



October 27, 2023

Mr. Reice Haase  
Deputy Executive Director  
North Dakota Industrial Commission  
600 East Boulevard Avenue, Department 405  
State Capitol, 14th Floor  
Bismarck, ND 58505-0840

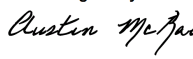
Dear Mr. Haase:

Subject: Quarterly Progress Report Entitled “iPIPE – intelligent Pipeline Integrity Program”  
Contract No. G-046-88; UND Project – Fund 43500-UND0022445  
EERC Funds 23121 and 26743

Attached is the quarterly progress report on the subject project for the period of July 1, 2023 – September 30, 2023.

If you have any questions, please contact me by phone at (701) 777-5402 or by email at [amcrae@undeerc.org](mailto:amcrae@undeerc.org).

Sincerely,

DocuSigned by:  
  
2CF0ADB88C44D7...

T. Austin McRae  
Research Engineer  
Integrated Petroleum Systems

TAM/rlo

Attachment

c: Brent Brannan, North Dakota Industrial Commission  
Karen Tyler, North Dakota Industrial Commission



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# IPIPE – INTELLIGENT PIPELINE INTEGRITY PROGRAM

Quarterly Progress Report

*(for the period of July 1, 2023 – September 30, 2023)*

*Prepared for:*

Reice Haase

North Dakota Industrial Commission  
600 East Boulevard Avenue, Department 405  
State Capitol, 14th Floor  
Bismarck, ND 58505-0840

Contract No. G-046-88

*Prepared by:*

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October 2023

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## TABLE OF CONTENTS

|  |            |
|--|------------|
| LIST OF FIGURES .....                        | i          |
| LIST OF TABLES .....                         | i          |
| EXECUTIVE SUMMARY .....                      | ii         |
| BACKGROUND .....                             | 1          |
| ACCOMPLISHMENTS DURING REPORTING PERIOD..... | 2          |
| MEMBERSHIP AND FINANCIAL INFORMATION .....   | 3          |
| FUTURE ACTIVITIES .....                      | 5          |
| PARTIAL LISTING OF iPIPE MEDIA MENTIONS..... | Appendix A |

### LIST OF FIGURES

|                          |   |
|--------------------------|---|
| 1 Project progress ..... | 4 |
|--------------------------|---|

### LIST OF TABLES

|   |   |
|---|---|
| 1 iPIPE Original Budget.....                      | 3 |
| 2 iPIPE Updated Budget .....                      | 3 |
| 3 iPIPE Expected Budget and Expenses to Date..... | 4 |

**iPIPE – INTELLIGENT PIPELINE INTEGRITY PROGRAM**  
**Quarterly Progress Report**  
**July 1, 2023 – September 30, 2023**

**EXECUTIVE SUMMARY**

This document is a quarterly report for activity conducted by the intelligent Pipeline Integrity Program (iPIPE), led by the Energy & Environmental Research Center, for the North Dakota Industrial Commission Oil and Gas Research Program. The goal of iPIPE is to develop and demonstrate cutting-edge technology that can prevent and/or detect pipeline leaks.

Activity in Quarter 3 2023 focused on one remaining effort:

- Dedicated Space-Based Hyperspectral Imaging – Orbital Sidekick (OSK) is a company that is providing unmatched resolution for hyperspectral imaging from space to identify hydrocarbons such as methane. iPIPE supported OSK in the first launch of OSK’s Aurora satellite via SpaceX rideshare in 2021. The learnings from the Aurora program are being applied to OSK’s Global Hyperspectral Observation Satellite (GHOST) constellation, with successful launches in April and June 2023. The program is a vertical integration of satellite technology to align with industry metrics.

**iPIPE – INTELLIGENT PIPELINE INTEGRITY PROGRAM**  
**Quarterly Progress Report**  
**July 1, 2023 – September 30, 2023**

**BACKGROUND**

During a May 2017 meeting with North Dakota pipeline operators, Governor Doug Burgum challenged industry to apply advanced technologies to eliminate pipeline leaks in North Dakota. In response to the Governor’s challenge, industry chose a proactive path and engaged in a 3½-year program, led by the Energy & Environmental Research Center (EERC), to advance development and application of emerging technologies to prevent and detect pipeline leaks. The intelligent Pipeline Integrity Program (iPIPE) intends to assist in the development of multiple emerging technologies to prevent and detect pipeline leaks by engaging with technology providers to refine not-yet-commercial products specifically for buried gathering pipelines in North Dakota and then demonstrate technology application on working gathering pipelines.

The goal of this project is to develop and demonstrate cutting-edge technology that can prevent and/or detect gathering pipeline leaks. This goal is supported by accomplishment of the following objectives:

- Select the most promising emerging (near-commercial) technologies for demonstration.
- Assist technology providers in refinement of their products.
- Demonstrate multiple technologies on working gathering pipelines.
- Document results of technology demonstrations.
- Facilitate adoption of technologies into North Dakota pipeline operations.

Multiple demonstrations of emerging technologies on working pipelines will simultaneously assist technology providers in refining designs, pave a path toward full commercialization in the North Dakota market and beyond, prepare pipeline operators for adoption of the new tools, and improve the performance and economics of gathering pipeline operations in North Dakota and beyond. With demonstrated success, additional consortium members (pipeline operators) will join the effort, thus enabling field testing of more technologies and further proliferating new technology among all pipeline operators.

Members of the industry-led consortium during Quarter (Q) 3 2023 included Enbridge, Energy Transfer Partners, Equinor, Goodnight Midstream, Hess Corporation, Marathon Petroleum Logistics (MPLx), ONEOK, Phillips 66, and TC Energy.

The following summarizes program activities from July 1, 2023, through September 30, 2023.

## ACCOMPLISHMENTS DURING REPORTING PERIOD

- Program-level activities
  - Program management
    - ◆ EERC staff, including members of the project team, participated in a multiday event during the week of August 7–11. This in-person-only event occurred at the EERC facility in Grand Forks, North Dakota, and comprised training on EERC functions related to research management and execution, team meetings, and team building.
  - Program meetings
    - ◆ On July 21, August 18, and September 15, 2023, iPIPE held monthly member meetings to update all members on program status. The goal of these meetings is to keep members apprised of a variety of program topics, including recruitment, finances, strategic direction, and technology development project status, and discuss and make decisions regarding the course of the iPIPE Program.
  - Member recruitment
    - ◆ Discussions continued with a number of companies regarding membership in the consortium. Some of these companies have approached the program regarding membership requirements and benefits, while others have been previously approached by the program and/or existing consortium members.
  - Program media mentions
    - ◆ Since inception, iPIPE has now been highlighted in more than 95 public multimedia and print articles. A partial listing of known media mentions is provided in Appendix A.
- Technology selection
  - The EERC continues to engage with companies from around the globe, offering emerging (not yet commercial) technologies as they discover or are directed to iPIPE. Additional technology providers will be sought through iPIPE 2.0 and future program iterations.
- Demonstration execution – Satelytics Phase IV
  - Satelytics has completed its analysis of land movement detection using a current stereo pair of images and stereo pairs-generated historical data.
  - The independent EERC evaluation report for this task has been drafted and is under internal review.
- Demonstration execution – Orbital Sidekick (OSK)
  - OSK has provided data proving commissioning of the first Global Hyperspectral Observation Satellite (GHOSat).
  - OSK and iPIPE continued to meet throughout the quarter to discuss progress and prepare for the start of regular data captures.
- Demonstration execution – Pipeline-Risk
  - Pipeline-Risk has delivered its final report, completed its construction of a risk-learning system for gathering lines, and demonstrated its abilities using member-provided data.
  - The independent EERC evaluation report is being drafted.

- Demonstration execution – TOKU
  - TOKU has completed its demonstration of pipeline-monitoring equipment, analysis of leak simulation data, and refinement of algorithms and has submitted its final report.
  - The independent EERC evaluation report for this task has been drafted and is under internal review.

## MEMBERSHIP AND FINANCIAL INFORMATION

The original budget proposed to the North Dakota Industrial Commission (NDIC) Oil and Gas Research Program (OGRP) totaled \$3,714,000, as shown in Table 1. To demonstrate additional resources provided by new members, additional financial commitment from NDIC, and significantly increased in-kind cost share provided by technology providers and program members, an updated budget is presented in Table 2. Table 2 demonstrates the rapid growth of this program. Table 3 presents greater detail on the expected budget and actual expenses incurred by the program to date.

**Table 1. iPIPE Original Budget**

| <b>Sponsors</b>                                  | <b>2018</b>      | <b>2019</b>      | <b>2020</b>      | <b>2021</b>      | <b>Total</b>       |
|--|------------------|------------------|------------------|------------------|--------------------|
| NDIC – Cash                                      | \$403,320        | \$405,226        | \$393,454        | \$398,000        | \$1,600,000        |
| Industry – Cash                                  | \$264,000        | \$450,000        | \$450,000        | \$450,000        | \$1,614,000        |
| Industry and<br>Technology Provider –<br>In-Kind | \$125,000        | \$125,000        | \$125,000        | \$125,000        | \$500,000          |
| <b>Total</b>                                     | <b>\$792,320</b> | <b>\$980,226</b> | <b>\$968,454</b> | <b>\$973,000</b> | <b>\$3,714,000</b> |

**Table 2. iPIPE Updated Budget**

| <b>Sponsors</b>                               | <b>2018</b>        | <b>2019</b>        | <b>2020</b>        | <b>2021</b>        | <b>Total</b>       |
|---|--------------------|--------------------|--------------------|--------------------|--------------------|
| NDIC – Cash                                   | \$565,909*         | \$735,730*         | \$438,772*         | \$859,589          | \$2,600,000        |
| Industry – Cash                               | \$352,000*         | \$700,000*         | \$850,000*         | \$675,000          | \$2,577,000        |
| Industry and Technology<br>Provider – In-Kind | \$525,878*         | \$1,074,077*       | \$949,051*         | \$500,000          | \$3,049,006        |
| <b>Total</b>                                  | <b>\$1,443,787</b> | <b>\$2,509,807</b> | <b>\$2,237,823</b> | <b>\$2,034,589</b> | <b>\$8,226,006</b> |

\* Reflects actuals for these years.

The program continues to solicit additional members to contribute to this program. As additional members join the program, Tables 2 and 3 will be updated to show the additional financial resources brought to the program.

Project progress, as represented by the project schedule presented in the original NDIC OGRP proposal, is shown in Figure 1.

**Table 3. iPIPE Expected Budget and Expenses to Date**

| Sponsors                       | Expected Budget     | Actual Expenses as of 9/30/23   | Balance Remaining of Expected Budget |
|--------------------------------|---------------------|---|--------------------------------------|
| NDIC Share – Cash              | \$2,600,000         | \$2,440,258   | \$159,742                            |
| Industry Share – Cash          | \$2,577,000         | \$2,431,712   | \$145,288                            |
| Industry – In-Kind             | \$375,000           | <i>Phillips 66</i> \$60,500<br><i>Enbridge</i> \$126,436<br><i>Energy Transfer</i> \$0<br><i>Equinor</i> \$153,230<br><i>Goodnight</i> \$37,135<br><i>Hess</i> \$228,093<br><i>MPLx</i> \$17,936<br><i>Oasis</i> \$40,069<br><i>ONEOK</i> \$5,000<br><i>TC Energy</i> \$0<br><i>Whiting</i> \$9,042<br><b>TOTAL</b> \$677,441 | \$0                                  |
| Technology Providers – In-Kind | \$3,076,597*        | <i>Satellytics</i> \$1,713,450<br><i>Direct-C</i> \$185,867<br><i>Ingu</i> \$88,266<br><i>Orbital Sidekick</i> \$1,321,061<br><i>TOKU</i> \$190,990<br><i>Pipeline-Risk</i> \$50,000<br><b>TOTAL</b> \$3,549,634  | \$0                                  |
| <b>Total</b>                   | <b>\$8,628,597*</b> | <b>\$9,099,046</b>  | <b>\$305,030**</b>                   |

\* Includes budget estimates from proposals for 2020 technology development projects and an estimate of anticipated 2021 in-kind from technology providers.

\*\* This amount does not include industry in-kind contributions provided in excess of the expected budget.

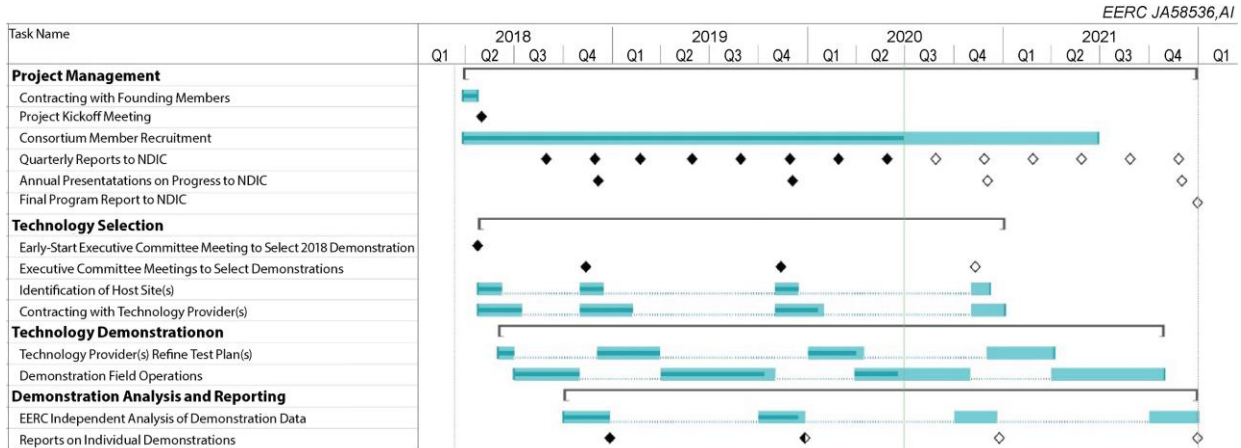


Figure 1. Project progress.

## **FUTURE ACTIVITIES**

The planned activities for the next quarter are detailed below:

- Program-level activities
  - The EERC will work with consortium members and stakeholders to continue iPIPE on its successful path beyond the original 2018–2021 timeline with iPIPE 2.0.
  - iPIPE will continue ongoing, and start new, discussions with potential program members.
- Technology selection
  - The EERC will remain engaged with and be on the lookout for providers of relevant, promising, emerging technology, with iPIPE continuing beyond its original 3½-year timeline into iPIPE 2.0 and future iterations.
- Demonstration execution – Satelytics Phase IV
  - The EERC will complete and distribute its independent review of this project. This will result in full project completion.
- Demonstration execution – OSK
  - OSK is expected to continue commissioning satellites into Q4 2023. The second commissioned satellite will enable the kickoff of regular data captures and analysis of iPIPE areas of interest (AOIs). Regular data captures are currently expected in December 2023.
  - GHOSSt 4 and 5 are now tentatively scheduled for launch in Q1 2024. GHOSSt 6 is scheduled for Q3 2024.
- Demonstration execution – Pipeline-Risk
  - The EERC will complete and distribute its independent review of this project. This will result in full project completion.
- Demonstration execution – TOKU
  - The EERC will complete and distribute its independent review of this project. This will result in full project completion.



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**APPENDIX A**

**PARTIAL LISTING OF iPIPE MEDIA MENTIONS**

# Partial List of Articles Highlighting iPIPE:

Updated April 1, 2023

| Title   | Date      | URL   |
|---|-----------|---|
| Industry Responds to Governor's Initiative to Improve Pipeline Technology; Program Funding Approved by North Dakota Industrial Commission   |           | <a href="https://www.ndoil.org/industry-responds-to-governors-initiative-to-improve-pipeline-technology-program-funding-approved-by-north-dakota-industrial-commission/">https://www.ndoil.org/industry-responds-to-governors-initiative-to-improve-pipeline-technology-program-funding-approved-by-north-dakota-industrial-commission/</a> |
| Satelytics Selected to Participate in the intelligent Pipeline Integrity Program (iPIPE)  | 5/18/2018 | <a href="https://mailchi.mp/satelytics/satelytics-chosen-to-participate-in-iPIPE-project?e=922473135e">https://mailchi.mp/satelytics/satelytics-chosen-to-participate-in-iPIPE-project?e=922473135e</a>   |
| ND Implements Intelligent Pipeline Project  | 5/22/2018 | <a href="http://northamericanshalemagazine.com/articles/2380/nd-implements-intelligent-pipeline-project">http://northamericanshalemagazine.com/articles/2380/nd-implements-intelligent-pipeline-project</a>   |
| North Dakota Governor Doug Burgum Provides Remarks This Morning at the Williston Basin Petroleum Conference in Bismarck, Thanks Hess and the Industry for Innovation Through iPIPE Program. | 5/23/2018 | <a href="https://twitter.com/HessCorporation/statuses/999315208261853185">https://twitter.com/HessCorporation/statuses/999315208261853185</a>   |
| North Dakota Pipeline Leak Detection Initiative Announced   | 5/25/2018 | <a href="https://extension.psu.edu/north-dakota-pipeline-leak-detection-initiative-announced">https://extension.psu.edu/north-dakota-pipeline-leak-detection-initiative-announced</a>   |
| New Consortium Sets Goal of Improving Pipelines   | 5/26/2018 | <a href="https://www.mrt.com/business/oil/article/New-consortium-sets-goal-of-improving-pipelines-12941971.php">https://www.mrt.com/business/oil/article/New-consortium-sets-goal-of-improving-pipelines-12941971.php</a>   |
| Industry Responds to Governor's Initiative to Improve Pipeline Technology; Program Funding Approved by North Dakota Industrial Commission   | 5/26/2018 | <a href="https://www.oilandgasonline.com/doc/industry-governors-initiative-pipeline-program-north-dakota-industrial-commission-0001">https://www.oilandgasonline.com/doc/industry-governors-initiative-pipeline-program-north-dakota-industrial-commission-0001</a>   |
| New Consortium Sets Goal of Improving Pipelines   | 5/27/2018 | <a href="https://www.timesunion.com/business/oil/article/New-consortium-sets-goal-of-improving-pipelines-12941971.php">https://www.timesunion.com/business/oil/article/New-consortium-sets-goal-of-improving-pipelines-12941971.php</a>   |
| Principal Engineer Jay Almlie Discusses the iPIPE Program on Energy Matters Radio   | 5/31/2018 | <a href="https://www.youtube.com/watch?v=ZQuwsK0z2aM">https://www.youtube.com/watch?v=ZQuwsK0z2aM</a>   |
| North Dakota Selects Ingu Solutions for Demonstration of Cutting-Edge Leak Detection and Prevention Technology for Oil and Gas Pipelines  | 5/31/2018 | <a href="https://ingu.co/iPIPE/">https://ingu.co/iPIPE/</a>   |
| Leak Detection Project Kicks Off This Summer  | 6/1/2018  | <a href="https://myemail.constantcontact.com/Here-are-the-week-s-top-North-Dakota-energy-stories-.html?soid=1102657032033&amp;aid=NpwT2Ynl17c">https://myemail.constantcontact.com/Here-are-the-week-s-top-North-Dakota-energy-stories-.html?soid=1102657032033&amp;aid=NpwT2Ynl17c</a>   |
| How a Canadian Solution to Detecting Pipeline Leaks Is Being Used in North Dakota   | 6/5/2018  | <a href="https://www.bnnbloomberg.ca/video/how-a-canadian-solution-to-detecting-pipeline-leaks-is-being-used-in-north-dakota~1410402">https://www.bnnbloomberg.ca/video/how-a-canadian-solution-to-detecting-pipeline-leaks-is-being-used-in-north-dakota~1410402</a>   |
| iPIPE Program Helps Solve Pipeline Leaks in ND  | 6/6/2018  | <a href="http://www.kfyrtv.com/content/news/iPIPE-Program-helps-solve-pipeline-leaks-in-ND--484747291.html">http://www.kfyrtv.com/content/news/iPIPE-Program-helps-solve-pipeline-leaks-in-ND--484747291.html</a>   |
| Startup Uses Small Sensors to Check North Dakota Oil Pipes  | 6/10/2018 | <a href="https://www.alvareviewcourier.com/story/2018/06/10/interesting-items/startup-uses-small-sensors-to-check-north-dakota-oil-pipes/37406.html">https://www.alvareviewcourier.com/story/2018/06/10/interesting-items/startup-uses-small-sensors-to-check-north-dakota-oil-pipes/37406.html</a>   |
| Sensors to Monitor Oil, Brine Gathering Lines Coming to ND  | 6/12/2018 | <a href="https://www.westfargopioneer.com/news/science-and-nature/4459638-sensors-monitor-oil-brine-gathering-lines-coming-nd">https://www.westfargopioneer.com/news/science-and-nature/4459638-sensors-monitor-oil-brine-gathering-lines-coming-nd</a>   |
| Pipe Sensors to Monitor Gathering Lines   | 6/12/2018 | <a href="https://bismarcktribune.com/business/local/pipe-sensors-to-monitor-gathering-lines/article_cd64586c-1d52-52df-83e6-b661d3b95f0a.html">https://bismarcktribune.com/business/local/pipe-sensors-to-monitor-gathering-lines/article_cd64586c-1d52-52df-83e6-b661d3b95f0a.html</a>   |
| Startup Uses Small Sensors to Check North Dakota Oil Pipes  | 6/21/2018 | <a href="https://www.apnews.com/9d65538034a24711a4a84d4e2bb38efe">https://www.apnews.com/9d65538034a24711a4a84d4e2bb38efe</a>   |
| Startup Uses Small Sensors to Check North Dakota Oil Pipes  | 6/21/2018 | <a href="https://www.usnews.com/news/best-states/north-dakota/articles/2018-06-21/startup-uses-small-sensors-to-check-north-dakota-oil-pipes">https://www.usnews.com/news/best-states/north-dakota/articles/2018-06-21/startup-uses-small-sensors-to-check-north-dakota-oil-pipes</a>   |
| Startup Uses Small Sensors to Check North Dakota Oil Pipes  | 6/21/2018 | <a href="https://m.washingtontimes.com/news/2018/jun/21/startup-uses-small-sensors-to-check-north-dakota-o/">https://m.washingtontimes.com/news/2018/jun/21/startup-uses-small-sensors-to-check-north-dakota-o/</a>   |
| iPIPE: Taking a Bite Out of Leaks   | 6/25/2018 | <a href="http://blogs.und.edu/und-today/2018/06/taking-a-bite-out-of-leaks/">http://blogs.und.edu/und-today/2018/06/taking-a-bite-out-of-leaks/</a>   |
| iPIPE: Taking a Bite Out of Leaks   | 6/29/2018 | <a href="http://www.northdakotaagconnection.com/story-state.php?id=688&amp;yr=2018">http://www.northdakotaagconnection.com/story-state.php?id=688&amp;yr=2018</a>   |
| Industry Demonstrates Commitment to Stopping Pipeline Leaks   | 7/17/2018 | <a href="http://northamericanshalemagazine.com/articles/2444/industry-demonstrates-commitment-to-stopping-pipeline-leaks">http://northamericanshalemagazine.com/articles/2444/industry-demonstrates-commitment-to-stopping-pipeline-leaks</a>   |
| Testing of New Pipeline Inspection Device Begins in Bakken  | 7/18/2018 | <a href="https://www.spe.org/en/ogf/ogf-article-detail/?art=4404">https://www.spe.org/en/ogf/ogf-article-detail/?art=4404</a>   |

| Title   | Date       | URL   |
|---|------------|---|
| Testing of New Pipeline Inspection Device Begins in Bakken (link not active)  | 7/18/2018  | <a href="https://www.spe.org/en/print-article/?art=4404">https://www.spe.org/en/print-article/?art=4404</a>   |
| 6 Companies Collaborating on Pipeline Leak Detection  | 8/15/2018  | <a href="https://www.willistonherald.com/news/companies-collaborating-on-pipeline-leak-detection/article_bbce3194-a098-11e8-8bac-1b765123019e.html">https://www.willistonherald.com/news/companies-collaborating-on-pipeline-leak-detection/article_bbce3194-a098-11e8-8bac-1b765123019e.html</a>   |
| More Skin in the Game: New Technology to Find, Fix Leaks  | 8/20/2018  | <a href="https://pgjonline.com/magazine/2018/august-2018-vol-245-no-8/features/more-skin-in-the-game-new-technology-to-find-fix-leaks">https://pgjonline.com/magazine/2018/august-2018-vol-245-no-8/features/more-skin-in-the-game-new-technology-to-find-fix-leaks</a>   |
| Burgum Highlights Oil Industry's Progress, Challenges at ND Petroleum Council's Annual Meeting in Fargo             | 9/25/2018  | <a href="https://www.governor.nd.gov/news/burgum-highlights-oil-industry%E2%80%99s-progress-challenges-nd-petroleum-council%E2%80%99s-annual-meeting">https://www.governor.nd.gov/news/burgum-highlights-oil-industry%E2%80%99s-progress-challenges-nd-petroleum-council%E2%80%99s-annual-meeting</a>   |
| Burgum Highlights Oil Industry's Progress, Challenges at ND Petroleum Council's Annual Meeting in Fargo             | 9/25/2018  | <a href="https://votesmart.org/public-statement/1287849/burgum-highlights-oil-industrys-progress-challenges-at-nd-petroleum-councils-annual-meeting-in-fargo#.XDz9tVxKjmE">https://votesmart.org/public-statement/1287849/burgum-highlights-oil-industrys-progress-challenges-at-nd-petroleum-councils-annual-meeting-in-fargo#.XDz9tVxKjmE</a> |
| The Digital Oilfield: How Digital Technologies Are Changing the Oil Industry in ND and Nationwide                   | 9/30/2018  | <a href="http://www.prairiebusinessmagazine.com/business/energy-and-mining/4506605-digital-oilfield-how-digital-technologies-are-changing-oil">http://www.prairiebusinessmagazine.com/business/energy-and-mining/4506605-digital-oilfield-how-digital-technologies-are-changing-oil</a>   |
| Progress for Partners Key to Energy & Environmental Research Center (link not active)                               |            | <a href="https://www.ndliving.com/content/progress-partners-key-energy-environmental-research-center">https://www.ndliving.com/content/progress-partners-key-energy-environmental-research-center</a>   |
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| 2018 State of the State Address   | 1/23/2019  | <a href="https://www.governor.nd.gov/events/2018-state-state-address">https://www.governor.nd.gov/events/2018-state-state-address</a>   |
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| The Crude Life Interview: Joe Dancy, Energy Expert & Educator   | 5/18/2019  | <a href="http://www.thecrudelife.com/podcast/the-crude-life-interview-joe-dancy-energy-expert-educator/">http://www.thecrudelife.com/podcast/the-crude-life-interview-joe-dancy-energy-expert-educator/</a>   |
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| iPIPE Program Assisting in Detection of Pipeline Leaks in the Pipeline & Gas Journal September Edition (Page 50–52) | 9/10/2019  | <a href="https://www.nxtbook.com/nxtbooks/gulfpub/pgj_201909/">https://www.nxtbook.com/nxtbooks/gulfpub/pgj_201909/</a>   |
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| Almlie and Helms: Where Innovation Leads, Regulation Follows  | 10/18/19   | <a href="https://trib.com/opinion/columns/almlie-and-helms-where-innovation-leads-regulation-follows/article_ee198ef8-05aa-599f-9df9-67bfd8492bc0.html">https://trib.com/opinion/columns/almlie-and-helms-where-innovation-leads-regulation-follows/article_ee198ef8-05aa-599f-9df9-67bfd8492bc0.html</a>                                       |
| Shared on Drilling Info's Social Media Site: Almlie, Helms: Innovation Leads, Regs Follow                           | 10/20/19   | <a href="https://www.grandforksherald.com/opinion/columns/4728897-Almlie-Helms-Innovation-leads-regs-follow">https://www.grandforksherald.com/opinion/columns/4728897-Almlie-Helms-Innovation-leads-regs-follow</a>   |
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| Bakken Backers Email: Almlie, Helms: Innovation Leads, Regs Follow  | 10/25/19   | <a href="https://www.grandforksherald.com/opinion/columns/4728897-Almlie-Helms-Innovation-leads-regs-follow">https://www.grandforksherald.com/opinion/columns/4728897-Almlie-Helms-Innovation-leads-regs-follow</a>   |

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| Previewing the PSC’s DAPL 2.0 Expansion Hearing   | 11/11/2019 | <a href="https://www.am1100theflag.com/news/12320-previewing-psc%E2%80%99s-dapl-20-expansion-hearing">https://www.am1100theflag.com/news/12320-previewing-psc%E2%80%99s-dapl-20-expansion-hearing</a>   |
| Oasis Petroleum’s Jared Iverson Talks about the Next 20 years in the Bakken                                 | 12/4/2019  | <a href="https://www.willistonherald.com/news/oil_and_energy/oasis-petroleum-s-jared-iverson-talks-about-the-next-years/article_2368a346-16f1-11ea-81ad-d3443353be3e.html">https://www.willistonherald.com/news/oil_and_energy/oasis-petroleum-s-jared-iverson-talks-about-the-next-years/article_2368a346-16f1-11ea-81ad-d3443353be3e.html</a>   |
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| iPIPE Looks to Enhance Pipeline Safety  | 12/17/2019 | <a href="https://www.kfyrtv.com/content/news/iPipe-looks-to-enhance-pipeline-safety-566298741.html">https://www.kfyrtv.com/content/news/iPipe-looks-to-enhance-pipeline-safety-566298741.html</a>   |
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| Podcast: iPIPE with Jay Almlie — Real Technology, Real Pipelines, Real Progress                             | 1/7/2020   | <a href="https://pipelinerspodcast.com/episode-109-iPIPE-jay-almлие/">https://pipelinerspodcast.com/episode-109-iPIPE-jay-almлие/</a>   |
| iPIPE Welcomes New Consortium Member  | 1/10/2020  | <a href="https://mailchi.mp/undeerc/news-release-iPIPE-receives-chairmans-stewardship-award-585605">https://mailchi.mp/undeerc/news-release-iPIPE-receives-chairmans-stewardship-award-585605</a>   |
| DAPL Owner Joining North Dakota’s iPIPE Consortium to Help Advance Leak Detection Technology                | 1/13/2020  | <a href="https://www.willistonherald.com/news/regional/dapl-owner-joining-north-dakota-s-iPIPE-consortium-to-help/article_ab8d13a8-3652-11ea-9117-ef358444f87f.html">https://www.willistonherald.com/news/regional/dapl-owner-joining-north-dakota-s-iPIPE-consortium-to-help/article_ab8d13a8-3652-11ea-9117-ef358444f87f.html</a>   |
| Energy Transfer Joins Pipeline Spill Consortium   | 1/14/2020  | <a href="https://bismarcktribune.com/bakken/energy-transfer-joins-pipeline-spill-consortium/article_5f983ae5-109c-596e-a254-f09974b1f8c1.html">https://bismarcktribune.com/bakken/energy-transfer-joins-pipeline-spill-consortium/article_5f983ae5-109c-596e-a254-f09974b1f8c1.html</a>   |
| iPIPE Welcomes New Consortium Member: Dakota Access Pipeline  | 1/16/2020  | <a href="http://undeerc.blogspot.com/2020/01/iPIPE-partnership-welcomes-new-member.html">http://undeerc.blogspot.com/2020/01/iPIPE-partnership-welcomes-new-member.html</a>   |
| TC Energy Will Join North Dakota’s iPIPE Consortium to Help Advance Leak Detection                          | 1/16/2020  | <a href="https://www.willistonherald.com/news/oil_and_energy/tc-energy-will-join-north-dakota-s-iPIPE-consortium-to/article_2a52fa3e-38b7-11ea-aca2-23bf860113c.html">https://www.willistonherald.com/news/oil_and_energy/tc-energy-will-join-north-dakota-s-iPIPE-consortium-to/article_2a52fa3e-38b7-11ea-aca2-23bf860113c.html</a>   |
| iPIPE Partnership Welcomes New Member: TC Energy  | 1/16/2020  | <a href="http://undeerc.blogspot.com/2020/01/iPIPE-partnership-welcomes-new-member.html">http://undeerc.blogspot.com/2020/01/iPIPE-partnership-welcomes-new-member.html</a>   |
| Podcast: iPIPE — Inside the Tech Pitch with Jay Almlie  | 1/21/2020  | <a href="https://pipelinerspodcast.com/episode-111-iPIPE-tech-pitch-jay-almлие/">https://pipelinerspodcast.com/episode-111-iPIPE-tech-pitch-jay-almлие/</a>   |
| Enbridge Joins Consortium Evaluating Next-Generation Technology in the Pipeline Industry                    | 1/27/2020  | <a href="https://www.enbridge.com/stories/2020/january/iPIPE-consortium-evaluating-next-generation-pipeline-technology">https://www.enbridge.com/stories/2020/january/iPIPE-consortium-evaluating-next-generation-pipeline-technology</a>   |
| Monique Roberts LinkedIn Post   | 1/29/2020  | <a href="https://www.linkedin.com/posts/monique-roberts-81a84527_pipelinesafety-iPIPE-pipelineintegrity-activity-6628411257315741697-cUBx/">https://www.linkedin.com/posts/monique-roberts-81a84527_pipelinesafety-iPIPE-pipelineintegrity-activity-6628411257315741697-cUBx/</a>   |
| iPIPE Mentioned in 2019 State of the State Address  | 1/29/2020  | <a href="https://www.youtube.com/watch?v=5vllkqT6DaE">https://www.youtube.com/watch?v=5vllkqT6DaE</a><br>Link to 1:02 time: <a href="https://youtu.be/5vllkqT6DaE?t=3731">https://youtu.be/5vllkqT6DaE?t=3731</a>   |
| Bakken Oil, Gas to Energize North Dakota’s Global Impact, Governor Says                                     | 2/3/2020   | <a href="https://www.naturalgasintel.com/articles/120930-bakken-oil-gas-to-energize-north-dakotas-global-impact-governor-says">https://www.naturalgasintel.com/articles/120930-bakken-oil-gas-to-energize-north-dakotas-global-impact-governor-says</a>   |
| iPIPE with Jay Almlie on the Pipeliners Podcast: Episode 111  | 2/4/2020   | <a href="https://pipelinerspodcast.com/episode-113-iPIPE-operators-perspective-brian-epperson-greg-tilley/">https://pipelinerspodcast.com/episode-113-iPIPE-operators-perspective-brian-epperson-greg-tilley/</a>   |
| iPIPE on Energy Matters Radio (beginning at 9:15)   | 2/15/2020  | <a href="https://www.am1100theflag.com/news/14840-2-15-20-energy-matters-hour-1#volume">https://www.am1100theflag.com/news/14840-2-15-20-energy-matters-hour-1#volume</a>   |
| iPIPE on the Pipeliners Podcast: Episode 115  | 2/18/2020  | <a href="https://pipelinerspodcast.com/episode-115-iPIPE-vendor-perspective-john-van-pol-sean-donegan/">https://pipelinerspodcast.com/episode-115-iPIPE-vendor-perspective-john-van-pol-sean-donegan/</a>   |
| On the Path to Zero Pipeline Spills   | 2/27/2020  | <a href="http://blogs.und.edu/und-today/2020/02/on-the-path-to-zero-pipeline-spills/">http://blogs.und.edu/und-today/2020/02/on-the-path-to-zero-pipeline-spills/</a>   |
| iPIPE with Jay Almlie on the Pipeliners Podcast: Episode 117  | 3/2/2020   | <a href="https://pipelinerspodcast.com/episode-117-iPIPE-high-tide-floats-all-boats-jay-almлие/">https://pipelinerspodcast.com/episode-117-iPIPE-high-tide-floats-all-boats-jay-almлие/</a>   |
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| UND Today: Engineering Students Team Up with Industry   | 4/2/2020   | <a href="http://blogs.und.edu/und-today/2020/04/engineering-students-team-up-with-industry/">http://blogs.und.edu/und-today/2020/04/engineering-students-team-up-with-industry/</a>   |
| iPIPE Selects Orbital Sidekick as Partner for Pipeline Monitoring Project   | 11/19/2020 | <a href="https://www.prnewswire.com/news-releases/ipipe-selects-orbital-sidekick-as-partner-for-pipeline-monitoring-project-301177019.html">https://www.prnewswire.com/news-releases/ipipe-selects-orbital-sidekick-as-partner-for-pipeline-monitoring-project-301177019.html</a>   |
| Orbital Sidekick Secures \$16 Million Series A to Commercialize Hyperspectral Satellite Monitoring Solutions for Energy and Defense Sectors | 4/13/2021  | <a href="https://www.prnewswire.com/news-releases/orbital-sidekick-secures-16-million-series-a-to-commercialize-hyperspectral-satellite-monitoring-solutions-for-energy-and-defense-sectors-301267276.html">https://www.prnewswire.com/news-releases/orbital-sidekick-secures-16-million-series-a-to-commercialize-hyperspectral-satellite-monitoring-solutions-for-energy-and-defense-sectors-301267276.html</a>   |
| Smart Pipelines? (iPIPE) Incentivizes Private Industry to Create Smarter & Safer Pipelines  | 5/17/2021  | <a href="https://www.kxnet.com/news/smart-pipelines-ipipe-incentivizes-private-industry-to-create-smarter-safer-pipelines/">https://www.kxnet.com/news/smart-pipelines-ipipe-incentivizes-private-industry-to-create-smarter-safer-pipelines/</a>   |
| Orbital Sidekick to Launch Hyperspectral Satellite for Oil, Gas, Mine Monitoring  | 6/15/2021  | <a href="https://investableuniverse.com/2021/06/15/orbital-sidekick-hyperspectral-imaging-oil-gas-mining-defense/">https://investableuniverse.com/2021/06/15/orbital-sidekick-hyperspectral-imaging-oil-gas-mining-defense/</a>   |
| Hyperspectral Imaging Satellite, Currently Being Evaluated by iPIPE Consortium, Will Be Aboard SpaceX Flight                                | 6/30/2021  | <a href="https://www.enbridge.com/stories/2021/june/hyperspectral-imaging-satellite-latest-pipeline-monitoring-technology-officially-out-of-this-world">https://www.enbridge.com/stories/2021/june/hyperspectral-imaging-satellite-latest-pipeline-monitoring-technology-officially-out-of-this-world</a>   |
| Latest Pipeline Monitoring Technology Is Officially Out of This World   | 6/30/2021  | <a href="https://www.csrwire.com/press_releases/725086-latest-pipeline-monitoring-technology-officially-out-world">https://www.csrwire.com/press_releases/725086-latest-pipeline-monitoring-technology-officially-out-world</a>   |
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| iPIPE Launches into Space   | 7/6/2021   | <a href="https://blog.undeerc.org/2021/07/06/ipipe-launches-into-space/">https://blog.undeerc.org/2021/07/06/ipipe-launches-into-space/</a>   |
| iPIPE to Get Images from Space Satellite to Aid Leak Detection Effort   | 7/9/2021   | <a href="https://www.ndenergy.org/Newsletter/Fireworks-Festival/State-Sues-Biden-Over-Lease-Ban">https://www.ndenergy.org/Newsletter/Fireworks-Festival/State-Sues-Biden-Over-Lease-Ban</a>   |
| North Dakota's iPIPE Goes to Space!   | 7/13/2021  | <a href="https://www.kxnet.com/news/state-news/north-dakotas-ipipe-goes-to-space/">https://www.kxnet.com/news/state-news/north-dakotas-ipipe-goes-to-space/</a>   |
| SpaceX Launch Carried an Innovative Piece of the Bakken into Outer Space  | 8/4/2021   | <a href="https://www.willistonherald.com/news/oil_and_energy/spacex9-launch-carried-an-innovative-piece-of-the-bakken-into-outer-space/article_65a3ca42-f539-11eb-9257-636de96ec0bd.html">https://www.willistonherald.com/news/oil_and_energy/spacex9-launch-carried-an-innovative-piece-of-the-bakken-into-outer-space/article_65a3ca42-f539-11eb-9257-636de96ec0bd.html</a>   |
| iPIPE Helps Develop New Technology Using Artificial Intelligence  | 11/21/2021 | <a href="https://blog.undeerc.org/2021/11/18/ipipe-helps-develop-new-technology-using-artificial-intelligence/">https://blog.undeerc.org/2021/11/18/ipipe-helps-develop-new-technology-using-artificial-intelligence/</a>   |
| iPIPE Receives OGRP Funding   | 6/22/2022  | <a href="https://blog.undeerc.org/2022/06/22/ipipe-receives-ogrp-funding/">https://blog.undeerc.org/2022/06/22/ipipe-receives-ogrp-funding/</a>   |
| Orbital Sidekick Selected as Partner for Intelligent Pipeline Integrity Program (iPIPE)   | 10/6/2022  | <a href="https://www.prnewswire.com/news-releases/orbital-sidekick-selected-as-partner-for-intelligent-pipeline-integrity-program-ipipe-301642433.html?tc=eml_cleartime">https://www.prnewswire.com/news-releases/orbital-sidekick-selected-as-partner-for-intelligent-pipeline-integrity-program-ipipe-301642433.html?tc=eml_cleartime</a>   |