

The Critical Role of Instrumentation in the Future of the Midstream Industry

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As the midstream industry continues to grow and increase transportation volume and processing rates of unstable substances like Liquefied Natural Gas (LNG) and Natural Gas Liquids (NGLs), it is crucial that instrumentation implementation and technologies continue to develop at a proportional rate. Many past industrial catastrophes can be attributed to faulty or inadequate instrumentation, and with more midstream throughput than ever before, the risk of such incidents is bound to rise. The future of a safe midstream industry is one in which operators always know what is in their pipes.

Instrumentation in the midstream industry ranges from simple pressure gauges to advanced radiometric analyzers used to measure process properties such as specific gravity. While these instruments vary widely in utility, price point, and application, they are used because they allow operators to know what is in their pipelines or equipment, as well as process conditions. When instrumentation fails or is not used in a portion of the process, operators are blind to the process conditions in that area, thereby entering the “Zone of Uncertainty.” In this zone, it is very difficult to judge whether operations are safe and to assess the risks involved in any work that needs to be done in those areas. This paper will discuss what needs to be done to maintain safe operations as the midstream industry grows and expands, and details how to avoid the “Zone of Uncertainty” with adequate instrumentation.

The first and most affordable step the midstream industry must take to ensure a safe future is to ensure that instruments are functional before starting any equipment or transporting any material through pipelines. A good way of ensuring this is with a proper mechanical integrity or instrument reliability/maintenance program. Keeping tabs on whether instrumentation is operational and calibrated is crucial to safe operations. An example of the potential consequences of faulty instrumentation was seen in the 2005 BP Texas City refinery explosion. After a CSB investigation of the incident, it was found that a faulty level-indicator instrument on the plant’s Isomerization unit’s Raffinate tower led to an overflow of highly flammable liquids. A subsequent instrument failure of a downstream blowdown drum high-level alarm also caused operators to have no knowledge of this dangerous upset, which led to the deaths of 15 workers and over 180 injuries.[1]

The second step that the midstream industry should take is to update instrumentation to modern technologies. New instrumentation and control system technology has allowed operators to remotely view live process conditions via Supervisory Control and Data Acquisition (SCADA) systems through a Human Machine Interface (HMI), such as a computer monitor. This promotes safety by eliminating the need for operators to manually check conditions while moving down a pipeline or through a processing unit. It is also extremely important that this data be digitized and made publicly available through

databases such as the Pipeline Open Data Standard (PODS).[2] Having a primary master source of pipeline information, such as a data model like PODS, will allow midstream companies to standardize and improve pipeline integrity and operational safety across the industry.

The final step the midstream industry should take is to increase instrumentation. Using more instrumentation will fill knowledge gaps and create a complete picture for operators. In the case of a high-pressure gas line, temperature and pressure would be obvious conditions to monitor; however, there will still be uncertainties about the line's properties. For instance, if moisture enters the pipeline undetected, operators may never know unless they have an instrument such as a dew point analyzer. Sometimes more instrumentation may be redundant, but it is important to consider all potential process conditions that upset conditions could cause and install instrumentation to catch them.

As the midstream industry expands, it is critical that operators always know what is in their pipes and system process conditions. By following the three recommendations of ensuring functional instrumentation before startup, modernizing instrumentation, and using more instrumentation, the future of the midstream industry will be safer for everyone involved.

References

[1] <https://www.csb.gov/bp-america-texas-city-refinery-explosion/>

[2] <https://pods.org/>