



**CHAMPIONX**  
ARTIFICIAL LIFT

**PrimePump™**  
SOLUTIONS

# Jet Lift: Bridge the Gap Between Various Forms of AL

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# Agenda

- ▶ Challenge
- ▶ Solution
- ▶ Jet lift system design
- ▶ Results

# Challenge

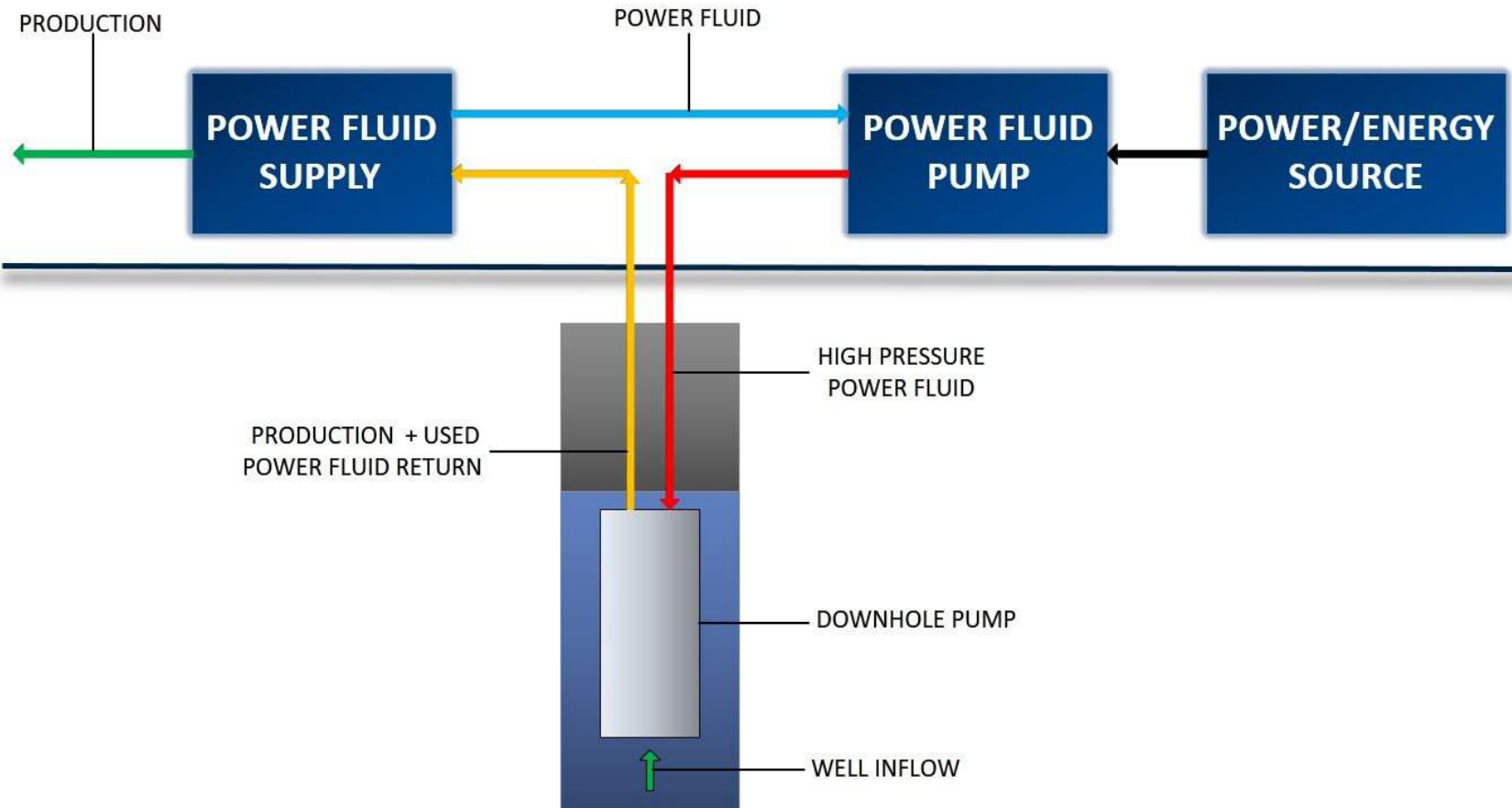
- ▶ Initial strategy was to commence post-flowback production from fractured wells with ESPs, and then transition to rod lift as rates declined over time
- ▶ However, as the wells approached the transition window between ESPs and rod pumps, high sand content and gas-to-liquids ratios caused frequent downtime for both types of lift, negatively impacting well performance



# Solution

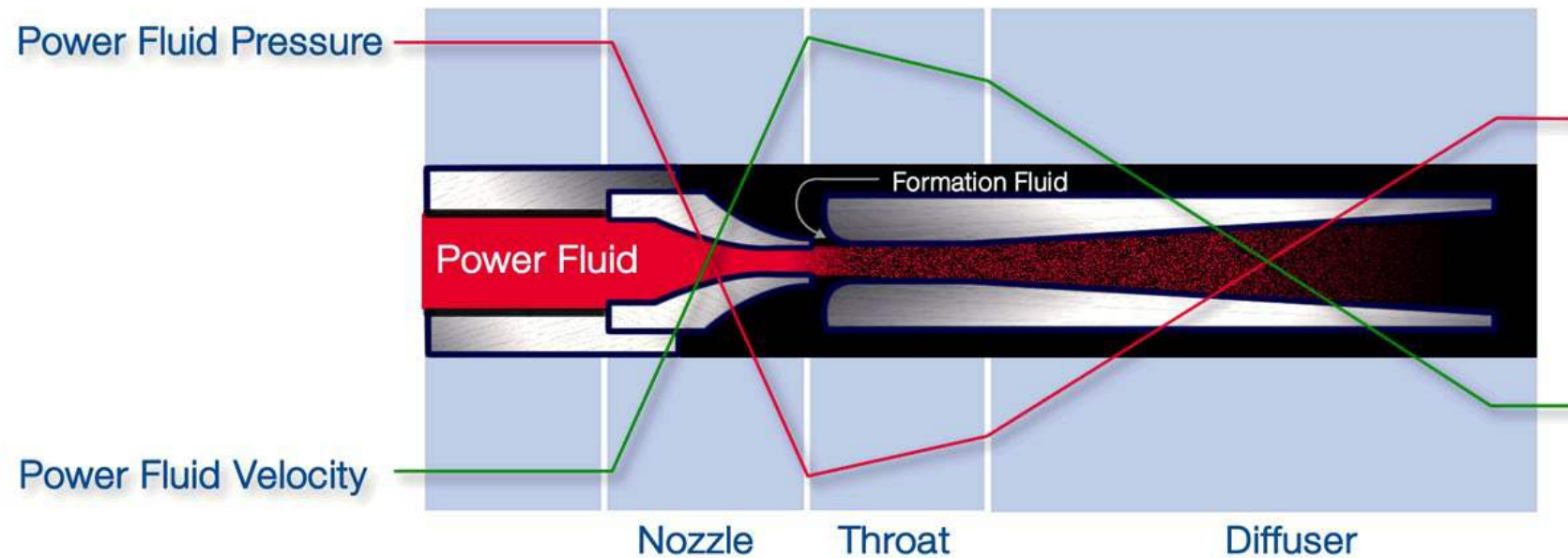
- ▶ Effectively bridge the application gap between high-rate ESPs in early well life and lower-rate rod pumps later in the lifecycle and accommodate the solids, wellbore deviation and GORs
  - ▶ Reduce the amount of well intervention to reduce downtime and capital expense
  - ▶ Maintain production rate
- ▶ Install a jet lift concentric string system
  - ▶ Allows gas to flow up the casing annulus similar to rod lift reducing the gas interference in the downhole jet pump
  - ▶ Jet pumps have the capabilities to handle solids and be set lower in the wellbore while still maintaining the production target

# Jet lift system overview



# Jet lift system overview

## Jet Pump Venturi Effect





# Jet lift system overview

Tubing Size	Jet Pump Size	*Maximum Capacity*
CT 1-1/4" or Larger	1-1/4" JP	~500 BPD
2-3/8"	1-1/2" & 2" STD JP	~1500 BPD
2-3/8"	2" High Volume JP	~3000 BPD
2-7/8"	2-1/2" STD JP	~3000 BPD
2-7/8"	2-1/2" High Volume JP	~6000 BPD
3-1/2"	3-1/2" High Volume JP	~12000 BPD

\*Casing sizes must be considered

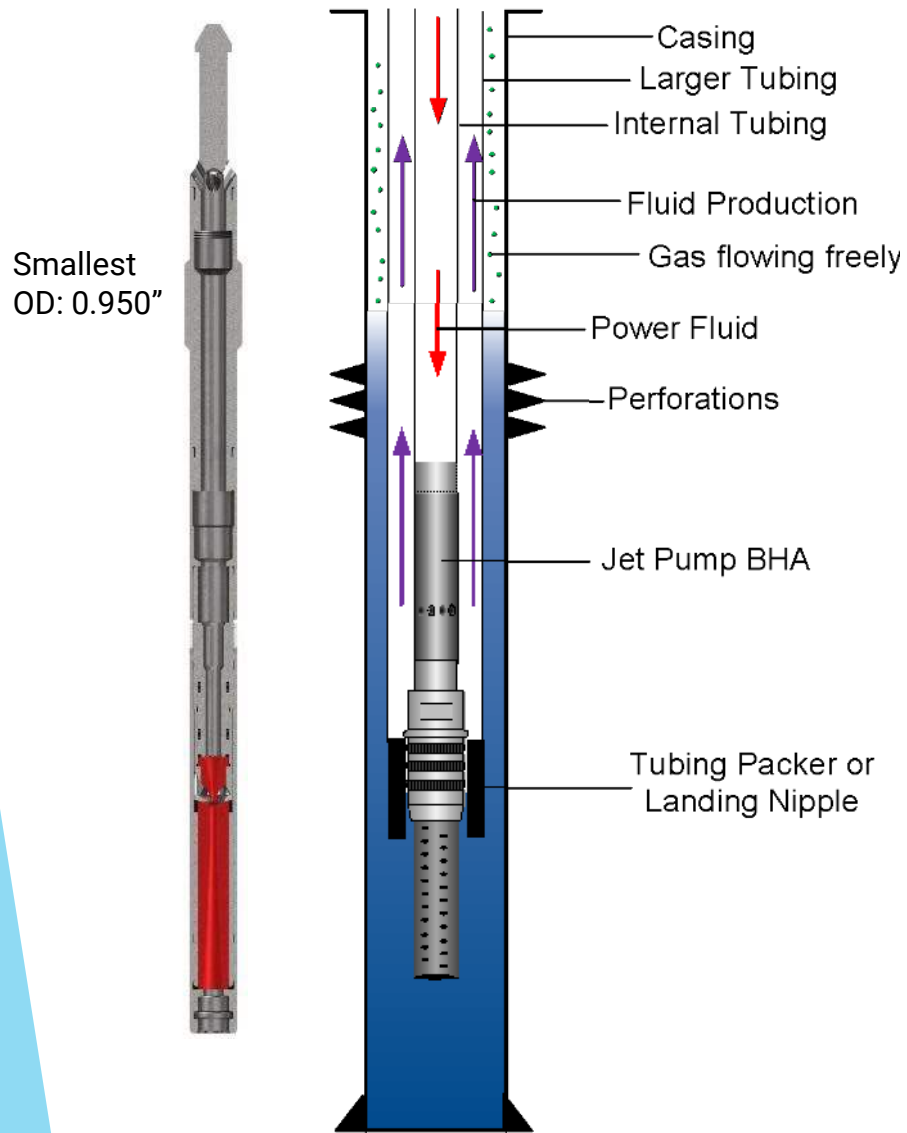


# Jet lift system overview

Category	Typical Range	Extreme Range
Depth (TVD)	2,000'-15,000'	20,000'
Producing Rate	25-2,000 BPD	10,000 BPD
Producing BHP	25-200psi / 1,000' of Lift	Near Pump Off
Temperature	250° F	450° F
Setting Deviation	40°-60°	90°
DLS	0-15° / 100'	20° / 100'
Gas Handling	100-1500:1 GLR	>1500:1 GLR
Produced Solids	1-5 lbs. / Bbl.	>25 lbs. / Bbl
Fluid Gravity	20° - 50° API	8° API



# Concentric string completion (vertical)



## ► Advantages

- Can be installed below the perforations and into the lateral
- Allows gas to flow up the casing annulus while keeping the pump submerged (Prod. Csg = 7"; Prod. Tbg = 2-7/8"; Inj. Tbg = 1-1/4")
- Jet pump can still be pumped in and out

## ► Disadvantages

- Limited to 500 BPD maximum production

# Concentric design



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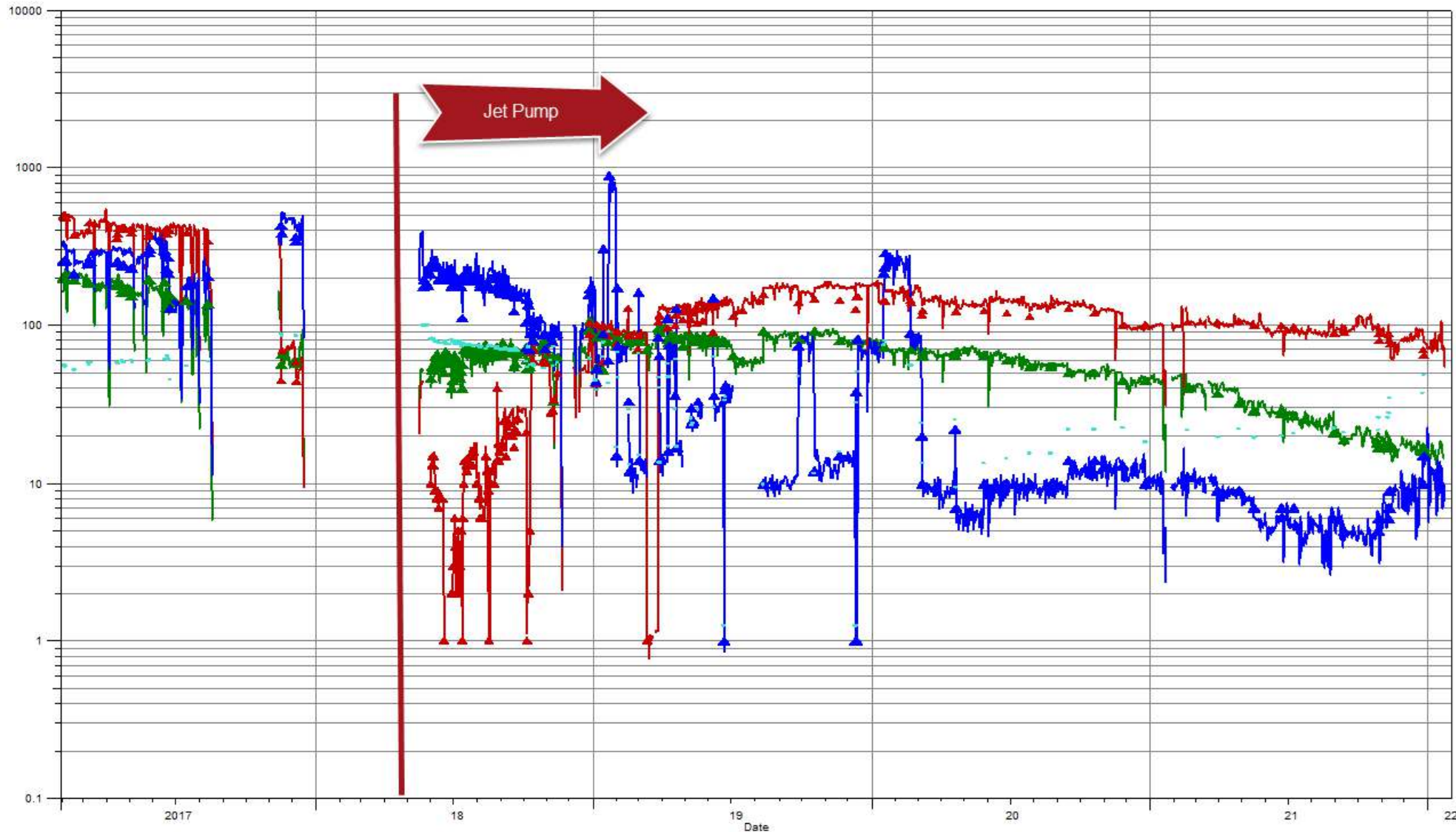
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# Results (horizontal well configuration)

- ▶ Set pump at 70°, which allowed the system to maintain the same bottomhole pressure as the ESP system
  - ▶ Sub 450 psi producing BHP @ ~200 BPD
- ▶ Three wells produced from one surface pump
  - ▶ Spread maintenance and rental costs across three wells
- ▶ Three-year run time with no workover rig
  - ▶ Previous artificial lift systems had at least one pull per year

# Results (horizontal well configuration)





# Conclusion

- ▶ Jet lift system reduced downtime due to solids and gas interference
- ▶ Concentric installation allowed for gas ventilation
- ▶ Pump Intake at the base of the curve (~300' deeper than previous lift system)
- ▶ Multiple wells ran from a singular surface pump
- ▶ Maintained previous ALS production with less downtime



# Thanks and questions

## ► Acknowledgments

- Mauricio Monzon, Apache Production Engineer
- ChampionX Artificial Lift and the Prime Pump Solutions operations team





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