Application Note: Verax™ Vapor Pressure

Vapor Pressure Measurement: RVP, TVP, VPCRx

Vapor Pressure's increasing relevance in Midstream operations

Around the world, the increased liquids produced from gas wells has elevated the focus on handling crude, condensate, natural gas liquids, and blends in an efficient, safe, and environmentally-conscious manner. While numerous factors contribute to this increased focus, the primary factor is the sheer volume of liquid hydrocarbons being transported by pipeline, rail, and roads. Raw, unstabilized crudes, condensates, and blends can be dangerous to store and transport due to high vapor pressure. Therefore, stabilizing is now often required to ensure the product meets safety specifications, usually measured by vapor pressure (RVP, TVP and/or VPCRx). However, up until now there has not been a cost effective method with low environmental impact to measure the vapor pressure in real time as the product is being processed, stored, loaded, or transported.

Condensate Stabilizer

Traditional RVP measurement problems

Measuring the Vapor Pressure of stabilized crude, stabilized condensate, and condensate blends in midstream facilities has proven to be a challenge due to paraffins in the process stream. Analysis with a conventional ASTM method requires the sample to be measured at 100°F, which is below the condensing point of paraffin present in the typical condensate stream. This plugs sample lines and measurement cells in a traditional on-line RVP analyzer, which leads to a maintenance-intensive failure of the device.
On-line systems utilizing conventional ASTM methods are mechanical devices with cycle times between 4-6 minutes, not including sample lag. Due to the slow response, real-time control of the stabilizer is not possible. Manual control necessitates "overcooking" the condensate, which increases VP give-away into low-value gas product and wastes fuel.
A typical RVP analyzer requires a sample conditioning system (SCS), and spent sample is flared or vented. These sampling and analytical operations, therefore, negatively impact the ESG profile of a site by increasing hydrocarbon emissions and it's carbon footprint.

Verax NIR Spectrometer

The JP3 Verax Solution

The JP3 Verax™ system utilizes NIR (Near Infrared) spectroscopy and chemometrics to determine the Vapor Pressure of a liquid stream. JP3 developed the field deployable Verax system which enables midstream operators, loading/unloading terminals, refineries, and other oil & gas facilities to benefit from NIR spectroscopy.
The Verax analyzer system operates at line temperatures and pressures (-10F to 225F; 0 to 1750psi) without a sampling system, sample lines, or filtering required. There are no consumables, lamps, or moving parts which require maintenance: reliability, uptime and speed of response are dramatically improved.

Critical Data. Real Time.

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Expert Service and Support, Tailored to Your Needs

Almost all optical-based systems will require chemometric models, which are developed by chemometricians using process samples. Most other optical analyzer manufacturers rely on the end user to create, develop and maintain these calibration models. JP3's in-house team of project managers and Ph.D. chemometricians offer a full range of support options: from hardware-only sales to full-service model development and support.

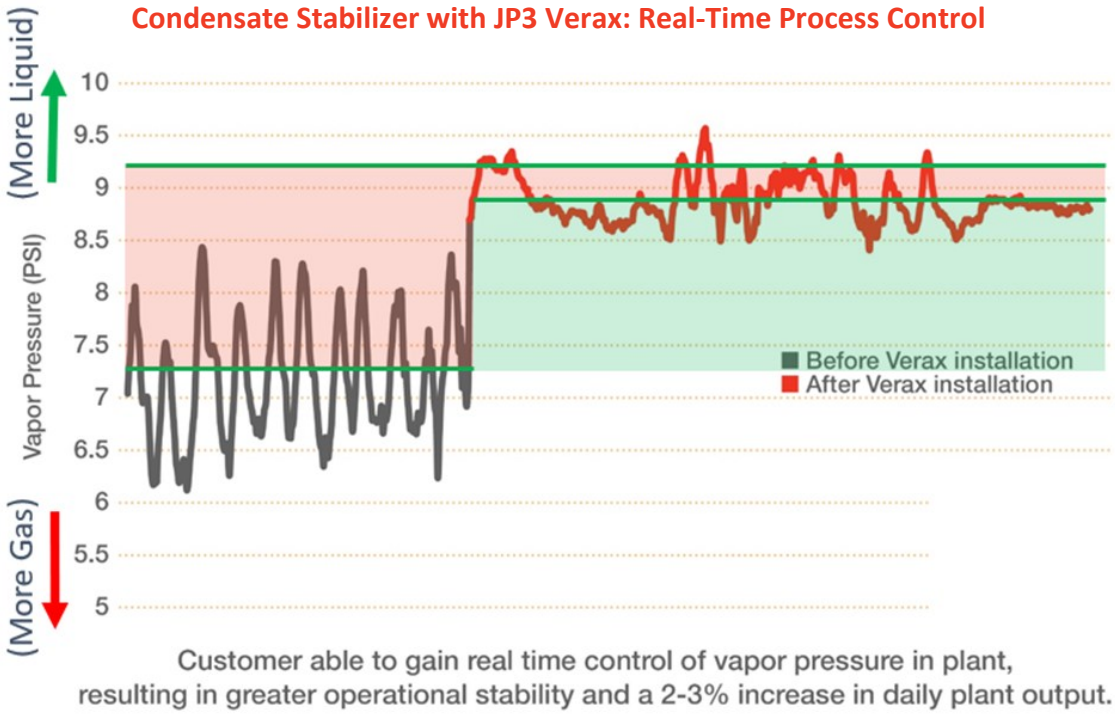
Designed for Speed and Reliability

The highly reliable Verax analyzer provides analysis for up to four process streams in less than fifteen seconds per stream. Utilizing a highly stable and repeatable laser optical source, and packaged to operate in harsh environments without a shelter, the Verax operates in-line at process pressure and temperature. The VeraSight™ flow cells are mounted at the process points of measurement with fiber optic cable connections back to the control unit. All material is returned to the pipe, resulting in emissions-free operation. This means sample transport is minimal, usually being a simple bypass pipe. This improves response time due to increased sample flow, improves safety due to the near-zero maintenance requirement, and improves ESG performance since no sample is vented or flared.

Common analytical methods for VP analysis

Method	Response Time	Operational Efficiency	Sample Conditioning System	Multiple Property Measurements	Environmental Controls	Initial Cost	Cost of Ownership
Lab Sampling	>30 minutes	-$$$	N/A	Yes	No	$	$$
On-Line Mechanical RVP	~6 minutes	-$$	Yes	No	Required	$$	$$$
Gas Chromatograph	>5 minutes	-$$	Yes	Sometimes	Required	$$	$$$
JP3 Verax	15 seconds	+$$$	No	Yes	No	$$	$

Condensate Stabilizer with JP3 Verax: Real-Time Process Control



Customer able to gain real time control of vapor pressure in plant, resulting in greater operational stability and a 2-3% increase in daily plant output.

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