SUMMARY: API RECOMMENDED PRACTICE 1175

Why Do We Need API 1175?

While leak detection cannot prevent a leak, a good leak detection program will help minimize the consequences of a leak. The pipeline industry is committed to leak prevention, with the goal of zero releases. While operators are taking significant steps towards their objective, should a release occur, a strong leak detection program, composed of effective leak detections systems, is a part of successful mitigation.

Leak Detection Programs are essential to minimize releases. This helps to:

- Minimize the impact of releases on people, public and employees
- Minimize the impact of releases on the environment - animals, plants, waterways, and soil
- Minimize impact of releases on infrastructure - buildings, roads, bridges, other utilities, and pipelines
- Drive industry performance toward a goal of zero releases

The leak detection system must be designed and installed appropriately to cope with the various operating situations and conditions of the specific pipeline.

The leak detection system must be maintained, so it is reliable and always available.

The leak detection system must be tuned, so it works as needed and alarms only when there is a real release and never misses a release – highly reliable.

People must know what to do along with others

- Roles and responsibilities
- Documented procedures
- Training, testing and drills

Supported by Leadership

Effective leadership strategy and supportive culture.

WHAT IS API RP 1175?

This pipeline leak detection program (LDP) management recommended practice (RP) provides guidance to pipeline operators of hazardous liquid pipeline systems regarding a risk-based pipeline LDP management process. API 1175 focuses not only LD systems but on overall leak detection programs, to provide operators with valuable guidance on the components needed to implement a leak detection strategy, emphasizing the utmost importance of a company leak detection culture and strategy. The RP addresses integration of leak detection systems, performance testing, operator training, alarm management, field surveillance, and many other components via a Leak Detection Program.

Requires that pipeline leak detection is managed by structuring the various elements of leak detection into a leak detection program..

API RP 1175 divides a Leak Detection program into the following components:

1. LD culture and strategy
2. Selection of LD methods
3. Performance targets, metrics and KPIs
4. Testing
5. Control center procedures for recognition and response
6. Alarm management
7. Roles, responsibilities and training
8. Reliability Centered Maintenance (RCM) for LD equipment
9. Overall performance evaluation of the LD program
10. Management of change
11. Improvement process

Leak Detection Culture and Strategy

Culture

Culture is a system of shared assumptions, values, and beliefs that governs how people behave in organizations. These shared values have a strong influence on the people in the organization and dictate how they act, and perform their jobs.

A strong LD culture promotes prompt action to help reduce the consequences of a leak.

Visible and continuous management support for the Leak Detection program.

Employees should understand the LD strategy.

Recognition and integration of all methods of leak detection.

Commitment to improving pipeline leak detection (even if leak detection goals are met).

Promote teamwork within departments and across the organization.

The different parties involved in the leak detection program should cooperate and collaborate, e.g. it is important to closely involve the integrity management team.

A leak detection program includes not only the technology, but the people involved in applying the technology. Improving an organization's culture moves its people from thinking about safety and integrity to practicing safety and integrity.

Just as pipeline operators have developed a strong safety culture, it is important for pipeline operators to develop a strong leak detection culture.

Strategy

The leak detection strategy should manage the technical component of a leak detection program, set the requirements, outline the goals of the LDP and outline how the LDP will meet those goals. This written document promotes the company's Leak Detection Culture and puts it into action.

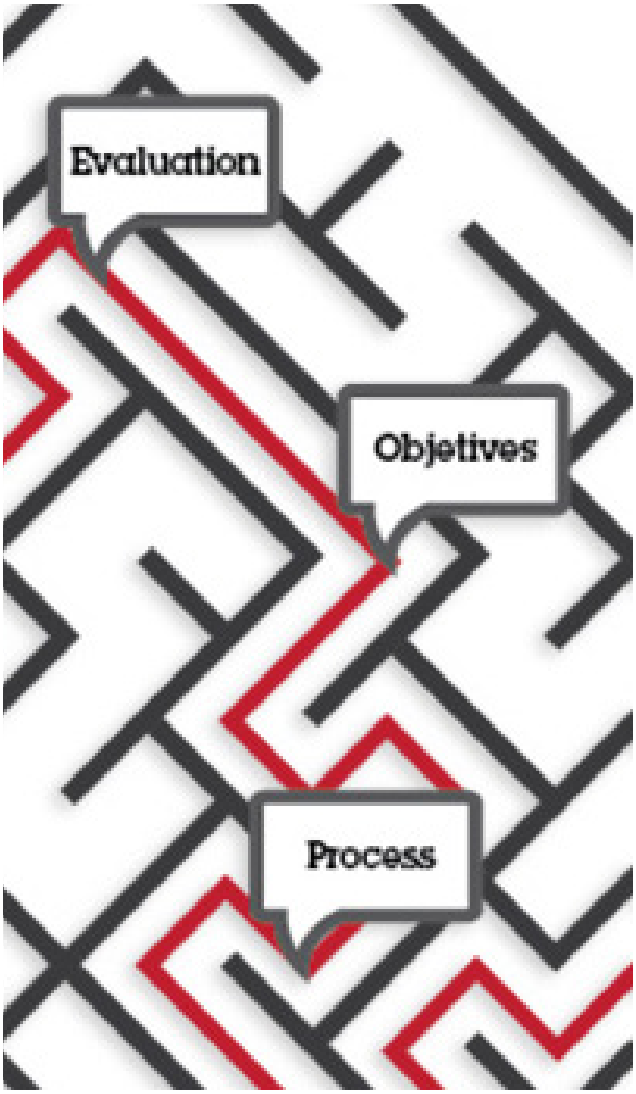
- Begins with a gap assessment to identify areas for improvement.

- Outlines the requirements of the leak detection program.

- Sets goals and establishes timelines and responsibility.

- Describes how the company will meet regulatory requirements and go beyond the minimum to implement industry best practices.

- Clearly defined roles, responsibilities, policies, procedures, and processes.

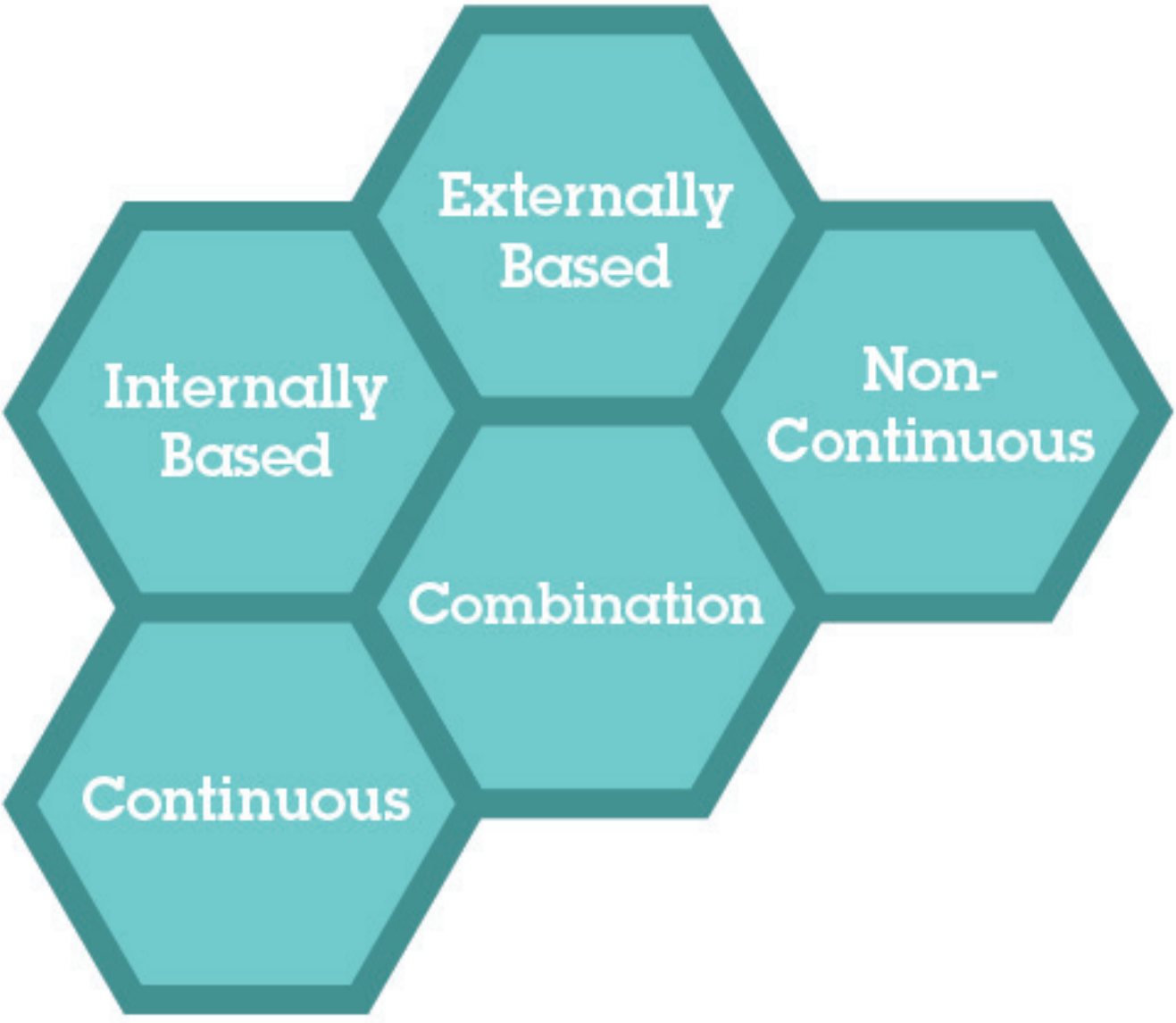


Key Leak Detection Strategy Elements

- Management commitment and leadership.
- Consistency with company goals and requirements.
- How goals and requirements should be satisfied.
- Employment of risk management.
- Selection of Leak Detection (LD) methods.
- Integration of all forms of leak detection employed.
- Consideration of regulatory requirements and industry standards.
- Ongoing measurement of programs performance.
- Training, testing, and operation procedures.
- Reporting.
- Review and approvals.
- Management of change.
- Ongoing improvement.

Selection of Leak Detection Methods

Leak detection systems (LDS) provide early notification of loss of containment (LOC), so immediate and subsequent actions can be taken to mitigate the consequence of the leak. The LDS decreases the dynamic leak volume by reducing the time required to detect a leak, and initiate a shutdown which then allows action to manage the static leak volume.

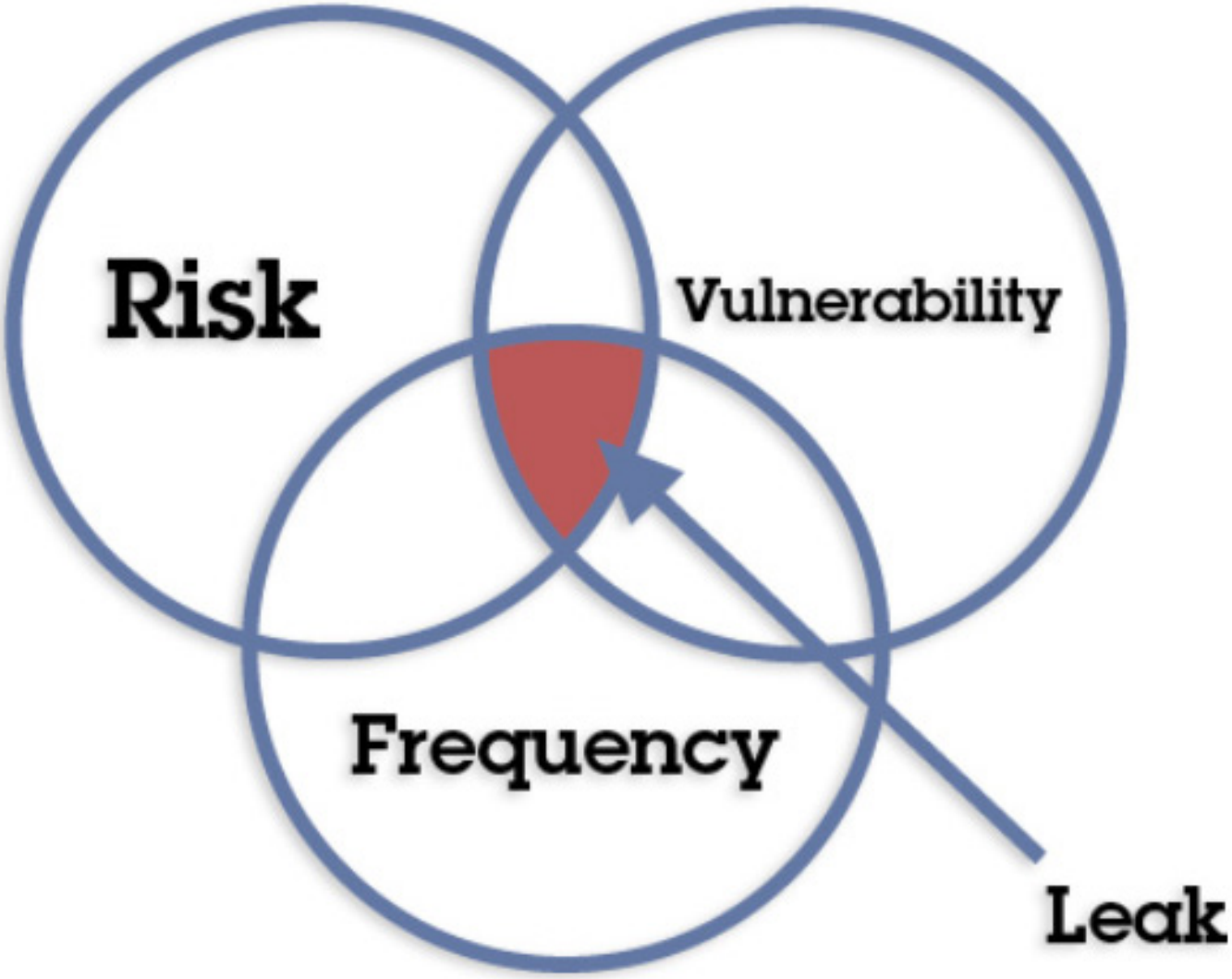


- Perform risk assessment with leak detection focus.
- Usually a leak detection focused IMP baseline assessment.
- Include regulatory requirements and best practices.
- Identify options for an integrated leak detection strategy.
- Consider primary, complimentary and alterative leak detection.
- Assess requirements of individual pipelines.
- Link to leak detection strategy performance targets.
- Evaluate best available technologies to meet leak detection strategy.
- Document each step of the selection process.

Evaluating Leak Detection Technology Options

Leak detection methodologies and technologies cover a wide range of different approaches and principles.
Methodologies can be classified into internally—based and externally-based detection principles. They can be continuous or non-continuous.
Leak detection options may depend on the complexity of the pipeline system and its operations.
Evaluate how the options meet your specific pipeline system design and its operations.
It is helpful to review LD selection options with other industry users, vendors, and consultants.

It may be necessary to periodically evaluate the selection of LDSs to ensure they are meeting the requirements of the leak strategy. Possible reasons for the review could be population or environmental changes that may have occurred around the pipeline. Or perform the periodic review on a timed cycle.



Risk Tolerance

Leak detection reduces the risk consequence portion of a loss of containment, but does not reduce the probability of a leak. However, an evaluation of leak event likelihood or probability, threats, vulnerabilities and frequency of leaks will drive the selection of LDSs and the design of the LDP.

The risk assessment should attempt to estimate the un-mitigated and mitigated consequence level of different leak rates at each location of the pipeline, and assess the likelihood of each leak rate occurring by evaluating the possibility of the occurrence of the various threats. Pipelines that have a high-risk score should have a leak detection strategy that goes above and beyond the Part 195 minimum regulatory requirements.

Performance Targets, Metrics, and KPIs

The terms metric and KPI are closely related in RP 1175. The metrics (e.g. reliability) are quantified by the KPIs (e.g. number of false alarms) of the metric. KPIs and their targets should be specific and measurable quantities, but their design and implementation should facilitate the attainment of desirable overarching goals (e.g. high reliability) of a pipeline operator's LDP.

API RP 1130 Annex C defines these metrics as: sensitivity, reliability, accuracy and robustness.

Establish performance targets, metrics, and KPIs for the Leak detection systems.

Define, then track to ensure goals are met.

Revise as part of a continual improvement process.

Performance targets are part of the operator's strategy and selection process.

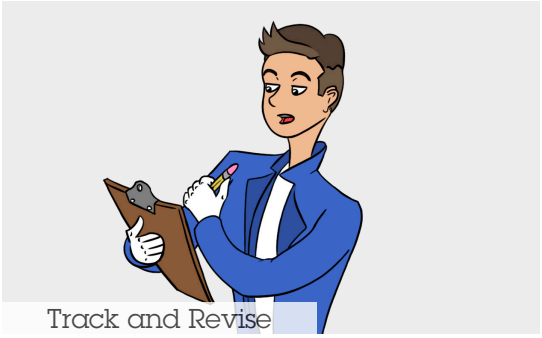
API RP 1130, Annex C defines these metrics as:

- Sensibility:, reliability, accuracy and robustness.

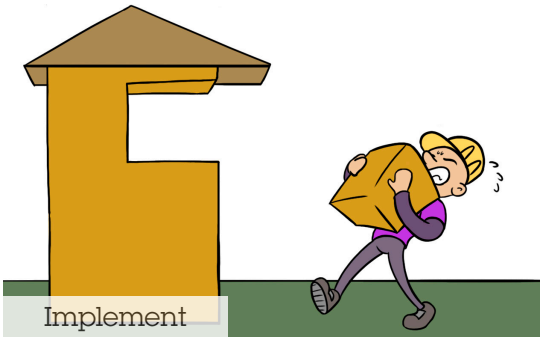
The metrics are suitable for any leak detection system

Establish Targets

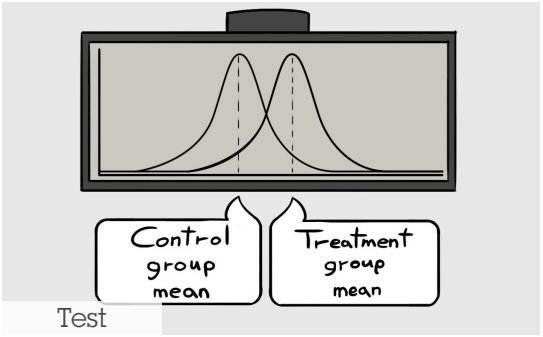
Define



Track and Revise



Implement



Test

Verify

Testing

Quantification of the performance of your leak detection systems is important in minimization the detected spill volume. Testing offers an opportunity to improve the culture, procedures, knowledge levels and performance.

Leak detection systems shall be tested when installed, after significant pipeline changes, and on a regular basis not to exceed 5 years.

Testing shall include the requirements of API RP 1130 tailored to the specific pipeline leak detection system installed.

Sound engineering judgment should be used to develop and execute a detailed and rigorous test plan.

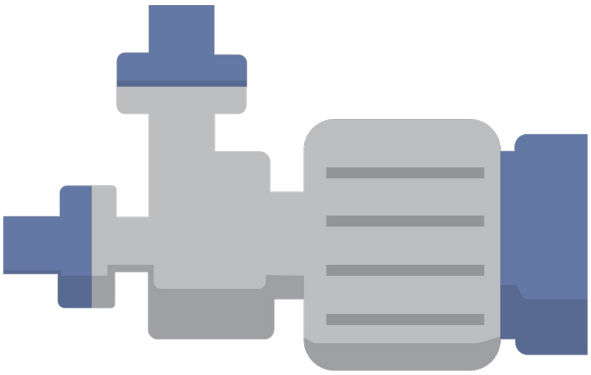
Some leak detection systems (such as external) may require system-specific testing methods or detailed checklist evaluations (see API RP 1162, Annex E). E.g., for LDSs such as third party reporting it may be necessary to use a detailed checklist.

The pipeline operator may also consider methods to test control-room staff and LD response procedures.

Control Center Procedures for Recognition and Response

Program should include documented leak response procedures that prompt appropriate action based on the process, tools, analysis, and understanding and;

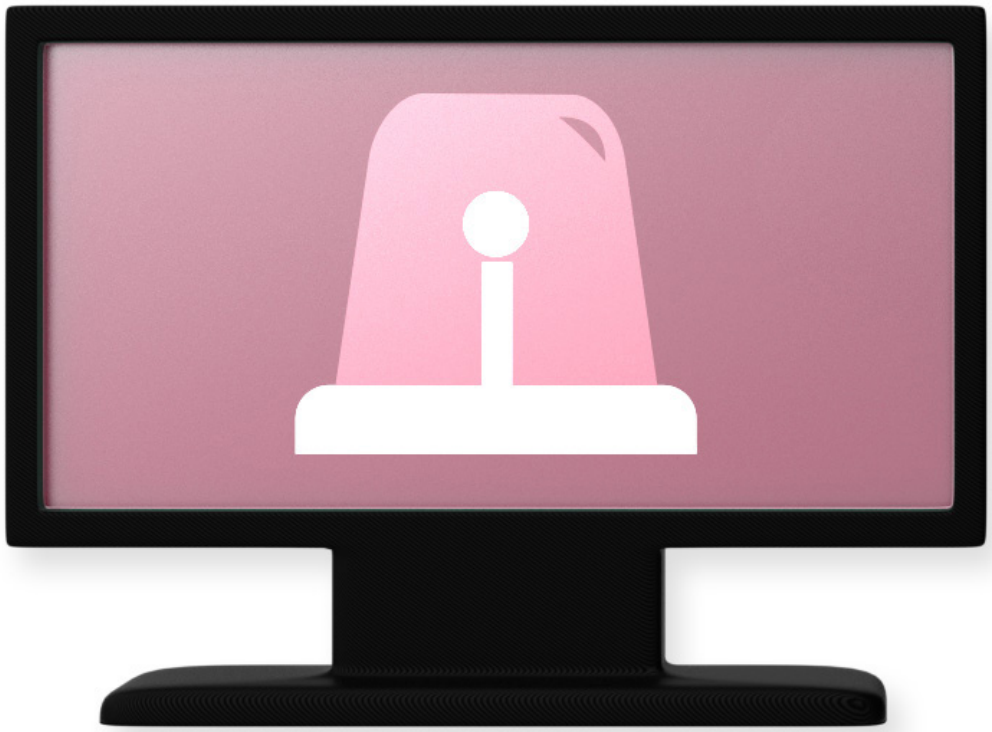
- Define the process, tools, and actions to be used by the pipeline controller to recognize and respond.



- Describe action protocol for leak indications or a combination of indications.
- Address reporting and documentation
- Ensure safe pipeline restart.

The Pipeline Controller is an important component in the response to the LDS alarms. 195.452 require pipeline operators to explicitly declare the level of individual authority of Pipeline Controllers, so they know their authority and responsibility.

Note: Industry experts are promoting the safer practice of first assuming the leak is real then working to prove it is not.



Alarm Management

Periodic Alarm Review:

The process of analyzing alarms with the goal of increasing confidence in the alarms.

Threshold Setting:

Considers if adjustments are necessary to maintain credibility.

Tuning:

Adjusting the leak detection (LD) system for more precise functioning or target performance

Use alarm data to improve credibility and ensure clarity.

Alarm review – evaluate the KPIs potential for further action or improvements.

CLARITY

Alarms identify what is wrong
Alarms show why it is wrong

CREDIBILITY

Alarms happen when they should
Alarms don't happen when they shouldn't

Roles and Responsibilities

Descriptions of the stakeholders' roles and responsibilities help the stakeholders to understand their areas of responsibility and expectation(s) for compliance.

STAKEHOLDERS

RESPONSIBILITIES

API RP-1175	Management	Control Center	Analyst	Engineering	IT Group	SCADA Support	Field Operations	Public / Land Owners
Aerial Surveillance	A							
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		
Recordkeeping & 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	

R: Responsible, A:Accountable, C:Consulted, I:Informed

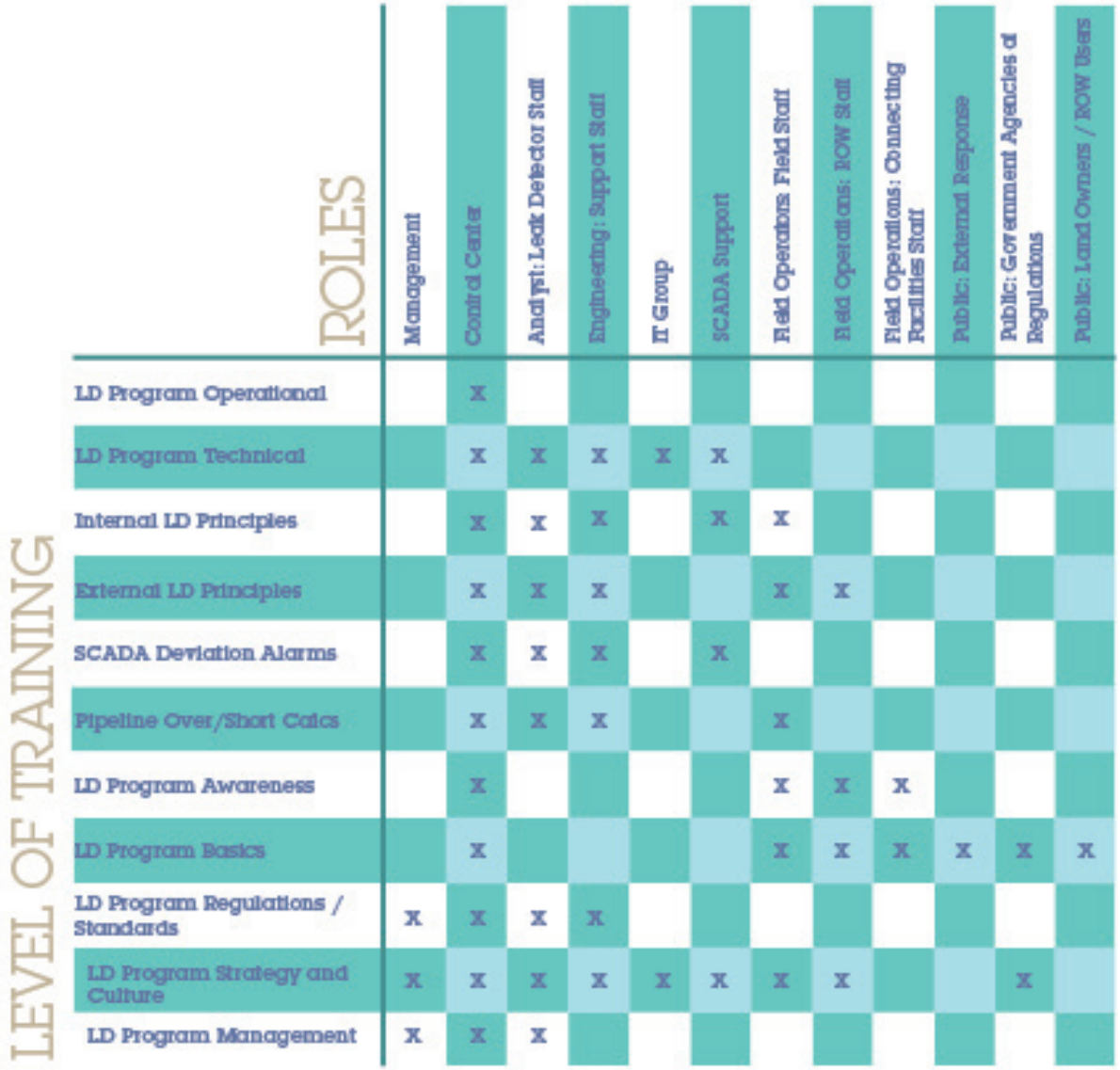
Training

Training modules may be focused on the roles of the individuals, and support the pipeline operator's culture and strategy.

Training metrics may include effectiveness measures.

Employees should be trained to work together effectively as a team.

Effective training has the potential to greatly reduce the consequence of a release.



Reliability Centered Maintenance

Reliability Centered Maintenance for Leak Detection Equipment

- Ensure that all components of the leak detection (LD) system and its supporting infrastructure are designed for reliability and maintained appropriately.
- Discuss the leak detection system and supporting components of the maintenance program with the users of the leak detection system and/or with vendors.
- Integrate the LD system components into the pipeline operator's maintenance management system.
- Develop processes for scheduled and unscheduled maintenance.
- Identify critical backup and redundancy components.
- Conduct reliability assessments; evaluate against metrics.
- Review failure mechanisms; understand probabilities of failure.
- Ensure people have tools, training/qualification, and time.
- Maintenance should include field instruments, communications, and software, etc.

Overall Performance Evaluation of the Leak Detection Program

Capture noteworthy results from operation of the leak detection program.
Compare company and industry performance.
Report the results to management annually on the overall performance monitoring.
Internally evaluate all performance aspects of API RP 1175.
Externally review leak detection industry information, including incident reports, databases, PHMSA guidance, activities in the pipeline industry and changes to regulations.

Management of Change

Implementing this program will require change. It's essential:

- To define scope of changes
- To review carefully and approve appropriately
- To include testing processes, procedures, and training
- To communicate to all affected stakeholders; controllers, management field operations, others
- To complete documentation

Pipeline operators shall apply their formal Management of Change (MOC) process as required in 49 CFR Part 195.446(f).

The MOC process should include the requirements of API 1167, Section 14 and API 1160, Section 13.

The Process Should Include:

- Scope of the change(s)
- Clearly defined roles and approval responsibilities — Include stakeholders in planning
- Requirements for evaluating changes (e.g. risk assessment)
- Testing and test methods (as needed)
- Documentation plan
- Notification requirements (Including controllers and shift workers)
- Training

Special Situations:

- Emergencies
- Short-term changes

Improvement Planning and Process

Identify and define opportunities to improve any part of the leak detection program on a regular basis!

Define the tasks needed to retain the freshness of the leak detection program.
The opportunities should be planned, budgeted, and scheduled.
Assign clear accountability for each opportunity and track to completion.
LD program strategy should be reviewed annually.

The Process Should:

- Be performed periodically to define, plan for, and track to completion improvements that are needed to meet existing or new LD program goals
- Report results of improvements undertaken and/or underway in an annual report or as part of a pipeline operator's integrity management plan annual report
- Identify and define opportunities to improve any part of the LD program
- The opportunities should be planned (resources budgeted and scheduled)
- Be tracked to completion
- Be updated and improved on a regular basis

Source: American Petroleum Institute. API Recommended Practice 1175. Pipeline Leak Detection Program Management. 2015.