

CASE STUDY



Optimizing Waxy Crude Production in the Uinta Basin with Jet Pump Technology

Background

The Uinta Basin in Utah is one of the few places in the world that produces unique, high paraffin crude with very low compositional quantities of sulfur (0.01%), acid (>0.1%), metals (Ni and V), and low nitrogen content.

This waxy crude, which solidifies at temperatures below ~80°F, poses several operational challenges. But, primarily because of its unique lubricating qualities, it also presents growing opportunities in industrial and commercial uses, fuels and anode grade coke feedstocks. Once considered a low value crude, Uinta Wax has gained considerable value as refiners have adapted to process it, embraced its use as a lubricant base, and also to take advantage of blending opportunities with light sweet crude.

While its handling and transportation challenges are well known, producing this resource also presents unique obstacles. This case study focuses on the challenges of producing high paraffin crude and how artificial lift technologies have been employed to help overcome these challenges.



Jet pumps are emerging as a practical, cost-effective alternative to other forms of artificial lift in the Uinta Basin. Their unique advantages lie in reducing downtime, simplifying maintenance, and empowering operators to sustain production in wells where other artificial lift technologies struggle.

JJ Tech

5220 Hollywood Avenue
Shreveport, LA 71109
j-jtech.com

1-877-217-3590

Heated storage tanks >~80°F are required to maintain temperature of waxy crude above the pour point.



Challenges

Operators faced several persistent challenges in developing Uinta Basin wells:

- **Solidification:** Waxy crude can solidify at liquid temperatures below ~80°F creating paraffin build up on pumps and equipment.
- **Sand production:** Sand can complicate operations and cause equipment failures or require additional maintenance interventions.
- **Rod lift failures:** Deviated wellbores frequently led to parted rods and tubing issues.
- **High initial production volumes:** New wells commonly exceed 1500 barrels per day (BPD), beyond the efficient range of rod lift.
- **ESP costs and limitations:** Electric submersible pumps handled high rates but are costly to service, resize or work over (\$250,000+ per occurrence), sensitive to solids, and required pulling to resize as produced volumes decreased.
- **Gas lift issues:** Frequent paraffin buildup required costly maintenance, with wax cutting interventions two to three times weekly.

These challenges prompted operators to explore alternatives that could reduce downtime, lower costs, and sustain production under demanding conditions.

Historical Production Methods

For early wells in the basin dating back to the 1950's and earlier, rod lift systems were the primary artificial lift technology employed in the region until the past 20-30 years, when new lift technologies became available and exploration of the play expanded into more challenging formations. While rods are still a foundational technology used today, the advent of horizontal drilling, development of deviated wells, differing grades of produced paraffin (black and yellow waxes), and sand production created a need for more robust and alternative solutions.

Evaluating Artificial Lift Options

Rod Lift

Rod lift remains an economical and generally reliable artificial lift solution in limited conditions, provided volumes are lower and wells are not deviated. However, rod lifts have been shown to be impractical in deviated wells where they suffer repeated tubing failures and parted rods that requires bringing in a rig, and they are simply not efficient at higher production volumes >300 BPD that exceed rod lift capability.

Electric Submersible Pumps (ESPs)

ESPs can handle high initial production rates (2,000–4,000 BPD) and are effective at pulling down bottom hole pressure. Their largest obstacles are high costs and maintenance requirements. ESPs tend to fail as a well reduces in volume, leading to oversizing as it runs down or running to failure that requires workovers up to \$250K with additional cost of production delays.

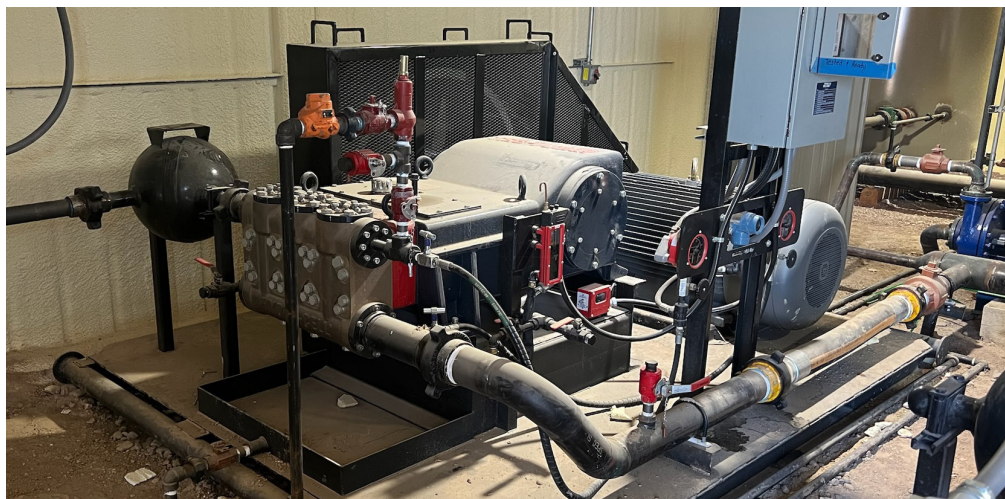
Gas Lift

Gas lift has been trialed in the basin but is problematic in wax-heavy environments. Operators reported frequent wax cutting interventions, requiring 2–3 weekly maintenance jobs, which drove up costs and downtime.

Jet Lift

In many instances, jet pumps have emerged as a practical middle ground in the Uinta Basin. While operators noted that jet pumps are not a universal solution for every well, they fill a critical role in a number of requirements.

- Handle high initial production volumes above 1500 BPD.
- Perform well in high sand and solids environments
- They offer flexibility, nozzle and throat changes can be made quickly and no rig is required for resizing
- Maintenance is much lower and simpler than ESPs, with fewer failures.
- Power fluid can be heated to help keep the extracted oil temperature above the pour point



Featuring no moving parts downhole, jet pumps are driven by surface pumps, allowing easier changes and maintenance without workovers.

Solution: Jet Pump Technology

To bridge the gap between flowing wells and rod lift, operators introduced JJ Tech Jet Pump Systems as an alternative artificial lift solution.

Key advantages identified by field teams included:

- **Improved economics:** Jet lift sits between ESP (most expensive) and gas lift (least costly) but offers a balance of efficiency, reliability, and flexibility. JJ Tech Jet Pumps offer 3 to 5 year typical freedom from the costly, frequent workovers required by other artificial lift systems.
- **High-rate capacity:** Effective for wells producing >300 BPD, bridging the gap between flowing wells and rod lift, and as a long-term lift solution for deviated wells that cannot employ rods.
- **Produced sand tolerance:** JJ Tech Jet Pump Systems are built to handle produced sand and solids better than rods or ESPs with much higher surface pump tolerance to abrasives, solids and particles, and operate with a closed or blocked suction line without damaging the pump.
- **Maintenance advantage:** JJ Tech Jet Pumps can be retrieved hydraulically without a workover rig or slick-line, resized (throat/nozzle change), and redeployed without a rig. JJ Tech Jet Pumps offer greater reliability with no moving downhole components.
- **Reduced downtime:** JJ Tech Jet Pump Systems including the downhole jet pump and the surface seal-less diaphragm pump typically run for years with only minimal maintenance. Jet pumps have significantly lowered unforeseen interruptions compared to rods or ESPs.
- **Improved well performance:** Wells can sustain high production until economic thresholds justified transition to rod lift. With the JJ Tech Jet Pump, downhole gauges (pressure bombs) can be circulated in and out of the wellbore without the use of wireline.
- **Operator empowerment:** JJ Tech trains and supports operators to service equipment themselves, reducing reliance on contractors and lowering costs.

User Roundtable

Dustin Webb, Production Foreman for Scout Energy Partners, and **Eric Campbell**, Production Foreman for FourPoint Resources, LLC discuss their experiences with artificial lift technologies in the Uinta Basin.

Question: What are the unique challenges in the basin and what technologies are used?

Dustin

There's been a lot of techniques over the years they've tried to lift this waxy crude. Rod lift has been the artificial lift of choice, before technology came around. I'd say over the past 30 years it (the technology) has just gotten better and better, with horizontal drilling technologies to go along with that.

Eric

With rods, we had deviated wells experiencing repeated failures due to parted rods or holes in tubing. The jet pump was brought in as an option to lift these oils without having those types of failures. That's where it originated for us. We ran with it and now we have these bigger wells that produce a lot of sand and make way more volume than a rod post pump can move, so we use jet pumps to help pump down the well before we put rods on it.

Right now, we run an ESP in a well right after initial flowing. Usually they're set up to handle over 2000 barrels a day or more, up to 3000 to 4000, and you run those as you pull the well down. The difference with a Jet Pump is, as you circulate out the pump we can easily change the throat and nozzle combo and move on. You know you can resize as the well stops producing, but basically you're oversized on ESP once you get to a certain point. Just to pull an ESP and resize it, you're looking at \$250K plus, which is about the same investment as buying a 200 horsepower jet pump system and installing it.

We are looking more towards other means of artificial lift, whether it be jet lift or ESP, because of deviation and the way the drilling has changed. So, to try to make sure they get everything, ESPs are taking big kick outs at the start of start of the wells, but once run down, rods are going to be real hard to get into these wells and produce. That's where jet pumps come into play.

We started using jet pumps for that reason. After initial flow of wells, we're still producing way too much for rod lift, so we have to have some sort of artificial lift between rod lift and flowing. ESPs are just expensive all the way around and don't handle the solids.

Dustin

I know some of our neighbors just to the West and East are using gas lift. Their biggest issue with gas lift is the paraffin because they're having

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Dustin Webb

Production Foreman
Scout Energy

to go in with a wax cutter two or three times a week and they have that additional expense to go in and cut. The wax just put it on a maintenance basis. Just for that reason, a jet lifted well has an edge over the gas lift. With the jet lift, we can quickly pull the pump and flush it.

We’ve been running jet pumps for close to two years now, and in that time we’ve only had one well failure and it was just because that well plugged off the paraffin. And so, we’re comparing different paraffin contents among the wells, the ones that run smoother and don’t have the wax issues, but we just don’t have enough proof of wells yet and enough failures. But I think what I’m getting at is that maintenance is a key with any artificial lift used in this basin.

Eric

Yes, one place where jet lift is above the others is the maintenance. There are a lot of wells in our field that we haven’t had a rig job on, because we do the maintenance – we bring out the pump. We haven’t had any paraffin off backsides. So that’s definitely a huge advantage of jet lift.

Once we install it, there’s some wells where you put your initial pump in and it works great until you got to change throat and nozzle combination. Then you just pull out, change the combo, drop it back down, and it just runs. You don’t ever have any issues. The only thing you ever really have to replace is parts on the jet pump itself, but you can do that yourself without a service rig.

Whereas rods, like you say, you’ve got to bring in a rig. It’s not every well – we do have rod lift wells that run for years as well – but typically you’ll see a failure or two with them, especially early on in life when we’re pulling 300 plus of fluid with it.

Dustin

I don’t disagree with that. In the years we’ve been dealing with jet pumps, we’ve had engineers try to bring in a different type of artificial lift or bounce ideas off of this and the jet lift, they can’t come up with anything that’s going to work better. With less downtime, the well performance, the whole thing, you know when they start looking at different avenues, it pretty much shoots down other types of artificial lift, especially with companies that like to run a little more lean and not spend a lot of capital.

When asked why the JJ Tech Jet Pump solution was selected over other Jet Pump technology solutions, the surface pump performance was initially a deciding factor:

Eric

It was basically an engineer brought it to us. We tried it and ended up really liking it. But yeah, I’m guessing at first it was the Wanner pump, and the reason we keep going forward with it is the combination of the



JJ Tech Hydraulic Jet Pump Systems are driven by Wanner Hydra-Cell Pro® surface pumps that offer a number of advantages over other jet pumps and other forms of artificial lift.

Wanner pump and the downhole equipment being a lot easier to work with. **For me, I can 100% say it's decreased downtime on my wells, because I service the wells, and like I said, they normally just run.**

On a jet lift, there's not a ton of maintenance, but what we work on the most tends to be the surface equipment. Some surface pumps are not as reliable as others. Most of it is just typical wear and tear on something that runs 24 hours a day, 365 days a year, at maybe 80% of max. We run these things hard. You're not just idling them. **I'm a fan of the Wanner Engineering pumps when it comes to jet lift.**

Dustin

Yeah, that's 100% correct. As Eric said, normal wear and tear occurs because we use water to charge these pumps rather than oil, so we have a serious lack of lubrication – you're basically pumping salt water 24 hours a day without any kind of lubrication.

Wanner Hydra-Cell Pro® pumps feature a seal-less design with no packing or seals to wear, leak or fail. The pump's design separates the sealed power end from the process fluid, eliminating the need for external lubrication or reliance on the pumped liquid for lubrication.

The seal-less design and check valves enable Hydra-Cell diaphragm pumps to work with particulates that would damage other pumps. They tolerate abrasives, solids and particles up to 800 microns and 9 Mohs without needing fine filtration. They can also pump acids and liquids with up to 40% dissolved solids. This allows the pump to handle corrosive liquids and abrasives such as produced sand with less wear than gear, screw-type or plunger pumps, and operate with a closed or blocked suction line, allowing it to run dry indefinitely without damage to the pump.

On why the JJ Tech Jet Pump was selected:

"For me, I can 100% say it's decreased downtime on my wells because they normally just run."

Eric Campbell

Production Foreman
FourPoint Resources

Results

Reduced Downtime

Jet pumps consistently decreased downtime compared to other artificial lift methods. Eric Campbell, Production Foreman at FourPoint Resources, noted “For me, I can 100% say it’s decreased downtime on my wells.”

Cost Efficiency

- Simplified self-servicing of pumps saved time and money by avoiding third-party rebuilds.
- Jet pumps required fewer catastrophic interventions compared to ESPs, cutting major workover expenses.
- Companies operating lean, such as Scout Energy, found jet pumps particularly aligned with budget-conscious strategies.

Sustained Well Performance

Wells were able to produce at high initial rates without overloading rod systems, while also avoiding frequent ESP maintenance requirements and failures.

Dustin Webb, Production Foreman at Scout Energy, emphasized “In two years of running jet pumps, half a dozen engineers have tried to replace them with other lift methods, but nothing works better in this basin.”

Conclusion

Jet pump technology has proven to be a critical enabler of Uinta Basin production, allowing operators to handle the challenges of waxy crude where traditional methods may fall short. By reducing downtime, lowering costs, and offering flexibility, JJ Tech Jet Pumps in particular have helped operators sustain performance in one of the most unique and demanding oil-producing regions in the United States.

While not a replacement for rod lift in all scenarios, and not as aggressive as ESPs in initial production drawdown, jet pumps provide a practical, cost-effective alternative that balances reliability with operational efficiency. Their unique advantage lies in reducing downtime, simplifying maintenance, and empowering operators to sustain production in wells where other artificial lift technologies struggle.



HEADQUARTERS / 5220 Hollywood Avenue, Shreveport, LA 71109
877-217-3590 **j-jtech.com**

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