



API RP 1175 Pipeline Leak Detection Overview

2015 API Pipeline Conference
and Control Room Forum

April 28 - 30, 2015 | Savannah, Georgia

Discussion Topics

- Why is this RP needed?
- Purpose
- Objectives – Table of Contents
- Details Within
- Upcoming Activities



Key Messages

- High level of interest in pipeline leak detection
- Detect leaks quickly, with certainty, facilitate quicker shutdown, and minimize negative consequences
- To be Balloted July 2015
- PowerPoint Aids will be available around July



Desired Outcomes/Decisions

- Report Out Status of RP initiatives/objectives and activities
- Focus on the being proactive and assist in industry Leak Detection Program (LDP) Management Initiatives

Why is this RP needed?

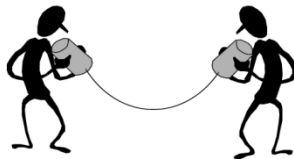
API
RP 1175

Leak Detection Task Force

Guidance Document to Address Concerns of Mandate

Leak Detection Initiatives & Rulemaking Considerations

PHMSA presented to API Cybernetics Workgroup April 17, 2013 seeking feedback on path forward



General Accounting Office (GAO) Study

DOT should: 1) improve incident response data and use these data to evaluate whether to implement a performance-based framework for incident response times and 2) share guidance and information on evaluation approaches to inform operators' decisions

NTSB Recommendation P-11-10

Require that all operators of natural gas transmission and distribution pipelines equip their SCADA systems with tools to assist in recognizing and pinpointing the location of leaks, including line breaks; such tools could include real-time leak detection system and appropriately spaced flow and pressure transmitters along covered transmission lines

Congressional Mandate

Pipeline Safety, Regulatory Certainty and Job Creation Act of 2011 Section 8 Leak Detection required to analyze technical, operational, and economic feasibility aspects on leak detection systems...

Proactive

Comprehensive Integration

- Establishes a framework for leak detection program management for hazardous liquid pipelines
- Applies to Hazardous Liquids Pipelines regulated by the U.S. Department of Transportation

Tactical

Analyze

- Integrate Data
- Share Guidance
- Decision Support

- Provide conformity with regulations, only augment (not replace) existing standards and requirements

Reactive

High-Level Interest

8 (a): Due by January 3, 2013; Finalized December 10, 2012

API and AOPL filed comments to the draft October 26, 2012

8 (b): Due as soon as practical after January 3, 2014



Focuses on management of Leak Detection Programs (LDPs), not the design of Leak Detection Systems (LDSs)

Purpose of API 1175

- Provide holistic, high-level overview of **LIQUID** LDP management
 - Guidance on development, implementation, and management of a sustainable LDP to minimize the size and consequences of leak events
 - Enhanced guidance on selection and on establishing performance measures of LDSs
 - Address identified gaps and incorporating guidance into a comprehensive program document
- Focus on using a risk-based approach for LDPs
- All forms of LDSs used should be managed in a coordinated manner
- Encourage operators to “go beyond”

Areas Detailed in 1175

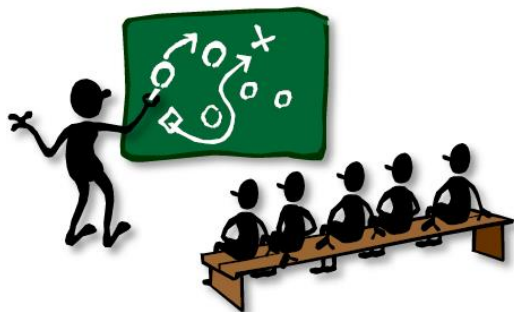
- Definitions
- Culture and Strategy
- Selection of LDSs
- Performance Targets, Metrics, and KPIs
- Testing
- CC Procedures for Recognition and Response Alarm Management
- Roles, Responsibilities and Training
- Reliability Centered Maintenance for Leak Detection Equipment
- Overall Performance Evaluation of the LDP
- Improvement Planning and Process

Leak Detection Culture

- Management support for the LDP – Visible and Ongoing
- Employees understand the Leak Detection Strategy
- Recognition and integration of all methods of leak detection
- Ongoing support towards improving pipeline leak detection, (*even if the pipeline operator is meeting leak detection goals*)
- Promotion and endorsement of teamwork within departments and across the organization
- Coordination and collaboration between the different entities involved in the LDP
- Clearly defined roles and responsibilities; concise policies, procedures and processes
- Culture is maintained by having a healthy sense of vulnerability



Leak Detection Strategy



- The technical component of the LDP and should be managed by the application to detect leaks
 - A written document that promotes the company's Leak Detection Culture
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- Sets goals and outlines the requirements of the LDP
 - Should outline how the company will meet minimum regulatory requirements and go beyond the minimum to implement industry best practices

Leak Detection Strategy Outline

- Visible Management Commitment and Leadership
- Company Goals and Requirements
- How Goals & Requirements Should Be Satisfied
- Employment of Risk Management
- Selection of LDSs
- Integration of All forms of Leak Detection Employed
- Consideration of Regulatory Requirements and Industry Standards
- Ongoing Measurement of Performance of the Program
- Training, Testing and Operations/Procedures
- Reporting
- Review and Approvals
- Management of Change
- Ongoing Improvement

The Process of Selection of Leak Detection

- Align with the Company Culture and Strategy
- Link Performance Targets, Metrics, and KPIs
- Incorporate Regulatory Requirements, Best Practices, and Company Requirements
- Perform the Overall Risk Assessments
- Evaluate Best Available Technology(ies)
- Modify to Cover Particular Requirements of Individual Pipelines
- Periodic Review of Selection via Leak Detection Capability Evaluation (LDCE)



Performance Targets, Metrics, and KPIs



- Operators should:
 - Establish performance targets, metrics, and KPIs for the Leak Detection Systems
 - Define and track to ensure the overarching goals are met.
 - Refine and Revise as part of a continual improvement process
- Performance Targets are part of the Operator’s *Strategy*, and *Selection* process
 - Performance targets should be tailored to the level at which they are being directed
 - Performance targets should be determined by analysis using sound engineering expertise and judgment
 - Typically through Estimation or Observation
- API RP 1130 Annex C defines these metrics as: sensitivity, reliability, accuracy, and robustness, that may be applied to any LDS.
- The metrics may be applied to any LDS (e.g. externally-based LDSs)

Testing

- All LDSs in a LDP should be tested when implemented and on a periodic basis as outlined in API RP 1130
- The testing process should include the requirements of LDS testing as outlined in API RP 1130
- The requirements of API RP 1130 should be tailored where necessary to accommodate the unique aspects of the LDSs and the specific assets upon which the LDS is implemented
- Wherever possible the testing should incorporate the testing recommendations of the LDS manufacturer or developers
- Consider methods to test Control Room staff that respond to leak alarms

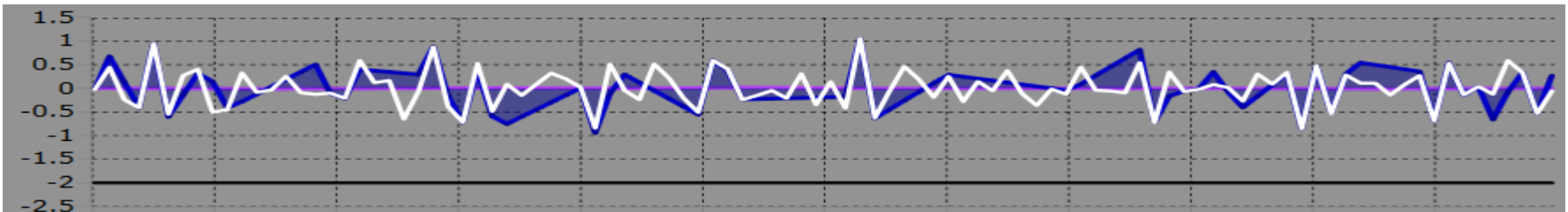
Control Center Procedures for Recognition and Response

- The pipeline operator should
 - Have a documented leak response procedure that:
 - Outlines the processes, tools and actions to be used by the Pipeline Controller to recognize and respond.
 - Develop a description and action protocol for leak indications or combination of indications
- The procedures may specify different actions that are taken to analyze different potential leak indications.
- Validation of Potential Leak Indication
- Reporting and Documentation
- Pipeline Restart



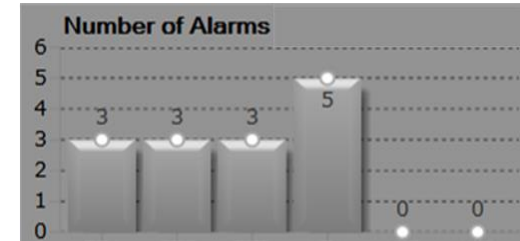
Alarm Management

- Alarm management employs tuning and threshold setting methods
 - Driven by pipeline analysis, data collection, and review
 - Encompass a slate of methods aimed at increasing Controller responsiveness
- Clarity and credibility of leak detection alarms should be a primary factor in categorizing alarms
 - Alarms that required immediate action to shutdown the pipeline, or high credibility alarms
 - Alarms that required an immediate investigation and preparation to shutdown or lower credibility alarms
 - Alarms that were proven to be “false” or non-leak alarms



Alarm Management Continued

- Alarm data collection considers
 - Post alarm actions to capture the information recorded at the time the alarm occurred
 - Add additional information to create an accessible database of leak alarm information and build an alarm history that can be used for alarm review
- Alarm review is the process of analyzing alarms with the goal of increasing the confidence of the alarms
- Threshold setting considers, based on alarm review
 - Existing thresholds
 - Needed adjustments to maintain the performance per KPIs
- Tuning is adjusting the LDS for more precise functioning, or target performance per the culture and strategy



Roles and Responsibilities

- Pipeline operators should have clear descriptions of their stakeholder’s roles and responsibilities
 - Help the stakeholder(s) understand their areas of responsibility and
 - Expectation(s) for compliance

API-1175								
Stakeholders Responsibilities	Management	Control Center	Analyst	Engineering	IT Group	SCADA Support	Field Operations	Public / Land Owners
Aerial Surveillance	A						R	
Alarm Management & Threshold	A	R, C, I	I	R		R, C, I	I, C	
Culture / Strategy	R, A	I, C	I	C, I	I	I	I	I
Design	A	I, C	I	R		C, I	I	
Emergency Response	A	R, C, I		R		I	R	I
Performance	A	I	C	R, C, I		R, C, I		
Record Keeping & Reporting	A	R, C, I					R	
Restart Authorization	R, A	C, I		I			C, I	
Leak / Rupture	R, A	R, C, I	C	C, I			R, C, I	
Testing	A	C	C, I			R	R	
Training	A	R	I			R	R	

Training

- The level, content, method, frequency and testing/verification of the training should be based on the roles and functions of the individuals and to support the pipeline operator Culture and Strategy
- Training metrics should be established to ensure training effectiveness
- Employees should be trained to work together effectively as a team

Level of Training	Roles											
	Management	Control Center	Analyst: Leak Detection Staff	Engineering: Support Staff	IT Group	SCADA Support	Field Operations: Field Staff	Field Operations: ROW Staff	Field Operations: Connecting Facilities Staff	Public: External Response	Public: Government Agencies or Regulators	Public: Land Owners / ROW Users
LDP Operational		X	X									
LDP Technical		X	X	X	X	X						
Internal LD Principles		X	X	X		X	X					
External LD Principles		X	X	X		X	X					
SCADA Deviation Alarms		X	X	X		X						
Pipeline Over/Short Calcs		X	X	X			X					
LDP Awareness		X					X	X	X			
LDP Basics		X					X	X		X	X	X
LDP Regulations/Standards	X	X	X	X								
LDP Strategy & Culture	X	X	X	X	X	X	X	X			X	
LDP Management	X	X	X									

Reliability Centered Maintenance (RCM) for Leak Detection Equipment

- Ensure that all components of the LDS and their supporting infrastructure components are designed for reliability and maintained appropriately
- Discuss the LDS and maintenance program with the users of the LDSs and/or with vendors
- Integrate the leak detection components into a pipeline operator's MMS or CMMS system or similar system to provide for automation of maintenance activity, schedule, and maintenance and failure tracking



■ RCM Process

1. **Function** of the component?
2. **Performance** standard?
3. How can it **fail**?
4. **Events** that **cause** failures?
5. What **happens after** the failures?
6. **Relates** to the LDS?
7. **Prevent consequence of failure**?
8. If **no preventive task** cannot be found?

■ DfRM Process

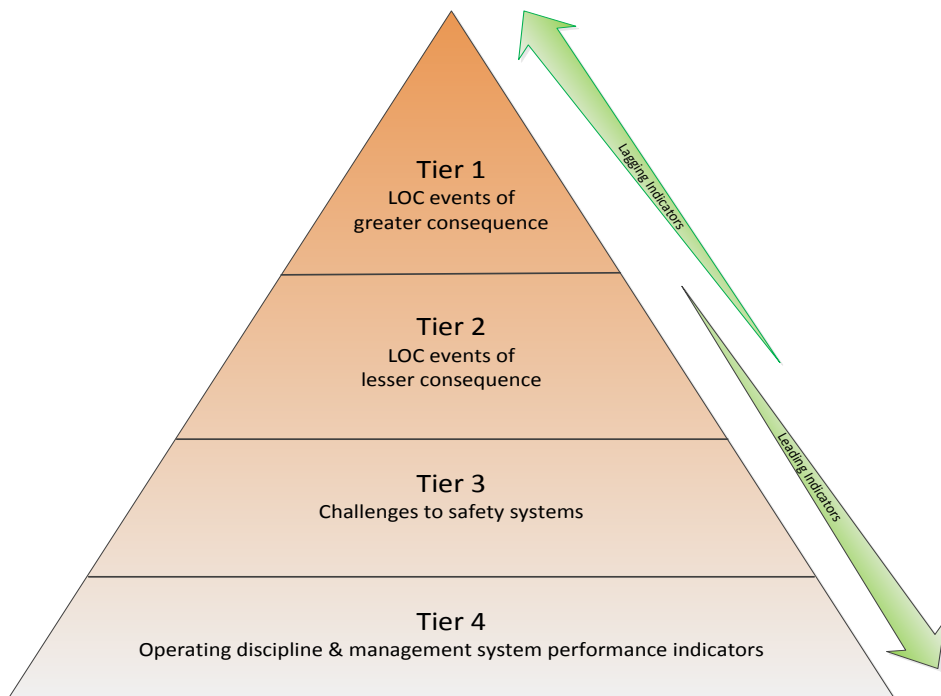
1. Design for Reliability and Maintainability (DfRM)
goal: **Team approach**.
2. **Gather** maintenance **data and develop** into Reliability, Availability and Maintainability (**RAM**) models.
3. **Develop/identify maintenance concepts** using information from the RAM models.
4. **Design, analyze, test, and improve/optimize** the LDS using selected maintenance concepts.
5. **Finalize** the design **through Engineering**, and **Implement** the **DfRM**.
6. **Collect field** maintenance **data and develop KPIs**.
7. Make field **improvements** as required by safety, economics, and other factors.
8. Design rules may be **revised**, new tools developed, and design approaches validated or revised.

Overall Performance Evaluation of the LDP

- Overall performance evaluation of the Operator's LDP should
 - Capture noteworthy results of operations of the LDP,
 - Look at company and industry performance,
 - Report to management the results of the overall performance monitoring on an annual basis
- Internally, looks at all performance aspects of API RP 1175
- Externally, looks at leak detection industry information (incident reports, databases, guidance provided by PHMSA, API PPTS, and other related sources), activities in the pipeline industry and changes to regulations



Leading and Lagging Indicators



- Leading indicators are used to predict a future outcome of a process
- Lagging indicators are those KPIs which measure an event once it has already occurred
- Dual Assurance is a concept whereby a leading indicator at a lower tier is matched with a lagging indicator at a higher tier
- Data normalization refers to the effort to make data comparable over time or between different entities

Improvement Planning and Process

- Identify and Define Opportunities to improve any part of the LDP
- Define the tasks needed to retain the interest or freshness of the LDP
- The opportunities should be planned, budgeted, and scheduled
- Consider the timeframe as to when the opportunities will be complete
- Tracked to completion
- Updated and improved on a regular basis
- LDP Strategy should be reviewed annually

Upcoming Activities

■ API Timeline

- Final Draft Version – May 19 – June 19
- Issue for Ballot and Voting – June 19
- Expected Approval – July / August

■ Implementation (*A new API Approach*)

- Develop an industry implementation plan and schedule:
 - Stage 1: Industry Information and Training Sessions
 - Stage 2: Industry Survey and Site Visits
 - Stage 3: API RP 1175 Revision-2 Development
 - Stage 4: Ongoing KPI Review and Analysis Revision-3 Development

- May be basis for future DOT regulations on LDP Management



Time after RP is approved:

- Up to 2 years (parallel)
- Up to 2 years (parallel)
- Up to 3 years
- At least 3 to 5 years

Thank You for Attention

**Questions / Comments /
Suggestions?**

