

Pipeline Research Council International

PRCI Strategic Research Priority (SRP)

Leak Detection SRP Breakout Sessions



LEADING PIPELINE RESEARCH

Nikolaos (Nikos) Salmatanis
Leak Detection Engineer/Loss of Containment SME, Chevron
• Fall TC Meeting
October 2024

Pipeline Research Council International

LD-1-01

Leak Detection Feasibility Assessment

Project Status Update

Nikolaos (Nikos) Salmatanis

Leak Detection Engineer/Loss of Containment SME, Chevron

Dallas, TX

October 15th, 2024



LEADING PIPELINE RESEARCH

LD-1-01 - Scope

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- **LD-1-01: SRP LD: Internal and External Leak Detection Technology Test Facility Feasibility Assessment**
- A feasibility study to develop a high-level estimate to build and maintain a facility for testing CPM and ILI (type) applications as well as external leak detection systems, that includes hardware, equipment, back-end software, identifying current capabilities, technology testing gaps, and practical options for a dedicated pipeline Leak Detection Test Site (TS) for real-world hydrocarbon leak simulations/testing.

LD – 01 Leak Detection Feasibility Assessment

Overview

Activities Underway/Completed (since last report) - The draft report is nearing completion and is under review at Baker Risk - The interviews have all been completed and have contributed to the draft report - Cost estimates have been posted in the project folder, updates and tighter numbers would require more detailed design specs	Overall Project Status/Significant Findings 85% completion - Need Team review of draft report and cost analysis
Planned Activities (next period) Send out the draft Final Report for comment and review to the project team	Current Issues, Risks and Decisions Needed End of the year crunch

Rationale/Explanation of Deviations between Plan and Forecast

Status

Overall Schedule	The overall project is on schedule	No issues anticipated at this time
Active Task(s)	Finishing up the drafted Final Report	Need help from PRCI Project Team on aligning the cost data
Cost to Date	No costs have been incurred for PRCI to date and significant progress has been made	No issues anticipated at this time
Threats/Scope Changes or Additions	A lot of times outside of Baker Risk’s control	

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LD-1-02

Liquid Pipeline Leak Event Primary Data Repository

Project Status Update



LEADING PIPELINE RESEARCH

Nikolaos (Nikos) Salmatanis
Leak Detection Engineer/Loss of Containment SME, Chevron

Dallas, TX
October 15th, 2024

LD-1-02 Scope

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- [LD-1-02: SRP LD New Multi-Year Project: Liquid Pipeline Leak Event Primary Data Repository](#)
- Phase 1: Identify the general requirements for a permanent repository for industry-supplied pipeline leak event data. The requirements would include defining the type of data to be included in the database, the frequency of updating the database with new data, how the data would be accessed (e.g. Admin/Operator/Supplier Views and Reports), and how long the data will be kept.

Overview

Activities Underway/Completed (since last report) - Choose a Researcher - Contract Executed via PRCI	Overall Project Status/Significant Findings 0% completion per Project Kick-Off
Planned Activities (next period) - See below (start the project) - Validate PRCI Project Team	Current Issues, Risks and Decisions Needed None at this time

Rationale/Explanation of Deviations between Plan and Forecast

Status

Overall Schedule 	The overall project is on schedule, but started late	Contract Kick-off on the 21st of October with UTSI
Active Task(s) 	- Contracting Kick-Off Meeting on the 21st - Review of initial PRCI Project Documentation for team submittal	N/A
Cost to Date 	No costs have been incurred for PRCI to-date	N/A
Threats/Scope Changes or Additions 	None at this time	

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LD-1-03

SRP LD: Technical Best Practice for Computational Pipeline Monitoring on Liquid Pipelines

Project Status Update



LEADING PIPELINE RESEARCH

Daniel W. Nagala
Principal Investigator, UTSI International

TC 2024 Fall Meeting
15 October 2024

LD-1-03 Technical Best Practice for Computational Pipeline Monitoring on Liquid Pipelines

Overview

Activities Underway/Completed (since last report) - We continue to wait for results from operator surveys issued by API. We expect these within the next 30 days, based on current information. - We now have responses from most of the major CPM vendors servicing the industry, and once we can correlate these responses with those of operators we will initiate further contact as necessary with participating vendors. - We completed and uploaded a brief summary of API 1130 and 1175 requirements as part of the project's Milestone 1 tasks. This was inadvertently overlooked earlier during the Phase 1 work.	Overall Project Status/Significant Findings We continue to be behind our intended schedule due to delays related to obtaining operator survey responses. The estimated schedule impact is now approximately 5 months.
Planned Activities (next period) - Review operator survey responses and correlate them with the information provided by vendors. - Begin, and hopefully complete interviews with a subset of operators (TBD), as well as follow up with vendors as needed. - Issue intermediate project report on survey findings related to the information obtained.	Current Issues, Risks and Decisions Needed - We continue to be impacted by the absence of operator survey responses. - We have agreed on a revised approach to accelerate the remaining work in the project (Phases 3, 4 and 5), which will reduce the calendar time to complete by approximately 6 months, allowing for completion in December 2025, assuming survey responses are obtained in the coming weeks.

Rationale/Explanation of Deviations between Plan and Forecast

Status

Overall Schedule	We have agreed on a revised execution plan for the remaining project phases to allow completion by the end of 2025, but this is highly depending on receipt of operator survey results ASAP.	With the revised execution plan we have reduced the calendar time by 6 months, allowing completion by the end of 2025.
Active Task(s)	- Vendor survey responses have been received, except for two we are following up on. - Operator surveys were published by API, and responses are expected in the next few weeks.	Hope to schedule operator and vendor interview session for the November/early December time frame.
Cost to Date	On target	No issues anticipated at this time
Threats/Scope Changes or Additions	We do not expect any scope changes at this stage.	

Technical Best Practice for Computational Pipeline Monitoring on Liquid Pipelines - Overview

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- **Principal investigator:** UTSI International Corporation
- **PRCI Project Team Leader:** Ben Laurie
- **Total costs:** \$283,200
- **Background:** The project will provide all operators with the technical guidance to confidently implement CPM on the significant number of pipelines without a continuous leak monitoring capability. This will increase industry-wide adaptation of CPM, improve the rapid detection of leaks, and reduce PHMSA-tracked industry leak consequences.
- **Research Objectives/Project Deliverables:** The proposed research will provide an operator with the necessary technical understanding to implement appropriate CPM leak detection technology to meet regulatory API-1130 requirements.

Latest Project Status Summary

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Milestone	Task	MS_Task	Task Name	Task Deliverable	
1	1	1_1	Project kickoff and Literature Review	Kickoff meeting and Literature review bibliography	Complete
2	1	2_1	Supplier and Operator Surveys	Questionnaires and summary of information obtained	Underway
3	1	3_1	Best practice for the design, operational integration, maintenance, testing, and training	Summary Document	Not Started
3	2	3_2	Best practice for the design, operational integration, maintenance of instrumentation and measurement	Summary Document	Not Started
3	3	3_3	Approaches to determine the level of accuracy and repeatability for CPM inputs	Summary Document	Underway (Low Level)
3	4	3_4	Best practices for the design, operational integration and maintenance of telecom networks	Summary Document	Underway (Low Level)
3	5	3_5	Range of performance expectations, operational capabilities, validation methods, and limitations	Summary Document	Not Started
4	1	4_1	Final Report	Final Report following draft reviews and updates	Not Started
5	1	5_1	Final Presentation	Final presentation to PRCI Members (approx 10% of total)	Not Started

Value to Members/Knowledge Transfer

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- **Target audience:** Pipeline Operators, Leak Detection Program Managers, CPM Service Providers
- **Value:** The proposed research will provide an operator with the necessary technical understanding to implement appropriate CPM leak detection technology to meet regulatory API-1130 requirements.
- **Knowledge transfer recommendations:** A final report will be prepared that combines and formalizes the information and supporting documentation into an actionable handbook for selecting and implementing CPM systems.
- **Questions/comments?**

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LD-1-04

Technical Understanding of Gas Leak Events and Placement of Leak Detection Sensors

Project Status Update



LEADING PIPELINE RESEARCH

Zach Locks
Project Lead

Dallas, TX
October 2024

Overview

Activities Underway/Completed (since last report) - RFP submitted - Received 2 proposals from contractors - Reviewing proposals with project team	Overall Project Status/Significant Findings
Planned Activities (next period) - Award the work - Increase allocated funds due to proposals being higher than expected	Current Issues, Risks and Decisions Needed Vote on contractor award

Rationale/Explanation of Deviations between Plan and Forecast

Status

Overall Schedule	Delayed due to team resourcing and change in scope	
Active Task(s)	Reviewing proposals with project team	
Cost to Date	Insufficient funds budgeted to pay for either proposal	
Threats/Scope Changes or Additions	Change in Project Lead to Zach Locks	

Technical Understanding of Gas Leak Events and Placement of Leak Detection Sensors- Overview

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- **Principal investigator:** TBD
- **PRCI Project Team Leader:** Zach Locks
- **Total costs:** \$88,500 (Approved). Likely need more based on proposals received
- **Background:** Part of Leak Detection SRP
- **Research Objectives/Project Deliverables:** Provide operators a methodology to understand gas leaks on pipelines by locating, detecting, and quantifying high probable leak areas based on historical data. The objective is to enable operators to prioritize sensor deployment, fixed and/or remote, strategically across assets.

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LD-1-05

Assessment of Optical Technologies to Detect, Locate, and Quantify Methane Emissions

Project Status Update



LEADING PIPELINE RESEARCH

LD-1-05 Scope

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- [SRP LD: Assessment of Optical Technologies to Detect, Locate, and Quantify Methane Emission | PRCI](#)
- The CPS has utilized optical technologies for methane emission detection for many years. This idea needs to be socialized/refined with CPS. I would suggest that this idea could be executed under CPS with more bandwidth than available under SOM (but not stuck on that as a requirement). There are other ideas proposed under CPS/GHG SRP that potentially overlap this idea. If a subgroup of the two TCs refine the objectives/scope/execution plan and still support this as a priority by 9/5/23, I would support proposing this to the RSC/EA for 2024 funding.

LD-1-05 Status Update

Overview

Activities Underway/Completed (since last report) - Contract with SwRI has been approved by team members - Contract with SwRI has been signed and contract has been returned	Overall Project Status/Significant Findings N/A
Planned Activities (next period) Schedule kickoff meeting with SwRI to proceed with project	Current Issues, Risks and Decisions Needed Project timing is moving slower than anticipated due to communication to vendor and team

Rationale/Explanation of Deviations between Plan and Forecast

Status

Overall Schedule	It has taken additional time to get contract with research institute signed and approved to begin the project	Scheduling of kickoff meeting will assist with getting project back on schedule
Active Task(s)	Schedule kickoff meeting	No issues anticipated at this time
Cost to Date	- No costs to date - Budget has been reviewed within context of 2024 and 2025 spending plans	No issues anticipated at this time
Threats/Scope Changes or Additions	No issues anticipated at this time	

Pipeline Research Council International

LD-1-06

SRP LD: Industry Technical Best Practice Using Inventory and CPM for Natural Gas Pipeline Leak Detection

Project Status Update



LEADING PIPELINE RESEARCH

Kaitlin McCauley

Leak Detection Engineer, Williams

Hyatt Regency, Dallas, TX

10/15/2024

LD-1-06 Scope

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- **SRP LD: Industry Technical Best Practice Using Inventory and CPM for Natural Gas Pipeline Leak Detection | PRCI**
- The project will provide gas pipeline operators with quality technical guidance on the best technology practices for gas pipeline leak detection using internal leak detection methods. This will expand industry options for leak detection including guidance on using CPM as a possible continuous monitoring method for the rapid identification of large leaks and ruptures.

LD-1-06 CPM & Inventory for Gas Leak Detection

Overview

Activities Underway/Completed (since last report) • ‘Technology Needs’ Task 1 (Out of 3) • As of 10/8, survey has been distributed to vendors • Operator survey created and reviewed.	Overall Project Status/Significant Findings • 15% completion with kickoff meeting conducted, provider survey distributed, and operator survey draft reviewed during team meeting.
Planned Activities (next period) • Receive and compile completed vendor survey • Distribute survey to operators • Receive API survey data possibly in October (Mark Piazza has agreed to share survey data)	Current Issues, Risks and Decisions Needed • Survey data has taken a while to receive.

Rationale/Explanation of Deviations between Plan and Forecast

Status

Overall Schedule	• 7 month time frame in the proposal started from 6/25 • Task 1 allotted 2.5 months, Task 2 allotted 2.5 months and Task 3 allotted 2 months	• Survey data taking time to receive
Active Task(s)	• ‘Technology Needs’ Task 1 (Out of 3)	• No issues anticipated at this time
Cost to Date	• No costs have been incurred for PRCI as of 6/25/24. • Last update, SWRI stated they plan to invoice \$24733 this quarter	• No issues anticipated at this time
Threats/Scope Changes or Additions	7 month time frame in the proposal started from 6/25 • Task 1 allotted 2.5 months • fdsf	

Pipeline Research Council International

LD-2-01

SRP LD New Multi-Year Project: Improve Leak Detection Technology Performance Through Retrofittable Sensors

Project Status Update



LEADING PIPELINE RESEARCH

Adam Hawley

Program Manager, Southwest Research Institute

Fall 2024 TC Meetings

10/15/2024

LD-2-01 Improve Leak Detection Technology Performance Through Retrofittable Sensors

Overview

Activities Underway/Completed (since last report) - May 2024 Contract with SwRI signed - June 2024 Kickoff meeting - Literature review completed	Overall Project Status/Significant Findings On Track
Planned Activities (next period) - Review LD-1-06 and API survey results when they become available. - Develop and circulate surveys to the sensor manufacturers, members, and CPM vendors.	Current Issues, Risks and Decisions Needed Seeking approval to utilize results from LD-1-06 and API for vendor surveys.

Rationale/Explanation of Deviations between Plan and Forecast

Status

Overall Schedule	- Project duration scheduled for nine months - Schedule organized into five main tasks	- Task1: Literature Review - Task 2: Stakeholder Survey - Task 3: Identification of Sensor Technologies - Task 4: Draft Testing and Validation Protocol - Task 5: Reporting
Active Task(s)	Compile surveys from the operators, CPM vendors and sensor manufactures.	Need member and vendor surveys generated and returned.
Cost to Date	- Invoiced \$19,000 of \$68,000 contracted (28%) - Spend corresponds with planned progress	On Track
Threats/Scope Changes or Additions	- Receipt of sufficient/timely surveys - Survey fatigue / multiple request for similar data by organizations/projects	

LD-2-01 SRP LD New Multi-Year Project: Improve Leak Detection Technology Performance Through Retrofittable Sensors - Overview

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- **Principal investigator:** Southwest Research Institute (Adam Hawley)
- **PRCI Project Team Leader:** Joseph Chamberlain
- **Total costs:** \$68,000
- **Background:** A key tool leveraged by the liquid pipeline community is the use of computational pipeline monitoring (CPM). One constraint of CPM systems is the availability of high-quality data from instrumentation along the pipeline. Increasing the amount, location, or accuracy of sensors on a pipeline could significantly increase the effectiveness of a CPM system; however, the cost to procure and install the sensors needs to be considered. As a result, the industry has a need for sensors that can be non-intrusively retrofitted to existing pipelines at an economical price point. These sensors need to be identified and evaluated so that industry can directly justify the cost of these additions.
- **Research Objectives/Project Deliverables:** The primary objective of this project is to identify feasible, retrofittable sensors and measurement methods for leak detection applications. The project will validate both intrusive and non-intrusive alternatives with respect to leak detection sensor and measurement requirements.

Tasks and Overall Status

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- Task1: Literature Review - Complete
- Task 2: Stakeholder Survey – 75% Complete
- Task 3: Identification of Sensor Technologies
- Task 4: Draft Testing and Validation Protocol
- Task 5: Reporting

Active Task – Stakeholder Survey (Task 2)

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- **Objectives**

- Create and issue a survey to send to PRCI member companies and **CPM vendors**.
- Summarize the results of the survey for the PRCI project team.

- **Approach**

- Generate two surveys
 - One for PRCI Member Companies
 - To identify: Sensors, measurement methods, system targets/tolerances, process conditions
 - **One for CPM Vendors**
 - To identify: **Available sensors, tolerances**

- **Deliverables**

- A short document providing a summary of the survey responses will be drafted

- **PRCI Project Team Input**

- Recommendations on the content for the survey
- Responses to the survey

Next Task – Identification of Sensor Technologies (Task 3)

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- **Objectives**

- The objective of this task is to identify sensors that could improve CPM system performance.

- **Approach**

- Based on the results from the literature review and survey, an assessment will be conducted with the goal to identify sensor technologies for CPM systems.
- Sensor developers will be contacted to determine currently available sensors, models, and the application range. A table will be generated to document various metrics, including:
 - Manufacturer, Model, Application metrics, installation requirements, cost and level of effort of install.

- **Deliverables**

- A table summarizing the metrics for the identified sensors.

- **PRCI Project Team Input**

- Recommendations sensor types or vendors
- Feedback on table for comparison metrics

Value to Members/Knowledge Transfer

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- **Target audience:** Operators, CPM Engineers, Leak Detection Specialist, measurement specialist, Facility Designers
- **Value:** This will enable the assessment of sensor availability and feasibility, ultimately providing operators with guidance to enhance their CPM systems.
- **Knowledge transfer recommendations:** Presentations at the SOM Technical Committee meetings, final report, a webinar summarizing the project findings
- **Questions/comments?**

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CPS-17-13



LEADING PIPELINE RESEARCH

CPS-17-13 Scope

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- [SRP LD: Testing of Macro-scale Gas Pipeline Leak Detection Technologies | PRCI](#)
- The deliverable would include a final report identifying the best leak detection technology for macro emissions monitoring that could be applied to large transmission pipelines or dense pipeline networks while addressing all comments and requests outlined in the work scope.

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Status

ted (since last report)		Overall Project Status/Significant Findings Add content here
		Current Issues, Risks and Decisions Needed Add content here
Rationale/Explanation of Deviations between Plan and Forecast		
	Add content here	Add content here
	Add content here	Add content here
	Add content here	Add content here
Cost to Date		
Threats/Scope Changes or A		Add content here

Pipeline Research Council International

Future Roadmap

2025-2029



LEADING PIPELINE RESEARCH

Nikolaos (Nikos) Salmatanis

Leak Detection Engineer/Loss of Containment SME, Chevron

Dallas, TX

October 15th, 2024

LD SRP Roadmap Overview

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Project Number	Idea	Title	Total funding (+18%)	2023				2024				2025				2026				2027				2028				2029																											
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4																								
LD-1-01	3469	Internal and External Leak Detection Technology Test Facility Feasibility Assessment	88,500				SOM																																																
LD-1-02	3399	Liquid Pipeline Leak Event Primary Data Repository	236,000						SOM																																														
LD-1-03	3334	Technical Best Practice for Computational Pipeline Monitoring on Liquid Pipelines	283,200				SOM																																																
LD-1-04	3392	Technical Understanding of Gas Leak Events and Placement of Leak Detection Sensors	88,500						SOM																																														
LD-2-01	3147	Improve Leak Detection Technology Performance Through Retrofittable Sensors	200,600						MEAS																																														
LD-1-05	3461	Assessment of Optical Technologies to Detect, Locate, and Quantify Methane Emission	344,700						CPS																																														
LD-1-06	3335	Industry Technical Best Practice Using Inventory and CPM for Natural Gas Pipeline Leak Detection	147,500						SOM																																														
CPS-17-13	3398	Testing of Macro-scale Gas Pipeline Leak Detection Technologies	177,000						SOM																																														
	3393	Characteristics of Gas Leak Signatures	472,000							CPS																																													
	3400	Leak Detection Sensor-Based Technology Test Facility Design	483,800							SOM				SOM																																									
	3401	Pipeline Segment Internal Leak Detection Technology Test Facility Design	531,000							SOM				SOM																																									
	3418	Leak Rate Estimation from Pipeline Defects	200,600							SOM																																													
	3310	Pipeline Digital Twin for Leak Detection Simulation and Machine Learning Applications	354,000																		SOM																																		
	3394	Repository for Validated Gas Leaks by Geographical Regions and Terrain Type	295,000											SOM																																									
	3395	Technology Direct Comparison for Gas Detection and Quantification using Aerial Platforms	472,000																		SOM																																		
	3336	Technical Best Practice for External Leak Detection Systems on Liquid Hydrocarbon Pipelines	88,500									SOM																																											
Future		Annual SRP Spend	\$	320,000				\$				732,410				\$				858,560				\$				800,000				\$				410,000				\$				300,000				\$				400,000			
Active		SRP Spend (+18%)	\$	377,600				\$				864,244				\$				1,013,101				\$				944,000				\$				483,800				\$				354,000				\$				472,000			
								TraditionalSOMTC Funding				SOMSRP Funding				MEAS SRP Funding				CPS SRP Funding																																			

SRP Plan Schedule and Funding for 2025

Idea	Title	Year	Comment	Y2024	Y2025	Y2026	Y2027	Status	Notes
3393	Characteristics of Gas Leak Signatures (LD SRP G2.2)	2025	A workshop on the topic may be beneficial. A workshop for SRP project scoping is being planned.		200	200		Deferred	Moved from 2024 to 2025
3400	Leak Detection Sensor-Based Technology Test Facility Design (LD SRP 3.3)	2025	LD-1-01 needs to be completed before this idea can proceed. LD-1-01 to be completed Q4 2024		50	200	160	Deferred	Moved from 2024 to 2025
3401	Pipeline Segment Internal Leak Detection Technology Test Facility Design (LD SRP L3.1)	2025	LD-1-01 needs to be completed before this idea can proceed. LD-1-01 to be completed Q4 2024		50	200	200	Deferred	Moved from 2024 to 2025
3418	Leak Rate Estimation from Pipeline Defects	2025	I do not believe that additional flow testing is needed under this project, even for fluids undergoing phase transformations. I believe that there is sufficient background data and models such that a tool can be developed directly. I believe that PRCI should specify the architecture of the software tool (e.g., a widget on PRCI's website/VTDC with a SaaS API for paid non-member usage) and that that work should be bid.		220			Recommend offramp	Data from EC-2-10 is available
3394	Repository for Validated Gas Leaks by Geographical Regions and Terrain Type (LD SRP G2.3)	2025	Dependent on the completion of 3393.		200	50			

Idea 3393 – Characteristic of Gas Leak Signatures

Overview

Activities Underway/Completed (since last report) The proposed research will review available gas leak events by composition of detected elements by concentration levels relative frequency of detection. Detection of elements should include but not limited to: CH4, Other/Total Hydrocarbons, and CO2. The database should store recorded signatures by probability (High, Medium, Low) vs. Consequence (High, Medium, Low) relative to leak detection methods deployed.	Overall Project Status/Significant Findings N/A
Planned Activities (next period) - Needs a Team Lead - Need to take the idea and put together an RFP - Need to list Researchers to send RFP out	Current Issues, Risks and Decisions Needed - Appears to be a pipeline specific project, based on PHMSA data, most of the methane emissions occur at facilities. - If the idea is completed as proposed, how is the database to be used to reduce emissions? - A workshop on the topic may be beneficial.

Rationale/Explanation of Deviations between Plan and Forecast

Status

Overall Schedule	Mid-Year 2024, conforming	No issues anticipated at this time
Active Task(s)	Communicate at PRCI Summer TC need for Team Lead, and other Planned Activities	PRCI assisting with getting Team Leads
Cost to Date	- No costs have been incurred for PRCI 2025: \$236K 2026: \$236K	No issues anticipated at this time
Threats/Scope Changes or Additions	- See Planned Activities - LD SRP project put in CPS: Greenhouse Emissions Reduction and Measurement	

Idea 3400 – Leak Detection Sensor-Based Technology Test Facility Design

Overview

Activities Underway/Completed (since last report) - Phase 1: Define and specify the requirements and industry options for dedicated test sites (TS) for comprehensive external pipeline LD technology testing. - Phase 2: Design any identified facilities to address testing gaps.	Overall Project Status/Significant Findings N/A
Planned Activities (next period) - Need to take the idea and put together an RFP - Need to list Researchers to send RFP out	Current Issues, Risks and Decisions Needed - LD SRP project LD-1-1 needs to be completed 1st. - Possible location options may include PRCI (TDC), GTI/university/other institutes, Baker Risk, and/or operator-provided sites.

Rationale/Explanation of Deviations between Plan and Forecast

Status

Overall Schedule	Mid-Year 2024, conforming	LD SRP project LD-1-1 needs to be completed 1st.
Active Task(s)	Communicate at PRCI Summer TC need for other Planned Activities	Nikolaos Salmatanis to be Team Lead
Cost to Date	- No costs have been incurred for PRCI 2025: \$59K 2026: \$236K 2027: \$189K	No issues anticipated at this time
Threats/Scope Changes or Additions	- See Planned Activities - Can be done in tandem with 3401, could use a joint Team Lead for 3400/3401	

Overview

Activities Underway/Completed (since last report) - Phase 1: Define and specify the requirements and industry options for a dedicated pipeline segment internal leak detection (e.g., CPM: RTTM/Acoustic, ILI: Smart pigs) test facility. - Phase 2: Address the gaps from Phase 1. Provide a comprehensive design and implementation path (i.e. blueprint) for a dedicated pipeline internal leak detection test facility.	Overall Project Status/Significant Findings N/A
Planned Activities (next period) - Needs a Team Lead - Need to take the idea and put together an RFP - Need to list Researchers to send RFP out	Current Issues, Risks and Decisions Needed - LD SRP project LD-1-1 needs to be completed 1st. - Possible location options may include PRCI (TDC), GTI/university/other institutes, Baker Risk, and/or operator-provided sites.

Rationale/Explanation of Deviations between Plan and Forecast

Status

Overall Schedule	Mid-Year 2024, conforming	LD SRP project LD-1-1 needs to be completed 1st.
Active Task(s)	Communicate at PRCI Summer TC need for other Planned Activities	PRCI assisting with getting Team Leads
Cost to Date	- No costs have been incurred for PRCI 2025: \$59K 2026: \$236K 2027: \$236K	No issues anticipated at this time
Threats/Scope Changes or Additions	- See Planned Activities - Can be done in tandem with 3400, could use a joint Team Lead for 3400/3401	

Idea 3418 – Leak Rate Estimation from Pipeline Defects

Overview

Activities Underway/Completed (since last report) The objective of this research is to develop data and leak rate estimation guidance for gas pipeline leak rates. This work will employ data and modelling tools developed in US DOT, PHMSA supported research “<i>Improve Liquid Pipeline Leak Rate Estimation</i>” (Agreement No.: 693JK32010009POTA). This work will differ from the previous work on leak rates for liquids because of the differences in behaviors of gases and liquids.	Overall Project Status/Significant Findings N/A
Planned Activities (next period) - Needs a Team Lead - Need to take the idea and put together an RFP - Need to list Researchers to send RFP out	Current Issues, Risks and Decisions Needed - Equipment and flanged connection or soft good (e.g. gaskets and seals) related leak rate testing not included in this project idea. - NGL's or other liquids that involve phase transformation as part of the release process. - A workshop on the topic may be beneficial.

Rationale/Explanation of Deviations between Plan and Forecast

Status

Overall Schedule	Mid-Year 2024, conforming	Shovel reading project.
Active Task(s)	Communicate at PRCI Summer TC need for Team Lead, and other Planned Activities	PRCI assisting with getting Team Leads
Cost to Date	- No costs have been incurred for PRCI 2025: \$260K	No issues anticipated at this time
Threats/Scope Changes or Additions	- See Planned Activities - Data from EC-2-10 is available	

Overview

Activities Underway/Completed (since last report) The proposed research will review available gas leak events by geographical region and terrain types including but not limited to: unusual vegetation, frozen dome, above ground pertinence, depth of cover, location of detection compared to leak origin.	Overall Project Status/Significant Findings Dependent on the completion of 3393
Planned Activities (next period) - Needs a Team Lead - Need to take the idea and put together an RFP - Need to list Researchers to send RFP out	Current Issues, Risks and Decisions Needed A workshop on the topic may be beneficial.

Rationale/Explanation of Deviations between Plan and Forecast

Status

Overall Schedule	Deferred to 2026	N/A
Active Task(s)	Communicate at PRCI Summer TC need for other Planned Activities	PRCI assisting with getting Team Leads
Cost to Date	- No costs have been incurred for PRCI 2026: \$2369K 2027: \$59K	No issues anticipated at this time
Threats/Scope Changes or Additions	- See Planned Activities - Missed on the original slate of LD SRP projects	

Idea #3336 Technical Best Practice for External Leak Detection Systems on Liquid Hydrocarbon Pipelines

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Link in PRIME: <https://www.prci.org/prime/idea/3336>

- **Status:** Project was originally taken out of the SRP roadmap due to pre-project completion. LD Advisory team and specifically API/LEPA are interested in helping get that project underway as soon as possible

Proposed outcome: The proposed research will provide an operator with the necessary technical guidance for confident selection of the correct ELDS technology for targeted facilities leak monitoring sites. Identify the ELD technical and operational requirements, and issues for ELD implementation and assessment. This would provide guidance on how to implement the technologies for installation commissioning and operationally based on research.

Proposed Scope:

- 1. Identify currently available ELDS technologies for liquids pipelines as listed by API-1175 and other sources.
 - 2. Formally assess the Technical Readiness Level (TRL) of each identified ELDS technology using the PRCI TRL scale. Select those technologies that are assessed with a sufficient TRL for operational deployment for liquids pipelines.
 - 3. Complete a detailed technical summary of the selected ELDS technologies.
 - 4. Complete an anonymized survey of operational ELDS installations in the liquids pipeline industry. Identify the key successes and challenges identified by the operators.
 - 5. Use the project results to develop a suggested ELDS Technology Selection Process to provide decision-making guidance to operators.
-
- Timeline & Budget Request: **12 month (or less) for \$75k**
 - Current placement on SOM TC roadmap is 2029

Idea 3336 – Technical Best Practice for External Leak Detection Systems on Liquid Hydrocarbon Pipelines

Overview

Activities Underway/Completed (since last report) The project will provide liquid operators with industry-recognized technical guidance to select appropriate ELDS for targeted leak detection. This will increase industry-wide adaptation of ELDS to improve the rapid detection of facilities leaks that are not detectable by CPM.
Planned Activities (next period) - Per RSC/EA, going to use SRP surplus from 2024 to fund for 2025 - Need to list Researchers to send RFP out

Overall Project Status/Significant Findings N/A
Current Issues, Risks and Decisions Needed - Industry Strategic Project with API and LEPA Support. - A workshop on the topic may be beneficial at PIX 2024.

Rationale/Explanation of Deviations between Plan and Forecast

Status

Overall Schedule	Mid-Year 2024, conforming	Shovel reading project; RFP drafted.
Active Task(s)	Communicate at PRCI Summer TC need for other Planned Activities	Nikolaos Salmatanis to be Team Lead
Cost to Date	- No costs have been incurred for PRCI 2025: \$89K	No issues anticipated at this time
Threats/Scope Changes or Additions	- See Planned Activities - Missed on the original slate of LD SRP projects	

Where we are going: Strategic Research Priority

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- **Idea #3336 – consideration for including of the project in 2025 or 2026**
- **Multi-million-dollar, five-year plan to quantumly accelerate pipeline related research to meaningfully advance the leak detection technology solutions space for liquid and gas pipelines**
- **Currently a multi technical committee effort**
 - Compressor and Pump Station, and GHG
 - Measurement
- **Other Items:**
 - RFPs have not received a lot of proposal return (sent to 5+ contractors with 1 or 2 proposals returned)
 - Many of the projects were sent out to the same leak detection contractors
 - Looking for more volunteers to participate on RFP development and team leadership

SRP Plan Schedule and Funding for 2026 and Beyond

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Idea	Title	Year	Comment	1st Year	2nd Year	Notes
3310	Pipeline Digital Twin for Leak Detection Simulation and Machine Learning Applications - (LD SRP 3.2)		I like the concept of using advanced analytics to improve leak detection. I'm not sure that this is exactly the idea. I think that all existing transient based (pipeline modeled) CPM systems are already functionally digital twins. Where I think there would be a better AI/Expert System approach is in alarm analysis to reduce false positive/false negative. For example, if the rate of change of discharge pressure does not meet certain minimums when a pump is turned (based on the current pipeline pressure, fluid properties, and pipe size) there is a higher likelihood of a pipeline leak/failure. But a high rate of pressure decrease occurs on the suction side of a pump when a pump turns on and that rate of change decreases with time, it is a normal transient. This is where I think that AI could be very valuable in developing empirical and rule-based logic that operators and leak detection vendors could apply to make CPM systems more reliable. I would recommend moving this forward to 2025 if this is fleshed out more with a specific focus on how the results of the research would be efficiently implemented by pipeline operators. A workshop on the topic may be in order.	200	100	Additional refinement needed
3395	Technology Direct Comparison for Gas Detection and Quantification using Aerial Platforms (LD SRP G2.4)		Dependent of the completion of 3398.	100	300	