

API RP 1175

PIPELINE LEAK DETECTION-PROGRAM MANAGEMENT

WEBINAR

NOVEMBER 15TH, 2017, 10 AM TO 11:30 AM CENTRAL TIME



TODAY'S AGENDA

- Learning share — Slack Lines
- Review API RP 1175 Purpose and Goals
- Strategy Document Template
- Performance Targets, Metrics, & KPIs
- Q & A
- Next Steps & Upcoming Events

Learning Share – Slack Lines

Jason Dalton – Marathon Pipe Line

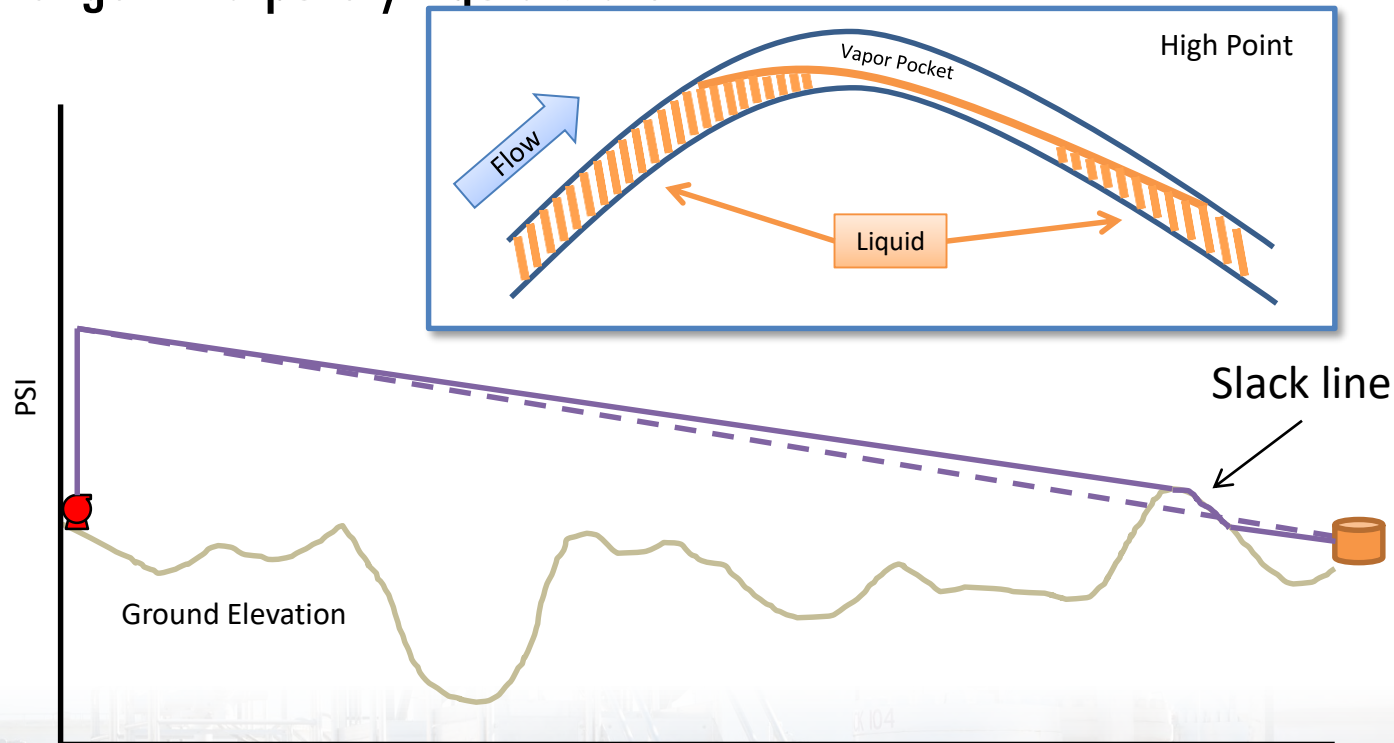


PURPOSE

- Understand the physics of a slack line
- Understand the risks of a slack line
- Lessons learned regarding slack lines

SLACK LINE PHYSICS

- A condition where the pressure in the pipeline (at one or more locations) is less than the fluid's vapor pressure, which creates areas where the fluid vaporizes and is no longer in a purely liquid state.

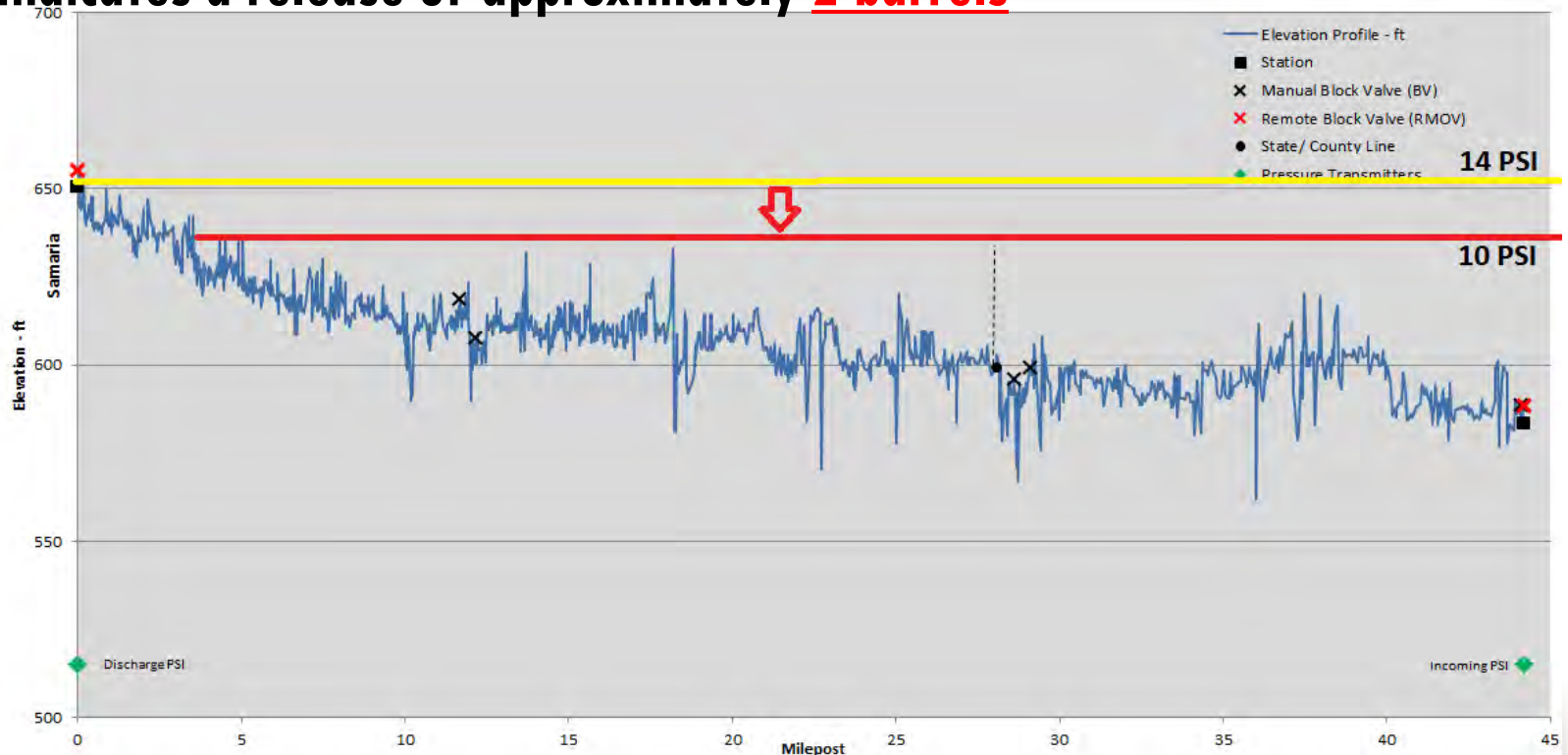


RISKS OF SLACK LINES

- ⚠ Slack line conditions can impede and potentially blind internal monitoring leak detection systems.
- ⚠ Slack line conditions can create abnormal conditions that could potentially result in system overpressure.

RISK OF SLACK LINES

Based on the elevation profile, a 4 psi loss of elevation pressure, when slack, could indicate a release of approximately 200 barrels. However, a 4psi when tight indicates a release of approximately 2 barrels



SLACK LINE-LEAK DETECTION RISKS

- **Blindness from potential leak**

- When a system is restarted in slack condition the vapor must be condensed back to liquid. During the time it takes for re-pressure the system is flowing at the receipt end but no product is being delivered at the terminating end. Is the line ruptured or just re-condensing?

- **Decreased leak detection performance**

- Presence of vapor pocket in the line interferes with the ability of leak detection systems to monitor the pipeline.



LESSONS LEARNED-LEAK DETECTION

- **Study the system**

- Analyze slack lines to ensure the line is behaving as expected.

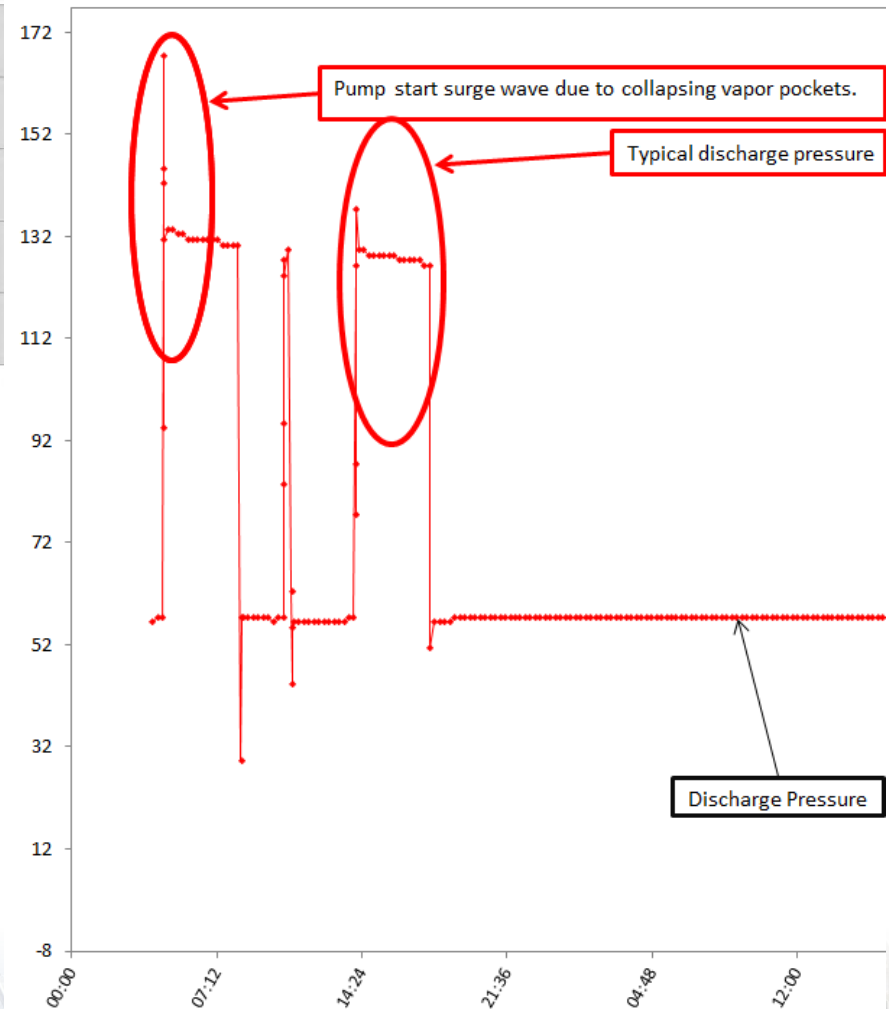
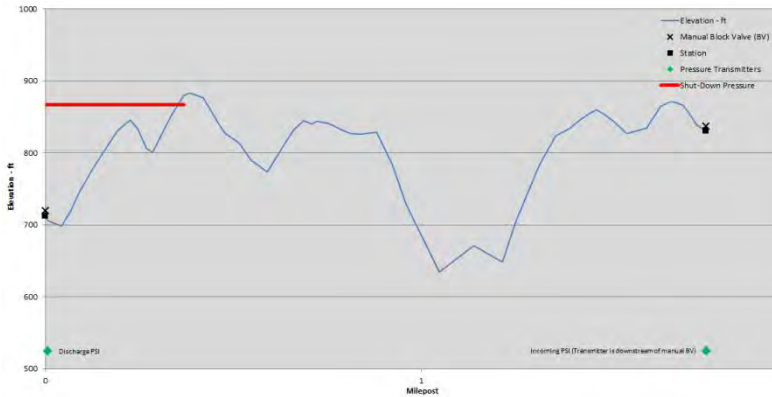
- **Know the system**

- Understand minimum pressures for all transmitters. If the pressures drop below normal minimums, this is an issue worthy of further investigation.

- **Reduce the exposure time**

- Re-pressure as quickly as possible following slack events to minimize the time in which leak detection systems are blinded or impeded.

SLACK LINE-PRESSURE CONTROL RISKS



- If a system is shut down and goes slack, a vapor pocket will be created that will allow abnormally high flow rates in a segment of the pipeline upon restart until the vapor is condensed.
- At the point of final condensation, when the line is again 100% liquid, the flow rate will instantaneously drop. The change in velocity will result in a pressure surge event.

LESSONS LEARNED-PRESSURE CONTROL

- Before starting a slack line that has never been slack before, a transient analysis should be considered prior to restart.
- Pressure controls need to adequately consider the role of transients even on short pipeline segments.

Review Purpose & Goals

Doug Sauer – Phillips66



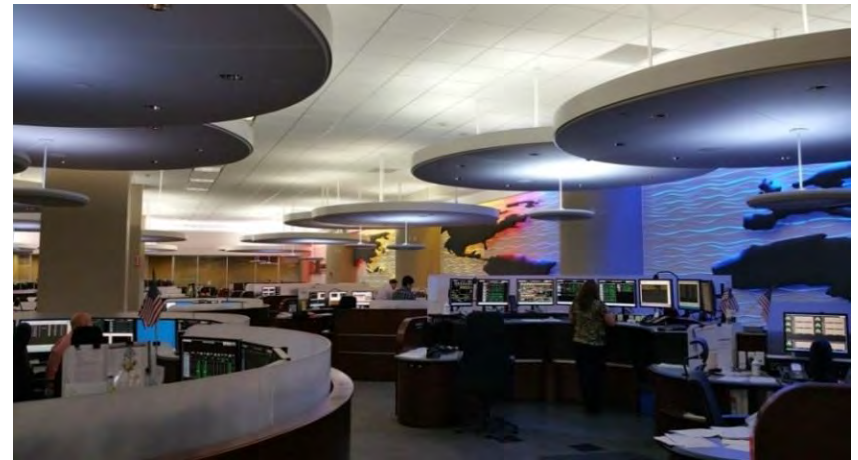
WHAT IS API RP 1175 LEAK DETECTION PROGRAM MANAGEMENT?

■ Purpose:

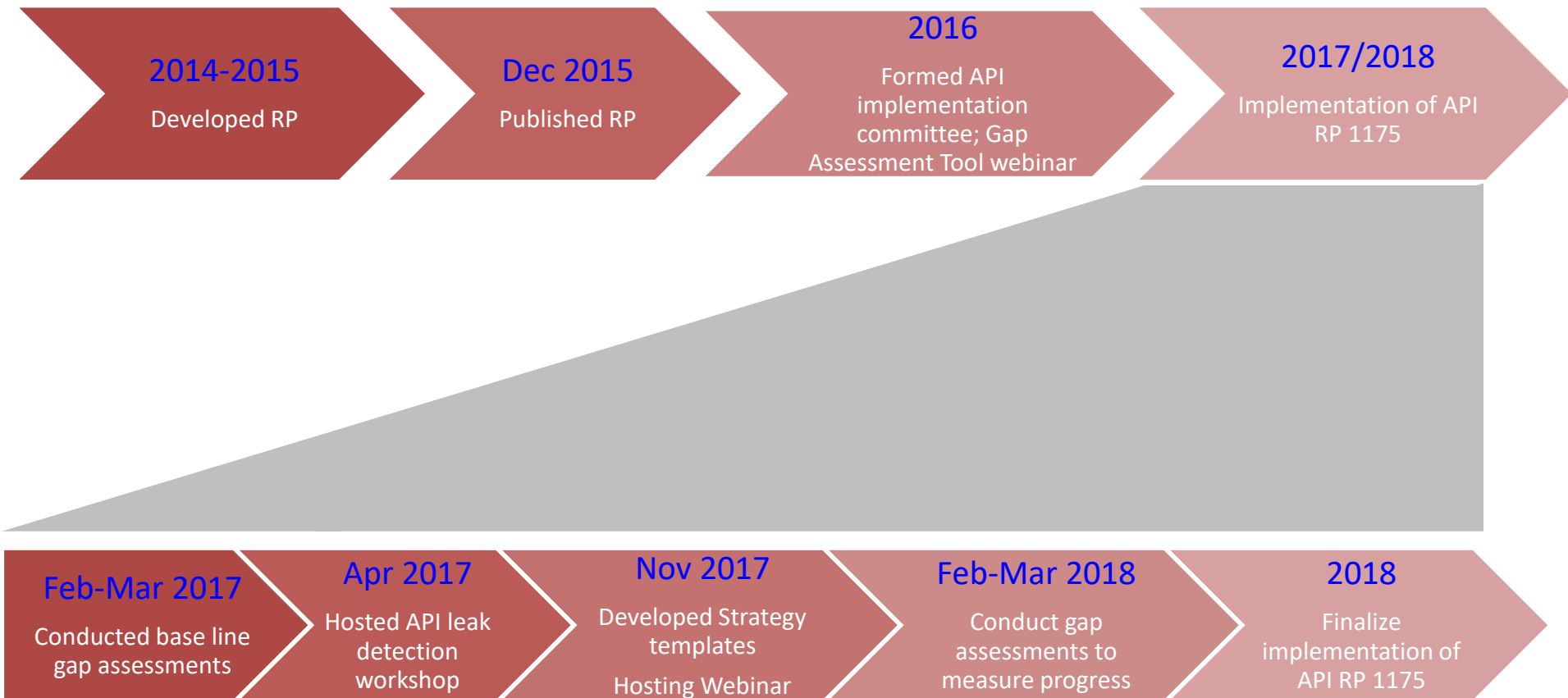
- Address PHMSA request to improve leak detection programs
- Provides non-technical recommendations for managing a holistic leak detection program

■ Elements:

- Leak detection culture and strategy
- Selection of leak detection methods
- Performance targets, metrics, and KPIs
- Testing
- Control Center procedures for recognition and response
- Alarm management
- Roles and responsibilities and training
- Reliability centered maintenance for leak detection equipment
- Overall performance evaluation of the LDP
- Management of change
- Improvement process(es)



Our Journey: Implementing API RP 1175 Leak Detection Program Management



MEASURING PROGRESS FROM LD PROGRAMS

Performance Metrics

1. Industry consolidated gap assessment scores and progress over time (2017 results to 2018 results for Gap Assessment Tool)
 - 37% of API & AOPL Members submitted Baseline Gap results, representing 95+% of Total Barrel Miles
2. Industry participation in API RP 1175 Implementation workshops/webinars
 - November 2016 Webinar had 106 registered
 - April 2017 Workshop had 170 registered
3. Average leak size (bbls released/event) trends for Crude, Refined Products, and HVLs
4. Industry leak detection performance using CPM systems



Our Team's Goal: Encourage and accelerate deployment of API RP 1175 to minimize consequences from spills (quicker detection, quicker shut down, smaller releases)

API RP 1175 IMPLEMENTATION TEAM



RP 1175 Implementation Team:

API -

Stuart Saulters

Buckeye Pipeline -

Rick Bishop

Chevron Pipe Line -

Robert Morgan

Enbridge -

Rick Barlow

LOOP -

Donny Chiasson

Marathon Pipe Line -

Jason Dalton

Phillips 66 Pipeline -

Doug Sauer

TransCanada -

Marieli Romero

Our View of Implementation Success:

Entire industry is developing excellent systems, processes, and people to detect and respond to releases promptly!



2017 GAP ASSESSMENT RESULTS

- Goal — accelerate deployment of API RP 1175 (RP was issued in 2015)
- Based on 2017 Results, shown to the right, largest gaps were:
 - LD Culture and Strategy
 - Performance Targets, Metrics, and KPIs
 - Overall Performance Evaluation
 - Improvement Process

Components		Median
Leak Detection Culture and Strategy		47
Selection of Leak Detection Methods		22
Performance Targets, Metrics and KPI		50
Testing		1
Control Center Procedures, Recognition and Response		6
Alarm Management		7
Roles, Responsibilities and Training		26
Reliability Centered Maintenance for LD Equipment		25
Overall Performance Evaluation of the LDP		50
Management of Change		1
Improvement Process		47
Total Gap Score		28

Strategy Document Template

Rick Bishop – Buckeye



STRATEGY DOCUMENT TEMPLATE

- Industry has expressed an interest in a “Strategy Document Template” to help jump-start development of Leak Detection Programs
- The API RP 1175 Implementation Team has developed this document and is presenting it for your consideration and use.
- The Strategy Document Template can be found online - [Here](#)

PipelineSMS.org > More Systems > Leak Detection > Leak Detection Relevant Documents

STRATEGY DOCUMENT TEMPLATE BASICS

- Organized largely along the lines of the RP, Section 5.2
- Written using “Microsoft Word” so it is individually and generally easy to modify and usable.
- Many reminders throughout the document for individual edits and modifications so companies will “write it for themselves.”
 - Suggest using hyperlinks or references to other company documents.
- Task tables provided to re-enforce responsibility and accountability to fit individual organizations.

STRATEGY DOCUMENT TEMPLATE STRUCTURE

- Major headings include:
 - Management Commitment
 - LD Strategy Goals and Requirements
 - Risk Management Approach to Leak Detection
 - Selected Leak Detection Methods
 - Regulatory Requirements and Industry Standards
 - Testing the LDS, LD KPI's and Evaluating the LDP
 - LDS Tuning and Support
 - Procedures and Training
 - Management of Change
 - Ongoing Improvement to the LDP
 - LDP Review and Approval
 - Appendices

APPEARANCE OF THE DOCUMENT

Generic Leak Detection Strategy

Instructions:

This document is intended to be a “Template” that Operators can use to speed implementation of RP-1175 at their companies. As such, Operators are encouraged to modify this document so that it describes **their** strategy. For example, many items are included; some of which may be deleted in any individual plan. Blanks are provided to be filled-in; bracketed items are provided such as [Company Name] so the document can be quickly and easily modified. It will be provided in Microsoft Word format so it can be easily used by others. It is not intended to be a complete and thorough handling of the topic nor will it meet any regulatory requirements. RP-1175 states that “the strategy document may be a single document or divided into multiple documents ...”. Users may want to identify and reference other internal documents within the Strategy Document.

Management Commitment

[Users: adjust to company general and specific LD goals]

[Company Name] is committed to maintaining and enhancing our leak detection capabilities. While we have already invested a great deal of time and effort toward improving pipeline integrity; thus minimizing some causes of releases, we are committed to the next line of defense which is a robust program of leak detection and timely response.

This Leak Detection Program Manual is an important component of the company’s Leak Detection Program (LDP). Details of the LDP elements are identified in API RP-1175 and include: Culture

TYPICAL RESPONSIBILITY TASK TABLE

LD Strategy Goals and Requirements

[Users: adjust to company general and specific LD goals]

The general company and industry goal will be to reduce the number, frequency and volume of releases and improve the timeliness of leak recognition and response. Five-year graphical trends should show ongoing improvement in all categories.

Specific company leak detection goals include the following:

[Users: adjust Responsibility Table for specific company requirements]

Responsible	Task	Due Date
Control Center	Continuous rupture monitoring	Ongoing
Control Center	Leak monitoring using continuous computational methods	Ongoing
Control Center Manager	Scheduled surveillance and observational reporting for low leak rate incidents like small or weeper leaks	Annual
LDP Manager	Complementary and supplemental methods for specific pipeline requirements	As Required
LDP Manager	Alternative, redundant or backup methods when the primary method is not functional	As Required

[Users: adjust to company general and specific LD goals]

The Leak Detection Program will include assessment of various methods of leak detection including Computational Pipeline Monitoring (CPM), inventory management, aerial patrols, Public

ROLES AND TRAINING

Procedures and Training

[Users: specific procedure and training documents should be identified in this section]

Procedures for Control Center response to LDS alarms are implemented and are reviewed on a regular basis. All LDS alarms are initially considered valid and are then assessed using a root cause analysis procedure. LDS alarm management procedures comply with regulatory requirements.

Procedures for implementation, use and maintenance of the Leak Detection Systems will be maintained according to the Company program of annual review by Subject Matter Experts (SMEs); according to our usual requirements. New procedures for new systems or to meet new requirements will be developed ahead of first-use, in-time to develop training programs and have the necessary individuals and Stakeholders trained and/or qualified.

Training will be provided at various levels to meet the needs of various parties including:

Role and Content of Training

Role	General Training Content
Management	Culture, Management, Reporting, Broad Operational and Broad Technical
Control Center	Culture, Management, Reporting, Detailed Operational and Broad Technical
Analyst: Leak Detection Staff	Culture, Management, Broad Operational and Detailed Technical
Engineering: Support Staff	Culture and Detailed Technical

Performance Targets, Metrics, and KPIs

Donny Chiasson – LOOP LLC



PERFORMANCE TARGETS, METRICS, AND KPIs

- Relationship of the terms

- Metrics - defines the overarching qualities desired from the leak detection system (LDS)

- KPIs - specific measure(s) of the metric

- Performance Targets - Values used to measure KPIs that determine if the metric goals are being achieved

- Example (*tying it together*)

Metric	KPI	Performance Target
Accuracy	Leak Location	+/- 5 miles

PERFORMANCE TARGETS, METRICS, AND KPIs

- Metrics referenced in API RP 1175* that can be used for a LDS:
 - Accuracy — How good are the size/location estimates?
 - Reliability — Can you depend on the leak detection system and alarms?
 - Robustness — Will it work in a less than perfect environment?
 - Sensitivity — How small a leak can you detect?
- Metrics should be included with each leak detection system (LDS) being utilized

(CPM as well as non-CPM LDSs; please refer to Section 6.5 -Table 2 for a wide range of leak detection techniques)

* Further details on metrics available in API RP 1130. Be aware that this document is specific to CPM, but the same metrics can be applied to non-CPM leak detection systems)

PERFORMANCE TARGETS, METRICS, AND KPIS

- Metric-KPI-Performance Target Examples

Metric	KPI	Performance Target
Accuracy	Leak Flow Rate	+/- xx bbl/hr
Reliability	False Alarms	(count)/month
Robustness	Amount of time critical pipeline instrumentation is unavailable	hh:mm/month
Sensitivity	Smallest detectable leak rate	xx bbl/hr

PERFORMANCE TARGETS, METRICS, AND KPIS

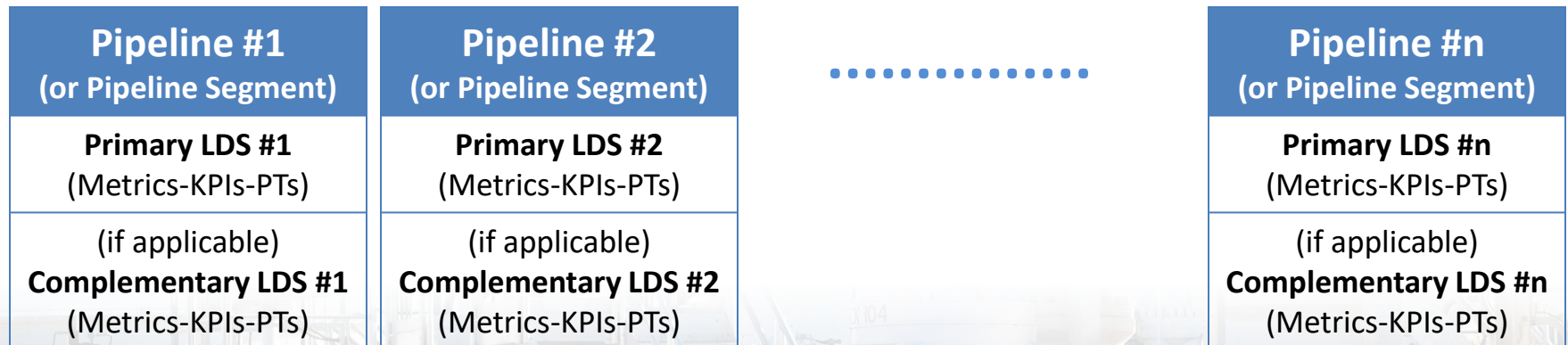
- LDS-Metric-KPI-Performance Target Examples

LDS	Metric	KPI	Performance Target
Real-Time Line Balance	Reliability	False alarms	(count)/month

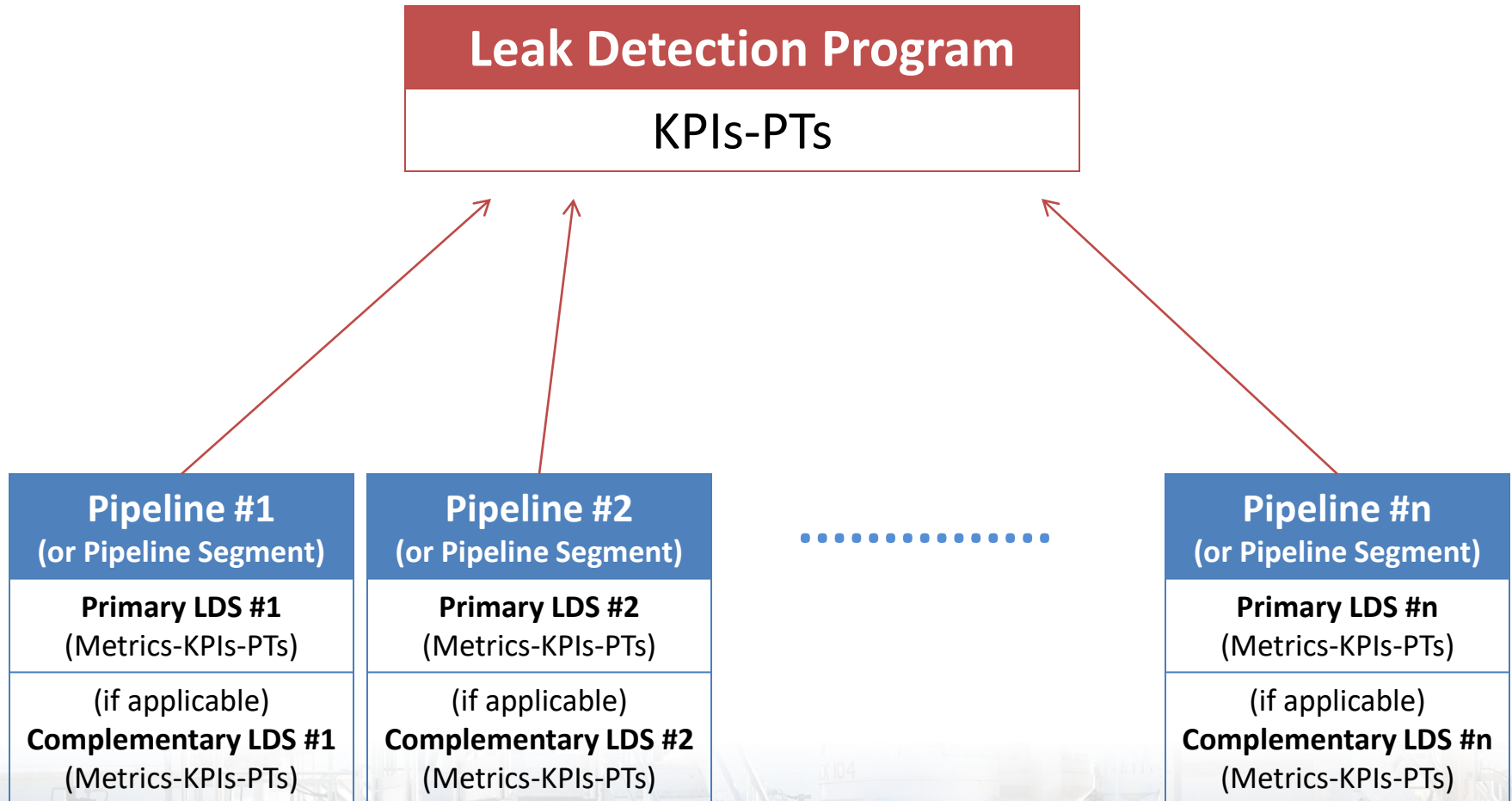
LDS	Metric	KPI	Performance Target
Acoustic Pigs	Accuracy	Leak Location	+/- xx feet



PERFORMANCE TARGETS, METRICS, AND KPIS



PERFORMANCE TARGETS, METRICS, AND KPIS



PERFORMANCE TARGETS, METRICS, AND KPIS

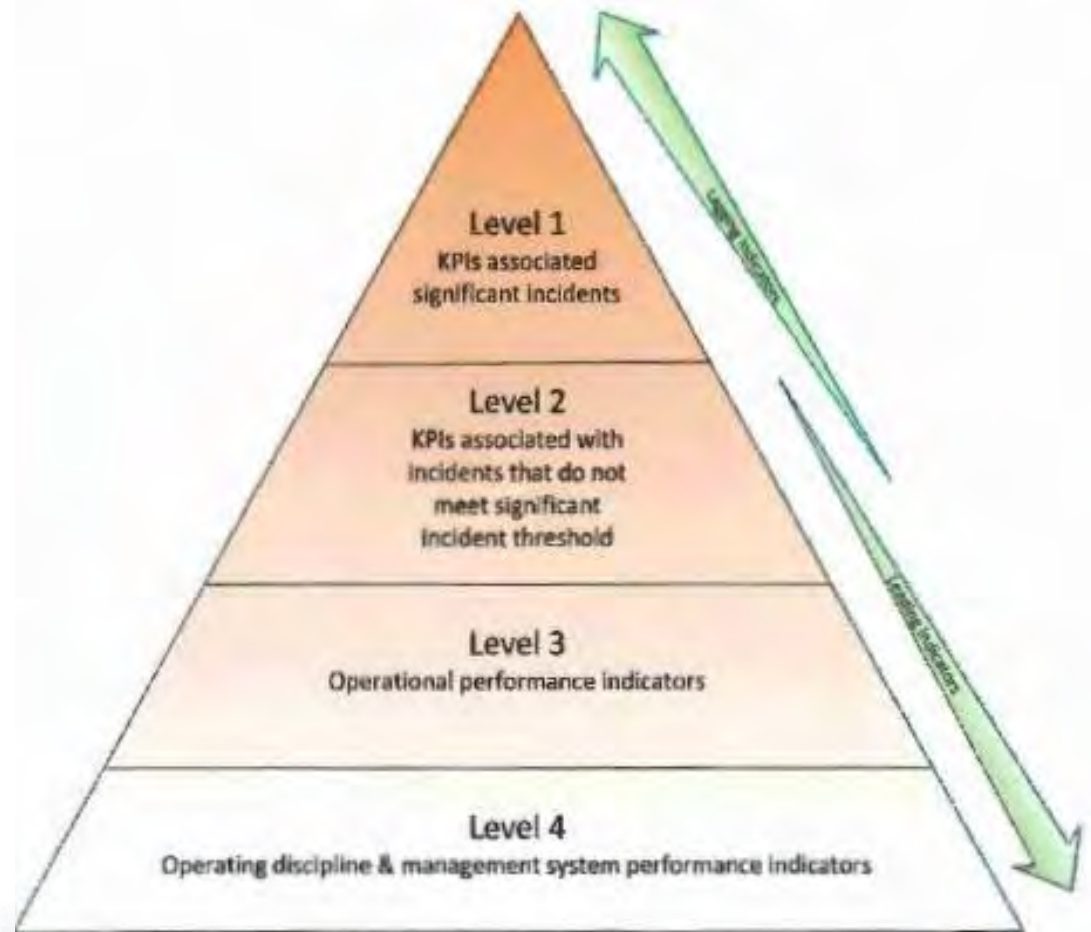
Leak Detection Program

KPIs-PTs

- KPIs should measure the LDP effectiveness
 - How well the people, processes, and LDSs are functioning holistically to achieve the overall objectives that were approved in the leak detection strategy
 - Not the same KPIs being used for individual LDSs
- A LDP performance report should be delivered to management on an annual basis

PERFORMANCE TARGETS, METRICS, AND KPIS

Leak Detection
Program KPI Levels
(Section 13.6 – Figure 3)



Q&A

Rick Barlow – Enbridge

USE *1 ON YOUR PHONE TO ASK A QUESTION



Next Steps

Robert Morgan – Chevron Pipe Line



UPDATE GAP ASSESSMENT TOOL (GAT)

- Asking that each Operator complete a gap assessment and share their GAP results with API by Mar1, 2018
 - Anonymous, give them to API (PipelineLDP@api.org)
 - Only want to see results for each section
 - API will compile results to see progress over last year AND which sections have the largest gaps

Components	Median
Leak Detection Culture and Strategy	
Selection of Leak Detection Methods	
Performance Targets, Metrics and KPI	
Testing	
Control Center Procedures, Recognition and Response	
Alarm Management	
Roles, Responsibilities and Training	
Reliability Centered Maintenance for LD Equipment	
Overall Performance Evaluation of the LDP	
Management of Change	
Improvement Process	
Total Gap Score	

PIPELINE PERFORMANCE TRACKING SYSTEM (PPTS)

- Data Mining Team (DMT) noticed a few challenges getting meaningful information out of PPTS reporting.
- API RP 1175 Implementation Team worked with DMT to reword LD section of the report in order to align the details of a release with API RP 1175.
 - Details on timing
 - What type(s) of LD is on pipeline system
 - Who/what detected leak
- Changes were approved by Cybernetics Team in October, then sent to DMT for adoption.
- Revised PPTS reporting will be effective on Jan1, 2018.



2018 API PIPELINE CONFERENCE & CYBERNETICS SYMPOSIUM

- When - April 24-26
- Where - St. Louis Union Station Hotel in St. Louis, Missouri.
- API 1175 Implementation Team will have a session at the Cybernetics Symposium
 - 3-20min presentations
 - To Be Determined



API 1175 RESOURCES

- API Website - [Here](#)

PipelineSMS.org > More Systems > Leak Detection

- Consider looking at the following - [Here](#)

PipelineSMS.org > More Systems > Leak Detection > Leak Detection Relevant Documents

- Gap Assessment Tool (GAT)

» Nov 2016 Webinar gives hints on using GAT

- Summary of several API RP 1175 sections

- Strategy Document Template



Close

Stuart Saulters – API

