



# API RP 1175 Pipeline Leak Detection

## Selection of Leak Detection

# Intent of this Section

- Help Operators select which leak detection principles, methods, and techniques to include in their leak detection program
- Can be used for the selection of new applications, additional applications, or re-examine existing applications
- Is a multi-step, multi-faceted, iterative process
- Should document each facet or step of the selection process

# The Process of Selection

- The Process should:
  - Align with the Company Culture and Strategy
  - Link Performance Targets, Metrics, and Key Performance Indicators (KPI's)
  - 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)

# Required Evaluation

- As outlined in 49 CFR 195.452 (i)(3):
  - ***A pipeline operator must have a means to detect leaks on its pipeline systems.***
  - ***A pipeline operator must evaluate the capability of its leak detection means and modify, as necessary, to protect the high consequence area.***
  - ***An Operator's evaluation must, at least, consider the following factors:***
    - *Length and size of the pipeline,*
    - *Type of product carried,*
    - *Pipeline's proximity to the high consequence area (**Assess layers of protection and verification of the intended functionality**),*
    - *Swiftness of leak detection (**Leak Detection Capability**),*
    - *Location of nearest response personnel (**Isolation Capability / Emergency Response Capability**),*
    - *Leak history (**Estimate probability of each leak scenario**), and*
    - *Risk assessment (**Overall Risk Analysis of the pipeline system**) results.*

# The Risk Assessment – A Risk-Based Approach

- Overall risk analysis of the pipeline
  - Utilizes Integrity Management Program (IMP) risk assessment but refocus with selection of leak detection in mind
  - Likelihood vs Consequence,
  - Verify appropriate weighting is applied on relevant factors that are important to the selection process
- Leak Detection capability of the existing LDSs
  - Primary, complementary, alternative LDSs in place and their coverage
  - Performance targets, metrics, and KPIs: reliability, sensitivity, robustness and accuracy
  - Strong emphasis on consequence, estimate un-mitigated / mitigated consequence levels
  - Evaluate the likelihood of the occurrence of the various threats
- Leak Detection capability of the existing Leak Detection Program (LDP)
  - Strength of the leak detection culture
  - Strength and completeness of the strategy
- Annex A considerations of cause and threats
  - Worst case leak may not be biggest
  - Consider all possible leaks, meaning a representative sample of leak sizes in relation to probabilities
- Leak size reduction initiatives and any IMP risk reduction initiatives
- Compare against the pipeline operator's risk tolerance

# Understanding Regulatory Requirements, Industry Publications & Recommended Practices

- Regulatory requirements for liquids pipelines are outlined in 49 CFR 195:
  - Section 195.134 – Comply API RP 1130 section 4.2
  - Section 195.402 - Procedural manual for O&M, and Emergencies
  - Section 195.412 – Right of Way (ROW) Inspections
  - Section 195.444 - Comply API RP 1130 section 6.0
  - Section 195.446 – Control Room Management (CRM)
  - Section 195.452 - IMP
- Requirement for Computational Pipeline Monitoring (CPM) in HCA's or as a condition of approval
- PHMSA Website FAQ 9.4 for should consider items
- There may be special conditions, state requirements or recommendations that must be considered as well.
- Other RPs and industry publications are noted in section 2.

# Understanding the Requirements Imposed by the Leak Detection Strategy

- The approved leak detection strategy may set a number of goals and targets that must be understood and accommodated during the selection process.
- For example:
  - A LDP that exceeds the minimum regulatory requirements
  - Aligns with the Company's leak detection performance targets, metrics, and KPIs
  - A goal of having both primary, independent and complementary methods and even particular techniques (for example, CPM)
  - Focus upon continuous methods of leak detection
  - Provide resources require to positively identify a LOC
  - An alternative LDS can be used if the primary LDS is out-of-service
  - Designated redundancy within a LDS



# Aligning the Selection with the Leak Detection Strategy and Regulatory Requirements

- This step is a quick check to ensure the techniques will comply with all requirements of regulatory and Company culture and strategy.
- This step may include undertaking a team review with Control Center and Field Operations and other directly involved stakeholders, then a presentation to senior management to obtain approval.
- An Operator should ask themselves:
  - Does the LDP have the capability of finding small leaks in a timely manner?
  - Does the LDP have the capability of finding big leaks, like ruptures, in a timely manner?
  - Does the LDP have the capability of finding seep leaks in a timely manner?



# Evaluating the Best Available Technology for Leak Detection – List and Classification of LDSs

- The methodologies used to detect leaks cover a wide spectrum of technologies and are based on a number of different detection principles.
- These methodologies can be classified into internally-based and externally-based detection principles.
- Methodologies can be continuous or periodic (non-continuous).
- Each method has its strengths and weaknesses of leaks on liquid hydrocarbon pipelines or loss of containment.
- Dependent on the application and the complexity of the pipeline system to which the leak detection method is applied.
- Not all techniques are proven or appropriate for every pipeline system!
- It may be helpful to discuss application with other users or vendors (bring own grain of salt).

# Selection Criteria Considerations

- Key areas of consideration in the criteria:
  - What features are needed?
  - What performance is needed?
  - What is the process of the selection criteria to vet the LDS?
- Annex B and API RP 1130 4.2 outline a list of selection considerations
  - List applies to CPM LDSs, but can be applicable to other non-CPM techniques
- Should consider regulatory, special permits, corrective action orders or safety orders within the criteria
- Should consider the physical environment, both capital and operational expenditures, and benefits of the LDS
- Maintain an overall system view and each component works with the others to provide the desired performance

# Modifying the Selection to Cover Particular Requirements of Individual Pipelines

- Leak Detection Systems are engineered systems, meaning that the same technology applied to multiple pipelines can have different results.
- It is necessary to ensure that the particular operational conditions of a pipeline or its design can be accommodated by the same system used on other lines.
  - An additional technique or modification to the technique is necessary to accommodate system on other lines.
- Improvements or other changes occur from time to time as well.
- For example:
  - Availability of new leak detection technology, or extensions, to be evaluated by selection criteria

# Periodic Review of Selection

- The purpose is to keep the leak detection program current
- It will be necessary to periodically evaluate the selection of leak detection systems to ensure they are meeting the requirements of the Company's leak strategy.
- Possible reasons for a review
  - New LDSs
  - Change of Service
  - New Connection
  - Application Update
  - Regulatory Change
  - Experience
  - Population / Environmental Change
  - Time Cycle
    - One approach to a timed cycle is to review the leak detection requirements based upon a five year cycle with 1/5 of pipeline being reviewed in one year, very much like through a baseline IMP.
  - The team may look at SA's, non-SA's that are pristine areas, leak detection alarms and any other performance related information.