

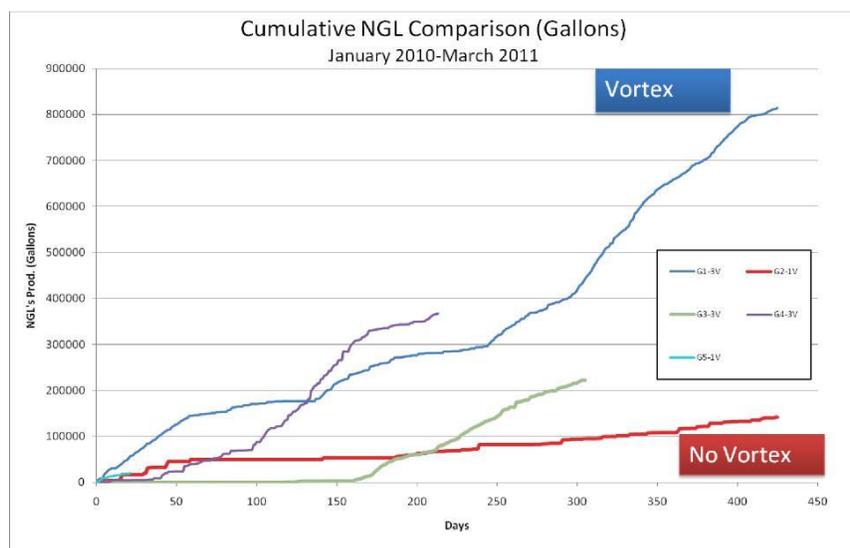


## Vortex Tools: Improved Natural Gas Liquids Recovery

A Texas independent producer was incurring significant cost in pigging lines (due to accumulation of liquids dropping out at low spots during transport) and believed that valuable revenues from natural gas liquids (NGLs) were not being optimized. After an initial analysis of the current value of recovering liquids through pigging to the processing plant, a comparable recovery model was developed that, given the high prices of NGLs at the time, hypothesized a field recovery solution using the Vortex technology would provide an economic benefit.

This Vortex NGL solution is a field processing solution maintains NGLs in a liquefied (as opposed to gaseous) form for long distances. Using the principles of a spiraling, organized flow, different components of a two-phase flow are separated by this “tornado in a pipe” and then travel as a separated co-flow for long distances (up to six miles measured in this trial). Using the Vortex tool resulted in significant NGLs being collected (in a pressurized bullet tank). The gas was 1,150-1,275 BTU and NGL prices at the time were ~\$50/barrel. The higher the BTU, the more liquids are recovered.

Data was gathered on producing wells with and without the Vortex solution over a 15-month period. The following graph compares a gathering system with a Vortex tool on each of three producing wells to a gathering line without Vortex tools over that same 15-month trial period. The blue line (Vortex) shows the NGLs recovered with the Vortex tools—814,179 gallons—compared to the red line (pigging) where only 142,170 gallons of NGLs were recovered at the separator before the processing plant.



In these operations, Vortex Tools made additional revenues by knocking out NGLs in the gathering lines, reducing line freeze ups, eliminating free liquids in gas meters, yielding better measurement, lowering maintenance and repairs, reducing free liquids through dehydrators, reducing glycol cost and filter cost (by as much as 80%), and greatly reducing production tank flash emissions. Over 1.2 million gallons of additional NGLs were recovered from three gathering lines in a single year, translating to over \$2 million of additional revenues. An average well line with Vortex paid for itself in less than 60 days (including the cost of the Vortex tool and associated bullet tanks/installation). Additional “non-revenue” benefits like less pigging, reduced methanol use, reduced hydrate formation and zero line freeze-ups on gathering lines with Vortex also bolstered the value of these tools. The Vortex tools are now a part of this customer’s new well completion program, with a surface line tool placed on each new flowline.