API RP 1175 Implementation Team Lottery

IF WE ALL PLAY, WE ALL WIN

Update on Leak Detection Regulations and Initiatives

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By
Christopher Hoidal

Interesting Public Statements Following Large Spills

- “[Company] has robust system integrity, inspection and maintenance programs that meet or exceed all federal regulatory requirements"
- “We use robust, state-of-the-art leak detection technologies that can notify us in real-time”
- “If there is a change in pressure or flow, [company] can remotely and automatically shut off flow within three minutes and activate trained responders.”

Realities

- December 2016 – 6 inch pipeline releases over 4000 barrels of crude into a stream, and the spill is discovered by a rancher.
- May 2015 – 24 inch pipeline releases almost 3ooo barrels of crude after failed startup and shutdown. Subsequent drain down and discharge into ocean reported by beachgoers.
- July 2011 – 12-inch pipeline releases 1500 barrels of crude into flooding river, but despite timely detection, controllers took wrong shut down actions.

Recent Spills where Operator was Unaware of Release

Is leak detection possible?

- Often we need to ask a multi-part question
  - Is it technically possible?
  - Is it practical?
    - Operationally feasible
    - Economically feasible
- It's not rocket science, but fluid dynamics can get complicated
- Cost vs. complexity: Higher cost and complexity does not necessarily translate to better performance

Putting Leak Detection Systems into Context

- One of many pipeline safety layers
- Must integrate technology, people, procedures, and operating environment
- Too much focus on any one discrete element without considering the others or how they interact, and system may fail
- Leak detection vs. rupture detection.
  - Some consider leak detection all encompassing and rupture detection a higher risk/consequence subset (Rupture must be addressed first)

Gaps We Often See

- **Hybrid systems** – Single Phase Systems that have numerous, unmetered, multiphase injection points.
- **Lack of instrumentation** – Can't monitor pipeline pressures at key locations while it is not flowing, e.g. low-lying areas, streams.
- **Improper response -** When accurate leak and location information provided to controllers they lack system knowledge to enact correct shutdown response.
- **Limited use of external leak detection systems** as part of the overall spill detection strategy, e.g. pumps, valve vaults, etc.
- **Cultural and perception issues**
  - Changing company controller mindset from "it can't be a leak, prove to me it is" to "it may be a leak, prove to me it's not"
  - Public awareness and perception – Rapid Leak detection not that easy; solicit their assistance in reporting leaks.

Examples of Gaps

Static Drain Down – (3000 barrels while line idled)

Valve Flange leak in Vault (500-1000 barrels during start up)

PHMSA Initiatives

- **Rulemaking** – Response to Mandates and Spill Events
- **Research and Development** – What is Possible and Practical?
- **Enforcement Policy** – Consistency being emphasized between regions and states

Rulemaking

Observed Rulemaking Gaps

- Leak Detection System regulations hardest in Part 195 to enforce by trained inspectors
  - Pure Performance based even with API 1175
  - Discussions of KPIs such as Reliability, Sensitivity, Accuracy, and Robustness just words without strong Performance Targets and Testing. (NEED Minimums to Inspect to)

Research and Development

PHMSA Leak Detection R&D – since 2012 (approx. $6.2M)

- INO Technologies Assessment of Leak Detection Systems for Hazardous Liquid Pipelines – HL - Closed
- Advanced Leak Detection LiDAR – HL - Closed
- Advanced Development and Technology Transfer of a Methane/Natural Gas Microsensor – Dist - Closed
- Improving Leak Detection System Design Redundancy & Accuracy – HL/GT
- Small-Scale DIAL for Methane Detection – GG/GT/Dist
- Emissions Quantification Validation Process – Dist
- Natural Gas Pipeline Leak Rate Measurement System – GG/GT/Dist
- Aerial Small Methane Leak Survey – GG/GT/Dist
- Framework for Verifying and Validating the Performance and Viability of External Leak Detection Systems for Liquid and Natural Gas Pipelines – HL/GT

Observed R&D Gaps

- Leak Detection System R&D could focus more on:
  - Different operating modes, e.g. start up, idled
  - Heterogenous or multiphase flow as seen in many gathering or hybrid systems (part transmission and part gathering)
  - External Leak Detection Systems (valves, remote facilities)

Continue to Participate in Standards Development and Update

- API RP 1168 (Control Room Management)
- API RP 1175 (Leak Detection Program Management) - A great start!
- API RP 1130 (Computational Pipeline Monitoring)
- API TR 1149 (Pipeline Variable Uncertainties and Their Effects on Leak Detectability)

Enforcement

PHMSA Enforcement
Focused on Consistency and Performance

§195.452 (i)(3) Leak Detection

1. Do records show inclusion of all of the required 195.452(i)(3) evaluation factors, including risk assessment results?
2. Do records show that other considerations have been factored into the evaluation of leak detection systems? If applicable, do records show provisions for the transportation of ethanol and biofuels?
3. For operators of low stress pipelines, do records show the written program in compliance with all applicable parts of 195.452?
4. How often has leak detection been evaluated? How are changes to the operator's system factored into the leak detection evaluation?
5. How have accidents been factored into the leak detection system evaluation?

PHMSA Enforcement
Focused on Consistency and Performance

§195.444 CPM Leak Detection

1. Design must address section 4.2 of API 1130 in its [195.134]
2. Operator must comply with API 1130 requirements in operating, maintaining, testing, record-keeping, and dispatcher training. [195.444]
3. Check CPM documentation and data retention. [API-1130, 6.6 and 6.4]
4. Check pipeline controller training and retraining. [API-1130, 6.5]
5. There are many ways that an operator may detect leaks. The operator must conduct a risk analysis, per 195.452(i)(2) to identify the need for additional preventive and mitigative features. Leak detection capability must be evaluated, per 195.452(i)(3), using the results of this risk analysis and other factors listed in that paragraph. An operator must determine if modifications to its leak detection means are needed to improve the operator's ability to respond to a pipeline failure and protect HCAs.

Enforcement Gaps

- Regulations and Standards are so Performance Orientated they are hard to enforce.
  - Good comprehensive lists to consider in creating a good Leak Detection Program but few objective criteria to ensure poor performance outliers addressed prior to spill.
  - Risk tolerance of operators may be seriously out of sync with public (more than just HCA protection)

PHMSA Enforcement

Focused on Performance

Post Incident Enforcement Examples

1. Did spill exceed the worst case discharge in their Facility Response Plan?
2. Did the operator protect or minimize damage of HCA's through an enhanced leak detection system and the use of remotely controlled valves? Was the HCA's enough, e.g. National Parks, fishing areas, beaches, transportation corridors, etc. **Our mission is to protect people, property, and environment not just HCAs.**
3. **Did operator implement the changes that the Integrity Management Program SMEs recommend for improvement?**
4. Did the controllers have sufficient information to take proper actions?
5. Were there sufficient sensors to determine whether a large leak was occurring and where?

Questions?

Chris Hoidal
720-963-3160
chris.hoidal@dot.gov

API RP 1175

Culture and Strategy Executive Panel

4:00 – 5:15

AGENDA

- Panelist Introductions
- 1st Part – Topic Discussions (Panelists Only)
  - Culture (Greg Smith)
  - Strategy (Dan Nerbonne)
  - Scalability (Tom Shaw)
  - Lessons Learned (Jan Hayes)
- 2nd Part – Questions from the Audience

Executive Panelists

Greg Smith
President
Shell Pipeline

Dan Nerbonne
Executive V.P. of Ops. & Eng.
Plains All American Pipeline

Tom Shaw
President
LOOP LLC

Jan Hayes
Associate Professor
RMIT University