

Production Problem:

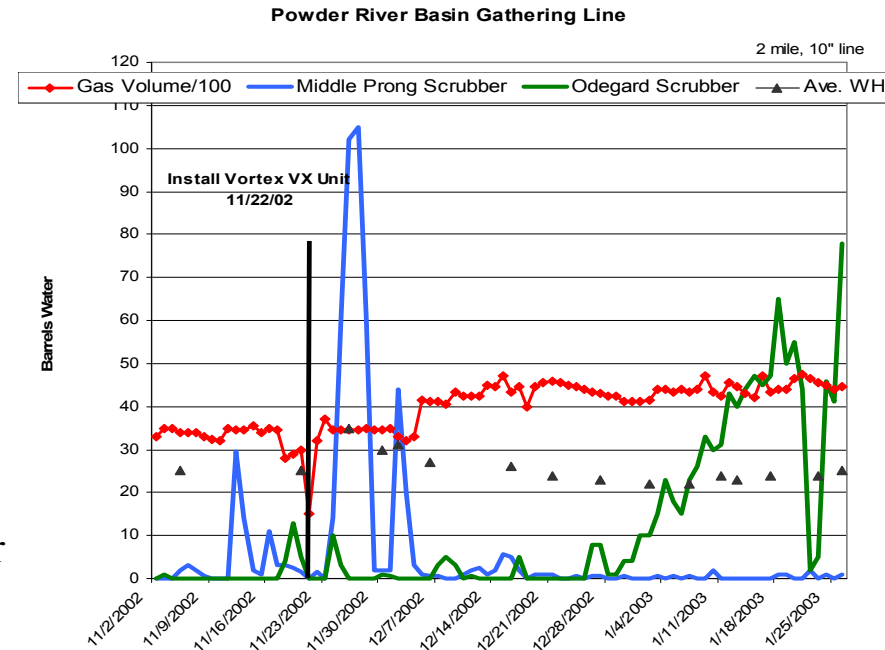
- When flowline velocities drop below the critical ‘sweep – rate’ stagnant liquids deposit along the bottom of the flowline.
- Vortex Flow surface tools have proven to purge these stagnant liquids from flowlines.
- Vortex VX tools have lines with flow velocities as low as 9ft./second.

Selected Vortex Case Study:

- 2.3 mile section of 10” gathering line at 28 PSIA
- After VX installation, extremely large volume of water is evacuated from the line within two weeks.
- Gas rate increases from 3,400 to 4,400 MCFD
- After 3 months upstream pressure was reduced by 8 PSI

Overall Vortex Results:

- Vortex has deployed over 100 VX Surface tools ranging from 2” to 12” inlet/outlet sizes targeted at removing stagnant liquids, reducing pressure drop and enhancing production.
- Whenever customers have been able to observe or measure liquid production, VX tool installation has corresponded to enhanced liquid production.
- Production has been enhanced 80% of the time.



Improved Production Economics

- *At only \$4.00 MCF*
- *Six Month Value of Enhanced Production:*
 - 5 MCFD = \$3,600
 - 25 MCFD = \$18,000
 - 50 MCFD = \$36,000
 - 100 MCFD = \$72,000
 - 1,000 MCFD = \$720,000

Operations and Production

Problem:

- Paraffin deposits in flowlines
- Lines become constricted
- Wellhead pressures rise
- Lines require hot-oil or hot-water treatments to eliminate accumulated paraffin

One Month
without a VX tool



Over Four
Months with a
VX tool in
place!



Selected Vortex Case Study:

- A rod pump oil well that produced 95 BWD and 5 BOD had a flowline that would completely clog with paraffin every 30 days.
- With a VX tool was installed at the wellhead, the flowline was kept free from substantial paraffin deposition for five months.

Overall Vortex Results:

- Ten VX tools have been installed where paraffin deposition on the flowline was a significant problem... **all ten** installations have shown very positive indications that paraffin deposition has been mitigated!

Production Economics

- At \$25 BO
- *Six Month Value of Enhanced Production:*
 - 1 BOD = \$4,500
 - 2 BOPD = \$9,000
 - 3 BOPD = \$13,500
 - 5 BOPD = \$22,500
 - 10 BOPD = \$45,000

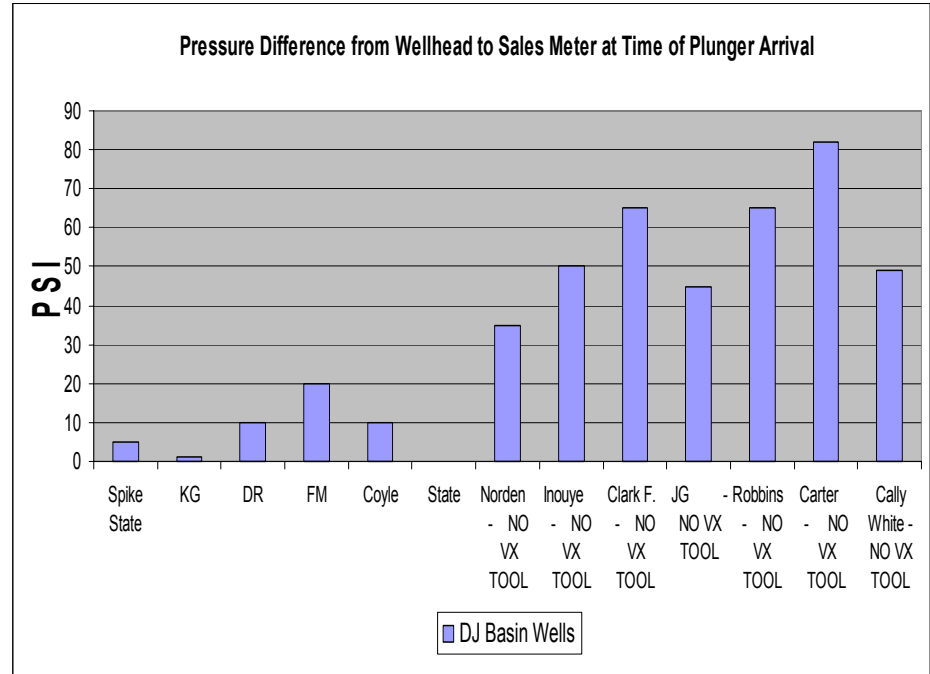


Operations and Production Problem:

- Flow velocities in multi-phase flowlines often less the required velocity to sweep liquids from lines.
- Lines become constricted
- Wellhead pressures are increased

Selected Vortex Case Study:

- 13 wells were observed during plunger production cycles.
- Six of the wells had VX tools in place on their flowlines and 7 wells were operating without the VX tools.
- Flowlines with VX tools in place operated with 60 PSI less pressure difference between their wellhead and the separator!



Overall Vortex Results:

- When pressures have been observed, the VX tools have effectively reduced pressures over 90% of the time!

Production Economics

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Operations and Production Problem:

- Flow velocities in multi-phase flowlines often less the required velocity to sweep liquids from lines.
- Lines become constricted, wellhead pressures are increased and **production is impeded.**

Selected Vortex Case Study:

- Production 10 wells with VX tools on their flowlines were studied.
- Production was compared to long-term decline curves. Chart 1 shows 12 months of production prior to installation of the VX tools. Chart 2 shows production after installation of the VX tools.

Production Economics

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Chart 1: Pre VX Installation

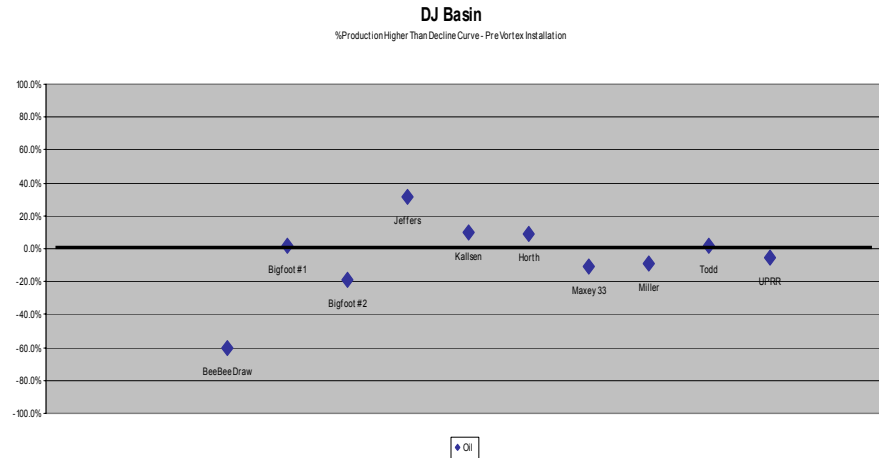
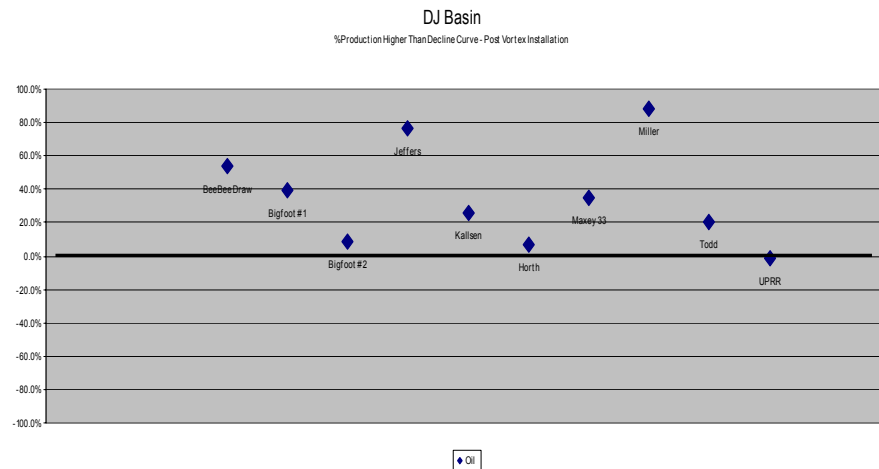


Chart 2: Post VX Installation



Operations and Production

Problem:

- Expensive, time consuming and production limiting Pigging facilities are used to sweep stagnant liquids from production lines.

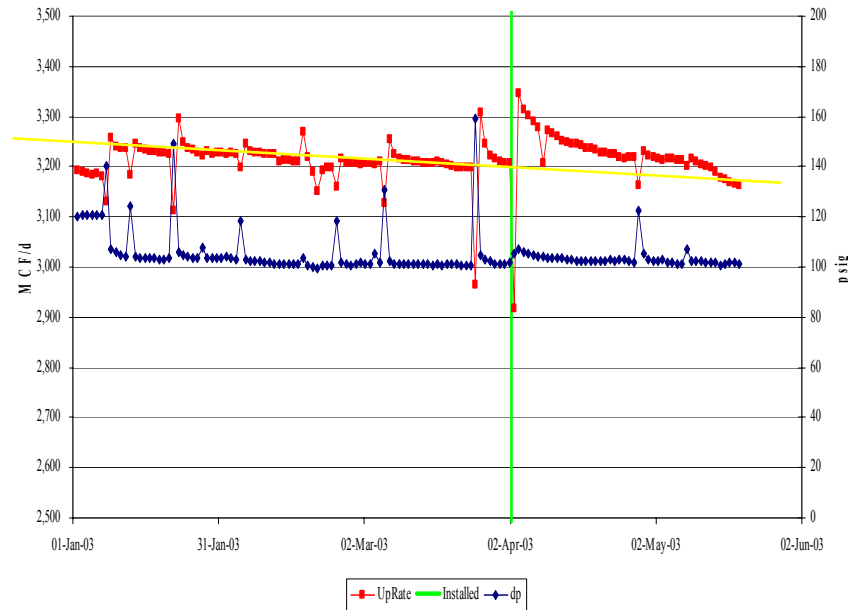
Selected Vortex Case Study:

- 4” gas line in the San Juan Basin installed a VX tool in place of the pig launcher.
- Gas rate increased and pressure remained consistent after installation.

Overall Vortex Results:

- Four customer installations have targeted the elimination of pigging facilities.
- Three of these four installations have successfully replaced pigging facilities!

Gizmo 4 Daily (Arnaud /A/ 2 Line, 4-inch)



Production Economics

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Operations and Production Problem:

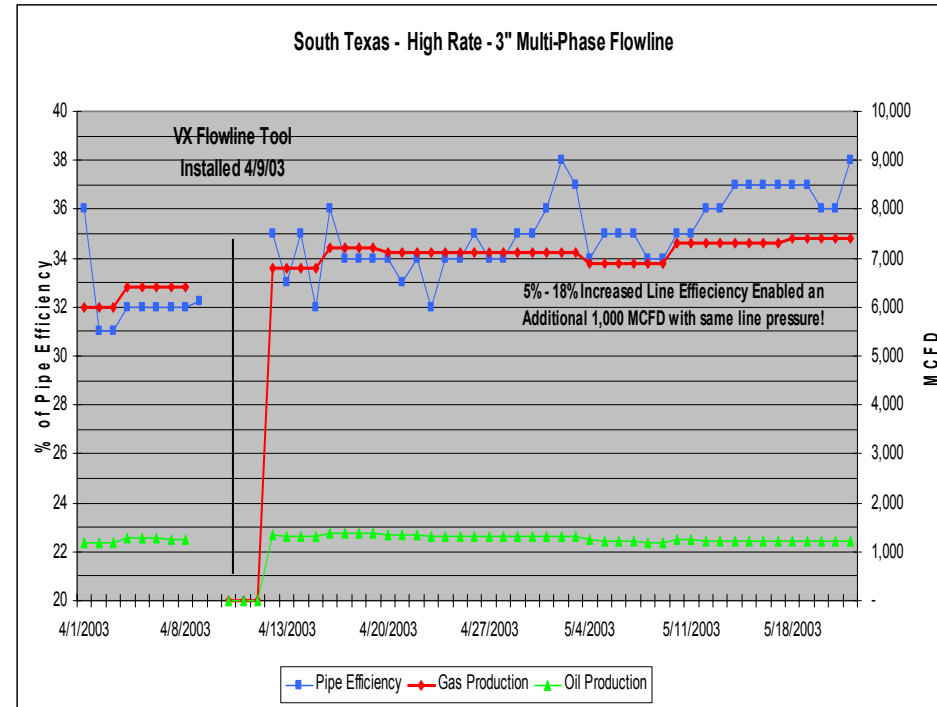
- High rate multi-phase lines incur substantial pressure drop due to friction.

Selected Vortex Case Study:

- South Texas flowline was able to increase gas rate by 1,000 MCFD while maintaining same pressure drop.
- VX created a 18% more efficient multi-phase flowline!

Overall Vortex Results:

- The VX tools are based on multi-phase transportation technology proven to effectively move even solids with minimal pressure drop.
- This VX installation represents the only high rate multi-phase oil and gas flow studied to date.



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Operations and Production Problem:

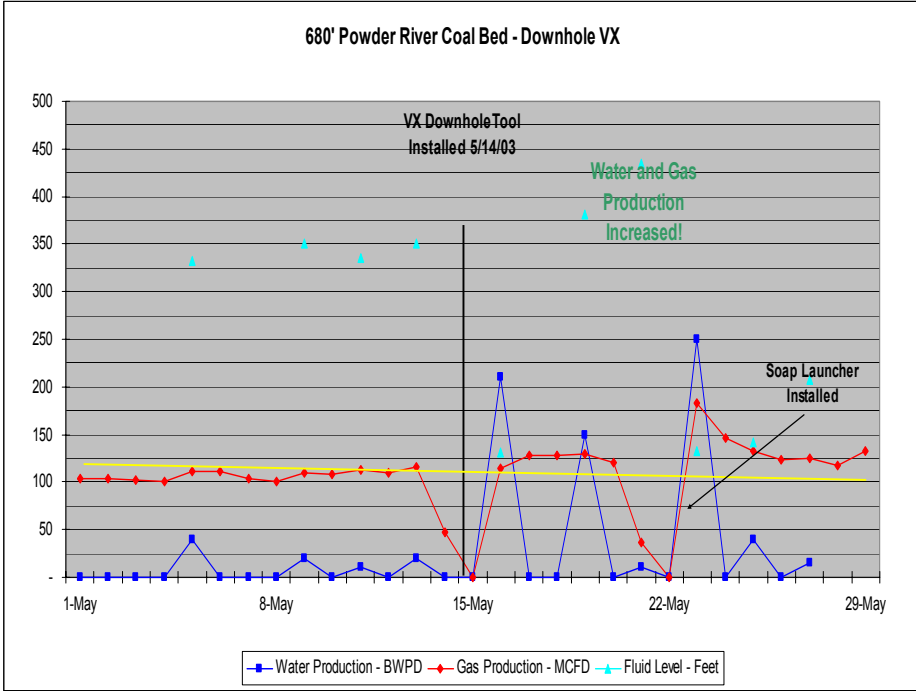
- Water on the formation impedes gas production.

Selected Vortex Case Study:

- This is an 800’ deep Powder River coal bed well
- Water production pre Vortex downhole VX was 30 BWD
- After downhole VX installed water rate increased to over 200 BWP!
- Gas rate increased by 25% to 125 MCFD.

Overall Downhole VX Results:

- VX downhole tools have more effectively removed liquid in a number of installations.

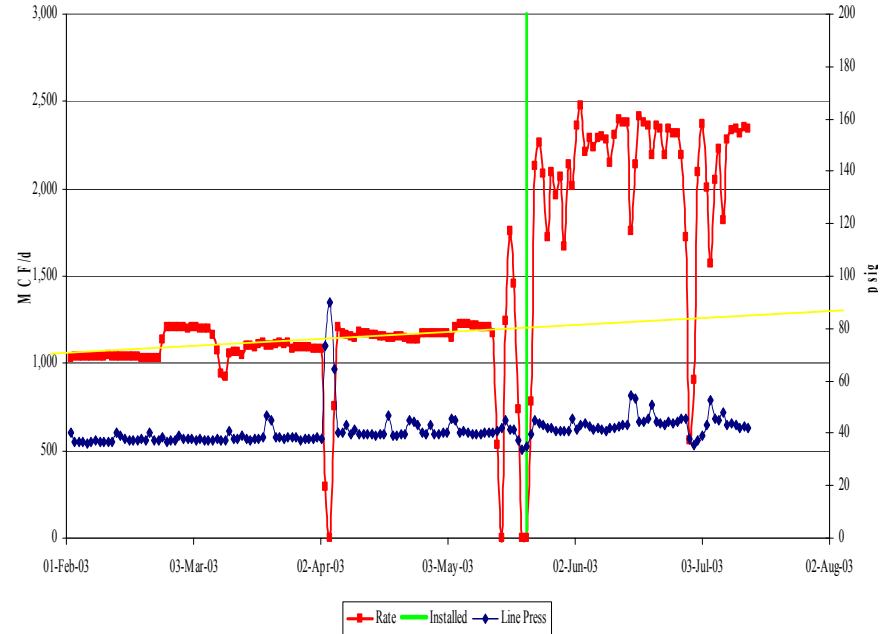


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JB Gardner Gas Uni /A/ 1



Operations and Production Problem:

- Water on the formation impedes gas production.

Selected Vortex Case Study:

- This San Juan well was 3,000’ deep and produced from fairway coal.
- The fluid level in the wellbore pre Vortex downhole VX was 300’
- After downhole VX installed fluid level was reduced to 25’ and the gas rate increased to over 2,000 MCFD!

Overall Downhole VX Results:

- VX downhole tools have more effectively removed liquid and enhanced the gas rate in a number of installations.

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