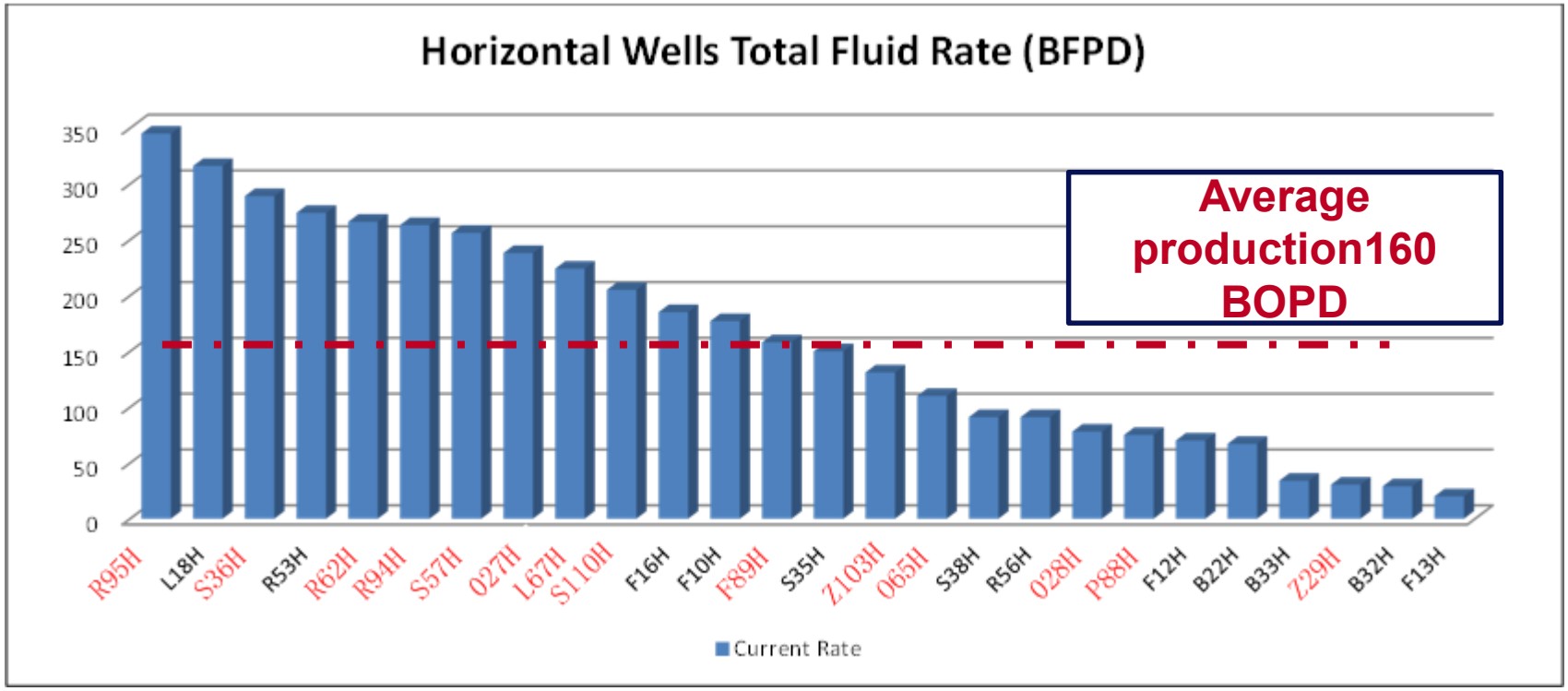

Precede sand control (in red) showed very good performance in Emerald (Colombia)

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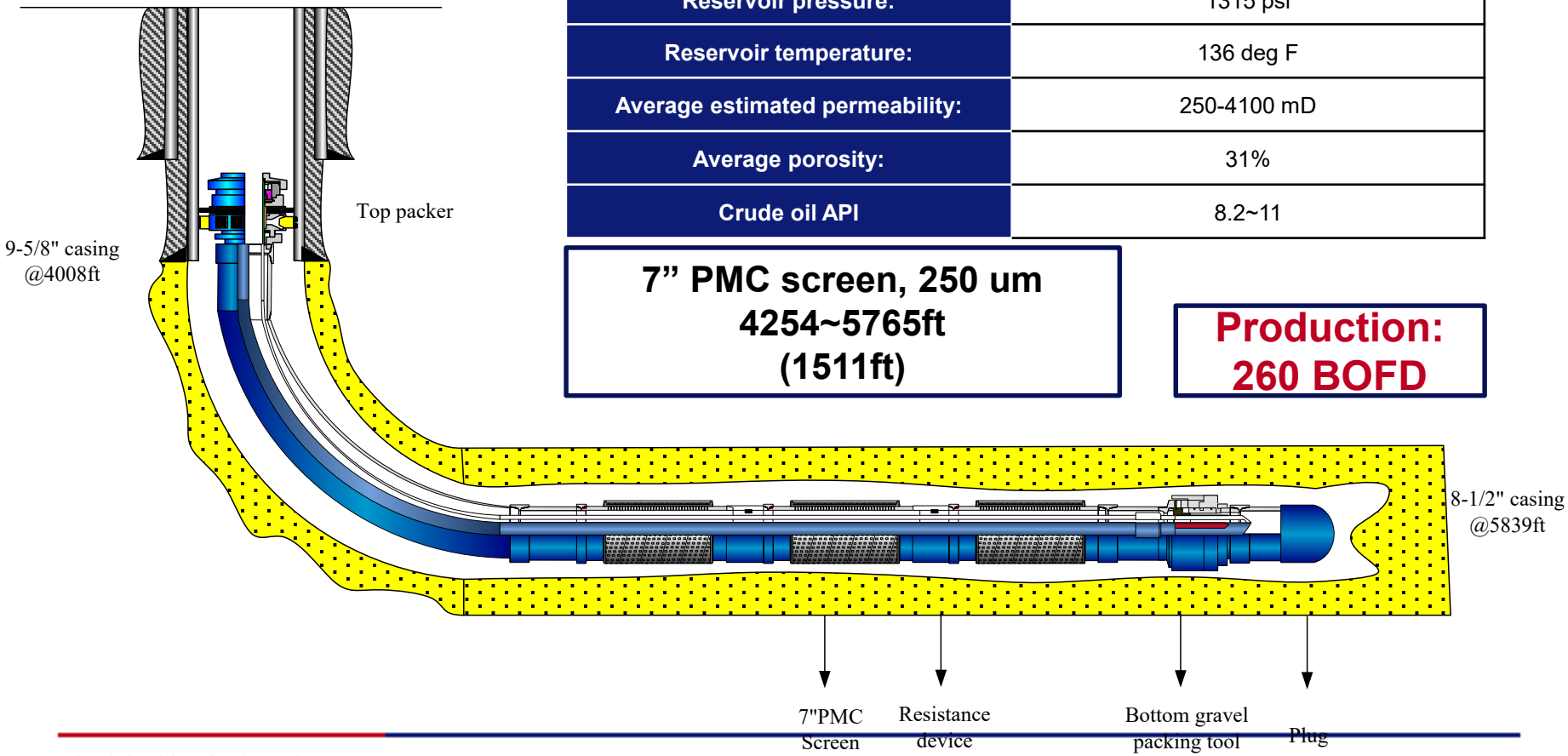
Emerald-R62H

Well name:	R62H
Reservoir type:	Sandstone
Block name:	Capella
Pay zone	M
Reservoir pressure:	1315 psi
Reservoir temperature:	136 deg F
Average estimated permeability:	250-4100 mD
Average porosity:	31%
Crude oil API	8.2~11



7” PMC screen, 250 um
4254~5765ft
(1511ft)

Production:
260 BOFD

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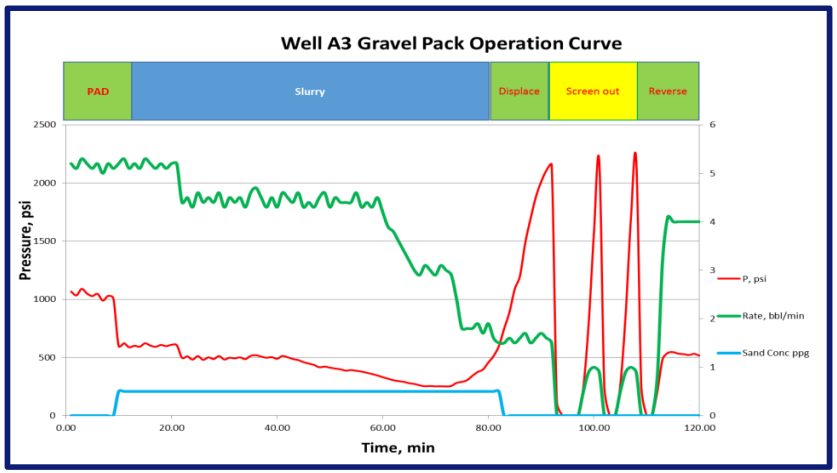
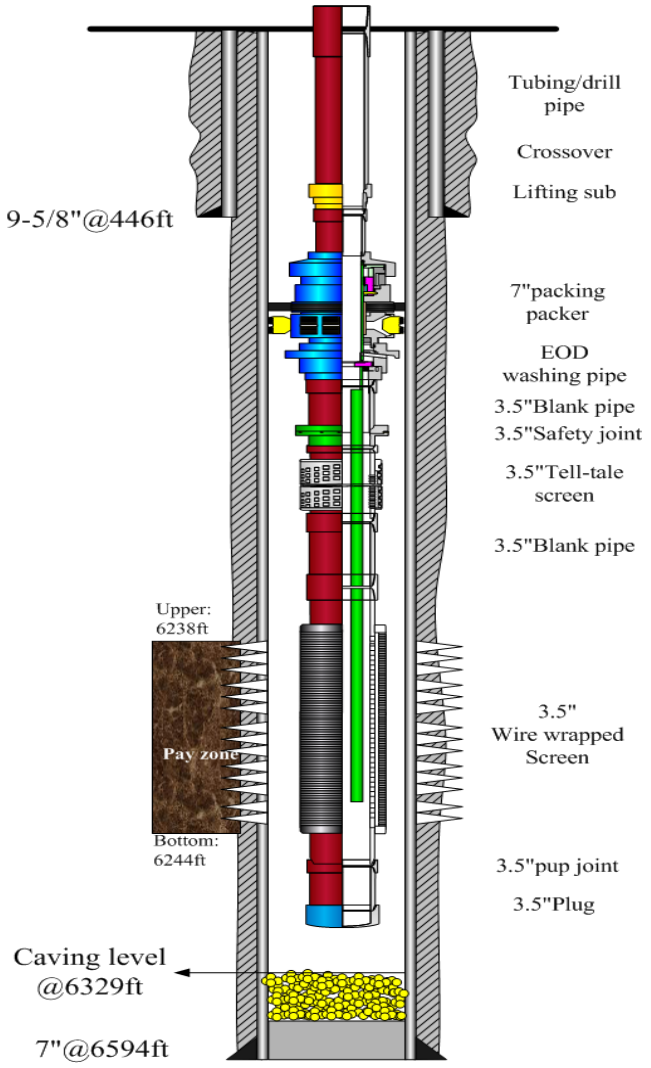
New Granada- Leona A3 GP Summary

Well name:	**Leona A3**
Zone name:	Carbonera C7
Block name:	Leona
Average Estimated Permeability:	1350 mD
Average Porosity:	26%

5500 lb 20/40 ceramic proppant pay zone (6238 - 6244ft)





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Well name: M101-P7

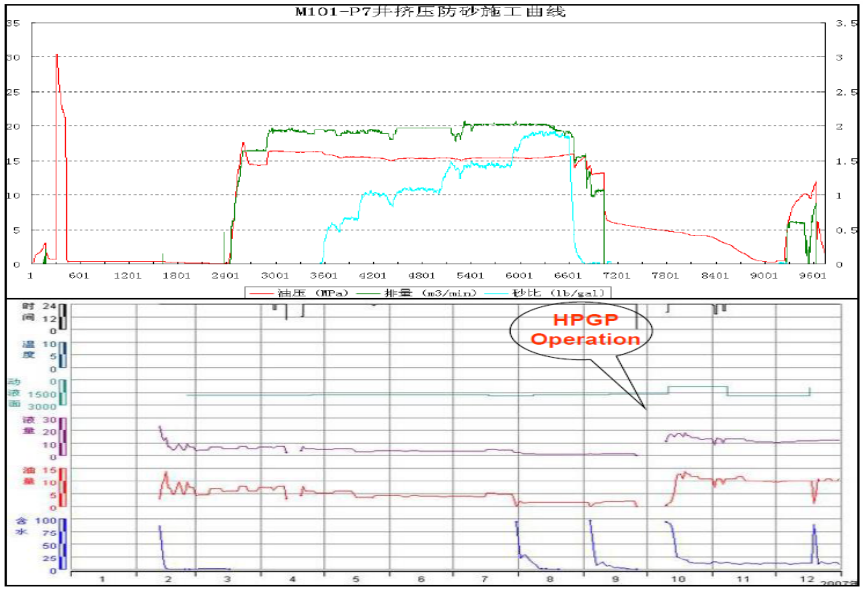
TVD: 3444ft, PBTD: 3445ft

Median grain diameter of formation: 208um

Reservoir Pressure: Temperature:145F, Crude oil reservoir

Reservoir data

No.	Zone	Top (ft)	Bottom (ft)	Thickness （ft）	Porosity (%)	Permeability (md)	SW (%)	Result
1	JLM	3387	3429	42	26	4120	/	oil



- Delivery rate 12.6bpm
- Proppant con. 5%-20%
- Total sand input 11m³
- Lightweight ceramsite
- 250um screen /16/20 mesh

- 30% stimulation
- More than 200 days sand-control validity perriod

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THANKS!

Helping others succeed…

www.antonoil.com