Technical Bulletin

Process Vision

Better Monitoring of Pipeline Contamination

When natural gas is processed, liquids are injected to remove water vapour, carbon dioxide and hydrogen sulphide. It is vital that these liquids are completely removed from the gas stream prior to exporting the gas for sale, yet, to date, there is no effective method to determine if liquid separators are working to their stated efficiency 100% of the time. Often operators find out about a problem too late, and liquid carry-over has caused £Ms of damage.

Contamination in gas system.

If hydrocarbon liquids are allowed to enter dehydration systems, foaming can occur requiring the addition of de-foaming agents. At the exit of the de-hydration system, liquids like glycol (MEG and TEG), crawl down the walls of the pipeline causing further problems.

If the processing plant is fitted with a refrigeration (or dew pointing) system to remove as much, high value, gas condensate as possible, glycol enters the system, causing blockages, loss of efficiency, and problems with the temperature control of the system, leading to further liquids remaining in the export gas stream.

Gas analyser systems are specifically designed to avoid and filter out liquids.

Gas contracts strictly specify the gas quality, and require there to be no liquids, with good reason. If allowed into the gas network, liquids can build up in low spots and corrode the internal pipe wall as happened in Carlsbad, New Mexico.

Post-rupture fire at Carlsbad, New Mexico.

If breaches of the contract are proved, buyers can decide to reject the supply until the process upset is resolved, or re-negotiate the price. In some cases, a large fine from the buyer or pipeline operator will also add to costs.

In gas processing plants and refineries there are often absorber beds or catalysts that are sensitive to liquids. There have been many instances where liquids have been allowed to carry-over into the gas stream, and have damaged £Ms worth of catalyst or absorbent.

Heat exchange after a catalyst failure due to liquid carry-over.

LineVu

We believe that process supervisors and operations teams should have the best information possible in order to make the best operational decisions.

LineVu is a camera system providing a permanent video stream of pipeline activity, available to view at any time. LineVu provides an alarm when the following contamination is detected:

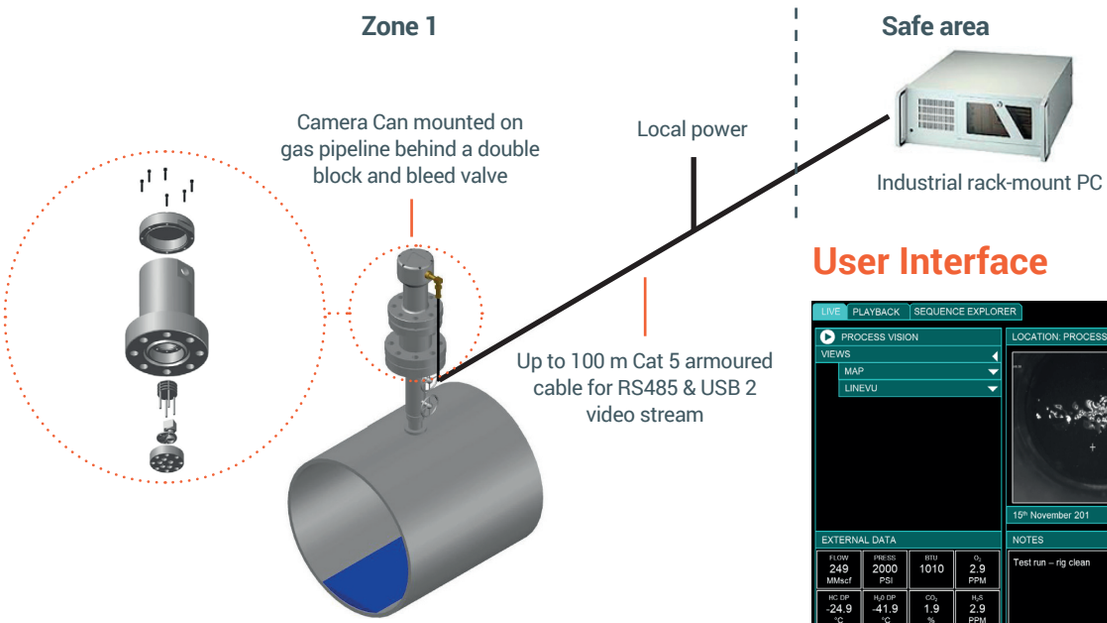
- Liquids
- Hydrates
- Foam

Under normal dry gas conditions, the system will see no movement (even though the gas may be moving at around 30 mph). In the event of contamination, image processing delivers an alarm. This offers a significant step forward in process assurance for critical applications.

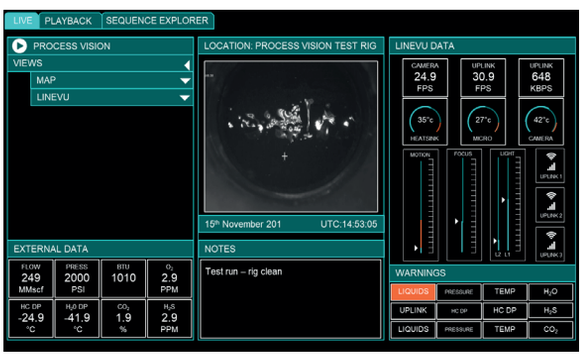
LineVu is a very powerful tool for diagnostics, and provides evidence of events where tariff agreements have been broken and justification is needed to support a decision to temporarily stop the supply, or support a compensation claim from the gas supplier.

Using existing tapping points, LineVu can be installed at custody transfer points, or at the entry to, or exit from, critical gas processing systems.

Overview



User Interface



Indisputable Evidence

Greater process confidence is gained when operators can *see* events in high pressure systems. With LineVu, a live video feed of pipeline activity is available at any time via a standard web browser. An alarm (volt-free relay) is raised when contamination is detected, and LineVu automatically starts recording data at that point. It continues to record until no further contamination is detected. Time, date and location are burnt onto the video image so that, during event play-back, all relevant process data is played-back alongside the video, providing a complete picture of the event to aid fault diagnosis.

The user interface allows process data such as gas flow-rate, line pressure, position of critical valves, and other relevant details to be displayed and recorded alongside the video.

A New Way of Thinking

After safety considerations, ease of installation and commissioning are of great importance. LineVu does not require sections of pipe to be removed, or pits to be dug. It is mounted above the pipeline, using existing 2" or 3" tapping points wherever possible, behind a double block and bleed valve. This stand-off from the main pipeline avoids contamination of the optical windows. With a maximum working pressure of 200 Bar, LineVu is compatible with the majority of pipeline networks and gas processing plants.

Data may be stored in the rack-mount PC, or on the client's network. Still shots may be taken for entry into reports, or sent via SMS texts to interested parties. Video may be uploaded for remote access, and for service engineers or customers to view to improve response to an event.

Safety

Safety is a key feature. LineVu is permanently installed on a pipeline or high pressure vessel. Independent LOPA and FMEA studies confirm that the secondary containment system provides sufficient levels of safety for pipeline network installation.

Benefits

Buyers

At custody transfer points, buyers can make better decisions. With firm evidence they can:

- decide the acceptability of the supply
- correct flow meter readings for wet gas
- make the supplier accountable
- re-negotiate costs
- lower legal costs

Suppliers

At gas export points, suppliers can reduce downtime. With better information they can:

- quickly determine the severity of the process failure
- improve operational decisions
- lower risk of financial penalties
- provide proof of dry gas

Asset Integrity Managers

With LineVu in place, asset integrity managers can:

- lower the risk of hydrate blockages
- decrease the requirement for pigging

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