Leak Detection Systems: What is the state-of-the-art?

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Key issues

There is no one “leak” and there is no one “perfect” LDS, for all failure modes and all pipelines.

- Different failure mechanisms
- Ruptures, leaks and seeps
- Natural gas, HVL and liquids requirements

“Performance” of an LDS is a complex issue:

- Leak size / leak rate / speed of detection
- Associated shutoff and recovery systems
- Robustness and reliability: false positives vs. misses

Historical performance metrics for LDS are also confusing:

- The data supplied to the PHMSA incident databases is not always complete
- The pipeline controller/control room identified a release around 17% of the time.
Key observations

An LDS is often “expected” to perform as an elementary industrial automation alarm, with an on/off state and six-sigma reliability:
• As a System, an LDS can be in several States.
• Process and people factors, as well as technology.

System redundancy is a major tool in improving reliability:
• Visual patrols for large but slow, SCADA for sudden high-rate releases
• Control room alarms and field personnel
• Different physical principles

Operators have a strong preference for LDS that utilizes field equipment that is already in place.
• Pressure/Flow Monitoring and CPM LDS technologies dominate
• Where SCADA or metering systems are not already in place, they are rarely installed with the sole objective of leak detection
• Visual inspection programs are similarly often already in place
Since the October 2012 PHMSA report:

There has been a recognition of people and process issues
• API RP 1175, PHMSA R&D, and others

There has been an increased adoption of External LD technologies
• Particularly new construction, upstream gathering systems, water disposal
• Fiber optic systems are becoming “almost” routine – fiber is being laid anyway

Certain Statistical CPM techniques have become mainstream

The “funnel” designing and field testing new technologies is improving
• At least six operator / industry initiated field trials, including PRCI, C-FER, etc.
• Automated, drone, satellite inspection
• Wireless sensor networks, AI, acoustic monitoring, etc.
Thank You

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