



INTELLIGENT PIPELINE INTEGRITY PROGRAM

Western Dakota Energy Association Annual Meeting

New Town, ND

November 7, 2018

Brent Lohnes

General Manager, Hess Corporation

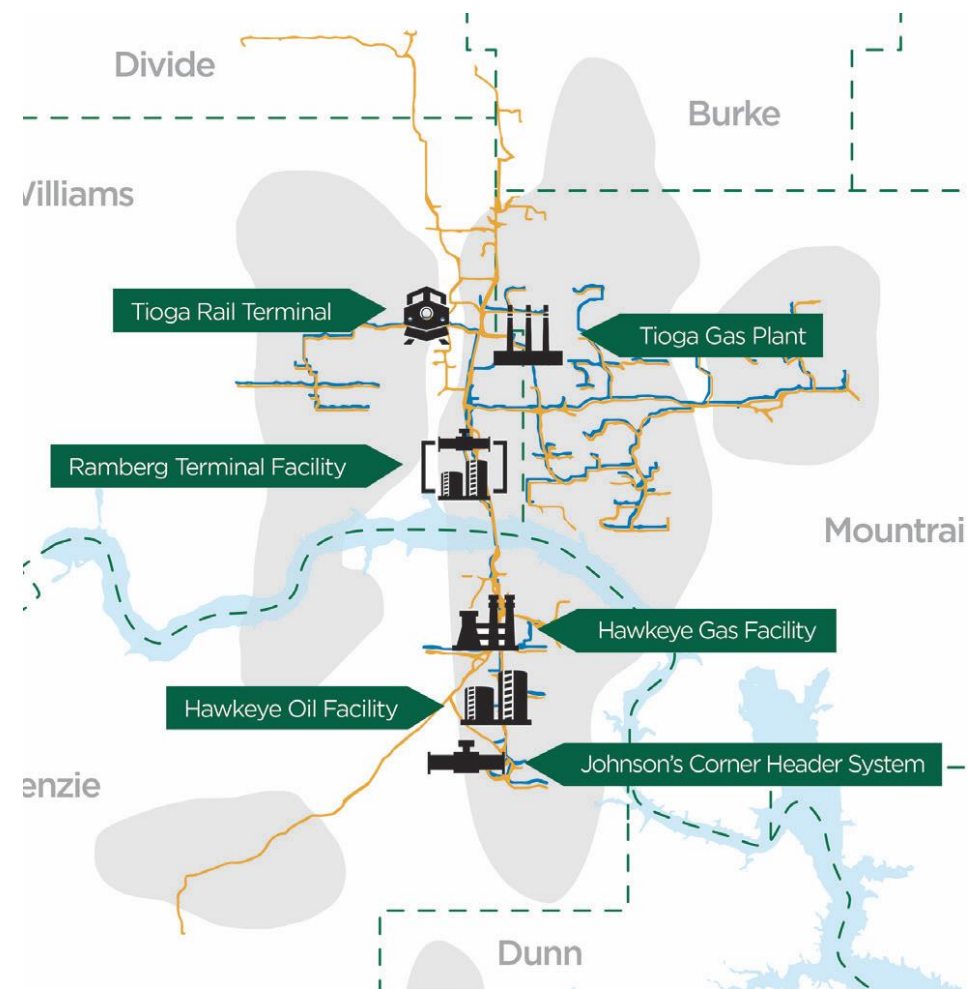
Critical Challenges.

Practical Solutions.

HESS CORPORATION

- Hess drilled the first well in 1951
- Average Bakken working interest: ~75%
- 554,000 net acres
- Net EUR: ~2.0 BBOE
- ~1.7 BBOE yet to produce
- ~2,900 future operated drilling locations
- Hess second largest producer in ND

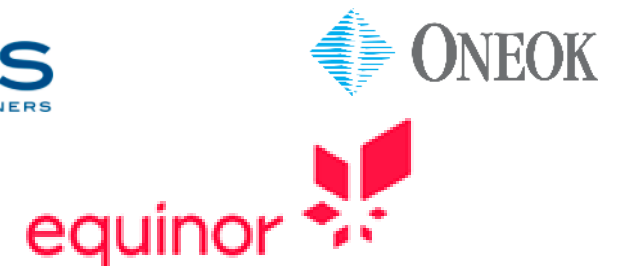
NORTH DAKOTA BAKKEN FOOTPRINT



OVERVIEW



- Governor Burgum's challenge to industry
- Partnership: Industry and North Dakota Industrial Commission
- iPIPE mission: Advance emerging technologies to prevent pipeline releases
- Unique collaboration between pipeline operators and technology providers
- Multiyear commitment required to ensure momentum and continuity
- \$4M investment over 3 years by Industry and state of North Dakota
 - 8 companies and the North Dakota Industrial Commission



SELECTING TECHNOLOGY












- EERC coordinates technology selection:
 - Technology providers pitch solutions to executive committee
 - 30-minute presentations
 - Overview, cost model, demonstration schedule, expected outcome
- Executive committee:
 - Seven-seat committee with rotating seats to ensure all industry members have a voice
 - Executive committee oversees EERC
 - EERC serves in advisory role as independent third-party research and development lead
 - Meets annually to select next demonstrations

2018 TECHNOLOGY PROPOSALS



- May 2018 technologies

	DETECTION: Opportunistic data collection + AI
	DETECTION: UAV + advanced analytics + BVLOS
  	DETECTION: UAV + AI + novel sensor suite
	DETECTION/PREVENTION: Golf ball-sized free-floating sensor
	DETECTION: AI + multiple sensors
	DETECTION/PREVENTION: Fiber optic leak and land movement detection
	DETECTION: Noncontact, Internet of Things monitoring of pipelines

- October 2018 technology presentations: 9 proposals

SATELYTICS - OPPORTUNISTIC DATA



Leveraging Big Data:

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

Leveraging Technology



Satellites



Nano-satellites



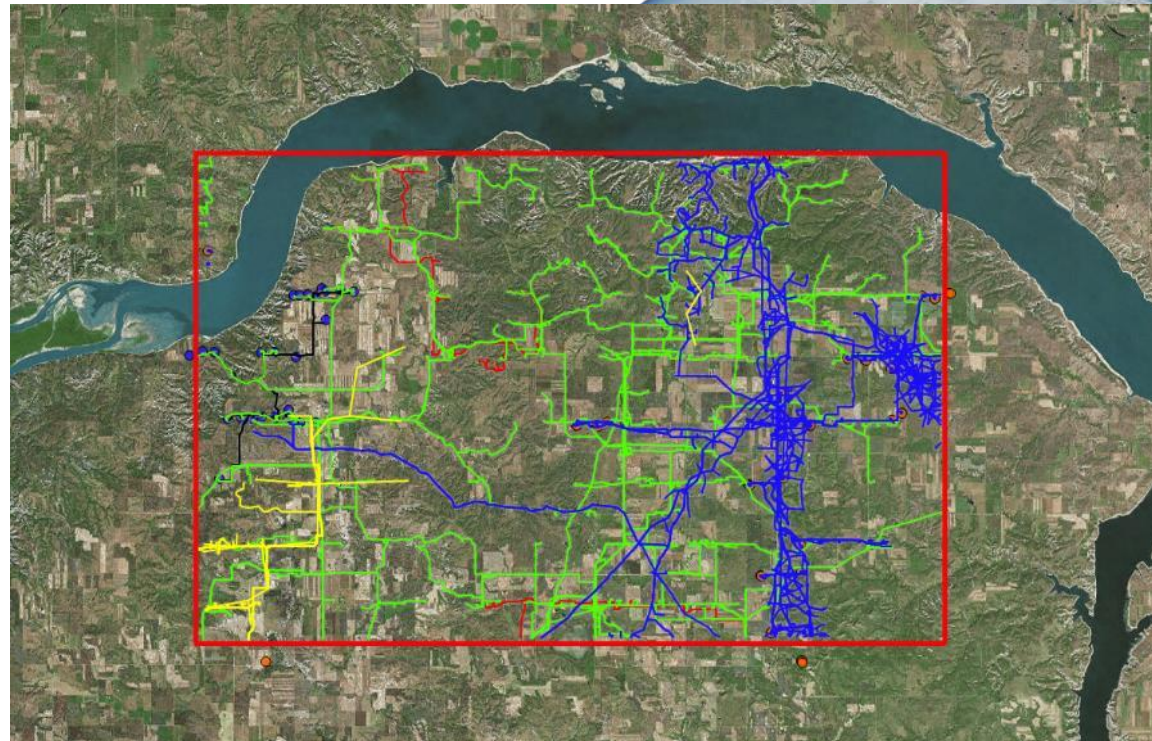
Aircraft



Drone/UAV



Fixed/Persistent Platform



INGU SOLUTIONS – PIPELINE SENSOR

“Golf Ball” Pipeline Sensor

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



Pipers™: Control in the palm of your hand

- Deploy when needed
- in all pipelines
- no downtime

- Detect leaks
- Locate deposits
- Determine isometry

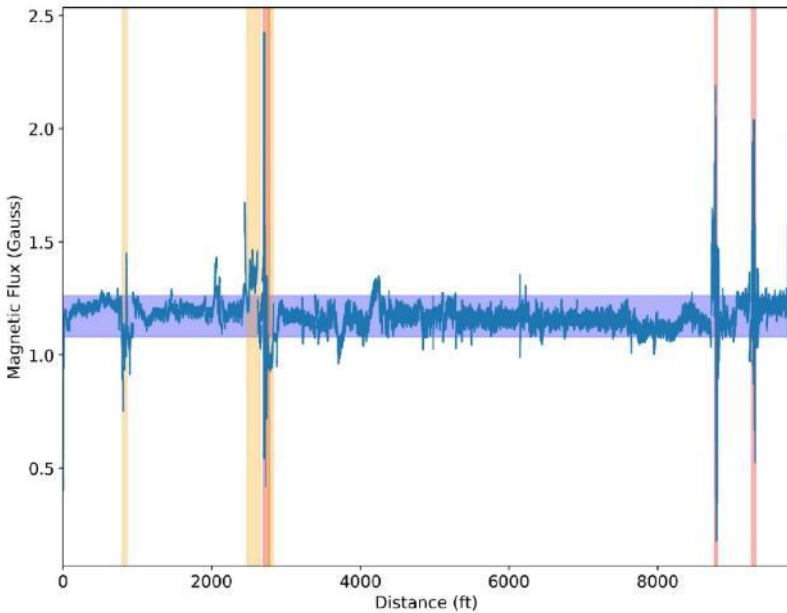


INGU SOLUTIONS – FIELD TEST KEY RESULTS



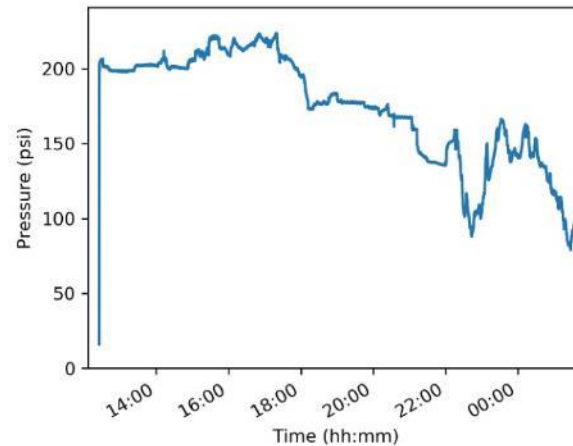
Pipers sensing suite

- Gyroscope
- Acoustics
- Residual magnetization
- Pressure



Residual magnetization:

- Directional orientation of pipeline
- Pipeline hardware locations
- Changes in wall condition

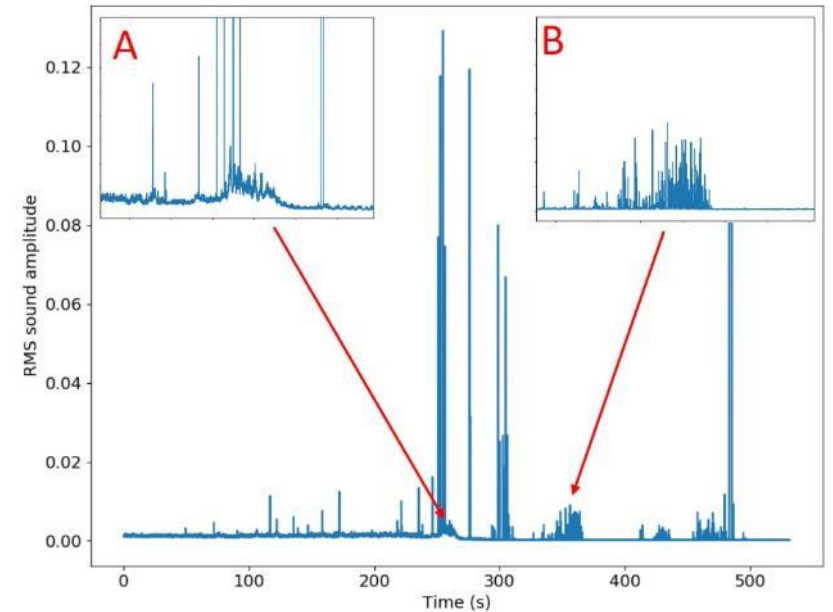


Pressure:

- Obstructions
- Flow variance
- Change detection

A) Flow noise at tee

B) Turbulent zone caused Piper to bounce off wall



Acoustic:

- Leak “whistling”
- Deposits
- Pipeline hardware locations



DEMONSTRATIONS TIMELINES



Satelytics

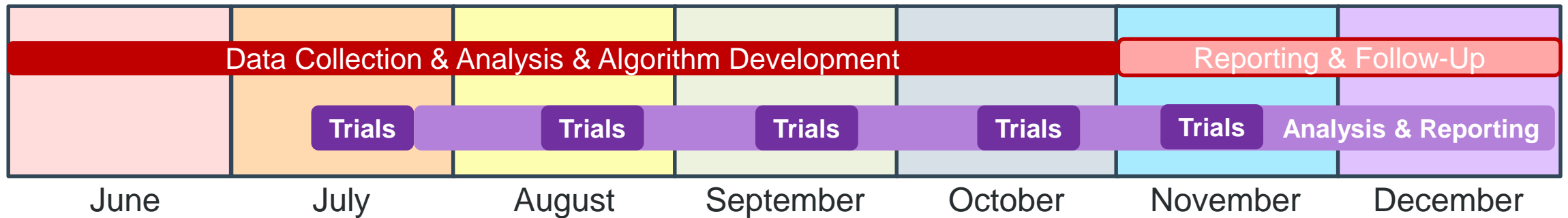


- Weekly satellite data gathering of a 1000 mi² area south of Lake Sakakawea
- Algorithms process data to provide alerts
- Utilizes Artificial Intelligence to improve analysis

Ingu Solutions



- 15 tests conducted with multiple operators
- Various pipeline diameters, materials & fluids
- With & without pig launcher & receivers



All demonstrations performed on operating pipelines volunteered by iPIPE members

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An Industry-Led Program to Advance Emerging Technologies to Provide Additional Tools for Pipeline Leak Prevention and Pipeline Leak Detection