PHMSA Research, Technical and Policy Perspectives

Working Group #2

Remote Sensing/Leak Detection-Mitigation

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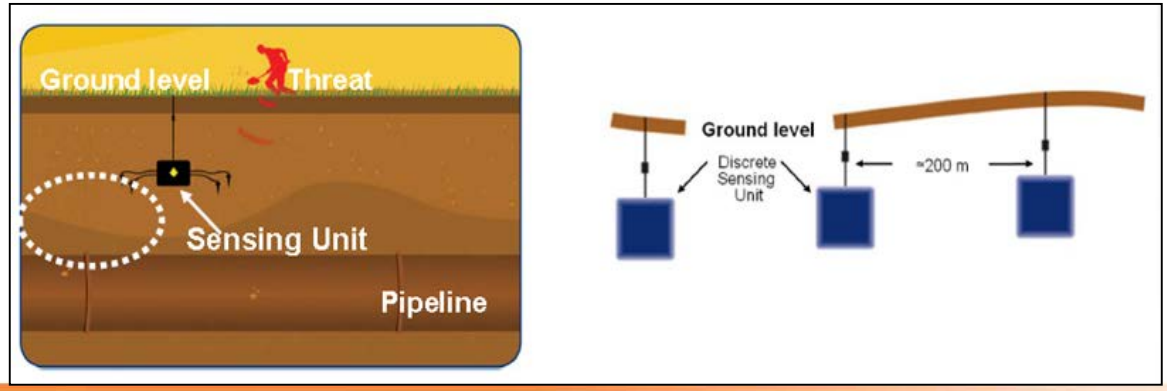
Pipeline Research and Development Forum

September 11-12, 2018

Remote Sensing: Threat Prevention

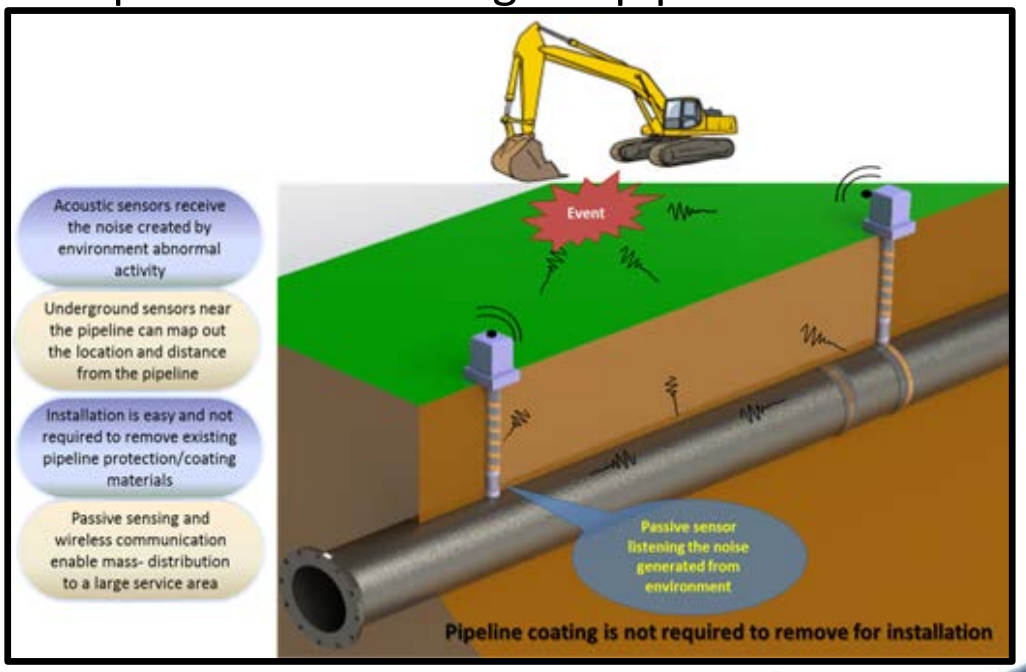
- Program Objective: Research in this area supports technology development that can remotely monitor the occurrence and severity of various integrity threats to pipelines.
- PHMSA's Research Portfolio:
  - 9 Awarded Relevant Projects since 2002
  - $5.1M PHMSA + $4.3M Resource Sharing
  - 2 Commercialized Technologies supporting remote sensing to detect excavation on the right-of-way



Ongoing Research

Combined Vibration, Ground Movement, and Pipe Current Detector

Main Objective: This project will demonstrate the feasibility of a pipeline right-of-way (ROW) defense system based on stationary sensors mounted on, or adjacent to, the pipeline. The sensor data from multiple locations along the pipe will be wirelessly forwarded to a central location for further analysis. Analytics residing at a central location will correlate the data from multiple sensors to alert operators to events of interest occurring in the ROW with minimal latency.



Results: Sept 30, 2018

PHMSA: $299,030

Technology Transfer Anticipated!

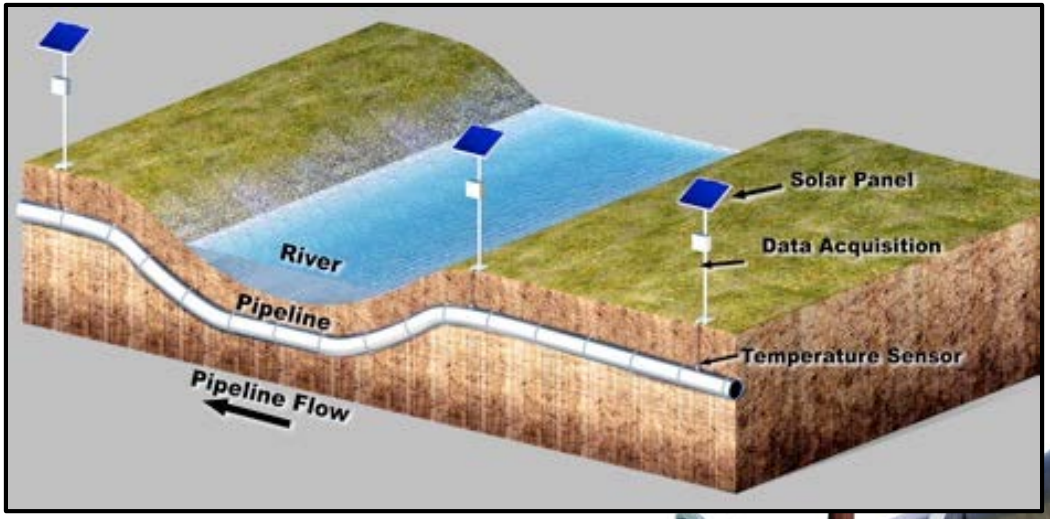
Ongoing Research

Threat Prevention for Pipeline River Crossings

Main Objective: This project will demonstrate an "active" remote monitoring system capable of determining the degree of scour in a river bed thereby alerting pipeline operators should the amount of cover of the pipeline become reduced. The proposed technology is based on a temperature gradient decay method for monitoring a subject pipeline river crossing for scour conditions. Field demonstrations of the technology will provide a validation of the applicability for detecting depletion of cover above an installed pipeline.

Results: Feb 1, 2021

PHMSA: $400,000



Leak Detection & Remote Sensing

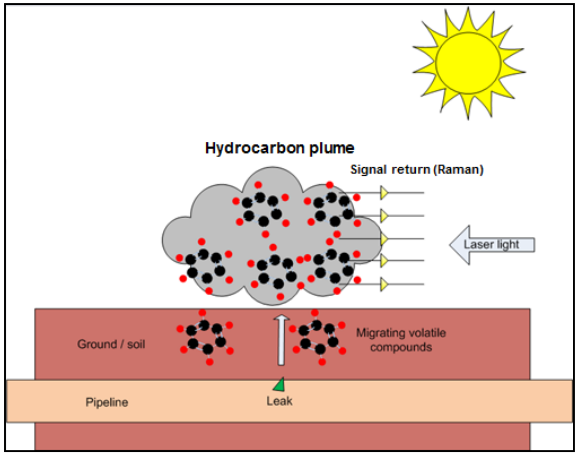
- Program Objective: Research in this area supports leak detection system and process analysis and supports technology development that can remotely monitor the occurrence and severity of pipeline leaks.
- PHMSA's Research Portfolio:
  - 20 Awarded Projects
  - $10.8M PHMSA + $4.7 Resource Sharing
  - 4 Commercialized Technologies or Products

Notable Outputs/Impacts

Internal Liq/N-Gas LDS transferred from the water pipeline industry

Helicopter based lased systems for methane vapor detection

Fixed wing based laser systems for Liq/N-Gas vapor detection



Detection of vapors from liquid petroleum pipeline leaks from a mobile platform with up to three spectroscopic instruments

Recently Completed Project

Framework for Verifying and Validating the Performance and Viability of External Leak Detection Systems for Liquid and Natural Gas Pipelines

Main Objective: The framework includes standardized methods to assess the performance of technologies intended to detect small release events (i.e. leaks) and quantitative criteria to rank the performance of these systems over a range of release scenarios.

Results: Final report issued

New/Ongoing Research

External Leak Detection Body of Knowledge

Main Objective: This project will develop a recommended practice (RP) for external based leak detection on natural gas transmission lines. The RP will increase the safe operation of the U.S. natural gas transmission pipeline network by standardizing practices across operators and increasing the likelihood a leak is found before becoming a safety hazard. The work will be conducted in three phases: 1) information gathering and technology assessment; 2)establish standardized sensor specifications and testing practices; and 3) develop guidelines for a central technology certification organization and the full RP.

Results: Feb 1, 2021

PHMSA: $400,000

NOTE: Project builds off of prior PHMSA and industry efforts.

New/Ongoing Research

Cost Benefit Analysis of Deploying or Retrofitting External Based Leak Detection Sensors

Main Objective: This project will deliver a methodology will enable liquid and natural gas pipeline decision makers to objectively weigh the safety, environmental protection and public perception enhancements to be gained from system deployment against the associated installation, maintenance and operating costs. The output obtained from the application of this methodology will inform technology deployment decisions and enable operators to tailor system requirements and deployment configurations to their pipeline systems.

Results: Nov 1, 2019

PHMSA: $348,396

NOTE: Project builds off of prior PHMSA and industry efforts.

Leak Detection/ Remote Sensing: Ongoing Goals

- Improve pipeline safety: ability to deploy and perform in the most challenging pipeline environments
- Efficiency – Less time and $$
- Less disruption to the public
- Less impact to the environment
- Improved accuracy, reliability, robustness, and response (as close to real-time as possible)

PHMSA Inspections & Drones/UAS

- **Vision:** To enhance pipeline safety inspections and investigations by giving inspectors the ability to safely gain visual access to areas that would otherwise be inaccessible.
- **Primary benefits:**
  1. Identifying potential risks; and
  2. Determining regulatory compliance

PHMSA Inspections & Drones/UAS

- **Rights-of-way/clearings**
  - General condition
  - Land movement
  - Flooding impact
  - 3rd party excavation
  - Post Storm ROW inspection
- **River Crossings**
- **Class location verification**
- **Accident Response Assessments**
  - Spill size
  - Spill trajectory
- **Tank inspections**
- **National Pipeline Mapping System accuracy verification**
- **Development of Inspector Training Materials**

Drone/UAS Compliance

- **Drone usage growing with Pipeline Operators**
  - Must meet all applicable FAA regulations
  - Integrity Inspections govern more dialog with PHMSA on compliance
- **Sensor research still needed**
- **Demonstrations and validation needed to improve regulator confidence**

NTSB Recommendations

- NTSB Recommendation P-11-10

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

Pending Rulemakings

Rupture Detection and Valve Rule

(NPRM stage)

- This rulemaking would address the installation of ASV/RCV or equivalent technology being installed on newly constructed or entirely replaced natural gas and hazardous liquid transmission pipelines with the objective of improving overall incident response for new and replaced pipelines.

- This rule would establish and define rupture detection and response time metrics including the integration of Automatic Shutoff Valves (ASV) and Remote Control Valve (RCV) placement as necessary.

- Rulemaking is in response to Section 4 and 8 of the 2011 Act, NTSB Recommendations and studies perform by both PHMSA and GAO.

Thank You!/RD&T Program Contacts

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