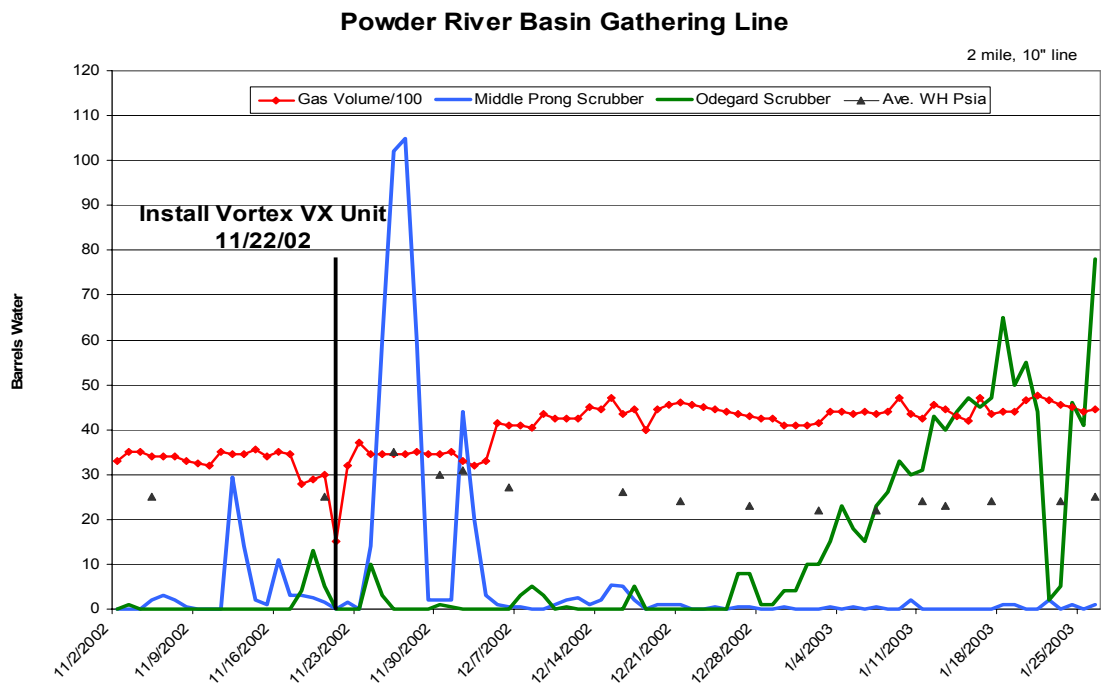


Gathering Trunk Lines Case Study 2004



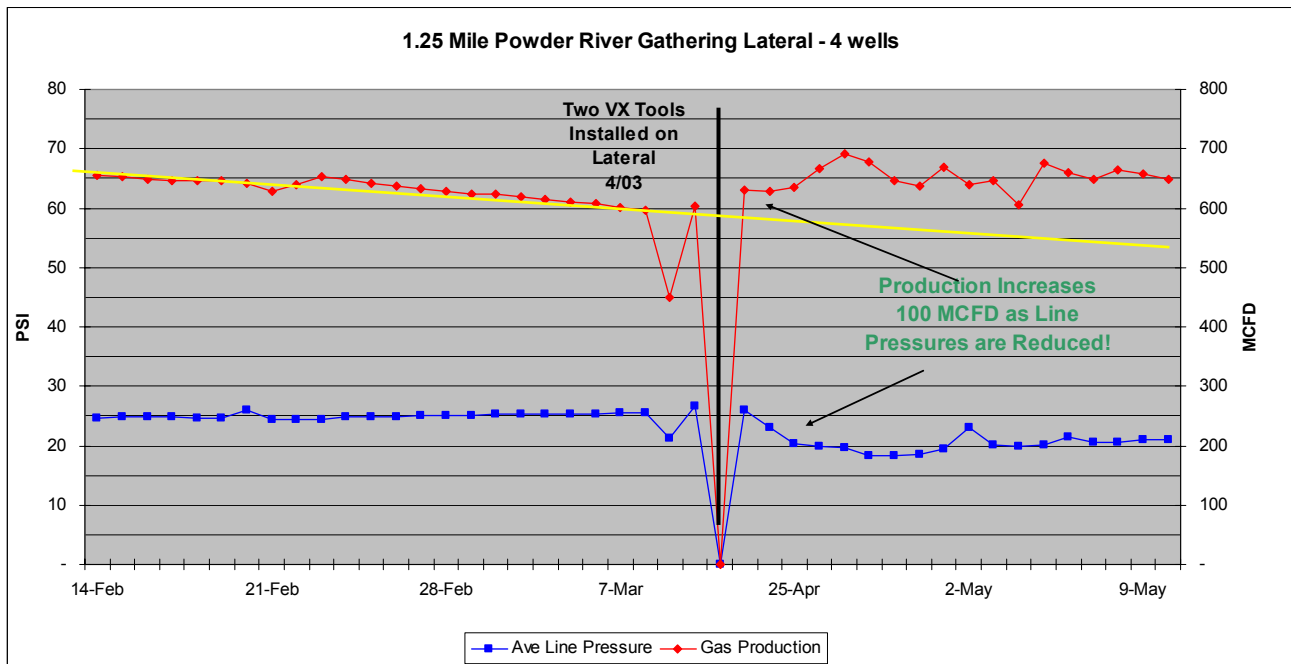
Powder River Basin – WY - Gathering Trunk Line SX Installation Removes Stagnant Liquids, Reduces Field Pressures and Increases Production – A 10” SX Tool was installed 2.33 miles upstream of a scrubber. Immediately after installation water produced at the scrubber increased dramatically. Six weeks after installation, water produced at a second scrubber at the end of a downstream Y also increased significantly. Field pressures have been reduced and field production is up substantially from 3,400 MCFGPD to 4,400 MCFGPD. Some work was performed on a couple of the 12 wells in the field. It is estimated that the SX has enhanced production by 800 MCFD. It appears the SX moved about 200 BW with the first spike.



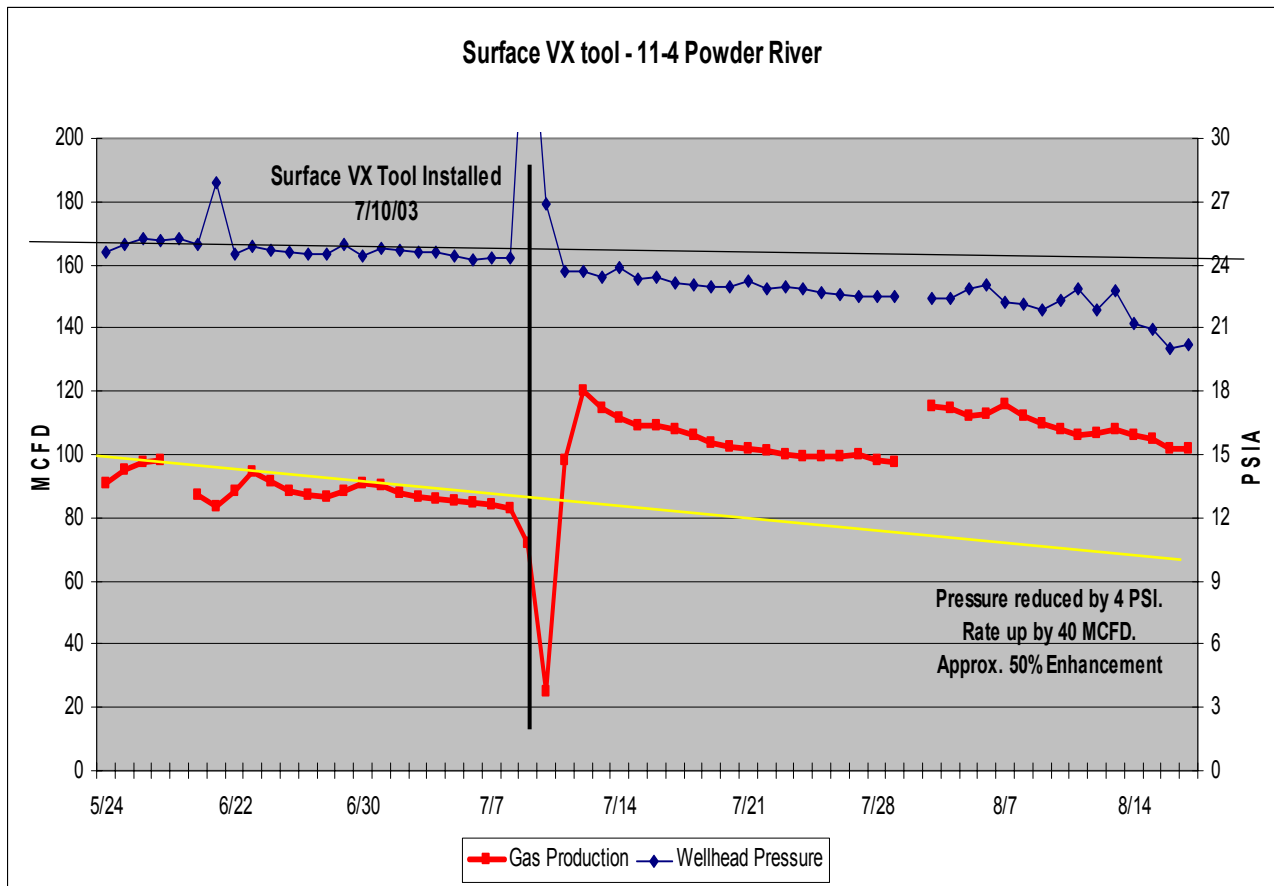
"The first thing we saw upon installation of a 10" SX Tool in our trunk line was substantial water arriving at our scrubber 2.3 miles downstream. Within a couple of days after installation, the daily water produced at the scrubber exceeded 100 BWPD. Over the next two months, our average upstream wellhead pressures were lowered by 8 PSI during which time production throughput was increasing from 3,400 MCFD to 4,400 MCFD. Needless to say, we are very pleased with the performance of the SX tool".

Thomas B. Smith, P.E. Sr. Petroleum Engineer, Marathon Oil Company - February, 2003

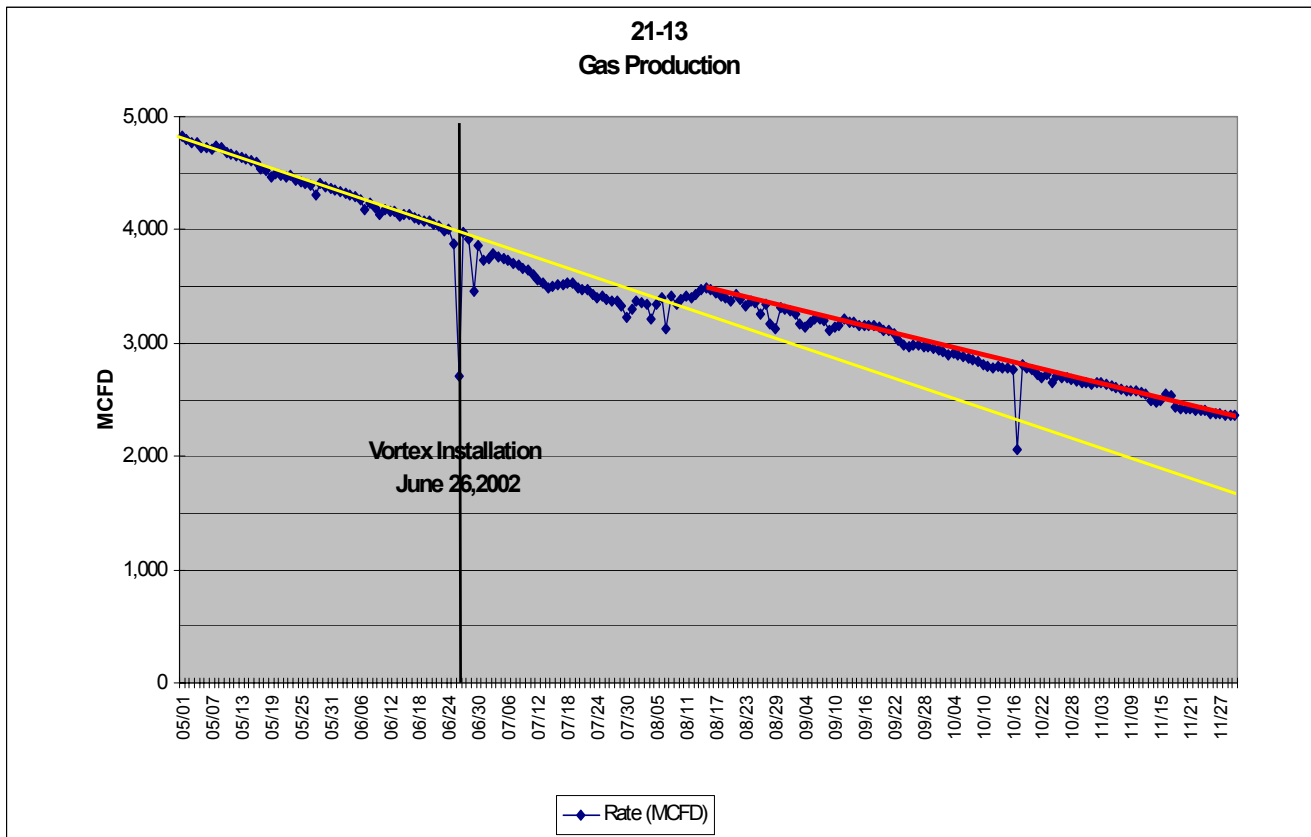
Reduced Wellhead Pressures - Enhanced Production - Four Wells on One Gathering Line – Gathering lateral was approximately two miles long. Two 4" SX tools were installed 4/14/03 on a gas gathering line. Typical pressure loss through this line was 12 PSI. The furthest upstream wellhead pressure was 30 PSIA. These wells are being produced using Electronic Submersible Pumps (ESP) that pumps water off of the formation using the tubing. The gas flows up the casing where it flows down a separate line. The gas has water vapor entrained and will drop out in the gas gathering line. The highest occurrence of 'dropping-out' occurs in the fall and spring when there are significant air temperature changes. The line traverses a couple of hills and gullies. Production improved immediately upon installation. Within a month of installation, the furthest upstream wellhead pressure had been reduced to only 23 PSIA! Charted below is an aggregated summary for the four wells on the gathering line.

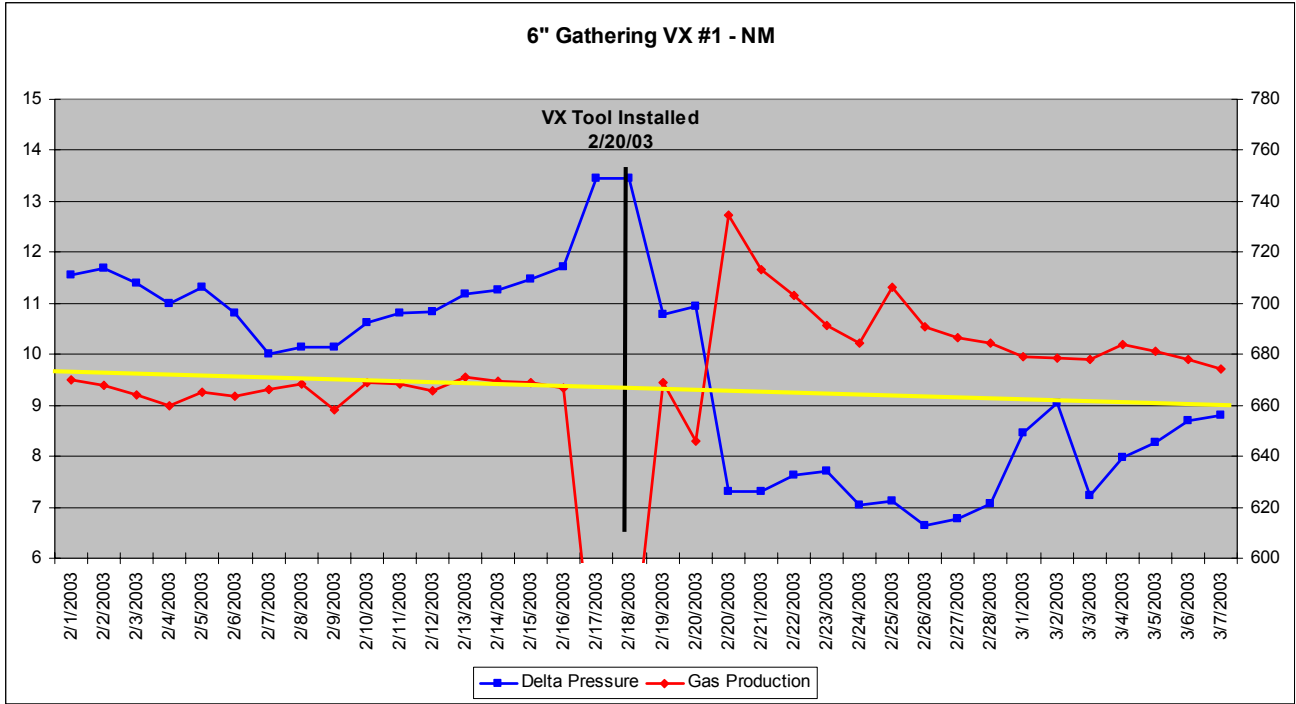


Reduced Wellhead Pressures - Enhanced Production – Individual Well Gathering Lateral – One 4” SX tool was installed 7/9/03 on a gas gathering line. Typical pressure loss through this line was 7 PSI. This well is produced using an Electronic Submersible Pump (ESP) that pumps water off of the formation using the tubing. The gas flows up the casing where it flows down a separate line. The gas has water vapor entrained and will drop out in the gas gathering line. The highest occurrence of ‘dropping-out’ occurs in the fall and spring when there are significant air temperature changes. The well sits in a low spot and the line travels uphill to a larger trunk line. Production improved immediately upon installation. Just over a month of installation, the pressure drop had been reduced to only 1 psi and the wellhead pressure had been reduced to only 19 PSIA!



Powder River Basin – WY - Gathering Trunk Line - Enhanced Production - 1 - 8”
SX tool installed on a 1.25 mile line that runs from a pod to a compressor station. This line did not exhibit characteristics of a line with significant liquid (pressure drop was not great and there was no water in the line when it was cut to do the install). About 30 days after installation, production shifted above the preinstallation production trend line. The post installation production trend continued to have greater variation from the pre-install trend line through 11/30/02. Modeled pressure variance analysis for the 1st 60 days after installation was inconclusive. However, there were several key pieces of data that were not available to perform the analysis.

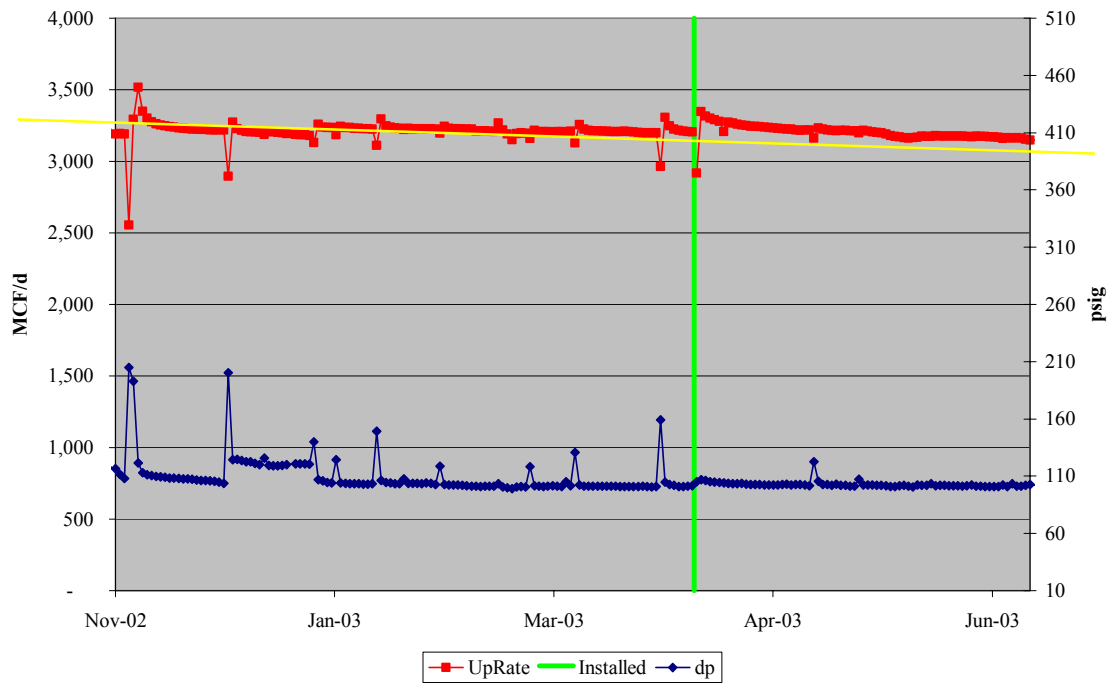




Gathering Line Installation - 4-inch tool was installed in gathering line in the San Juan basin. The SX tool replaced a pig launcher and enabled consistent line pressure on the low end of the historical range without pigging the gathering line.

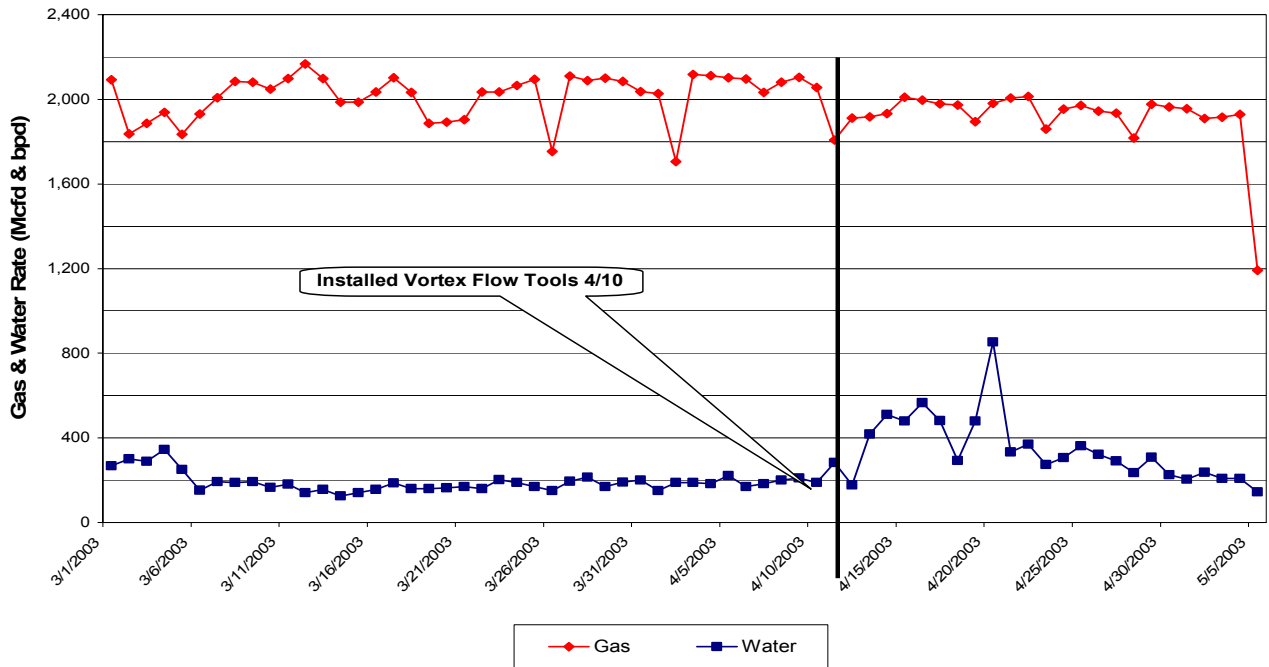


4 Inch Line Pig Launcher Replacement



Michigan Basin – Gathering Trunk Line Installations – Water Evacuated from gathering lines – one 6” tool and three - 4” SX tools - were installed in April 2003 on gathering lines and one trunk line that collects gas and water from several wells. These lines were experiencing significant pressure drop and it was suspected that there was stagnant water in the lines. Immediately after installation, you can see from the chart below how the water production was dramatically increased at the compressor and then how the water production lessened back down – indicating that the line had been cleared of stagnant water.

Bart Star Project - Michigan Atrium Shale



Gathering SX Tool Tired of Pigging – Duke Energy Tries a New Approach

Duke Energy used the Vortex SX in an attempt to eliminate pigging on a heavily used lateral in a gathering system in the DJ basin. The 3 mile line was on a schedule that required pigging every two weeks to remove accumulated fluids in the line. Detailed line and installation information is as follows:

Basin:	Denver-Julesburg (DJ)
Pigging Schedule:	Once each week before SX installation
Flowline Size:	3”
Flowline Length:	~15,000 feet
Vortex SX Install:	Just after sales meter that collects gas from three wells and before 15,000 foot flowline run
Other:	Line would occasionally freeze-up during winter

The Vortex SX was installed in approximately 3 hours on September 5, 2002. In the several weeks following installation, there have been two very impressive benefits:

- 1) Pigging that was required every week has not been required since!
- 2) Line pressures have fallen by 16%, from 240 psi to 200 psi

In the 18 months since the tool has been operating, the line has not required pigging, reducing pigging expense and improving line uptime and related line throughput.



Vortex Flow, LLC Customer Quotes

We had a two mile, 4" flowline that produced 6 BWD, 70 BOD, and 1,100 MCFD. This line did not have any drips in place. We had to regularly pig this line as wellhead pressure would increase from 600 PSI to 800 PSI in only a couple of days. The liquid holdup would also cause this line to freeze often in the winter.

We installed a 4" Vortex surface SX tool in place of our pig launcher on September 3rd, 2003. On the day of installation we pigged the line prior to installing the SX tool. The next day we had a slug of fluid in the treating vessels. The SX tool has eliminated our need to pig this line while enabling our wellhead pressure to be consistently only 500 PSI. This has reduced our average wellhead pressure by 100 PSI and eliminated our costs for pigging. We have also noticed less slugging of fluid and gas at the treating facility. We can't wait to make it through the winter without our line freezing.

Michael Tornes

Lario Oil and Gas Company

Wyoming

September 23, 2003

We installed one SX tool on a gathering trunk line 1.25 miles from our compressor. We saw a great deal of liquid both at our drip and at our compressor facility. In fact, so much liquid was transported through our 10" gathering line that our compressor was knocked down briefly after installation. Four weeks after installation, the pressure drop was reduced, resulting in the production increase of 94 MCFD (26%) to about 450 MCFD. We are looking forward to additional Vortex SX installations.

Scott Chipperfield, Continental Industries

Casper, WY