INTELLIGENT PIPELINE INTEGRITY PROGRAM

A Disruptive Government–Industry Team Changing the Narrative on Pipelines

IOGCC Annual Business Meeting
Oklahoma City, Oklahoma
Sunday, May 5, 2019

Jay Almlie, iPIPE Program Manager
Principal Engineer, Mid-/Downstream Oil & Gas
Energy & Environmental Research Center

INTRODUCTION TO *iPIPE*

Changing the Narrative on Pipelines

The New York Times

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

Esquire

Pipelines Leak—Or They Explode

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

The Bismarck Tribune

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

The Intercept_

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

KCET

North Dakota: The Oil Spill State

Program Overview

- iPIPE mission
  - Advance emerging technologies to prevent pipeline releases.
  - Fund development work, and provide market feedback to hone products.

- Unique collaboration between pipeline operators and technology providers.
- $5M investment over 3 years.
- Nine pipeline operators and the North Dakota Industrial Commission.
  - Welcoming participation from other companies and other states.
  - Nationwide interests.

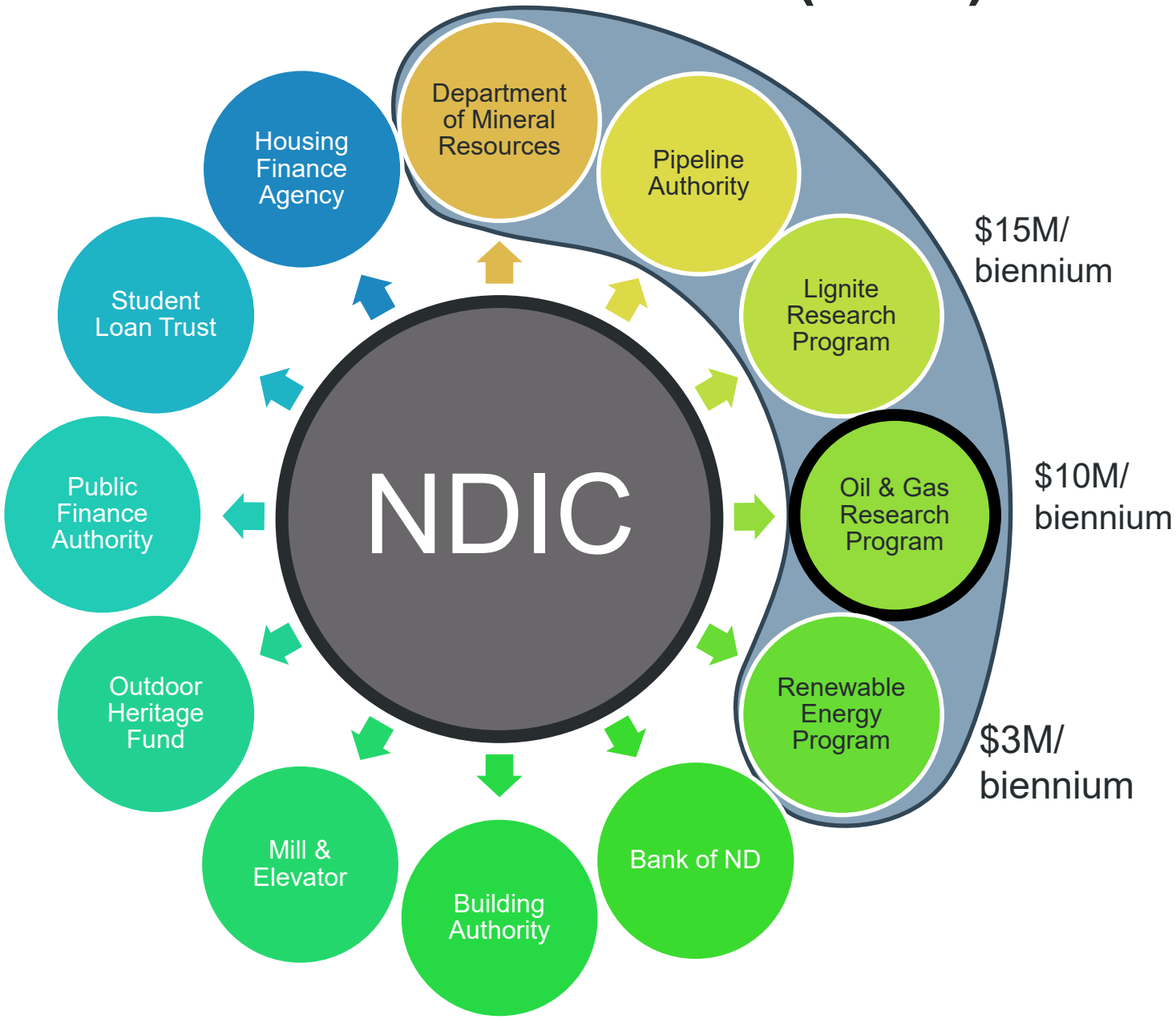
Overview of the North Dakota Industrial Commission (NDIC)

Commission Members

- Governor
- Attorney General
- Agriculture Commissioner

OGRP Mission

- Promote efficient use of energy.
- Promote environmentally sound E&P methods and technologies.
- Develop the state's oil and gas resources.
- Support O&G R&D.



iPIPE Funding Formula

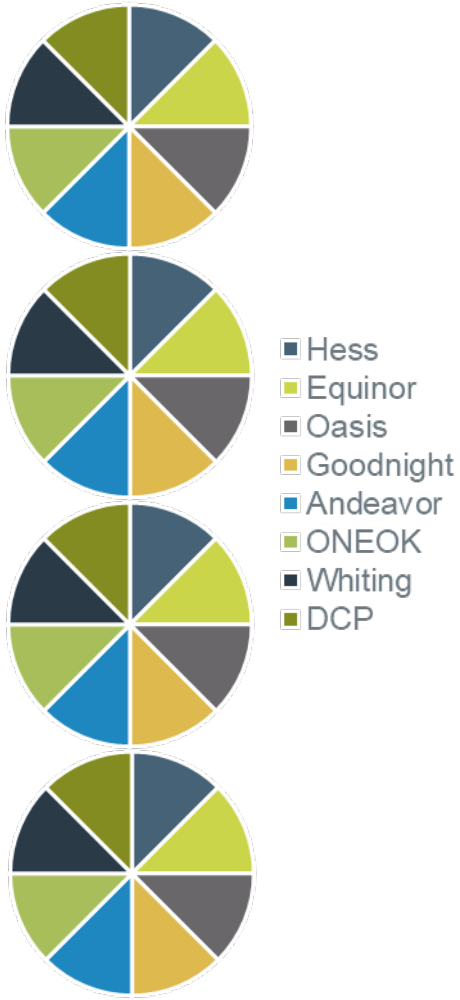
$2.15M Industry

2018
$44k ea.
$352k sum

2019
$75k ea.
$600k sum

2020
$75k ea.
$600k sum

2021
$75k ea.
$600k sum



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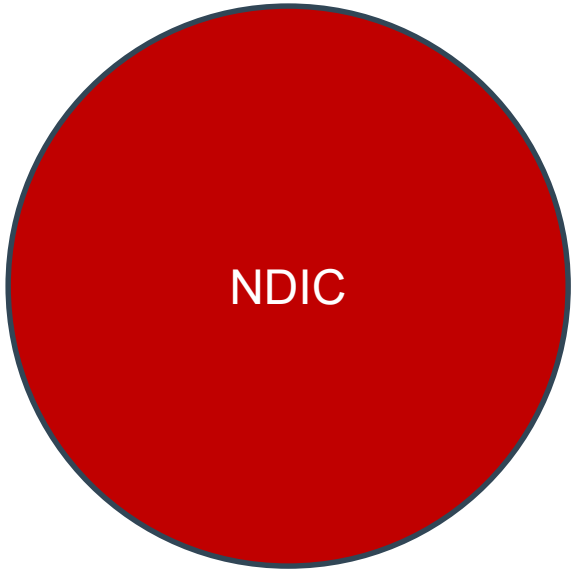
$1.6M NDIC



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$3.75M TOTAL

iPIPE
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- This was awarded in a lump sum up front
- We have indicated intent to request incremental funding of $1M from NDIC for each 4 new partners added to the consortium (after founding 6 members)

Technology Selection Process

Modeled after TV's "Shark Tank"

- EERC coordinates "Shark Tank" events.
  - Technology providers pitch solutions to expert selection committee.
  - Presentations summarize technology overview, cost model, demonstration schedule, expected outcome.

- Selection committee
  - Meets annually to select technologies to codevelop.
    (EERC serves a nonvoting, advisory role.)
  - Directs EERC to contract with selected technology providers.

iPIPE Selection Committee Determines Spending

- At each technology selection event ("Shark Tank"), the iPIPE Selection Committee determines how many projects it wishes to fund and determines funding caps for each project.

2018

Technology Funded	iPIPE Cash Outlay
Satelytics (satellite, artificial intelligence)	
Ingu Solutions (golf ball sensor)	
TOTAL	**$ 562,500**

2019

Technology Funded	Anticipated iPIPE Cash Outlay
Satelytics (Phase II)	
Direct-C (nanocomposite sensors)	
Insitu (BVLOS drone)	
TOTAL	**$ 860,000**

2018 TECHNOLOGY DEVELOPMENT

Satelytics

Satelytics – Opportunistic Data

Leveraging Big Data:

- Data Acquisition
- Spectra
- Bands
- Algorithms
- Analytics
- Alerts and Dashboards

Leveraging Technology

Satellites

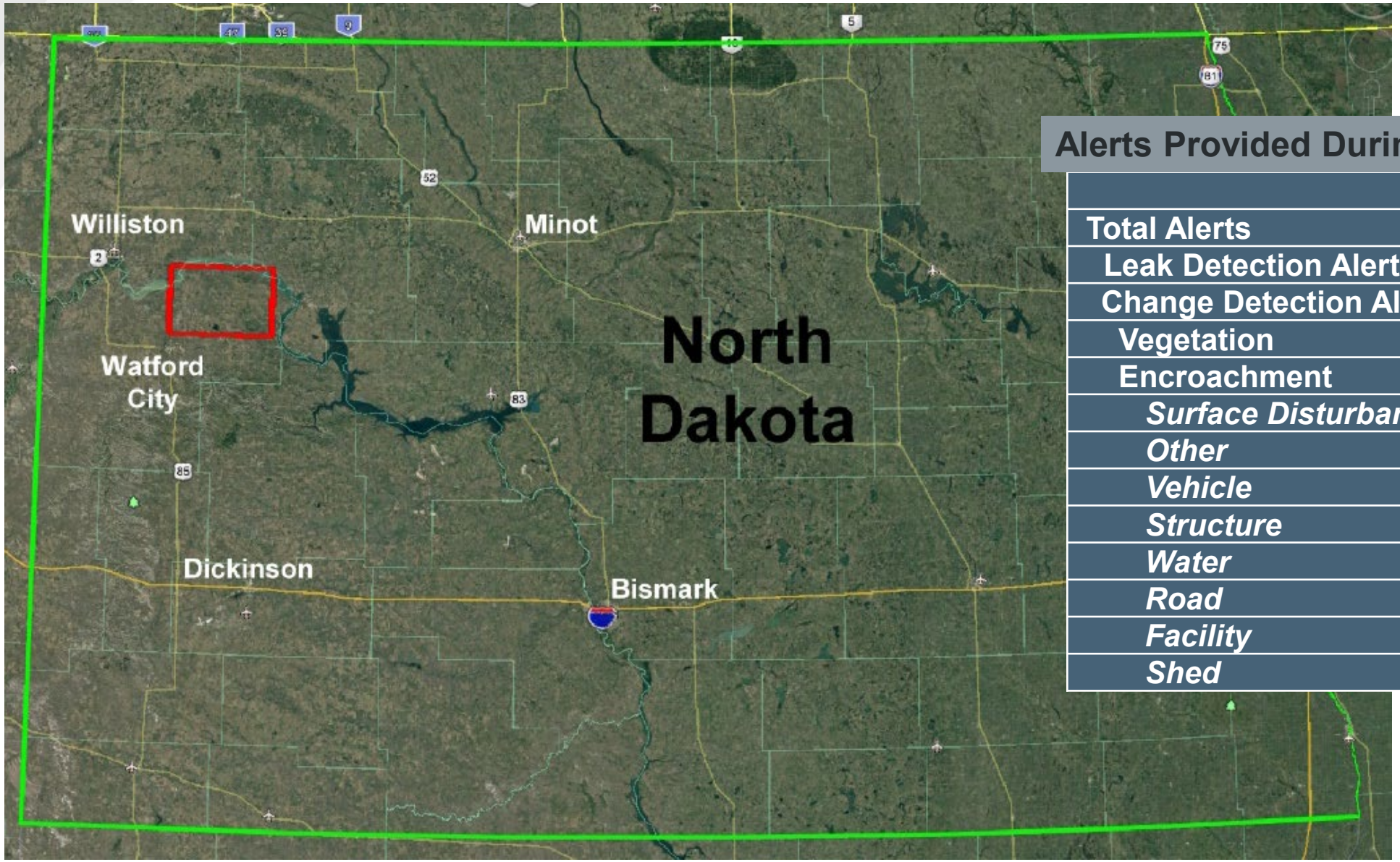
Nanosatellites

Aircraft

Drone/UAV

Fixed/Persistent Platform

Area of Interest



Alerts Provided During 5 months of 2018

	Alerts
Total Alerts	3,113
Leak Detection Alerts	176
Change Detection Alerts	2,937
Vegetation	34
Encroachment	2,903
Surface Disturbance	*1,384*
Other	*749*
Vehicle	*353*
Structure	*215*
Water	*143*
Road	*47*
Facility	*11*
Shed	*1*

2018 TECHNOLOGY DEVELOPMENT

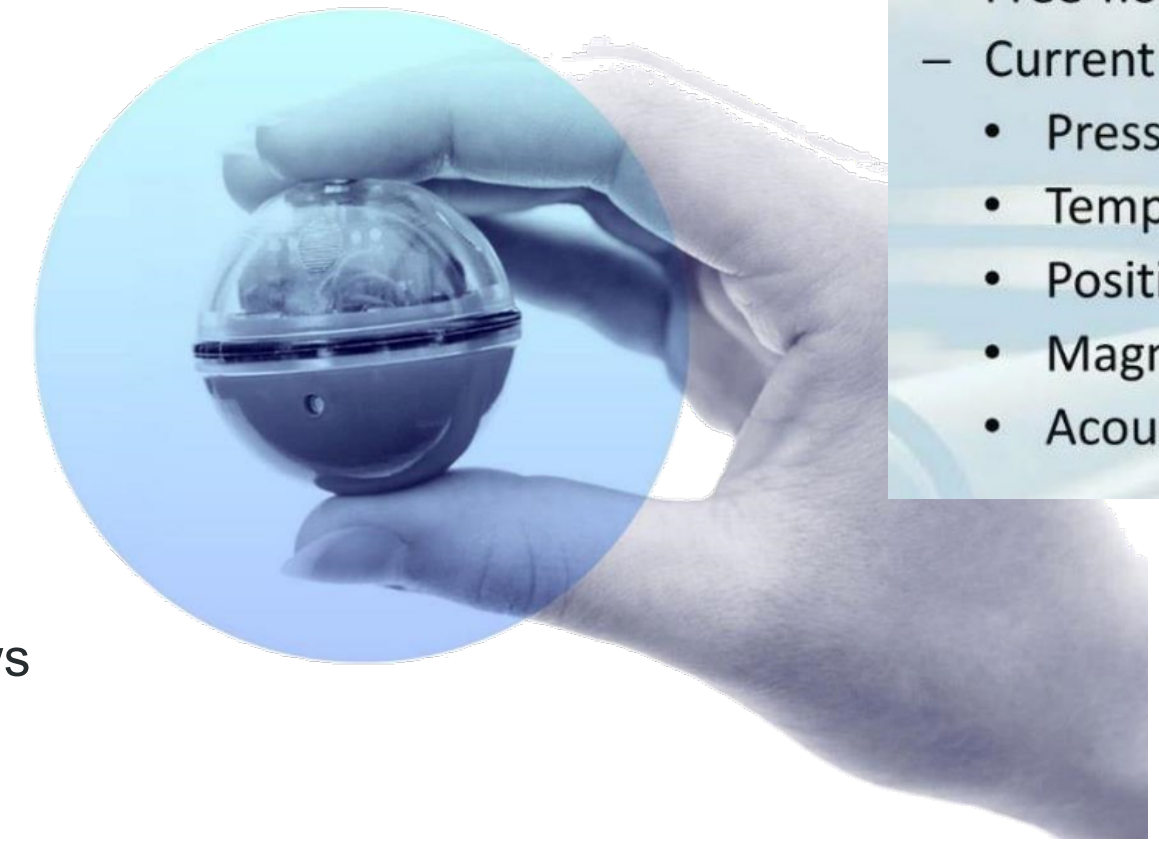
Ingu Solutions

“Golf Ball” Pipeline Sensor

iPIPE

Pipers™: Control in the palm of your hand

- Deploy when needed in all pipelines
- No downtime



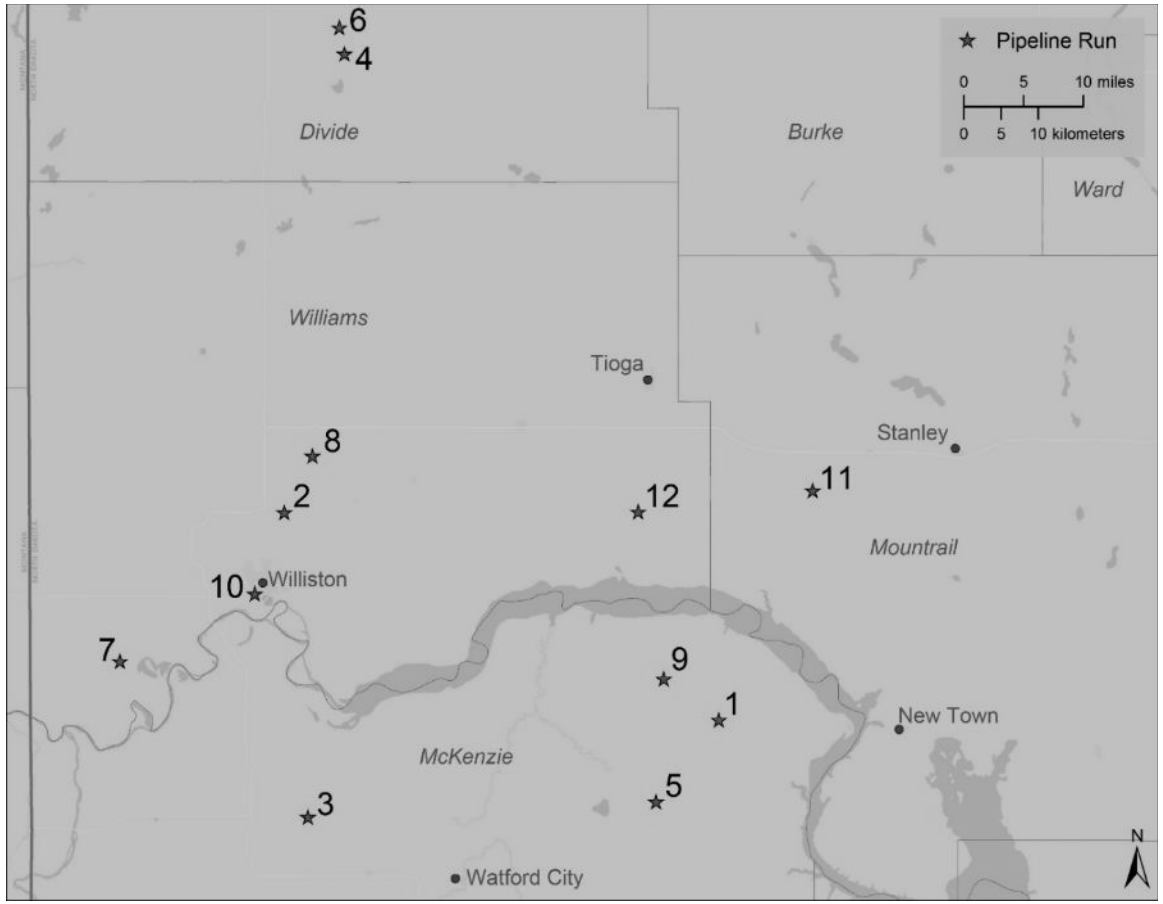
- Golf ball-sized (1.5 inch)
- Free-flowing; adjustable weight
- Current sensors
  - Pressure
  - Temperature
  - Position (acceleration/rotation)
  - Magnetic fields
  - Acoustics

- Detect leaks
- Locate deposits
- Identify pipe wall flaws
- Locate pipeline centerlines

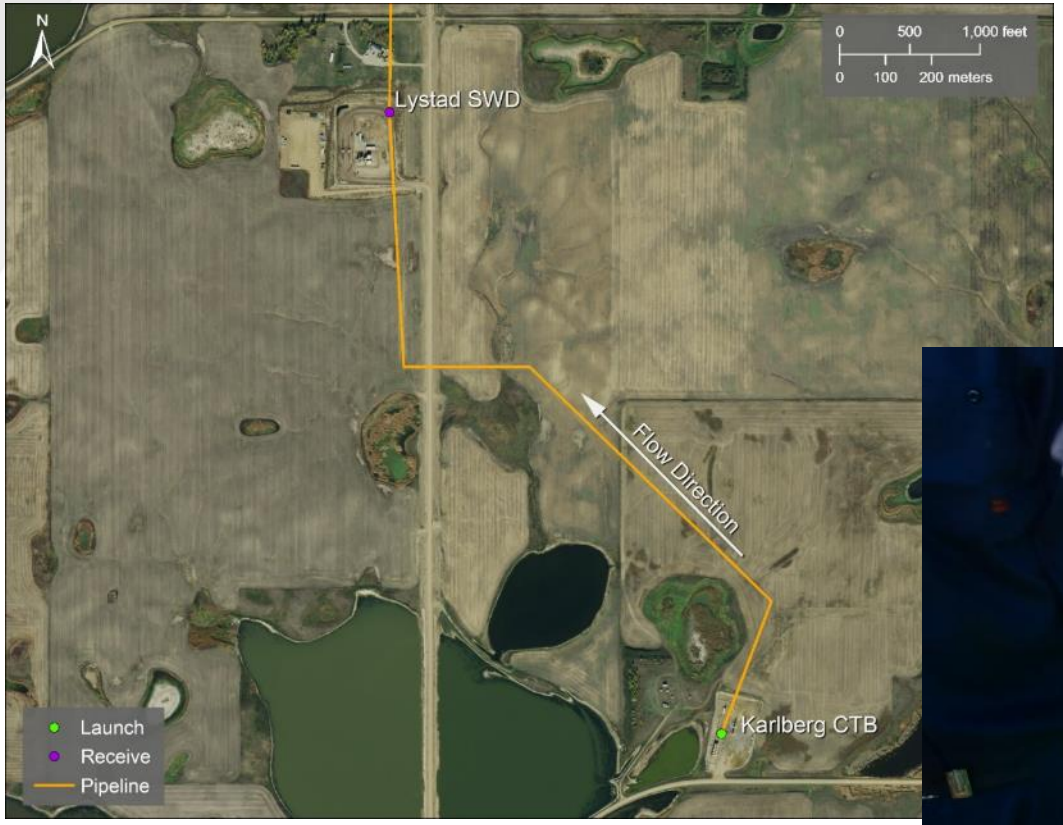
INGU SOLUTIONS

ND Pipers Runs

EERC ID#	Volunteering Pipeline Operator	Pipeline Description
1	Hess Corp.	6”, nonmetallic, crude oil
2	Equinor	8”, metallic, crude oil
3	Equinor	6”, nonmetallic, produced water
4	Goodnight Midstream	6”, nonmetallic, produced water
5	Hess Corp.	6”, metallic, high-pressure natural gas
6	Goodnight Midstream	6”, nonmetallic, produced water
7	Oasis Midstream Partners	4”, nonmetallic, produced water
8	Equinor	8”, nonmetallic, produced water
9	Andeavor	6”, metallic, crude oil
10	Oasis Midstream Partners	6”, metallic, crude oil
11	Hess Corp.	6”, metallic, crude oil
12	Hess Corp.	6”, nonmetallic, crude oil



Field Trial Overview



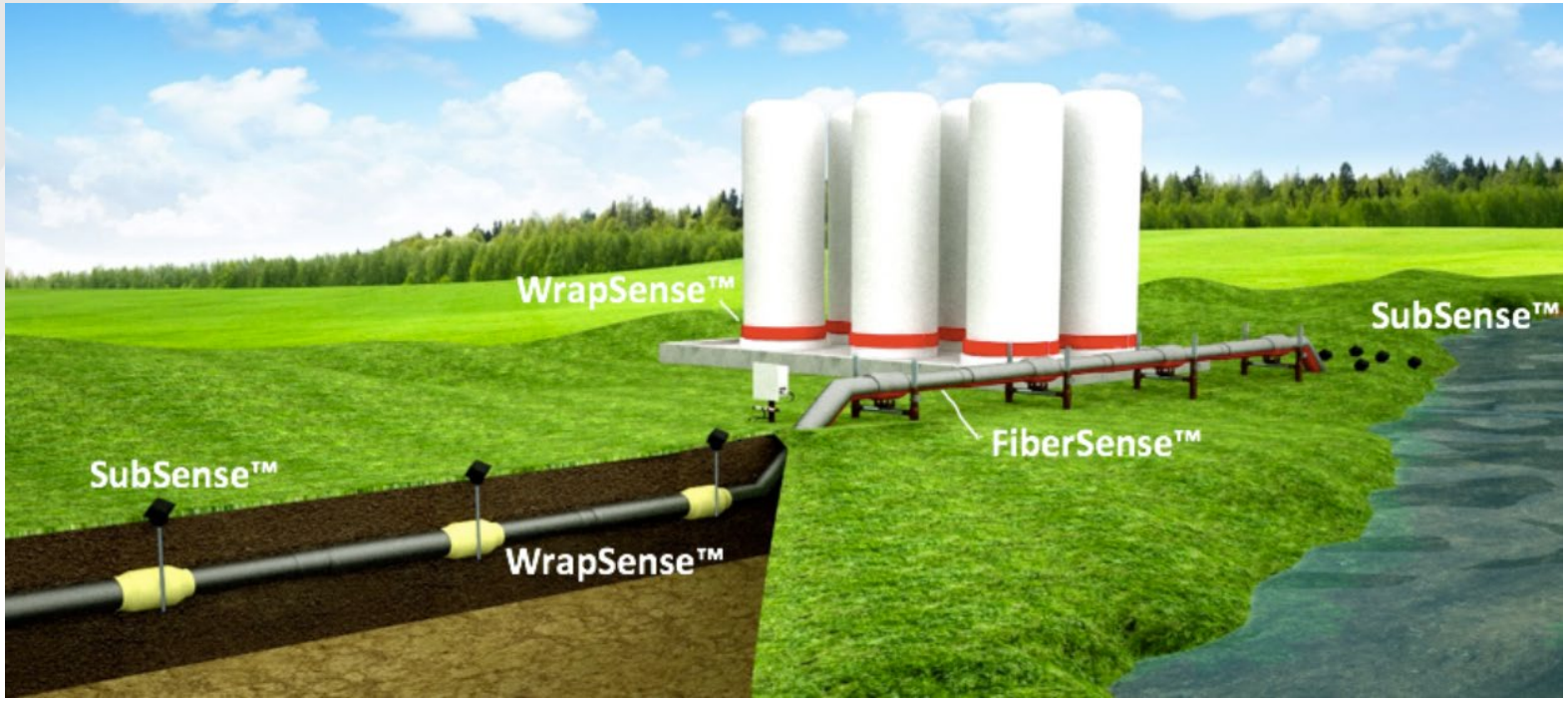
2019 TECHNOLOGY DEVELOPMENT

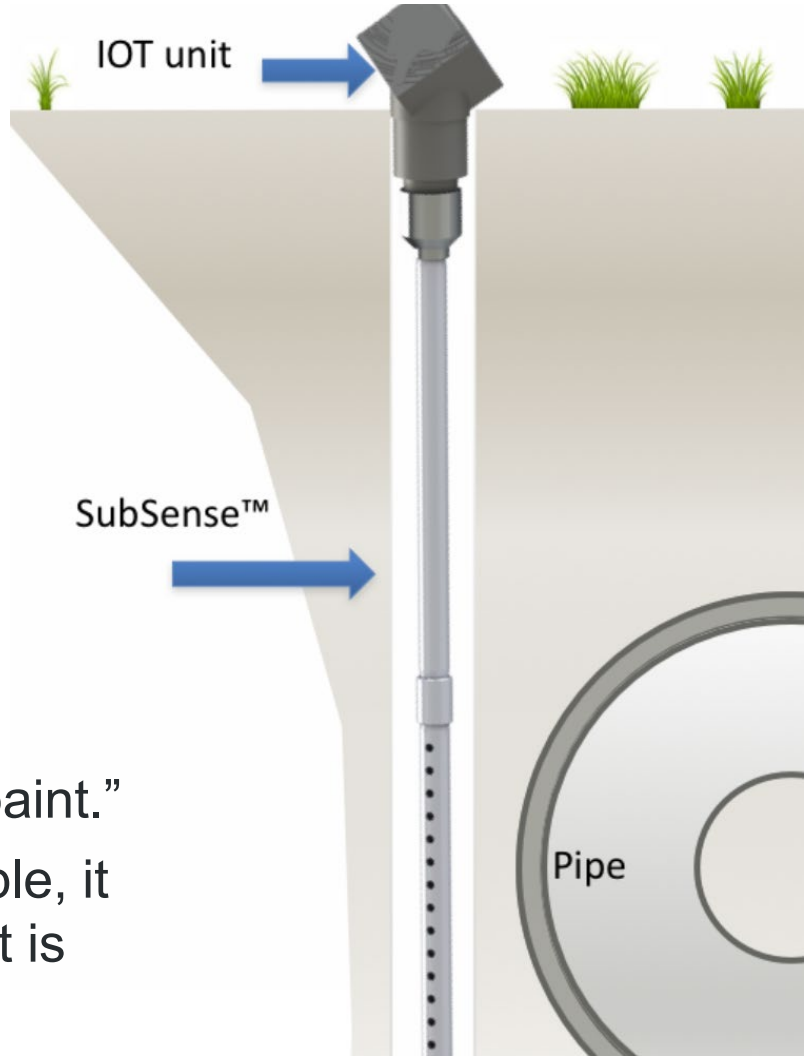
Three Selected

Selected for 2019 Contracting

Satelytics	Phase II of current work
INSITU	BVLOS-focused drone-based leak detection
DIRECT-C	Nanotechnology "paint" for leak detection

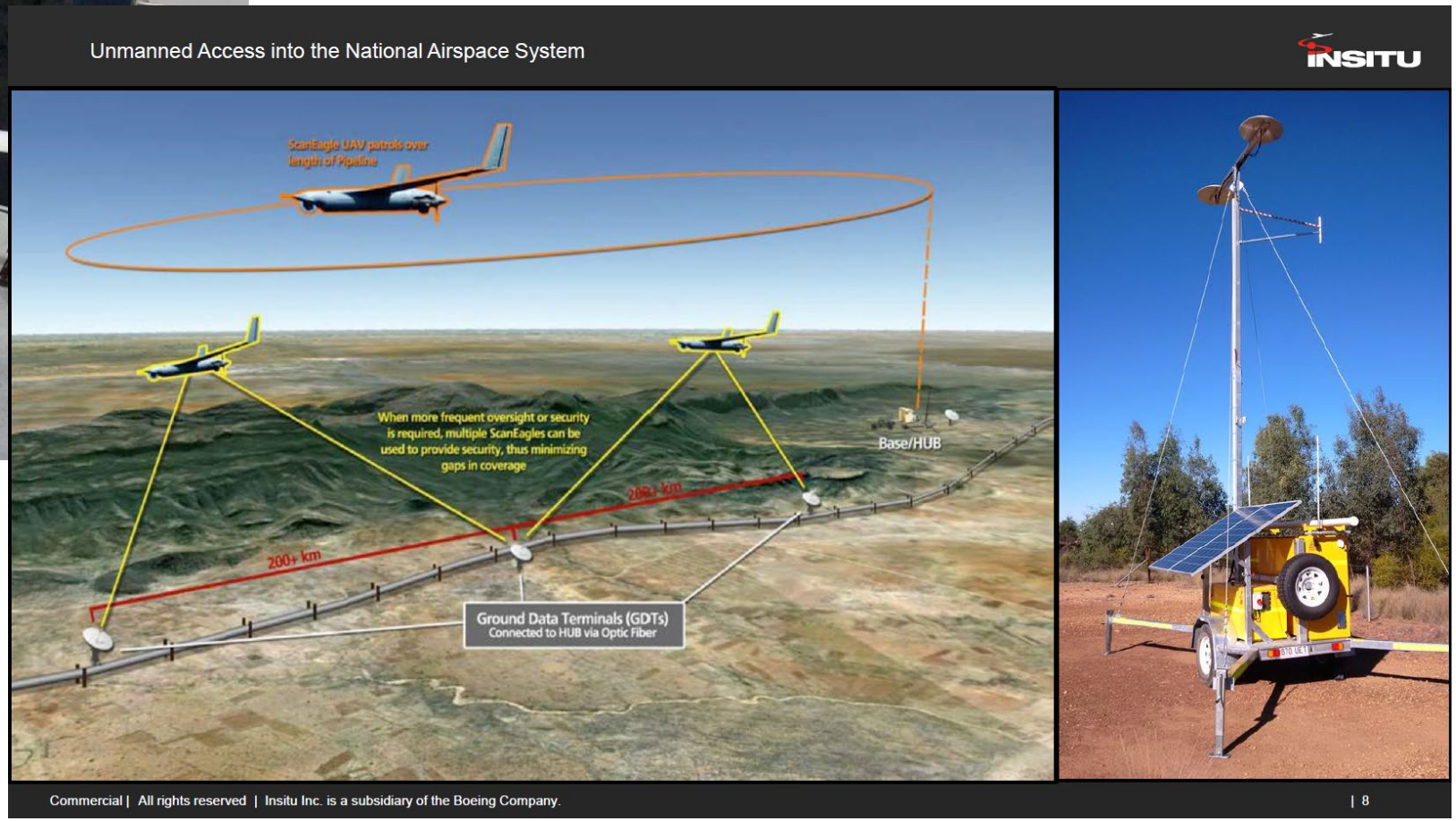
Direct-C





- Uses polymers mixed with nanoparticles to create an “intelligent paint.”
- When applied to a PCB board, flexible substrate, or fiber optic cable, it creates a sensor to indicate presence of different fluids for which it is tuned (hydrocarbons or brine).

Insitu


Unmanned Access into the National Airspace System
INSITU
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
Base/HUB
200+ km
200+ km
Ground Data Terminals (GDTs)
Connected to HUB via Optic Fiber
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http://www.ipipepartnership.com

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