



Monitoring Non-Condensable Gases (TRS) in Kraft Pulp Mills

Most pulp mill managers have serious concerns about the safe incineration of non-condensable gases collected from digesters, reactors and other sources in the pulping process.

Experience has shown that explosions and fires can occur without warning if the concentration of sulfides and other flammable gases entering the incinerator is too high. Besides the risks to personnel, such incidents can damage equipment and result in costly downtime.

Pulp mill operators have also learned that using blowers and venting systems to dilute the gas before incineration is not sufficient to eliminate the risks. The only certain way to guard against fires and explosions is to use continuous flammable gas monitoring.

Background

Non-condensable gases, usually referred to as Total Reduced Sulfur compounds (TRS) or Dilute Vent Gases, are by-products of the kraft pulp process. These gases, mostly sulfurous, are extremely malodorous and flammable. Because venting non-condensable gases directly into the atmosphere is prohibited for environmental reasons, pulp mills usually collect and incinerate them in a waste or recovery boiler, a lime kiln, or an incinerator.

In the past, continuous sampling and gas monitoring was a problem for three key reasons:

1. The environment that needs to be sampled is often saturated with water vapor. Combined with corrosive aspect of the TRS gases, most sensors will stay operational for only a short period of time.
2. Most sensors can only operate at ambient, as opposed to process temperatures, so they are positioned far away from incinerators, using a snaking pipe arrangement and pumps to cool samples. This convoluted network can lead to many sample delivery and maintenance problems, particularly when TRS is saturated with water vapor.
3. Many flammable gas monitors are accurate for only a small group of gases. The varied gases present in pulp mill applications often exceed the accuracy capabilities of many sensors. It's crucial to find a monitor that is accurate for all the gases that are present.

Because of its rugged construction and unique operating technology, Control Instruments' PrevEx® Flammability Analyzer, Model SNR674, provides the optimum system for monitoring non-condensable gases, due to the following ideal features:

Straight-Through Flow Design

The Model SNR674's simple flow system has no capillaries that can clog or pumps that can fail, even with critical TRS samples in a mist state. Because the sensor operates at high temperature, water droplets and mists are maintained in a vapor state throughout the sampling process.

Extremely Fast Response Time

The Model SNR674's high sampling speed dramatically improves response time— an important factor in pulp mill applications. Sample delivery time from the process to the analyzer cell gives the Model SNR674 a total response time as low as one second. This ultra-fast response allows valuable time for operator intervention before TRS is diverted from the incinerator and vented into the atmosphere — clearly a "last resort" safeguard.

Universal Calibration

Unlike other sensor technologies, the PrevEx® Flammability Analyzer, Model SNR674, is designed to give close-to-linear response to a wide range of flammable gases and vapors, including hydrogen sulfide, dimethyl sulfide, methyl mercaptan, and numerous other compounds found in TRS gases. As a result, the Model SNR674 accurately measures the total concentration of flammable gases present in a TRS sample.

Reliable Fail Safe Operation

Control Instruments' model SNR674 is a fail safe design. If there is any problem with the operation of the analyzer the self-diagnostics detect this and activate the FAULT relay. This allows the operator to be notified if ever the analyzer's readings cannot be relied upon due to any issue (inadequate sample flow, loss of fuel, etc.). By contrast many other gas monitors can be in a failure state and have no way to notify the operator.

Low Maintenance, Easy Servicing

Due to the heated design and simple sampling system maintenance is minimized even in a difficult application such as pulp mills.