THE HUNT FOR NEW TECHNOLOGY TO PREVENT AND DETECT LIQUIDS GATHERING PIPELINE LEAKS

Williston Basin Petroleum Conference
Bismarck, North Dakota
May 22, 2018

Dr. Brian Kalk, Energy Systems Director, EERC
Jay Almlie, Principal Engineer, EERC
99.99%
FIGHTING A FLAWED BUT CATCHY NARRATIVE

The New York Times

With Big Spill to Clean, Pipeline Owner Seeks Keystone XL Approval

Pipelines Leak—Or They Explode

Let’s check in on the death funnels criss-crossing America.

Tioga oil pipeline spill cleanup nearing milestone after 4 years, but work continues

FIVE SPILLS, SIX MONTHS IN OPERATION: DAKOTA ACCESS TRACK RECORD HIGHLIGHTS UNAVOIDABLE REALITY — PIPELINES LEAK

North Dakota: The Oil Spill State
• Proper installation of pipelines

• Call before you dig

• Defense in depth (multiple layers of protection for challenging situations)
EERC PIPELINE STUDY TRAJECTORY

HB 1358 and HB 1347 Tasked the EERC with Providing Guidance

- Background on liquids gathering pipelines
- Analyze spill statistics
- Assess feasibility and cost-effectiveness of leak detection
- Field demonstrations of leak detection systems
- Emerging Technology
- Risk Assessment
EMERGING TECHNOLOGY FOR LIQUIDS GATHERING PIPELINES

More Than a Toy Box! Less Than a Silver Bullet!

Governor Burgum challenged industry in May 2017 to think outside the box and apply new technology to conquer the problem of pipeline leaks.
An Industry-Led Program to Advance Emerging Technologies to Provide Additional Tools for Pipeline Leak Prevention and Pipeline Leak Detection
MEMBERSHIP

TODAY

NEXT YEAR?

Critical Challenges.
Practical Solutions.
$4M program to demonstrate and advance emerging technologies with potential to prevent and detect pipeline releases.

- Number, scope of demonstrations determined by funding available.
- Multiyear commitment required to ensure momentum and continuity.
SELECTION OF DEMONSTRATIONS

• EERC coordinates “Shark Tank” events.
  – Technology providers pitch solutions to executive committee.
  – 30-minute presentations (overview, cost model, demonstration schedule, expected outcome).

• Five-seat executive committee:
  – Rotating seats to ensure all industry members have a voice.
  – Meets annually to select next demonstrations.
  – EERC serves a nonvoting, advisory role.
  – Directs EERC to contract with one or more demonstrations each year.
## MAY 2018 “SHARK TANK” PARTICIPANTS

<table>
<thead>
<tr>
<th>Company</th>
<th>DETECTION:</th>
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<tr>
<td>Satelytics</td>
<td>Opportunistic data collection + AI</td>
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<tr>
<td>INSITU</td>
<td>UAV + advanced analytics + BVLOS</td>
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<tr>
<td>eSmart Systems</td>
<td>UAV + AI + novel sensor suite</td>
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<tr>
<td>INGU Solutions</td>
<td>DETECTION/PREVENTION: Golf ball-sized free-floating sensor</td>
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<tr>
<td>SwRI</td>
<td>AI + multiple sensors</td>
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<tr>
<td>omnisens+</td>
<td>DETECTION/PREVENTION: Fiber optic leak and land movement detection</td>
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<tr>
<td>Rheidian</td>
<td>DETECTION: Noncontact, Internet of Things monitoring of pipelines</td>
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We are using Deep Learning to recognise assets and to identify potential faults and problems.
Unmanned Access into the National Airspace System

ScanEagle UAV patrols over length of pipeline.

When more frequent oversight or security is required, multiple ScanEagles can be used to provide security, thus minimizing gaps in coverage.

Ground Data Terminals (GDTs) Connected to HUB via Optic Fiber.

Base/HUB

200+ km

200+ km

200+ km
Data Acquisition
Spectra
Bands
Algorithms
Analytics
Alerts and Dashboards
SLED – Smart Leak Detection

2017 R&D 100 Finalist
Pipers™: Control in the palm of your hand

- Deploy when needed
- in all pipelines
- no downtime

- Detect leaks
- Locate deposits
- Determine isometry

- Golf ball-sized (1.5 inch)
- Free-flowing; adjustable weight
- Current sensors
  - Pressure
  - Temperature
  - Position (acceleration/rotation)
  - Magnetic fields
  - Acoustics
MEMBER RECRUITEMENT

- Increasing membership yields multiple benefits for industry and the state.
  - More demonstrations and additional tool development.
  - Spread of best practices across ALL pipeline operators.
  - Public relations benefits.
CONTACT INFORMATION

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